

Biblioteka Główna i OINT
Politechniki Wrocławskiej



100100319238

Копи. Копи
18. II. 13

A 610 II
m







Nature,
Dec. 12, 1911.]

Nature

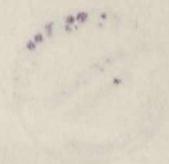
ILLUSTRATED JOURNAL OF SCIENCE

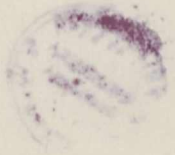


Nature

A WEEKLY

ILLUSTRATED JOURNAL OF SCIENCE





Nature



ILLUSTRATED BY SCIENCE

Nature,
Dec. 12, 1901.]

Nature

A WEEKLY

ILLUSTRATED JOURNAL OF SCIENCE

VOLUME LXIV

MAY to OCTOBER 1901



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

1912, 1942.

London

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



Nature,
Dec. 12, 1901

Nature

A WEEKLY

ILLUSTRATED JOURNAL OF SCIENCE



VOLUME LXIV

RICHARD CLAY AND SONS, LIMITED,
LONDON AND BUNGAY.



Of Nature found in most public libraries for sale - Wordsworth

MACMILLAN AND CO. LIMITED
NEW YORK: THE MACMILLAN COMPANY

INDEX

- ABBE Diffraction Theory of Microscope, Examination of the, J. W. Gordon, 320
- Abell (R. D.), the Condensation of Ethylphenylketone with Benzaldehyde, 175
- Aber Valley Colliery, Coal Dust Explosion at, 111
- Absinthe, Motor Car worked by, 213
- Abydos, the Earliest Inhabitants of, a Craniological Study, D. Randall-Maciver, 647
- Accidium berberidis*, Specimens of, J. Lewton Brain, 77
- Achard (M.), Influence of Feeding, Work and Dust on Tuberculosis, 71; Influence of variations of Temperatures on Tuberculosis, 644
- Ackroyd (W.), Origin of Combined Chlorine in Moorland Waters, 46; Computation of the Age of the Earth from the Amount of Salt in the Sea, 566; on the Inverse Ratio of Chlorine to Rainfall, 612
- Acoustics: the Song of Birds, Henri Coupin, 20, 62; the Musical Arc, W. Duddell, 58; the Subjective Lowering of Pitch, E. Hurten Harding, 103, 181; Prof. F. J. Allen, 182, 301; G. W. Hemming, 182; E. C. Sherwood, 233; Suggested Experiment, G. W. Hemming, 308; Nernst's Phonograph, 164; Ruhmer's Phonograph, 164; Monaural Localisation of Sound, Prof. J. R. Angell and Dr. W. Fite, 263; Behaviour of small closed Cylinders in Organ Pipes, B. Davis, 547; Interesting Phenomenon in connection with Theory of Sound, Bergen Davis, 554; Death of R. Koenig, 579; Obituary Notice of, 630
- Adams (E. P.), Electromagnetic Effects of moving Charged Spheres, 415
- Adams (John Couch), the Collected Scientific Papers of, 576
- Adaptation among the Deer, an instance of, R. Lydekker, F.R.S., 257
- Addresses of Authors of Scientific Papers, Prof. Sydney J. Hickson, F.R.S., 601
- Adulteration, the New Milk-Standard, 432; the Work of the Government Laboratory, Dr. T. E. Thorpe, 553
- Aeronautics, the International Balloon Ascent of April 19, 88; Hoffmann's Flying Machine, 112; the Balloon Ascents of May 14, 189; the Kress Flying Machine, 190; the Santos Dumont Airship, 286, 489; the Deutsch Prize won by M. Santos Dumont, 635; High Balloon Ascent by Drs. Pierson and Suering, 356; the William Beedle Airship, 489; "How to cross the Atlantic in a Balloon," Prof. S. A. King, 582; On the Exploration of the Upper Strata of the Atmosphere by means of Kites, A. Lawrence Rotch, 590; Recent International Balloon Ascents, 608
- Africa: the Climate of Pemba, T. Burtt, 20; a Report on German East Africa, A. C. Hollis, 67; Veterinary Work in British East Africa and Uganda Protectorates, R. J. Sturdy, 67; the difference between Memphis and Thebes Mummies, Mr. Harting, 70; Scientific Work in Egypt, 318; the Farafra Oasis, Egypt, H. J. L. Beadnell, 359; the Dakhla Oasis, Egypt, H. J. L. Beadnell, 581; Gold Mining in Egypt, C. J. Alford, 636; the Natives of South Africa, their Economic and Social Conditions, E. Sidney Hartland, 73; Prehistoric Implements in the Transvaal and Orange River Colony, Stanley B. Hutt, 103; South African Philosophical Society, 144; Medical and Surgical Experiences in the South African War, 346; New Mammals from Uganda, Oldfield Thomas, 142; West African Studies, Mary H. Kingsley, 231; Poison of Lotus Arabicus, W. R. Dunstan, F.R.S., and T. A. Henry, 367; Fauna of North-East Rhodesia, C. P. Chesnaye, 383; Carboniferous Goniatites in Sahara, M. Collot, 392; the Anti-Mosquito Campaign in Sierra Leone, 489, 579; Major R. Ross, F.R.S., 489; the West African Campaign against Malaria, Major Ronald Ross, 636; Simultaneity of Mosquitoes and Malaria at Constantine, A. Billet, 524; Magnetic and Meteorological Observations at Mauritius, 582; the Origin and Birthplace of the Proboscidea, Dr. C. W. Andrews, 582; Essays and Photographs, Some Birds of the Canary Islands and South Africa, H. E. Harris, 603; Chemical Analysis of Mummified Fishes of Ancient Egypt, MM. Lortet and Hugouenq, 668
- After-Images and Colour-Vision, Negative, Shelford Bidwell, F.R.S., 216
- Agitation of the Sea, Unusual, Hon. Rollo Russell, 6
- Agriculture: Agricultural Seeds, Dr. Maxwell T. Masters, F.R.S., 30; Agriculture in New South Wales, 106; Report of Royal Agricultural Society, 111; the Scientific Study of Commercial Crop Cultivation, R. H. Wallace, 164; Cultura del Frumento, 1899-1900, Prof. Italo Giglioli, 229; Wheat-growth favoured by Potassium Salts, H. Coupin, 248; the South-eastern Agricultural College at Wye, 283; Death and Obituary Notice of Miss Eleanor A. Ormerod, 308, 330; Yearbook of the United States Department of Agriculture, 1900, Prof. R. Warington, F.R.S., 372; Agricultural Experiments, 364; Agricultural Statistics of India, 407; the Colorado Potato Beetle, W. F. Kirby, 450; Relations between Climate and Crops, H. B. Wren, 493; Nature Teaching, Francis Watts, 550; on the Application of Geology to Agriculture by the Preparation of Soil Maps, J. R. Kilroe, 565
- Aims of the National Physical Laboratory, the Discourse delivered at the Royal Institution by Dr. R. T. Glazebrook, F.R.S., 290
- Alaska, the Cape Nome Gold Region, F. C. Schrader and A. H. Brooks, 409
- Alcock (Major), Instances of Commensalism, 190
- Alford (C. J.), Gold Mining in Egypt, 636
- Algebraic Potential Curves, Dr. E. Kasner, 221
- Algol Variables: Orbits of RR Puppis and V Puppis, 384; New Algol-Type Variable, 78 (1901) Cygni, 583; New Southern Algol Variable, 639
- Allbutt (Prof. T. Clifford, F.R.S.), Science and Mediaeval Thought, 76
- Allen (Prof. F. J.), the Subjective Lowering of Pitch, 182, 301
- Allen (H. S.), the Settlement of Solid Matter in Fresh and Salt Water, 279
- Allen (Dr. J. A.), the Wood Bison of Great Slave Lake, 135
- Alloys, Copper-tin, Results of Chilling, C. T. Heycock and F. H. Neville, 221
- Almy (J. E.), Discharge Current from Surface of large Curvature, 547
- Aluminium, on the Commercial Importance of, Prof. E. Wilson, 613; Aluminium and its Uses, 650
- Amalitzky (Prof. W.), Gigantic Permian Anomodonts at Sokolki, Russia, 239
- Amazon: Album de Aves Amazonicas, Dr. Emilio A. Goeldi, 397
- America: Von den Antillen zum Fernen Westen: Reiseskizzen

- eines Naturforschers, F. Doflein, 2; the Fishes of North and Middle America, a Descriptive Catalogue of the Species of Fish-like Vertebrates found in the Waters of North America, North of the Isthmus of Panama, David Starr Jordan and Barton Warren Evermann, 4; American Journal of Mathematics, 92, 295, 572; American Journal of Science, 92, 221, 365, 415, 547; Public Health in America, Mrs. Percy Frankland, 117; the Biology of Mount Shasta, 242; an American Introduction to Botany: Plant Studies, an Elementary Botany, John M. Coulter, 300; Stanford Compendium of Geography and Travel in Central and South America, A. H. Keane, Colonel George Earl Church, 353; American Agricultural Researches, Prof. R. Warington, F.R.S., 372; the Annual Report of the Bureau of American Ethnology, 425; Address at American Society of Civil Engineers: Progress of Civil Engineering, J. J. R. Cross, 438; the Denver Meeting of the American Association, Address by Prof. R. S. Woodward, President of the Association, 498; the Insect Book: a Popular Account of the Bees, Wasps, Ants, Grasshoppers, Flies and other North American Insects, exclusive of the Butterflies, Moths and Beetles, with full Life-histories, Tables and Bibliographies, Leland O. Howard, 549; Zoology of the Twentieth Century, Address at American Association for Advancement of Science at Denver, Prof. C. B. Davenport, 566; Nernst Lamp in America, A. J. Wurt's Paper read at American Institute of Electrical Engineers, 632
- Amesbury and Stonehenge, a Sentimental and Practical Guide to, Lady Antrobus, 465
- Amphibia and Reptiles: the Cambridge Natural History, Vol. viii., Hans Gadow, G. A. Boulenger, F.R.S., 401
- Analytical Chemistry: Die wissenschaftlichen Grundlagen der Analytischen Chemie elementar dargestellt, Prof. W. Ostwald, 5
- Anatomy: Death and Obituary Notice of Prof. Giulio Bizzozero, 59; the Anatomy of the Cat, Jacob Reighard and H. S. Jennings, 155; the Name of the *Sensorium Commune* Region of the Brain, Prof. G. E. Smith, 435; Death and Obituary Notice of Dr. James Foulis, 635
- Anderson (Prof. R. J.), on the Relationships of the Premaxilla in the Bears, 587
- Anderson (Dr. W. C.), on Aluminium-tin Alloys, 612
- André (Ch.), Duration of Period of Variation in Luminosity of Planet Eros, 368
- André (M.), Formation of Acids in Plants, 596
- Andrews (Dr. Charles W.), a New Name for an Ungulate, 577; the Origin and Birthplace of the Proboscidea, 582
- Andrews (E. C.), the Caves of Fiji, 143
- Angell (Prof. J. R.), Monaural Localisation of Sound, 263
- Anglo-American Work on the Market Garden, an, L. H. Bailey, 122
- Animal Life: a First Book of Zoology, President D. Starr Jordan and Prof. V. L. Kellogg, 525
- Animals, the Feeding of, W. H. Jordan, 625
- Annalen der Physik, 118, 246
- Annandale (Nelson), Natural History Notes, 331
- Annandale (Mr.), on the Half-Siamese Half-Malay Community of Sai-Kau, 614
- Annual of the British School at Athens, 11
- Ant-gardens in Amazon Region, E. Ule, 553
- Ants, American, Social Symbiosis among, W. H. Wheeler, 409
- Antarctica: the National Antarctic Expedition, 131, 182, 233; Prof. Edward B. Poulton, F.R.S., 83, 156, 206; the Resignation of Prof. J. W. Gregory, 58, 132; Prof. J. W. Gregory, 181; Snow Conditions in the Antarctic, C. E. Borchgrevink, 257; First on the Antarctic Continent, C. E. Borchgrevink, 279; the Meteorological Arrangements on board the *Discovery*, Dr. H. R. Mill, 554; on the Methods and Plans of the Scottish National Antarctic Expedition, W. S. Bruce, 591; Polar Exploration, Civilian, 626; the best Ship for Exploration, 656
- Anthropogeography of Argentina, on the, Dr. Francisco Moreno, 590
- Anthropology: the Older Civilisation of Greece, 11; H. R. Hall, 280; Anthropological Institute, 47, 119, 142, 223, 271; the Natives of South Africa: their Economic and Social Conditions, E. Sidney Hartland, 73; the Language and Origin of the Basques, 90; Death and Obituary Notice of Anthony Wilkin, 110; the Golden Bough: a Study in Magic and Religion, J. G. Frazer, 201; Dr. J. G. Frazer's Views of the Relations between Magic, Religion and Science, J. S. Stuart-Glennie, 615; West African Studies, Mary H. Kingsley, 231; Historical Development and Problems of Anthropology, Dr. B. Hagen, 239; Folk Customs in India, 264; Boomerangs, Gilbert T. Walker, 338; Ottavio Zanotti Bianco, 400; the Mediterranean Race: a Study of the Origin of European Peoples, G. Sergi, 370; New Methods of Obtaining Cubic Index of Skull, M. Pelletier, 490; a New Record of Totemism, Hon. Auberon Herbert, 522; the Cave-dwellers of North-west Mexico, Dr. Carl Lumholtz, 522; the Decorative Symbolism of the Arapaho Indians, A. L. Kroeber, 582; the Possible Improvement of the Human Breed under the Existing Conditions of Law and Sentiment, Dr. Francis Galton, F.R.S., 659 (see also Section H., British Association)
- Anti-Vivisection Society, the National, and Lord Lister, 55; Hon. Stephen Coleridge, 101; Editor, 101
- Antiseptics: Tannoform, 113
- Antrobus (Lady): a Sentimental and Practical Guide to Amesbury and Stonehenge, 465; and the Recent Work at Stonehenge, 602
- Applied Science, Prize Subjects in, 438
- April Meteors of 1901, W. F. Denning, 21
- Arapaho Indians, the Decorative Symbolism of, A. L. Kroeber, 582
- Arbitrages, Expertises et, F. Rigaud, 648
- Archæology: the Older Civilisation of Greece, 11; the Oldest Civilisation of Greece: Studies of the Mycenaean Age, H. R. Hall, 280; the Difference between Memphis and Thebes Mummies, Mr. Harting, 70; the Picts' Houses of Scotland, D. McRitchie, 311; Egyptology in Egypt, 319; Wooden Human Effigies from German New Guinea, D. R. Poch, 358; Aboriginal Grave in Darling River, N.S.W., Graham Officer, 416; the "Onvar" of Malekula, New Hebrides, W. R. Harper, 416; Palaeolithic Implements found on Knowle Farm, 432; the French Stonehenge: an Account of the Principal Megalithic Remains in the Morbihan Archipelago, T. Cato Worsfold, 465; a Sentimental and Practical Guide to Amesbury and Stonehenge, Lady Antrobus, 465; the Recent Work at Stonehenge, Lady Antrobus, 602; Folklore about Stonehenge, Rev. O. Fisher, 648; Exploration of the Tinnevely (Madras) District, Mr. Rea, 489; Yorkshire Earthworks, Mrs. E. S. Armitage, 531; the Flemish Giant Festivals, 531; Palaeolithic Drawings on Walls of Caves in Dordogne, L. Capitan and H. Breuil, 572; Palaeolithic Drawings on Walls of Cave of La Mouthe, Emile Rivière, 596; on the Chronology of the Stone Age of Man, Dr. W. Allen Sturge, 615; Sir John Evans, 615; Prof. Kendall, 615; Report on the Age of Stone Circles, 615; on Excavations on Neolithic Sites in the Isle of Arran, Drs. Duncan and Bryce, 615; Dr. Munro on a "Kiichen Midden" near Elie in Fife, 615; on the Age of Ogham Writing in Ireland, R. A. S. Macalister, 615; on the Bones of Hen Nekht, an Egyptian King of the Third Dynasty, C. S. Myers, 615; on the Neolithic Settlement which underlies the Mycenaean Palace at Knossos, 615; on the Præsos Excavations, Mr. Bosanquet, 615; on a Mycenaean Site Excavated at Zakro, Mr. Hogarth, 615
- Arctica: the Late Mr. Seebom's Travels in Arctic Europe and Asia, 32; the Rise and Fall of Smeeenburg, Spitzbergen, Sir Martin Conway, 40; the Norwegian North Polar Expedition, 1893-96, Dr. C. Chree, F.R.S., 151; Le Esplorazioni Polari nel Secolo xix., Luigi Hugues, 158; on the Determination of Positions in Polar Exploration, E. Plumstead, 278; Death of Baron von Nordenskjöld, 381; Obituary Notice of, W. S. Bruce, 450; Polar Exploration, Civilian, 626
- Arctowski (H.), the Climate of Glacial Periods, 238; the *Belgica* Soundings, 238
- Argentina: on the Anthropogeography of, Dr. Francisco Moreno, 590
- Arizona, Excavations in, Dr. Walter Fewkes, 425
- Armitage (Mrs. E. S.), Yorkshire Earthworks, 531
- Armour-clad Whales, 652
- Armstrong (Dr.), Educational Experiment and Research, 591; on the Teaching of Botany in Universities, 593
- Armstrong (T.), a New Principle in Wireless Telegraphy Discovered, 636
- Army Education Committee, the, 55
- Arnold (Prof. J. O.), the Properties of Steel Castings, 64, 316
- Arran Geology, on Recent Discoveries in, W. Gunn, 564

- Arrhenius' Electrolytic Dissociation Theory, Prof. Kahlenberg, 383
- Arsenic, on the Detection and Estimation of, in Beer and Articles of Food, W. Thomson, 612
- Arsonval (M. D'), Osmotic Pressure as Protection from Cold in Living Cell, 295
- Artesian Water, on the Conditions under which it is obtained in Queensland, Dr. R. Logan Jack, 565
- Artillery, Hailstorm, W. N. Shaw, F.R.S., 159
- Artini (E.), Ricerche Petrografiche e Geologiche sulla Valsesia, 640
- Arts, Society of, Medal Awards, 213
- Ascarza (Sig.), Wave-length of Green Corona Line, 289
- Ashton (A. W.), Mechanical Electrification of Dielectrics, 141; Model Imitating Behaviour of Dielectrics, 141
- Aso (Mr.), Causes of Difference in Colour between Green and Black Tea, 607
- Astral Gravitation, Essays in Illustration of the Action of, in Natural Phenomena, W. L. Jordan, 155
- Astronomy: Magnetic Observations during Total Solar Eclipse of May 28, 1900, Dr. William Ellis, F.R.S., 15; Observations at Santa Pola of the Total Eclipse of the Sun on May 28, 1900, Sir Norman Lockyer, F.R.S., 343; Obituary Notice of Dr. A. Hirsch, 18; Comet 1901 I (a), 21, 42, 63, 114, 191, 436, 557; E. C. Willis, 55; J. Cresswell, 410; Observations at Algiers, MM. Rambaud and Sy, 143; Definitive Orbit of Comet 1894, II (Gale), 89; Encke's Comet, 359, 384, 583; Elliptic Elements of Comet 1900, c, M. Perrotin, 644; April Meteors of 1901, W. F. Denning, 21; the Meteoric Epoch of July and August, W. F. Denning, 240; the August Meteors, W. F. Denning, 410; W. E. Rolston, 411; the October Orionids, W. F. Denning, F.R.S., 651; Auroræ and Meteors, Alex. C. Henderson, 527; Our Astronomical Column, 21, 42, 63, 89, 114, 136, 167, 191, 216, 240, 265, 289, 311, 335, 359, 384, 410, 436, 456, 491, 523, 532, 556, 583, 609, 639, 659; Stellar Photography with a Siderostat, 42; Forms of Images in Stellar Photography, 191; the Cape Photographic Durchmusterung for the Equinox 1875, David Gill, F.R.S., J. C. Kapteyn, 257; a Photometric Durchmusterung, including all the Stars of the Magnitude 7.5 and brighter North of Declination -40° , Edward C. Pickering, 257; Formulæ for Variation of Latitude, 42; Nova Persei, 42, 191, 410, 437, 491; Sir Norman Lockyer, F.R.S., 69, 341; Prof. Copeland and Dr. J. Halm, 119; Spectrum of Nova Persei, 240, 456, 556, 639; Appearance of the Photographic Image of Nova Persei, 639; Photographs of the Zodiacal Light, 42; Publications de l'Observatoire Astronomique et Physique de Tachkent: Etudes sur la Structure de l'Univers, W. Stratonoff, Howard Payn, 56; the Vatican Observatory, 61; Washington Observations, 1891-92, 63; Stellar Photometry, B. Baillaud, 63; New Nebulæ, 63; Variability of Eros, 63, 359, 384; Opposition of Eros in 1903, 491; Duration of Period of Variation in Luminosity of Eros, Ch. André, 368; Hipparchus and the Precession of the Equinoxes, Rev. H. M. Close, 71; Astronomical Society, 71, 247; the Recent Total Solar Eclipse of May 18, 1901, 79, 114, 136, 289, 311; Spectrum of ζ Puppis, 89; New Variable Star 71 (1901) Aurigæ, Stanley Williams, 89; Hisgon's Variable 13 (1900) Cygni, 114; Two New Variable Stars, Prof. W. Ceraski, 167; New Variable Stars, 191; Orbits of Algol Variables, RR Puppis and V Puppis, 384; New Variable Star 77 (1901) Herculis, 532; New Algol-type Variable 78 (1901), Cygni, 583; New Southern Algol-Variable, 639; Climate and Time and Mars, 106; the Planet Saturn, W. F. Denning, 114; Astronomical Occurrences in June, 114; in July, 216; in August, 335; in September, 436; in October, 532; in November, 659; the Supposed Ultra-Neptunian Planet, Prof. George Forbes, F.R.S., 119, 587; Evidence of the Existence of an Ultra-Neptunian Planet, 524; the Centenary of the Discovery of Ceres, 129; Snow on the Moon's Surface, 136; Oxford University Observatory, 136; the Royal Observatory, Greenwich, 136; Uniform Transmission of Astronomical Telegrams, 167; Photography of Corona, 167; the Solar Activity, 1833-1900, Papers read before Royal Society, Dr. William J. S. Lockyer, 196; Black Spot on Jupiter, 216; Dark Spot on Jupiter, 240; Markings on Jupiter, W. F. Denning, 351; Influence of Magnification on Apparent Value of Diameters of Jupiter, J. Guillaume, 668; on the Theory of Temporary Stars, Dr. J. Halm, 253; Opening of Tycho Brahe's Tomb, 261; Death and Obituary Notice of Sir Cuthbert Peek, 261; Death of Prof. T. H. Safford, 261; Light Variation of the Minor Planet (345) Tercidina, 265; the Minor Planet Tercidina, 289; United States Naval Observatory, 265; on the Determination of Positions in Polar Exploration, E. Plumstead, 278; Ten-year Greenwich Star Catalogue for 1890, 216; New Nebulæ, 216, 336; G. Bigourdan, 312; Parallax of μ Cassiopeie, 216; Wave-length of Green Corona Line, Signor Ascarza, 289; Deformation of the Sun's Disc, Signor A. Ricco, 289; the Twelve Movements of the Earth, M. Flammarion, 312; the Paris Observatory in 1900, 335; Photography by the Light of Venus, 336; Death of Prof. Wilhelm Schur, 356; Obituary Notice of, Dr. William J. S. Lockyer, 380; Celestial Objects having Peculiar Spectra, 359; Motion of α Persei in the Line of Sight, 359; Observations of Mars, 384; Variations of the Magnetic Needle, 384; the Cape Observatory, Sir David Gill, 410; Period of Mira Ceti, Prof. A. A. Nijland, 410; Period of Mira (θ Ceti), 659; a Text-book of Astronomy, Prof. George C. Comstock, 424; Brightness of the Solar Corona, January 22, 1898, Prof. Turner, 436; the Spectroscopic Binary "Mizar," 437; the Spectroscopic Binary η Pegasi, 609; the Spectroscopic Binary Capella, 639; Density and Figure of Close Binary Stars, Dr. Alex W. Roberts, 468; Réunion du Comité international permanent pour l'exécution de la Carte photographique du ciel, tenue à l'Observatoire de Paris en 1900, 449; Death of Dr. Charles Meldrum, F.R.S., 452; New Double Stars, 456; Six Stars with Variable Radial Velocity, 456; Causes of the Variability of Earthshine, 456; Solar Radiation, J. Y. Buchanan, F.R.S., 456; Radial Velocity of 1830 Groombridge, 491; Histoire du Ciel, Clemence Royer, 497; Variable Radial Velocity of δ Orionis, 491; Diameter of Mercury, 523; Periodicity of the Inequalities of Mercury, 524; Observations at Algiers of Planet GQ, F. Sy, 524; Fireball of September 14, 1901, 532; Diameter of Venus, 556; the Collected Scientific Papers of John Couch Adams, 576; Fireball of September 14, 1492, C. E. Stromeyer, 577; the International Survey of the Heavens, Prof. A. Ricco, 582; on the Rotation of Faculæ on the Sun's Surface, Father Cortie, 587; Photograph of the Spectrum of Lightning, 583; Micrometric Observations of Neptune and its Satellite, 639; Prehistoric Astronomy: the French Stonehenge: an Account of Principal Megalithic Remains in the Morbihan Archipelago, T. Cato Worsfold, 465; a Sentimental and Practical Guide to Amesbury and Stonehenge, Lady Antrobus, 465
- Astrophysics: Scientific Worthies, Sir William Huggins, K.C.B., Prof. H. Kayser, 225; Astrophysical Researches at Smithsonian Institution, Prof. S. P. Langley, 269; Annals of the Astrophysical Observatory of the Smithsonian Institution, Measurements of Solar Radiation, S. P. Langley, 352; Density and Figure of Close Binary Stars, Dr. Alex W. Roberts, 468
- Astruc (A.), Acidimetry of Arsenic Acid, 272; Distribution of Acidity in Stem, Leaf and Flower, 572
- Athens, the Annual of the British School at, 11
- Athletes, Photographic Analysis of the Movements of, 377
- Atmosphere: Mémoires originaux sur la Circulation générale de l'Atmosphère, Marcel Brillouin, 396; on the Mean Temperature of the Atmosphere, and the Causes of Glacial Period, H. N. Dickson, 590
- Atmospheric Air, on the Separation of the Least Volatile Gases of, and their Spectra, Prof. G. D. Liveing, F.R.S., and Prof. J. Dewar, F.R.S., 294
- Atmospheric Electricity, Report on Observations in Terrestrial Magnetism and, made at the Central Meteorological Observatory of Japan for the year 1897, Dr. C. Chree, F.R.S., 151
- Atwater (Dr.), Food Consumption and Metabolism, the Mechanical Efficiency of Bicyclists, 382
- Abel (E. van), Density of Alloys, 143
- Auger (V.), Manganic Phosphates, 296
- August Meteors of 1901, the, W. F. Denning, 410; W. E. Rolston, 411
- Auks and Puffins, Position of, Dr. R. W. Shufeldt, 408
- Aurigæ, New Variable Star 71 (1901), Stanley Williams, 89
- Auroræ and Meteors, Alex. C. Henderson, 527
- Australia: Australian Marsupials, B. A. Bensley, 88; Science in Australia, Prof. Livingside, 296; Boomerangs, Gilbert T. Walker, 338; Ottavio Zanotti Bianco, 400; the Jarrah and Karri Woods of West Australia, 453

- Automobiles, Mode of Action of Brakes of, A. Petol, 464
 Avebury (Lord, F.R.S.), Notes from a Diary 1889-1891, Sir Mountstuart E. Grant Duff, 228
 Axis-vectors, the Use of, Prof. F. Slate, 54
 Ayrton (Hertha), Mechanism of Electric Arc, 365
 Ayrton (Prof. W. E., F.R.S.), Death and Obituary Notice of Viriamu Jones, 161
- Bacteriology : Luminous Bacteria, 57; the Diagnosis of Plague, Dr. E. Klein, F.R.S., 91; Cement-disintegration, R. Greig Smith, 144; *Vibrio denitrificans*, R. Greig Smith, 144; New Method of Examination for Typhoid Bacillus, R. Cambier, 200; Glucoproteins as Culture-media, Charles Lepierre, 296; Bacteriology of Healthy Animal Organs, Dr. Ford, 333; Oxidation of Propylglycol by *Mycoderma Aceti*, André Kling, 344; the Life-work of Dr. G. A. Hansen, 433; Bacterial Disease of Potato, G. Delacroix, 464; the Report of the Thompson Yates Laboratories, 604; on the Chemical and Biological Changes occurring during the Bacterial Treatment of Sewage, Prof. E. A. Letts and R. F. Blake, 612; on Humus and the so-called Irreducible Residue in Bacterial Treatment of Sewage, Dr. S. Rideal, 612; Neutral Red as Test for Colon Bacillus, Messrs. Makgill and Savage, 637; Bacteroids of Leguminous Nodules and Culture of *Rhizobium Leguminosarum*, R. Greig Smith, 272
- Bactrian Camel, the Origin and Habits of, 355
 Baeyer (M. v.), Researches on Organic Peroxides, 64
 Bailey (L. H.), the Principles of Vegetable Gardening, 122
 Baillaud (B.), Stellar Photometry, 63
 Bakerian Lecture at Royal Society; the Nadir of Temperature and Allied Problems, Prof. James Dewar, F.R.S., 243
 Balachowski (D.), Electrolytic Separation of Nickel and Cobalt, 224
 Baldwin (E. B.), Meteorological Observations in Franz-Josef Land, 357
 Balfour (Mr.), on Scientific Research, 109
 Balfour (Prof. J. Bayley, F.R.S.), Opening Address in Section K at the Glasgow Meeting of the British Association, 557; on the Cuticular Structure of *Euphorbia Abdelkuri*, 618
 Ballard (M.), the Voandzou plant, 48
 Ballistic Experiments, Testing of some, Rev. F. Bashforth, 445
 Ballooning : the International Balloon Ascents of April 19, 88; the Ascents of May 14, 189; High Balloon Ascent, Drs. Berson and Suering, 356; the Santos Dumont Airship, 286, 489; the Deutsch Prize won by M. Santos Dumont, 635; the William Beedle Airship, 489; Recent International Ascents, 608
 Ballore (F. de M. de), the Non-existence of Isophymic Curves in Seismography, 524
 Baly (E. C. C.), Spectrum of Cyanogen, 247
 Bancroft (T. L.), the Intermediary Host of *Filaria immitis*, 416
 Banks (Right Hon. Sir Joseph), Illustrations of the Botany of Captain Cook's Voyage Round the World in H.M.S. *Endeavour* in 1768-1771, 374
 Barac (M.), Analysis of Red Rain, 489
 Barbados, Landslip at, 635
 Barnett (P. A.), on the Scope of Educational Science, 591
 Barr (Prof.), on a Folding Range Finder for Infanry, 613
 Barr (M.), on a Machine for the Manufacture of Type, 613, 614
 Barrett (Charles G.), Lepidoptera of the British Islands, 444
 Barrett-Hamilton (Captain G. E. H.), the Colours of Guillemots' Eggs, 600
 Barrow (George), Silurian (?) Rocks in Forfar and Kincardine, 142; on Lateral Variations of Composition in Zones of the Eastern Highland Schists, 565
 Batrachians and Reptiles in the Cambridge Natural History, G. A. Boulenger, F.R.S., 401
 Baud (A.), Capillary Constants of Organic Liquids, 224, 248
 Baxandall (F. E.), Enhanced Lines in Spectrum of Chromosphere, 45; the Arc Spectrum of Vanadium, 45
 Baxendell (J.), Observations at Fernley Observatory, 112
 Bashforth (Rev. F.), Testing of some Ballistic Experiments, 445
 Basic Rocks, Chemistry of the Cygnian Stars and, Sir Norman Lockyer, K.C.B., F.R.S., Prof. Edw. Suess, 629
 Basques, the Language and Origin of the, 90
 Basset (A. B., F.R.S.), Problems of Geometry, 400
 Beadnell (H. J. L.), the Farafra Oasis, Egypt, 359; on the Discovery of Bone-beds of Early Tertiary Age in the Fayum Depression, 566; the Dakhla (Egypt) Oasis, 581
 Bears, on the Relationships of the Premaxilla in the, Prof. R. J. Anderson, 587
 Beat, a Simple Model for Demonstrating, K. Honda, 626
 Beaumont (Prof. Roberts), Le Coton, Prof. H. Lecomte, 124
 Beauverie (J.), Attempt to Render Vegetables Immune against Cryptogamic Diseases, 296
 Becquerel (H.), Physiological Action of Radium Rays, 175; Radiation of Uranium Constant at very Low Temperatures, 344
 Bedford (Duchess of), Photograph of Greenland Musk-ox, 63
 Bee, the Life of the, Maurice Maeterlinck, 231
 Bee, Variation in a, Prof. T. D. A. Cockerell, 158
 Beedle (William), Airship, the, 489
 Beetle, the Colorado Potato, W. F. Kirby, 450
 Behaim (Martin), and the History of Geography, 589
 Behrend (B.A.), the Induction Motor, 252
 Beilby (G. T.), on the Minute Structure of Metals, 612; on the Action of Ammonia on Metals at High Temperatures, 612
 Belgian Expedition to Ka-Tanga, Captain Lemaire, 590
 Belgica Soundings, H. Arctowski and A. F. Renard, 238
 Bell (A. M.), on Plants and Coleoptera from a Pleistocene Deposit at Wolvercote, Oxfordshire, 565
 Bell (Dr. Robert, F.R.S.), a Canadian Geological Explorer, 81; on the Topography and Resources of Northern Ontario, Canada, 590
 Bénard (Henri), on the Cellular Distribution of Eddies produced in Liquid Films when Convection Currents are set up, 454
 Benedict (Francis Gano), Chemical Lecture Experiments, 350
 Benham (Dr. W. B.), Viscera of Cogia Whale, 142
 Benoit (Dr.), Mass of Cubic Decimetre of Distilled Water, 112; Best Alloy for Measures of Length, 112
 Bensley (B. A.), the Australian Marsupials, 88
 Benson (Claude E.), the Cape Viper, 126
 Benthall (Dr. W.), Reflex Action Instinct, Paper read at Derby Medical Society, 459
 Berkeley's Drei Dialoge Zwischen Hylas und Philonous, Dr. R. Richter, 4
 Berkeley's Abhandlung über die Prinzipien der Menschlichen Erkenntnis, Dr. F. Ueberweg, 4
 Berlin, the International Zoological Congress, 405
 Bernadou (John B.), Smokeless Powder, Nitro-cellulose and Theory of the Cellulose Molecule, 600
 Berson (Dr.), High Balloon Ascent, 356
 Bertainchand (E.), Analysis of Tunis Red Rain, 72
 Bertrand (G.), Biochemical Differentiation of two ferments of Vinegar, 224
 Berthelot (A.), Origin of the Loue River, 440
 Berthelot (Daniel), the Neutralisation of Phosphoric Acid, 175; Behaviour of Amino-Acids to Indicators, 199; Formation of Insoluble Phosphates by Double Decomposition, 224; Reaction of two bases added simultaneously to Phosphoric Acid, 248; Acetylmethyl Radicles, 248; Phosphoric Acid and Chlorides of Alkaline Earths, 271; Formation of Acids in Plants, 596; Action of Hydrogen Peroxide Solution on Silver Oxide, 644
 Bertsch (E.), Synthesis of Aromatic Aldeximes by Fulminating Silver, 191
 Betterave à Sucre, La, L. Malpeaux, 28
 Beyer (Prof.), Protection of Sea Birds of Louisiana Gulf Coast, 19
 Bianco (Ottavio Zanotti), Boomerangs, 400
 Biblical Encyclopædia, A, Prof. T. K. Cheyne and Dr. J. Sutherland Black, 3
 Bibliography of Chemistry, A Select, 1492-1897; Henry Carington Bolton, 430
 Bibliography, An Essay in Critical, G. Rudolf, 51
 Bicyclists, the Mechanical Efficiency of, Drs. Atwater and Sherman, and R. C. Carpenter, 382
 Bidwell (Shelford, F.R.S.), Negative After-images and Colour-vision, 216
 Bigourdan (G.), Le Système Métrique, 250; New Nebulæ, 312
 Billet (A.), Simultaneity of Mosquitoes and Malaria at Constantine, 524
 Biltz (H.), Dissociation of Sulphur Molecules, 638
 Binary Stars, Close, Density and Figure of, Dr. Alex. W. Roberts, 468

- Binary Stars, Spectroscopic, Mizar, 437; λ Pegasi, 609; Capella, 639
- Binet (Alfred), Psychology of Reasoning, 325
- Biology: the Life and Letters of Thomas Henry Huxley, F.R.S., by Leonard Huxley, Prof. W. T. Thiselton Dyer, F.R.S., 145; Some Recent Work on Diffusion, Lecture at Royal Institution, Dr. Horace T. Brown, F.R.S., 171, 193; Binary Fission in Ciliata, Dr. J. Y. Simpson, 199; Die Mutations Theorie, Versuche und Beobachtungen über die Entstehung von Arten im Pflanzenreich, Prof. Hugo de Vries, 208; Biology of Mount Shasta, 242; In-Breeding, Prof. Cossar Ewart, 271; Osmotic Pressure as Protection from Cold in Living Cell, M. D'Arsonval, 295; B. Eyferth's Einfachste Lebensformend des Tier- und Pflanzenreiches, Dr. Walther Schönichen und Dr. Alfred Kalberlah, G. S. West, 301; Les Problèmes de la Vie, Essai d'une interprétation scientifique de phénomènes vitaux, La Substance Vivante et la cytotérière, Dr. Ermanno Giglio-Tos, 321; Blüthengeheimnisse: Eine Blütenbiologie in Einzelbildern, Georg Worgitzky, 444; Death of Martin Fountain Woodward, 528; Hamburg Meeting of German Association, 609; Marine Biology: the Marine Resources of the British West Indies, Dr. J. E. Duerden, 31; Luminous Bacteria, 57; Coloration of Marine Animals, Prof. W. C. McIntosh, 62; Marine Biology in Liverpool, Prof. W. A. Herdman, F.R.S., 115; Rate of Growth of Corals, J. S. Gardiner, 143; The Second International Conference for the Exploration of the Sea, 218; the Marine Mollusca of Tasmania, Prof. Ralph Tate and W. L. May, 548; Marine Poisons and Burrowing Habit, G. Bohn, 644
- Birds: the Song of Birds, Henri Coupin, 20, 62; Der Gesang der Vögel, Dr. Valentin Häcker, 52; the Birds of Siberia, A Record of a Naturalist's Visit to the Valleys of the Petchora and Yenesei, Henry Seebohm, 32; Bird-destruction in New South Wales, A. J. North, 165; How to know the Indian Ducks, F. Finn, 278; A Handbook of British Birds, J. E. Harting, 297; Bird Watching, Edmund Selous, 325; Album de Aves Amazonicas, Dr. Emilio A. Goeldi, 397; Manual of the Birds of Iceland, Henry H. Slater, 443; the Colours of Guillemots' Eggs, Captain G. E. H. Barrett-Hamilton, 600; Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History), E. W. Oates, 600; Bird Life in the Canaries and South Africa, H. E. Harriss, 603
- Bison at Woburn Abbey, Musk-Ox and, 63
- Bison of Great Slave Lake, the Wood, Dr. J. A. Allen, 135
- Bituminous Deposits of Cuba, the, H. E. Peckham, 365
- Bizzozero (Prof. Giulio), Death and Obituary Notice of, 59
- Black Spot on Jupiter, 216
- Black (Dr. J. Sutherland), Encyclopædia Biblica: Critical Dictionary of the Literary, Political and Religious History, the Archaeology, Geography and Natural History of the Bible, 3
- Black (Dr. Sinclair), *Empusa acridis*, the Locust-destroying Fungus, 357
- Blackman (Dr. F. F.), Recovery of Foliage Leaves from Surgical Injuries, 143; on Natural Surgery in Leaves, 619
- Blake (R. F.), on the Chemical and Biological Changes occurring during the Bacterial Treatment of Sewage, 612
- Blanc (M.), Conversion of Uncoloured into Coloured Compounds of Sodium Tetrazotolysulphite with Ethyl- β -Naphthylamine, 272
- Blatchford (T.), Geology of Kanouna Gold-mining District, 61
- Bleicher (Prof.), Death and Obituary Notice of, 164
- Bles (E. J.), on a Method for Recording Local Faunas, 588
- Blondel (André), Oscillographs, 308, 408
- Blood, a Contribution to the Study of the, and Blood-pressure, George Oliver, M.D., 1
- Blood-rain, F. H. Perry-Coste, 55; the Dust of Blood-rain, Prof. Arthur W. Rücker, F.R.S., 30
- Blount (Bertram), Electro-chemistry, 77
- Blue Sky Light, the Colour and Polarisation of, Dr. N. E. Dorsej, 138
- Blüthengeheimnisse: Eine Blütenbiologie in Einzelbildern, Georg Worgitzky, 444
- Blyth (Sir James), Viticulture, 432
- Bocher (Prof.), Non-oscillatory Linear Differential Equations of Second Order, 198
- Bodding (Rev. P. O.), Thunderbolts as Charms, 264
- Bodroux (F.), Action of Isobutylene Bromide on Benzene in Presence of Aluminium Chloride, 176
- Bohm (Dr. G.), L'Evolution du Pigment, 28; Marine Poisons and Burrowing Habit, 644
- Bolton (Henry Carrington), Evolution of the Thermometer, 1592-1743, 25; a Select Bibliography of Chemistry, 1492-1897, 430
- Bone-beds: on the Bone-beds of Pikermi, Attica, Dr. A. Smith Woodward, 566; on a Newly-discovered Bone-bed at Achmet Aga, North Eubœa, Dr. A. Smith Woodward, 566; on the Discovery of Bone-beds of Early Tertiary Age in the Fayum Depression, H. J. L. Beadnell, 566
- Bongert (A.), Product of Nitration of Aceto-acetic Ether, 296
- Books of Science, Forthcoming, 593
- Boomerangs, Gilbert T. Walker, 338; Ottavio Zanotti Bianco, 400
- Borchgrevink (C. E.), Snow Conditions in the Antarctic, 257; First on the Antarctic Continent, 279
- Bordier (M.), Electrolysis of Animal Tissues, 120
- Börnstein (Dr. R.), Leitfaden der Wetterkunde, 180
- Borradaile (L. A.), on the Land Crustaceans of a Coral Island, 588
- Borthwick (A. W.), on the Diameter Increment of Trees, 619
- Bosanquet (Mr.), on the Praesos Excavations, 615
- Bose (R. C. L.), Karabin, 47
- Botany: Assimilation Chlorophyllienne et la Structure des Plantes, Dr. Ed. Griffon, 28; the Voandzou plant, M. Bolland, 48; Two New Genera of Chinese Trees, W. B. Hemsley, F.R.S., 70; the Flora of Tibet, W. B. Hemsley, F.R.S., and H. H. Pearson, 70; Linnean Society, 70, 142, 223; Specimens of *Acididium berberidis*, J. Lewton Brain, 77; Chlorophyll Assimilation, Jean Friedel, 88; the Sporulation of Yeasts, A. Guillaumon, 96; Glucoside Characteristic of Germinating Period of Beech, P. Tailleur, 120; New South Wales Linnean Society, 143, 272, 416, 548; Recovery of Foliage Leaves from Surgical Injuries, F. F. Blackman and G. L. C. Matthæi, 143; a Raid on Wild Flowers, Prof. L. C. Miall, F.R.S., Prof. R. Meldola, F.R.S., 126; a Raid upon Wild Flowers, David Houston, 156; Dr. George Watt, the Hanbury Medallist for 1901, 162; the Scientific Study of Commercial Crop Cultivation, R. H. Wallace, 164; Die Mutationstheorie, Versuche und Beobachtungen über die Entstehung von Arten im Pflanzenreich, Prof. Hugo de Vries, 208; Death and Obituary Notice of Maxime Cornu, Sir W. T. Thiselton-Dyer, F.R.S., 211; Biochemical Differentiation of Two Ferments of Vinegar, G. Bertrand and R. Sazerac, 224; Catalase, a New Vegetable Enzyme, Dr. O. Loew, 239; Vitality of Seeds, Dr. Henry H. Dixon, 256; Shade in Coffee Culture, O. F. Cook, 264; Sources of Insect Attraction in Flowers, Prof. F. Plateau, 264; Chemical Relationship between Hæmoglobin and Chlorophyll, Herren Nencki and Marchlewski, 265; Saccharification of Leguminous Seeds Favoured by Sodium Fluoride, H. Hérissey, 272; Vegetation of Punctiform nostoc in Presence of Carbohydrates, R. Bouilhac, 272; Generality of Metal-fixation by Cell-wall in Plants, H. Devaux, 272; Bacteroids of Leguminous Nodules and Culture of *Rhizobium leguminosarum*, R. Greig Smith, 272; Osmotic Pressure as Protection from Cold in Living Cell, M. D'Arsonval, 295; Attempt to Render Vegetables Immune against Cryptogamic Diseases, J. Beauverie, 296; Plant Studies, an Elementary Botany, John M. Coulter, 300; Possible Provision of Nature against Hybridisation, Dr. W. Burck, 310; the Story of Wild Flowers, Rev. Prof. G. Henslow, 350; *Empusa acridis*, the Locust-destroying Fungus, Dr. Sinclair Black, 357; the Prothalli of *Ophioglossum pendulum*, *Helminthostachys zeylanica* and *Psilotum*, W. H. Lang, 365; Poison of *Lotus arabicus*, W. R. Dunstan, F.R.S., and T. A. Henry, 367; Die Reizleitung und die Reizleitenden Strukturen bei den Pflanzen, Dr. B. Nemeç, 371; Illustrations of the Botany of Captain Cook's Voyage Round the World in H.M.S. *Endeavour* in 1768-1771, Right Hon. Sir Joseph Banks and Dr. Daniel Solander, W. Botting Hemsley, F.R.S., 374; Flowers and Ferns in their Haunts, M. O. Wright, 375; Curious Incrustations on Roots in Littoral Sand-dunes of Victoria, 409; the Mechanism of Etherification in Plants, E. Charabot and A. Hébert, 440; Blüthengeheimnisse, Eine Blütenbiologie in Einzelbildern, Georg Worgitzky, 444; New Garden Plants: a Study in Evolution, 446; the Jarrah and Karri Woods of West Australia, 453; the Moon and Vegetation, 454; Bacterial Disease of Potato, G. Delacroix, 464; Stream Invasion by *Jussiaea grandiflora* in France, P. Carles, 464; the "Weeping" Habit in Trees the Result of Diminished Vitality, T. Meehan, 528; Botany

- of Interior of New South Wales, iv., R. H. Cambage, 548; Death and Obituary Notice of Prof. A. F. W. Schimper, Percy Groom, 551; Ant Gardens in Amazon Region, E. Üle, 553; Distribution of Acidity in Stem, Leaf and Flower, A. Astruc, 572; Death and Obituary Notice of William West, 579; Botanical Laboratory of Hakgala (Ceylon) Gardens, 580; Theine in the Tea-plant and Organic Iron Compounds in Plants, U. Suzuki, 582; on the Teaching of Botany in Universities, Prof. Bower, 592; Prof. Miall, 593; Prof. Marshall Ward, 593; Prof. Withers, 593; Prof. Armstrong, 593; Dr. D. H. Scott, 593; Dr. Kimmins, 593; Sir John Gorst, 593; on the Teaching of Botany in Schools, Harold Wager, 592; the Formation of Acids in Plants, MM. Berthelot and André, 596; Causes of Difference in Colour between Green and Black Tea, Mr. Aso, 607; Double Flowers and Parasitism, Marin Molliard, 620; *Diotis Candidissima*, C. P. Hurst, 644; Chemical Effects of Light on Plant Life, Herren Ciamician and Silber, 658; *see also* Section K British Association.
- Bottomley (Dr. J. T.), on Radiation of Heat and Light from a Heated Solid, 586
- Boudouard (M.), Aluminium-Magnesium Alloys, 176
- Bouffé (F.), Psoriasis and Neurasthenia, 440
- Bouilliac (R.), Vegetation of Punctiform Nostoc in Presence of Carbohydrates, 272
- Boulenger (G. A., F.R.S.), the Cambridge Natural History, vol. viii., Amphibia and Reptiles, Hans Gadow, 401
- Boulud (M.), the Sugars from Blood, 320
- Bourcet (P.), Iodine in Blood, 248
- Bouty (E.), the Dielectric Cohesion of Gases, 344
- Bouveault (L.), Product of Nitration of Aceto-acetic Ether, 296
- Bower (Prof., F.R.S.), on the Teaching of Botany in Universities, 592; on a Specimen of *Ophioglossum simplex* collected by Mr. Ridley in Sumatra, 617
- Boyle (Sir Courtenay, K.C.B.), Death and Obituary Notice of, 82
- Boys (C. V., F.R.S.), the Comptometer, 265; British Instruments at the Paris Exhibition, 576
- Brain (J. Lewton), Specimens of *Accidium berberidis*, 77
- Braum (Prof. Dr. Ferdinand), Drahtlose Telegraphie durch Wasser und Luft, 497
- Brebner (George), on the Anatomy of *Danaca* and other Marathaceae, 617
- Bredig (G.), the Inorganic Ferments, 135
- Breglia (Prof. Ernesto), Il Calcolo Grafico applicato alla Misura delle Volte, 27
- Bretschneider (Dr. E.), Death and Obituary Notice of, 87
- Breuil (H.), Palæolithic Drawings on Walls of Caves in Dordogne, 572
- Brillouin (Marcel), Mémoires Originaux sur la circulation générale de l'atmosphère, 396
- Brinell's Method of Determining Hardness of Iron and Steel, A. Wahlberg, 64
- British Association Meeting, the, Prof. Magnus Maclean, 78, 284
- British Association Meeting at Glasgow, 403, 470, 502; Inaugural Address by Prof. Arthur W. Rücker, Sec.R.S., President of the Association, 470
- Section A (Mathematics and Physics).**—Opening Address by Major P. A. MacMahon, D.Sc., F.R.S., President of the Section, 477; on the Magnetic Effects of Electrical Convection, Dr. Crémieu, Dr. H. A. Wilson, Lord Kelvin, 586; on the Proposed New Unit of Pressure, the Megadyne per Square Centimetre, Dr. Guillaume, 586; on Optical Glass, Dr. Glazebrook, Mr. Hinks, 586; the Seismological Committee on Certain Frequent Small Movements of the Seismograph Trace, 586; on the Determination of Magnetic Force on board Ship, Captain Creak's Modified Dip Circle, 586; on the Absolute Amount of Gravitational Matter in any Large Volume of Interstellar Space, Lord Kelvin, 586, 626; on Radiation of Heat and Light from a Heated Solid, Dr. J. T. Bottomley, 586; on Determining the Influence of Water Vapour on the Energy Lost by a Heated Body placed in an Enclosure containing Air, Hydrogen or Water Vapour, Prof. Morley and Mr. Brush, 586; a New Pressure Gauge, Prof. Morley, 586; on Determining the Depression of the Freezing Points of Extremely Dilute Solutions, Mr. E. H. Griffiths, 586; a New Argument for the Existence of an Ether, Mr. B. Hopkinson, 586; Experiments on the Passage of Electricity through Mercury Vapour, Prof. Schuster, 587; the Latest Form of Prof. Minchin's Photo-electric Cell, 587; on the Effects of Sea Temperature and Wind Direction on the Seasonal Variation of Air Temperature in these Islands, Messrs. W. N. Shaw and R. W. Cohen, 587; the Depression of the Earth's Crust due to an Area of High Barometric Pressure can be Detected by a Seismograph at Great Distances from the Centre of the Depression, Mr. F. N. Denison, 587; on a Planet beyond Neptune with a Mass about Equal to that of Jupiter, Prof. G. Forbes, 587; on the Faculæ on the Sun's Surface, Father Cortie, 587
- Section B (Chemistry).**—Opening Address by Prof. Percy F. Frankland, F.R.S., President of the Section, the Position of British Chemistry at the Dawn of the Twentieth Century, 503; on Duty-free Alcohol, Dr. W. T. Lawrence, 611; Dr. T. E. Thorpe, 611; Prof. A. Michael, 611; on Enzymic Action, Prof. Adrian Brown, 611-12; on the Chemical and Biological Changes occurring during the Bacterial Treatment of Sewage, Prof. E. A. Letts, Mr. R. F. Blake, 612; on Humus and the so-called Irreducible Residue in the Bacterial Treatment of Sewage, Dr. S. Rideal, 612; on Sulphuric Acid as a Typhoid Disinfectant, Dr. S. Rideal, 612; on the Inverse Ratio of Chlorine to Rainfall, Mr. W. Ackroyd, 612; on the Minute Structure of Metals, Mr. G. T. Beilby, 612; on the Action of Ammonia on Metals at High Temperatures, Prof. G. G. Henderson, Mr. G. T. Beilby, 612; on Aluminium-Tin Alloys, Dr. W. C. Anderson and G. Lean, 612; on the Properties of Radium, Prof. Willy Marckwald, 612; on so-called "Phototropic" Substances, Prof. Willy Marckwald, 612; on the Three Stereoisomeric Cinnamic Acids, Prof. A. Michael, 612; on the Condensation of Benzil with Dibenzilketone, Prof. G. G. Henderson, Mr. Corstorphine, 612; on Some Points in Chemical Education, Prof. Joji Sakurai, 612; on the Detection and Estimation of Arsenic in Beer and Articles of Food, Mr. W. Thomson, 612; on the Electrolytic Conductivity of Halogen Salt Solutions, Dr. J. Gibson, 612
- Section C (Geology).**—Opening Address by John Horne, F.R.S., F.R.S.E., F.G.S., President of the Section, Recent Advances in Scottish Geology, 509; on Recent Discoveries in Arran Geology, Mr. W. Gunn, 564; on Lateral Variations of Composition in Zones of the Eastern Highland Schists, Mr. G. Barrow, 565; on the Structure and Probable Succession of the Schists of the Southern Highlands, Mr. P. Macnair, 565; on the Re-discovery of a Tree-trunk Embedded in Volcanic Ash in Mull, Sir A. Geikie, 565; on the Sequence of the Tertiary Igneous Eruptions in Skye, Mr. A. Harker, 565; on the Resemblance of the Old Red Sandstone of North-west Ireland to the Torridon Rocks of Sutherland, Messrs. A. McHenry and J. H. Kilroe, 565; on the Relation of the Silurian and Ordovician Rocks of North-west Ireland to the Great Metamorphic Series, Messrs. A. McHenry and J. H. Kilroe, 565; Mr. G. H. Kinahan, 565; on the Geological Distribution of the Fishes of the Carboniferous Rocks and of the Old Red Sandstone of Scotland, Dr. Traquair, 565; Mr. R. Kidston, 565; on the Conditions under which Artesian Water is obtained in Queensland, Dr. R. Logan Jack, 565; on the Cambrian Fossils of the North-west Highlands, Mr. B. N. Peach, 565; on a Machine for Investigating Fossil Remains, Prof. Sollas, 565; on Plants and Coleoptera from a Pleistocene Deposit at Wolvercote, Oxfordshire, Mr. A. M. Bell, 565; on Overflow Channels and other Phenomena Indicating Glacier-dammed Lakes in the Cheviots, Prof. P. F. Kendall, Mr. H. B. Muff, 565; on the Application of Geology to Agriculture by the Preparation of Soil Maps, Mr. J. R. Kilroe, 565; on the Scottish Ores of Copper, Mr. J. G. Goodchild, 565; on the Trias of Elgin and Nairn, Dr. W. Mackie, 565; on the Source of the Alluvial Gold of the Kildonan Field, Sutherland, Mr. J. Malcolm Maclaren, 566; on the Influence of Organic Matter on the Deposition of Gold in Veins, Mr. J. Malcolm Maclaren, 566; on the Mode of Occurrence of Cairngorms, Mr. E. H. Cunningham Craig, 566; on Computation of the Age of the Earth from the amount of Salt in the Sea, Prof. Joly, Mr. Ackroyd, 566; on the Sources of the Warp in the Humber, Mr. W. H. Wheeler, 566; on the Bone-beds of Pikerini, Attica, Dr. A. Smith Woodward, 566; on a Newly-discovered Bone-bed at

Achmet Aga, North Eubœa, Dr. A. Smith Woodward, 566; on the Discovery of Bone-beds of Early Tertiary Age in the Fayum Depression, Mr. H. J. L. Beadnell, 566; on the Physical History of the Norwegian Fjords, Prof. E. Hull, 566; on the Origin of the Gravel Flats of Berkshire and Surrey, Mr. H. W. Monckton, 566; Report of the Geological Photographs Committee, Prof. W. W. Watts, 566; Report of the Committee on Erratic Blocks, Prof. P. F. Kendall, 566; Report of the Committee on Carboniferous Life Zones, Dr. Wheelton Hind, 566; Report of the Committee on the Underground Waters of N.W. Yorkshire, Capt. A. R. Derryhouse, 566; Report of the Committee on the Exploration of Irish Caves, 566; Report of the Committee on the Structure of Crystals, Mr. W. Barlow, Prof. H. A. Miers, Mr. G. F. Herbert Smith, 566

Section D. (Zoology).—Opening Address by Prof. J. Cossar Ewart, M.D., F.R.S., President of the Section; the Experimental Study of Variation, 482; on the Pelvic Cavity of the Porpoise as a Guide to the Determination of the Sacral Region in Cetacea, Dr. Hepburn, Dr. D. Waterston, 587; on the Relationships of the Premaxilla in the Bears, Prof. R. J. Anderson, 587; Report of the Committee on Bird Migration in Great Britain and Ireland, 587; Report of the "Index Animalium" Committee, 587; Report of the Committee on the Zoology of the Sandwich Islands, 587; Report of the Committee on the Coral Reefs of the Indian Regions, 587; Report of the Committee for the Table at the Naples Zoological Station, 587; Natural History and Ethnography of the Malay Peninsula, Mr. W. W. Skeat, 587; on the Coral Islands of the Maldives, Mr. J. Stanley Gardiner, 587; on a Method for Recording Local Faunas, Mr. E. J. Bles, 588; on Germinal Selection in Relation to Inheritance, Prof. J. Arthur Thomson, 588; on the Behaviour of Young Gulls Naturally and Artificially Hatched, Prof. J. Arthur Thomson, 588; Dredging Expedition in Connection with the Millport Marine Station, 588; on Dimorphism in Foraminifera, Mr. J. J. Lister, 588; on the Relation of Binary Fission and Conjugation to Variation, Dr. J. Y. Simpson, 588; on Zebras and Zebra Hybrids, Prof. J. C. Ewart, 588-589; on a Large Nematode Parasitic in the Sea-urchin, Dr. J. F. Gemmill, 588; on the Land Crustaceans of a Coral Island, Mr. L. A. Borradaile, 588; on the Youngest Known Larva of *Polypterus*, Mr. J. S. Budgett, 588; on the Origin of the Vertebrate Limbs, Mr. J. Graham Kerr, 588; on the Story of Malaria, Major R. Ross, 588

Section E. (Geography).—Opening Address by Hugh Robert Mill, D.Sc., LL.D., F.R.S.E., F.R.G.S., President of the Section, on Research in Geographical Science, 532; on Martin Behaim and the History of Geography, Mr. E. G. Ravenstein, 589; Final Report of the Committee on the Climate of Tropical Africa, Mr. Ravenstein, 589; on the Morphological Divisions of Europe, Dr. A. J. Herbertson, 589; on Geographical Conditions Affecting British Trade, Mr. G. G. Chisholm, 589; on the Influence of Geographical Environment on Political Evolution, Prof. Alleyne Ireland, 589; on the Effects of Vegetation in the Valley and Plain of the Clyde, Prof. G. F. Scott Elliot, 589; on a Scheme of the Scottish Natural History Society for Reference to Papers on Scottish Natural History, &c., Miss Marion Newbigin, 589; on a Botanical Survey of Scotland, Prof. W. G. Smith, 590; on the Anthropogeography of Argentina, Dr. Francisco Moreno, 590; on the Belgian Expedition to Ka-Tanga, Captain Lemaire, 590; Report of the Committee on Terrestrial Surface Waves, Dr. Vaughan Cornish, 590; on the Mean Temperature of the Atmosphere and the Causes of Glacial Periods, Mr. H. N. Dickson, 590; on the Scientific Study of the Lakes of the British Islands, Dr. Mill, 590; Sir John Murray, 590; Mr. John Horne, 590; Colonel D. A. Johnston, 590; Report of the Committee on a Scheme for Surveying British Protectorates, 590; on the Topography and Resources of Northern Ontario, Canada, Dr. R. Bell, 590; on the Exploration of the Upper Strata of the Atmosphere by Means of Kites, Mr. A. Lawrence Rotch, 590; Report of the Committee on the Change of the Land-level of the Phlegraean Fields, Mr. Günther, 590-1; on Weather Maps Published Daily by various Countries; Mr. W. N. Shaw, F.R.S., 591; on the Organisation and Equipment of the

National Antarctic Expedition, Dr. J. Scott Keltie, 591; Dr. H. R. Mill, 591; on the Method and Plans of the Scottish National Antarctic Expedition, Mr. W. S. Bruce, 591; on the Experimental Demonstration of the Curvature of the Earth's Surface, Mr. H. Yule Oldham, 591; on an Expedition in Western China, Dr. R. Logan Jack, 591; on the Crux of the Upper Yang-tse, Mr. Archibald Little, 591; on the Representation of the Heavens in the Teaching of Cosmography, M. Galeron, 591; on the Movements of Men by Land and Sea, Mr. Mackinder, 591

Section G. (Mechanics).—Opening Address by Colonel R. E. Crompton, M.Inst.C.E., President of the Section, 517; on the Mechanical Exhibits at the Glasgow Exhibition, Mr. D. H. Morton, 613; on a Long-continuous-burning Petroleum Lamp for Beacons and Buoys, Mr. J. R. Wigham, 613; on a Recording Manometer for High Pressures, Mr. J. E. Petavel, 613; Report of the Small Screw Gauge Committee, 613; Report of the Committee on the Resistance of Road Vehicles to Traction, 613; on Railway Rolling Stock, Present and Future, Mr. D. Macdonald, 613; on the Panama Canal, Mr. Bunau-Varilla, 613; on the Commercial Importance of Aluminium, Prof. E. Wilson, 613; on the Protection of Buildings from Lightning, Mr. Killingworth Hedges, 613; on a Folding Rangefinder for Infantry, Prof. George Forbes, 613; Prof. Barr, 613; Prof. Stroud, 613; on a Machine for the Manufacture of Type, Mr. M. Barr, 613-14; on Some Recent Developments in Chain Driving, Mr. C. R. Garrard, 614

Section H (Anthropology).—Opening Address by Prof. D. J. Cunningham, M.D., D.Sc., LL.D., D.C.L., F.R.S., President of the Section, 539; on the Origin of the Cartilage of the stapes and its continuity with the Hyoid Arch, Dr. J. F. Gemmill, 614; on the Morphology of Transverse Vertebral Processes, Prof. A. Macalister, F.R.S., 614; on the "Temporary Fissures" of the Human Cerebral Hemispheres, Prof. J. Symington, 614; on the Frequency and Pigmentation Value of the Surnames of Scottish School Children in Eastern Aberdeenshire, Mr. J. F. Tocher, Mr. J. Gray, 614; on a Skull found in Peat in the Bed of the River Orwell, Miss Nina Layard, 614; Report of the Committee for the Ethnographic Survey of Canada, 614; on the Traditional History of the Caniengahakas, Mr. J. O. Brant Sero, 614; Report of the Skeat Expedition to the Malay Peninsula, 614; on the Half-Siamese Half-Malay Community of Sai-Kau, Mr. Annandale, Mr. Robinson, 614; on the Projected Ethnographic Survey of India, Mr. W. Crooke, 614; on Hints of Evolution in Tradition, Mr. D. MacRitchie, 615; on Dr. Fraser's Views of the Relations between Magic, Religion and Science, Mr. J. S. Stuart Glennie, 615; on the Chronology of the Stone Age of Man, Dr. W. Allen Sturge, 615; Sir John Evans, 615; Prof. Kendal, 615; on an Exhibit of Naturally Chipped Flints from the Larne Gravels and North Irish Beaches, Mr. Coffey, 615; on a Flint Palæolith with alleged "Thong-Marks," Miss Layard, 615; on a Piece of Yew from the Forest Bed of Kessingland, Mr. F. D. Longe, 615; Report of the Committee on the Age of Stone Circles, 615; on Excavations on Neolithic Sites in the Isle of Arran, Drs. Duncan and Bryce, 615; on a "Kitchen Midden" near Elie in Fife, Dr. Munro, 615; on the Excavation of the Roman Station at Ardoch in Perthshire, Mr. J. H. Cunningham, 615; Report of the Silchester Excavation Committee, 615; on the Age of Ogham Writing in Ireland, Mr. R. A. S. Macalister, 615; on the Bones of Hen Nekht, an Egyptian King of the Third Dynasty, Mr. C. S. Myers, 615; Report of the Cretan Exploration Committee, 615; on the Neolithic Settlement which underlies the Mycenaean Palace at Knossos, Mr. A. J. Evans, F.R.S., 615; on the Præsois Excavations, Mr. Bosanquet, 615; on a Mycenaean Site Excavated at Zakro, Mr. Hogarth, 615

Section I (Physiology).—Opening Address by Prof. John G. McKendrick, M.D., LL.D., F.R.S., President of the Section, 545

Section K (Botany).—Opening Address by Prof. I. Bayley Balfour, F.R.S., President of the Section, 557; on the Aims and Proposals of the International Association of Botanists, Dr. Lotsy, 615; on the Vegetation of Mount Ophir, Mr. A. G. Tansley, 616; on the Cytology of the Cyanophyceæ, Mr. Harold Wager, 616; on the Bromes

- and their Brown Rust, Prof. Marshall Ward, 616; Contributions to our Knowledge of the Gametophyte in the Ophioglossales and Lycopodiales, Mr. William H. Lang, 616; on the Vascular Anatomy of the Cyatheaceae, Mr. D. T. Gwynne-Vaughan, 616; on a Specimen of *Ophioglossum simplex* collected by Mr. Ridley in Sumatra, Prof. Bower, F.R.S., 617; on the Anatomy of *Ceratopteris thalictroides*, Miss Sibille O. Ford, 617; on Two Malayan "Myrmecophilous" Ferns, Mr. R. H. Yapp, 617; on the Anatomy of *Danaea* and other Marattiaceae, Mr. George Brehner, 617; on the Anatomy of *Todea*, Mr. A. C. Seward, F.R.S., Miss S. O. Ford, 617; Remarks on the Nature of the Stele of *Equisetum*, Mr. J. T. Gwynne-Vaughan, 617; on a Primitive Type of Structure in Calamites, Dr. D. H. Scott, F.R.S., 617; on a Calamite from the Calciferous Sandstone of Burntisland, Dr. D. H. Scott, F.R.S., 617; on the Past History of the Yew in Great Britain and Ireland, Prof. Conwentz, 617; on the Distribution of Certain Forest Trees in Scotland, Mr. W. N. Niven, 618; on Certain Points in the Structure of the Seeds, *Aethiostema*, Brongn., and *Stephanospermum*, Brongn., Prof. F. W. Oliver, 618; on the Structure and Origin of Jet, Mr. A. C. Seward, F.R.S., 618; on the Cuticular Structure of *Euphorbia Abdelkuri*, Professor Bayley Balfour, F.R.S., 618; on Abnormal Secondary Thickening in *Kendrickia Walkeri*, Miss A. M. Clark, 618; on the Histology of the Sieve Tubes of *Pinus*, Mr. A. W. Hill, 618; on Examples of Heterogenesis in Conifers, Dr. Lotsy, 618; on the Morphology of the "Flowers" of *Cephalotaxus*, Mr. W. C. Worsdell, 618; on Correlation in the Growth of Roots and Shoots, Prof. Kny, 618; on Natural Surgery in Leaves, Dr. F. F. Blackman, Miss Matthaei, 619; on the Absorption of Ammonia from Polluted Sea-water by *Ulva latissima*, Prof. Letts, Mr. John Hawthorne, 619; on the Diameter Increment of Trees, Mr. A. W. Borthwick, 619; on the Strength and Resistance to Pressure of Certain Seeds, Prof. G. F. Scott Elliot, 619; on the Transport of British Timber, Mr. Samuel Margerison, 619
- Section L (Education).*—Opening Address by the Right Hon. Sir John E. Gorst, F.R.S., President of the Section, 562; Educational Experiment and Research, Dr. Armstrong, 591; on the Experimental Method of Educational Teaching, Prof. L. C. Miall, 591; Sir Michael Foster, 591; on the Scope of Educational Science, Prof. H. L. Withers, 591; Mr. P. A. Barnett, 591; on the Teaching of Mathematics, Prof. Perry, 592; Prof. Hudson, 592; Prof. Forsyth, 592; Major MacMahon, 592; Prof. Rücker, 592; Prof. Silvanus Thompson, 592; Prof. Henrici, 592; Prof. Everett, 592; Prof. L. C. Miall, 592; Mrs. W. N. Shaw, 592; Appointment of a Committee of the British Association to Report upon Improvements in the Teaching of Mathematics, 592; on the Teaching of Botany in Schools, Mr. Harold Wager, 592; on the Teaching of Botany in Universities, Prof. Bower, 592; Prof. Miall, 593; Prof. Marshall Ward, 593; Prof. Withers, 593; Prof. Armstrong, 593; Dr. D. H. Scott, 593; Dr. Kimmins, 593; Sir John Gorst, 593; on the Organisation of Technical and Secondary Education, Sir Henry Roscoe, 593; Sir Michael Foster, 593; on the Creation of Local Educational Authorities, Sir Philip Magnus, 593; on the Influence of the Universities and Examining Bodies upon the Work of Schools, the Bishop of Hereford, 593; on the Teaching of Science in Elementary Schools, Dr. J. H. Gladstone, 593
- British Birds: a Handbook of, J. E. Harting, 297
- British Chemistry, the Position of, at the Dawn of the Twentieth Century: Opening Address in Section B at the Glasgow Meeting of the British Association, Prof. Percy F. Frankland, F.R.S., 503
- British East Africa and Uganda Protectorates, Veterinary Work in, R. J. Sturdy, 67
- British Instruments at the Paris Exhibition, C. V. Boys, F.R.S., 576
- British Islands: Lepidoptera of the, Charles G. Barrett, 444; on the Scientific Studies of the British Islands, Dr. Mill, 590; Sir John Murray, 590
- British Medical Association: Scientific Research as the Basis of all Medical Progress, Dr. G. B. Ferguson, 330
- British Mollusca: Our Country's Shells and How to Know Them: A Guide to, W. J. Gordon, 206
- British Museum: The Oldest Civilisation of Greece: Studies of the Mycenaean Age, H. R. Hall, 280; a Guide to the Shell and Star-fish Galleries (Mollusca, Polyzoa, Brachiopoda, Tunicata, Echinoderma and Worms) in the British Museum (Nat. Hist.), 423; Catalogue of the Collection of Birds' Eggs in the British Museum (Nat. Hist.), E. W. Oates, 600
- British Serpents, the Life-History of, and Local Distribution in the British Isles, Gerald R. Leighton, 624
- British School at Athens, the Annual of the, 11
- British Trade, Geographical Conditions Affecting, G. G. Chisholm, 589
- British West Indies, the Marine Resources of the, Dr. J. E. Duerden, 31
- Bromwich (T. J. I'A.), Congruent Reductions of Bilinear Forms, 295
- Bronze Medals, Alloys for, Sir W. C. Roberts-Austen, 309
- Brooks (A. H.), the Cape Nome (Alaska) Gold Region, 409
- Brough (B. H.), a Steel Medal, 65
- Brown Rust, on the Bromes and their, Prof. Marshall Ward, 616
- Brown (Prof. Adrian), on Enzymic Action, 611, 612
- Brown (Dr. Horace T., F.R.S.), Some Recent Work on Diffusion; Lecture at Royal Institution, 171, 193
- Browne (E. A.), a Manual of School Hygiene, 373
- Bruce (W. S.), Death and Obituary Notice of Prof. Baron Adolf Erik von Nordenskjöld, 450; on the Methods and Plans of the Scottish National Antarctic Expedition, 591
- Bruner (L.), Dynamic Investigations on Bromination of Aromatic Compounds, 265
- Brunhes (B.), Direction of Magnetisation in Clay Beds baked by Lava Flow, 320
- Brunton (Sir Lauder, F.R.S.), Glycolytic Enzyme in Muscle, 198
- Brush (Mr.), on Determining the Influence of Water Vapour on the Energy Lost by a Heated Body Placed in an Enclosure containing Air, Hydrogen or Water Vapour, 586
- Brussels Meteorological Averages, 1833-1900, 214
- Bryant (Sophie), Euclid's Elements of Geometry, 623
- Bryce (Dr.), on Excavations on Neolithic Sites in the Isle of Arran, 615
- Buchanan (J. Y., F.R.S.), the Size of the Ice-grain in Glaciers, 399; Solar Radiation, 456
- Buckley (Arabella B.), Cassell's Eyes and No Eyes, 550
- Budgett (J. S.), on the Youngest Known Larva of *Polypterus*, 588
- Buffalo Exhibition, the Electrical Illuminations at the, 287
- Building Construction, First Stage, Brysson Cunningham, 625
- Bullen (Rev. R. A.), Two Well-Sections, 94
- Bulletin of American Mathematical Society, 45, 221, 341
- Bulletin of the Philosophical Society of Washington, 253
- Bulman (G. P.), Hybrid Oochromy, with a Note on Xenia, 207
- Bunau-Varilla (M.), on the Panama Canal, 613
- Bunel (L.), New Mode of Decomposition of Bisulphite Derivatives, 176
- Burck (Dr. W.), Possible Provision of Nature against Hybridisation in Plants, 310
- Burntisland, on a Calamite from the Calciferous Sandstone of, Dr. D. H. Scott, F.R.S., 617
- Burstall (Prof. F. W.), Proceedings of the Eighth Annual Meeting of the Society for the Promotion of Engineering Education, held in New York City July 2-3, 1900, 204
- Burt (J.), the Climate of Pemba, 20
- Butterflies and Moths, Familiar, W. F. Kirby, 375
- Byrn (Edward W.), Progress of Invention in the Nineteenth Century, 125
- Cable, Submarine, on a Form of Artificial, Prof. A. Trowbridge, 77
- Cairngorms, on the Mode of Occurrence of, E. H. Cunningham Craig, 566
- Calamite, on a, from the Calciferous Sandstone of Burntisland, Dr. D. H. Scott, F.R.S., 617
- Calamites, on a Primitive Type of Structure in, Dr. D. H. Scott, F.R.S., 617
- Calculus: the Elements of the Differential and Integral Calculus, J. W. A. Young, C. E. Linebarger, 396; Differential and Integral Calculus, with Applications for Colleges, Universities and Technical Schools, E. W. Nichols, 396
- California: the Salton Salt Deposits, 19

- Californian Method of Fruit Protection from Frost, A. G. McAdie, 214
- Callendar (Prof. H. L.), Thermodynamical Correction of Gas Thermometer, 23
- Calmette's (Dr.) Anti-Venene, the Value of, 657
- Cabbage (R. H.), Botany of Interior of New South Wales, 548
- Cambier (R.), New Method of Examination for Typhoid Bacillus, 200
- Cambridge Natural History, vol. viii., Amphibia and Reptiles, Hans Gadow, G. A. Boulenger, F.R.S., 401
- Cambridge Philosophical Society, 95, 143
- Camel, Bactrian, the Origin and Habits of, 355
- Canada: a Canadian Geological Explorer, Dr. Robert Bell, F.R.S., 81; on the Topography and Resources of Northern Ontario, Dr. R. Bell, F.R.S., 590; Report of the British Association Committee for the Ethnographical Survey of Canada, 614; on the Traditional History of the Canien-gahakas, J. O. Brant Sero, 614
- Canal Navigation: the Aire and Calder Canal Navigated by a Sea-going Steamer, 434
- Canary Islands and South Africa, Essays and Photographs, some Birds of the, II. E. Harris, 603
- Cape Observatory, the, Sir David Gill, 410; the McClean Telescope at the Cape Observatory, 632
- Cape Photographic Durchmusterung for the Equinox 1875, the, Sir David Gill, F.R.S., 257
- Cape Viper, the, Claude E. Benson, 126
- Capella, Spectroscopic Binary, 639
- Capitan (L.), Palæolithic Drawings on Walls of Caves in Dordogne, 572
- Carbon Monoxide, the Spectra of, and Silicon Compounds, Dr. Karl v. Wesendonk, 29; the Persistence of the Spectrum of Carbon Monoxide, Prof. W. N. Hartley, F.R.S., 54
- Cardew (Major), Electric Traction, 437
- Carhart (Prof.), the Various Determinations of the E.M.F. of the Clark Cell, 60
- Charles (P.), Stream Invasion by *Jussiaea grandiflora* in France, 464
- Carnac and Stonehenge, 465
- Carnegie Technical School at Pittsburg, 570
- Carpenter (R. C.), Food Consumption and Metabolism; the Mechanical Efficiency of Bicyclists, 382
- Carter (W.), Reactions of Hydroxamides, 175
- Cassell's Eyes and No Eyes Series, Arabella B. Buckley, 550
- μ Cassiopeiæ, Parallax of, 216
- Cartography: Maps: their Uses and Construction, James Morrison, 599
- Cat, the Anatomy of the, Jacob Reighard and H. S. Jennings, 155
- Catalase, a New Vegetable Enzyme, Dr. O. Loew, 239
- Catalogue of the Collection of Birds Eggs in the British Museum (Natural History), E. W. Oates, 600
- Causes of the Variability of Earthshine, 456
- Causse (H.), Reaction with Crystal Violet characteristic of Pure Waters, 272
- Cave-dwellers of N. W. Mexico, the, Dr. C. Lumholtz, 522
- Caves in Dordogne, Palæolithic Drawings on Walls of, L. Capitan and H. Breuil, 572
- Caves of Fiji, the, B. Sawyer and E. C. Andrews, 143
- Ceibes, the Island of, Dr. Paul Sarasin and Dr. Fritz Sarasin, 203
- Celestial Objects having Peculiar Spectra, 359
- Cell, a Convenient Primary, A. E. Munby, 30
- Cell, the "Edison" Storage, 241
- Centenary of the Discovery of Ceres, 129
- Cephalotaxus*, on the Morphology of the "Flowers" of, W. C. Worsdell, 618
- Ceraski (Prof. W.), Two New Variable Stars, 167
- Ceratopteris thalictroides*, on the Anatomy of, Miss Sibille O. Ford, 617
- Cerebral Science, Studies in Anatomical Psychology, Dr. Wallace Wood, 101
- Ceres, the Centenary of the Discovery of, 129
- Cetacea, on the Pelvic Cavity of the Porpoise as a Guide to the Determination of the Sacral Region in the, Dr. Hepburn, 587; Dr. D. Waterston, 587
- Chain Driving, on some Recent Developments in, C. R. Gerard, 614
- Chalk, Zones in, Dr. A. W. Rowe, 355
- Chalmers (Rev. James) ("Tamate"), Obituary Notice of, Dr. A. C. Haddon, F.R.S., 38
- Channel Islands and South Devon on April 24, Reported Earthquakes in, Dr. Charles Davison, 126
- Chapman Jones Photographic Plate Tester, the, 134
- Charabot (E.), Mechanism of Etherification in Plants, 440
- Charrin (M.), Absence of Bacteria in Air and Food Prejudicial to Animal Organism, 48
- Chauveau (A.), Can Sulphuretted Hydrogen Poisoning be Caused through Skin and Mucous Membrane? 320
- Chavastelon (R.), Action of Acetylene on Neutral Saturated Solution of Cuprous Chloride, 224
- Cheesewright's (Mr.) projected London and Brighton Electric Railway, 580
- Chemistry: Die Wissenschaftlichen Grundlagen der Analytischen Chemie elementar dargestellt, Prof. W. Ostwald, 5; an Introduction to Modern Scientific Chemistry, Dr. Lassarc-Cohn, 5; Electro-Chemistry, John Hill Twigg, 5; Dr. F. Mollwo Perkin, 5; Indigo and Sugar, Dr. F. Mollwo Perkin, 10; the Progress of Artificial Indigo, 433; Obituary Notice of Prof. Francois Marie Raoult, 17; Chemistry in its Relations to Engineering, Prof. Frank Clowes, 22; Barium Hydride, M. Guntz, 23; Estimation of Nitric Acid in Waters by Stannous Chloride, H. Henriot, 23; Glucamine, L. Maquenne and E. Roux, 24; Experimental Chemistry, Lyman C. Newell, 27; Assimilation Chlorophyllienne et la Structure des Plantes, Dr. Ed. Griffon, 28; the Spectra of Carbon Monoxide and Silicon Compounds, Dr. Karl v. Wesendonk, 29; the Persistence of the Spectrum of Carbon Monoxide, Prof. W. N. Hartley, F.R.S., 54; Carbon Monoxide in Blood of Newly-born, M. Nicloux, 224; a Convenient Primary Cell, A. E. Munby, 30; Chemical Society, 46, 94, 174; Nitrocamphene, Aminocamphene and Hydroxycamphene, O. Forster, 46; Origin of Combined Chlorine in Moorland Waters, W. Ackroyd, 46; Robinin, Violaquercitrin and Osyritrin, A. G. Perkin, 46; New Method of Preparing Salicylaldehyde Methyl Ether, J. C. Irvine, 47; Di-iodococaine Hydrochloride, W. Garsed and J. N. Collie, 47; Preparation of Synthetical Glucosides, H. Ryan and W. S. Mills, 47; Karabin, R. C. L. Bose, 47; New Series of Dimercuri-ammonium Salts, P. C. Ráy, 47; Urea-formation by Oxidation of Albumin by Ammonium Persulphate, L. Huguoneng, 120; the Existence of Ammonium, Dr. O. Ruff, 637; Ethyl Nitro-acetate, A. Wahl, 48; the Voandzou, M. Balland, 48; the Periodic Classification and the Problem of Chemical Evolution, G. Rudolf, 51; Physikalisch-chemische Propädeutik, H. Griesbach, 53; Researches on Organic Peroxides, MM. v. Baeyer and Villiger, 64; Osmosis through Membrane of Copper Ferrocyanide, G. Flusin, 71; Combinations of Aluminium with Tungsten, Léon Guillet, 71; Aluminium-molybdenum Alloys, Léon Guillet, 176; Aluminium-magnesium Alloys, M. Boudouard, 176; Aluminium in Mineral Waters, F. Parmentier, 176; Action of Isobutylenebromide on Benzene in Presence of Aluminium Chloride, F. Bodroux, 176; Alumina in Madagascar Soil, T. Schläesing, 119; Crystallised Lime, Ad. Jouve, 71; Hydration of Amylpropionic Acid with Formation of Caproyl-acetic Acid, Ch. Moureu and R. Delange, 71; Dimethylpyruvic Acid, A. Wahl, 72; Action of Acid Chlorides on Ether Oxides in Presence of Zinc Chlorides, Marcel Descudé, 72; Electro-Chemistry, Bertram Blount, 77; Dr. F. Mollwo Perkin, 77; the Velocity of Reactions, W. Duane, 92; Derivatives of Bicyclopentane, W. H. Perkin, jun., and J. F. Thorpe, 94; Lead Silicates in Relation to Pottery Manufacture, T. E. Thorpe and C. Simmonds, 94; the Use of Lead Compounds in Pottery, Prof. T. E. Thorpe, F.R.S., 408; Influence of Grinding on Solubility of Lead in Lead Fritts, Dr. T. E. Thorpe, F.R.S., and Charles Simmonds, 175; Substitution of Zinc-White for White Lead in Oil Painting, A. Levache, 120; 2:6-dibromo-4-nitrosophenol, M. O. Forster and W. Robertson, 94; the Aromatic Organo-magnesium Compounds, MM. Tissier and Guignard, 96; Decomposition of Albuminoids into Protoplasmides, A. Etard, 96; the Sporulation of Yeasts, A. Guilliermond, 96; Praktikum des Anorganischen Chemikers, Dr. Emil Knoevenagel, 99; Vitrified Quartz, Lecture at Royal Institution, W. A. Shenstone, F.R.S., 65, 126, Prof. J. Joly, F.R.S., 102; Relations between Electrical Conductivity and Chemical Character of Solutions, Prof. J. Gibson, 119; Molecular depression of Temperature of maximum Density of Water caused by Dissolution of Salts, L. C. de Coppet, 119; Synthesis of Primary Acetylenic Alcohols, C. Moureu and H. Desmots,

- 120; Oxidation of Primary Alcohols by Contact Action, J. A. Trillat, 120; Glucoside Characteristic of Germinating Period of Beech, P. Tailleux, 120; Le Coton, Prof. H. Lecomte, Prof. Roberts Beaumont, 124; the Leipzig Chemical Laboratory, 127; the Inorganic Ferments, G. Bredig and K. Ikeda, 135; the Addition of Hydrogen to Hydrocarbons, Paul Sabatier and J. B. Senderens, 143; Density of Alloys, E. von Aubel, 143; Reduction of Silver Chloride by Hydrogen, M. Journiaux, 143; Action of Solar Radiations on Silver Chloride in presence of Hydrogen, M. Journiaux, 248; Synthesis of Aromatic Aldoximes by Fulminating Silver, R. Scholl, E. Bertsch, 191; Action of Silver on Hydrobromic Acid, M. Journiaux, 344; Action of Hydrogen Peroxide Solution on Silver Oxide, Daniel Berthelot, 644; Emanations from Radio-active Substances, Prof. E. Rutherford, 157; New Method of Crystallising Ferro-silicium, -Manganese and -Chromium, D. Korda, 165; the Neutralisation of Phosphoric Acid, Daniel Berthelot, 175; Optically Active Nitrogen Compounds, W. J. Pope and A. W. Harvey, 174; Reactions of Hydroxamides, R. H. Pickard and W. Carter, 175; the Colloid Form of Piperine, H. G. Madan, 175; the Condensation of Ethylphenylketone, with Benzaldehyde, R. D. Abell, 175; New Method of Determining Hydrolytic Dissociation, R. C. Farmer, 175; New Metallic Borides, S. A. Tucker and H. R. Moody, 175; Action of Alkyl Malonic Esters on Diazoic Chlorides, G. Farrel, 176; New Mode of Decomposition of Bisulphite Derivatives, P. Freundler and L. Bunel, 176; Secondary Products of Action of Sulphuric Acid on Wood Charcoal, A. Verneuil, 176; Public Water-supplies, Requirements, Resources and the Construction of Works, F. E. Turneure and H. L. Russell, 179; Does Chemical Transformation Influence Weight? Lord Rayleigh, F.R.S., 181; Succinic Dialdehyde, C. Harries, 191; Glycolytic Enzyme in Muscle, Sir Lauder Brunton, F.R.S., and Herbert Rhodes, 198; Catalase, a New Vegetable Enzyme, Dr. O. Loew, 239; Behaviour of Amino-acids to Indicators, Daniel Berthelot, 199; Variations of Alkaloidal Nitrogen in Urine, H. Guillemard, 200; Chemical Technology, or Chemistry in its Applications to Arts and Manufactures, vol.iii., Gas Lighting, Charles Hunt, 205; Tyrer's Marsh-Berzelius Arsenic Test Apparatus, 215; Formation of Insoluble Phosphates by Double Decomposition, Daniel Berthelot, 224; Action of Epichlorhydrin and Epibromhydrin on Sodium Derivatives of Benzoylacetic Esters, M. Haller, 224; Capillary Constants of Organic Liquids, Ph. A. Guye, A. Baud, 224; Europium, a New Element, Eug. Demarcay, 224; Chlorobromides of Thallium, V. Thomas, 224; Action of Acetylene on Neutral Saturated Solution of Cuprous Chloride, R. Chavastelon, 224; Method of Synthesis of Acetylenic Aldehydes, Ch. Mouren and A. Delange, 296; Electrolytic Separation of Nickel and Cobalt, D. Balachowski, 224; Biochemical Differentiation of Two Ferments of Vinegar, G. Bertrand and R. Sazerac, 224; Reactions of Two Bases Added Simultaneously to Phosphoric Acid, Daniel Berthelot, 248; Acetylenic Radicles, Daniel Berthelot, 248; Synthesis of Colouring Matter from Diphenylene-phenylmethane, A. Haller and A. Guyot, 248; Action of Mercuric Oxide on Aqueous Solutions of Metallic Salts, A. Mailhe, 248; Action of Acid Chlorides on Aldehydes in Presence of Zinc Chloride, Marcel Descudé, 248; Synthesis of Boronatrocalcite, A. de Schulten, 248; Iodine in Blood, MM. Stassano and P. Bourcet, 248; Die Heterocyclischen Verbindungen der Organischen Chemie, Edgar Wedekind, 252; Electrochemical Laboratory at Owens College, Manchester, 262; Chemical Analysis of Scotch Sandstones, Dr. W. Mackie, 264; Chemical Relationship between Hæmoglobin and Chlorophyll, Herren Nencki and Marchlewski, 265; Dynamic Investigations on Bromination of Aromatic Compounds, L. Bruner, 265; Molecular Constitution of Supersaturated Solutions, Prof. Hartley, F.R.S., 271; Phosphoric Acid and Chlorides of Alkaline Earths, Daniel Berthelot, 271; Fused Niobium, Henri Moissan, 271; Refraction Indexes of Liquid Mixtures, J. de Kowalewski and J. de Modzelewski, 272; Acidimetry of Arsenic Acid, A. Astruc and J. Tarbouriech, 272; Conversion of Uncoloured into Coloured Compound of Sodium Tetrazotolysulphite with Ethyl- β -Naphthylamine, A. Seyewetz, M. Blanc, 272; Action of Benzaldehyde on Sodium Methol, C. Martine, 272; Camphor Combinations with β -hydroxy- α -naphthylaldehyde, André Helbronner, 272; Action of Bromacetophenone on Sodium Acetylacetonate, F. March, 272; Action of Hydrogen Sulphide on Acetylacetonate, F. Leteur, 272; Saccharification of Leguminous Seeds Favoured by Sodium Fluoride, H. Hérissé, 272; Generality of Metal-fixation by Cell-wall in Plants, H. Devaux, 272; Reaction with Crystal Violet Characteristic of Pure Waters, H. Causse, 272; Oxochloride of Phosphorus as Cryoscopic Solvent, G. Oddo, 288; New Derivatives of Benzylcamphor and Benzylidene camphor, A. Haller and J. Minguin, 295; Manganic Phosphates, V. Auger, 296; Action of Acid Chlorides on Methanal, Louis Henry, 296; Dinaphthoxanthene, R. Fosse, 296; Product of Nitration of Acetoacetic Ether, L. Bouveault and A. Bongert, 296; the Intermittent Spring at Vesse, F. Parmentier, 296; the Sugar from Blood, MM. R. Lépine and Boulud, 320; Thermal Study of Potassium Hydrates, 320; Position and Prospects of Electro-chemical Industries, J. W. Swan, F.R.S., 329; the Crystallisation of Salt Solutions, Dr. H. M. Dawson, 336; Radiation of Uranium Constants at very Low Temperatures, H. Becquerel, 344; Electrolytic Preparation of Pure Oxide of Cerium, Jean Stebba, 344; Action of Copper Hydrate on Solutions of Metallic Salts, A. Mailhe, 344; Oxidation of Propylglycol by *Mycoderma aceti*, André Kling, 344; Modern Chemistry, William Ramsay, 349; Chemical Lecture Experiments, Francis Gano Benedict, 350; Poison of *Lotus arabicus*, W. R. Dunstan, F.R.S., and T. A. Henry, 367; Solubility of Mixtures of Sulphate of Copper and Sulphate of Soda, MM. Massol and Maldes, 368; Aluminium-Molybdenum Alloys, Léon Guillet, 368; the Crystallisation of Cerium Oxide, Jean Sterba, 368; Action of Ethyl Alcohol on Barium Ethylate, Marcel Guerbet, 368; die Krystallisation von Eiweissstoffen und ihre Bedeutung für die Eiweisschemie, Dr. Fr. N. Schulz, 375; Lehrbuch der Mathematischen Chemie, J. J. van Laar, 375; New Method of preparing Aniline, Paul Sabatier and J. B. Senderens, 392; Qualitative Chemical Analysis, Organic and Inorganic, F. Mollwo Perkin, 397; Woad as a Blue Dye, Dr. C. B. Plowright, 413; Action of Sodium Thiosulphate on Solutions of Metallic Salts at High Temperatures and Pressures, J. T. Norton, Jun., 415; the Laboratory of Wilhelm Ostwald, 428; a Select Bibliography of Chemistry, 1492-1897, Henry Carrington Bolton, 430; the Self-Educator in Chemistry, James Knight, 467; Death of Dr. J. L. W. Thudichum, 489; Obituary Notice, 527; a Cesium-tellurium Fluoride, H. L. Wells and J. M. Willes, 547; Estimation of Calcium, Strontium and Barium as Oxalates, C. A. Peters, 548; Molecular Weights of Chloral Hydrate at Boiling-point, M. de Forcrand, 572; Distribution of Acidity in Stem, Leaf and Flower, A. Astruc, 572; Theine in the Tea-plant and Organic Iron Compounds in Plants, N. Suzuki, 582; the formation of Acids in Plants, MM. Berthelot and André, 596; Calculation of Heats of Volatilisation and Fusion of Elements, M. de Forcrand, 596; Nitromannite and Nitrocellulose, Léo Vignon and F. Gerin, 596; Formation of Isatin Derivative of Albumen, Julius Gnezda, 596; Antimony in Organism, G. Pouchet, 596; Chemistry Teaching in United States Medical Schools, Prof. J. H. Long, 607; Causes of Difference in Colour between Green and Black Tea, 607; Action of Urethane on Pyruvic Acid, L. J. Simon, 620; Action of Urea on Pyruvic Acid, L. J. Simon, 644; Monobromalenic Dialdehyde, R. Lespiau, 620; Reducing Properties of Nitric Esters, Léo Vignon and F. Gerin, 620; Chemistry of the Cygnian Stars and Basic Rocks, Sir Norman Lockyer, K.C.B., F.R.S.; Prof. Edw. Suess, 629; Death of Prof. Maercker, 635; Dissociation of Sulphur Molecules, H. Biltz, 638; Nitro-derivative of Pentaerythrite, Léo Vignon and F. Gerin, 644; Hemoverdine, L. Lewin, 644; Note on a Point of Chemical Nomenclature, 648; Chemical Effects of Light on Plant Life, Herren Ciamician and Silber, 658; Chemical Analysis of Mummified Fishes of Ancient Egypt, MM. Lortet and Hugouneq, 668; Action of Pyridine Bases on Tetra-halogen Quinones, Henry Imbert, 668; Oxidation of Benzene Hydrocarbons by Manganese Peroxide and Sulphuric Acid, H. Fournier, 668; Nitro-Derivatives of Arabite and Rhamnite, Léo Vignon and F. Gerin, 668; Physiological Chemistry, the Feeding of Animals, W. H. Jordan, 625; see also Section B, British Association.
- Chesnaye (C. P.), Fauna of N.E. Rhodesia, 383
Cheviots, on Overflow Channels and other Phenomena indicating

- Glacier-dammed Lakes in the, Prof. P. F. Kendall, H. B. Muff, 565
- Cheyne (Prof. T. K.), Encyclopædia Biblica: Critical Dictionary of the Literary, Political and Religious History, the Archaeology, Geography and Natural History of the Bible, 3
- Child: his Nature and Nurture, the, W. B. Drummond, 53
- China: Death and Obituary Notice of Dr. E. Bretschneider, 87; on an Expedition in Western China, Dr. R. Logan Jack, 591; on the Crux of the Upper Yang-tse, Archibald Little, 591; Tibet and Chinese Turkestan, Captain Deasy, 653
- Chisholm (G. G.), on Geographical Conditions affecting British Trade, 589
- Chlorophyll: Assimilation Chlorophyllienne et la Structure des Plantes, Dr. Ed. Griffon, 28; Chlorophyll Assimilation, Jean Friedel, 88
- Chree (Dr. C., F.R.S.), Applications of Elastic Solids to Metrology, 93; the Norwegian North Polar Expedition, 1893-96, 151; Report on Observations in Terrestrial Magnetism and Atmospheric Electricity made at the Central Meteorological Observatory of Japan for the Year 1897, 151
- Chronographic Measurements, a New Method of using Tuning-forks in, Rev. F. J. Jervis-Smith, F.R.S., 232
- Chronometers, Use of Nickel-Steel Alloy for Compensation Balance, C. E. Guillaume, 88
- Chrystal (Prof. G.), Solution of Cubic and Biquadratic Equations, 5; Obituary Notice of Prof. Tait, 305
- Church (Colonel George Earl), Central and South America, A. H. Keane, 353
- Ciamician (Herr), Chemical Effects of Light on Plant Life, 658
- Ciel, Histoire du, Clemence Royer, 497
- Circulation of the Atmosphere, the, Mémoires originaux sur la Circulation générale de l'Atmosphère, Marcel Brillouin, 396
- Circulation of the Surface Waters of the North Atlantic Ocean, H. N. Dickson, 665
- Civil Engineering, Progress of, Address at American Society of Civil Engineers, J. J. R. Croes, 438
- Civil Engineers, Institute of, Chemistry and its Relations to Engineering, Prof. Frank Clowes, 22
- Civilian War Hospital, a, 346
- Civilisation of Greece, the Older, 11; the Oldest, H. R. Hall, 280
- Clarke (Miss A. M.), on Abnormal Secondary Thickening in *Kendrickia Walkeri*, 618
- Claude (H.), Lecithin in Tuberculosis, 572
- Claypole (Dr. E. W.), Death and Obituary Notice of, 528
- Clayton (H. H.), the Eclipse Cyclone, 271
- Climate and Crops, Relations between, H. B. Wren, 493
- Close (Rev. M. H.), Hipparchus and the Precession of the Equinoxes, 71; Phototherapy, 301
- Cloud Observations in India, E. H. Hill, 262
- Clowes (Prof. Frank), Chemistry in its Relations to Engineering, 22
- Clyde, on the Effects of Vegetation in the Valley and Plain of the, Prof. G. F. Scott Elliott, 589
- Coal Dust Explosion at Aber Valley Colliery, 111
- Coal Exports of Great Britain, the, E. G. Wethered, 19
- Coal-Field, the Dover, 581
- Coal Hoist, New Hydraulic, 407
- Coal-Mining, a Text-Book of, Herbert W. Hughes, 324
- Cockerell (Prof. T. D. A.), Variation in a Bee, 158
- Coffee Culture, Shade in, O. F. Cook, 264
- Coffey (Mr.), on Naturally Chipped Flints from the Larne Gravels and North Irish Beaches, 615
- Cohen (R. W.), on the Effects of Sea Temperature and Wind Direction on the Seasonal Variation of Air Temperature in these Islands, 587
- Coker (Dr. E. G.), Apparatus for Strain-measurement, 199
- Coleridge (Hon. Stephen), the National Anti-Vivisection Society and Lord Lister, 101
- Coles (John), Hints to Travellers, 100
- Collie (J. N.), Diiodococaine Hydride, 47
- Collinge (W. E.), Anatomy of Slugs from North-West Borneo, 199
- Collot (M.), Carboniferous Goniatites in Sahara, 392
- Colorado Potato Beetle, the, W. F. Kirby, 450
- Coloration of Marine Animals, Prof. W. C. McIntosh, 62
- Colour and Polarisation of Blue Sky Light, the, Dr. N. E. Dorsey, 138; Negative After-Images and Colour-Vision, Shelford Bidwell, F.R.S., 216; Colour-Standards, Prof. S. P. Langley, 269
- Colours of Guillemots' Eggs, the, Captain G. E. H. Barrett-Hamilton, 600
- Colson (Albert), Inversion-points of Solutions, 644
- Comets: Comet *a* (1901), 21, 42, 63, 114, 191; Elements of Comet 1901 (1), 436, 557; Observation of Comet *a* (1901), J. Cresswell, 410; Observations of Comet *a* (1901) at Algiers, MM. Rambaud and Sy, 143; the New Comet, E. C. Willis, 55; Definitive Orbit of Comet 1894 II (Gale), 89; Encke's Comet, 359, 384, 583; Elliptic Elements of Comet 1900 *c*, M. Perrotin, 644
- Commensalism, Instances of, Major Alcock, 190
- Commercial Education at Home and Abroad, Frederick Hooper and James Graham, 442
- Compass and its Deviations aboard Ship, a Treatise on Electromagnetic Phenomena and on the, Mathematical, Theoretical and Practical, Commander T. A. Lyons, 125
- Comptometer, the, C. V. Boys, F.R.S., 265
- Comstock (Prof. Geo. C.), a Text-book of Astronomy, 424
- Conchology: Radiographs of Mollusk Shells, Dr. G. H. Rodman, 189
- Conference, the International Seismological, at Strassburg, Dr. F. Omori, 340
- Congresses: the Congress on Tuberculosis, 301, 327; the Sixth Annual Congress of the South-Eastern Union of Scientific Societies, 192; the International Zoological Congress, 405; Recent Progress in Waterways and Maritime Works, Papers read at International Engineering Congress at Glasgow, 639
- Consciousness, the Evolution of, Leonard Hall, 467
- Construction, Building, First Stage, Brysson Cunningham, 625
- Consular Reports, Notes from Recent, 67
- Conway (Sir Martin), the Rise and Fall of Smeerenburg, Spitsbergen, 40
- Conwentz (Prof.), on the Past History of the Yew in Great Britain and Ireland, 617
- Cook (Captain), Illustrations of the Botany of Captain Cook's Voyage Round the World in H.M.S. *Endeavour* in 1768-1771, Right. Hon. Sir Joseph Banks and Dr. Daniel Solander, W. Botting Hemsley, F.R.S., 374
- Cook (O. F.), Shade in Coffee Culture, 264
- Cooper (Dr. R. T.), Suggested Afforestation of Ireland, 264
- Cooper Medical College in San Francisco, Lane Lectures at, History of Physiology during the Sixteenth, Seventeenth and Eighteenth Centuries, Sir M. Foster, K.C.B., Sec. R.S., 417
- Cooper-Hewitt Mercury Vapour Lamp, the, 581
- Copeland (Prof.), Nova Persei, 119
- Copper, on the Scottish Ores of, J. G. Goodchild, 565
- Copper Oxide, Decomposition of, Philip Harrison, 233
- Coppet (L. C. de), Molecular Depression of Temperature of Maximum Density of Water caused by Dissolution of Salts, 119
- Coral Island, on the Land Crustaceans of a, L. A. Borradaile, 588
- Coral Islands of the Maldives, J. Stanley Gardiner on the, 587
- Corals, Rate of Growth of, J. S. Gardiner, 143
- Corbino (O. M.), Constitution of White Light, 464
- Cornu (A.), Determination of Three Principal Optical Parameters of a Crystal by Refractometer, 320
- Cornu (Maxime), Death and Obituary Notice of, Sir W. T. Thiselton-Dyer, F.R.S., 211
- Cornish (Dr. Vaughan), Sand Waves in Tidal Currents, 412; Report of the Committee on Terrestrial Surface Waves, 590
- Corona, Photography of, 167
- Coronas (Rev. J.), the Luzon Cyclone of September 8, 1900, 61
- Correlation in the Growth of Roots and Shoots, on, Prof. Kny, 618
- Corstorphine (Mr.), on the Condensation of Benzil with Dibenzylketone, 612
- Cortie (Father), on the Faculae on the Sun's Surface, 587
- Cosmogony and Evolution: Entstehen und Vergehen der Welt als Kosmischer Kreisprozess, J. G. Vogt, 277
- Cosmography, on the Representation of the Heavens in the Teaching of, M. Galeron, 591
- Coton, Le, Prof. H. Lecomte, Prof. Roberts Beaumont, 124
- Coulter, (John M.), Plant Studies, an Elementary Botany, 300
- Coupin (Henri), the Song of Birds, 20, 62; Wheat Growth Favoured by Potassium Salts, 248
- Craig (E. H. Cunningham), on the Mode of Occurrence of Cairngorms, 566
- Craniology: New Method of Obtaining Cubic Index of Skull, M. Pelletier, 490; Opening Address in Section H at the

- Glasgow Meeting of the British Association, Prof. D. J. Cunningham, F.R.S., 539; on the "Temporary Fissures" of the Human Cerebral Hemisphere, Prof. J. Symington, 614; on a Skull found in Peat in the Bed of the River Orwell, Miss Nina Layard, 614; the Earliest Inhabitants of Abydos; a Craniological Study, D. Randall-Maciver, 647
- Creak's (Capt.) Modified Dip Circle: on the Determination of Magnetic Force on board Ship, 586
- Crémieu (V.), the Existence of Open Currents, 71; a very Sensitive Electric Balance, 143; on the Magnetic Effects of Electrical Convection, 586
- Cresswell (J.), Observation of Comet *a* (1901), 410
- Crete, Excavations of Ancient Sites in, 615
- Croes (J. J. R.), Progress of Civil Engineering, Address at American Society of Civil Engineers, 438
- Crompton (Col. R. E.), Opening Address in Section G at the Glasgow Meeting of the British Association, 517
- Crook (Z.), New Magnetic Yoke for Measuring Hysteresis, 92
- Crops, Relations between Climate and, H. B. Wren, 493
- Crustacea, the Stalk-eyed, of British Guiana, West Indies and Bermuda, Dr. Charles G. Young, 98
- Crystallisation; Results of chilling Copper-Tin Alloys, C. T. Heycock and F. H. Neville, 221
- Crystallisation of Salt Solutions, the, Dr. H. M. Dawson, 336
- Crystallography: Comparative Study of Magnesium Group of Double Selenates, A. E. Tutton, F.R.S., 141; Isomorphic Relations between Sulphates and Orthophosphates, G. T. Prior, 247; Determination of Three Principal Optical Parameters of a Crystal by Refractometer, A. Cornu, 320; Die Krystallisation von Eiweissstoffen und ihre Bedeutung für die Eiweisschemie, Dr. Fr. N. Schulz, 375
- Crystals of Calaverite, Herbert Smith, 247
- Cuba, the Bituminous Deposits of, H. E. Peckham, 365
- Cubic and Biquadratic Equations, Solution of, Prof. G. Chrystal, 5
- Cultura del Frumento, 1899-1900, Prof. Italo Giglioli, 229
- Culture (1492-1899), Annals of Politics and, G. P. Gooch, 53
- Culture, Greek Philosophy and Modern, Theodor Gomperz, 345
- Cunningham (Brysson), First Stage Building Construction, 625
- Cunningham (Prof. D. J., F.R.S.), Opening Address in Section H at the Glasgow Meeting of the British Association, 539
- Cunningham (J. T.), Long-tailed Japanese Fowls, 158
- Curie (P.), Physiological Action of Radium Rays, 175; Radio-activity of Radium Salts, 368
- Curious Phenomenon, a, Stanley B. Hutt, 233
- Current Measurements, Earth, Dr. B. Weinstein, 230
- Curvature of the Earth's Surface, on the Experimental Demonstration of the, H. Yule Oldham, 591
- Cyanophyceæ, on the Cytology of the, Harold Wager, 616
- Cyatheaceæ, on the Vascular Anatomy of the, D. T. Gwynne-Vaughan, 616
- Cygni, Hisgen's Variable, 13 (1900), 114
- Cygni, New Algol-type Variable, 78 (1901), 583
- Cygnian Stars and Basic Rocks, Chemistry of the, Sir Norman Lockyer, K.C.B., F.R.S., Prof. Edw. Suess, 629
- Cylinders, Circular, Elastic Equilibrium of, L. N. G. Filon, 246
- Cytology: Lecithoblast and Angioblast der Wirbelthiere, Wilhelm His, 75; Les Problèmes de la Vie, Essai d'une interprétation scientifique de phénomènes vitaux, la Substance Vivante et la cytotidérièse, Dr Ermanno Giglio-Tos, 321; on the Cytology of the Cyanophyceæ, Harold Wager, 616
- Danaea, on the Anatomy of, and other Marattiaceæ, George Brebner, 617
- Danby Dale, Landslip in, 41
- Dark Spot on Jupiter, 240
- Darwin (Horace), Vertical Stone-movements due to Soil-moisture and Frost, 222
- Darwinism, the Elements of, a Primer, A. J. Ogilvy, 28
- Darwin'schen Selectionsprincipien, Ueber Bedeutung und Tragweite des, L. Plate, 49
- Davenport (Prof. C. B.), Zoology of the Twentieth Century, Address at American Association for Advancement of Science, at Denver, 566
- David (P.), Direction of Magnetisation in Clay-beds Baked by Lava Flow, 320
- David (Prof. T. W. E., F.R.S.), Geological Notes on Kosciusko, New South Wales, 143; New Rock from Kosciusko, New South Wales, 416
- Davis (A. S.), Pseudoscopic Vision without a Pseudoscope, 376
- Davis (B.), Behaviour of Small Closed Cylinders in Organ Pipes, 547; Interesting Phenomenon in Connection with Theory of Sound, 554
- Davison (Dr. Charles), the Reported Earthquakes in the Channel Islands and South Devon on April 24, 126; the Inverness Earthquake of September 18, 527
- Dawson (Charles), Toad in Flint Nodule, 70
- Dawson (Dr. H. M.), the Crystallisation of Salt Solutions, 336
- Day (A. L.), Expansion of Metals at High Temperatures, 92
- Deasy (Captain), Tibet and Chinese Turkestan, 653
- Debiérne (A.), Radio-activity of Radium Salts, 368
- Decay of our Sea-fisheries, the, 310
- Decomposition of Copper Oxide, Philip Harrison, 233
- Dedekind (Richard), Essays on the Theory of Numbers, 374
- Deer, an Instance of Adaptation among the, R. Lydekker, F.R.S., 257
- Definitive Orbit of Comet 1894 II. (Gale), 89
- Deformation of the Sun's Disc, Signor A. Ricco, 289
- Delacroix (G.), Bacterial Disease of Potato, 464
- Delange (A.), Hydration of Amylpropionic Acid with formation of Caproylacetic Acid, 71; Method of Synthesis of Acetylenic Aldehydes, 296
- Demarçay (Eug.), Europium, a new Element, 224
- Demerara, "Fish-arrows" from, W. E. Hoyle, 644
- Denison (F. N.), the Seismograph as a Sensitive Barometer, 271; that the Depression of the Earth's Crust due to an Area of High Barometric Pressure can be Detected by a Seismograph at Great Distances from the Centre of the Depression, 587
- Denning (W. F.), April Meteors of 1901, 21; the Planet Saturn, 114; the Meteoric Epoch of July and August, 240; Markings on Jupiter, 351; the August Meteors of 1901, 410; the October Orionids, 651
- Denoyès (M.), Action of Currents of High Frequency on Urinary Secretion, 272
- Density and Figure of Close Binary Stars, Dr. Alex W. Roberts, 468
- Denver Meeting of the American Association, Address by Prof. R. S. Woodward, President of the Association, 498; Zoology of the Twentieth Century, Address at American Association for Advancement of Science, Prof. C. B. Davenport, 566
- Derby Medical Society, Paper read at, Reflex Action and Instinct, Dr. W. Benthall, 459
- Deschanel's Natural Philosophy, Electricity, J. D. Everett, 50
- Descudé (Marcel), Action of Acid Chlorides on Ether Oxides in presence of Zinc Chloride, 72; Action of Acid Chlorides on Aldehydes in presence of Zinc Chloride, 248
- Desmots (H.), Synthesis of Primary Acetylenic Alcohols, 120
- Devaux (H.), Generality of Metal-fixation by Cell-wall in Plants, 272
- Devon, South, the Reported Earthquakes in the Channel Islands and, on April 24, Dr. Charles Davison, 126
- Dewar (Prof. James, F.R.S.), the Nadir of Temperature and Allied Problems, Bakerian Lecture at Royal Society, 243; on the Separation of the Least Volatile Gases of Atmospheric Air and their Spectra, 294
- Diameter of Mercury, 523
- Diameter of Venus, 556
- Diary 1889-1891, Notes from a, Sir Mountstuart E. Grant Duff, Lord Avebury, F.R.S., 228
- Dickson (H. N.), on the Mean Temperature of the Atmosphere and the Causes of Glacial Periods, 590; Circulation of the Surface Waters of the North Atlantic Ocean, 665
- Diffusion, some Recent Work on, Lecture at Royal Institution, Dr. Horace T. Brown, F.R.S., 171, 193
- Digits of Man, Hair on the, Dr. Walter Kidd, 351
- Dimorphism in Foraminifera, J. J. Lister, 588
- Dina (Alberto), Hysteresis of Iron under various Magnetic Fields, 638
- Dines (W. H.), Fallacy of Explanation as to Double Diurnal Barometer Wave, 308
- Disease, the Treatment of, by Light, 259
- Dispersion, Théorie Nouvelle de la, M. G. Quesneville, 625
- Distribution of Rainfall over the Land, the, Dr. Andrew J. Herbertson, 423
- Dixon (Dr. Henry H.), Vitality of Seeds, 256
- Dobbie (J. J.), the Absorption Spectra of Cyanogen Compounds, 175
- Doflein (F.), von den Antillen zum Fernen Westen; Reiseskizzen eines Naturforschers, 2

- Dorsey (Dr. N. E.), the Colour and Polarisation of Blue Sky Light, 138
- Douse (T. le M.), Origin of Name "Surrey," 490
- Dover Coal-field, the, 581
- Dragons of the Air, an Account of Extinct Flying Reptiles, H. G. Seeley, 645
- Drinkwater (H.), First Aid to the Injured, 5
- Drummond (W. B.), the Child: his Nature and Nurture, 53
- Duane (W.), the Velocity of Chemical Reactions, 92
- Dublin Royal Irish Academy, 71, 223
- Dublin Royal Society, 95, 271
- Ducks, How to Know the Indian, F. Finn, 278
- Duddell (W.), the Musical Arc, 58; Resistance and Electromotive Force of Electric Arc, 496; Resistance of an Electrolyte, 496
- Duerden (Dr. J. E.), the Marine Resources of British West Indies, 31
- Duff (Sir Mountstuart E. Grant), Notes from a Diary 1889-1891, 228
- Dumont (M. Santos), Air Ship, 286, 489; the Deutsch Prize won by, 635
- Duncan (Dr.), on Excavations on Neolithic Sites in the Isle of Arran, 615
- Dunstan (W. R., F.R.S.), Poison of *Lotus arabicus*, 367
- Dust of "Blood-rain," the, Prof. Arthur W. Rücker, F.R.S., 30
- Duthiers (Baron H. de L.), Death and Obituary Notice of, 308
- Duty-free Alcohol for Chemical Laboratories, on, Dr. T. E. Thorpe, 611; Dr. W. J. Lawrence, 611; Prof. A. Michael, 611
- Dyeing: Wood as a Blue Dye, Dr. C. B. Plowright, 413; the Progress of Artificial Indigo, 433
- Dynamics: Stress—its Definition, R. F. Muirhead, 207; Reviewer, 207; Boomerangs, Gilbert T. Walker, 338; Ottavio Zanotti Bianco, 400; Theoretical Mechanics: an Elementary Treatise, W. Woolsey Johnson, 646
- Earth: Earth Current Measurements, Dr. B. Weinstein, 230; the Twelve Movements of the Earth, M. Flammarion, 312; Outlines of Physiography, an Introduction to the Study of the Earth, A. J. Herbertson, 325; Computation of the Age of the Earth from the amount of Salt in the Sea, Prof. Joly, 566; Mr. Ackroyd, 566; the Experimental Demonstration of the Curvature of the Earth's Surface, H. Yule Oldham, 591
- Earthquakes: the Reported Earthquakes in the Channel Islands and South Devon on April 24, Dr. Charles Davison, 126; the Inverness Earthquake of September 18, 521; Dr. Davison, 527; Rev. Dr. Andrew Henderson, 601
- Earthworks, Yorkshire, Mrs. E. S. Armitage, 531
- Earthshine, Causes of the Variability of, 456
- Eastern Counties, Holidays in, Percy Lindley, 232
- Ebert (Prof. H.), Phenomena of Atmospheric Electricity, 382
- Eclipses: the Smithsonian Solar Eclipse Expedition, Prof. S. P. Langley, 53; the Recent Total Eclipse of the Sun, 79, 114, 136; the Total Eclipse of May 18, 1901, 289, 311; Magnetic Observations during Total Solar Eclipse, Dr. William Ellis, F.R.S., 15
- Edinburgh Mathematical Society, 224
- Edinburgh Royal Society, 119, 143, 199, 271, 343
- "Edison" Storage Cell, the, 241
- Education: the Army Education Committee, 55; the Extension of Knowledge, Dr. D. J. Hill, 117; Proceedings of the Eighth Annual Meeting of the Society for the Promotion of Engineering Education held in New York City, July 2-3, 1900, Prof. F. W. Burstall, 204; Education of Engineers, 462; Government Aid in United States to Higher Education, Dr. C. D. Walcott, 261; Philip's Educational Terrestrial Globe, 375; Function of a University, Oration at University College, Prof. W. Ramsay, F.R.S., 388; Rural-Readers, Book I., Vincent T. Murché, Prof. R. Meldola, F.R.S., 394; the Teacher's Manual of Object Lessons for Rural Schools, Vincent T. Murché, Prof. R. Meldola, F.R.S., 394; Commercial Education at Home and Abroad, Frederick Hooper and James Graham, 442; the Self-Educator in Chemistry, James Knight, 467; Nature Teaching, Francis Watts, 550; the Carnegie Technical School at Pittsburg, 570; Royal College of Science and the University of London, Prof. W. A. Tilden, F.R.S., 583; on some Points in Chemical Education, Prof. Joji Sakurai, 612; the New Basis of Geography, a Manual for the Preparation of the Teacher, Jacques W. Redway, 648; see also Section L, British Association
- Eggs, the Colours of Guillemots', Captain G. E. H. Barrett-Hamilton, 600
- Eggs in the British Museum (Natural History), Catalogue of the Collection of Birds', E. W. Oates, 600
- Egypt: Scientific Work in, 317; Lake Victoria Nyanza Rain Gauges, Sir William Garstin, 317; the Sudd in the Bahr-el-Gebel, 318; Meteorological Department, 318; the Preservation of Game, 318; the Farafra Oasis, H. J. L. Beadnell, 359; Gold-Mining in Egypt, C. J. Alford, 636
- Egyptology: Libyan Notes, D. Randall-Maciver and A. Wilkin, 123; Egyptology, 319; on the Bones of Hen Nekt, an Egyptian King of the Third Dynasty, C. S. Myers, 615; the Earliest Inhabitants of Abydos: a Craniological Study, D. Randall-Maciver, 647
- Eisenhart (Dr.), Surfaces whose First and Second Fundamental Forms are Second and First of Another, 341
- Electricity: Electro-Chemistry, John Hill Twigg, 5; Dr. F. Mollwo Perkin, 5; Recent Developments in Electric Signalling, 6; Sir William Preece's System of Etheric Signalling, 163; New System of Ammeters and Voltmeters, Pierre Weiss, 23; a Convenient Primary Cell, A. E. Munby, 30; Electric Vacuum-Tube Lamps, P. C. Hewitt, 39; Deschanel's Natural Philosophy, J. D. Everett, 50; the Musical Arc, W. Duddell, 58; the Various Determinations of the E.M.F. of the Clark Cell, Prof. Carhart, 60; Measurement of Sensitiveness of Coherers for Wireless Telegraphy, Carl Kinsley, 60; Marconi's Wireless Telegraphy on the *Lake Champlain* Atlantic Liner, 111; Wireless Telegraphy on Ocean Liners, 188; Wireless Telegraphy on the *Lucania*, 381, 406, 553; Syntonic Wireless Telegraphy, Mr. Marconi, 130; Wireless Telegraphy for War Purposes, 383; Drahtlose Telegraphie durch Wasser und Luft, Prof. Dr. Ferdinand Braun, 497; a New Principle in Wireless Telegraphy discovered, A. Orling and T. Armstrong, 636; Wireless Telegraphic Communication with Zugspitze Observatory, Bavaria, 637; Electrical Conductivity of Air and Salt Vapours, H. A. Wilson, 70; the Existence of Open Currents, V. Crémieu, 71; on the Magnetic Effects of Electrical Convection, Dr. Crémieu, Dr. H. A. Wilson, Lord Kelvin, 586; Law of Electrical Stimulation of Nerves, Georges Weiss, 72; Electro-Chemistry, Bertram Blount, 77; Dr. F. Mollwo Perkin, 77; on a Form of Artificial Submarine Cable, Prof. A. Trowbridge, 77; Attempt to discover Radiation from Surface of Metals carrying Alternating Currents of High Frequency, O. W. Richardson, 95; New Form of Electric Furnace, Prof. J. Joly, F.R.S., 95; a Perfectly Astatic Galvanometer, M. Lippmann, 96; Simple Astatic Galvanometer, G. Lippmann, 554; Central Electrical Stations, their Design, Organisation and Management, C. H. Wordingham, 100; the Telautograph, Foster Ritchie, 107; Relations between Conductivity and Chemical Character of Solutions, Prof. J. Gibson, 119; Electrolysis of Animal Tissues, MM. Bordier and Gilet, 120; Electrification of Dielectrics by Mechanical Means, A. W. Ashton, 141; Model Imitating Behaviour of Dielectrics, Prof. Fleming and A. W. Ashton, 141; a very Sensitive Balance, V. Crémieu, 143; Report on Observations in Terrestrial Magnetism and Atmospheric Electricity made at the Central Meteorological Observatory of Japan for the Year 1897, Dr. C. Chree, F.R.S., 151; Death and Obituary Notice of Virium Jones, Prof. W. E. Ayrton, F.R.S., 161; Nernst's Phonograph, 164; Ruhmer's Phonograph, 164; Electro-magnets, T. L. James, 168; Influence of Temperature on Electromotive Force of Magnetisation, René Paillot, 175; the Telegraphone, Herr Poulsen, 183; Vibrations produced in a wire with an Influence Machine, D. Negreano, 200; an Electrical Grouseometer, G. Léon, 200; Measurements of Ionic Velocities in Aqueous Solutions, B. D. Steele, 222; Electromotive Forces of Contact and the Ionic Theory, E. Rothé, 224; Electrolytic Separation of Nickel and Cobalt, D. Balachowsky, 224; the Berlin Company's Naples Installation for Transmission of Energy, 237; the "Edison" Storage Cell, 241; Electrolytic Conductivity of Salt Solutions in Liquid Sulphur Dioxide, A. Hagenbach, 246; Electrolytic Conductivity of Halogen Salt Solutions, on the, Dr. J. Gibson, 612; Effect of High Frequency Oscillatory Field on Electrical Resistance, S. A. F. White, 246; the Induction Motor, B. A. Behrend, 252; the Treatment of Disease by Light, 259; Electro-chemical Laboratory at Owens College, Manchester, 262; Electricity Supply "in Bulk" at Newcastle-

on-Tyne, 262; Focus-tube as Electric Valve, Prof. O. Murani, 263; Action of Currents of High Frequency on Urinary Secretion, MM. Denoyès, Maitre and Bouvière, 272; Electrodynamics, Modern, H. Poincaré, 273; *Electricité et Optique*, La Lumière et ses Théories Electrodynamiques, H. Poincaré, 273; the Illuminations at the Buffalo Exhibition, 287; Electrical Dispersion in Closed Air-spaces, J. Elster and H. Geitel, 308; Oscillographs, André Blondel, 308, 408; Electrolytical Method of Removing Superfluous Hair, Dr. A. Whitfield, 311; Position and Prospects of Electrochemical Industries, J. W. Swan, F.R.S., 329; the Dielectric Cohesion of Gases, E. Bouty, 344; Electrolytic Preparation of Pure Oxide of Cerium, Jean Stebba, 344; New Solution for Copper Voltmeter, W. K. Shepard, 365; Mechanism of Electric Arc, Bertha Ayrton, 365; Phenomena of Atmospheric Electricity, Prof. H. Ebert, 382; Arrhenius' Electrolytic Dissociation Theory, Prof. Kahlenberg, 383; Electric Capacity of Human Body, G. de Metz, 392; Transmission of Hertzian Waves through Conducting Liquids, Charles Nordmann, 392; Electrolysis of Hæmoglobin Compounds, Dr. Arthur Gamgee, F.R.S., 415; Colour of Ions, G. Vaillant, 415; Experiments on High Resistances, O. N. Rood, 415; Electromagnetic Effects of Moving Charged Spheres, E. P. Adams, 415; on the Supersession of the Steam by the Electric Locomotive, W. Langdon, 437; Electric Traction, Major P. Cardew, 437; Resistances and Electromotive Forces of Electric Arc, W. Duddell, 496; Resistance of an Electrolyte, W. Duddell, 496; James Bowman Lindsay, Sir William Preece, 521; Proposed Utilisation of Tramway Trolley Wires for Fire-extinction, 521; Discharge Current from Surface of Large Curvature, J. E. Almy, 547; Maxwell's Theory and Kerr's Phenomenon, Luigi Giaganino, 554; Mr. Cheeswright's Projected London and Brighton Railway, 580; the Cooper-Hewitt Mercury Vapour Lamp, 581; Experiments on the Passage of Electricity through Mercury Vapour, Prof. Schuster, 587; the Latest Form of Prof. Minchin's Photo-electric Cell, 587; the Telephone System of the British Post Office, T. E. Herbert, 599; Excitability of Spinal Marrow, A. N. Vitznou, 620; Nernst Lamp in America, paper read at American Institute of Electrical Engineers by A. G. Wurts, 632; Variation with Temperature of Thermoelectromotive Force and Electric Resistance of Nickel, Iron and Copper, E. P. Harrison, 667

Elgin and Nairn, on the Trias of, Dr. W. Mackie, 565

Elliott (Prof. G. F. Scott), on the Effects of Vegetation in the Valley and Plain of the Clyde, 589; on the Strength and Resistance to Pressure of Certain Seeds and Fruits, 619

Ellis (Dr. William, F.R.S.), Magnetic Observations during Total Solar Eclipse, 15

Elster (J.), Electrical Dispersion in Closed Air-spaces, 308

Emanations from Radio-active Substances, Prof. E. Rutherford, 157

Embryology: Lecithoblast und Angioblast der Wirbelthiere, Wilhelm His, 75

Encke's Comet, 359, 384, 583

Encyclopædia Biblica: Critical Dictionary of the Literary, Political, and Religious History, the Archæology, Geography and Natural History of the Bible, Prof. T. K. Cheyne and Dr. J. Sutherland Black, 3

Engineering: Recent Developments in Electric Signalling, 6; Chemistry in its Relations to Engineering, Prof. Frank Clowes, 22; Il calcolo Grafico Applicato alla Misura delle Volte, Prof. Ernesto Breglia, 27; the Steam-engine Indicator, Cecil H. Peabody, 125; New Turbine-driven Vessel, 133; the Turbine-propelled Vessel King Edward, 334; Public Water-supplies: Requirements, Resources, and the Construction of Works, F. E. Turneure and H. L. Russell, 179; Proceedings of the Eighth Annual Meeting of the Society for the Promotion of Engineering Education held in New York City, July 2-3, 1900, Prof. F. W. Burstall, 204; Education of Engineers, 462; Gas Lighting, Charles Hunt, 205; Motor Car worked by Absinthe, 213; the Simplon Tunnel, 235; the Settlement of Solid Matter in Fresh and Salt Water, W. H. Wheeler, 181; H. S. Allen, 279; the Properties of Steel Castings, Prof. J. O. Arnold, 316; International Engineering Congress, 431; Progress of Civil Engineering, Address at American Society of Civil Engineers, J. J. R. Croes, 438; Mode of Action of Brakes of Automobiles, A. Petol, 464; Opening Address in Section G at the Glasgow Meeting of the British

Association, Colonel R. E. Crompton, 517; Papers on Mechanical and Physical Subjects, Prof. Osborne Reynolds, F.R.S., 549; Experimental Engineering, Testing and Strength of Materials of Construction, W. C. Popplewell, 597; Nernst Lamp in America, Paper Read at American Institute of Electrical Engineers by A. J. Wurts, 632; Recent Progress in Waterways and Maritime Works, Papers Read at International Engineering Congress at Glasgow, 639; see also Section G, British Association.

England's Neglect of Science, Prof. Perry, F.R.S.; Prof. George M. Minchin, F.R.S., 226

Enoch (Mr.), the Metamorphoses of *Æschna cyanea*, 47

Entomology: the Stridulating Organs of *Hydrophilus piceus*, G. W. Kirkaldy, 20; the Life-history of *Hydrophilus piceus*, Dr. C. Rengel, 20; Mimicry in Spiders, Dr. W. A. Wagner, 41; the Metamorphoses of *Æschna cyanea*, Mr. Enock, 47; Mosquitoes and Malaria, G. Noë, 88; Major Ronald Ross, F.R.S., 453; the Question of Priority, 287; the Anti-Mosquito Campaign in Sierra Leone, 579; Major R. Ross, 489; the West African Campaign, Major Ronald Ross, 636; Simultaneity of Mosquitoes and Malaria at Constantine, A. Billet, 524; the Malaria-Free District of Massarosa, Dr. Grassi, 581; Mosquitoes and Filaria, F. L. Bancroft, 416; Mosquitoes and Yellow Fever, 453; H. de Gouvea, 655; Mosquitoes and Sounds, Major Ronald Ross, 607; the Common Grey Mosquito, Calcutta, Miss N. Evans, 638; Attraction of Sounds for Mosquitoes, Sir H. S. Maxim, 655; Entomological Society, 95, 223; Discharges of Formic Acid in Ant-nests, Prof. Poulton, 223; Social Symbiosis among American Ants, W. H. Wheeler, 409; Ant Gardens in Amazon Region, E. Ule, 553; the Life of the Bee, Maurice Maeterlinck, 231; Sources of Insect Attraction in Flowers, Prof. F. Plateau, 264; Death of Miss Eleanor A. Ormerod, 308; Obituary Notice of, 330; Familiar Butterflies and Moths, W. F. Kirby, 375; the Intermediary Host of *Filaria immitis*, T. L. Bancroft, 416; Horn-feeding Larvæ, Captain W. J. Hume McCorquodale, 446; the Colorado Potato Beetle, W. F. Kirby, 450; Sex-determination in Lepidoptera, A. Giard, 464; the Insect Book: a Popular Account of the Bees, Wasps, Ants, Grasshoppers, Flies, and other North American Insects, exclusive of the Butterflies, Moths and Beetles, with Full Life-histories, Tables and Bibliographies, Leland O. Howard, 549; Luminous Traps for Pyralis in Beaujolais, G. Gastine and V. Vermorel, 572

Epidemiological Society, Address at, Diagnosis of Plague, Dr. E. Klein, F.R.S., 91

Equations, Solution of Cubic and Biquadratic, Prof. G. Chrystal, 5

Equisetum, Remarks on the Nature of the Stele of, J. T. Gwynne-Vaughan, 617

Eros, Variation of, 63, 359, 384; Opposition of Eros in 1903, 491

Eskimos, the, E. W. Nelson, 426

Essays, Descriptive and Biographical, Grace, Lady Prestwich, with a Memoir by Louisa E. Milne, 349

Essays on the Theory of Numbers, Richard Dedekind, 374

Essays and Photographs, some Birds of the Canary Islands and South Africa, H. E. Harris, 603

État (A.), Decomposition of Albuminoids into Protoplasmides, 96

Ether, a New Argument for the Existence of an, B. Hopkinson, 586

Etheric Signalling, Sir William Preece's System of, 163

Ethnography: the Indian Survey, 214; Messrs. Annandale and Robinson on the Half-Siamese Half-Malay Community of Sai-Kau, 615

Ethnology: the Older Civilisation of Greece, 11; the Oldest Civilisation of Greece: Studies of the Mycænean Age, H. R. Hall, 280; the Language and Origin of the Basques, 90; the late Dr. Arthur Hazelius, 163; the Fire-Walk Ceremony in Tahiti, Prof. S. P. Langley, 397; the Annual Report of the Bureau of American Ethnology, 425; Occasional Essays on Native South Indian Life, Stanley P. Rice, 574; "Fish-arrows" from Demerara, W. E. Hoyle, 644

Etymology: Origin of Name "Surrey," T. le M. Douse, 490

"Euclid Revised," Nixon's, Geometrical Exercises from, with Solutions, Alexander Larmor, 497

Euclid's Elements of Geometry, Charles Smith and Sophie Bryant, 623

Euphorbia abdelkuri, on the Cuticular Structure of, Prof. Bayley Balfour, F.R.S., 618

- Europe, on the Morphological Divisions of, Dr. A. J. Herbertson, 589
- European Peoples, the Origin of, G. Sergi, 370
- Evans (A. J., F.R.S.), on the Neolithic Settlement which underlies the Mycenaean Palace at Knossos, 615
- Evans (Sir John), on the Chronology of the Stone Age of Man, 615
- Evans (John), Influence of Copper on Steel Rails and Plates, 64
- Evans (Miss N.), the Common Grey Mosquito of Calcutta, 638
- Evans (R.), Three New Species of *Peripatus*, 490
- Everett (J. D.), Deschanel's Natural Philosophy, Electricity, 50
- Everett (Prof.), on the Teaching of Mathematics, 592
- Evermann (Barton Warren), the Fishes of North and Middle America: a Descriptive Catalogue of the Species of Fish-like Vertebrates found in the Waters of North America, North of the Isthmus of Panama, 4
- Evidence of the Existence of an Ultra-Neptunian Planet, Prof. G. Forbes, 524
- Evolution: L'Evolution du Pigment, 28; Ueber Bedeutung und Tragweite des Darwinischen Selections princips, L. Plate, 49; die Mutations theorie, Versuche und Beobachtungen über die Entstehung von Arten im Pflanzenreich, Prof. Hugo de Vries, 208; Cosmogony and Evolution, Entstehen und Vergehen der Welt als Kosmischer Kreisprozess, J. G. Vogt, 277; the Limits of Evolution, Prof. Howison, 323; New Garden Plants: a Study in Evolution, 446; Evolution of Consciousness, Leonard Hall, 467; Evolution of the Thermometer, 1592-1743, Henry Carrington Bolton, 25
- Ewart (Prof. J. Cossar, F.R.S.), In-breeding, 271; Opening Address in Section D at the Glasgow Meeting of the British Association, the Experimental Study of Variation, 482; on Zebras and Zebra Hybrids, 588, 589
- Exercise, Temperament and, W. W. Davis, 435
- Expedition, the Antarctic, 131, 182, 233; Prof. Edward B. Poulton, 83, 156, 206; Resignation of Prof. J. W. Gregory, 58, 132; Prof. J. W. Gregory, 181
- Experimental Engineering: Testing and Strength of Materials of Construction, W. C. Popplewell, 597
- Experiments, Agricultural, 364
- Expertises et Arbitrages, F. Rigaud, 648
- Existence of an Ultra-Neptunian Planet, Evidence of the, Prof. G. Forbes, 524
- Exploration: a Canadian Geological Explorer, Dr. Robert Bell, F.R.S., 81; Italian Exploration in Arctic Regions, Luigi Hugues, 158; the Second International Conference for the Exploration of the Sea, 218; Polar Exploration, Civilian, 626; Tibet and Chinese Turkestan, Captain Deasy, 653
- Explosives: Handbook on Petroleum, Captain J. H. Thomson and Boverton Redwood, W. T. Lawrence, 441; Smokeless Powder, Nitro-cellulose and Theory of the Cellulose Molecule, John B. Bernadou, 600
- Eyes and No Eyes Series, Cassell's, Arabella B. Buckley, 550
- Eyferth's (B.), Einfachste Lebensformen des Tier- und Pflanzenreiches, Dr. Walther Schönichen und Dr. Alfred Kalberlah, G. S. West, 301
- Fact and Fable, Effie Johnson, 76
- Familiar Butterflies and Moths, W. F. Kirby, 375
- Farm Poultry, G. C. Watson, 575
- Farmer (R. C.), New Method of Determining Hydrolitic Dissociation, 175
- Farrington (Dr. O. C.), Peculiar Forms of Stalactites and Stalagmites, 288
- Fauna of North East Rhodesia, C. P. Chesnaye, 383
- Favrel (G.), Action of Alkyl Malonic Esters in Diazoic Chlorides, 176
- Fechner (Gustav Theodor), W. Wundt, 526
- Feeding of Animals, the, W. H. Jordan, 625
- Ferguson (Dr. G. B.), Scientific Research as Basis of Medical Progress, 330
- Fergusson's Surveying Circle and Percentage Tables, J. C. Fergusson, 278
- Ferns in Their Haunts, Flowers and, M. O. Wright, 375
- Fewkes (Dr. Walter), Excavations in Arizona, 425
- Fick (Dr. Adolf), Death and Obituary Notice of, 432
- Fiji, the Caves of, B. Sawyer and E. C. Andrews, 143
- Filaria immitis*, the Intermediary Host of, T. L. Bancroft, 416
- Filon (L. N. G.), Elastic Equilibrium of Circular Cylinders, 246
- Filtration Works, Water, James H. Fuertes, 421
- Finn (Frank), How to Know the Indian Ducks, 278; Long-Tailed Japanese Fowls, 232, 551
- Fire-extinction, Proposed Utilisation of Electric Tramway Trolley Wires for, 521
- Fireball of September 14, 1901, 532
- Fireball of September 14, 1492, C. E. Stromeyer, 577
- Fire Walk Ceremony in Tahiti, the, Prof. S. P. Langley, 397
- First Aid to the Injured, H. Drinkwater, 5
- Fish Arrows from Demerara, W. E. Hoyle, 644
- Fisher (Rev. O.), Folklore about Stonehenge, 648
- Fisheries: the Second International Conference for the Exploration of the Sea, 218; the Decay of Sea Fisheries, 310; Pearl and Pearl-Shell Fisheries, Prof. W. C. McIntosh, F.R.S., 376; Sea Fisheries: the Destruction of Shore-fish Ova and Fry, Prof. McIntosh, 523
- Fishes: the Fishes of North and Middle America: a Descriptive Catalogue of the Species of Fish-like Vertebrates found in the Waters of North America North of the Isthmus of Panama, David Starr Jordan and Barton Warren Evermann, 4; Fish-rain in South Carolina, 608; Chemical Analysis of Mummified Fishes of Ancient Egypt, MM. Lortet and Hugouenq, 668
- Fite (Dr. W.), Monaural Localisation of Sound, 263
- Flame, a Curious, L. L. Garbutt, 649
- Flammarion (M.), the Twelve Movements of the Earth, 312
- Fleming (Prof.), Model imitating Behaviour of Dielectrics, 141
- Flemish Giant Festivals, the, 531
- Flints and Totemism, Hon. Auberon Herbert, 522
- Flints, Naturally Chipped, on an Exhibit of, from the Larne Gravels and North Irish Beaches, Mr. Coffey, 615
- Floras of the Past: Status of the Mesozoic Floras of United States: the Older Mesozoic, Lester F. Ward, W. M. Fontaine, A. Warner and F. H. Knowlton, 633
- Flowers and Ferns in their Haunts, M. O. Wright, 375
- Flowers, the Story of Wild, Rev. Prof. G. Henslow, 350
- Flowing Water, an Outline of the Development and Application of the Energy of, Joseph P. Frizell, 121
- Flusin (G.), Osmosis through Membrane of Copper Ferrocyanide, 71
- Flying-Machine, Hoffmann's, 112; the Kress, 190
- Fog Formations, A. G. McAdie, 43
- Fog Inquiry, London, W. N. Shaw, F.R.S., 649
- Folklore: the Natives of South Africa, their Economic and Social Conditions, E. Sidney Hartland, 73; the Golden Bough, a Study in Magic and Religion, J. G. Frazer, 201; Folk Customs in India, 264; the Fire Walk Ceremony in Tahiti, Prof. S. P. Langley, 397; the Annual Report of the Bureau of American Ethnology, 425; the Moon and Vegetation, 454; the Pontianak of the Malays, Dr. R. Lasch, 555; Occasional Essays on Native South Indian Life, Stanley P. Rice, 574; Gog and Magog, 577; Folklore about Stonehenge, Rev. O. Fisher, 648
- Fontaine (W. M.), Status of the Mesozoic Floras of United States, the Older Mesozoic, 633
- Food Consumption and Metabolism, Drs. Atwater and Sherman and R. C. Carpenter, 382
- Food of the Senegal Galago, M. O. Hill, 376
- Foraminifera, on Dimorphism in, J. J. Lister, 588
- Forbes (Prof. G., F.R.S.), New Range-finder, 309; on a Folding Range-finder for Infantry, 613; the Supposed Ultra-Neptunian Planet, 119; Evidence of the Existence of an Ultra-Neptunian Planet, 524; on a Planet beyond Neptune with a Mass about equal to that of Jupiter, 587
- Forcrand (M. de), Thermal Study of Potassium Hydrates, 320; Molecular Weight of Chloral Hydrate at Boiling Point, 572; Calculation of Heats of Volatilisation and Fusion of Elements, 596
- Ford (Miss Sibille O.), on the Anatomy of *Ceratopteris thalictroides*, 617; on the Anatomy of *Todea*, 617
- Ford (Dr.), Bacteriology of Healthy Animal Organs, 333
- Forecast and Fact, 400
- Forel (F. A.), the Thermal Variations of Waters, 71
- Forestry: Suggested Afforestation of Ireland, Dr. R. T. Cooper, 264; the Jarrah and Karri Woods of West Australia, 453; Fumigation of Fruit Trees, 642
- Forrest (James), Lecture Institute of Civil Engineers, Prof. Frank Clowes, 22
- Forster (O.), Nitrocamphene, Aminocamphene and Hydroxycamphene, 46; 2:6-dibromo-4-nitrosophenol, 94
- Forsyth (Prof.), on the Teaching of Mathematics, 592

- Fosse (R.), Dinaphthoxanthene, 296
- Fossils : the Origin and Habits of the Bactrian Camel, 355 ; on the re-discovery of a Tree-trunk embedded in Volcanic Ash in Mull, Sir A. Geikie, 565 ; on the Cambrian Fossils of the North-West Highlands, B. N. Peach, 565 ; on a Machine for Investigating Fossil Remains, Prof. Sollas, 565 ; on Plants and Coleoptera from a Pleistocene Deposit at Wolvercote, Oxfordshire, Mr. A. M. Bell, 565 ; a New Name for an Ungulate, Dr. Charles W. Andrews, 577 ; Dragons of the Air, an Account of Extinct Flying Reptiles, H. G. Seeley, 645
- Foster (Dr. Le N., F.R.S.), the Death-rates from Mining Accidents in United Kingdom, 434
- Foster (Sir Michael, K.C.B., F.R.S.), History of Physiology during the Sixteenth, Seventeenth and Eighteenth Centuries, Lane Lectures at Cooper Medical College in San Francisco, 417 ; on the Experimental Method of Educational Teaching, 591 ; on the Organisation of Technical and Secondary Education, 593
- Foulis (Dr. James), Death and Obituary Notice of, 635
- Fournier (H.), Oxidation of Benzene Hydrocarbons by Manganese Peroxide and Sulphuric Acid, 668
- Fowler (W. Warde), Winter Singing of Thrush, 215 ; the Natural History and Antiquities of Selborne, Gilbert White, 369
- Fowls, Long-tailed Japanese, J. T. Cunningham, 158 ; Frank Finn, 232, 551
- Fox (Howard), the Contorted Beds of Gunwalloe, 166
- Frankland (Mrs. Percy), Public Health in America, 117
- Frankland (Prof. Percy F., F.R.S.), Opening Address in Section B at the Glasgow Meeting of the British Association, the Position of British Chemistry at the Dawn of the Twentieth Century, 503
- Frazer (J. G.), the Golden Bough, a Study in Magic, and Religion, 201
- Frazer's (Dr.) Views of the Relations between Magic, Religion and Science, J. S. Stuart Glennie, 615
- Freezing Points of Extremely Dilute Solutions, on Determining the Depression of the, E. H. Griffiths, 586
- Fremont (Ch.), Evaluation of Resistance of Steel to Traction deduced from Resistance to Shearing, 496
- French Stonehenge, an Account of the Principal Megalithic Remains in the Morbihan Archipelago, T. Cato Worsfold, 465
- Freundler (P.), New Mode of Decomposition of Bisulphite Derivatives, 176
- Friedel (Jean), Chlorophyll Assimilation, 88
- Fritts, Lead, Influence of Grinding on Solubility of Lead in, Dr. T. E. Thorpe, F.R.S., and Charles Simmonds, 175
- Frizell (Joseph P.), an Outline of the Development and Application of the Energy of Flowing Water, 121
- Frouin (Albert), Action of Alcohol on Gastric Secretion, 24
- Fruit-protection from Frost, Californian Method, A. G. McAdie, 204
- Fruit Trees, Fumigation of, 642
- Fruits, on the Strength and Resistance to Pressure of certain Seeds and, Prof. G. F. Scott Elliot, 619
- Fuel, Metals as, Lecture at Royal Institution, Sir W. Roberts-Austen, K.C.B., F.R.S., 360
- Fuertes (James H.), Water Filtration Works, 421
- Fumigation of Fruit Trees, 642
- Functions of a University, Oration at University College, Prof. W. Ramsay, F.R.S., 388
- Fungus, the "Shot-hole" Fungi of Stone-fruit Trees in Australia, D. McAlpine, 416
- Gadow (Hans), the Cambridge Natural History, vol. viii., Amphibia and Reptiles, 401
- Gaillard (M.), Influence of Feeding, Work and Dust on Tuberculosis, 71 ; Influence of Variations of Temperature on Tuberculosis, 644
- Galago, the Food of the Senegal, M. O. Hill, 376
- Galeron (M.), on the Representation of the Heavens in the Teaching of Cosmography, 591
- Galton (Dr. Francis, F.R.S.), the Possible Improvement of the Human Breed under the Existing Conditions of Law and Sentiment, 659
- Galvanometer, Simple Astatic, G. Lippmann, 96, 554
- Game-preservation in Egypt, 318
- Game-phyte, Contributions to our Knowledge of the, in the Ophioglossales and Lycopodiales, William H. Lang, 616
- Gamgee (Dr. Arthur, F.R.S.), Behaviour of Hæmoglobin Compounds in Magnetic Field and their Electrolysis, 415
- Gant (Frederick James), Modern Natural Theology ; with a Testimony of Christian Evidences, 422
- Garbutt (L. L.), A Curious Flame, 649
- Garden Plants, New, a Study in Evolution, 446
- Gardening, the Principles of Vegetable, L. H. Bailey, 122
- Gardiner (J. Stanley), Rate of Growth of Corals, 143 ; on the Coral Islands of the Maldives, 587
- Garrard (C. R.), on some Recent Developments in Chain Driving, 614
- Garrigou (F.), Utilisation of Wine Residues and Spoilt Wines as Manure, 344
- Garsed (W.), Diiodococaine Hydriodide, 47
- Garstin (Sir William), Scientific Work in Egypt, 318
- Gas Lighting, Charles Hunt, 205 ; the New Standard Pentane Ten-Candle Lamp and New Photometer, 189
- Gases, on the Separation of the Least Volatile, of Atmospheric Air and their Spectra, Prof. G. D. Liveing, F.R.S., and Prof. J. Dewar, F.R.S., 294
- Gastine (G.), Luminous Traps for *Pyrallis* in Beaujolais, 572
- Geikie (Sir Archibald, F.R.S.), the Scenery of Scotland Viewed in Connection with its Physical Geology, 33 ; Dinner to Sir Archibald Geikie, F.R.S., 34 ; Recent Studies of Old Italian Volcanoes, 103 ; Our Mountain Seclusion, 206 ; on the re-discovery of a Tree Trunk embedded in Volcanic Ash in Mull, 565
- Geitel (H.), Electrical Dispersion in Closed Air-spaces, 308
- Gemmill (Dr. J. F.), on a large Nematode Parasitic in the Sea-urchin, 588 ; on the Origin of the Cartilage of the *Stapes* and its Continuity with the Hyoid Arch, 614
- Geodesy : Death and Obituary Notice of Prof. Johannes Lamp, 237
- Geography : Russian Society's Medal Awards, 286 ; Ancient Globe at Tsarskoe-Selo, 286 ; the Subterranean Waters of the Ajusco (Mexico) Chain, MM. Marroquin y Rivera and P. C. Sanchez, 288 ; Stanford's Compendium of Geography and Travel, Central and South America, A. H. Keane, Colonel George Earl Church, 353 ; Illustrations of the Botany of Captain Cook's Voyage Round the World in H.M.S. *Endeavour* in 1768-1771, Right Hon. Sir Joseph Banks, Dr. Daniel Solander and W. Botting Hemsley, F.R.S., 374 ; Philip's Educational Terrestrial Globe, 375 ; Royal Geographical Society, Sand Waves in Tidal Currents, Dr. Vaughan Cornish, 412 ; Origin of the Loue River, A. Berthelot, 440 ; Maps, their Uses and Construction, James Morrison, 599 ; the Sven Hedin Expedition, 606 ; the New Basis of Geography, a Manual for the Preparation of the Teacher, Jacques W. Redway, 648 ; Tibet and Chinese Turkestan, Captain Deasy, 653 ; Mount McKinley, Alaska, R. Muldrow, 658 ; see also Section E of the British Association
- Geology : the Scenery of Scotland Viewed in Connection with its Physical Geology, Sir Archibald Geikie, F.R.S., 33 ; Dinner to Sir Archibald Geikie, F.R.S., 34 ; the Geological Society and its Museum, 57 ; Geology of Kanouna Gold Mining District, T. Blatchford, 61 ; Vitriified Quartz, W. A. Shenstone, F.R.S., 65, 126 ; Prof. J. Joly, F.R.S., 102 ; a Canadian Geological Explorer, Dr. Robert Bell, F.R.S., 81 ; Two Well Sections, Rev. R. A. Bullen, 94 ; Geological Development of Antigua, Guadeloupe, Anguilla, St. Martin, St. Bartholomew, Sombbrero, St. Christopher Chain and Saba Banks, Prof. J. W. Spencer, 94 ; Influence of Winds on Climate during Pleistocene Period, F. W. Harmer, 94 ; Geological Society, 94, 142, 199, 295 ; Recent Studies of Old Italian Volcanoes, Sir Archibald Geikie, F.R.S., 103 ; Silurian (?) Rocks in Forfar and Kincardine, George Barrow, 142 ; Crush Conglomerates of Argyll, J. B. Hill, 142 ; Ice-erosion in Skye, Alfred Harker, 143 ; the Caves of Fiji, B. Sawyer, and E. C. Andrews, 143 ; Geological Notes on Kosciusko, New South Wales, Prof. T. W. E. David, F.R.S., R. Helms and E. F. Pittman, 143 ; New Rock from Kosciusko, New South Wales, F. B. Guthrie, Prof. David, F.R.S., and W. G. Woolnough, 416 ; Death and Obituary Notice of Prof. Bleicher, 164 ; the Slaty Rocks of Cornwall, J. B. Hill, 166 ; the Contorted Beds of Gunwalloe, Howard Fox, 166 ; the Settlement of Solid Matter in Fresh and Salt Water, W. H. Wheeler, 181 ; H. S. Allen, 279 ; Passage of Coal Seam into Seam of Dolomite, 199 ; Ueber die geologische Geschichte der Insel Celebes auf Grund der Tierverbreitung, Dr. Paul Sarasin and Dr. Fitz Sarasin, 203

- Our Mountain Seclusion, Sir Archibald Geikie, F.R.S., 206 ;
 Death and Obituary Notice of Dr. Joseph de Conte, 261 ;
 Chemical Analysis of Scotch Sandstones, Dr. W. Mackie,
 264 ; the Mineralogy of Scotland, M. Forster Heddle, Prof.
 H. A. Miers, F.R.S., 395 ; the Geological History of the
 Rivers of East Yorkshire, F. R. Cowper Reed, 277 ; Peculiar
 Forms of Stalactites and Stalagmites, Dr. O. C. Farrington,
 288 ; Use of a Geological datum, Beeby Thompson, 295 ;
 Intrusive Tuff-like Rocks in Ireland, J. R. Kilroe and A.
 McHenry, 295 ; Buried Glaciers on Great Lyakhoff Island,
 Baron Toll, 310 ; Zones in Chalk, Dr. H. W. Rowe, 355 ;
 Fossils of *Protophippus* found in Texas, 356 ; the Farafra Oasis,
 Egypt, H. J. L. Beadnell, 359 ; the Dakhla Oases, Egypt,
 H. J. L. Beadnell, 581 ; the Bituminous Deposits of Cuba,
 H. E. Peckham, 365 ; Carboniferous *Goniatites* in Sahara,
 M. Colloit, 392 ; the Size of the Ice-grain in Glaciers, J. Y.
 Buchanan, F.R.S., 399 ; Death and Obituary Notice of Prof.
 Baron Adolf Erik von Nordenskjöld, W. S. Bruce, 450 ;
 Sharks' Teeth Discovered at Woking, 523 ; Death and
 Obituary Notice of Dr. E. W. Claypole, 528 ; *Essai d'une*
Explication par les Causes actuelles de la Partie théorique de
la Géologie, H. Hermite, 575 ; *La Géologie*, H. Guède, 575 ;
 on the Mean Temperature of the Atmosphere and the Causes
 of Glacial Periods, H. N. Dixon, 590 ; A New Miocene
 Flightless Auk, Dr. F. A. Lucas, 608 ; *Ricerche Petrogra-*
fiche e Geologiche sulla Valsesia, E. Artini and G. Melzi, Dr.
 H. J. Johnston-Lavis, 640 ; the Sivamalai series of *Eleolite*
 and *Corundum-Syenites*, T. H. Holland, 657 ; *see also* Section
 C of the British Association
- Geometry : Problems of Geometry, A. B. Basset, F.R.S., 400 ;
 Death of Admiral de Jonquières, 432 ; Geometrical Exercises
 from Nixon's "Euclid Revised" with Solutions, Alexander
 Larmor, 497 ; Two Problems of Geometry, D. M. Y. Sommer-
 ville, 526 ; Plane and Solid Geometry, Arthur Schultze and
 F. L. Sevenoak, Prof. George M. Minchin, F.R.S., 573 ;
Euclid's Elements of Geometry, Charles Smith and Sophie
 Bryant, 623
- Gerin (F.), *Nitromannite* and *Nitrocellulose*, 596 ; Reducing
 Properties of Nitric Esters, 620 ; Nitro-derivative of Pentaery-
 thrite, 644 ; Nitro-derivatives of *Arabite* and *Rhamnite*, 668
- Germany : Von den Antillen Zum Fernen Westen : Reiseskiz-
 zen Eines Naturforschers, F. Doflein, 2 ; Report on German
 East Africa, A. C. Hollis, 67 ; the Hamburg Meeting of the
 German Association, 609
- Germinal Selection in Relation to Inheritance, Prof. J. Arthur
 Thomson, 588
- Gesang der Vögel, Der, Dr. Valentin Häcker, 52
- Giant Festivals, the, 531
- Giard (A.), Sex Determination in *Lepidoptera*, 464
- Gibson (Prof. J.), Relations between Electrical Conductivity
 and Chemical Character of Solutions, 119 ; on the Electro-
 lytic Conductivity of Halogen Salt Solutions, 612
- Giglioli (Prof. Italo), *Cultura del Frumento*, 1899-1900, 229
- Giglio Tos (Dr. Ermanno), *Les Problèmes de la Vie*, *Essai d'une*
Interprétation Scientifique de Phénomènes Vitaux, *La Sub-*
stance Vivante et la Cytodièrese, 321
- Gilet (M.), *Electrolysis of Animal Tissues*, 120
- Gill (Sir David, F.R.S.), the Cape Photographic Durch-
 mustering for the Equinox, 1875, 257 ; the Cape Observa-
 tory, 410
- Giuganino (Luigi), Maxwell's Theory of Tensions and Kerr's
 Phenomenon, 554
- Glacial Epochs, Mars on, Percival Lowell, 107
- Glacial Periods, the Climate of, H. Arcowski, 238 ; on the
 Mean Temperature of the Atmosphere and the Causes of
 Glacial Periods, H. N. Dickson, 590
- Glaciers : Buried Glaciers on Great Lyakhoff Island, Baron Toll,
 310 ; the Size of the Ice-grain in Glaciers, J. Y. Buchanan,
 F.R.S., 399 ; on Overflow Channels and other Phenomena
 Indicating Glacier-dammed Lakes in the Cheviots, Prof. P.
 F. Kendall, H. B. Muff, 565
- Gladstone (Dr. J. H.), on the Teaching of Science in Element-
 ary Schools, 593
- Glasgow : the Ninth Jubilee of Glasgow University, 186 ;
 Glasgow International Engineering Congress, 431 ; Recent
 Progress in Waterways and Maritime Works, Papers Read at
 International Engineering Congress at Glasgow, 639 ; on the
 Mechanical Exhibits at the Glasgow Exhibition, D. H.
 Morton, 613 ; British Association Meeting at Glasgow, *see*
 British Association
- Glass, Jena, Prof. S. P. Thompson, F.R.S., 199
- Glass, Optical, Dr. Glazebrook, 586 ; Mr. Hinks, 586
- Glazebrook (Dr. R. T., F.R.S.), the Aims of the National
 Physical Laboratory, Discourse delivered at the Royal Insti-
 tution, 290 ; Optical Glass, 586
- Globe, Ancient, at Tsarskoe-Selo, 286
- Gnezzda (Julius), Formation of *Isatin Derivative of Albumin*,
 596
- Goeldi (Dr. Emilio A.), *Album de Aves Amazonicas*, 397
- Gog and Magog, 577
- Gold : Gold in Wicklow, E. St. J. Lyburn, 134 ; the Cape
 Nome Gold Region, Alaska, F. C. Schrader and A. H.
 Brooks, 409 ; Gold Mining in Egypt, C. J. Alford, 636 ; on
 the Influence of Organic Matter on the Deposition of Gold
 in Veins, J. Malcolm Maclaren, 566 ; on the Source of the
 Alluvial Gold of the Kildonan Field, Sutherland, J. Malcolm
 Maclaren, 566
- Golden Bough : a Study in Magic and Religion, the, J. G.
 Frazer, 201 ; on Dr. Frazer's Views of the Relations between
 Magic, Religion and Science, J. S. Stuart Glennie, 615
- Gomperz (Theodor), *Greek Thinkers : a History of Ancient*
Philosophy, 345
- Gooch (G. P.), *Annals of Politics and Culture (1492-1899)*,
 53
- Goodchild (J. G.), on the Scottish Ores of Copper, 565
- Gordon (J. W.), Examination of Abbe Diffraction Theory of
 Microscope, 320
- Gordon (W. J.), Our Country's Shells and How to Know
 Them : a Guide to British Mollusca, 206
- Gorilla, *Polyphem ein*, Dr. Th. Zell, 467
- Horst (Sir John), Opening Address in Section L at the Glasgow
 Meeting of the British Association, 562 ; on the Teaching of
 Botany in Universities, 593
- Göttingen Royal Society, 548
- Gouveá (Dr. H. de), *Mosquitoes and Yellow Fever*, 655
- Grablowitz (Prof.), Simple Recording Seismological Tide-gauge,
 554
- Graham (James), *Commercial Education at Home and Abroad*,
 442
- Graham (W. H.), *Hoopoes on Lundy Island*, 164
- Graphical Mensuration of Vaults, the, Prof. Ernesto Breglia, 27
- Grassé (Dr.), the Malaria-free District of Massarossa, 581
- Gravaris (G.), Probable Relation between Characteristic Angle
 of Deformation of Metals and Newtonian Coefficient of
 Restitution, 392
- Gravel Flats of Berkshire and Surrey, on the Origin of the,
 H. W. Monckton, 566
- Gravitation : Essays in Illustration of the Action of Astral
 Gravitation in Natural Phenomena, William Leighton Jordan,
 155
- Gravitational Matter, Absolute Amount of, in any Large
 Volume of Interstellar Space, Lord Kelvin, 586-626
- Gray (Prof. Andrew, F.R.S.), a Treatise on Physics, 97
- Gray (J.), on the Frequency and Pigmentation Value of the
 Surnames of Scottish School Children in Eastern Aberdeens-
 hire, 614
- Greece, Myths of, Explained and Dated, George St. Clair,
 180
- Greece, the Older Civilisation of, 11
- Greece, the Oldest Civilization of, Studies of the Mycenaean
 Age, H. R. Hall, 280
- Greek Thinkers : a History of Ancient Philosophy, Theodor
 Gomperz, 345
- Green Corona Line, Wave Length of, Sig. Ascarza, 289
- Greenwich, the Royal Observatory, 136
- Greenwich Star Catalogue for 1890, Ten-Year, 216
- Gregory (Prof. J. W., F.R.S.), Resignation of Leadership of
 Scientific Staff of National Antarctic Expedition, 58, 132,
 181
- Griesbach (H.), *Physikalisch-Chemische Propädeutik*, 53
- Griffiths (E. H.), on Determining the Depression of the
 Freezing Points of Extremely Dilute Solutions, 586
- Griffon (Dr. Ed.), *Assimilation Chlorophyllienne et la Structure*
des Plantes, 28
- Groom (Percy), Death and Obituary Notice of, Prof. A. F. W.
 Schimper, 551
- Groombridge, Radial Velocity of 1830, 491
- Guède (H.), *La Géologie*, 575
- Guerbet (Marcel), Action of Ethyl Alcohol on Barium Ethylate,
 368

- Guignard (M.), the Aromatic Organo-magnesium Compounds, 96
- Guillaume (C. E.), Use of Nickel-steel Alloy for Compensation Balance in Chronometers, 88
- Guillaume (J.), Influence of Magnification on Apparent Value of Diameters of Jupiter, 668
- Guillaume (Dr.), Laws of Radiation as Applied to Incandescent Mantles, 309
- Guillaume (Dr.), the Proposed New Unit of Pressure, the Megadyne per Square Centimetre, 586
- Guillemard (H.), Variations of Alkaloidal Nitrogen in Urine, 200
- Guillemonat (M.), Absence of Bacteria in Air and Food prejudicial to Animal Organism, 48
- Guillemot's Eggs, the Colours of, Captain G. E. H. Barrett-Hamilton, 600
- Guillet (Léon), Combinations of Aluminium with Tungsten, 71 ; Aluminium-Molybdenum Alloys, 176, 368
- Guilliermond (A.), the Sporulation of Yeasts, 96
- Gulls Naturally and Artificially Hatched, on the Behaviour of Young, Prof. J. Arthur Thomson, 588
- Gunn (W.), on Recent Discoveries in Arran Geology, 564
- Gunnery: New Range-finder, Prof. G. Forbes, F.R.S., 309 ; on a folding Range-finder for Infantry, Prof. Barr, 613
- Guntz (M.), Barium Hydride, 23
- Guthrie (F. B.), New Rock from Kosciusko, New South Wales, 416
- Guye (P. A.), Capillary Constants of Organic Liquids, 224, 248
- Guyot (A.), Synthesis of Colouring Matter from Diphenylene-phenylmethane, 248
- Gwynne-Vaughan (D. T.), on the Vascular Anatomy of the Cyathaceae, 616
- Gwynne-Vaughan (J. T.), Remarks on the Nature of the Stele of *Equisetum*, 617
- Häcker (Dr. Valentin), Der Gesang der Vögel, 52
- Haddon (Dr. A. C., F.R.S.), Obituary Notice of Rev. James Chalmers ("Tamate"), 38 ; a Plea for a Prehistoric Survey of Southern India, 469
- Hagen (Dr. B.), Anthropology, 239
- Hagenbach (A.), Electrolytic Conductivity of Salt Solutions in Liquid Sulphur Dioxide, 246
- Hail-prevention by Cannonading, W. L. Moore, 382
- Hail-prevention, a Method for, G. M. Stanoiewitch, 415
- Hailstorm Artillery, W. N. Shaw, F.R.S., 159
- Hair on the Digits of Man, Dr. Walter Kidd, 351
- Hairs, Superfluous, Electrolytical Method of Removing, Dr. A. Whitfield, 311
- Hall (H. R.), the Oldest Civilization of Greece: Studies of the Mycenaean Age, 280
- Hall (Leonard), the Evolution of Consciousness, 467
- Hall-Edwards (J.), the Röntgen Rays in Military Surgery, 454
- Haller (A.), Action of Epichlorhydrin and Epibromhydrin on Sodium Derivatives of Benzoylacetic Esters, 224 ; Synthesis of Colouring Matter from Diphenylene-phenylmethane, 248 ; New Derivatives of Benzylcamphor and Benzylidenecamphor, 295
- Halm (Dr. J.), on the Theory of Temporary Stars, 253 ; Nova Persei, 119
- Hamburg Meeting of the German Association, 609
- Hammer (Dr. E.), Der Hammer-Fennelsche Tachymeter-Theodolit und die Tachymeter-Kippregel zur unmittelbaren Lattenablesung von Horizontalabstand und Höhenunterschied, 598
- Hamilton (Sir W.), Elements of Quaternions, 206
- Hanbury Medallist for 1901, the, Dr. George Watt, 162
- Handbook on Petroleum, Captain J. H. Thomson and Boverton Redwood, W. T. Lawrence, 441
- Hansen (Dr. G. A.), the Life-work of, 433
- Harding (E. Hurren), the Subjective Lowering of Pitch, 103, 182
- Hanker (Alfred), Ice-erosion in Skye, 143 ; on the Sequence of the Tertiary Igneous Eruptions in Skye, 565
- Harkness (Dr. H. W.), Death of, 356
- Harman (F. W.), Influence of Winds on Climate during Pleistocene Period, 94
- Harper (W. R.), the "Onvar" of Malekula, New Hebrides, 416
- Harries (C.), Succinic Dialdehyde, 191
- Harris (H. E.), Essays and Photographs, some Birds of the Canary Islands and South Africa, 603
- Harrison (E. P.), Variation with Temperature of Thermoelectromotive Force and Electric Resistance of Nickel, Iron and Copper, 667
- Harrison (Philip), Decomposition of Copper Oxide, 233
- Hart (J. H.), Notes on Natural History of Trinidad, 40
- Harting (J. E.), a Handbook of British Birds, 297
- Harting (Mr.), the Difference between Memphis and Thebes Mummies, 70
- Hartland (E. Sidney), Native Races as Imperial Problems, 73
- Hartley (Prof. W. N., F.R.S.), the Persistence of the Spectrum of Carbon Monoxide, 54 ; the Absorption Spectra of Cyanogen Compounds, 175 ; Banded Flame-spectra of Metals, 271 ; Molecular Constitution of Supersaturated Solutions, 492 ; Flame-spectrum Phenomena of Basic Bessemer Blow, 492
- Harvard, A Photometric Durchmusterung, including all Stars of the Magnitude 7.5 and brighter North of Declination -40° obtained with the Meridian Photometer during the years 1895-98, Edward C. Pickering, 257
- Harvey (A. W.), Optically Active Nitrogen Compounds, 174
- Hatch (Dr. F. H.), the Kolar (Mysore) Goldfield, 41
- Hawthorne (John), on the Absorption of Ammonia from Polluted Sea-water by *Ulva latissima*, 619
- Hazlehurst (J. N.), Towers and Tanks for Water-works, 525
- Hazellius (Dr. Arthur), the late, 163
- Headley (F. W.), Foreign Oysters acquiring Characters of Natives, 158
- Health in America, Public, Mrs. Percy Frankland, 117
- Heat: Thermodynamical Correction of Gas Thermometer, Prof. H. L. Callendar, 23 ; the Thermal Variations of Waters, F. A. Forel, 71 ; Expansion of Metals at High Temperatures, L. Holborn and A. L. Day, 92 ; Heat Dissipated by Platinum Surface at High Temperatures, IV., High-pressure Gases, J. E. Petavel, 93 ; Thermal Properties of Isopentane and Normal Pentane, J. Rose-Innes and Prof. S. Young, 93 ; Molecular Depressions of Temperature of Maximum Density of Water Caused by Dissolution of Salts, L. C. de Coppet, 119 ; Influence of Temperature on Electromotive Force of Magnetisation, René Paillot, 175 ; Results of chilling Copper-tin Alloys, C. T. Heycock and F. H. Neville, 221 ; the Nadir of Temperature and Allied Problems, Bakerian Lecture at Royal Society, Prof. James Dewar, F.R.S., 243 ; Thermal Conductivity of Living Human Skin, J. Leclère, 263 ; Thermal Study of Potassium Hydrates, M. de Forcrand, 320 ; Molecular Weight of Chloral Hydrates at Boiling Point, M. de Forcrand, 572 ; Calculation of Heat of Volatilisation and Fusion of Elements, M. de Forcrand, 596 ; Inversion-points of Solutions, Albert Colson, 644 ; Variation with Temperature of Thermoelectromotive Force and Electric Resistance of Nickel, Iron and Copper, E. P. Harrison, 667
- Hébert (A.), Mechanism of Etherification in Plants, 440
- Hedde (M. Forster), the Mineralogy of Scotland, 395
- Hedges (Killingworth), on the Protection of Buildings from Lightning, 613
- Hedin (Sven), Expedition, the, 606
- Helbronner (André), Camphor Combinations with β -hydroxy- α -naphthaldehyde, 272
- Helium: the Nadir of Temperature and Allied Problems, Bakerian Lecture at Royal Society, Prof. James Dewar, F.R.S., 243
- Hellmann (Dr. G.), Meteorologische Beobachtungen vom xiv bis xvii Jahrhundert, 124
- Helms (R.), Geological Notes on Kosciusko (N. S. W.), 143
- Hemming (G. W.), Subjective Lowering of Pitch, 182
- Hensalech (G. A.), the Band Spectrum of Nitrogen in the Oscillating Spark, 48
- Hemsley (W. Botting, F.R.S.), Two New Genera of Chinese Trees, 70 ; the Flora of Tibet, 70 ; Illustrations of the Botany of Captain Cook's Voyage Round the World in H.M.S. *Endeavour* in 1768-1771, Right Hon. Sir Joseph Banks and Dr. Daniel Solander, 374
- Henderson (Alex. C.), Auroras and Meteors, 527
- Henderson (Rev. Dr. Andrew), the Recent Inverness Earthquake, 601
- Henderson (Prof. G. G.), on the Condensation of Benzil with Dibenzylketone, 612 ; on the Action of Ammonia on Metals at High Temperatures, 612
- Henrici (Prof.), on the Teaching of Mathematics, 592
- Henriet (H.), Estimation of Nitric Acid in Waters by Stannous Chloride, 23

- Henry (Louis), Action of Acid Chlorides on Methanal, 296
 Henry (T. A.), Poison of *Lotus arabicus*, 367
 Henslow (Rev. Prof. G.), the Story of Wild Flowers, 350
 Hepburn (Dr. D.), Viscera of Porpoise, 344; on the Pelvic Cavity of the Porpoise as a Guide to the Determination of the Sacral Region in Cetacea, 587
 Herbert (Hon. Auberon), a New Record of Totemism, 522
 Herbert (T. E.), the Telephone System of the British Post-Office, 599
 Herbertson (A. J.), Outlines of Physiography, an Introduction to the Study of the Earth, 325
 Herbertson (Dr. Andrew J.), the Distribution of Rainfall over the Land, 423; on the Morphological Divisions of Europe, 589
 Herculis, New Variable Star 77 1901, 532
 Herdman (Prof. W. A., F.R.S.), Marine Biology in Liverpool. 115; Life by the Seashore: an Introduction to Natural History, Marion Newbiggin, 621
 Heredity: Statistical Investigation on Variability and Heredity, Prof. Karl Pearson, F.R.S., 102; the Swimming Instinct, Prof. C. Lloyd Morgan, F.R.S., 208; Reflex Action and Instinct, Paper read at Derby Medical Society, Dr. W. Benthall, 459; Prof. J. Arthur Thomson on Germinal Selection in Relation to Inheritance, 588; the Possible Improvement of the Human Breed under the Existing Conditions of Law and Sentiment, Dr. Francis Galton, F.R.S., 659
 Hereford (the Bishop of), on the Influence of the Universities and Examining Bodies upon the Work of Schools, 593
 Hérissey (H.), Saccharification of Leguminous Seeds favoured by Sodium Fluoride, 272
 Hermite (H.), Essai d'une Explication par les Causes actuelles de la Partie théorique de la Géologie, 575
 Herpetology: the Cape Viper, Claude E. Benson, 126; the Life History of British Serpents and their Local Distribution in the British Isles, Gerald R. Leighton, 624
 Herschel (Prof. A. S., F.R.S.), a Vertical Light Beam through the Setting Sun, 232
 Heterocyclic Organic Compounds, Die Heterocyclischen Verbindungen der Organischen Chemie, Edgar Wedekind, 252
 Heterogenesis in Conifers, on Examples of, Dr. Lotsy, 618
 Hewitt (P. C.), Electric Vacuum-Tube Lamps, 39
 Hexactinellida, Studies on the, Isao Iijima, Prof. E. A. Minchin, 393
 Heycock (C. T.), Results of Chilling Copper-tin Alloys, 221
 Hickson (Prof. Sydney J.), Addresses of Authors of Scientific Papers, 601
 Highland Schists: on Lateral Variations of Composition in Zones of the Eastern Highland Schists, Mr. G. Barrow, 565; on the Structure and Probable Succession of the Schists of the Southern Highlands, Mr. P. Macnair, 565
 Hilger (A.), the Michelson Echelon Grating, 383
 Hill (A. W.), on the Histology of the Sieve Tubes of *Pinus*, 618
 Hill (Dr. D. J.), the Extension of Knowledge, 117
 Hill (E. H.), Cloud Observations in India, 262
 Hill (J. B.), Crush-conglomerates of Argyll, 142; the Slaty Rocks of Cornwall, 166
 Hill (M. O.), the Food of the Senegal Galago, 376
 Himstedt (Herr), Effect on Eye of Röntgen &c. Rays, 529
 Hinks (Mr.), Optical Glass, 586
 Hints to Travellers, John Coles, 100
 Hipparchus and the Precession of the Equinoxes, Rev. H. M. Close, 71
 Hirsch (Dr. A.), Obituary Notice of, 18
 His (Wilhelm), Lecithoblast and Angioblast der Wirbelthiere, 75
 Hisgen's Variable 13 (1900) Cygni, 114
 Histogenesis Vertebrate, Wilhelm His, 75
 Histology: Die Reizleitung und die reizleitenden Strukturen bei den Pflanzen, Dr. B. Nemeç, 371
 Histoire du Ciel, Clemence Royer, 497
 History of Physiology, the, Lane Lectures at Cooper Medical College in San Francisco, Sir M. Foster, K.C.B., Sec. R.S., 417
 History as a Science, J. S. Stuart-Glennie, 326
 Hoffmann's Flying Machine, 112
 Hogarth (Mr.), on a Mycenaean Site Excavated at Zakro, 615
 Holborn (L.), Expansion of Metals at High Temperatures, 92
 Holidays in Eastern Counties, Percy Lindley, 232
 Holland (T. H.), the Sivamalai Series of Elaeolite- and Corundum-Syenites, 657
 Holland, Recent Scientific Work in, 208
 Hollis (A. C.), a Report on German East Africa, 67
 Holt-White (Rashleigh), the Life and Letters of Gilbert White of Selborne, 276
 Honda (K.), a Simple Model for Demonstrating Beat, 626
 Hooper (Frederick), Commercial Education at Home and Abroad, 442
 Hoopoes on Lundy Island, W. H. Graham, 164
 Hope (E. W.), a Manual of School Hygiene, 373
 Hopkinson (E.), a New Argument for the Existence of an Ether, 586
 Horn-feeding Larvæ, Captain W. J. Hume McCorquodale, 446
 Hornaday (W. T.), Ovis Fannini, 310
 Horne (John, F.R.S.), Opening Address in Section C at the Glasgow Meeting of the British Association: Recent Advances in Scottish Geology, 509
 Horticulture: the Royal Horticultural Society's Lily Conference, Wilfred Mark Webb, 316; New Garden Plants: a Study in Evolution, 446; Fumigation of Fruit Trees, 642
 Hospital, a Civilian War, 346
 Houston (David), a Raid upon Wild Flowers, 156
 Howard (Leland O.), the Insect Book: a Popular Account of the Bees, Wasps, Ants, Grasshoppers, Flies, and other North American Insects, exclusive of the Butterflies, Moths and Beetles, with full Life-histories, Tables and Bibliographies, 549
 Howison (Prof.), the Limits of Evolution, 323
 Hoyle (W. E.), "Fish-arrows" from Demerara, 644
 Hudson (Prof.), on the Teaching of Mathematics, 592
 Huggins (Sir William, K.C.B.), Scientific Worthies, Prof. H. Kayser, 225
 Hughes (Herbert W.), a Text-book of Coal-mining, 324
 Hugounenq (L.), Urea-formation by Oxidation of Albumin by Ammonium Persulphate, 120; Chemical Analysis of Mummified Fishes of Ancient Egypt, 668
 Hugues (Luigi), Le Esplorazioni Polari nel Secolo XIX., 158
 Hull (Prof. E.), on the Physical History of the Norwegian Fjords, 566
 Human Breed, the Possible Improvement of the, under the Existing Conditions of Law and Sentiment, Dr. Francis Galton, F.R.S., 659
 Human Nature Club, the, E. L. Thorndike, 325
 Humane Review, the, 101
 Humber, on the Sources of the Warp in the, W. H. Wheeler, 566
 Hunt (Charles), Gas-Lighting, 205
 Hurst (C. P.), Diotis Candidissima, 644
 Hutt (Stanley B.), Prehistoric Implements in the Transvaal and Orange River Colony, 103; a Curious Phenomenon, 233
 Huxley (Leonard), the Life and Letters of Thomas Henry Huxley, F.R.S., Prof. W. T. Thiselton-Dyer, F.R.S., 145
 Huxley (Thomas Henry, F.R.S.), the Scientific Memoirs of, 76; the Life and Letters of Thomas Henry Huxley, F.R.S., by Leonard Huxley, Prof. W. T. Thiselton-Dyer, F.R.S., 145
 Huxley Lecture, the Second, of the Anthropological Institute, Sir Francis Galton, 659
 Hybrid Ochromy, with a Note on Xenia, G. P. Bulman, 207
 Hydraulics: an Outline of the Development and Application of the Energy of Flowing Water, Joseph P. Frizell, 121; Reservoirs for Irrigation, Water-power and Domestic Water-supply, James D. Schuyler, 154; New Hydraulic Coal Hoist, 407; Towers and Tanks for Water-works, J. N. Hazlehurst, 525
 Hydrography: The Second International Conference for the Exploration of the Sea, 218; Sand Waves in Tidal Currents, Dr. Vaughan Cornish, 412
 Hydrogen: the Nadir of Temperature and Allied Problems, Banksian Lecture at Royal Society, Prof. James Dewar, F.R.S., 243; the Liquefaction of Hydrogen, 302
 Hygiene: Public Health in America, Mrs. Percy Frankland, 117; the Science of Hygiene: a Text-Book of Laboratory Practice, Walter C. C. Pakes, 178; a Manual of School Hygiene, E. W. Hope and E. A. Browne, 373; School Hygiene, Edward Shaw, 373; Water Filtration Works, James H. Furtès, 421
 Ice-erosion in Skye, Alfred Harker, 143
 Ice-grain in Glaciers, the Size of the, J. V. Buchanan, F.R.S., 399
 Iceland, Manual of the Birds of, Henry H. Slater, 443
 Ichthyology: The Fishes of North and Middle America, a

- Descriptive Catalogue of the Species of Fish-like Vertebrates found in the Waters of North America North of the Isthmus of Panama, David Starr Jordan and Barton Warren Evermann, 4; Chemical Analysis of the Mummified Fishes of Ancient Egypt, M. M. Lortet and Hugouneq, 668
- Iijima (Isao), Studies on the Hexactinellida, 393
- Ikeda (K.), the Inorganic Ferments, 135
- Illusion, a New Optical Pseudoscopic Vision without a Pseudoscope, Prof. R. W. Wood, 351; A. S. Davis, 376
- Images in Stellar Photography, Forms of, 191
- Imbert (Henry), Action of Pyridine Bases on Tetra-halogen Quinones, 668
- Impostors among Animals, Prof. W. M. Wheeler, 264
- In-breeding, Prof. Cossar Ewart, 271
- India: The Kolar Gold-Field, Mysore, Dr. F. H. Hatch, 41; the Jurassic Brachiopoda of Cutch, Dr. F. L. Kitchin, 134; the Ethnographical Survey of India, 214; on the Projected Ethnographic Survey of India, W. Crooke, 614; How to Know the Indian Ducks, F. Finn, 278; Cloud Observations, E. H. Hill, 262; Folk Customs in India, 264; Decrease of Indigo Cultivation, 381; the Work of the Pasteur Institute at Kasauli, 383; Agricultural Statistics, 407; a Plea for a Prehistoric Survey of Southern India, Prof. Alfred C. Haddon, F.R.S., 469; Archæological Exploration of the Tinnevely District, Madras, Mr. Rea, 489; the Indian Rainfall of Autumn, 1900, Major Prain, 530; Occasional Essays on Native South Indian Life, Stanley P. Rice, 574; Botanical Laboratory at Hakgala Gardens, Ceylon, 580; the Value of Dr. Calmette's Anti-Venene, 657; the Sivamalai Series of Eleolite and Corundum-Syenites, T. H. Holland, 657
- Indiana Caves, Dr. O. C. Farrington, 288
- Indigo and Sugar, Dr. F. Mollwo Perkin, 10
- Indigo Cultivation in India, Decrease of, 381
- Indigo, the Progress of Artificial, 433
- Indies, West, Von den Antillen zum Fernen Westen: Reise-skizzen eines Naturforschers, F. Doflein, 2
- Indicator, the Steam-Engine, Cecil H. Peabody, 125
- Induction Motor, the, B. A. Behrend, 252
- Industry, Society of Chemical, Presidential Address at, J. W. Swan, F.R.S., 329
- Inequalities of Mercury, Periodicity of the, 524
- Infusoria: the Significance of Spiral Swimming, Dr. H. S. Jennings, 165; Binary Fission in Ciliata, Dr. J. Y. Simpson, 199
- Injured, First Aid to the, H. Drinkwater, 5
- Inorganic Chemistry: Praktikum des Anorganischen Chemikers, Dr. Emil Knoevenagel, 99
- Insects: Horn-feeding Larvæ, Captain W. J. Hume McCorquodale, 446; the Insect Book: a Popular Account of the Bees, Wasps, Ants, Grasshoppers, Flies and other North American Insects, exclusive of the Butterflies, Moths and Beetles, with full Life-Histories, Tables and Bibliographies, Leland O. Howard, 549
- Instinct, the Swimming, Prof. C. Lloyd Morgan, F.R.S., 208
- Instinct, Reflex Action and, Paper read at Derby Medical Society, Dr. W. Benthall, 459
- Institute of Civil Engineers: Chemistry and its Relations to Engineering, Prof. Frank Clowes, 22
- Institution of Electrical Engineers, Journal of the, on the Supersession of the Steam by the Electric Locomotive, W. Langdon, 437
- Institution, Royal: Vitrified Quartz, W. A. Shenstone, F.R.S., 65, 126; Prof. J. Joly, F.R.S., 102; Some Recent work on Diffusion, Dr. Horace T. Brown, F.R.S., 171, 193; the Aims of the National Physical Laboratory, Dr. R. T. Glazebrook, F.R.S., 290; Metals as Fuel, Sir W. Roberts-Austen, K.C.B., F.R.S., 360; Polish, Rt. Hon. Lord Rayleigh, F.R.S., 385
- Instruments at the Paris Exhibition, British, C. V. Boys, F.R.S., 576
- Intelligence as the Soul of the Universe, Frederick James Gant, 422
- International Conference for the Exploration of the Sea, the Second, 218
- International Engineering Congress at Glasgow, 431
- International Seismological Conference at Strassburg, the, Dr. F. Omori, 340
- International Zoological Congress, the, 405
- Interstellar Space, on the absolute Amount of Gravitational Matter in any Large Volume of, Lord Kelvin, 586, 626
- Invention in the Nineteenth Century, Progress of, Edward W. Byrn, 125
- Inventions: Twentieth Century, a Forecast, George Sutherland, 74
- Inverness Earthquake of September 18, 521; Dr. Charles Davison, 527; Rev. Dr. Andrew Henderson, 601
- Ionic Velocities in Aqueous Solutions, Measurement of, B. B. Steele, 222
- Ireland (Prof. Alleyne), on the Influence of Geographical Environment on Political Evolution, 589; Suggested Afforestation of Ireland, Dr. R. T. Cooper, 264; on the Resemblance of the Old Red Sandstone of North-West Ireland to the Torridon Rocks of Sutherlandshire, A. McHenry, J. H. Kilroe, 565; on the Relation of the Silurian and Ordovician Rocks of North-West Ireland to the Great Metamorphic Series, A. McHenry, J. H. Kilroe, 565; G. H. Kinahan, 565
- Iron and Steel Institute, 64, 491
- Irrigation, Water-power, and Domestic Water-supply, Reservoirs for, James D. Schuyler, 154
- Irvine (J. C.), New Method of Preparing Salicylaldehyde Methyl Ether, 47
- Italy: Italian Geology, Ricerche Petrografiche e Geologiche sulla Valsesia, E. Artini and G. Melzi, Dr. H. J. Johnston-Lavis, 640; Recent Studies of Old Italian Volcanoes, Sir Arch. Geikie, F.R.S., 103; Le Esplorazioni Polari nel Secolo XIX., Luigi Hugues, 158
- Jack (Dr. R. Logan), on the Conditions under which Artesian Water is obtained in Queensland, 565; on an Expedition in Western China, 591
- Jackson (H.), Liveingite, 95
- Jaeger (W.), Researches on the Normal Cell, especially the Weston Element, 118
- James (T. L.), Electro-magnets, 168
- Japan: Report on Observations in Terrestrial Magnetism and Atmospheric Electricity made at the Central Meteorological Observatory of Japan 1897, Dr. C. Chree, F.R.S., 151
- Japanese Fowls, Long-tailed, J. T. Cunningham, 158; Frank Finn, 232, 551
- Japanese Sponges, Studies on the *Hexactinellida*, Isao Iijima, Prof. E. A. Minchin, 393
- Jeans (J. H.), the Mechanism of Radiation, 199
- Jena Glass, Prof. S. P. Thompson, F.R.S., 199
- Jennings (H. S.), the Anatomy of the Cat, 155
- Jervis-Smith (Rev. F. J., F.R.S.), a New Method of Using Tuning-forks in Chronographic Measurements, 232; the Rolling Angle of a Ship found by Photography, 576
- Jet, on the Structure and Origin of, A. C. Seward, F.R.S., 618
- Johnson (Effie), Fact and Fable, 76
- Johnson (W. Woolsey), Theoretical Mechanics: an Elementary Treatise, 646
- Johnston-Lavis (Dr. H. J.), Ricerche Petrografiche e Geologiche sulla Valsesia, E. Artini and G. Melzi, 640
- Joly (Prof. J., F.R.S.), New Form of Electric Furnace, 95; Method of identifying Minerals in Rock-sections by their bi-refringence, 95; Vitrified Quartz, 102; Computation of the Age of the Earth from the Amount of Salt in the Sea, 566
- Jones (Prof. J. Viriamu), Death of, 132; Obituary Notice, Prof. W. E. Ayrton, F.R.S., 161
- Jonquières (Admiral de), Death of, 432
- Jordan (David Starr), the Fishes of North and Middle America, a Descriptive Catalogue of the Species of Fish-like Vertebrates found in the Waters of North America, North of the Isthmus of Panama, 4; Animal Life, a First Book of Zoology, 525
- Jordan (W. H.), the Feeding of Animals, 625
- Jordan (William Leighton), Essays in Illustration of the Action of Astral Gravitation in Natural Phenomena, 155
- Jouiniaux (M.), Reduction of Silver Chloride by Hydrogen, 143; Action of Solar Radiations on Silver Chloride in Presence of Hydrogen, 248; Action of Silver on Hydrobromic Acid, 344
- Jouve (Ad.), Crystallised Lime, 71
- Jubilee of Glasgow University, the Ninth, 186
- Jupiter, Black Spot on, 216
- Jupiter, Dark Spot on, 240
- Jupiter, Markings on, W. F. Denning, 351
- Kahlenberg (Prof.), Arrhenius' Electrolytic Dissociation Theory, 383
- Kalberlah (Dr. Alfred), B. Eyferth's Einfachste Lebensformen des Tier und Pflanzenreiches, 301

- Kapteyn (J. C.), the Cape Photographic Durchmusterung for the Equinox 1875, 257
- Kasner (Dr. E.), Algebraic Potential Curves, 221
- Ka-Tanga, on the Belgian Expedition to, Captain Lemaire, 590
- Kayser (Prof. H.), Scientific Worthies, Sir William Huggins, 225
- Keane (A. H.), Central and South America, 353
- Kellogg (Prof. V. L.), Animal Life: a First Book of Zoology, 525
- Kelvin (Lord), on the Magnetic Effects of Electrical Convection, 586; on the Absolute Amount of Gravitational Matter in any Large Volume of Interstellar Space, 586, 626
- Kendal (Prof.), on the Chronology of the Stone Age of Man, 615
- Kendall (Prof. P. F.), on Overflow Channels and other Phenomena Indicating Glacier-dammed Lakes in the Cheviots, 565
- Kendrickia Walkeri*, on Abnormal Secondary Thickening in, Miss A. M. Clarke, 618
- Kerr (J. Graham), on the Origin of Vertebrate Limbs, 588
- Kerr's Phenomenon, Luigi Giuganino, 554
- Kidd (Dr. Walter), Hair on the Digits of Man, 351
- Kidston (R.), on the Geological Distribution of the Fishes of the Carboniferous Rocks and of the Old Red Sandstone of Scotland, 565
- Kildonen Field, Sutherland, on the Source of the Alluvial Gold of the, J. Malcolm Maclaren, 566
- Kilroe (J. R.), Intrusive Tuff-like Rocks in Ireland, 295; on the Resemblance of the Old Red Sandstone of North-West Ireland to the Torridon Rocks of Sutherland, 565; on the Relation of the Silurian and Ordovician Rocks of North-West Ireland to the Great Metamorphic Series, 565; on the Application of Geology to Agriculture by the Preparation of Soil Maps, 565
- Kimmins (Dr.), on the Teaching of Botany in Universities, 593
- Kinahan (G. H.), on the Relation of the Silurian and Ordovician Rocks of North-west Ireland to the Great Metamorphic Series, 565
- Kingsley (Mary H.), West African Studies, 231
- Kinsley (Carl), Measurement of Sensitiveness of Coherers for Wireless Telegraphy, 60
- Kirby (W. F.), Familiar Butterflies and Moths, 375; the Colorado Potato Beetle, 450
- Kirkaldy (G. W.), the Stridulating Organs of Water-Bugs, 20
- Kitchen (Dr. F. L.), the Jurassic Brachiopoda of Cutch, 134
- Kites in Meteorology raised by Tug Motion, A. L. Rotch, 453; on the Exploration of the Upper Strata of the Atmosphere by means of Kites, A. Lawrence Rotch, 590
- Klein (Dr. E., F.R.S.), the Diagnosis of Plague, 91
- Kling (André), Oxidation of Propylglycol by Mycoderma Aceti, 344
- Knight (James), the Self-Educator in Chemistry, 467
- Knoevenagel (Dr. Emil), Praktikum des Anorganischen Chemikers, 99
- Knowledge, the Extension of, Dr. D. J. Hill, 117
- Knowlton (F. H.), Status of the Mesozoic Floras of United States, the Older Mesozoic, 633
- Kny (Prof.), on Correlation in the Growth of Roots and Shoots, 618
- Koch (Prof. Robert), the Suppression of Tuberculosis, 312
- Kodis (Dr. Theodore), New Method of Staining Brain Tissue, 72
- Koenig (Rudolph), Death of, 579; Obituary Notice of, 630
- Kohlstock (Dr.), Death and Obituary Notice of, 40
- Korda (D.), New Method of Crystallising Ferro-Silicium, Manganese and Chromium, 165
- Kosciusko, New South Wales, Geological Notes on, Prof. J. W. E. David, F.R.S., R. Helms and E. F. Pittman, 143; New Rock from Kosciusko, F. B. Guthrie, Prof. David, F.R.S., and W. G. Woolnough, 416
- Kowalski (J. de), Refraction Indices of Liquid Mixtures, 272
- Kress Flying Machine, the, 190
- Kroeber (A. L.), the Decorative Symbolism of the Arapaho Indians, 582
- Krystallisation von Eiweissstoffen und ihre Bedeutung für die Eiweisschemie, die, Dr. F. N. Schulz, 375
- Laar (J. J. van), Lehrbuch der Mathematischen Chemie, 375
- Laboratories: the Leipzig Chemical Laboratory, 127; the Aims of the National Physical Laboratory, Discourse delivered at the Royal Institution by Dr. R. T. Glazebrook, F.R.S. 290; the Laboratory of Wilhelm Ostwald, 428; the Report of the Thompson-Yates Laboratories, 604; a Manual of Laboratory Physics, H. M. Tory and F. H. Pitcher, 350
- Lacaze-Duthiers (Baron de), Death and Obituary Notice of, 380
- Lakes of the British Islands, on the Scientific Studies of the, Dr. Mill, 590; Sir John Murray, 590
- Lamarckism: Foreign Oysters acquiring Characters of Natives, J. M. Tabor, 126; F. W. Headley, 158; Hair on the Digits of Man, Dr. Walter Kidd, 351
- Lamp (Prof. Johannes), Death and Obituary Notice of, 237
- Lamp, the Cooper-Hewitt Mercury Vapour, 581
- Lamp, Nernst, in America, A. J. Wurts' Paper read at American Institute of Electrical Engineers, 632
- Landslip in Danby Dale, 41
- Landslip at Barbados, 635
- Lane Lectures at Cooper Medical College in San Francisco, History of Physiology during Sixteenth, Seventeenth, and Eighteenth Centuries, Sir M. Foster, K.C.B., Sec. R.S., 417
- Lang (William H.), Prothalli of Ophioglossum Pendulum, Helminthostachys Zeylanica and Psilotum, 365; Contributions to our Knowledge of the Gametophyte in the Ophioglossales and Lycopodiales, 616
- Langdon (W.), on the Supersession of the Steam by the Electric Locomotive, 437
- Langley (Prof. S. P.), the Smithsonian Solar Eclipse Expedition, 53; Astrophysical Researches at Smithsonian Institution, 269; Colour-standards, 269; Measurements of Solar Radiation, Annals of the Astrophysical Observatory at the Smithsonian Institution, 352; the Fire Walk Ceremony in Tahiti, 397
- Language and Origin of the Basques, the, 90
- Lankester (Prof. E. Ray, F.R.S.), a Treatise on Zoology, 26; the Okapi, 188, 247
- Lannelongue (M.), Influence of Feeding, Work and Dust on Tuberculosis, 71; Influence of Variations of Temperature on Tuberculosis, 644
- Lapicque (L.), Reaction-time in Different Races, 224
- Larmor (Alexander), Geometrical Exercises from Nixon's Euclid, Revised, with Solutions, 497
- Larve, Horn-feeding, Captain W. J. Hume McCorquodale, 446
- Lasch (Dr. R.), the Pontianak of the Malay, 555
- Lassar-Cohn (Dr.), an Introduction to Modern Scientific Chemistry, 5
- Last Essays, Rt. Hon. Prof. F. Max Müller, 251
- Latitude, Formulæ for Variation of, 42
- Lauder (A.), the Absorption Spectra of Cyanogen Compounds, 175
- Laussedat (Colonel A.), Recherches sur les Instruments, les Méthodes et le dessin Topographiques, 622
- Lawrence (Dr. W. T.), Handbook on Petroleum, Captain J. T. Thomson and Boverton Redwood, 441; on Duty-free Alcohol, 611
- Layard (Miss Nina), on a Skull Found in Peat in the Bed of the River Orwell, 614; on a Flint Palæolith with alleged "Thong-marks," 615
- Le Conte (Dr. Joseph), Death and Obituary Notice of, 261
- Lead Silicates in relation to Pottery Manufacture, Dr. T. E. Thorpe, F.R.S., 94
- Lead Compounds in Pottery, the Use of, Prof. T. E. Thorpe, F.R.S., 408
- Lead Frits, Influence of Grinding on Solubility in, Dr. T. E. Thorpe, F.R.S., and Charles Simmonds, 175
- Lean (G.), on Aluminium-tin Alloys, 612
- Decithoblast und Angioblast der Wirbelthiere, Wilhelm His, 75
- Lecomte (Prof. H.), Le Coton, 124
- Lees (Dr. C. H.), Mathematics and Physics at the British Association, 586
- Lefèvre (J.), Thermal Conductivity of Living Human Skin, 263
- Leighton (Gerald R.), the Life-history of British Serpents and Local Distribution in the British Isles, 624
- Leipzig Chemical Laboratory, the, 127
- Lemaire (Capt.), on the Belgian Expedition to Ka-Tanga, 590
- Lengenbach Binnenthal, Notes on Minerals from the, R. H. Solly, 577
- Length, Measures of, Best Alloy for, Dr. Benoit, 112
- Leon (G.), an Electrical Grismometer, 200
- Lepidoptera: Catalog der Lepidopteren des Palæarctischen Faunengebietes, 348; Lepidoptera of the British Islands Charles G. Barrett, 444

- Lepierre (Charles), Glucoproteins as Culture-Media for Microbes, 296
- Lépine (R.), the Sugars from Blood, 320
- Leprosy: the Life-work of Dr. G. A. Hansen, 433
- Leslie (C. de), Influence of Spermato-toxin on Reproduction, 620
- Lespiau (R.), Monobromalonic Dialdehyde, 620
- Leteur (F.), Action of Hydrogen Sulphide on Acetylacetone, 272
- Letts (Prof. E. A.), on the Chemical and Biological Changes occurring during the Bacterial Treatment of Sewage, 612; on the Absorption of Ammonia from Polluted Sea-water by *Ulva latissima*, 619
- Lewin (L.), Hemoverdine, 644
- Libyan Notes, D. Randall-Maciver and A. Wilkin, 123
- Life, Animal, a First Book of Zoology, President D. Starr Jordan and Prof. V. L. Kellogg, 525
- Life of the Bee, the, Maurice Maeterlinck, 231
- Life by the Seashore, an Introduction to Natural History, Marion Newbigin, Prof. W. A. Herdman, F.R.S., 621
- Light: The Colour and Polarisation of Blue Sky Light, Dr. N. E. Dorsay, 138; the New Standard Pentane Ten-candle Lamp and the New Photometer, 189; the Treatment of Disease by Light, 259; Light Variation of the Minor Planet (345) Tercidina, 265; Constitution of White Light, O. M. Corbino, 464; on the Magnetic Rotation of Light and the Second Law of Thermodynamics, Lord Rayleigh, F.R.S., 577; the Latest Form of Prof. Minchin's Photo-electric Cell, 587; Nernst Lamp in America, A. J. Wurts' Paper read at American Institute of Electrical Engineers, 632; Chemical Effects of Light on Plant Life, Herren Ciamician and Silber, 658
- Light-beam, a Vertical, through the Setting Sun, Prof. A. S. Herschel, F.R.S., 232
- Lighting, Gas, Charles Hunt, 205
- Lightning, Photograph of the Spectrum of, 583
- Lightning, on the Protection of Buildings from, Killingworth Hedges, 613
- Lily Conference, the Royal Horticultural Society's, Wilfred Mark Webb, 316
- Limits of Evolution, the, Prof. Howison, 323
- Lincei, Reale Accademia dei, Prize Awards, 381
- Lindeck (St.), Researches on the Normal Cell, especially the Weston Element, 118
- Lindley (Percy), Holidays in Eastern Counties, 232
- Lindsay (James Bowman), Sir William Preece, 521
- Linebarger (C. E.), the Elements of the Differential and Integral Calculus, 396
- Linnean Society, 70, 142, 223
- Lippmann (M.), a Perfectly Astatic Galvanometer, 96; Simple Astatic Galvanometer, 554
- Liquefaction of Hydrogen, the, 302
- Liquids, Creeping of, and Tension of Mixtures, Dr. F. T. Trouton, F.R.S., 223
- Liquids, Capillary Constants of Organic, P. A. Guye and A. Baud, 224, 248
- Lister (Lord), the Anti-Vivisection Society and, 55; the National Anti-Vivisection Society and Lord Lister, Hon. Stephen Coleridge, 101; Editor, 101
- Lister (J. J.), on Dimorphism in Foraminifera, 588
- Little (Archibald), on the Crux of the Upper Yang-tse, 591
- Livache (A.), Substitution of Zinc-white for White Lead in Oil-painting, 120
- Livinge (Prof. G. D., F.R.S.), on the Separation of the Least Volatile Gases of Atmospheric Air and their Spectra, 294
- Liveingite, R. H. Solly and H. Jackson, 95
- Liverpool, Marine Biology in, Prof. W. A. Herdman, F.R.S., 115
- Liversidge (Prof.), Science in Australia, 296
- Locke's (John) Versuch über den Menschlichen Verstand, 4
- Lockyer (Sir Norman, K.C.B., F.R.S.), Enhanced Lines in Spectrum of Chromosphere, 45; the Arc Spectrum of Vanadium, 45; Further Observations on Nova Persei, No. 2, 69; Further Observations on Nova Persei, 341; Observations at Santa Pola of Solar Eclipse of May 28, 1900, 343; Chemistry of the Cygnian Stars and Basic Rocks, Prof. Edward Suess, 629
- Lockyer (Dr. William J. S.), the Solar Activity 1833-1900, Paper read at Royal Society, 196; Death and Obituary Notice of Prof. Wilhelm Schur, 380
- Locomotion: Mode of Action of Brakes of Automobiles, A. Petot, 464
- Locomotive, on the Supersession of the Steam by the Electric, W. Langdon, 437
- Locust-destroying Fungus, *Empusa acridii*, Dr. Sinclair Black, 357
- Loew (Dr. Oscar), Catalase, a New Vegetable Enzyme, 239
- Logarithms, an Introduction to the Practical Use of, F. G. Taylor, 424
- Logic: the Use of Words in Reasoning, Alfred Sedgwick, 231
- London Fog Inquiry, W. N. Shaw, F.R.S., 649
- London Thunderstorm of July 25, 331, 434
- London, the University of, 89
- London, Royal College of Science and the University of, Prof. W. A. Tilden, F.R.S., 583
- Long-tailed Japanese Fowls, J. T. Cunningham, 158; Frank Finn, 232, 551
- Long (Prof. J. H.), Chemistry Teaching in U.S. Medical Schools, 607
- Longe (F. D.), on a Piece of Yew from the Forest bed near Kessingland, 615
- Lortet (M.), Chemical Analysis of Mummified Fishes of Ancient Egypt, 668
- Lotsy (Dr.), on the Aims and Proposals of the International Association of Botanists, 615; on Examples of Heterogenesis in Conifers, 618
- Loue River, Origin of the, A. Berthelot, 440
- Louisiana Gulf Coast, Protection of Sea Birds of, Prof. Beyer, 19
- Lowell (Percival), Mars on Glacial Epochs, 107
- Lucania. Wireless Telegraphy on the, 381, 406, 553
- Lucas (Dr. F. A.), A New Miocene Flightless Auk, 608
- Lumholtz (Dr. Carl), the Cave-dwellers of North-West Mexico, 522
- Lyburn (E. St. J.), Gold in Wicklow, 134
- Lycopodiales, Contributions to our Knowledge of the Gametophyte in the Ophioglossales and, William H. Lang, 616
- Lydekker (R., F.R.S.), the Age of the Woburn Abbey Musk-ox, 103; an Instance of Adaptation among the Deer, 257
- Lyons (Commander T. A.), A Treatise on Electromagnetic Phenomena and on the Compass and its Deviations Aboard Ship, Mathematical, Theoretical, and Practical, 125
- McAdie (A. G.), Fog Formations, 43; Californian Method of Fruit-protection from Frost, 214
- Macalister (Prof. A., F.R.S.), on the Morphology of Transverse Vertebral Processes, 614
- Macalister (R. A. S.), on the Age of Ogham Writing in Ireland, 615
- McAlpine (D.), the "Shot-hole" Fungi of Stone Fruit Trees in Australia, 416
- McCorquodale (Captain W. J. Hume), Hornfeeding Larvæ, 446
- Macdonald (N. D.), on Railway Rolling Stock, Present and Future, 613
- MacDowall (Alex B.), the Moon and Wet Days, 424
- McHenry (A.), Intrusive Tuff-like Rocks in Ireland, 295; on the Relations of the Silurian and Ordovician Rocks of North-West Ireland to the Great Metamorphic Series, 565; on the Resemblance of the Old Red Sandstone of North-West Ireland to the Torridon Rocks of Sutherland, 565
- McIntosh (Prof. W. C., F.R.S.), Colouration of Marine Animals, 62; Pearl and Pearl-shell Fisheries, 376; the Destruction of Shore Fish, Ova and Fry, 523
- McKendrick (Prof. John G., F.R.S.), Opening Address in Section I at the Glasgow Meeting of the British Association, 545
- MacKenzie (A. S.), Experiment on Period of Rod Vibrating in Liquid, 657
- Mackie (Dr. W.), Chemical Analysis of Scotch Sandstone, 264; on the Trias of Elgin and Nairn, 565
- Mackinder (Mr.), on Movements of Men by Land and Sea, 591
- McKinley, Mount, Alaska, R. Muldrow, 658
- Maclaren (J. Malcolm), on the Source of the Alluvial Gold of the Kildonan Field, Sutherland, 566; on the Influence of Organic Matter on the Deposition of Gold in Veins, 566
- Maclean (Prof. Magnus), the British Association Meeting, 78; Glasgow Meeting of the British Association, 284
- McClean Telescope at the Cape Observatory, 632
- MacMahon (Major P. A., F.R.S.), Opening Address in Section A at the Glasgow Meeting of the British Association, 477

- MacMahon (Prof.), on the Teaching of Mathematics, 592
 Macnair (P.), on the Structure and Probable Succession of the Schists of the Southern Highlands, 565
 McRitchie (D.), the "Picts' Houses" of Scotland, 311
 MacRitchie (R. A. S.), Hints of Evolution in Tradition, 615
 Madan (H. G.), the Colloid Form of Piperine, 175
 Maercker (Prof.), Death of, 635
 Maeterlinck (Maurice), the Life of the Bee, 231
 Magic and Religion: the Golden Bough, a Study in, J. G. Frazer, 201; Magic, Religion and Science, Dr. Frazer's views of the Relation between, J. S. Stuart Glennie, 615
 Magnetisation, Direction of, in Clay Beds Baked by Lava Flow, B. Brunhes and P. David, 320
 Magnetism: Magnetic Observations during Total Solar Eclipse, Dr. William Ellis, F.R.S., 15; the Growth of Magnetism in Iron under Alternating Magnetic Force, Ernest Wilson, 46; New Yoke for Measuring Hysteresis, Z. Crook, 92; Hysteresis of Iron under various Magnetic Fields, Alberto Dina, 638; Magnetic Deflection of Kathode Rays, H. A. Wilson, 95; Permeability of Nickel-Steels in Intense Fields, René Paillot, 96; a Treatise on Electromagnetic Phenomena and on the Compass and its Deviations Aboard Ship, Mathematical, Theoretical and Practical, Commander T. A. Lyons, 125; on the Determination of Magnetic Force on Board Ship, by Captain Creak's Modified Dip Circle, 586; Electromagnets, T. L. James, 168; Influence of Temperature on Electromotive Force of Magnetisation, René Paillot, 175; Die Erdströme im Deutschen Reichstergelände und ihr Zusammenhang mit den Erdmagnetischen Erscheinungen, Dr. B. Weinstein, 230; Variations of the Magnetic Needle, 384; Death and Obituary Notice of Charles A. Schott, 406; Behaviour of Hæmoglobin Compounds in Magnetic Field, Dr. Arthur Gamgee, F.R.S., 415; Maxwell's Theory and Kerr's Phenomenon, Luigi Giuganino, 554; on the Magnetic Rotation of Light and the Second Law of Thermodynamics, Lord Rayleigh, F.R.S., 577; Magnetic Observations on Mauritius, 582; on the Magnetic Effects of Electrical Convection, Dr. Crémieu, Dr. H. A. Wilson, Lord Kelvin, 586; Asymmetry of Zeeman Effect, G. W. Walker, 668; Terrestrial Magnetism: the Norwegian North Polar Expedition, 1893-96, Dr. C. Chree, F.R.S., 151; Report on Observations in Terrestrial Magnetism and Atmospheric Electricity made at the Central Meteorological Observatory of Japan for the Year 1897, Dr. C. Chree, F.R.S., 151; the Collected Scientific Papers of John Couch Adams, 576
 Magnus (Sir Philip), on the Creation of Local Educational Authorities, 593
 Magog, Gog and, 577
 Mailhe (A.), Action of Mercuric Oxide on Aqueous Solutions of Metallic Salts, 248; Action of Copper Hydrate on Solutions of Metallic Salts, 344
 Makgill (Mr.), Neutral Red a Test for Colon Bacillus, 637
 Malaria, Mosquitoes and, G. Noë, 88; Major Ronald Ross, F.R.S., 453; the Question of Priority, 287; the Anti-Mosquito Campaign in Sierra Leone, 579; Major R. Ross, F.R.S., 489; on the Story of Malaria, Major R. Ross, 588; the West African Campaign, Major Ronald Ross, 636; Simultaneity at Constantine of Mosquitoes and Malaria, A. Billet, 524; the Malaria-free District of Massarosa, Dr. Grassi, 581
 Malays, the "Pontianak" of the, Dr. R. Lasch, 555
 Malay Peninsula: on the Half-Siamese, Half-Malay Community of Sai-Kau, Mr. Annandale, Mr. Robinson, 614; on the Vegetation of Mount Ophir, A. G. Tansley, 616
 Malayan "Myrmecophilous" Ferns, on Two, R. H. Yapp, 617
 Maldès (M.), Solubility of Mixtures of Sulphate of Copper and Sulphate of Soda, 368
 Maldives, the Coral Islands of the, J. Stanley Gardiner, 587
 Malpeaux (L.), La Betterave à Sucre, 28
 Mammoth, the Siberian, 286
 Man, Hair on the Digits of, Dr. Walter Kidd, 351
 Manchester Literary and Philosophical Society, 47, 175, 644
 Manometer, Recording, for High Pressures, J. E. Petaval, 613
 Manual of Laboratory Physics, A., H. M. Tory and F. H. Pitcher, 350
 Manual of School Hygiene, A. E. W. Hope and E. A. Browne, 373
 Maps: on Weather Maps published daily by various Countries, W. N. Shaw, F.R.S., 591; Maps, their Uses and Construction, James Morrison, 599
 Maquenne (L.), Glucamine, 24
 March (F.), Action of Bromacetophenone on Sodium Acetyl-acetone, 272
 Marchlewski (Herr), Chemical Relationship between Hæmoglobin and Chlorophyll, 265
 Markwald (Prof. Willy), on the Properties of Radium, 612; on so-called Phototropic Substances, 612
 Marconi (Mr.), Syntonic Wireless Telegraphy, 139
 Marconi's Wireless Telegraphy on the *Lake Champlain* Atlantic Liner, 111; on the *Lucania*, 381, 406, 553
 Margerison (Samuel), on the Transport of British Timber, 619
 Marine Biology: the Marine Resources of British West Indies, Dr. J. E. Duerden, 31; Luminous Bacteria, 57; Coloration of Marine Animals, Prof. W. C. McIntosh, 62; Marine Biology in Liverpool, Prof. W. A. Herdman, F.R.S., 115; Rate of Growth of Corals, J. S. Gardiner, 143; the Marine Mollusca of Tasmania, Prof. Ralph Tate and W. L. May, 548; Marine Poisons and Burrowing Habit, G. Bohn, 644
 Marine Engineering, New Turbine-driven Vessel, 133
 Marine Resources of the British West Indies, the, Dr. J. G. Duerden, 31
 Maritime Works, Recent Progress in Waterways and, Papers read at International Engineering Congress at Glasgow, 639
 Market Garden, an Anglo-American Work on the, L. H. Bailey, 122
 Markings on Jupiter, W. F. Denning, 351
 Marriott (W.), the Weather of March, 1901, 47
 Marroquin y Revira (M.), the Subterranean Waters of the Ajuco (Mexico) Chain, 288
 Mars, Climate and Time and, 106
 Mars on Glacial Epochs, Percival Lowell, 107
 Mars, Observations of, 384
 Marshall (F. H. A.), Hair in the Equidæ, 271
 Marsupials, the Australian, B. A. Bensley, 88
 Martin (Geoffrey), a Possible Method of Attaining the Absolute Zero of Temperature, 376
 Martine (C.), Action of Benzaldehyde on Sodium Menthol, 272
 Martre (M.), Action of Currents of High Frequency on Urinary Secretion, 272
 Massol (M.), Solubility of Mixtures of Sulphate of Copper and Sulphate of Soda, 368
 Masters (Dr. Maxwell T., F.R.S.), Agricultural Seeds, 30
 Materials of Construction, Testing and Strength of, Experimental Engineering, W. C. Poppellwell, 597
 Mathematics: Solution of Cubic and Biquadratic Equations, Prof. G. Chrystal, 5; Il Calcolo Grafico applicato alla Misura delle Volte, Prof. Ernesto Breglia, 27; Trihomologous Triangles, J. A. Third, 41; Bulletin of American Society, 45, 221, 341; the Use of Axis-vectors, Prof. F. Slate, 54; American Journal of Mathematics, 92, 295, 572; Mathematical Society, 95, 223; a Treatise on Electromagnetic Phenomena and on the Compass and its Deviations aboard Ship, Mathematical, Theoretical and Practical, Commander T. A. Lyons, 125; Death and Obituary Notice of William Walton, 164; Non-Oscillatory Linear Differential Equations of Second Order, Prof. Böcher, 198; Elements of Quaternions, Sir W. Hamilton, 206; Proof of Fundamental Surface Functions, S. Zaremba, 214; Algebraic Potential Curves, Dr. E. Kasner, 221; Edinburgh Society of Mathematics, 224; the Comptometer, C. V. Boys, F.R.S., 265; the Teaching of Mathematics, F. L. Ward, 280; Prof. Perry, 592; Death of J. Hamblin Smith, 285; Congruent Reductions of Bilinear Forms, T. J. I'A. Bromwich, 295; Obituary Notice of Prof. Tait, Prof. G. Chrystal, 305; Surfaces whose first and second fundamental forms are second and first of another, Dr. Eisenhart, 341; Some Discontinuous and Determinate Functions, C. K. Wead, 357; Essays on the Theory of Numbers, Richard Dedekind, 374; Lehrbuch der Mathematischen Chemie, J. J. van Laar, 375; the Elements of the Differential and Integral Calculus, J. W. A. Young, C. E. Linebarger, 396; Differential and Integral Calculus with Applications for Colleges, Universities and Technical Schools, E. W. Nickols, 396; An Introduction to the Practical Use of Logarithms, F. G. Taylor, 424; Geometrical Exercises from Nixon's Euclid Revised with Solutions, Alexander Larmor, 497; Two Problems of Geometry, D. M. Y. Somerville, 526; Plane and Solid Geometry, Arthur Schultze and F. L. Sevenoak, Prof. George M. Minchin, F.R.S., 573; Euclid's Elements of Geometry, Charles Smith and Sophie Bryant, 623; Simple

- Circular Slide-Rule, Pierre Weiss, 523; Transactions of the American Mathematical Society, 548; *see also* Section A of the British Association.
- Matthaei (Miss G. L. C.), Recovery of Foliage Leaves from Surgical Injuries, 143; On Natural Surgery in Leaves, 619
- Matteucci (Prof. R. V.), Activity of Vesuvius in April—May, 1900, 134
- Mauritius Observatory, Report of, 135; Magnetic and Meteorological Observations at, 582
- Maxim (Sir H. S.), Attraction of Sounds for Mosquitoes, 655
- Maxwell's Theory of Tensions, Luigi Giuganino, 554
- May (W. L.), The Marine Mollusca of Tasmania, 548
- Measurements of Solar Radiation, Annals of the Astrophysical Observatory of the Smithsonian Institution, S. P. Langley, 352
- Measures of Length, Best Alloy for, Dr. Benoit, 112
- Measures, Weights and, Le Système Métrique, G. Bigourdan, 250
- Mechanics: the Mechanical Forces of Nature and their Exploitation, F. Reuleaux, 137; Apparatus for Strain-Measurement, Dr. E. G. Coker, 199; Elastic Equilibrium of Circular Cylinders, L. N. G. Filon, 246; Theoretical Mechanics: an Elementary Treatise, W. Woolsey Johnson, 646; Papers on Mechanical and Physical Subjects, Prof. Osborne Reynolds, F.R.S., 549; *see also* Section G of the British Association.
- Medals, Bronze, Alloys for, Sir W. C. Roberts-Austen, 209
- Medieval Thought, Science and, Prof. T. Clifford Albutt, F.R.S., 76
- Medicine: Death and Obituary Notice of Dr. Kohlstock, 40; Tannoform, 113; Phototherapy, M. H. Close, 301; the Congress on Tuberculosis, 301; the Suppression of Tuberculosis, Prof. Robert Koch, 312; Scientific Research as Basis of Medical Progress, Dr. G. B. Ferguson, 330; a Civilian War Hospital, 346; Reflex Action and Instinct, Paper read at Derby Medical Society, Dr. W. Benthall, 459; Chemistry Teaching in United States Medical Schools, Prof. J. H. Long, 607; Prizes for Researches in Medical Science, 610
- Mediterranean Race: a Study of the Origin of European Peoples, the, G. Sergi, 370
- Meeham (T.), the "Weeping" Habit in Trees the Result of Diminished Vitality, 528
- Megadyne per Square Centimetre, the Proposed New Unit of Pressure, the, Dr. Guillaume, 586
- Megalithic Remains in the Morbihan Archipelago, French Stonehenge, an Account of the Principal, T. Cato Worsfold, 465
- Meldola (Prof. R., F.R.S.), a Raid on Wild Flowers, 126; Rural Readers, Book i., Vincent T. Murché, 394; the Teacher's Manual of Object Lessons for Rural Schools, Vincent T. Murché, 394
- Meldrum (Dr. Charles, F.R.S.), Death of, 452
- Melzi (G.), Ricerche Petrografiche e Geologiche sulla Valsesia, 640
- Memoires Originaux sur la Circulation générale de l'atmosphère, Marcel Brillouin, 396
- Men, on the Movements of, by Land and Sea, Mr. Mackinder, 591
- Mensuration, the Graphical, of Vaults, Prof. Ernesto Breglia, 27
- Mercury: Diameter of Mercury, 523; Periodicity of the Inequalities of Mercury, 524
- Mercury Vapour, Experiments on the Passage of Electricity through, Prof. Schuster, 587
- Mesozoic Floras of United States, Status of the, the Older Mesozoic, Lester F. Ward, W. M. Fontaine, A. Warner and F. H. Knowlton, 633
- Messedaglia (Angelo), Death and Obituary Notice of, 59
- Metabolism, Food Consumption and, Drs. Atwater and Sherman and R. C. Carpenter, 382
- Metallurgy: Idiomorphic Crystals in Blast Furnace Hearth, J. E. Stead, 64; Influence of Copper on Steel Rails and Plates, J. E. Stead and John Evans, 64; the Properties of Steel Castings, Prof. J. O. Arnold, 64, 316; Brunell's Method of Determining Hardness of Iron and Steel, A. Wallberg, 64; a Steel Medal, B. H. Brough, 65; Probable Relation between Characteristic Angle of Deformation of Metals and Newtonian Coefficient of Restitution, G. Gravaris, 392; Copper and Iron Alloys, J. E. Stead, 492; Steel Wire with and without Copper, J. E. Stead and F. H. Wigham, 492; Flame-Spectrum Phenomena of Basic Bessemer Blow, Prof. W. N. Hartley and H. Ramage, 492; Bearing on Fracture of Internal Strains of Iron and Steel, Arthur Wingham, 492; Evolution of Resistance of Steel to Traction deduced from Resistance to Shearing, Ch. Fremont, 496; on the Minute Structure of Metals, G. T. Beilby, 612; on the Action of Ammonia on Metals at High Temperature, G. T. Beilby, 612; Prof. G. G. Henderson, 612; on Aluminium Tin Alloys, Dr. W. C. Anderson, 612; G. Lean, 612
- Metals: Metals as Fuel, Lecture at Royal Institution by Sir W. Roberts-Austen, K.C.B., F.R.S., 360; Aluminium and its Uses, 650
- Meteorology: "Leitfaden der Wetterkunde," Dr. B. Börnstein, 180; Obituary Notice of Dr. A. Hirsch, 18; the Climate of Pemba, T. Burt, 20; the Dust of "Blood-Rain," Prof. W. Rücker, F.R.S., 30; Blood-Rain, F. H. Perry-Coste, 55; Analysis of Tunis Red Rain, E. Bertainchand, 72; Analysis of Red Rain, M. Barac, 489; "Weather-Shooting," Dr. J. M. Pernter, 39; Hailstorm Artillery, W. N. Shaw, F.R.S., 159; a Method for Hail-prevention, G. M. Stanoiéwitsch, 415; Hail-prevention by Cannonading, W. L. Moore, 382; the Dispersion of Hail and Thunder Clouds by Gun-firing, Signor Palazzo, 657; Fog Formations, A. G. McAdie, 43; London Fog Inquiry, W. N. Shaw, F.R.S., 649; the Weather of March 1901, W. Marriott, 47; the Luzon Cyclone of September 8, 1900, Rev. J. Coronas, 61; Recent Work of the United States Weather Bureau, 80; Periodicity of Cyclonic Winds, Rupert T. Smith, 95; Meteorological Society, 95, 271; Observations at Fernley Observatory, J. Baxendell, 112; the North Atlantic and Mediterranean Pilot Chart for June, 112; for July, 238; for August, 332; for September, 434; for October, 529; Symons's Magazine, 119; Meteorological Observations taken at Camden Square 1858-97, 119; Meteorologische Beobachtungen vom xiv. bis xvii. Jahrhundert, Dr. G. Hellmann, 124; Report of Mauritius Observatory, 135; Meteorological Observations at Mauritius, 582; the Royal Observatory, Greenwich, 136; Report on Observations in Terrestrial Magnetism and Atmospheric Electricity made at the Central Meteorological Observatory of Japan 1897, Dr. C. Chree, F.R.S., 151; Meteorological Average for Brussels, 1833-1900, 214; the Heat in New York, 237; the Recent Heat in New York, Dr. Mill, 308; Meteorological Council's Sunshine Values for each Month in the Year, 237; Comparison of Records of Osler's and Dine's Anemometer, 237; the Climate of Glacial Periods, H. Arctowski, 238; Snow conditions in the Antarctic, C. E. Borchgrevingk, 257; Cloud Observations in India, E. H. Hill, 262; Kite Investigations at Smithsonian Institution, Mr. Rotch, 269; Kite-raising by Tug-motion, A. L. Rotch, 453; the Eclipse Cyclone, H. H. Clayton, 271; the Seismograph as a Sensitive Barometer, F. N. Denison, 271; Fallacy of Explanation as to Double Diurnal Barometer Wave, W. H. Dines, 308; the Victoria Nyanza Rain Gauges, Sir William Garstin, 318; the Egyptian Meteorological Department, 318; London Thunderstorm of July 25, 331, 434; Climates of Mammoth Tank, Colorado, R. de C. Ward, 357; Atmospheric Conditions of Fog in Belgium, Dr. E. Vanderlinden, 357; Observations in Franz Josef Land, E. B. Baldwin, 357; Mémoires Originaux sur la Circulation Générale de l'Atmosphère, Marcel Brillouin, 396; Phenomena of Atmospheric Electricity, Prof. H. Ebert, 382; Forecast and Fact, 400; the Distribution of Rainfall over the Land, Dr. Andrew J. Herbertson, 423; the Moon and Wet Days, Alex. B. McDowall, 424; the Moon and Vegetation, 454; the Development of Rainfall Measurement, Dr. H. R. Mill, 455; Relations between Climate and Crops, H. B. Wren, 493; the Indian Rainfall of Autumn, 1900, Major Prain, 530; Meteorological Arrangements on Board the *Discovery*, Dr. H. R. Mill, 554; the Depression of the Earth's Crust Due to an Area of High Barometric Pressure, can be Detected by a Seismograph at great Distances from the Centre of the Depression, F. L. Denison, 587; on the Effects of Sea Temperature and Wind Direction on the Seasonal Variation of Air Temperature in these Islands, W. N. Shaw, 587; R. W. Cohen, 587; Results of Meteorological Observations made at the Radcliffe Observatory, Oxford, in the Eight Years, 1892-99, Arthur A. Rambaut, F.R.S., 599; Rain of Fish in South Carolina, 608; on the Inverse Ratio of Chlorine to Rainfall, W. Ackroyd, 612; the Achariach

- Station, 636; the Climate of Sevenoaks, W. W. Wagstaffe, 637
- Meteorites: Fireball of September 14, 1901, 532; Fireball of September 14, 1492, C. E. Stromeyer, 577
- Meteors: April Meteors of 1901, W. F. Denning, 21; the Meteoric Epoch of July and August, W. F. Denning, 240; the August Meteors of 1901, W. F. Denning, 410; W. E. Rolston, 411; Auroræ and Meteors, Alex. C. Henderson, 527
- Metric, Le Systeme, G. Bigourdan, 250
- Metz (G. de), Electric Capacity of Human Body, 392
- Mexico, the Subterranean Waters of the Ajusco Chain, MM. Marroquin y Rivera and P. C. Sanchez, 288; the Cave Dwellers of North-West Mexico, Dr. C. Lumholtz, 522
- Miall (Prof. L. C., F.R.S.), a Raid on Wild Flowers, 126; the Natural History and Antiquities of Selborne, Gilbert White, 369; on the Experimental Method of Educational Teaching, 591; on the Teaching of Mathematics, 592; on the Teaching of Botany in Universities, 593
- Michael (Prof. A.), on Duty-Free Alcohol, 611; on the Three Stereoisomeric Cinamic Acids, 612
- Michelson Echelon Grating, the, A. Hilger, 383
- Micrometric Observations of Neptune and its Satellite, 639
- Microscopy: the Metamorphoses of *Aschna cyanea*, Mr. Enoch, 47; Microscopical Society, 47, 142, 320; Convenience for Viewing Diffraction Patterns of Diatoms, J. Rheinberg, 60; New Method of Staining Brain Tissue, Dr. Theodore Kodis, 72; Method of Identifying Minerals in Rock-Sections by their Bi-Refringence, Prof. J. Joly, F.R.S., 95; B. Eyferth's Einfachste Lebensformen der Tier- und Pflanzenreiches, Dr. Walther Schönichen and Dr. Alfred Kalberlah, G. S. West, 301; Examination of Abbe Diffraction Theory, J. W. Gordon, 320
- Miers (Prof. H. A., F.R.S.), the Mineralogy of Scotland, M. Forster Heddle, 395
- Military Surgery, the Röntgen Rays in, J. Hall-Edwards, 454
- Milk Standard, the New, 432
- Mill (Dr.), the Recent Heat in New York, 308
- Mill (Dr. H. R.), the Development of Rainfall Measurement, 455; Opening Address in Section E at the Glasgow Meeting of the British Association on Research in Geographical Science, 532; Meteorological Arrangements on Board the *Discovery*, 554; on the Scientific Studies of the Lakes of the British Islands, 590
- Mills (W. S.), Preparation of Synthetical Glucosides, 47
- Milne (Louisa E.), Memoir of Grace, Lady Prestwich, 349
- Mimicry: Impostors among Animals, Prof. W. M. Wheeler, 264
- Minchin (Prof. E. A.), Studies on the Hexactinellida, Isao Iijima, 393
- Minchin (Prof. George M., F.R.S.), England's Neglect of Science, Prof. Perry, F.R.S., 226; Plane and Solid Geometry, Arthur Schultze and F. L. Sevenoak, 573
- Minchin's (Prof.), Photo-Electric Cell, 587
- Mindeleff (Cosmos), the Novaho *hogans*, 425
- Minguin (J.), New Derivatives of Benzylcamphor and Benzylidenecamphor, 295
- Mineralogy: the Salton (California) Salt-Deposits, 19; the Coal Exports of Great Britain, E. B. Wethered, 19; the Kolar (Mysore) Gold-field, Dr. F. H. Hatch, 41; Method of Identifying Minerals in Rock-sections by their Bi-refringence, Prof. J. Joly, F.R.S., 95; Liveingite, R. H. Solly and H. Jackson, 95; Vitriified Quartz, Lecture at Royal Institution, W. A. Shenstone, F.R.S., 65, 126; Prof. J. Joly, F.R.S., 102; Gold in Wicklow, E. St. J. Lyburn, 134; Mineralogical Society, 247; Isomorphic Relations between Sulphates and Orthophosphates, G. T. Prior, 247; Crystals of Calaverite, Herbert Smith, 247; Chemical Analysis of Scotch Sandstones, Dr. W. Mackie, 264; the Mineralogy of Scotland, M. Forster Heddle, Prof. H. A. Miers, F.R.S., 395; the Cape Nome Gold Region, Alaska, F. C. Schrader and A. H. Brooks, 409; Death and Obituary Notice of Prof. Baron Adolf Erik von Nordenskjöld, W. S. Bruce, 450; Notes on Minerals from the Lengenbach Binnenthal, R. H. Solly, 577; Gold Mining in Egypt, C. J. Alford, 636
- Mining: Coal-dust Explosion at Aber Valley Colliery, 111; a Text-Book of Coal-Mining, Herbert W. Hughes, 324; the Death Rates from Mining Accidents in the United Kingdom, Dr. Le N. Foster, F.R.S., 434; the Dover Coal-field, 581; Gold Mining in Egypt, C. J. Alford, 636
- Minor Planet Tercidina, the, 289
- Mira Ceti, Period of, Prof. A. A. Nijland, 410
- Mira (*o* Ceti), Period of, 659
- Mitra (S. B.), the "Crystalline Style" of the Bivalve Molluscs, 490
- "Mizar," the Spectroscopic Binary, 437
- Modern Chemistry, William Ramsay, 349
- Modern Natural Theology, with the Testimony of Christian Evidences, Frederick James Gant, 422
- Modzelewski (J. de), Refraction Indices of Liquid Mixtures, 272
- Moissan (Henri), Fused Niobium, 271
- Molinier (M.), Action of Alcohol on Gastric Secretion, 24
- Mollard (Marin), Double Flowers and Parasitism, 620
- Mollusca: Our Country's Shells and How to Know them, a Guide to British Mollusca, W. J. Gordon, 206; the "Crystalline Style" of the Bivalve Molluscs, S. B. Mitra, 490
- Monckton (H. W.), on the Origin of the Gravel Flats of Berkshire and Surrey, 566
- Moody (H. R.), New Metallic Borides, 175
- Moon and Vegetation, the, 454
- Moon and Wet Days, the, Alex. B. MacDowall, 424
- Moon's Surface, Snow on the, 136
- Moore (Benjamin), an Introduction to Physiology, William Townsend Porter, 298
- Moore (W. L.), Hail-prevention by Cannonading, 382
- Morbihan Archipelago: French Stonehenge, an Account of the Megalithic Remains in the, T. Cato Worsfold, 465
- Morbology: Rats and the Plague, 18; Influence of Feeding, Work and Dust on Tuberculosis, MM. Lannelongue, Achard and Gaillard, 71; the Congress on Tuberculosis, 301; the Suppression of Tuberculosis, Prof. Robert Koch, 312; Lecithin in Tuberculosis, H. Claude and A. Zaky, 572; Influence of Variations of Temperature on Tuberculosis, MM. Lannelongue, Achard and Gaillard, 644; Mosquitoes and Malaria, G. Noè, 88; Major Ronald Ross, F.R.S., 453; the Anti-Mosquito Campaign in Sierra Leone, 579; Major R. Ross, F.R.S., 489; on the Story of Malaria, Major R. Ross, 588, the West African Campaign against Malaria, Major Ronald Ross, 636; the Malaria-free District of Massarosa, Dr. Grassi, 581; Simultaneity of Mosquitoes and Malaria at Constantine, A. Billet, 524; Mosquitoes and Yellow Fever, 453; Dr. H. de Gouvêa, 655; the Diagnosis of Plague, Dr. E. Klein, F.R.S., 91; New Method of Examination for Typhoid Bacillus, R. Cambier, 200; Psoriasis and Neuraesthesia, F. Bouffé, 440
- Moreno (Dr. Francisco), on the Anthropogeography of Argentina, 590
- Morgan (Prof. H. T.), Regeneration and Liability to Injury in Animals, 455
- Morley (Prof.), on Determining the Influence of Water Vapour on the Energy lost by a Heated Body placed in an Enclosure containing Air, Hydrogen or Water Vapour, 586; a New Pressure Gauge, 586
- Morphology: on the Morphological Divisions of Europe, Dr. A. J. Herbertson, 589; on the Morphology of Transverse Vertical Processes, Prof. A. Macalister, F.R.S., 614
- Morrison (James), Maps, Their Uses and Construction, 599
- Morton (D. H.), on the Mechanical Exhibits at the Glasgow Exhibition, 613
- Mosquitoes: Mosquitoes and Malaria, G. Noè, 88; Major Ronald Ross, F.R.S., 453; the Question of Priority, 287; the Anti-mosquito Campaign in Sierra Leone, 579; Major R. Ross, F.R.S., 489; the West African Campaign, Major Ronald Ross, 636; Simultaneity of Mosquitoes and Malaria at Constantine, A. Billet, 524; the Malaria-free District of Massarosa, Dr. Grassi, 581; Mosquitoes and *Filaria*, T. L. Bancroft, 416; Mosquitoes and Yellow Fever, 453; H. de Gouvêa, 655; Mosquitoes and Sounds, Major Ronald Ross, 607; Attraction of Sounds for Mosquitoes, Sir H. S. Maxim, 655; the Common Grey Mosquito of Calcutta, Miss N. Evans, 638
- Moths: Familiar Butterflies and, W. F. Kirby, 375
- Motor, the Induction, B. A. Behrend, 252
- Motor Car Worked by Absinthe, 213
- Mount Staasta, the Biology of, 242
- Mountain Seclusion, Our, Sir Archibald Geikie, F.R.S., 206
- Moureu (Ch.), Hydration of Amylpropionic Acid with Formation of Caproylacetic Acid, 71; Synthesis of Primary Acetylenic Alcohols, 120; Method of Synthesis of Acetylenic Aldehydes, 296

- Movements of Athletes, Photographic Analysis of, 377
 Movements of the Earth, the Twelve, M. Flammarion, 312
 Movements of Men by Land and Sea, Mr. Mackinder, 591
 Muff (H. B.), on Overflow Channels and Other Phenomena indicating Glacier-dammed Lakes in the Cheviots, 565
 Muirhead (R. F.), Stress—its Definition, 207
 Muldrow (R.), Mount McKinley, 658
 Mull, on the Re-discovery of a Tree Trunk Embedded in Volcanic Ash in, Sir A. Geikie, 565
 Müller (Prof. F. Max), Last Essays, 251
 Mummies, the Difference Between Memphis and Thebes, Mr. Harting, 70
 Mummified Fishes of Ancient Egypt, Chemical Analysis of, MM. Lortet and Hugouenq, 668
 Munby (A. E.), A Convenient Primary Cell, 30
 Munro (Dr.), on a "Kitchen Midden" near Elie, in Fife, 615
 Murani (Prof. O.), Focus-tube as an Electric Valve, 263
 Murché (Vincent T.), Rural Readers, Book i., 394: the Teacher's Manual of Object Lessons for Rural Schools, 394
 Murray (Sir John), on the Scientific Studies of the Lakes of the British Islands, 590
 Museums: the Geological Society and its Museum, 57; Novitates Zoologicae, a Journal of Zoology in Connection with the Tring Museum, 249; a Guide to the Shell and Star-fish Galleries in the British Museum (Nat. Hist.), 423; Catalogue of the Collection of Birds' Eggs in the British Museum (Nat. Hist.), E. W. Oates, 600
 Music: the Subjective Lowering of Pitch, E. Hurren Harding, 103, 182; Prof. F. J. Allen, 182, 301; G. W. Hemming, 182, 308; E. C. Sherwood, 233; Suggested Experiment, 308
 Musk-ox and Bison at Woburn Abbey, 63; the Age of the Woburn Abbey Musk-ox, R. Lydekker, F.R.S., 103
 Mycenaean Question, the, H. R. Hall, 280
 Myers (C. S.), on the Bones of Hen Nekht, an Egyptian King of the Third Dynasty, 615
 Mythology: Polyphem ein Gorilla, Dr. Th. Zell, 467
 Myths of Greece Explained and Dated, George St. Clair, 180
 Nadir of Temperature and Allied Problems, the, Bakerian Lecture at Royal Society, Prof. James Dewar, F.R.S., 243
 Nagel (Herr), Effect on Eye of Röntgen &c. Rays, 529
 Nairn, on the Trias of Elgin and, Dr. W. Mackie, 565
 National Antarctic Expedition, the, 131, 182, 233; Prof. Edward B. Poulton, F.R.S., 83, 156, 206; Prof. J. W. Gregory, F.R.S., 58, 132, 181
 National Anti-Vivisection Society, the, and Lord Lister, 55; Hon. Stephen Coleridge, 101; Editor, 101
 National Physical Laboratory, the Aims of the, Discourse delivered at the Royal Institution by Dr. R. T. Glazebrook, F.R.S., 290; Report on Observatory Department of National Physical Laboratory, 407
 Native South Indian Life, Occasional Essays on, Stanley P. Rice, 574
 Natives of South Africa: their Economic and Social Conditions, E. Sidney Hartland, 73
 Nature, the Mechanical Forces of, and their Exploitation, F. Reuleaux, 137
 Nature Teaching, Francis Watts, 550
 Natural History: Von den Antillen zum Fernen Westen, Reiseskizzen eines Naturforschers, F. Doflein, 2; the Birds of Siberia, a Record of a Naturalist's Visit to the Valleys of the Petchora and Yenesei, Henry Seebohm, 32; Notes on Natural History of Trinidad, J. H. Hart, 40; Musk-ox and Bison at Woburn Abbey, 63; the Age of the Woburn Abbey Musk-Ox, R. Lydekker, F.R.S., 103; Toad in Flint Nodule, Charles Dawson, 70; Linnean Society, 70, 142, 223; Fact and Fable, Effie Johnson, 76; the Stalk-eyed Crustacea of British Guiana, West Indies and Bermuda, Dr. Charles G. Young, 98; Foreign Oysters acquiring Characters of Natives, J. M. Tabor, 126; F. W. Headley, 158; New South Wales Linnean Society, 143, 272, 416, 548; the Significance of Spiral Swimming, Dr. H. S. Jennings, 165; Charles St. John's Note-Book, 1846-1853, T. Digby Pigott, 177; an Instance of Adaptation among the Deer, R. Lydekker, F.R.S., 257; a Handbook of British Birds, J. E. Harting, 297; the Life and Letters of Gilbert White of Selborne, Rashleigh Holt-White, 276; Natural History of Selborne, Gilbert White, 276; Natural History and Antiquities of Selborne, Gilbert White, L. C. Miall, F.R.S., and W. Warde Fowler, 369; Natural History Notes, Nelson Annandale and H. Robinson, 331; Death of Dr. H. W. Harkness, 356; the Cambridge Natural History, vol. viii., Amphibia and Reptiles, Hans Gadow, G. A. Boulenger, F.R.S., 401; a Guide to the Shell and Star-fish Galleries (Mollusca, Polyzoa, Brachiopoda, Tunicata, Echinoderma and Worms) in the British Museum, 423; Life by the Seashore: an Introduction to Natural History, Marion Newbigin, Prof. W. A. Herdman, F.R.S., 621
 Natural Philosophy: Deschanel's Natural Philosophy, iii., Electricity, J. D. Everett, 50; Death of Prof. P. G. Tait, 261
 Natural Selection: Ueber Bedeutung und Tragweite des Darwin'schen Selectionsprincipals, L. Plate, 49; Foreign Oysters acquiring Characters of Natives, J. M. Tabor, 126; F. W. Headley, 158
 Naval Architecture: the Rolling Angle of a Ship found by Photography, Rev. F. J. Jervis-Smith, F.R.S., 576
 Naval Observatory, United States, 265
 Navigation: a Treatise on Electromagnetic Phenomena and on the Compass and its Deviations Aboard Ship, Mathematical, Theoretical and Practical, Commander T. A. Lyons, 125; New Turbine-driven Vessel, 133; the Turbine-propelled Vessel *King Edward*, 334; the Aire and Calder Canal Navigated by a Sea-going Steamer, 434; on a Long Continuous-burning Petroleum Lamp for Beacons and Buoys, J. R. Wigham; the Rolling Angle of a Ship found by Photography, Rev. F. J. Jervis-Smith, F.R.S., 576; Recent Progress in Waterways and Maritime Works, Papers read at International Engineering Congress at Glasgow, 639
 Nebulae: New Nebulae, 93, 216, 336; G. Bigourdan, 312
 Negative After-Images and Colour-Vision, Shelford Bidwell, F.R.S., 216
 Neglect of Science, England's, Prof. Perry, F.R.S., Prof. George M. Minchin, F.R.S., 226
 Negreano (D.), Vibrations Produced in a Wire with an Influence Machine, 200
 Nelson (E. W.), the Eskimos, 426
 Nemeç (Dr. B.), Die Reizleitung und die reizleitenden Strukturen bei den Pflanzen, 371
 Nencki (Herr), Chemical Relationship between Haemoglobin and Chlorophyll, 265
 Neolithic Sites in the Isle of Arran, Drs. Duncan and Bryce, 615
 Neptune and its Satellite, Micrometric Observations of, 639
 Nernst Lamp in America, A. J. Wurts' Paper read at American Institute of Electrical Engineers, 632
 Nernst's Phonograph, 164
 Neville (F. H.), Results of Chilling Copper-Tin Alloys, 221
 New Garden Plants: a Study in Evolution, 446
 New Guinea, German, Wooden Human Effigies from, D. R. Poch, 358
 New South Wales: Agriculture in, 106; New South Wales Linnean Society, 143, 272, 416, 548; Bird-Destruction in New South Wales, A. J. North, 165; New South Wales Royal Society, 296, 416; Botany of Interior of New South Wales, R. H. Cabbage, 548
 New York, the Heat in, 237; Dr. Mill, 308
 New York City, July 2-3, 1900, Proceedings of the Eighth Annual Meeting of the Society for the Promotion of Engineering Education held in, Prof. F. W. Burstall, 204
 Newbigin (Miss Marion), on a Scheme of the Scottish Natural History Society, 589; Life by the Seashore: an Introduction to Natural History, 621
 Newcastle-on-Tyne, Electricity Supply in Bulk at, 262
 Newell (Lyman C.), Experimental Chemistry, 27
 Nichols (E. W.), Differential and Integral Calculus with Applications for Colleges, Universities and Technical Schools, 396
 Niçloux (M.), Carbon Monoxide in Blood of Newly-born, 224
 Nijland (Prof. A. A.), Period of Mira Ceti, 410
 Ninth Jubilee of Glasgow University, the, 186
 Nitro-cellulose and Theory of the Cellulose Molecule, Smokeless Powder, John B. Bernadou, 600
 Niven (W. N.), on the Distribution of Certain Forest Trees in Scotland, 618
 Nixon's "Euclid Revised" with Solutions, Geometrical Exercises from, Alexander Larmor, 497
 Noè (G.), Mosquitoes and Malaria, 88
 Nomenclature, Note on a Point of Chemical, 648
 Nordenskjöld (Baron Adolf Erik von), Death of, 381; Obituary Notice of, W. S. Bruce, 450
 Nordman (Charles), Transmission of Hertzian Waves through Conducting Liquid, 392

- Norfolk and Norwich Naturalists' Society, Woad as a Blue Dye, Dr. C. B. Plowright, 413
- North (A. J.), Bird-destruction in New South Wales, 165
- North American Folk Lore, 425
- North Atlantic and Mediterranean Pilot Charts for June, 112; for July, 238; for August, 332; for September, 434; for October, 529
- North Atlantic Ocean, Circulation of the Surface Waters of the, H. N. Dickson, 665
- Norton (J. T., jun.), Action of Sodium Thiosulphate on Solutions of Metallic Salts at High Temperatures and Pressures, 415
- Northway (M. J.), Experiments on Period of Rod Vibrating in Liquid, 657
- Norway: the Norwegian North Polar Expedition, 1893-96, Dr. C. Chree, F.R.S., 151; on the Physical History of the Norwegian Fjords, Prof. E. Hull, 566
- Notes from a Diary, 1889-91, Sir Mountstuart E. Grant Duff, Lord Avebury, F.R.S., 228
- Nova Persei, 42, 191, 437, 491; Spectrum of, 240, 456, 556, 639; Further Observations on Nova Persei, Sir Norman Lockyer, K.C.B., F.R.S., 341; Appearance of the Photographic Image of Nova Persei, 639
- Novaho *hogans*, the, Cosmes Mindeleff, 425
- Numbers, Essays on the Theory of, Richard Dedekind, 374
- Oates (E. W.), Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History), 600
- Observations of Mars, 384
- Observatories: Report of Mauritius Observatory, 135; Magnetical and Meteorological Observations made at Royal Alfred Observatory, Mauritius, 582; Oxford University Observatory, 136; the Royal Observatory, Greenwich, 136; Report on Observations in Terrestrial Magnetism and Atmospheric Electricity made at the Central Meteorological Observatory of Japan, 1897, Dr. C. Chree, F.R.S., 151; a Photometric Durchmusterung, including all Stars of the Magnitude 7.5 and Brighter North of Declination -40° , obtained with Meridian Photometer during Years 1895-98 at Harvard College Observatory, E. C. Pickering, 257; United States Naval Observatory, 265; the Paris Observatory in 1900, 335; Annals of the Astrophysical Observatory at the Smithsonian Institution, Measurements of Solar Radiation, S. P. Langley, 352; the Cape Observatory, Sir David Gill, 410; the McClean Telescope at the Cape Observatory, 632; Réunion du Comité International Permanent pour l'Exécution de la Carte Photographique du Ciel tenue à l'Observatoire de Paris en 1900, 449; Results of Meteorological Observations made at the Radcliffe Observatory, Oxford, in the Eight Years 1892-99, Arthur A. Rambaut, F.R.S., 599
- Oceanography: the Belgian Soundings, H. Arctowski and R. F. Renard, 238; Oceanographical Results of *Valdivia* Expedition, Dr. G. Schott, 263; the Admiralty Surveys, 1900, Sir W. J. L. Wharton, 309; the Circulation of the Surface Waters of the North Atlantic Ocean, H. N. Dickson, 665
- October Orionids, the, W. F. Denning, F.R.S., 651
- Oddo (G.), Oxychloride of Phosphorus and Cryoscopic Solvent, 288
- Oecology: Death and Obituary Notice of Prof. A. F. W. Schimper, Percy Groom, 551
- Officer (Graham), Aboriginal Grave in Darling River District, 416
- Ogham Writing in Ireland, on the Age of, R. A. S. Macalister, 615
- Ogilvy (A. J.), the Elements of Darwinism, 28
- Okapi, the, 309; Prof. E. R. Lankester, F.R.S., 188, 247
- Oldham (H. Yule), on the Experimental Demonstration of the Curvature of the Earth's Surface, 591
- Oliver (George, M.D.), a Contribution to the Study of the Blood and Blood Pressure, 1
- Oliver (Prof. F. W.), on Certain Points in the Structure of the Seeds *Aethiostea*, Brongn., and *Stephanospermum*, Brongn., 618
- Omori (Dr. F.), the International Seismological Conference at Strasburg, 340
- Oochromy, Hybrid, with a Note on Xenia, G. P. Bulman, 207
- Ophioglossales and Lycopodiales, Contributions to our Knowledge of the Gametophyte in the, William H. Lang, 616
- Ophioglossum Simplex*, on a Specimen of, Collected by Mr. Ridley in Sumatra, Prof. Bower, F.R.S., 617
- Opposition of Eros, 1903, 491
- Optics: Method of Identifying Minerals in Rock Sections by their Bi-refringence, Prof. J. Joly, F.R.S., 95; l'Optique des Rayons de Röntgen et des Rayons Secondaires que en dérivent, G. Sagnac, 101; the Colour and Polarisation of Blue Sky-Light, Dr. N. E. Dorsey, 138; the Mechanism of Radiation, J. H. Jeans, 199; Jena Glass, Prof. S. P. Thompson, F.R.S., 199; a Vertical Light-beam through the Setting Sun, Prof. A. S. Herschel, F.R.S., 232; Electricité et Optique, la Lumière et ses Theories Electrodynamiques, H. Poincaré, 273; Laws of Radiation as applied to Incandescent Mantles, Dr. Guillaume, 309; Determination of Three Principal Parameters of a Crystal by Refractometer, A. Cornu, 320; Pseudoscopic Vision without a Pseudoscope, a New Optical Illusion, Prof. R. W. Wood, 351; A. S. Davis, 376; Constitution of White Light, O. M. Corbino, 464; Effects of Röntgen &c. Rays on Eye, Herren Himstedt and Nagel, 529; on Magnetic Rotation of Light and the Second Law of Thermodynamics, Lord Rayleigh, F.R.S., 577; Optical Glass, Dr. Glazebrook, Mr. Hinks, 586
- Orbit of Comet 1894 II (Gale), Definitive, 89
- Orbits of Algol Variable, R. R. Phipps and V. Phipps, 384
- Ordovician Rocks of North-West Ireland, on the Relation of the Silurian and, to the Great Metamorphic Series, A. McHenry, J. H. Kilroe, 565; G. H. Kinahan, 565
- Organic Peroxides, Researches on, MM. von Baeyer and Villiger, 64
- Orionids, the October, W. F. Denning, F.R.S., 651
- δ Orionis, Variable Radical Velocity of, 491
- Orling (A.), a New Principle in Wireless Telegraphy Discovered, 636
- Ormerod (Miss Eleanor A.), Death of, 308; Obituary Notice of, 330
- Ornithology: Protection of Sea-Birds of Louisiana Gulf Coast, Prof. Beyer, 19; the Song of Birds, Henri Coupin, 20, 62; Der Gesang der Vögel, Dr. Valentin Häcker, 52; Long-tailed Japanese Fowls, J. T. Cunningham, 158; Frank Finn, 232, 551; Hoopoes on Lundy Island, W. H. Graham, 164; Bird-destruction in New South Wales, A. J. North, 165; Winter Singing of Thrush, W. W. Fowler, 215; How to Know the Indian Ducks, F. Finn, 278; a Handbook of British Birds, J. E. Harting, 297; Bird Watching, Edmund Selous, 325; Album de Aves Amazonicas, Dr. Emílio A. Goeldi, 397; Position of Auks and Puffins, Dr. R. W. Shufeldt, 408; the Skeleton of the Cuckoo, Dr. R. W. Shufeldt, 435; Manual of the Birds of Iceland, Henry H. Slater, 443; the Colour of Guillemots' Eggs, Captain G. E. H. Barrett Hamilton, 600; Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History), E. W. Oates, 600; Essays and Photographs, some Birds of the Canary Islands and South Africa, H. E. Harris, 603
- Oscillographs, André Blondel, 308, 408
- Osmosis through Membrane of Copper Ferrocyanide, G. Flusin, 71
- Osmotic Pressure as a Protection from Cold in Living Cell, M. D'Arsonval, 295
- Ostwald (Prof. W.), Die wissenschaftlichen Grundlagen der Analytischen Chemie elementar dargestellt, 5; the Laboratory of Wilhelm Ostwald, 248
- Ovis Fannini, W. T. Hornaday, 310
- Oxford Text-Book of Zoology, the, Prof. E. Ray Lankester, Part II. the Porifera and Coelentera, E. A. Minchin, G. H. Fowler and G. C. Bourne, 26
- Oxford University Observatory, 136
- Oxide, Copper, Decomposition of, Phillip Harrison, 233
- Oysters Acquiring Characters of Natives, Foreign, J. M. Tabor, 126; F. W. Headley, 158
- Paillet (Réné), Permeability of Nickel-Steel in Intense Magnetic Fields, 96; Influence of Temperature on Electromotive Force of Magnetisation, 175
- Pakes (Walter C. C.), the Science of Hygiene, a Text-Book of Laboratory Practice, 178
- Palaearctic Lepidoptera, a Catalogue of, 348
- Palaebotany, Status of the Mesozoic Floras of United States; the Older Mesozoic, Lester F. Ward, W. M. Fontaine, A. Warner and F. H. Knowlton, 633
- Palaolithics: Prehistoric Implements in the Transvaal and Orange River Colony, Stanley B. Hutt, 103; Palaolithic Implements found on Knowle Farm, 432; Palaolithic Drawings on Walls of Caves in Dordogne, L. Capitan and H. Breuil,

- 572; Palaeolithic Drawings on Walls of Cave of La Mouthe, Emile Rivière, 596
- Palaeontology, the Jurassic Brachiopoda of Cutch, Dr. F. L. Kitchen, 134; Gigantic Permian Anomodonts, &c., at Sokolki, Russia, Prof. W. Amalitzky, 239; the Siberian Mammoth, 286; Fossils of Prototippus found in Texas, 356; Fossil Fishes in Edinburgh Carboniferous and South Scottish Silurian Rocks, Dr. R. H. Traquair, 343; Shark's Teeth Discovered at Woking, 523; the Origin and Birth-place of the Proboscidea, Dr. C. W. Andrews, 582; a New Miocene Flightless Auk, Dr. F. A. Lucas, 608; Armour-clad Whales, 652
- Palazzo (Dr. Luigo), the Palombara Earthquake of April 24, 1901, 288; the Dispersion of Hail and Thunder Clouds by Gun Firing, 657
- Panama Canal, on the, Bunau-Varilla, 613
- Parallax of μ Cassiopeiae, 216
- Paris: Paris Academy of Sciences, 23, 47, 71, 96, 119, 143, 175, 199, 224, 248, 271, 295, 320, 344, 368, 392, 415, 440, 464, 496, 524, 572, 596, 620, 644, 668; the Increase of the Population of Paris, 163; the Paris Observatory in 1900, 335; Réunion du Comité International permanent pour l'exécution de la Carte Photographique du ciel, tenue à l'Observatoire de Paris en 1900, 449; British Instruments at the Paris Exhibition, C. V. Boys, F.R.S., 576
- Parmentier (F.), Aluminium in Mineral Waters, 176; the Intermittent Spring at Vesse, 296
- Pasteur Institute at Kasauli (India), the Work of the, 383
- Pasteur Monument at Dôle, the, 163
- Patagonian Ground-Sloth, the Hair of the, Dr. W. G. Ride-wood, 190
- Patrick (Prof. G. T. W.), Why do Men Swear? 334
- Payn (Howard), Publications de l'Observatoire Astronomique et Physique de Tachkent. Etudes sur la Structure de l'Univers, W. Stratonoff, 56
- Peabody (Cecil H.), the Steam Engine Indicator, 125
- Peach (B. N.), on the Cambrian Fossils of the North-west Highlands, 565
- Pearl and Pearl-shell Fisheries, Prof. W. C. McIntosh, F.R.S., 376
- Pearson (H. H.), the Flora of Tibet, 70
- Pearson (Prof. Karl, F.R.S.), Statistical Investigation on Variability and Heredity, 102
- Peckham (H. E.), the Bituminous Deposits of Cuba, 365
- Peek (Sir Cuthbert), Death and Obituary Notice of, 261
- η Pegasi Spectroscopic Binary, 609
- Pellat (M.), Infinite Space necessitated by Notion of Infinite Time, 41
- Pelletier (M.), New Method of obtaining Cubic Index of Skull, 490
- Period of Mira Ceti, Prof. A. A. Nijland, 410
- Period of Mira (α Ceti), 659
- Periodic Classification and the Problem of Chemical Evolution, the, G. Rudorf, 51
- Periodicity of the Inequalities of Mercury, 524
- Peripatus, Three New Species of, R. Evans, 490
- Perkin (A. G.), Robinin, Violaquercitrin and Osyritrin, 46
- Perkin (Dr. F. Mollwo), Electro-Chemistry, 5, 77; Indigo and Sugar, 10; Qualitative Chemical Analysis, Organic and Inorganic, 397
- Perkin (W. H., Jun.), Derivatives of Bicyclopentane, 94
- Pernter (Dr. J. M.), Weather-shooting, 39
- Peroxides, Researches on Organic, MM. v. Baeyer and Villiger, 64
- Perronin (M.), Elliptic Elements of Comet 1900 c, 644
- Perry (Prof., F.R.S.), England's Neglect of Science, 226; on the Teaching of Mathematics, 592
- Perry-Coste (F. H.), Blood-rain, 55
- α Persei in the Line of Sight, Motion of, 359
- Persei, Nova, 42, 191, 240, 410, 437, 456, 491, 556; Further Observations on Nova Persei, Sir Norman Lockyer, K.C.B., F.R.S., 341; Appearance of the Photographic Image of Nova Persei, 639
- Petavel (J. E.), Heat Dissipated by Platinum Surface at High Temperature, iv.; High-Pressure Gases, 93; on a Recording Manometer for High Pressures, 613
- Peters (C. A.), Estimation of Calcium, Strontium and Barium as Oxalates, 548
- Petot (A.), Mode of Action of Brakes of Automobiles, 464
- Petrography: Ricerche Petrografiche e Geologiche sulla Vallesia E. Artini and G. Melzi, Dr. H. J. Johnston-Lavis, 640
- Petroleum, Handbook on, Captain J. H. Thomson and Boverton Redwood, W. T. Lawrence, 441
- Pharmacy: Death and Obituary Notice of Prof. Bleicher, 164; Hanbury Gold Medal for 1901 Presented to Dr. George Watt by the Pharmaceutical Society, 162
- Philip's Educational Terrestrial Globe, 375
- Philology: Last Essays, Right Hon. Prof. F. Max Müller, 251; Death of Canon Isaac Taylor, 635
- Philosophy: a History of Ancient Greek Thinkers, Theodor Gomperz, 345
- Philosophical Society of Washington, Bulletin of the, 253
- Photography, Nernst's, 164; Ruhmer's Phonograph, 164
- Photo-electric Cell, the Latest Form of Prof. Minchin's, 587
- Photography: Stellar Photography with a Siderostat, 42; Photographs of the Zodiacal Light, 42; the Chapman-Jones Plate Tester, 134; Photography of Corona, 167; Forms of Images in Stellar Photography, 191; the Cape Photographic Durchmusterung for the Equinox, 1875, David Gill, F.R.S., J. C. Kapteyn, 257; Photography by the Light of Venus, 336; Photographic Analysis of the Movements of Athletes, 377; the Photographic Chart of the Heavens, 449; the Rolling Angle of a Ship found by Photography, Rev. F. J. Jarvis-Smith, F.R.S., 576; the International Survey of the Heavens, Prof. A. Riccò, 583; Photograph of the Spectrum of Lightning, 583; Essays and Photographs: Some Birds of the Canary Islands and South Africa, H. E. Harris, 603; Appearance of the Photographic Image of Nova Persei, 639
- Photometry: Stellar Photometry, B. Baillaud, 63; a Photometric Durchmusterung, including all Stars of the Magnitude 7.5 and Brighter North of Declination - 40°, Edward C. Pickering, 257
- Phototherapy: the Treatment of Disease by Light, 259; Phototherapy, M. H. Close, 301
- "Phototropic" Substances, So-called, Prof. Willy Marckwald, 612
- Physician, the, as Physiologist, George Oliver, M.D., 1
- Physics: Die Wissenschaftlichen Grundlagen der Analytischen Chemie elementar dargestellt, Prof. W. Ostwald, 5; Obituary Notice of Prof. H. A. Rowland, 16; Physical Society, 23, 93, 141, 199, 246, 667; the Spectra of Carbon Monoxide and Silicon Compounds, Dr. Karl v. Wesendonk, 29; a Convenient Primary Cell, A. E. Munby, 30; Infinite Space necessitated by Notion of Infinite Time, M. Pellat, 41
- Physikalisch-chemische Propädeutik, H. Griesbach, 53; Publications de l'Observatoire Astronomique et Physique de Tachkent, Études sur la Structure de l'Univers, W. Stratonoff, Howard Payn, 56; Death and Obituary Notice of Sir Courtenay Boyle, K.C.B., 82; Application of Elastic Solids to Meteorology, Dr. Chree, 93; a Treatise on Physics, Prof. Andrew Gray, F.R.S., 97; the Subjective Lowering of Pitch, E. Hurren Harding, 103, 182; Prof. F. J. Allen, 128, 301; G. W. Hemming, 182, 308; E. C. Sherwood, 233; Suggested Experiment, 308; Mass of Cubic Decimetre of Distilled Water, Dr. Benoit, 112; Best Alloy for Measures of Length, Dr. Benoit, 112; Researches on the Normal Cell, especially the Weston Element, W. Jaeger and St. Lindeck, 118; Annalen der Physik, 118, 246; Relations between Electrical Conductivity and Chemical Character of Solutions, Prof. J. Gibson, 119; Influence of Temperature on the Elasticity of Metals, C. Schaefer, 119; Death of Prof. J. Viriamu Jones, 132; Obituary Notice of, Prof. W. E. Ayrton, F.R.S., 161; Essays in Illustration of the Action of Astral Gravitation in Natural Phenomena, William Leighton Jordan, 155; some Recent Work on Diffusion, Lecture at Royal Institution, Dr. Horace T. Brown, F.R.S., 171, 193; Influence of Grinding on Solubility of Lead in Lead Fritts, Dr. T. E. Thorpe, F.R.S., and Charles Simmonds, 175; Stress, its Definition, R. F. Muirhead, 207; Reviewer, 207; Vertical Stone-Movements due to Soil-moisture and Frost, Horace Darwin, 222; Creeping of Liquids and Tension of Mixtures, Dr. F. T. Trouton, F.R.S., 223; Capillary Constants of Organic Liquids, P. A. Guye and A. Baud, 224, 248; Scientific Worthies, Sir William Huggins, K.C.B., Prof. H. Kayser, 225; a New Method of using Tuning-forks in Chronographic Measurements, Rev. F. J. Jarvis-Smith, F.R.S., 232; Decomposition of Copper Oxide, Philip Harrison, 233; Molecular Constitution of Supersaturated Solutions, Prof. Hartley, F.R.S., 271; the Aims of the National Physical Laboratory, Discourse delivered at the Royal Institution by Dr. R. T. Glazebrook,

- F.R.S., 290; Report on Observatory Department of National Physical Laboratory, 407; the Liquefaction of Hydrogen, 302; the Crystallisation of Salt Solutions, Dr. H. M. Dawson, 336; a Manual of Laboratory Physics, H. M. Tory and F. H. Pitcher, 350; a Possible Method of attaining the Absolute Zero of Temperature, Geoffrey Martin, 376; Polish, Lecture at Royal Institution, Right Hon. Lord Rayleigh, F.R.S., 385; the Laboratory of Wilhelm Ostwald, 428; on the Cellular Distribution of Eddies produced in Liquid Films when Convection Currents are set up, Henri Bénard, 454; Papers on Mechanical and Physical Subjects, Prof. Osborne Reynolds, F.R.S., 549; Interesting Phenomenon in Connection with Theory of Sound, Bergen Davis, 554; a Simple Model for Demonstrating Beat, K. Honda, 626; Death and Obituary Notice of Rudolph Koenig, 630; a Curious Flame, L. L. Garbutt, 649; Experiments on Period of Rod Vibrating in Liquid, M. J. Northway and A. S. Mackenzie, 657; Variation with Temperature of Thermoelectromotive Force and Electric Resistance of Nickel, Iron and Copper, E. F. Harrison, 667; Asymmetry of Zeeman Effect, G. W. Walker, 668
- Physiography, Outlines of, an Introduction to the Study of the Earth, A. J. Herbertson, 325
- Physiology: a Contribution to the Study of the Blood and Blood-pressure, George Oliver, M.D., 1; Carbon Monoxide in Blood of Newly-born, M. Nicloux, 224; Iodine in Blood, MM. Stassano and P. Bourcet, 248; the Sugars from Blood, MM. R. Lépine and Boulud, 320; Action of Alcohol on Gastric Secretion, Albert Frouin and M. Molinier, 24; Absence of Bacteria in Air and Food prejudicial to Animal Organism, MM. Charrin and Guillemonat, 48; Law of Electrical Stimulation of Nerves, Georges Weiss, 72; Physiological Action of Radium Rays, H. Becquerel and P. Curie, 175; Glycolytic Enzyme in Muscle, Sir Lauder Brunton, F.R.S., and Herbert Rhodes, 198; Variations of Alkaloidal Nitrogen in Urine, H. Guillemard, 200; Action of Currents of high frequency on urinary secretion, MM. Denoyès, Martre and Rouvière, 272; Reaction Time in different Races, L. Lapique, 224; an Introduction to Physiology, William Townsend Porter, Benjamin Moore, 298; can Sulphuretted Hydrogen Poisoning be caused through Skin and Mucous Membrane? A. Chauveau, 320; Viscera of Porpoise, Drs. D. Hepburn and D. Waterston, 344; Die Krystallisation von Eiweissstoffen und ihre Bedeutung für die Eiweisschemie, Dr. Fr. N. Schulz, 375; the Mechanical Efficiency of Bicyclists, Drs. Atwater and Sherman and R. C. Carpenter, 382; Lectures on the History of Physiology during the Sixteenth, Seventeenth and Eighteenth Centuries; Lane Lectures at Cooper Medical College in San Francisco, Sir M. Foster, K.C.B., Sec.R.S., 417; Death and Obituary Notice of Dr. Adolf Fick, 432; Temperament and Exercise, W. W. Davis, 435; Regeneration and Liability to Injury in Animals, Prof. T. H. Morgan, 455; Reflex Action and Instinct; Paper read at Derby Medical Society, Dr. W. Benthall, 459; the Evolution of Consciousness, Leonard Hall, 467; Death and Obituary Notice of Dr. J. L. W. Thudicum, 527; Death and Obituary Notice of Prof. A. F. W. Schimper, Percy Groom, 551; Antimony in Organism, G. Pouchet, 596; Excitability of Spinal Marrow, A. N. Vitznou, 620; Influence of Spermotoxin on Reproduction, C. de Leslie, 620; Physiological Chemistry, the Feeding of Animals, W. H. Jordan, 625; Plant Physiology, Vitality of Seeds, Dr. Henry H. Dixon, 256; Die Reizleitung und die reizleitenden Strukturen bei den Pflanzen, Dr. B. Nemeč, 371; *see also* Section I in the British Association
- Pickard (R. H.), Reactions of Hydroxamides, 175
- Pickering (Edward C.), a Photometric Durchmusterung, including all Stars of the Magnitude 7.5, and brighter North of Declination -40° , obtained with the Meridian Photometer during years 1895-98, 257
- "Picts' Houses," of Scotland, the, D. McRitchie, 311
- Pigment, L'Evolution du, Dr. G. Bohn, 28
- Pigott (T. Digby), Charles St. John's Note Book, 1846-1853, 177
- Pilot Chart of North Atlantic and Mediterranean for June, 112; for July, 238; for August, 332; for September, 434; for October, 529
- Pinus*, on the Histology of the Sieve Tubes of, A. W. Hill, 618
- Pisciculture, Canadian, Railway Tank Car for Carrying Live Fish, 490
- Pitch: the Subjective Lowering of, E. Hurren Harding, 103, 182; Prof. F. J. Allen, 182, 301; G. W. Hemming, 182, 308; G. C. Sherwood, 233; Suggested Experiment, 308
- Pittman (E. F.), Geological Notes on Kosciusko (N.S.W.), 143
- Pittsburg, the Carnegie Technical School at, 570
- Plague: the, Rats and, 18; the Diagnosis of Plague, Dr. E. Klein, F.R.S., 91
- Plane and Solid Geometry, Arthur Schultze and F. L. Sevenoak, Prof. George M. Minchin, F.R.S., 573
- Planets: Variability of Eros, 63, 359, 384; Opposition of Eros in 1903, 491; the Planet Saturn, W. F. Denning, 114; the Centenary of the Discovery of Ceres, 129; Dark Spot on Jupiter, 240; Markings on Jupiter, W. F. Denning, 351; Light Variation of the Minor Planet (345) Tercidina, 265; the Minor Planet Tercidina, 289; Photography by the Light of Venus, 336; Diameter of Venus, 556; Observations of Mars, 384; Diameter of Mercury, 523; Periodicity of the Inequalities of Mercury, 524; Evidence of the Existence of an Ultra-Neptunian Planet, Prof. G. Forbes, 524; on a Supposed New Planet beyond Neptune, Prof. G. Forbes, 587; Micrometric Observations of Neptune and its Satellite, 639
- Plant Physiology, Vitality of Seeds, Dr. Henry H. Dixon, 256; Die Reizleitung und die Reizleitenden Strukturen bei den Pflanzen, Dr. B. Nemeč, 371
- Plant Studies, an Elementary Botany, John M. Coulter, 300
- Plants, New Garden, a Study in Evolution, 446
- Plate (L.), Ueber Bedeutung und Tragweite des Darwin'schen Selectionsprincipis, 49
- Plateau (Prof. F.), Sources of Insect-attraction in Flowers, 264
- Plato's Staat, F. Schleiermacher, 4
- Plowright (Dr. C. B.), Woad as a Blue Dye, 413
- Plumstead (E.), on the Determination of Positions in Polar Exploration, 278
- Poch (Dr. R.), Wooden Human Effigies from German New Guinea, 358
- Poincaré (H.), Electricité et Optique, La Lumière et ses Theories Electrodynamiques, 273
- Polar Exploration, on the Determination of Positions in, E. Plumstead, 278; Civilian, 626
- Polarisation, the Colour and, of Blue Sky-light, Dr. N. E. Dorsey, 138
- Polish, Lecture at Royal Institution, Right Hon. Lord Rayleigh, F.R.S., 385
- Political Economy, Death and Obituary Notice of Angelo Messedaglia, 59
- Political Evolution, Influence of Geographical Environment on, Prof. Alleyne Ireland, 589
- Politics and Culture (1492-1899), Annals of, G. P. Gooch, 53
- Polluted Sea-water, on the Absorption of Ammonia from, by *Uva latissima*, Prof. Letts, John Hawthorne, 619
- Polyphem ein Gorilla, Dr. Th. Zell, 467
- Polypterus*, on the youngest known Larva of, J. E. Budgett, 588
- Pontianak, the, of the Malays, Dr. R. Lasch, 555
- Pope (W. J.), Optically Active Nitrogen Compounds, 174
- Popplewell (W. C.), Experimental Engineering, Testing and Strength of Materials of Construction, 597
- Population of Paris, the Increase of the, 103
- Porpoise, on the Pelvic Cavity of the, as a Guide to the Determination of the Sacral Region in Cetacea, Dr. Hepburn, 587; Dr. Waterston, 587
- Porpoise, Viscera of, Dr. D. Hepburn and Dr. Waterston, 344
- Porter (William Townsend), an Introduction to Physiology, 298
- Positions in Polar Exploration, on the Determination of, E. Plumstead, 278
- Post Office, the Telephone System of the British, T. E. Herbert, 599
- Potato, Bacterial Disease of, G. Delacroix, 464
- Potato Beetle, the Colorado, W. F. Kirby, 450
- Pottery, the Use of Lead Compounds in, Prof. T. E. Thorpe, F.R.S., 408
- Pouchet (G.), Antimony in Organism, 596
- Poulsen (Herr), the Telephonograph, 183
- Poulton (Prof. Edward B., F.R.S.), National Antarctic Expedition, 156, 206; Resignation of Prof. J. W. Gregory, 83
- Poulton (Prof.), Discharges of Formic Acid in Ant-nests, 223
- Poultry Farm, G. C. Watson, 575
- Powder, Nitro-cellulose and Theory of the Cellulose Molecule, Smokeless, John B. Bernadou, 600
- Prain (Major), the Indian Rainfall of Autumn, 1900, 530

- Preece's (Sir William) System of Etheric Signalling, 163;
James Bowman Lindsay, 521
- Prehistoric Astronomy: the French Stonehenge—An Account of Principal Megalithic Remains in the Morbihan Archipelago, T. Cato Worsfold, 465; a Sentimental and Practical Guide to Amesbury and Stonehenge, Lady Antrobus, 465
- Prehistoric Implements in the Transvaal and Orange River Colony, Stanley B. Hutt, 103
- Prehistoric Survey of Southern India, A Plea for a, Prof. Alfred C. Haddon, F.R.S., 469
- Pressure, Proposed New Unit of, the Megadyne per Square Centimetre, Dr. Guillaume, 586
- Pressure Gauge, a New, Prof. Morley, 586
- Pressures, High, on a Recording Manometer for, J. E. Petaval, 613
- Prestwich (Grace, Lady). Essays, Descriptive and Biographical, with a Memoir of, by Louisa E. Milne, 349
- Primary Cell, a Convenient, A. E. Munby, 30
- Prior (G. T.), Isomorphic Relations between Sulphates and Orthophosphates, 247
- Prize-subjects in Applied Science, 438
- Prizes for Researches in Medical Science, 610
- Problems of Geometry, A. B. Basset, F.R.S., 400
- Progress of Civil Engineering, Address at American Society of Civil Engineers, J. J. R. Croes, 438
- Progress of Invention in the Nineteenth Century, Edward W. Byrn, 125
- Properties of Steel Castings, the, Prof. J. O. Arnold, 316
- Pseudoscopic Vision without a Pseudoscope, a New Optical Illusion, Prof. R. W. Wood, 351; A. S. Davis, 376
- Psychology: the Human Nature Club, E. L. Thorndike, 325; Psychology of Reasoning, Alfred Binet, 325; Why do Men Swear? Prof. G. T. W. Patrick, 334; the Evolution of Consciousness, Leonard Hall, 467; Gustav Theodor Fechner, W. Wundt, 526
- Pterodactyles, Dragons of the Air: an Account of Extinct Flying Reptiles, H. G. Seeley, 645
- Public Health in America, Mrs. Percy Frankland, 117
- Public Water-supplies: Requirements, Resources, and the Construction of Works, F. E. Turneaure and H. L. Russell, 179
- μ Puppis, Spectrum of, 89
- RR Puppis and V Puppis, Orbits of Algol Variables, 384
- Qualitative Chemical Analysis, Organic and Inorganic, F. Mollwo Perkin, 397
- Quaternions, Elements of, Sir W. Hamilton, 206
- Quartz, Vitrified, Lecture at Royal Institution, W. A. Shenstone, F.R.S., 65, 126; Prof. J. Joly, F.R.S., 102
- Queensland, on the Conditions under which Artesian Water is obtained in, Dr. R. Logan Jack, 565
- Quesneville (M. G.), Théorie Nouvelle de la Dispersion, 625
- Radcliffe Observatory, Oxford in the Eight Years 1892-99, Results of the Meteorological Observations made at the, Arthur A. Rambaut, F.R.S., 599
- Radial Velocity of 1830, Groombridge, 491
- Radial Velocity of δ Orionis, Variable, 491
- Radial Velocity, Six Stars with Variable, 456
- Radiation, the Mechanism of, J. H. Jeans, 199; Laws of Radiation as Applied to Incandescent Mantles, Dr. Guillaume, 309; Radiation of Uranium Constant at Very Low Temperatures, H. Becquerel, 344; Measurements of Solar Radiation, Annals of the Astrophysical Observatory at the Smithsonian Institution, S. P. Langley, 352; Solar Radiation, J. Y. Buchanan F.R.S., 456; Radiation of Heat and Light from a Heated Solid, Dr. J. T. Bottomley, 586
- Radio-active Substances, Emanations from, Prof. E. Rutherford, 157
- Radio-activity of Radium Salts, P. Curie and A. Debierne, 368
- Radiography: Magnetic Deflection of Kathode Rays, H. A. Wilson, 95; Attempt to Discover Radiation from Surface of Metals carrying Alternating Currents of High Frequency, O. W. Richardson, 95; l'Optique des Rayons de Röntgen et des Rayons Secondaires qui en dérivent, G. Sagnac, 101; Physiological Action of Radium Rays, H. Becquerel and P. Curie, 175; Radiographs of Mollusk Shells, Dr. G. H. Rodman, 189; Nature of X-Rays, J. Semenov, 344; the Theory of Diffraction of Röntgen Rays, Prof. Sommerfeld, 357; the Röntgen Rays in Military Surgery, J. Hall-Edwards, 454; Effect on Eye of Röntgen &c. Rays, Herren Himstedt and Nagel, 529
- Radium, on the Properties of, Prof. Willy Marckwald, 612
- Raid on Wild Flowers, a, Prof. L. C. Miall, F.R.S., 126; Prof. R. Meldola, F.R.S., 126; David Houston, 156
- Railways: Mr. Cheesewright's Projected London and Brighton Electric Railway, 580; on Railway Rolling Stock, Present and Future, N. D. Macdonald, 613
- Rain, Blood, F. H. Perry-Coste, 55; the Dust of, Prof. Arthur W. Rücker, F.R.S., 30
- Rain-drops, Curious, 280
- Rainfall, the Distribution of, over the Land, Dr. Andrew J. Herbertson, 423
- Rainfall Measurement, the Development of, Dr. H. R. Mill, 455
- Rainfall, on the Inverse Ratios of Chlorine to, W. Ackroyd, 612
- Ramage (Hugh), Banded Flame-spectra of Metals, 271; Flame-spectrum Phenomena of Basic Bessemer Blow, 492
- Rambaud (M.), Observations of Comet *a* (1901) at Algiers, 143
- Rambaut (Arthur A., F.R.S.), Results of the Meteorological Observations made at the Radcliffe Observatory, Oxford, in the Eight Years 1892-99, 599
- Ramsay (Prof. W., F.R.S.), Modern Chemistry, 349; Function of a University, Oration at University College, 388
- Randall-Maciver (D.), Libyan Notes, 123; the Earliest Inhabitants of Abydos, a Craniological Study, 647
- Range-finder, New, Prof. G. Forbes, F.R.S., 309
- Range-finder, on a Folding, for Infantry, Prof. George Forbes, 613; Prof. Barr, 613; Prof. Stroud, 613
- Raoul (Prof. François Marie), Obituary Notice of, 17
- Rats and the Plague, 18
- Ravenstein (E. G.), on Martin Behaim and the History of Geography, 589; Final Report of the Committee on the Climate of Tropical Africa, 589
- Ray (R. C.), New Series of Di-mercuri-ammonium Salts, I., 47
- Rayleigh (Right Hon. Lord, F.R.S.), Does Chemical Transformation Influence Weight? 181; Polish, Lecture at Royal Institution, 385; on Magnetic Rotation of Light and the Second Law of Thermodynamics, 577
- Rea (Mr.), Archæological Exploration of the Tinnevely (Madras) District, 489
- Reaction Time in different Races, L. Lapicque, 224
- Reale Accademia dei Lincei, Prize Awards, 381
- Reasoning, Psychology of, Alfred Binet, 325
- Reasoning, the Use of Words in, Alfred Sidgwick, 231
- Recent Total Solar Eclipse, the, 79
- Red Rain, Analysis of Tunis, E. Bertainchand, 72; Analysis of Red Rain, M. Barac, 489
- Redway (Jacques W.), the New Basis of Geography, a Manual for the Preparation of the Teacher, 648
- Redwood (Boverton), Handbook on Petroleum, 441
- Reed (F. R. Cowper), the Geological History of the Rivers of East Yorkshire, 277
- Reflex Action and Instinct, Paper read at Derby Medical Society, Dr. W. Benthall, 459
- Regeneration and Liability to Injury in Animals, Prof. H. T. Morgan, 455
- Reighard (Jacob), the Anatomy of the Cat, 155
- Religion, the Golden Bough; a Study in Magic and, J. G. Frazer, 201; Dr. Frazer's Views of the Relations between Magic, Religion and Science, J. S. Stuart-Glennie, 615
- Renard (A. F.), the *Belgica* Soundings, 238
- Rengel (Dr. C.), the Life-history of *Hydrophilus piccus*, 20
- Reptilia: Amphibia and Reptiles, the Cambridge Natural History, vol. viii., Hans Gadow, G. A. Boulenger, F.R.S., 401; Dragons of the Air, an Account of Extinct Flying Reptiles, H. G. Seeley, 645
- Research, Scientific, Mr. Balfour on, 109; Scientific Research as a Basis of Medical Process, Dr. G. B. Ferguson, 330
- Researches in Medical Science, Prizes for, 610
- Reuleaux (F.), the Mechanical Forces of Nature and their Exploitation, 137
- REVIEWS AND OUR BOOKSHELF.
- A Contribution to the Study of the Blood and Blood-pressure, George Oliver, 1
- Von den Antillen zum Fernen Westen; Reiseskizzen eines Naturforschers, F. Doflein, 2
- Encyclopædia Biblica, Critical Dictionary of the Literary,

- Political and Religious History, the Archæology, Geography and Natural History of the Bible, Prof. T. K. Cheyne and Dr. J. Sutherland Black, 3
- Plato's Staat, F. Schliermacher, 4
- John Locke's Versuch über den Menschlichen Verstand, 4
- Berkeley's Abhandlung über die Prinzipien der Menschlichen Erkenntnis, Dr. F. Ueberweg, 4
- Berkeley's Drei Dialoge zwischen Hylas und Philonous, Dr. R. Richter, 4
- The Fishes of North and Middle America; a Descriptive Catalogue of the Species of Fish-like Vertebrates found in the Waters of North America, North of the Isthmus of Panama, David Starr Jordan and Barton Warren Evermann, 4
- Die Wissenschaftlichen Grundlagen der analytischen Chemie elementar dargestellt, W. Ostwald, 5
- An Introduction to Modern Scientific Chemistry, Dr. Lassarc-Cohn, 5
- First Aid to the Injured, H. Drinkwater, 5
- The Annual of the British School at Athens, 11
- Evolution of the Thermometer, 1592-1743, Henry Carrington Bolton, 25
- A Treatise on Zoology; the Porifera and Coelentera, E. A. Minchin, G. H. Fowler, and G. C. Bourne, with an Introduction by E. Ray Lankester, F.R.S., 26
- Il Calcolo Grafico applicato alla Misura delle Volte, Prof. Ernesto Breglia, 27
- Experimental Chemistry, Lyman C. Newell, 27
- The Elements of Darwinism; a Primer, A. J. Ogilvy, 28
- La Betterave à Sucre, L. Malpeaux, 28
- Assimilation Chlorophyllienne et la Structure des Plantes, Dr. Ed. Griffon, 28
- L'Evolution du Pigment, Dr. G. Bohn, 28
- The Birds of Siberia; a Record of a Naturalist's Visit to the Valleys of the Petchora and Yenesei, Henry Seebohm, 32
- The Scenery of Scotland viewed in Connection with its Physical Geology, Sir Archibald Geikie, 33
- Ueber Bedeutung und Tragweite des Darwin'schen Selectionsprincipis, L. Plate, 49
- Deschanel's Natural Philosophy, 111; Electricity, J. D. Everett, 50
- The Periodic Classification and the Problem of Chemical Evolution, G. Rudorf, 51
- Der Gesang der Vögel, Dr. Valentin Häcker, 52
- Physikalisch-chemische Propädeutik, H. Griesbach, 53
- Annals of Politics and Culture (1492-1899), G. P. Gooch, 53
- The Child: His Nature and Nurture, W. B. Drummond, 53
- Publications de l'Observatoire Astronomique et Physique de Tachkent, Etudes sur la Structure de l'Univers, W. Strattonoff, Howard Payn, 56
- The Natives of South Africa, their Economic and Social Condition, E. Sidney Hartland, 73
- Twentieth Century Inventions: a Forecast, George Sutherland, 74
- Lecithoblast und Angioblast der Wirbelthiere, Wilhelm His, 75
- The Scientific Memoirs of Thomas Henry Huxley, 76
- Fact and Fable, Effie Johnson, 76
- Science and Mediaeval Thought, Prof. T. Clifford Allbutt, F.R.S., 76
- A Treatise on Physics, Prof. Andrew Gray, F.R.S., 97
- The Stalk-eyed Crustacea of British Guiana, West Indies and Bermuda, Charles G. Young, 98
- Praktikum des anorganischen Chemikers, Dr. Emil Knoevenagel, 99
- Central Electrical Stations: their Design, Organisation and Management, C. H. Wordingham, 100
- Hints to Travellers, 100
- L'Optique des Rayons de Röntgen et des Rayons secondaires qui en dérivent, G. Sagnac, 101
- Cerebral Science; Studies in Anatomical Psychology, Wallace Wood, 101
- The Humane Review, 101
- I vulcani dell'Italia Centrale e i loro Prodotti. Vulcano Laziale, V. Sabatini, Sir Archibald Geikie, F.R.S., 104
- Atti della Reale Accademia delle Scienze Fisiche e Matematiche di Napoli, Sir Archibald Geikie, F.R.S., 104
- An Outline of the Development and Application of the Energy of Flowing Water, Joseph P. Frizell, 121
- The Principles of Vegetable Gardening, L. H. Bailey, 122
- Libyan Notes, D. Randall-Maciver and A. Wilkin, 123
- Meteorologische Beobachtungen vom xiv bis xvii Jahrhundert, 124
- Le Coton, Prof. H. Lecomte, Prof. Roberts Beaumont, 124
- Taxidermy, Comprising the Skinning, Stuffing and Mounting of Birds, Mammals and Fish, 125
- A Treatise on Electromagnetic Phenomena and on the Compass and its Deviations aboard Ship, Mathematical, Theoretical and Practical, Commander T. A. Lyons, 125
- The Steam-engine Indicator, Cecil H. Peabody, 125
- Progress of Invention in the Nineteenth Century, Edward W. Byrn, 125
- Life and Letters of Thomas Henry Huxley, F.R.S., Leonard Huxley, Sir W. T. Thistelton-Dyer, F.R.S., 145
- The Norwegian North Polar Expedition, 1893-96, Scientific Results, Dr. C. Chree, F.R.S., 151
- Report on Observations in Terrestrial Magnetism and Atmospheric Electricity made at the Meteorological Observatory of Japan for the Year 1897, Dr. C. Chree, F.R.S., 151
- Reservoirs for Irrigation, Water-Power and Domestic Water-supply, James D. Schuyler, 154
- The Anatomy of the Cat, Jacob Reighard and H. S. Jennings, 155
- Essays in Illustration of the Action of Astral Gravitation in Natural Phenomena, William Leighton Jordan, F.S.A., 155
- Charles St. John's Note Book, 1846-1853, Invererne, Nairn, Elgin, T. Digby Pigott, C.B., 177
- The Science of Hygiene: a Text-Book of Laboratory Practice, Walter C. C. Pakes, 178
- Public Water-supplies: Requirements, Resources, and the Construction of Works, F. E. Turneure and H. L. Russell, 179
- Leitfaden der Wetterkunde, gemeinverständlich bearbeitet, Dr. R. Bornstein, 180
- Myths of Greece Explained and Dated; an Embalmed History from Uranus to Perseus, including the Eleusinian Mysteries and the Olympic Games, George St. Clair, 180
- The Golden Bough: a Study in Magic and Religion, J. G. Fraser, 201
- Über die geologische Geschichte der Insel Celebes auf Grund der Thierverbreitung, Dr. Paul Sarasin and Dr. Fritz Sarasin, 203
- Proceedings of the Eighth Annual Meeting of the Society for the Promotion of Engineering Education held in New York City, July 2-3, 1900, Prof. F. W. Burstall, 204
- Chemical Technology; or, Chemistry in its Applications to Arts and Manufactures, vol. iii. Gas Lighting, Charles Hart, 205
- Elements of Quaternions, Sir W. Hamilton, 206
- Our Country's Shells and How to Know Them: a Guide to the British Mollusca, W. J. Gordon, 206
- England's Neglect of Science, Prof. Perry, F.R.S., Prof. George M. Minchin, F.R.S., 226
- Notes from a Diary, 1889-1891, Sir Mountstuart E. Grant Duff, Lord Avebury, F.R.S., 228
- Cultura del Frumento, 1899-1900, XIII Anno di cultura continua del Frumento e del Granturco, Prof. Italo Giglioli, 229
- Die Erdströme im Deutschen Reichstelegraphengebiet und ihr Zusammenhang mit Erdmagnetischen Erscheinungen, Dr. B. Weinstein, 230
- The Life of the Bee, Maurice Maeterlinck, 231
- West African Studies, Mary H. Kingsley, 231
- The Use of Words in Reasoning, Alfred Sidgwick, 231
- Holidays in Eastern Counties, 232
- North American Fauna, 242
- Novitates Zoologicae, a Journal of Zoology in connection with the Tring Museum, 249
- Le Système Métrique, G. Bigourdan, 250
- Last Essays, Right Hon. Prof. F. Max Müller, 251
- Die Heterocyclischen Verbindungen der organischen Chemie, Edgar Wedekind, 252
- The Induction Motor, a Short Treatise on its Theory and Design, with numerous Experimental Data and Diagrams, B. A. Behrend, 252
- Bulletin of the Philosophical Society of Washington, 253
- The Cape Photographic Durchmusterung for the Equinox 1875, David Gill, C.B., F.R.S., and J. C. Kapteyn, 257
- A Photometric Durchmusterung, including all Stars of the

- Magnitude 7.5 and Brighter North of Declination -40° obtained with the Meridian Photometer during the Years 1895-98, Edward C. Pickering, 257
- Report of Prof. S. P. Langley, Secretary of the Smithsonian Institution for the Year ending June 30, 1900, 269
- Annual Report of the Board of Regents of the Smithsonian Institution for the Year ending June 30, 1899, 269
- Report of the U.S. National Museum for the Year ending June 1899, 269
- Electricité et Optique, La Lumière et ses Théories Electrodynamiques, Leçons Proférées à la Sorbonne en 1888, 1890 et 1899, H. Poincaré, 273
- The Life and Letters of Gilbert White of Selborne, Rashleigh Holt-White, 276
- The Natural History of Selborne, Gilbert White, 276
- Entstehen und Vergehen der Welt als Kosmischer Kreisprozess, auf Grund des pyknotischen Substanzbegriffes, J. G. Vogt, 277
- The Geological History of the Rivers of East Yorkshire, F. R. Cowper Reed, 277
- Fergusson's Surveying Circle and Percentage Tables, J. C. Fergusson, 278
- How to Know the Indian Ducks, F. Finn, 278
- The Oldest Civilisation of Greece, Studies of the Mycenaean Age, H. R. Hall, 280
- A Handbook of British Birds, J. E. Harting, 297
- An Introduction to Physiology, William Townsend Porter, Benjamin Moore, 298
- Plant Studies, an Elementary Botany, John M. Coulter, 300
- B. Eyferth's Einfachste Lebensformen des Tier- und Pflanzenreiches, Naturgeschichte der mikroskopischen Süßwasserbewohner, Dr. Walther Schönichen and Dr. Alfred Kalberlah, C. S. West, 301
- Handbook of British, Continental and Canadian Universities, with special mention of the Courses open to Women, Isabel Maddison, 301
- Les Problèmes de la Vie, Essai d'une Interprétation scientifiques de Phénomènes vitaux, la Substance Vivante et la Cytodiérèse, Dr. Ermanno Giglio-Tos, 321
- The Limits of Evolution, Prof. Howison, 323
- A Text-book of Coal-mining, Herbert W. Hughes, 324
- The Human Nature Club, E. L. Thorndike, 325
- Psychology of Reasoning, Alfred Binet, 325
- Outlines of Physiography, an Introduction to the Study of the Earth, A. J. Herbertson, 325
- Bird Watching, Edmund Selous, 325
- Greek Thinkers, a History of Ancient Philosophy, Theodor Gomperz, 345
- A Civilian War Hospital, being an Account of the Work of the Portland Hospital, and of Experience of Wounds and Sickness in South Africa, 1900, with a Description of the Equipment, Cost and Management of a Civilian Base Hospital in Time of War, 346
- Catalog der Lepidopteren des palæarktischen Faunengebietes, Famil. Papilionidae-Hepialidae, Dr. O. Staudinger and Dr. H. Rebel, Famil. Pyralidae-Micropterygidae, Dr. H. Rebel, 348
- Modern Chemistry, Theoretical Chemistry, Systematic Chemistry, William Ramsay, 349
- Essays, Descriptive and Biographical, Grace, Lady Prestwich, Louisa E. Milne, 349
- Chemical Lecture Experiments, Francis Gano Benedict, 350
- A Manual of Laboratory Physics, H. M. Tory and F. H. Pitcher, 350
- The Story of Wild Flowers, Rev. Prof. G. Henslow, 350
- Annals of the Astrophysical Observatory of the Smithsonian Institution, S. P. Langley, 352
- Stanford's Compendium of Geography and Travel, Central and South America, A. H. Keane, George Earl Church, 353
- The Natural History and Antiquities of Selborne, Gilbert White, L. C. Miall, F.R.S., and W. Warde Fowler, 369
- The Mediterranean Race: a Study of the Origin of European Peoples, G. Sergi, 370
- Die Reizleitung und die reizleitenden Strukturen bei den Pflanzen, Dr. B. Nemeč, 371
- Yearbook of the United States Department of Agriculture, 1900, Prof. R. Warington, F.R.S., 372
- School Hygiene, Edward Shaw, 373
- A Manual of School Hygiene, E. W. Hope, E. A. Browne, 373
- Illustrations of the Botany of Captain Cook's Voyage round the World in H.M.S. *Endeavour* in 1768-71, Right Hon. Sir Joseph Banks and Dr. Daniel Solander and James Britten, part ii., Australian Plants, W. Botting Hemsley, 374
- Essays on the Theory of Numbers, i. Continuity and Irrational Numbers, ii. the Nature and Meaning of Numbers, Richard Dedekind, 374
- Familial Butterflies and Moths, W. F. Kirby, 375
- Lehrbuch der mathematischen Chemie, J. J. van Laar, 375
- Philip's Educational Terrestrial Globe, 375
- Die Krystallisation von Eiweissstoffen und ihre Bedeutung für die Eiweisschemie, 375
- Flowers and Ferns in their Haunts, M. O. Wright, 375
- Studies on the *Hexactinellida*, *Euplectellidae*, Isao Iijima, Prof. E. A. Minchin, 393
- Rural Readers, Vincent T. Murché, Prof. R. Meldola, F.R.S., 394
- The Teacher's Manual of Object Lessons for Rural Schools, Vincent T. Murché, Prof. R. Meldola, F.R.S., 394
- The Mineralogy of Scotland, M. Forster Heddle, Prof. H. A. Miers, F.R.S., 395
- Mémoires originaux sur la Circulation générale de l'Atmosphère, Marcel Brillouin, 396
- The Elements of the Differential and Integral Calculus, J. W. A. Young and C. E. Linebarger, 396
- Differential and Integral Calculus with Applications for Colleges, Universities and Technical Schools, E. W. Nichols, 396
- Album de Aves Amazonicas, Emilio A. Goeldi, 397
- Qualitative Chemical Analysis, Organic and Inorganic, F. Mollwo Perkin, 397
- Amphibia and Reptiles, Hans Gadow, G. A. Boulenger, F.R.S., 401
- Lectures on the History of Physiology during the Sixteenth, Seventeenth and Eighteenth Centuries, Sir M. Foster, K.C.B., 417
- Water Filtration Works, James H. Fuertes, 421
- Modern Natural Theology, with the Testimony of Christian Evidences, Frederick James Grant, 422
- The Distribution of Rainfall over the Land, Andrew J. Herbertson, 423
- Tierleben der Tiefsee, Oswald Seeliger, 423
- A Guide to the Shell and Star-fish Galleries (Mollusca, Polyzoa, Brachiopoda, Tunicata, Echinoderma and Worms) in the British Museum (Nat. Hist.), 423
- A Text-book of Astronomy, Prof. George C. Comstock, 424
- An Introduction to the Practical Use of Logarithms, F. G. Taylor, 424
- The Annual Report of the Bureau of American Ethnology, J. W. Powell, 425
- A Select Bibliography of Chemistry, 1492-1897, Henry Carrington Bolton, 430
- On the Supersession of the Steam by the Electric Locomotive, W. Langdon, 437
- Electric Traction, Major P. Cardew, 437
- Handbook on Petroleum, Captain J. H. Thomson and Boverton Redwood, W. T. Lawrence, 441
- Commercial Education at Home and Abroad, a Comprehensive Handbook providing Materials for a Scheme of Commercial Education for the United Kingdom, including Suggested Curricula for all Grades of Educational Institutions, Frederick Hooper and James Graham, 442
- Manual of the Birds of Iceland, Henry H. Slater, 443
- Blütengeheimnisse, eine Blütenbiologie in Einzelbildern, Georg Worgitzky, 444
- The Lepidoptera of the British Islands, a Descriptive Account of the Families, Genera and Species Indigenous to Great Britain and Ireland, their Preparatory States, Habits and Localities, Charles G. Barrett, vol. vii., *Heterocera*, *Geometrina*, 444
- The French Stonehenge, an Account of the Principal Megalithic Remains in the Morbihan Archipelago, T. Cato Worsfold, 465
- A Sentimental and Practical Guide to Amesbury and Stonehenge, Lady Antrobus, 465
- Polyphem ein Gorilla, Dr. Th. Zell, 467
- The Evolution of Consciousness, Leonard Hall, 467
- The Self-Educator in Chemistry, James Knight, 467
- Drahtlose Telegraphie durch Wasser und Luft, Prof. Dr. Ferdinand Braun, 497

- Geometrical Exercises from Nixon's "Euclid Revised" with Solutions, Alexander Larmor, 497
- Histoire du Ciel, Clémence Royer, 497
- Papers on Mechanical and Physical Subjects, Prof. Osborne Reynolds, F.R.S., 549
- The Insect Book, a Popular Account of the Bees, Wasps, Ants, Grasshoppers, Flies and other North American Insects, exclusive of the Butterflies, Moths and Beetles, with full Life-histories, Tables and Bibliographies, Leland O. Howard, 549
- Nature Teaching, Francis Watts, 550
- Cassell's Eyes and No Eyes Series, Arabella B. Buckley, 550
- Plane and Solid Geometry, Arthur Schultze and F. L. Sevenoak, Prof. George M. Minchin, F.R.S., 573
- Occasional Essays on Native South Indian Life, Stanley P. Rice, 574
- Essai d'une Explication par les Causes actuelles de la Partie théorique de la Géologie, H. Hermite, 575
- La Géologie, H. Guède, 575
- Farm Poultry, G. C. Watson, 575
- The Collected Scientific Papers of John Couch Adams, 576
- Experimental Engineering, Testing and Strength of Materials of Construction, W. C. Popplewell, 597
- Der Hammer-Fennel'sche Tachymeter-Theodolit und die Tachymeter-kippregel zur unmittelbaren Lattenablesung von Horizontalabstand und Höhenunterschied, Dr. E. Hammer, 598
- Results of Meteorological Observations made at the Radcliffe Observatory, Oxford, in the eight years 1892-99, Arthur A. Rambaut, F.R.S., 599
- The Telephone System of the British Post Office, T. E. Herbert, 599
- Maps, their Uses and Construction, a Short Popular Treatise on the Advantages and Defects of Maps on Various Projections, followed by an Outline of the Principles involved in their Construction, G. James Morrison, 599
- Smokeless Powder, Nitro-cellulose and Theory of the Cellulose Molecule, John B. Bernadou, 600
- Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History), E. W. Oates, 600
- Essays and Photographs, some Birds of the Canary Islands and South Africa, H. E. Harris, 603
- Life by the Sea-shore: an Introduction to Natural History, Marion Newbiggin, Prof. W. A. Herdman, F.R.S., 621
- Recherches sur les instruments, les méthodes et le dessin Topographiques, Colonel A. Laussedat, 622
- Euclid's Elements of Geometry, Charles Smith and Sophie Bryant, 623
- The Life History of British Serpents and their Local Distribution in the British Isles, Gerald R. Leighton, 624
- The Feeding of Animals, W. H. Jordan, 625
- First Stage Building Construction, Brysson Cunningham, 625
- Théorie Nouvelle de la Dispersion, G. Quesneville, 625
- Status of the Mesozoic Floras of the United States, the Older Mesozoic, Lester F. Ward, W. M. Fontaine, A. Warner and F. H. Knowlton, 633
- Ricerche Petrografiche e Geologiche sulla Valsesia, E. Artini and G. Melzi, 640
- Dragons of the Air: An Account of Extinct Flying Reptiles, H. G. Seeley, 645
- Theoretical Mechanics: an Elementary Treatise, W. Woolsey Johnson, 646
- The Earliest Inhabitants of Abydos: a Craniological Study, D. Randall-Maciver, 647
- The New Basis of Geography: a Manual for the Preparation of the Teacher, Jacques W. Redway, 648
- Expertises et Arbitrages, F. Rigaud, 648
- Tibet and Chinese Turkestan, Captain Deasy, 653
- Reynolds (Prof. Osborne, F.R.S.), Papers on Mechanical and Physical Subjects, 549
- Rheinberg (J.), Contrivance for viewing Diffraction Patterns of Diatoms through the Microscope, 60
- Rhinoceros, the, Oldfield Thomas, F.R.S., 223
- Rhodes (Herbert), Glycolytic Enzyme in Muscle, 198
- Rhodesia, N.E., Fauna of, C. P. Chesnaye, 383
- Ricco (Signor A.), Deformation of the Sun's Disc, 289; the International Survey of the Heavens, 582
- Rice (Stanley P.), Occasional Essays on Native South Indian Life, 574
- Richardson (O. W.), Attempt to Discover Radiation from Surface of Metals carrying Alternating Currents of High Frequency, 95
- Richter (Dr. R.), Berkeley's Drei Dialoge zwischen Hylas und Philonous, 4
- Rideal (Dr. S.), on Humus and the so-called Irreducible Residue in Bacterial Treatment of Sewage, 612; on Sulphuric Acid as a Typhoid Disinfectant, 612
- Ridewood (Dr. W. G.), the Hair of the Patagonian Ground-Sloth, 190
- Ridley (Mr.), on a Specimen of *Ophioglossum simplex* collected by, in Sumatra, 617
- Rigaud (F.), Expertises et Arbitrages, 648
- Ritchie (Foster), the Telautograph, 107
- Rivers of East Yorkshire, the Geological History of the, F. R. Cowper Reed, 277
- Riviere (Emile), Palaeolithic Drawings on Walls of Cave of La Mouthe, 596
- Roberts (Dr. Alex. W.), Density and Figure of Close Binary Stars, 468
- Roberts-Austen (Sir W., K.C.B., F.R.S.), Alloys for Bronze Medals, 309; Metals as Fuel, Lecture at Royal Institution, 360
- Robertson (W.), 2: 6-dibromo-4-nitrosophenol, 94
- Robinson (H.), Natural History Notes, 331
- Robinson (Mr.), on the half-Siamese half-Malay Community of Sai-Kau, 614
- Rocks, Chemistry of the Cygnian Stars and Basic, Sir Norman Lockyer, K.C.B., F.R.S., Prof. Edw. Suess, 629
- Rodman (Dr. G. H.), Röntgen Radiographs of Mollusk Shells, 189
- Rolling Angle of a Ship found by Photography, Rev. F. J. Jervis-Smith, F.R.S., 576
- Rolston (W. E.), the August Meteors of 1901, 411
- Röntgen Rays: L'Optique des Rayons de Röntgen et des Rayons secondaires que en dérivent, G. Sagnac, 101; Nature of Röntgen Rays, J. Semenov, 344; the Theory of Diffraction of Röntgen Rays, Prof. Sommerfeld, 357; the Röntgen Rays in Military Surgery, J. Hall-Edwards, 454; Effect on Eye of the Röntgen Rays, Herren Himstedt and Nagel, 529; Radiographs of Mollusk Shells, Dr. G. H. Rodman, 189
- Rood (O. N.), Experiments on High Electrical Resistances, 415
- Roscoe (Sir Henry), on the Organisation of Technical and Secondary Education, 593
- Rose-Innes (J.), Thermal Properties of Isopentane and Normal Pentane, 93
- Rosin-cored Solder, 60
- Ross (Major Ronald, F.R.S.), Mosquitoes and Malaria, 453; the Anti-mosquito Campaign in Sierra Leone, 489; on the Story of Malaria, 588; Mosquitoes and Sounds, 607; the West African Campaign against Malaria, 636
- Rotch (A. Lawrence), Meteorological Kite, Investigation at Smithsonian Institute, 269; Meteorological Kite-raising by Tug-motion, 453; on the Exploration of the Upper Strata of the Atmosphere by means of Kites, 590
- Rothschild's Novitates Zoologicae, a Journal of Zoology in connection with the Tring Museum, 249
- Rouvière (M.), Action of Currents of High Frequency on Urinary Secretion, 272
- Roux (E.), Glucamine, 24
- Rowe (Dr. A. W.), Zones in Chalk, 355
- Rowland (Prof. H. A.), Obituary Notice of, 16
- Royal College of Science and the University of London, Prof. W. A. Tilden, F.R.S., 583
- Royal Geographical Society: Sand Waves in Tidal Currents, Dr. Vaughan Cornish, 412; see also Geography
- Royal Horticultural Society's Lily Conference, the, Wilfred Mark Webb, 316
- Royal Institution: Vitrified Quartz, W. A. Shenstone, F.R.S., 65, 126; Prof. J. Joly, F.R.S., 102; Some Recent Work on Diffusion, Dr. Horace T. Brown, F.R.S., 171, 193; the Aims of the National Physical Laboratory, Dr. R. T. Glazebrook, F.R.S., 290; Metals as Fuel, Sir W. Roberts-Austen, K.C.B., F.R.S., 360; Polish, Right Hon. Lord Rayleigh, F.R.S., 385
- Royal Society: Scope of the Royal Society, Sir W. T. Thiselton-Dyer, F.R.S., 29; Royal Society Selected Candidates, 36; Royal Society, 45, 57, 69, 93, 141, 198, 221, 246, 341, 365, 415, 496; Royal Society Conversazione, 57; the Antarctic Expedition, 131; Resignation of Dr. J. W. Gregory, 132; the Solar Activity 1833-1900, Dr. William J. S. Lockyer, 196; Bakerian Lecture at the Royal Society: the Nadir of

- Temperature and Allied Problems, Prof. James Dewar, F.R.S., 243; on the Separation of the Least Volatile Gases of Atmospheric Air and their Spectra, Prof. G. D. Liveing, F.R.S., and Prof. J. Dewar, F.R.S., 294; Brightness of the Solar Corona, January 22, 1898, 437
- Royer (Clemence), *Histoire du Ciel*, 497
- Rücker (Prof. Arthur W., F.R.S.), the Dust of "Blood-rain," 30; Inaugural Address at the Glasgow Meeting of the British Association, 470; on the Teaching of Mathematics, 592
- Rudolf (G.), the Periodic Classification and the Problem of Chemical Evolution, 51
- Ruff (Dr. O.), the Existence of Ammonium, 637
- Rural Readers, Book I., Vincent T. Murché, Prof. R. Meldola, F.R.S., 394
- Rural Schools, the Teacher's Manual of Object Lessons for, Vincent T. Murché, Prof. R. Meldola, F.R.S., 394
- Russell (H. L.), Public Water-supplies: Requirements, Resources, and the Construction of Works, 179
- Russell (Hon. Rollo), Unusual Agitation of the Sea, 6
- Russian Geographical Society's Medal Awards, 286
- Rutherford (Prof. E.), Emanations from Radio-active Substances, 157
- Ryan (H.), Preparation of Synthetical Glucosides, 47
- Sabatier (Paul), the Addition of Hydrogen to Hydrocarbons, 143; New Method of preparing Aniline, 392
- Safford (Prof. T. H.), Death of, 261
- Sagnac (G.), *L'Optique des Rayons de Röntgen et des Rayons Secondaires que en Derivent*, 101
- St. Clair (George), Myths of Greece Explained and Dated, an Embalmed History from Uranus to Perseus, including the Eleusinian Mysteries and the Olympic Games, 180
- St. John's (Charles) Note-book, 1846-1853, T. Digby Pigott, 177
- St. Louis Academy of Science, 72
- Sakurai (Prof. Joji), on Some Points in Chemical Education, 612
- Salt-deposits of Salton, California, 18
- Salt Solutions, the Crystallisation of, Dr. H. M. Dawson, 336
- San Francisco, Lane Lectures at Cooper Medical College in, History of Physiology during the Sixteenth, Seventeenth and Eighteenth Centuries, Sir M. Foster, K.C.B., Sec. R.S., 417
- Sanchez (P. C.), the Subterranean Waters of the Ajusco (Mexico) Chain, 288
- Sand Waves in Tidal Currents, Dr. Vaughan Cornish, 412
- Sarasin (Dr. Paul and Dr. Fritz), *Über die geologische Geschichte der Insel Celebes auf Grund der Thierverbreitung*, 203
- Saturn, the Planet, W. F. Denning, 114
- Savage (Mr.), Neutral Red a Test for Colon Bacillus, 637
- Sawyer (B.), the Caves of Fiji, 143
- Sazerac (R.), Biochemical Differentiation of Two Ferments of Vinegar, 224
- Scenery, the, of Scotland, viewed in connection with its Physical Geology, Sir Archibald Geikie, F.R.S., 33
- Schaefer (C.), Influence of Temperature on the Elasticity of Metals, 119
- Schenck (C. C.), the Spark Spectrum of Cadmium, 358
- Schimper (Prof. A. F. W.), Death and Obituary Notice of, Percy Groom, 551
- Schleiermacher (F.), *Plato's Staat*, 4
- Schloesing (T.), Alumina in Madagascar Soil, 119
- Scholl (R.), Synthesis of Aromatic Aldoximes by Fulminating Silver, 191
- Schönichen (Dr. Walther), B. Eyerth's Einfachste Lebensformen des Tier- und Pflanzenreiches, 301
- School Hygiene, Edward Shaw, 373
- School Hygiene, a Manual of, E. W. Hope and E. A. Browne, 373
- Schott (Charles A.), Death and Obituary Notice of, 406
- Schott (Dr. G.), Oceanographical Results of *Valdivia Expedition*, 263
- Schrader (F. C.), the Cape Nome (Alaska) Gold Region, 409
- Schulten (A. de), Synthesis of Boronatrocalcite, 248
- Schulze (Arthur), Plane and Solid Geometry, 573
- Schulz (Dr. Fr. N.), *Die Krystallisation von Eiweissstoffen und ihre Bedeutung für die Eiweisschemie*, 375
- Schur (Dr. W.), Death of, 356; Obituary Notice of, Dr. William J. S. Lockyer, 380
- Schuster (Prof.), Experiments on the Passage of Electricity through Mercury Vapour, 587
- Schuyler (James D.), Reservoirs for Irrigation, Water-power and Domestic Water-supply, 154
- Science: Science and Mediæval Thought, Prof. T. Clifford Allbutt, F.R.S., 76; the Scientific Memoirs of Thomas Henry Huxley, 76; Mr. Balfour on Scientific Research, 109; the Leipzig Chemical Laboratory, 127; the Sixth Annual Congress of the South-eastern Union of Scientific Societies, 192; Recent Scientific Work in Holland, 208; Scientific Worthies, Sir William Huggins, K.C.B., Prof. H. Kayser, 225; England's Neglect of Science, Prof. Perry, F.R.S., Prof. George M. Minchin, F.R.S., 226; Science in Australia, Prof. Liversidge, 296; Scientific Work in Egypt, 317; History as a Science, J. S. Stuart-Glennie, 326; Some Scientific Centres, the Laboratory of Wilhelm Ostwald, 428; Prize-subjects in Applied Science, 438; the Denver Meeting of the American Association, Address by Prof. R. S. Woodward, President of the Association, 498; Opening Address in Section E at the Glasgow Meeting of the British Association, on Research in Geographical Science, Dr. Hugh Robert Mill, 532; Zoology of the Twentieth Century, Address at the American Association for Advancement of Science at Denver, Prof. C. B. Davenport, 566; Royal College of Science and the University of London, Prof. W. A. Tilden, F.R.S., 583; Forthcoming Books of Science, 593; Addresses of Authors of Scientific Papers, Prof. Sydney J. Hickson, F.R.S., 601; Scientific Topography, *Recherches sur les Instruments, les Méthodes et le Dessin Topographiques*, Colonel A. Laussedat, 622
- Scope of the Royal Society, Sir W. T. Thiselton-Dyer, F.R.S., 29
- Scotland: the Scenery of Scotland, Viewed in Connection with its Physical Geology, Sir Archibald Geikie, F.R.S., 33; the Mineralogy of Scotland, M. Forster Heddle, Prof. H. A. Miers, F.R.S., 395; Recent Advances in Scottish Geology, Opening Address in Section C at the Glasgow Meeting of the British Association, John Horne, F.R.S., 509; on the Scottish Ores of Copper, J. G. Goodchild, 565; on the Geological Distribution of the Fishes of the Carboniferous Rocks and of the Old Red Sandstone of Scotland, Dr. Traquair, 565; R. Kidston, 565; on a Botanical Survey of Scotland, Prof. W. G. Smith, 590; on the Methods and Plans of the Scottish National Antarctic Expedition, W. S. Bruce, 591; on the Distribution of certain Forest Trees in Scotland, W. N. Niven, 618
- Scott (Dr. D. H., F.R.S.), on the Teaching of Botany in Universities, 593; on a Primitive Type of Structure in Calamites, 617; on a Calamite from the Calciferous Sandstone of Burnt-island, 617
- Sea, Unusual Agitation of the, Hon. Rollo Russell, 6
- Sea, the Second International Conference for the Exploration of the, 218
- Sea Birds of Louisiana Gulf Coast, Protection of, Prof. Beyer, 19
- Sea Fisheries: the Decay of our Sea Fisheries, 310; the Destruction of Shore-fish Ova and Fry, Prof. M'Intosh, 523
- Seashore, Life by the, an Introduction to Natural History, Marion Newbigin, Prof. W. A. Herdman, F.R.S., 621
- Sea-urchin, on a Large Nematode Parasitic in the, Dr. J. F. Gemmill, 588
- Seeborn (Henry), the Birds of Siberia, a Record of a Naturalist's Visit to the Valleys of the Petchora and Yenesei, 32
- Seed-sowing: the Moon and Vegetation, 454
- Seeds, Agricultural, Dr. Maxwell T. Masters, F.R.S., 30
- Seeds, Vitality of, Dr. Henry H. Dixon, 256
- Seeds and Fruits, on the Strength and Resistance to Pressure of Certain, Prof. G. F. Scott Elliot, 619
- Seeley (H. G.), *Dragons of the Air: an Account of Extinct Flying Reptiles*, 645
- Seeliger (Oswald), *Tierleben der Tiefsee*, 423
- Seismograph as Sensitive Barometer, F. N. Denison, 271
- Seismology: the Reported Earthquakes in the Channel Islands and South Devon on April 24, Dr. Charles Davison, 126; the Palombara Earthquake of April 24, 1901, Dr. Luigi Palazzo, 288; the International Seismological Conference at Strassburg, Dr. F. Omori, 340; the Inverness Earthquake of September 18, Dr. Charles Davison, 527; Rev. Dr. Andrew Henderson, 601; the Non-existence of Isopyhmic Curves, F. de M. de Ballore, 524; Simple Recording Tide-gauge,

- Prof. Grablovitz, 554; the Seismological Committee on certain Frequent Small Movements of the Seismograph Trace, 586; the Depression of the Earth's Crust due to an Area of High Barometric Pressure can be Detected by a Seismograph at Great Distances from the Centre of the Depression, F. L. Denison, 587
- Selborne, the Life and Letters of Gilbert White of, Rashleigh Holt-White, 276
- Selborne, the Natural History and Antiquities of, Gilbert White, L. C. Miall, F.R.S., and W. Warde Fowler, 369
- Selous (Edmund), Bird Watching, 325
- Semenov (J.), Nature of Röntgen Rays, 344
- Semmola (Prof. E.), the New Eruptive Cone on Vesuvius, 334
- Senderens (J. B.), the Addition of Hydrogen to Hydrocarbons, 143; New Method of Preparing Aniline, 392
- Senegal Galago, the Food of the, M. O. Hill, 376
- Sergi (G.), the Mediterranean Race, a Study of the Origin of European Peoples, 370
- Serotherapy: the Pasteur Monument at Dôle, 163; the Work of the Pasteur Institute at Kasauli, India, 383; the Value of Dr. Calmette's Anti-venene, 657
- Serpents and their Local Distribution in the British Isles, the Life-history of British, Gerald R. Leighton, 624
- Settlement of Solid Matter, the, in Fresh and Salt Water, W. H. Wheeler, 181; H. S. Allen, 279
- Setting Sun, a Vertical Light-beam through the, Prof. A. S. Herschel, F.R.S., 232
- Sevenoak (F. L.), Plane and Solid Geometry, 573
- Sewage: on the Chemical and Biological Changes occurring during the Bacterial Treatment of Sewage, Prof. E. A. Letts and R. F. Blake, 612; on Humus and the so-called Irreducible Residue in Bacterial Treatment of Sewage, Dr. T. Rideal, 612
- Seward (A. C., F.R.S.), on the Anatomy of *Todea*, 617; on the Structure and Origin of Jet, 618
- Seyewitz (A.), Conversion of Uncoloured into Coloured Compound of Sodium Tetrazotolysulphite with Ethyl- β -naphthylamine, 272
- Shark's Teeth found at Woking, 523
- Shasta, Mount, the Biology of, 242
- Shaw (Edward), School Hygiene, 373
- Shaw (W. N., F.R.S.), Hailstorm Artillery, 159; on the Effects of Sea Temperature and Wind Direction on the Seasonal Variation of Air Temperature in these Islands, 587; on Weather Maps published Daily by Various Countries, 591; London Fog Inquiry, 649
- Shaw (Mrs. W. N.), on the Teaching of Mathematics, 592
- Shell and Star-fish Galleries, a Guide to the, in the British Museum, 423
- Shells and How to Know Them, Our Country's: a Guide to the British Mollusca, W. J. Gordon, 206
- Shenstone (W. A., F.R.S.), Vitrified Quartz, Lecture at Royal Institution, 65, 126
- Shepard (W. K.), New Solution for Copper Voltmeter, 365
- Sherman (Dr.), Food Consumption and Metabolism; the Mechanical Efficiency of Bicyclists, 382
- Sherwood (E. C.), the Subjective Lowering of Pitch, 233
- Ship, the Rolling Angle of a, found by Photography, Rev. F. J. Jervis-Smith, F.R.S., 576
- Shufeldt (Dr. R. W.), Position of Auks and Puffins, 408; the Skeleton of the Cuckoos, 435
- Siberia: the Birds of Siberia, a Record of a Naturalist's Visit to the Valleys of the Petchora and Yenesei, Henry Seebohm, 32; Buried Glaciers on Great Lyakhoff Island, Baron Toll, 310
- Siderostat, Stellar Photography with a, 42
- Sidgwick (Alfred), the Use of Words in Reasoning, 231
- Signalling, Electric, Recent Developments in, 6; the Telautograph, Foster Ritchie, 107
- Silber (Herr), Chemical Effects of Light on Plant Life, 658
- Silchester, Report of the British Association Excavation Committee, 615
- Silicon Compounds, the Spectra of Carbon Monoxide and, Dr. Karl v. Wesendonk, 29
- Silurian and Ordovician Rocks of North-west Ireland, on the Relation of the, to the Great Metamorphic Series, A. McHenry, J. H. Kilroe, 565; G. H. Kinahan, 565
- Simmonds (C.), Lead Silicates in Relation to Pottery Manufacture, 94; Influence of Grinding on Solubility of Lead in Lead Fritts, 175
- Simon (L. J.), Action of Urethane on Pyruvic Acid, 620; Action of Urea on Pyruvic Acid, 644
- Simpson Tunnel, the, 235
- Simpson (Dr. J. Y.), Binary Fission in Ciliata, 199; on the Relation of Binary Fission and Conjugation to Variation, 588
- Sinology: Death and Obituary Notice of Dr. E. Bretschneider, 87
- Sixth Annual Congress of the South-Eastern Union of Scientific Societies, the, 192
- Skye, Ice-erosion in, Alfred Harker, 143
- Skye, on the Sequence of the Tertiary Igneous Eruptions in, A. Harker, 565
- Slate (Prof. F.), the Use of Axis-vectors, 54
- Slater (Henry H.), Manual of the Birds of Iceland, 443
- Slide-rule, Simple Circular, Pierre Weiss, 523
- Sloth, the Hair of the Patagonian Ground-, Dr. W. G. Ride-wood, 190
- Slugs from North-West Borneo, Anatomy of, W. E. Collinge, 199
- Smeerenburg, Spitsbergen, the Rise and Fall of, Sir Martin Conway, 40
- Smith (Charles), Euclid's Elements of Geometry, 623
- Smith (Prof. G. E.), the Name of the *Sensorium Commune* Region of the Brain, 435
- Smith (Herbert), Crystals of Calaverite, 247
- Smith (J. Hamblin), Death of, 285
- Smith (R. Greig), Bacteria and Cement-disintegration, 144; *Vibrio denitrificans*, 144; Bacteroids of Leguminous Nodule and Culture of *Rhizobium leguminosarum*, 272
- Smith (Rupert T.), Periodicity of Zylonic Winds, 95
- Smith (Prof. W. G.), on a Botanical Survey of Scotland, 590
- Smithsonian Institution, Recent Reports, 269
- Smithsonian Solar Eclipse Expedition, the, Prof. S. P. Langley, 53
- Smokeless Powder, Nitro-cellulose and Theory of the Cellulose Molecule, John B. Bernadou, 600
- Snake Poison: the Value of Dr. Calmette's Anti-venene, 657
- Snow on the Moon's Surface, 136
- Snow Conditions in the Antarctic, C. E. Borchgrevink, 257
- Society of Arts: Syntonic Wireless Telegraphy, Mr. Marconi, 130; Society of Arts Medal Awards, 213; Journal of the Society of Arts, Electric Traction, Major Cardew, 437
- Soil Maps, on the Application of Geology to Agriculture by the Preparation of, J. R. Kilroe, 565
- Solander (Dr. Daniel), Illustrations of the Botany of Captain Cook's Voyage Round the World in H.M.S. *Endeavour* in 1768-1771, 374
- Solar Activity 1833-1900, the, Paper Read before Royal Society, Dr. William J. S. Lockyer, 196
- Solar Corona, Brightness of the, January 22, 1898, Prof. Turner, 436
- Solar Eclipse, Magnetic Observations during Total, Dr. William Ellis, F.R.S., 15; the Smithsonian Solar Eclipse Expedition, Prof. S. P. Langley, 53; Observations of Solar Eclipse, May 28, 1900, 269
- Solar Radiation, Measurements of, Annals of the Astrophysical Observatory at the Smithsonian Institution, S. P. Langley, 352; Solar Radiation, J. Y. Buchanan, F.R.S., 456
- Solder, Rosin-cored, 60
- Solid Matter in Fresh and Salt Water, the Settlement of, W. H. Wheeler, 181; H. S. Allen, 279
- Sollas (Prof.), on a Machine for Investigating Fossil Remains, 565
- Solly (R. H.), Liveingite, 95; Notes on Minerals from the Lengenbach Binnenthal, 577
- Solution of Cubic and Biquadratic Equations, Prof. G. Chrystal, 5
- Solutions, Dilute, on Determining the Depression of the Freezing Points of Extremely, E. H. Griffiths, 586
- Sommerfeld (Prof.), the Theory of Diffraction of Röntgen Rays, 357
- Sommerville (D. M. Y.), Two Problems of Geometry, 526
- South Africa, the Natives of, their Economic and Social Conditions, E. Sidney Hartland, 73; see also Africa
- South African Philosophical Society, 144
- Specimens of *Accidium berberidis*, J. Lewton Brain, 77
- Spectrum Analysis: the Flash-Spectrum, R. W. Wood, 23; the Spectra of Carbon Monoxide and Silicon Compounds, Dr. Karl v. Wesendonk, 29; the Persistence of the Spectrum of Carbon Monoxide, Prof. W. N. Hartley, F.R.S., 54;

- Enhanced Lines in Spectrum of Chromosphere, Sir Norman Lockyer, F.R.S., and F. E. Baxandall, 45; the Arc Spectrum of Vanadium, Sir Norman Lockyer, F.R.S., and F. E. Baxandall, 45; the Band Spectrum of Nitrogen in the Oscillating Spark, G. A. Hemsalech, 48; Spectrum of Nova Persei, 240, 456, 556, 639; Prof. Copeland and Dr. J. Halm, 119; Further Observations on Nova Persei, Sir Norman Lockyer, F.R.S., 69, 341; Spectrum of ζ Puppis, 89; the Absorption Spectra of Cyanogen Compounds, W. N. Hartley, J. J. Dobbie and A. Lauder, 175; the Mechanism of Radiation, J. H. Jeans, 199; Negative After-images and Colour-vision, Sheldford Bidwell, F.R.S., 216; Spectrum and Cyanogen, E. C. C. Baly and Dr. H. W. Syers, 247; Banded Flame-spectra of Metals, Prof. Hartley, F.R.S., and Hugh Ramage, 271; Wave-length of Green Corona Line, Signor Ascarza, 289; on the Separation of the Least Volatile Gases of Atmospheric Air and their Spectra, Prof. G. D. Liveing, F.R.S., and Prof. J. Dewar, F.R.S., 294; Laws of Radiation as applied to Incandescent Mantles, Dr. Guillaume, 309; Observations at Santa Pola of Solar Eclipse of May 28, 1900, Sir Norman Lockyer, F.R.S., 343; the Spark Spectrum of Cadmium, C. C. Schenck, 358; Celestial Objects having Peculiar Spectra, 359; the Michelson Echelon Grating, A. Hilger, 383; the Spectroscopic Binary "Mizar," 437; Constitution of White Light, O. M. Corbino, 464; Flame-spectrum Phenomena of Basic Bessemer Blow, Prof. W. N. Hartley and H. Ramage, 492; Photograph of the Spectrum of Lightning, 583; Spectroscopic Binary η Pegasi, 609; Spectroscopic Binary Capella, 639
- Speculative Biology, Dr. Ermanno Giglio-Tos, 321
- Spencer (Prof. J. W.), Geological Development of Antigua, Guadeloupe, Anguilla, St. Martin, St. Bartholomew, Lombrero, St. Christopher Chain, and Saba Bank, 94
- Spiders, Mimicry in, Dr. W. A. Wagner, 41
- Sponges, Japanese, Studies on the *Hexactinellida*, Isao Iijima, Prof. E. A. Minchin, 393
- Sponges, Tobago, 637
- Spot on Jupiter, Black, 216
- Spot on Jupiter, Dark, 240
- Stalactites and Stalagmites, Peculiar Forms of, Dr. O. C. Farrington, 288
- Stalk-eyed-Crustacea, the, of British Guiana, West Indies and Bermuda, Dr. Charles G. Young, 98
- Stanford's Compendium of Geography and Travel, Central and South America, A. H. Keane, Colonel George Earl Church, 353
- Stanoiéwitch (G. W.), a Method for Hail-prevention, 415
- Stapes, on the Origin of the Cartilage of the, and its Continuity with the Hyoid Arch, Dr. J. F. Gemmill, 614
- Stars: Stellar Photography with a Siderostat, 42; Forms of Images in Stellar Photography, 191; Stellar Photometry, B. Baillaud, 63; New Variable Star 71 (1901) Aurigæ, Stanley Williams, 89; Two New Variable Stars, Prof. W. Ceraski, 167; New Variable Stars, 191; Orbits of Algol Variables, RR Puppis and V Puppis, 384; New Variable Star 77 (1901) Herculis, 532; New Southern Algol-Variable, 639; Ten-Year Greenwich Star Catalogue for 1890, 216; on the Theory of Temporary Stars, Dr. J. Halm, 253; the Cape Photographic Durchmusterung for the Equinox, 1875, David Gill, F.R.S., J. C. Kapteyn, 257; a Photometric Durchmusterung, including all Stars of the Magnitude 7.5, and Brighter North of Declination -40° , Edward C. Pickering, 257; Motion of α Persei in the Line of Sight, 359; Period of Mira Ceti, Prof. A. A. Nijland, 410; Nova Persei, 42, 191, 240, 410, 437, 491; Spectrum of Nova Persei, 456, 556, 639; Further Observations on Nova Persei, Sir Norman Lockyer, K.C.B., F.R.S., 341; Appearance of the Photographic Image of Nova Persei, 639; New Double Stars, 456; Six Stars with Variable Radial Velocity, 456; Density and Figure of Close Binary Stars, Dr. Alex. W. Roberts, 468; Variable Radial Velocity of δ Orionis, 491; Radial Velocity of 1830 Groombridge, 491; Chemistry of the Cygnian Stars and Basic Rocks, Sir Norman Lockyer, K.C.B., F.R.S., Prof. Edw. Suess, 629; Spectroscopic Binary Capella, 639
- Stassano (M.), Iodine in Blood, 248
- Statistical Investigations on Variability and Heredity, Prof. Karl Pearson, F.R.S., 102
- Statistics: the Increase of the Paris Population, 163
- Stead (J. E.), Idiomorphic Crystals in Blast Furnace Hearth, 64; Influence of Copper on Steel Rails and Plates, 64; Copper and Iron Alloys, 492; Steel Wire with and without Copper, 492
- Steam, on the Supersession of the, by the Electric Locomotive, W. Langdon, 437
- Steam-engine Indicator, the, Cecil H. Peabody, 125
- Stebba (Jean), Electrolytic Preparation of Pure Oxide of Cerium, 344
- Steel Castings, the Properties of, Prof. J. O. Arnold, 64, 316
- Steele (B. D.), Measurement of Ionic Velocities in Aqueous Solutions, 222
- Stellar Photography, Forms of Images in, 191
- Stellar Photography with a Siderostat, 42
- Stellar Photometry, B. Baillaud, 63
- Steba (Jean), the Crystallisation of Cerium Oxide, 368
- Stern (A. L.), the Nutrition of Yeast, 175
- Stimuli in Plants, a Mechanism for the Transmission of, Dr. B. Nemeç, 371
- Stromeyer (C. E.), Fireball of September 14, 1492, 577
- Stone Age of Man, on the Chronology of the, Sir W. Allen Sturge, 615; Sir John Evans, 615; Prof. Kendal, 615
- Stone Circles, Excavations at Arbor Low, 615
- Stone-movements, Vertical, due to Soil-moisture and Frost, Horace Darwin, 222
- Stonehenge: a Sentimental and Practical Guide to Amesbury and, Lady Antrobus, 465; the Recent Work at Stonehenge, Lady Antrobus, 602; Folklore about Stonehenge, Rev. O. Fisher, 648
- Storage Cell, the "Edison," 241
- Sturdy (R. J.), Veterinary Work in British East Africa and Uganda Protectorates, 67
- Strahan (Aubrey), Passage of Coal-seam into Seam of Dolomite, 199
- Strain-measurement, Apparatus for, Dr. E. G. Coker, 199
- Strassburg, the International Seismological Conference at, Dr. F. Omori, 340
- Stratonoff (W.), Publications de l'Observatoire Astronomique et Physique de Tachkent, Études sur la Structure de l'Univers, 56
- Stress, its Definition, R. F. Muirhead, 207; Reviewer, 207
- Stroud (Prof.), on a Folding Range Finder for Infantry, 613
- Structure des Plantes, Assimilation Chlorophyllienne et la, Dr. Ed. Griffon, 28
- Structure of the Universe, Studies on the, W. Stratonoff, Howard Payn, 56
- Stuart-Glennie (J. S.), History as a Science, 326; on Dr. Frazer's Views of the Relations between Magic, Religion and Science, 615
- Sturge (Dr. W. Allen), on the Chronology of the Stone Age of Man, 615
- Subjective Lowering of Pitch, the, E. Hurren Harding, 103, 182; Prof. T. J. Allen, 182, 301; G. W. Hemming, 182; E. C. Sherwood, 233; Suggested Experiment, G. W. Hemming, 308
- Submarine Telegraphy, on a Form of Artificial Submarine Cable, Prof. A. Trowbridge, 77
- Sucre, La Betterave à, L. Malpeaux, 28
- Suering (Dr.), High Balloon Ascent, 356
- Suess (Prof. Edw.), Chemistry of the Cygnian Stars and Basic Rocks, 629
- Sugar, Indigo and, Dr. F. Mollwo Perkin, 10
- Sumatra, on a Specimen of *Ophioglossum simplex* collected by Mr. Ridley in, Prof. Bower, F.R.S., 617
- Sun: the Recent Total Eclipse of the, 79, 114, 136; the Total Solar Eclipse, May 18, 1901, 289, 311; a Vertical Light-beam through the Setting Sun, Prof. A. S. Herschel, F.R.S., 232; Solar Radiation, J. Y. Buchanan, F.R.S., 456; on the Rotation of Facule on the Sun's Surface, Father Cortie, 587; Deformation of the Sun's Disc, Signor A. Ricco, 289
- Sun-spot Variation, a Long Period, Dr. William J. S. Lockyer, 196
- Suppression of Tuberculosis, the, Prof. Robert Koch, 312
- Surface Waters of the North Atlantic Ocean, Circulation of the, H. N. Dickson, 665
- Surgery: "Tannoform," 113; Electrolytical Method of Removing Superfluous Hairs, Dr. A. Whitfield, 311; a Civilian War Hospital, 346; the Röntgen Rays in Military Surgery, J. Hall-Edwards, 454
- Surnames, on the Frequency and Pigmentation Value of the, of Scottish School Children in Eastern Aberdeenshire, J. F. Tocher, J. Gray, 614

- "Surrey," Origin of Name, T. le M. Douse, 490
 Survey of Southern India, a Plea for a Prehistoric, Prof. Alfred C. Haddon, F.R.S., 469
 Surveying: Fergusson's Surveying Circle and Percentage Tables, J. C. Fergusson, 278; a New Surveying Instrument, Der Hammer-Fennel'sche Tachymeter-Theodolit und die Tachymeter-kippregel zur unmittelbaren Lattenablesung von Horizontalabstand und Höhenunterschied, Dr. E. Hammer, 598
 Sutherland (George), Twentieth Century Inventions, a Forecast, 74
 Sutherlandshire, on the Resemblance of the Old Red Sandstone of North-west Ireland to the Torridon Rocks of, A. McHenry, J. H. Kilroe, 565
 Suzuki (U.), Theine in the Tea-plant and Organic Iron Compounds in Plants, 582
 Swan (J. W., F.R.S.), Position and Prospects of Electrochemical Industries, 329
 Swearing: Why do Men Swear? Prof. G. T. W. Patrick, 334
 Swimming, Spiral, the Significance of, Dr. H. S. Jennings, 165
 Swimming Instinct, the, Prof. C. Lloyd Morgan, F.R.S., 208
 Sy (F.), Observations of Comet A (1901) at Algiers, 143; Observations at Algiers of Planet GG, 524
 Syers (Dr. W. H.), Spectrum of Cyanogen, 247
 Symbiosis, Social, among American Ants, W. H. Wheeler, 409
 Symington (Prof. J.), on the "Temporary Fissures" of the Human Cerebral Hemispheres, 614
 Symons's Meteorological Magazine, 119
 Syntonic Wireless Telegraphy, Mr. Marconi, 130
 Tabor (J. M.), Foreign Oysters acquiring Characters of Natives, 126
 Tacheometer-theodolite, der Hammer-Fennel'sche Tachymeter Theodolit und die Tachymeter-Kippregel zur unmittelbaren Lattenablesung von Horizontalabstand und Höhenunterschied, Dr. E. Hammer, 598
 Tachkent, Publications de l'Observatoire Astronomique et Physique de, Etudes sur la Structure de l'Univers, W. Stratonoff, Howard Payn, 56
 Tahiti, the Fire-Walk Ceremony in, Prof. S. P. Langley, 397
 Tailleux (P.), Glucoside Characteristic of Germinating Period of Beech, 120
 Tait (Prof. P. G.), Death of, 261; Obituary Notice of, Prof. G. Chrystal, 305
 Tanks for Water-Works, Towers and, J. N. Hazlehurst, 525
 "Tannoform," 113
 Tansley (A. G.), on the Vegetation of Mount Ophir, 616
 Tarbouriech (J.), Acidimetry of Arsenic Acid, 272
 Tasmania, the Marine Mollusca of, Prof. Ralph Tate and W. L. May, 548
 Tate (Prof. Ralph), the Marine Mollusca of Tasmania, 548
 Taxidermy, comprising the Skinning, Stuffing and Mounting of Birds, Mammals and Fish, 125
 Taylor (F. G.), an Introduction to the Practical Use of Logarithms, 424
 Taylor (Canon Isaac), Death of, 635
 Tea, Causes of Difference in Colour between Green and Black Tea, Mr. Asu, 607
 Teachers' Manual of Object Lessons for Rural Schools, the, Vincent T. Murché, Prof. R. Meldola, F.R.S., 394
 Technical School at Pittsburgh, the Carnegie, 570
 Telautograph, Foster Ritchie's, 107
 Telegony, Hybrid Oochromy, with a Note on Xenia, G. P. Bulman, 207
 Telegraphone, the, Herr Poulsen, 183
 Telegraphy: on a Form of Artificial Submarine Cable, Prof. A. Trowbridge, 77; Uniform Transmission of Astronomical Telegrams, 167; Measurement of Sensitiveness of Coherer for Wireless Telegraphy, Carl Kinsley, 60; Syntonic Wireless Telegraphy, Mr. Marconi, 130; Marconi's Wireless Telegraphy on the *Lake Champlain*, Atlantic Liner, 111; Sir William Preece's System of Etheric Signalling, 163; Wireless Telegraphy on Ocean Liners, 188; on the *Lucania*, 381, 406, 553; Wireless Telegraphy for War Purposes, 383; Drahtlose Telegraphie durch Wasser und Luft, Prof. Dr. Ferdinand Braun, 497; Wireless Telegraphy, James Bowman Lindsay, Sir William Preece, 521; a New Principle Discovered, A. Orling and J. Armstrong, 636; Wireless Telegraphic Communication with Zugspitze Observatory, Bavaria, 637
 Telephone System of the British Post Office, T. E. Herbert, 599
 Telescope, the McClean, at the Cape Observatory, 632
 Temperament and Exercise, W. W. Davis, 435
 Temperature: the Nadir of Temperature and Allied Problems, Bakerian Lecture at Royal Society, Prof. James Dewar, F.R.S., 243; a Possible Method of Attaining the Absolute Zero of Temperature, Geoffrey Martin, 376; on the Mean Temperature of the Atmosphere and the Causes of Glacial Periods, H. N. Dixon, 590
 Temporary Stars, on the Theory of, Dr. J. Halm, 253
 Ten-Year Greenwich Star Catalogue for 1890, 216
 Tercidina, Light Variation of the Minor Planet (345), 265
 Tercidina, the Minor Planet, 289
 Terrestrial Globe, Philip's Educational, 375
 Terrestrial Magnetism: the Norwegian North Polar Expedition 1893-96, Dr. C. Chree, F.R.S., 151; Report on Observations in Terrestrial Magnetism and Atmospheric Electricity made at the Central Meteorological Observatory of Japan for the Year 1897, Dr. C. Chree, F.R.S., 151; Die Erdströme im Deutschen Reichstelegraphengebiet und ihr Zusammenhang mit den Erdmagnetischen Erscheinungen, Dr. B. Weinstein, 230; the Collected Scientific Papers of John Couch Adams, 576
 Terrestrial Surface Waves, Report of the Committee on, Dr. Vaughan Cornish, 590
 Testing of some Ballistic Experiments, Rev. F. Bashforth, 445
 Testing and Strength of Materials of Construction: Experimental Engineering, W. C. Popplewell, 597
 Thane (G. D.), Report on Licensed Vivisection Experiments for 1900, 133
 Theology, Modern Natural, with the Testimony of Christian Evidences, Frederick James Gant, 422
 Theory of Temporary Stars, on the, Dr. J. Halm, 253
 Therapeutics: the Treatment of Disease by Light, 259; Lecithin in Tuberculosis, H. Claude and A. Zaky, 572
 Thermodynamics: Lehrbuch der Mathematischen Chemie, J. J. van Laar, 375; on Magnetic Rotation of Light and the Second Law of Thermodynamics, Lord Rayleigh, F.R.S., 577
 Thermometry: Thermodynamical Correction of Gas Thermometer, Prof. H. L. Callendar, 23; Evolution of the Thermometer, 1592-1743. Henry Carrington Bolton, 25
 Thibet: the Sven Hedin Expedition, 606
 Thibet and Chinese Turkestan, Captain Deasy, 653
 Thierverbreitung, Über die geologische Geschichte der Insel-Celebes auf Grund der, Dr. Paul Sarasin and Dr. Fritz Sarasin, 203
 Third (J. A.), Tri-homologous Triangles, 41
 Thiselton-Dyer (Sir W. T., F.R.S.), Scope of Royal Society, 29; the Life and Letters of Thomas Henry Huxley, F.R.S., by Leonard Huxley, 145; Death and Obituary Notice of Maxime Cornu, 211
 Thomas (Oldfield, F.R.S.), New Mammals from Uganda, 142; the Rhinoceros, 223; Antlers of Central Borneo Deer, 247
 Thomas (V.), Chlorobromides of Thallium, 224
 Thompson (Beeby), Use of a Geological Datum, 295
 Thompson (Prof. S. P., F.R.S.), Jena Glass, 199; on the Teaching of Mathematics, 592
 Thompson Yates Laboratories, the Report of the, 604
 Thomson (Prof. J. Arthur), on the Behaviour of Young Gulls Naturally and Artificially Hatched, 588; on Germinal Selection in Relation to Inheritance, 588
 Thomson (Captain J. H.), Handbook on Petroleum, 441
 Thomson (W.), on the Detection and Estimation of Arsenic in Beer and Articles of Food, 612
 Thorpe (J. F.), Derivatives of Bicyclopentane, 94
 Thorpe (Dr. T. E., F.R.S.), Lead Silicates in Relation to Pottery Manufacture, 94; Influence of Grinding on Solubility of Lead in Lead Frits, 175; the Use of Lead Compounds in Pottery, 408; the Work of the Government Laboratory, 553; on Duty-free Alcohol, 611
 Thrush, Winter Singing of, W. W. Fowler, 215
 Thudicum (Dr. J. L. W.), Death of, 489; Obituary Notice of, 527
 Thunderbolts as Charms, Rev. P. O. Bodding, 264
 Tidal Currents, Sand Waves in, Dr. Vaughan Cornish, 412
 Tierleben der Tiefsee, Oswald Seeliger, 423
 Tilden (Prof. W. A., F.R.S.), Royal College of Science and the University of London, 583

- Time, Climate and, and Mars, 106
 Tissier (M.), the Aromatic Organo-magnesium Compounds, 96
 Toad in Flint Nodule, Charles Dawson, 70
 Tobago Sponges, 637
 Tocher (J. F.), on the Frequency and Pigmentation Value of the Surnames of Scottish School Children in Eastern Aberdeenshire, 614
 Todea, on the Anatomy of, A. C. Seward, F.R.S., Miss Sibille O. Ford, 617
 Toll (Baron), Buried Glaciers on Great Lyakhoff Island, 310
 Topography and Resources of Northern Ontario, Canada, Dr. R. Bell, 590
 Topography, Scientific, Recherches sur les Instruments, les Méthodes et le Dessin Topographiques, Colonel A. Laussedat, 622
 Total Solar Eclipse, May 28, 1900, Magnetic Observations during, Dr. William Ellis, F.R.S., 15; Observations at Santa Pola, Sir Norman Lockyer, F.R.S., 343
 Total Solar Eclipse of May 18, 1901, the, 79, 114, 136, 289, 311
 Totemism, a New Record of, Hon. Auberon Herbert, 522
 Towers and Tanks for Water-works, J. N. Hazlehurst, 525
 Toxicology: Poison of *Lotus arabicus*, W. R. Dunstan, F.R.S., and T. A. Henry, 367; Antimony in Organism, G. Pouchet, 597
 Traction, Report of the Committee on the Resistance of Road Vehicles to, 613
 Tradition, on Hints of Evolution in, D. MacRitchie, 615
 Transactions of American Mathematical Society, 548
 Transvaal and Orange River Colony, Prehistoric Implements in the, Stanley B. Hutt, 103
 Traquair (Dr. R. H.), Fossil Fishes in Edinburgh Carboniferous and South Scottish Silurian Rocks, 343; on the Geological Distribution of the Fishes of the Carboniferous Rocks and of the Old Red Sandstone of Scotland, 565
 Travellers, Hints to, John Coles, 100
 Treatment of Disease by Light, the, 259
 Trees, Fruit, Fumigation of, 642
 Trees, on the Diameter Increment of, A. W. Borthwick, 619
 Trias of Elgin and Nairn, on the, Dr. W. Mackie, 565
 Trillat (J. A.), Oxidation of Primary Alcohols by Contact Action, 120
 Tring Museum, Novitates Zoologicae, a Journal of Zoology in Connection with the, 249
 Trinidad, Notes on Natural History of, J. H. Hart, 40
 Trouton (Dr. F. T., F.R.S.), Creeping of Liquids and Tension of Mixtures, 223
 Trowbridge (Prof. A.), on a form of Artificial Submarine Cable, 77
 Tuberculosis: Influence of Feeding, Work and Dust on, MM. Lannelongue, Achard and Gaillard, 71; the Congress on Tuberculosis, 301, 327; the Suppression of Tuberculosis, Prof. Robert Koch, 312; Lecithin in Tuberculosis, H. Claude and A. Zaky, 572; Influence of Variations of Temperature on Tuberculosis, MM. Lannelongue, Achard and Gaillard, 644
 Tucker (S. A.), New Metallic Borides, 175
 Tuning-forks, a New Method of using, in Chronographic Measurements, Rev. F. J. Jarvis-Smith, F.R.S., 232
 Tunnel, the Simplan, 235
 Turbine-driven Vessel, New, 133
 Turbine Propulsion, the *King Edward*, 334
 Turkestan, Tibet and Chinese, Captain Deasy, 653
 Turneure (F. E.), Public Water-supplies, Requirements, Resources and the Construction of Works, 179
 Turner (Prof.), Brightness of the Solar Corona, January 22, 1898, 436
 Tutton (A. E., F.R.S.), Comparative Study of Magnesium Group of Double Selenates, 141
 Twentieth Century Inventions: a Forecast, George Sutherland, 74
 Twigg (John Hill), Electro-Chemistry, 5
 Tycho Brahe's Tomb, Opening of, 261
 Type-casting, on a Machine for the Manufacture of Type, M. Barr, 613
 Tyrer's Marsh-Berzelius Arsenic Test Apparatus, 215
 Ueberweg (Dr. F.), Berkeley's Abhandlung über die Prinzipien der Menschlichen Erkenntnis, 4
 Uganda Protectorates, Veterinary Work in British East Africa and, R. J. Sturdy, 67
 Ule (E.), Ant-Gardens in Amazon Region, 553
 Ultra-Neptunian Planet, Evidence of the Existence of an, Prof. J. Forbes, 119, 524, 587
Uva latissima, on the Absorption of Ammonia from Polluted Sea-water by, Prof. Letts, John Hawthorne, 619
 Ungulate, a New Name for an, Dr. Charles W. Andrews, 577
 Uniform Transmission of Astronomical Telegrams, 167
 United States: United States Coast and Geodetic Survey, Magnetic Observations during Total Solar Eclipse, 15; Recent Work of the United States Weather Bureau, 80; United States Monthly Weather Review, the Colour and Polarisation of Blue Sky Light, Dr. N. E. Dorsey, 138; Proceedings of the Eighth Annual Meeting of the Society for the Promotion of Engineering Education held in New York City, July 2-3, 1900, Prof. F. W. Bursall, 204; United States Department of Agriculture, North American Fauna, 242; Year Book of the United States Department of Agriculture 1900, Prof. R. Warington, F.R.S., 372; Government Aid to Higher Education in the United States, Dr. C. D. Walcott, 261; United States Naval Observatory, 265; United States Monthly Weather Review, Relations between Climate and Crops, H. B. Wren, 493; Status of the Mesozoic Floras of United States, the Older Mesozoic, Lester F. Ward, W. M. Fontaine, A. Warner and F. H. Knowlton, 633
 Universe, Studies on the Structure of the, W. Strattonoff, Howard Payn, 56
 Universities: University Intelligence, 22, 43, 68, 92, 118, 140, 174, 198, 220, 244, 270, 295, 319, 341, 364, 392, 415, 440, 463, 495, 524, 547, 571, 595, 619, 642, 666; the University of London, 89; the Extension of Knowledge, Dr. D. J. Hill, 117; the Ninth Jubilee of Glasgow University, 186; Handbook of British, Continental and Canadian Universities, with Special Mention of the Courses open to Women, 301; Function of a University, Oration at University College, Prof. W. Ramsay, F.R.S., 388; Royal College of Science and the University of London, Prof. W. A. Tilden, F.R.S., 583
 Use of Words in Reasoning, the, Alfred Sidgwick, 231
 Vaillant (G.), Colour of Ions, 415
Valdivia Expedition, Oceanographical Results of, Dr. G. Schott, 263
 Valsesia, Ricerche Petrografiche e Geologie sulla, E. Artini and G. Melzi, Dr. H. J. Johnstone-Lavis, 640
 Vanderlinden (Dr. E.), Atmospheric Conditions of Fog in Belgium, 357
 Variability and Heredity, Statistical Investigations on, Prof. Karl Pearson, F.R.S., 102
 Variability of Earthshine, Causes of the, 456
 Variable Radial Velocity, Six Stars with, 456
 Variable Radial Velocity of δ Orionis, 491
 Variable Stars: New Variable Star 71 (1901), Aurigæ, Stanley Williams, 89; Two New Variable Stars, Prof. W. Ceraski, 167; New Variable Stars, 191; Orbits of Algol Variables, RR Puppis and V Puppis, 384; Period of Mira Ceti, Prof. A. A. Nijland, 410; New Variable Star 77 (1901) Hercules, 532; New Southern Algol-Variable, 639; New Algol-type Variable, 78 (1901), Cygni, 583
 Variation of Eros, 63, 359, 383
 Variation of Latitude, Formulæ for, 42
 Variation, a Long Period Sunspot, Dr. William J. S. Lockyer, 196
 Variation in a Bee, Prof. T. D. A. Cockerell, 158; Variation, the Experimental Study of, Opening Address in Section D at the Glasgow Meeting of the British Association, Prof. J. Gossar Ewart, 482; on the Relation of Binary Fission to Variation, Dr. J. Y. Simpson, 588
 Variations of the Magnetic Needle, 384
 Vatican Observatory, the, 61
 Vaults, the Graphical Mensuration of, Prof. Ernesto Breglia, 27
 Vegetable Gardening, the Principles of, L. H. Bailey, 122
 Velocity, Radial, of 1830 Groombridge, 491
 Velocity, Variable Radial, Six Stars with, 456
 Velocity, Variable Radial, of δ Orionis, 491
 Venus, Photography by the Light of, 336
 Venus, Diameter of, 556
 Vermorel (V.), Luminous Traps for *Pyrallis* in Beaujolais, 572
 Verneuil (A.), Secondary Products of Action of Sulphuric Acid on Wood Charcoal, 176
 Vertebrates, Lecithoblast und Angioblast der Wirbelthiere,

- Wilhelm His, 75; on the Origin of Vertebrate Limbs, J. Graham Kerr, 588
- Vertical Light-beam through the Setting Sun, a, Prof. A. S. Herschel, F.R.S., 232
- Vespe, the Intermittent Spring at, F. Parmentier, 296
- Vesuvius in April-May, 1900, Activity of, Prof. R. V. Matteucci, 134
- Vesuvius, the New Eruptive Cone, Prof. E. Semmola, 334
- Veterinary Work in British East Africa and Uganda Protectorates, R. J. Sturdy, 67
- Victoria, Curious Incrustations on Roots in Littoral Sand Dunes of, 409
- Vignon (Léo), Nitro-mannite and Nitrocellulose, 596; Reducing Properties of Nitric Esters, 620; Nitro-Derivatives of Pentacerythrite, 644; Nitro-Derivatives of Arabite and Rhamnite, 668
- Villiger (M.), Researches on Organic Peroxides, 64
- Viper, the Cape, Claude E. Benson, 126
- Virchow Celebration, the, 601
- Vision, Pseudoscopic, without a Pseudoscope, a New Optical Illusion, Prof. R. W. Wood, 351; A. S. Davis, 376
- Vitality of Seeds, Dr. Henry H. Dixon, 256
- Viticulture: Utilisation of Wine Residues and Spoilt Wines as Manure, F. Garrigou, 344; Viticulture, Sir James Blyth, 432; Luminous Traps for *Pyralis* in Beaujolais, G. Gastine and V. Vermorel, 572
- Vitrified Quartz, Lecture at Royal Institution, W. A. Shenstone, F.R.S., 65, 126; Prof. J. Joly, F.R.S., 102
- Vitznau (A. N.), Excitability of Spinal Marrow, 620
- Vivisection: the National Anti-Vivisection Society and Lord Lister, 55; Hon. Stephen Coleridge, 101; Editor, 101; Report on Licensed Experiments for 1900, G. D. Thane, 133
- Voandzou plant, the, M. Ballard, 48
- Vögel, Der Gesang der, Dr. Valentin Häcker, 52
- Vogt (J. G.), Entstehen und Vergehen der Welt als Kosmischer Kreisprozess, 277
- Volcanoes: Recent Studies of Old Italian Volcanoes, Sir Arch. Geikie, F.R.S., 103; Activity of Vesuvius in April-May 1900, Prof. R. V. Matteucci, 134; the New Eruptive Cone on Vesuvius, Prof. E. Semmola, 334; on the Sequence of the Tertiary Igneous Eruptions in Skye, A. Harker, 565
- Vries (Prof. Hugo de), Die Mutationstheorie, Versuche und Beobachtungen über die Entstehung von Arten in Pflanzenreich, 208
- Wager (Harold), on the Cytology of the Cyanophyceæ, 616; on the Teaching of Botany in Schools, 592
- Wagner (Dr. W. A.), Mimicry in Spiders, 41
- Wagstaffe (W. W.), the Climate of Sevenoaks, 637
- Wahl (A.), Ethyl Nitro-acetates, 48; Dimethyl-pyruvic Acid, 72
- Wahlberg (A.), Brinell's Method of Determining Hardness of Iron and Steel, 64
- Walcott (Dr. C. D.), Government Aid to Higher Education in United States, 261
- Walker (Gilbert T.), Boomerangs, 338
- Walker (G. W.), Asymmetry of Zeeman Effect, 668
- Wallace (R. H.), the Scientific Study of Commercial Cross Cultivation, 164
- Walton (William), Death and Obituary Notice of, 164
- War Hospital, a Civilian, 346
- Ward (Lester), Status of the Mesozoic Floras of United States, the Older Mesozoic, 633
- Ward (F. W.), the Teaching of Mathematics, 280
- Ward (Prof. Marshall), on the Teaching of Botany in Universities, 593; on the Bromes and their Brown Rust, 616
- Ward (R. de C.), Climate of Mammoth Tank, Colorado, 357
- Warfare, Future, H. G. Wells, 454
- Warington (Prof. R., F.R.S.), Year-book of the United States Department of Agriculture, 1900, 372
- Warner (A.), Status of the Mesozoic Floras of United States, the Older Mesozoic, 633
- Washington, Bulletin of the Philosophical Society of, 253
- Washington Observations, 1891-92, 63
- Water: The Thermal Variations of Waters, F. A. Forel, 71; an Outline of the Development and Application of the Energy of Flowing Water, Joseph P. Frizell, 121; Reservoirs for Irrigation, Water-power and Domestic Water-supply, James D. Schuyler, 154; Public Water-supplies: Requirements, Resources, and the Construction of Works, F. E. Turneure and H. L. Russell, 179; the Settlement of Solid Matter in Fresh and Salt Water, W. H. Wheeler, 181; H. S. Allen, 279; Water Filtration Works, James H. Tuertes, 421; Towers and Tanks for Water-works, J. N. Hazlehurst, 525
- Water Vapour, on Determining the Influence of, on the Energy Lost by a Heated Body placed in an Enclosure containing Air, Hydrogen or Water Vapour, Prof. Morley, Mr. Brush, 586
- Waterston (Dr. D.), Viscera of Porpoise, 344; on the Pelvic Cavity of the Porpoise as a Guide to the Determination of the Sacral Region in the Cetacea, 587
- Waterways and Maritime Works, Recent Progress in Papers read at International Engineering Congress at Glasgow, 639
- Watson (G. C.), Farm Poultry, 575
- Watt (Dr. George), the Hanbury Medallist for 1901, 162
- Watts (Francis), Nature Teaching, 550
- Wave-length of Green Corona Line, Sig. Ascarza, 289
- Waves, Sand, in Tidal Currents, Dr. Vaughan Cornish, 412
- Wead (C. K.), Some Discontinuous and Indeterminate Functions, 357
- Weather, the Moon and Wet Days, Alex. B. MacDowall, 424
- Weather Maps Published Daily by Various Countries, on, W. N. Shaw, F.R.S., 591
- "Weather-shooting," Dr. J. M. Pernter, 39
- Webb (Wilfred Mark), the Royal Horticultural Society's Lily Conference, 316
- Wedekind (Edgar), die Heterocyklischen Verbindungen der Organischen Chemie, 252
- Weight, Does Chemical Transformation Influence, Lord Rayleigh, F.R.S., 181
- Weights and Measures, le Système Métrique, G. Bigourdan, 250
- Weinstein (Dr. B.), die Erdströme im Deutschen Reichstelegraphengebiet und ihr Zusammenhang mit den Erdmagnetischen Erscheinungen, 230
- Weiss (Georges), Law of Electrical Stimulation of Nerves, 72
- Weiss (Pierre), New System of Ammeters and Voltmeters, 23; Simple Circular Slide-Rule, 523
- Wells (H. G.), Future Warfare, 454
- Wells (H. L.), a Cæsium-Tellurium Fluoride, 547
- Wesendonk (Dr. Karl v.), the Spectra of Carbon Monoxide and Silicon Compounds, 29
- West (G. S.), B. Eyferth's Einfachste Lebensformen des Tier- und Pflanzenreiches, Dr. Walther Schöniche and Dr. Alfred Kalberlah, 301
- West (William), Death and Obituary Notice of, 579
- West African Studies, Mary H. Kingsley, 231
- West Indies, British, the Marine Resources of, Dr. J. E. Duerden, 31
- Wet Days, the Moon and, Alex. B. MacDowall, 424
- Wethered (E. G.), the Coal Exports of Great Britain, 19
- Wetterkunde, Leitfaden der, Dr. R. Börnstein, 180
- Whale, Cogia, Viscera of, Dr. W. B. Benham, 142
- Whales, Armour-clad, 652
- Wharton (Sir W. J. L.), the Admiralty Survey, 1900, 309
- Wheat, Field Experiments on, Prof. Italo Giglioli, 229
- Wheeler (W. H.), the Settlement of Solid Matter in Fresh and Salt Water, 181; Social Symbiosis among American Ants, 409; on the Sources of the Warp in the Humber, 566
- Wheeler (W. M.), Imposters among Animals, 264
- White (Gilbert), the Natural History of Selborne, 276; the Life and Letters of Gilbert White, of Selborne, Rashleigh Holt-White, 276; the Natural History and Antiquities of Selborne, 369
- White (S. A. F.), Effect of High Frequency Oscillatory Field on Electrical Resistance, 246
- Whitfield (Dr. A.), Electrolytical Method of Removing Superfluous Hairs, 311
- Wigham (F. H.), Steel Wire with and without Copper, 492
- Wigham (J. R.), on a Long-continuous-burning Petroleum Lamp for Beacons and Buoys, 613
- Wild Flowers, a Raid on, Prof. L. C. Miall, F.R.S., Prof. R. Meldola, F.R.S., 126; David Houston, 156
- Wild Flowers, the Story of, Rev. Prof. G. Henslow, 350
- Wilkin (Anthony), Death and Obituary Notice of, 110
- Wilkin (A.), Libyan Notes, 123
- Williams (Stanley), New Variable Star 71 (1901) Aurigæ, 89
- Willis (E. C.), the New Comet, 55
- Willis (J. M.), a Cæsium-Tellurium Fluoride, 547
- Wilson (Ernest), the Growth of Magnetism in Iron under Alternating Magnetic Force, 46]

- Wilson (Prof. E.), on the Commercial Importance of Aluminium, 613
- Wilson (Dr. H. A.), Electrical Conductivity of Air and Salt Vapour, 70; Magnetic Deflection of Kathode Rays, 95; on the Magnetic Effects of Electrical Convection, 586
- Wingham (Arthur), Bearing on Fracture of Internal Strains of Iron and Steel, 492
- Wireless Telegraphy: Marconi's, on the *Lake Champlain*, Atlantic Liner, 111; Wireless Telegraphy on Ocean Liners, 188; Wireless Telegraphy on the *Lucania*, 381, 406, 553; Syntonic Wireless Telegraphy, Mr. Marconi, 130; Wireless Telegraphy for War Purposes, 383; Drahtlose Telegraphie durch Wasser und Luft, Prof. Dr. Ferdinand Braun, 497; Wireless Telegraphy, James Bowman Lindsay, Sir William Preece, 521; a New Principle discovered, A. Orling and T. Armstrong, 636; Wireless Telegraphic Communication with Zugspitze Observatory, Bavaria, 637
- Wislicenus (Johannes), the Leipzig Chemical Laboratory, 127
- Withers (Prof. H. L.), on the Scope of Educational Science, 591
- Withers (Prof.), on the Teaching of Botany in Universities, 593
- Woad as a Blue Dye, Dr. C. B. Plowright, 413
- Woburn Abbey, Musk-Ox and Bison at, 63
- Woburn Abbey Musk-Ox, the Age of the, R. Lydekker, F.R.S., 103
- Women, Handbook of British, Continental and Canadian Universities, with Special Mention of the Courses open to, 301
- Wood (R. W.), the Flash-Spectrum, 23
- Wood (Prof. R. W.), Pseudoscopic Vision without a Pseudoscope, a New Optical Illusion, 351
- Wood (Dr. Wallace), Cerebral Science Studies in Anatomical Psychology, 101
- Woodward (Dr. A. Smith), on the Bone-beds of Pikermi, Attica, 566; on a Newly-discovered Bone-bed at Achmet Aga, North Euboea, 566
- Woodward (Martin Fountain), Death of, 528; Obituary Notice of, 578
- Woodward (Prof. R. S.), Address at the Denver Meeting of the American Association, 498
- Woolnough (W. G.), New Rock from Kosciusko, New South Wales, 416
- Wordingham (C. H.), Central Electrical Stations, their Design, Organisation and Management, 100
- Words in Reasoning, the use of, Alfred Sidgwick, 231
- Worgitzky (Georg), Blütengeheimnisse: Eine Blütenbiologie in Einzelbildern, 444
- Worsfold (T. Cato), French Stonehenge: an Account of the Megalithic Remains in the Morbihan Archipelago, 465
- Worsdell (W. C.), on the Morphology of the "Flowers" of *Cephalotaxus*, 618
- Wren (H. B.), Relations between Climate and Crops, 493
- Wright (M. O.), Flowers and Ferns in their Haunts, 375
- Wundt (W.), Gustav Theodor Fechner, 526
- Wurts (A. J.), Nernst Lamp in America, Paper read at American Institute of Electrical Engineers, 632
- Wye, the South Eastern Agricultural College at, 283
- Xenia, Hybrid Oochromy, with a Note on, G. P. Bulman, 207
- Yapp (R. H.), on two Malayan "Myrmecophilous" Ferns, 617
- Yearbook of the United States Department of Agriculture, 1900, Prof. R. Warington, F.R.S., 372
- Yeast, the Nutrition of, A. L. Stern, 175
- Yellow Fever, Mosquitoes and, 453; Dr. H. de Gouvêa, 655
- Yew, on the Past History of the, in Great Britain and Ireland, Prof. Conwentz, 617
- Yorkshire Earthworks, Mrs. E. S. Armitage, 531
- Yorkshire East, the Geological History of the Rivers of, F. R. Cowper Reed, 277
- Young (Dr. Charles G.), the Stalk-eyed Crustacea of British Guiana, West Indies and Bermuda, 98
- Young (J. W. A.), the Elements of the Differential and Integral Calculus, 396
- Young (Prof. S.), Thermal Properties of Isopentane and Normal Pentane, 93
- Zaky (A.), Lecithin in Tuberculosis, 572
- Zaremba (S.), Proof of Fundamental Surface Functions, 214
- Zebraw and Zebra Hybrids, Prof. J. C. Ewart on, 588, 589
- Zeeman Effect, Asymmetry of, G. W. Walker, 668
- Zell (Dr. Th.), Polypthem ein Gorilla, 467
- Zero of Temperature, a Possible Method of Attaining the Absolute, Geoffrey Martin, 376
- Zodiacal Light, Photographs of the, 42
- Zones in Chalk, Dr. A. W. Rowe, 355
- Zoogeography: Über die geologische Geschichte der Insel Celebes auf Grund der Thierverbreitung, Dr. Paul Sarasin and Dr. Fritz Sarasin, 203
- Zoology: Zoological Gardens, Additions to, 21, 42, 62, 89, 113, 136, 167, 191, 216, 240, 265, 289, 311, 335, 359, 384, 410, 436, 456, 491, 523, 531, 556, 583, 609, 638, 658; a Treatise on Zoology, Prof. E. Ray Lankester, F.R.S., Part II. the Porifera and Coelentera, E. A. Minchin, G. H. Fowler and G. C. Bourne, 26; Zoological Society, 70, 142, 223, 247; Musk-Ox and Bison at Woburn Abbey, 63; the Age of the Woburn Abbey Musk-Ox, R. Lydekker, F.R.S., 103; the Australian Marsupials, B. A. Bensley, 88; the Wood Bison of Great Slave Lake, Dr. J. A. Allen, 135; New Mammals from Uganda, Oldfield Thomas, 142; Viscera of Cogia Whale, Dr. W. B. Benham, 142; the Anatomy of the Cat, Jacob Reighard and H. S. Jennings, 155; the Okapi, 188, 309; Prof. E. R. Lankester, F.R.S., 188, 247; the Hair of the Patagonian Ground-Sloth, Dr. W. G. Ridewood, 190; Instances of Commensalism, Major Alcock, 190; Anatomy of Slugs from North-West Borneo, W. E. Collinge, 199; the Rhinoceros, Oldfield Thomas, F.R.S., 223; Antlers of Central Borneo Deer, Oldfield Thomas, 247; Novitates Zoologicae, a Journal of Zoology in connection with the Tring Museum, 249; an instance of Adaptation among the Deer, R. Lydekker, F.R.S., 257; Hair in Equidae, F. H. A. Marshall, 271; Death of Baron H. de Lacaze Duthiers, 308; Obituary Notice of, 380; *Ovis fannini*, W. T. Hornaday, 310; the Origin and Habits of the Bactrian Camel, 355; Pearl and Pearl-shell Fisheries, Prof. W. C. McIntosh, F.R.S., 376; the Food of the Senegal Galago, M. O. Hill, 376; Fauna of North-East Rhodesia, C. P. Chesnaye, 383; Studies on the *Hexactinellida*, Isao Iijima, Prof. E. A. Minchin, 393; the Cambridge Natural History, vol. viii. Amphibia and Reptiles, Hans Gadow, G. A. Boulenger, F.R.S., 401; the International Zoological Congress, 405; Tierleben der Tiefsee, Oswald Seeliger, 423; Three New Species of Peripatus, R. Evans, 490; the "Crystalline Style" of the Bivalve Molluscs, S. B. Mitra, 490; Animal Life: a First Book of Zoology, President D. Starr Jordan and Prof. V. L. Kellogg, 525; Zoology of the Twentieth Century, Address at American Association for Advancement of Science, at Denver, Prof. C. B. Davenport, 566; Death and Obituary Notice of Martin F. Woodward, 578; the Origin and Birthplace of the Proboscidea, Dr. C. W. Andrews, 582



NATURE

A WEEKLY ILLUSTRATED JOURNAL OF SCIENCE.

"To the solid ground

Of Nature trusts the mind which builds for aye."—WORDSWORTH.

THURSDAY, MAY 2, 1901.

THE PHYSICIAN AS PHYSIOLOGIST.

A Contribution to the Study of the Blood and Blood-pressure. By George Oliver, M.D. London, F.R.C.P. Pp. xii+276. (London: H. K. Lewis, 1901.) Price 7s. 6d.

IT is to be feared that most medical men who are engaged in the active practice of their profession have little idea of making a practical application of the knowledge of physiology which they were at so great pains to acquire during the student period of their career. There are, however, many exceptions, and prominent amongst them the author of the little work which it is our present purpose to notice. Dr. George Oliver is fortunate in that his sphere of practice has given him leisure during several months in each year to study at length such physiological problems as have appeared to him to bear more directly upon the affections which he has been mainly called upon to treat, and the result of his studies has been a not immaterial addition to our knowledge of the physiology of the circulation and of the blood. Such addition has been obtained largely by the devising of methods which have more immediate applicability to the human subject than those which are in common use in the physiological laboratory. Not that Dr. Oliver has neglected the more strictly scientific study of physiological questions; as is evidenced by his well-known investigations into the functions of the ductless glands. But in the book before us the methods which are described are solely those which, whilst maintaining a high standard of scientific value, have a direct clinical application, and the observations which are given are the results of such application in the normal and occasionally in the abnormal subject, extending over a period of some ten years.

The first method which is described is that for determining the amount of colouring matter (hæmoglobin) in a sample of blood. For this purpose two chief procedures have come into use clinically. The principle of the one is that of taking a standard solution of hæmoglobin of

known dilution and diluting the sample of blood to be tested until its tint is similar to that of the standard (method of Hoppe-Seyler, modified by Gowers by the use of a picrocarmin gelatin, standardised to a known strength of hæmoglobin solution). The other proceeds on the principle of diluting the sample of blood to a constant extent and comparing it with glass tinted to resemble solutions of hæmoglobin of known degrees of dilution (method of Fleischl). In practice this method is the more simple and accurate, and has been adopted by Dr. Oliver, who has, however, for adequate reasons discarded the use of a coloured glass wedge which is the characteristic of Fleischl's hæmometer, and has adopted, instead, a series of coloured glass discs which represent gradations (percentages) in the amount of hæmoglobin of blood as compared with the normal. One of the most important reasons for this modification of the method is of great scientific interest; for it was found by Dr. Oliver, when making observations with Lovibond's tintometer on the mixture of colours required to reproduce exactly the tint of solutions of hæmoglobin of different strengths, that it is not possible to take a glass of a tint the same as that of a fairly strong solution of hæmoglobin and, merely by decreasing its thickness, to imitate the colour of a very weak solution, but that it is necessary, also, to alter the tone of colour with the change in strength of the solution, *e.g.* for comparison with weaker solutions of hæmoglobin it is necessary to add more yellow to the tint of the glass standards which are used for comparison with stronger solutions. The second method described is one for rapidly computing the number of coloured corpuscles in a given sample of blood. The older method depends upon the actual counting of the number in a measured quantity of blood diluted to a known amount with an isotonic solution of salts; indeed, all methods of computation must be standardised by this one. But such computation is laborious and takes some 15 minutes at the very least, whereas by the procedure devised by Dr. Oliver a satisfactory result can be obtained in less than 5 minutes. The method takes advantage of the fact that the coloured corpuscles of the blood impart opacity to any fluid in which they are suspended in sufficient number, and with normal blood taken as the standard a less or greater

percentage of corpuscles than the normal can be at once arrived at with considerable accuracy by determining at what dilution the flame of a candle can be seen through the mixture. By the employment of this method Dr. Oliver has made many determinations of the percentage (as compared with normal) of corpuscles in blood taken under different conditions both in health and disease, the chief of these varying conditions being those relating to time of day, rest and exercise, digestion, temperature and altitude. It is known that the number of red corpuscles per cubic millimetre may rise from 4,500,000 at sea-level to 7,000,000 or 8,000,000 at elevations of from 6000 to 14,000 feet above sea-level. This has been determined by Viault on the Cordilleras and by Egger and others on the Alps, and is confirmed by the author, who finds that the increase is apparent within 24 hours and attains its maximum within the first week. It is, however, not as great as had been supposed; part of the former results depending upon an inaccuracy (at low barometric pressures) in the instrument usually employed for enumeration, an inaccuracy not shared by the cytometer employed in these investigations. The description of these two methods and their results occupies nearly one half of the book, the other half being taken up by a description of methods for investigating the condition of the blood-vessels.

Of these the first is one for determining the average blood-pressure in the arteries. It is based upon the ascertained fact that any instrument which is used to observe the arterial pulse by external application gives the largest indications of pressure variations when the force with which it is itself pressing upon the artery is equivalent to the average blood-pressure within the vessel. This principle has already been employed for gauging the blood-pressure in man by Mosso and others, but the instrument which has been contrived by Dr. Oliver for the purpose, and which he called a "hæmodynamometer," is both more sensitive and more easy of application than most others which have been devised, the pressure being applied to a spring through an india-rubber bag or pad filled with fluid, and the indications being directly read off upon a dial (as in Hill and Barnard's original sphygmoscope). An even more ingenious instrument is the "arteriometer," which directly and with great accuracy measures the calibre of an artery, such as the radial, through all the tissues which cover it. Dr. Oliver has, with the aid of these instruments, recorded a very large number of observations upon the effects upon blood-pressure and upon the arteries of varying physiological conditions such as posture, exercise, emotions, rest and sleep, fatigue, food and digestion, temperature and climate; for the details of these and for many other observations on the effects upon the circulatory system of baths, massage and various other forms of treatment the interested reader is referred to the account which the author has himself given. The book furnishes an excellent illustration of what can be done by the scientific physician for the advancement of physiological knowledge, and its perusal will repay, not only the clinician for whom it is primarily intended, but also the physiologist who desires to compare the results which he obtains by experiments upon animals with those which can be obtained by experiments upon man.

E. A. S.

A GERMAN NATURALIST IN THE WEST INDIES AND AMERICA.

Von den Antillen zum Fernen Westen; Reiseskizzen eines Naturforschers. By F. Doflein. Pp. iv + 180. Illustrated. (Jena: G. Fischer, 1900.) Price M. 6.50.

WHILE containing little or nothing in the way of absolute novelty, this narrative of the travels of a German naturalist in the West Indies, Mexico, California, and the far North-West of America is a pleasantly written and charmingly illustrated volume which can scarcely fail to interest and attract a large number of his fellow-countrymen. According to the author, German travellers but seldom visit the countries through which he passed, so that the greater part of what he has to tell will be new to the majority of his readers. With the exception of two, the originals of the photographic illustrations, which add so much to the attractiveness of the volume, were taken by the author himself; and the exquisite manner in which these photographs have been reproduced reflects the highest credit on the firm to whom the task was entrusted.

The first part of the book, which is divided into seven chapters, is devoted to the West Indies, where Martinique was the first island visited. Here the author was much interested in the botanical gardens, where he was struck by the richness of the vegetation, and especially by the luxuriance of the lianas. Several charming views in the island are given.

The author's next point was Barbadoes, where he left the great ocean steamer to take passage in a smaller vessel for a cruise among the lovely isles of the Lesser Antilles group. After devoting several chapters to his experiences among these, the narrator discusses in the sixth the racial problems presented by the West Indies, illustrating a few characteristic types. In Chapter vii. he treats of the fauna of the Lesser Antilles, dwelling on the close connection existing between the animals of that group and those of Venezuela, Colombia and Central America, and giving good pictures of a few of the more remarkable forms, among them the dreaded *fer-de-lance* snake. A section of this chapter describes in some detail the coast fauna of Martinique, a striking feature of this part being the photograph of a tropic-bird in flight.

The remaining nine chapters, forming the second half of the volume, describe the continental portion of the author's tour, and are at least as full of interest as their predecessors. In the first of these chapters (viii.) we have an instructive sketch of the ancient buildings and weapons of Mexico, which the author calls the Pompeii of America. In addition to a view of the celebrated temple of the sun and photographs of stone weapons, the author gives a plate of human and animal clay masks collected by himself at Teotihuacan. In Chapter ix. we have a description of a traverse of the great desert tract of Mexico, illustrated by an excellent photograph of giant cactuses; while, in striking contrast to this, the reader, in Chapter x., is introduced to the glories of a summer's day in California. Following the latter is a description of a Chinese settlement in the same country, where the photograph of "Chinatown" will not fail to impress the reader with the importance assumed by the Mongolian

element in this part of America. Nor is zoology by any means neglected, Chapter xii. being devoted to an account of the Californian marine fauna, illustrated with a photograph of one of the remarkable Pacific hag-fishes of the genus *Bdellostoma*, and a second of the Californian medusa-starfish. Lovers of forest scenery will be enchanted with the beautiful photograph of a Sequoia-forest in California, which forms the most striking feature in the thirteenth chapter; this chapter dealing, not only with the primeval forests of the district, but likewise with the timber-felling industry.

In his concluding chapter, Dr. Doflein presents his readers with a capital account of the Yellowstone Park and its animal wonders, illustrating his description with an excellent photograph of a family party of black bears in their native wilds. The photograph of bisons is, however, by no means so successful as it might be, being, for one thing, on much too small a scale. Still more unsatisfactory is the one on page 175 lettered "Die Amerikanische Gemse (Weibchen)," which is intended to portray the female of the profig buck. If we are not mistaken, the animal in the foreground is a wapiti hind, while the one in the middle distance might be anything.

To any English reader desirous of keeping up his German by the perusal of a pleasantly written narrative of travel, Dr. Doflein's work may be commended; to his own countrymen it will commend itself. R. L.

A BIBLICAL ENCYCLOPÆDIA.

Encyclopaedia Biblica, Critical Dictionary of the Literary, Political and Religious History, the Archaeology, Geography and Natural History of the Bible. Edited by Prof. T. K. Cheyne and Dr. J. Sutherland Black. Vol. ii. E—K. (A. and C. Black, 1901.) Price 20s. net.

A WORK like this demands a critic whose forte is omniscience, for the articles are written by men who can speak as authorities, and necessarily enter into questions of theology, a province of human thought with which science is only indirectly concerned. This alone makes it difficult to give any notice of the book in a publication strictly scientific. To read through a volume of 1544 closely printed columns of small type would be a herculean task which we do not pretend to have attempted. We have not perused more than a few of the salient articles in the present volume, which, as it contains the letters from E to K, happens to include a large number of exceptional interest. If we remember that even the letter J covers names such as James, Jasher, Jeremiah, Jerusalem, Jesus, Job, John, Jordan, Joshua, Joseph, Judah and Judges we realise the significance of many articles. These seem to be summaries of everything important that has been written on the subject. Indeed, sometimes the variety is a little bewildering to the ordinary reader, who, however, cannot complain of a stinted choice, though the writers generally favour views distinctly progressive. One or two slips, notwithstanding the care with which, obviously, the work has been done, have caught our eye, such as the statement that the vicinity of Jerusalem consists of strata of the Eocene and *Chalk* formations—where Cretaceous should have been written, as the limestone is not the

variety designated chalk; or the obvious clerical error that Esdraelon lies 250 feet *below* the sea-level, which would make it difficult for the river Kishon to reach the Mediterranean. But the topographical articles, which of course have to be largely dealt with from the historical point of view, are generally excellent. For instance, the article "Geography" gives a most interesting account of what was known about that subject by the Old Testament writers. Formerly, no doubt, when the relations of theology and science were ill-understood, questions of Hebrew cosmogony and ethnology were more important than they now are; still there is an antiquarian interest, when the date of a document can be approximately determined, to see how much or how little the Hebrews had ascertained about the rest of the world. Evidently the knowledge of the Old Testament writers hardly extended eastward beyond Persia, or northward so far as the Caucasus, or southward beyond Ethiopia on the African continent, or westward of Greece, excepting Tartessus in Spain or possibly either Sicily or Carthage. If they had any notions of regions lying beyond those limits, such as India or China, these must have been of the vaguest, unless we locate Ophir in Mashonaland, to which identification, however, as we infer from the article on gold, the editor does not incline. The books of the Old Testament cover a long time, and knowledge grew; but we may safely assume that the writer of the ethnographical notices in Genesis x., whatever be their date, either did not know of, or deliberately excluded, the Black and the Yellow races. Probably, indeed, until about the tenth century before our era, the Hebrews had only a very limited knowledge of geography. The article on Egypt is full of information and has been brought down as nearly as possible to date. It is accompanied by three very useful little maps; one, a physical map of the Nile valley, north of Khartoum, another, on a smaller scale, of the Nile and the Euphrates, and a third showing the broader features of the geology. This brings out very clearly the close connection between the Sinaitic peninsula and the mountain region between the river and the Red Sea, and contains much information in a very small space.

A comparison of the historical part of this article with that in Smith's "Dictionary of the Bible," published in 1860, indicates, better than anything, how enormously our knowledge has been increased during recent years. The same is true in regard to the articles on the topography of Jerusalem. No doubt the one in the older work was below the general level, for the editor, owing to some strange infatuation, had accepted as established facts the absurd fancies of the late Mr. James Fergusson. These are properly ignored in the work before us, which treats this difficult and thorny subject in a fair and scholarly fashion. The author may sometimes incline to one view, the reader to another, but evidence is not perverted as it was in the older work. Personally, for instance, we do not believe the Ophel Hill to have been the site of the City of David. The passages supposed to be favourable to this identification are not, in our opinion, of much weight, and the distance of Jebus from any known spring is a difficulty which attaches to many hill forts. Some in our own country could not have endured a close siege for a few days without storage of water, and cisterns were familiar things at Jerusalem.

The western hill, like another Gergovia, is a natural site for a hill fort, while the descending ridge of Ophel, so far as we can infer from our studies of such structures, is exactly the position which their builders would have avoided. Such articles as "Gospels" and "Jesus" introduce us to questions of a character and a theological import which we must not discuss in these columns. Suffice it to say that, while indicating a certain amount of reaction from the extreme vagaries of representatives of the so-called "higher criticism," they express, as a rule, eminently "progressive" views. Some, indeed, are so very advanced that they could not, so far as we can see, be covered by the most liberal interpretation of the Nicene creed. Persons, however, who view with anxiety these removals of ancient landmarks may comfort themselves by observing how many idols of the cave have been set up by one confident discoverer only to be trampled under foot by the next comer. Indeed, on reading some of these efforts of the higher criticism we cannot help being reminded of the famous Historic Doubts, and think that by using similar methods we could prove William the Conqueror to be a person almost mythical and the Battle of Hastings mainly a legend. T. G. B.

OUR BOOK SHELF.

- Plato's Staat.* F. Schleiermacher. Zweite Auflage. C. Th. Siebert. (1901.) Mk. 3.
John Locke's Versuch über den Menschlichen Verstand. Zweiter Band. Zweite Auflage. C. Th. Siebert. (1901.) Mk. 3.
Berkeley's Abhandlung über die Prinzipien der Menschlichen Erkenntnis. Dr. F. Ueberweg. Dritte Auflage. (1900.) Mk. 2.
Berkeley's Drei Dialoge zwischen Hylas und Philonous. Dr. R. Richter. (Leipzig: Dürrschen Buchhandlung, 1901.) Mk. 2.

THERE is in Germany a widespread appetite for metaphysics. Earlier there than elsewhere scholars and philosophers of an order not far removed from the highest came to recognise that work bestowed on the translation and elucidation of foreign masterpieces in philosophy was the best of trainings in exact thinking and expression. The zeal of von Kirchmann for his educational ideal was untiring, and his industry was appalling. In the result, the *Philosophische Bibliothek* has succeeded in combining low cost and high achievement. It is the more to be regretted that its volumes so often come to pieces in the hand.

Schleiermacher's translation of "Plato's Republic," with von Kirchmann's sporadic notes, "needs no bush." It will not, of course, be much used in England after the labours of Davies and Vaughan and Dr. Bosanquet. It has undergone some revision, but still scorns Greek accents, while its use of breathings is haphazard. Similarly, von Kirchmann's translation of "Locke's Essay" has undergone revision before reissue. Something of the effect of Locke's style vanishes in the translation, but the substance is there. It is only the separate volume of notes which is likely to interest the English public, and that not greatly. Ueberweg's excellent version of the masterwork of Berkeley's earlier idealism has passed into a third edition, advisedly without revision. Its incisive notes possess some value even for those who have studied their Berkeley with the aids supplied by Prof. Campbell Fraser. It has a worthy successor in Dr. Raoul Richter's translation of "Berkeley's Three Dialogues between Hylas and Philonous." If we have not been singularly unfortunate—or fortunate—in

our sampling, Dr. Richter has succeeded as well as the translator of Berkeley could hope to succeed. He adds a straightforward introduction and some luminous notes chiefly on the usage of technical terms. The new series is, to our thinking, superior in form, printing and, above all, in stitching, to the old. The student, for whom the reading of Kant or Hegel in the original is only a hope of the distant future, might be worse advised than to take Dr. Richter's version of the dialogues and ground himself in German philosophical terminology by reading it along with the brilliant original. An English translation of a German "minor masterpiece" at once as excellent as this and as cheap is still to seek.

H. W. B.

The Fishes of North and Middle America; a Descriptive Catalogue of the Species of Fish-like Vertebrates, found in the Waters of North America, North of the Isthmus of Panama. By David Starr Jordan and Barton Warren Evermann. Part iv. Pp. ci + 3137-3313; plates I-CCCXCII. (Washington: U. S. National Museum, 1900.)

THE present part concludes this important work, of which we have given a full notice in vol. lxi of NATURE, p. 362. It commences with a systematic arrangement of the fishes described, which serves not only as a table of contents for all the four parts, but also as an exhibition of the views of the authors as to the genetic relations of American fishes. From it it will be seen that the fish-fauna of North and Middle America, as now understood and as stated by the authors, embraces 3 classes, 30 orders, 225 families, 1113 genera, 325 subgenera, 3263 species and 133 subspecies. "Additional Addenda" follow and occupy some 60 pages; they comprise a number of new genera and species described since the publication of part iii., the majority being the result of investigations made by Dr. Jordan in Mexico, and by Dr. Evermann in Porto Rico. Other additions or corrections regarding nomenclature, relations and distribution of previously known species, are duly attended to.

The bulk of the volume is devoted to the illustrations. In this series are represented about 958 types of fishes, thus, so far as numbers are concerned, surpassing even Cuvier and Valenciennes' "Histoire naturelle des Poissons," in which only about 700 species are figured. With few exceptions, the figures are original, and were drawn for the present work from specimens preserved in American collections, and by means of photography reproduced to a uniform size, the width of an octavo page. As the work has been published by the Smithsonian Institution with the view of bringing it within the reach of the people, no highly artistic and, therefore, expensive finish of the illustrations has been attempted; but they have not lost in accuracy thereby, and will fully answer the purpose of assisting the student of ichthyology in his initial studies, or the layman who seeks for occasional information. They show well the general appearance of the fish, the structure of fins and the arrangement of scales; but scarcely any additional details are given to illustrate the characters on which the numerous genera and species distinguished or adopted by the authors are based.

The illustrations are preceded by an explanatory list, in which the names of the artists, the numbers of the original specimens in the United States National Museum, or other sources whence the drawings were derived, are carefully noted. In fact, no pains have been spared by the authors to render their work instructive and handy for reference and ready use.

Already in our first notice we have testified to the high merits of the work; it renders the rich American fish-fauna more accessible than ever before to scientific ichthyologists throughout the world, and cannot fail to give a powerful impetus to the study of fishes in the authors' own country. A. G.

Die wissenschaftlichen Grundlagen der analytischen Chemie elementar dargestellt. Von W. Ostwald. Dritte Auflage. Pp. xi+221. (Leipzig: Engelmann, 1901.) Price M. 7.

THE services that Prof. Ostwald has rendered to physical science during the last quarter of a century are so numerous and so valuable that his writings cannot fail to exert considerable influence. In working out and extending the theories of van't Hoff and Arrhenius he played a leading part in laying the foundations of physical chemistry; and in applying these principles to the consideration of the problems of analytical chemistry, he has effected a complete revolution in the methods of approaching that subject. In 1894 he published the first edition of the "Wissenschaftliche Grundlagen," and thus furnished us with scientific explanations of much that up till that time had been little more than mere empiricism; analytical processes were interpreted by him in the light of the theory of solutions and the ionic hypothesis, and thus new life was infused into a branch of science that had become almost moribund.

It is gratifying to think that Prof. Ostwald's efforts have been appreciated; and the fact that a third edition of this striking work has been called for is sufficient evidence of its success. The new ideas are beginning to take a firm root, and are already finding their way into the latest text-books on the subject.

It is to be hoped that teachers of practical chemistry will study the pages of this last edition of the "Grundlagen der analytischen Chemie," and arrange their methods of instruction on the new lines it suggests. With this end in view Prof. Ostwald has added a chapter containing descriptions of a number of experiments illustrating some of the more important principles on which analytical chemistry is based.

In conclusion, we would draw attention to the closing words in which the author advocates the use of as simple apparatus as possible, that the attention of the student may be concentrated on the chief features of the experiment. Coming from so brilliant an experimenter and so popular a teacher, the advice is worthy of special emphasis.

An Introduction to Modern Scientific Chemistry. By Dr. Lassar-Cohn. Translated by M. M. Pattison Muir, M.A. Pp. viii + 348. (London: H. Grevel and Co.)

THE German original of this book has already been noticed in these columns (vol. lxi. p. 51, 1899). It has been translated into smooth English by Mr. Pattison Muir, and it may be cordially recommended as a clear exposition of the leading facts and principles of chemistry, well adapted to the class of readers for whom it was written, namely, University extension students and general readers. It must be borne in mind that the book is not intended for those who are able to study chemistry with their own hands. The fifty-eight illustrations in the book are its worst feature, but they are by the author, and no doubt the translator had no choice but to reproduce them.

A. S.

First Aid to the Injured. By H. Drinkwater. Pp. 104. (London: J. M. Dent and Co.; no date.) Price, 1s. net.

THE number and excellency of the illustrations are special features of this little book, and increase its interest and clearness, doing away also with the need of lengthy explanations. The proportion between the theoretical and practical parts is well maintained. The anatomical details are not by any means unduly prominent, but are only introduced in so far as they are necessary to enable the practical directions to be intelligently followed. The book can be strongly recommended as a clear and trustworthy instruction in "first aid."

NO. 1644, VOL. 64]

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Solution of Cubic and Biquadratic Equations.

THE historical note in your last number by Sig. Vacca regarding the graphical solution of a cubic, given by Mr. T. Hayashi, reminds me that I had intended, when Mr. G. B. Matthews published his suggestion for the graphical solution of a biquadratic by means of two parabolas (NATURE, Nov. 16, 1899), to point out that he too had been anticipated, as will be seen by referring to a paper by Mr. R. E. Allardice in the *Proceedings* of the Edinburgh Mathematical Society (April 7, 1890), where it is shown that, with the exception of the case where the roots of the biquadratic are equal in pairs, the real roots of the general biquadratic can be found graphically by means of two equal parabolas having their axes at right angles, the one fixed and the other movable; and also that every cubic can be reduced to the form $y^3 \pm y + r = 0$; and then solved graphically by means of the fixed curve $y = x^3$ and the movable straight line $x \pm y = r$.

I may take this opportunity of calling the attention of elementary teachers to the fact, also dwelt upon in Mr. Allardice's paper, that the most convenient method of discussing the algebraic solution of the general biquadratic, and of testing whether any particular biquadratic is soluble by means of quadratics or not, depends on the familiar theorem that $ax^2 + 2hxy + by^2 + 2gx + 2fy + c$ is decomposable into linear factors if $abc + 2fgh - af^2 - bg^2 - ch^2 = 0$, and not unless. Along with the biquadratic $x^4 + px^3 + qx^2 + rx + s = 0$ (1) consider the equation $x^2 - y = 0$ (2). By interequational transformation it is obvious that the system (1), (2) is equivalent to the system composed of (2) and $q^2x^2 + p^2xy + y^2 + rx + s = 0$ (3). Again, the system (2), (3) is equivalent to the system composed of (2) and $(q - \lambda)x^2 + p\lambda xy + y^2 + rx + \lambda y + s = 0$ (4), where λ is a constant at our disposal. If λ be so chosen that the left hand side of (4) breaks up into linear factors; that is, if λ be a root of the cubic

$$\lambda^3 - q\lambda^2 + (pr - 4s)\lambda + 4qs - r^2 - p^2s = 0 \quad (5)$$

then the system (2), (4) will be equivalent to two systems $y + \mu x + \nu = 0$, $y = x^2$, and $y + \rho x + \sigma = 0$, $y = x^2$. In other words, the four roots of (1) are the roots of the two quadratics $x^2 + \mu x + \nu = 0$, $x^2 + \rho x + \sigma = 0$.

The cubic (5) is not in general soluble by means of quadratics without the adjunction of a cube root: hence the solution of a biquadratic in general depends on the solution of a cubic and two quadratics.

The necessary and sufficient condition that the cubic be soluble by means of quadratics is that it have a commensurable root, which, if it exist, can be readily found by finding an integral root of another cubic of the form $x^3 + ax^2 + bx + c$, where a, b, c are all integral. The determination of μ, ν, ρ, σ then requires, in addition to rational operations with p, q, r, s, λ , merely the extraction of a square root.

To the tyro who is familiar with the elements of the coordinate geometry of the conic sections the rationale of the above process can be made evident by the consideration of the two line-pairs which contain the four points of intersection of two conics. It may be noted that, instead of the parabola $y = x^2$, we may use the rectangular hyperbola $xy = 1$, the only difference being that we are led to a different cubic resolvent.

Considering the space usually given in English text-books of algebra to the discussion of equations which are soluble by means of quadratics, it is strange that few, if any, of their authors emphasise the fundamental fact that the reduction of a biquadratic which is soluble by means of quadratics can be effected by finding the rational root of a cubic equation. I fear that I too must plead guilty to this omission, which among other things I propose to make good in the next edition of vol. i. of my "Algebra."

G. CHRYSAL.

Edinburgh, April 26.

Electro-Chemistry.

ALLOW me to point out an omission unnoticed by your reviewer of Mr. Bertram Blount's book on practical electro-chemistry (p. 582). Mr. Blount refers to the electrolysis of gold ore as a failure (Haycraft's method).

The omission is probably due to the fact that the process in question (Riecken's) has not been worked on a large scale except during the last three or four months, though the patent is three years old. Its efficacy depends essentially on securing a clean mercury kathode in the form of a thin stream of mercury flowing over a nearly vertical copper plate.

The liquid containing the pulverised ore is a continually agitated solution of cyanide and the anode is of iron, as the electro-motive force, one and a half volts, liberates nothing more corrosive than cyanogen. The particles of gold are doubtless cleansed of the obstructing sulphide and tellurous films by the convection currents of ionised cyanogen and also, in a more direct way, by the current as it passes through each particle, making in effect one side of it a kathode and the other an anode, just as is seen if we suspend a piece of metal in an electrolyte between the electrodes and unconnected with either.

This simple invention may revolutionise the treatment of refractory ores, yet apparently the inventor could get no hearing for three years till, at his own cost, he erected apparatus on a working scale in West Australia. The facts are valuable as showing how great an interval separates German intelligence from British engineering practice.

Intelligence of any kind, foreign or native, must indeed have been wanting when huge works, regardless of cost, were erected in presence of the published electrolytic method which could have been effectually tested in a single vat.

JOHN HILL TWIGG.

IF, as your correspondent, Mr. Twigg, says, Riecken's electrolytic process has only been worked on a large scale during the last three or four months, it is not unnatural that Mr. Blount has omitted to describe it. In most cases Mr. Blount has endeavoured to describe processes which are of proved utility, and therefore it was hardly necessary to draw attention to the omission. Further, the number of patents on the subject of electrolytic gold refining is very large, so that it would be manifestly impossible to describe them all. Riecken's process is a very neat one, and should any of the readers of NATURE be interested in the subject, an excellent description is to be found in the "Jahrbuch der Electrochemie" (vol. v. p. 380).

F. MOLLWO PERKIN.

Unusual Agitation of the Sea.

ON Wednesday, April 24, on going to the edge of the cliff above Alum Chine, Bournemouth, at 7.50 a.m., I was struck by the appearance of a succession of waves, resembling a slight ground swell, reaching the shore from an otherwise calm sea, there being no wind. The character of the waves was rather peculiar, and I then saw that every now and then, at intervals of about two or three minutes, much larger waves came in, and instead of breaking abruptly, extended quietly up the sandy beach to a greater height than was expected from their apparent elevation. I mentioned the phenomenon on reaching the house, and on the suggestion that the waves were the result of a distant storm, could not see that they might be so accounted for. Between 12 and 1 p.m. I again watched the undulations, and roughly measured the length on the beach by which the larger waves extended further than those of ordinary size. This was about 22 feet. The larger waves were less frequent than in the morning. Later in the afternoon, soon after 3 o'clock, some of my family were caught by the exceptionally large undulations, which rose surprisingly high upon the slightly sloping sand.

I have not heard whether any remarkable disturbance has been recorded by the seismometer, but I see in the *Daily Mail* and *Daily Express* of April 25 and 26 telegraphic reports of earthquakes in Italy, Portugal and Guernsey on April 24.

ROLLO RUSSELL.

RECENT DEVELOPMENTS IN ELECTRIC SIGNALLING.

IT is thirteen years since Hertz carried out the brilliant series of experiments which, apart from their great theoretical value, had the important effect of laying the foundation of modern systems of wireless telegraphy. Three years later we find the *Electrician* making the suggestion that the discoveries of Hertz

might be utilised for signalling to lightships, and five years later still, in 1896, Signor Marconi brought over to England the first practical wireless telegraphic apparatus and awakened public interest by the remarkably successful experiments which he carried out on Salisbury Plain and across the Bristol Channel. For a time the technical and lay Press was full of wireless telegraphy; great prospects were predicted for it; communication with lightships and lighthouses was the least of the feats it would accomplish; telegraphy at sea was to become as common as on land; some even went so far as to say that wires and cables of all sorts for telegraphic purposes were to become a thing of the past. But these revolutionary changes, if they are ever to be made, did not come with the rapidity which many apparently expected. It was soon recognised that we needed to know a great deal more about the subject before Hertz waves were to be even a trustworthy servant to the telegraphist, and even now we can scarcely call wireless telegraphy much more than experiment. But we have now more definite grounds for feeling sure of its ultimate success, and we can predict for it a useful future with much more surety and reason than was done in the first outburst of enthusiasm that followed Mr. Marconi's experiments.

The patient and persevering experimenting of the past five years has led to the gradual surmounting of many of the difficulties which at first beset wireless telegraphy, and Mr. Marconi, Prof. Slaby and the other pioneers who have thrown themselves with vigour into its development have met with a success which, if not complete, is yet very promising. It is not the greatly increased distance over which it has become possible to signal, an increase from a few miles in 1896 to more than 200 in 1901, that marks the most important development that has occurred. The greatest achievement is the successful solution of the problem of tuning. It was early seen that before wireless telegraphy could have at all an extended utility it would be necessary to find some means of confining each message to its correct destination and of preventing each receiving apparatus from responding to Hertz waves sent out from any transmitter in its neighbourhood. It seems that now almost all experimenters have overcome this difficulty, at any rate to a certain extent.

The improvement in distance over which it is possible to signal has been very marked. The empirical law put forward by Mr. Marconi that, other things being equal, the distance over which signalling would be possible was proportional to the product of the heights of the masts at the two ends seems to be fairly well established as a working rule. But the improvements in transmitting and receiving apparatus have been so great that it is now possible to signal over much greater distances with the same heights of masts than was the case in 1898. For example, in 1898 Mr. Marconi was only able to cover 15 miles with vertical wires 120 ft. high, whereas to-day, according to the recent announcement made by Prof. Fleming, a distance of 200 miles from the Lizard to St. Catherine's, Isle of Wight, has been signalled over with masts only 160 ft. high. Mr. Marconi certainly holds the record for long distance work. The example just quoted refers to signalling across sea; across land such great distances have not been attained, but here again we think the credit of having signalled over the greatest distance must be given to Mr. Marconi, who established in 1899 communication between Dovercourt and Chelmsford, a distance of more than 40 miles.

These long distances have been attained by Mr. Marconi partly by the use of a specially constructed transformer in the receiving circuit. Instead of connecting the vertical receiving wire in series with the coherer it is connected in series with the primary of this transformer, the secondary of which is in series with a condenser and the coherer. By this means the voltage of

the received oscillations is increased, and the resistance of the coherer more easily broken down. A somewhat analogous arrangement is used by Prof. Braun, to whose work allusion has already been made in NATURE,¹ in the transmitting circuit, the oscillations in the vertical wire being set up by induction and not by directly including the spark gap between the vertical wire and earth. The results that have been obtained by Prof. Braun are not, however, nearly so good as Mr. Marconi's latest work.

So far as tuning is concerned, Mr. Marconi appears to have successfully got over this difficulty. Prof. Fleming, in the lecture above referred to, stated that the communication between the Lizard and St. Catherine's was multiplex, it being possible to receive two or more messages at once at each place. Mr. Marconi himself, in an interview with an American contemporary, said that with his improved apparatus he could send or receive 2, 10 or 50 messages at the same time, without any interference whatever. Particulars as to the method have not, however, been published as yet, but it is to be hoped that the details of the system will be explained by Mr. Marconi at his forthcoming lecture at the Society of Arts.

In Germany the subject of wireless telegraphy has been tackled principally by Prof. Slaby and Count Arco, who took up the subject in order to find a system for the German Navy, to replace that of Mr. Marconi, the Marconi Company charging, it was said, prices prohibitive to any but the English Navy. Although the results, so far as distance is concerned, which Prof. Slaby has obtained are not very great, the system that he has developed is one of great interest and seems to be founded on sound scientific principles. Prof. Slaby has aimed throughout at getting rid of interference by producing only oscillations of a definite wave-length and tuning the receiver only to respond to these particular waves. In order to produce the oscillations, the transmitting circuit is arranged as shown in Fig. 1. An earthed loop of wire, ACDE, is used, instead of the single insulated vertical wire usually employed, in one arm of the loop there being a spark gap, AB, and a condenser, K. The ends C and D of the vertical wires are joined by a coil of wire as shown. In charging the condenser the whole loop is used, but in discharging it is only the arm ABC which is utilised, the coil of wire CD preventing the oscillations passing into the remainder of the circuit. Upon the length of the wire KC and the capacity of the condenser K the wave-length of the oscillations depends, and from their known values it can be calculated.

Theoretical considerations showed Prof. Slaby that the free ends of both the transmitting and receiving wires, *i.e.* the ends C and E (Fig. 2), are potential loops, and that the earthed ends B and D are potential nodes. If, now, to the receiving wire DE a second wire, DF, equal in length to CD, is connected, there will be a potential loop at F. At E and F, therefore, the potential will vary over a much greater range than at D. If at F a further length of wire, J, is attached, such that its length is half a wave-length, then there will be established between F and the free end, G, of the coil J a difference of phase of 180°. At both points there will be potential loops, but when the potential F has a maximum value in one direction that at G will have a maximum value in the opposite direction, and the potential difference between F and G will be double that between F and earth. By connecting the coherer between F and G it can thus be made to respond to received oscillations much feebler than those which would be required to work it if it were connected, as is usual, between D and earth. As an additional advantage, the earth connection at D can be removed, and the whole receiving apparatus thus rendered earth free.

Experiments have been made from time to time to

¹ NATURE, 1901, vol. lxxiii. pp. 403 and 474.

devise a suitable repeater for use with wireless telegraphy, and the results of some work which has been done by M. Guarini on this subject were recently published in the *Electrician*.¹ M. Guarini established stations at Brussels, Malines and Antwerp; messages were successfully transmitted between Brussels and Malines and also between Malines and Antwerp, and a repeater was then set up at Malines with the object of automatically transmitting the messages received from Antwerp to Brussels. The experiments were not, however, very successful, as the repeater did not always transmit the signals, and it was found, consequently, impossible to send any actual messages. A trustworthy repeater for wireless telegraphy would be very useful, but it is scarcely necessary to point out that it must be absolutely trustworthy, as if a man has to be on the spot to keep it up to its work he may as well be employed in retransmitting the messages.

In the meantime the wire-using telegraphists have been by no means panic stricken by the achievements of their wireless competitors, and some very notable developments have taken place during the past few years. We can only describe here a few of these; those who are more deeply interested in the subject may be referred to Mr. Gavey's paper on telegraphs and telephones at the Paris Exhibition, read recently before the Institution of Electrical Engineers,² in which will be

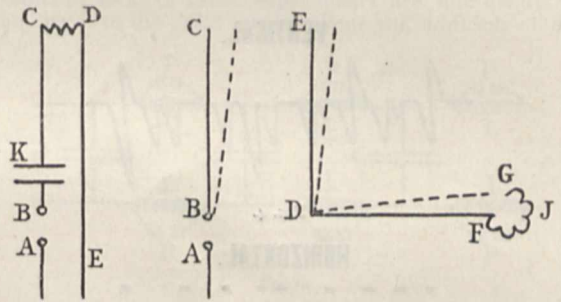


FIG. 1.

FIG. 2.

found descriptions of all the more important improvements effected in the last few years. One of the most remarkable is the Pollak-Virag high-speed telegraphic system. This system attracted considerable attention both in the technical and lay Press when it was first brought forward, towards the end of 1899, on account of the extremely high speed of signalling which it was said to be possible to attain by its use. It was reported that in trials in America a speed of 60,000 words an hour had been maintained over a line which was over 1000 miles in length, and that a speed as high as 100,000 words an hour had been attained. This is a very great improvement on the 400 or 500 words a minute possible with the Wheatstone automatic or Delaney multiplex systems, which are those commonly in use in this country. These remarkable results had been achieved by the use of a telephone diaphragm as the receiving instrument, the diaphragm being deflected by the currents received through the telegraph line and a deflection in one direction corresponding to a dash and in the opposite direction to a dot. The movements of the diaphragm were recorded photographically, a small mirror being attached to the diaphragm and a ray of light being reflected from this on to a revolving drum covered with a roll of sensitised paper. The record had, of course, to be subsequently developed in the ordinary manner.

Since its first introduction the system has undergone considerable development, a very ingenious modification

¹ The *Electrician*, March 22, 1901, vol. xlvi. p. 819.

² *Journal of the Institution of Electrical Engineers*, 1901, vol. xxx. p. 73.

having been introduced by means of which the recorded message is written in ordinary Latin characters and can consequently be read by any one. In order to do this it is necessary to give the mirror on the receiving instrument a horizontal as well as a vertical motion, and for this purpose two circuits are needed and two telephone diaphragms, one giving the mirror vertical movements and the other horizontal. A single metallic loop is employed, one telephone being put in the loop and the other between the loop and earth. Horizontal movements of the mirror, to right and to left, are produced by currents passing round the loop in one direction or the other respectively, and vertical movements by currents passing from the loop to earth; in this second case an upward movement is produced by a current in one direction and a downward movement by a current in the opposite direction, and also a downward movement of double the distance by a current at double the normal voltage.

PERFORATIONS.

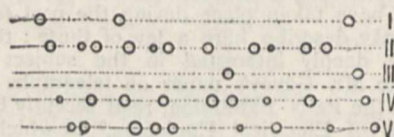


FIG. 3.

VERTICAL.

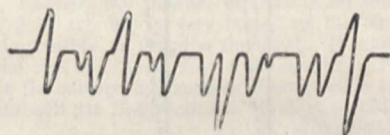


FIG. 4.

HORIZONTAL.



FIG. 5.

RESULTANT

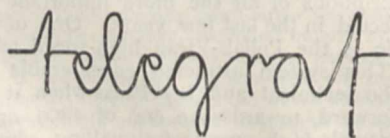


FIG. 6.

The line currents are sent by means of perforated strips of paper much in the same way as in the Wheatstone transmitter, but five strips are used, three to give the vertical components and two for the horizontal. These strips are shown in Fig. 3; the rows marked i, ii and iii give the vertical components, the first row giving the tall letters and the third the deflections of double amplitude for the letters with tails; rows iv and v give the horizontal components. Deflections of a fraction of the normal amplitude are given by contacts lasting a shorter time by means of the small perforations as seen in rows ii, iv and v. The perforations are so arranged that the combination of the vertical and horizontal movements of the mirror (as seen in Figs. 4 and 5 respectively) gives the Latin characters (Fig. 6), and all the perforations for one letter are punched at the same time by means of a special machine of the typewriting kind. To obviate the difficulty of having to use a rapidly moving narrow strip of sensitised paper to receive the photographic record, as in a tape machine, a very neat device is employed. The source of light is the filament of an incandescent lamp,

which is surrounded by an opaque cylinder in which a helical slit is cut. This cylinder is revolved, and as it turns the part of the filament acting as a source of light moves from left to right as the slit uncovers in succession the various portions of the filament; at the same time, the spot of light reflected on to the recording paper, which is a broad band of sensitised paper, will also move from left to right, thus writing a complete line on the paper; at the end of a complete revolution the spot will return again to the left-hand side of the paper band and will proceed to write a new line, this new line being brought under the other by a movement imparted to the band of paper. The message is thus directly obtained as an ordinary written message in lines one below the other, and the system has thus the great advantage over all Morse methods that the message has not got to be deciphered and transcribed by the receiving telegraphist. With this apparatus it is said that a speed of 1000 words a minute can be obtained.

The Pollak-Virag system, although in its most recent form it gives a record in ordinary handwriting characters, must not be confused with those systems designed to transmit the actual handwriting or drawing of the signaller. Several instruments, under the name telautographs, have from time to time been devised for this purpose, and the late Prof. Elisha Gray was, we believe, engaged on the perfecting of an invention of a telautograph at the time of his death. The attempts at solving the problem, which is, it must be confessed, a very fascinating one even though the very extensive utility of such an instrument may be questioned, have not, so far, proved very successful. Last year, however, there appeared in the technical Press descriptions of a telautograph which is the invention of Mr. Foster Ritchie, and which seems to have got over the difficulties in a very practical manner. In the Ritchie telautograph the message is written with an ordinary pencil; by means of levers attached to this pencil its movements are made to regulate the currents sent through the transmitting lines, and these currents in their turn regulate the motion of a pen at the receiving end. By an ingenious arrangement the receiving pen only makes marks on the paper when the transmitting pencil is pressed down on the writing table. The receiving pen exactly reproduces the characters written at the transmitting end, which can be written at the ordinary speed of handwriting. We hope on a later occasion to give a more detailed description of the apparatus.

We may finally describe an invention which has aroused considerable interest amongst our American cousins, namely, Dr. Pupin's system of long distance and oceanic telephony. Dr. Pupin has, we understand, disposed of his American patent rights to the American Telephone and Telegraph Company for a very large sum of money, which shows that this company have great confidence in the invention. The difficulty of carrying out successful telephony over a great length of line arises out of the fact that the line possesses both resistance and capacity; this is especially the case with submarine cables in which the capacity is large. These properties produce both attenuation and distortion of the transmitted signals, the arrival current being both very much weaker and different in character to the current sent into the cable at the transmitting end. The alteration in character is due to the fact that the more rapidly varying currents are more easily attenuated; if a varying current be sent into the cable by speaking into a telephone at the transmitting end this may be analysed, just as the sound to which it corresponds may be analysed, into a fundamental vibration and a number of higher harmonics; the higher harmonics will, after travelling along the cable to a certain distance, become so attenuated that they will be incapable of producing any effect on a receiving telephone, so that such an instrument, if placed at this point, will only

be actuated by the fundamental lower harmonics, and the sound it gives out will, in consequence, be different in character from the sound originally made at the transmitting end. The effect will show itself, therefore, in defective articulation, or distortion of the sounds arising out of the distortion of the telephone currents.

It has been shown by Mr. Oliver Heaviside that there are ways in which this distortion may be prevented and a "distortionless circuit" constructed. Without entering too deeply into the subject we may point out briefly the methods by which this may be effected. Since the cable possesses capacity, the first effect of sending current into it is to charge it, and no signal can be received at the far end until the cable is partly charged, and no further signal until the charge has had time to get out. Now if the insulation resistance of the cable be diminished, the charges will more readily leak out and thus it would be possible to expedite signalling; but at the same time the attenuation is increased, for more of the current will leak out of the cable; the remedy is, therefore, only a partial one, for though the speed of signalling may be increased, so much current will leak out on the way that the amount arriving at the far end may be too small to work the receiving instruments. Instead of simply diminishing the insulation resistance or of distributing artificial non-inductive leaks along the cable, inductive leaks may be placed at definite points along the cable; this method was proposed by Prof. S. P. Thompson in a paper read at the International Congress at Chicago in 1893.¹ A diagram of the cable construction suggested by Prof. Thompson is shown in Fig. 7; the capacity is represented as though it were not evenly distributed but

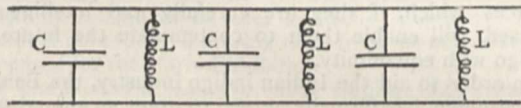


FIG. 7.

consisted of a number of condensers, C, C , connected as shunts to the cable; the inductive leaks are represented by the coils L, L . The capacity and self-induction are therefore combined in parallel, and it is well known that they can be combined in this way so as to behave, for a definite frequency, exactly as an ohmic resistance. The capacity of a submarine cable may be partially neutralised in this way, but the remedy is only a partial one for three reasons. Firstly, the inductive leaks, to correctly neutralise the capacity, should, like the capacity itself, be evenly distributed along the cable and not distributed in jerks; secondly, the correction will only be exact for a particular frequency; lastly, the leakage is increased and the same defect consequently occurs as in the case considered above in which the distortion was corrected by diminishing the insulation resistance. Theoretically, therefore, the system proposed by Prof. Thompson does not offer a perfect solution or give a truly distortionless circuit; but it would greatly diminish the distortion, though at the same time increasing the attenuation, and might therefore give a practical means of increasing the speed of signalling or even obtaining telephonic communication over the cable.

As Mr. Heaviside has shown, the only true way of obtaining a distortionless circuit—of obtaining the distortionless circuit, as he calls it—is to balance the effect of capacity by self-induction distributed along the cable in series with it and not as a leak to it. The four quantities which control the propagation of disturbances or signals along the line are its resistance, R , its external conductance, or conductivity of the insulation, K , its self-induction, L , and its capacity or "permittance," S , and the signals will be propagated without distortion if

$L/R = S/K$. The equality of these two ratios may be obtained by altering any of the four variables, but practically we may consider R and S as fixed. In ordinary cables the value of the ratio L/R is very small, and that of S/K comparatively large. In order to make the two equal we may increase K , that is to say diminish the insulation resistance, but this, as we have seen, leads to excessive leakage and is not, therefore, desirable. The method suggested by Prof. Thompson amounts practically to converting the capacity, S , partly or wholly into insulation conductivity, K , and thus diminishing S/K until it is as small as L/R . The self-induction coils added in this system must not be confounded with the self-induction of the cable L , for they are added as shunts to the cable. The ratio L/R may also be made equal to S/K by adding self-induction coils in series with the cable, thus increasing the value of L ; this is the solution adopted by Dr. Pupin. Here again the ideal solution is only obtained when the self-induction is evenly distributed, but a practical solution can be obtained by placing coils at intervals along the cable.

Dr. Pupin, besides repeating a good deal of Mr. Heaviside's theoretical investigations, worked out the necessary values of the self-induction of the coils and the maximum distance apart at which they can be placed in order to imitate sufficiently well an evenly distributed self-induction. He then proceeded to build some coils and to experiment with them on an artificial cable. The results of some of these experiments are interesting, as they point to the great improvement the addition of the

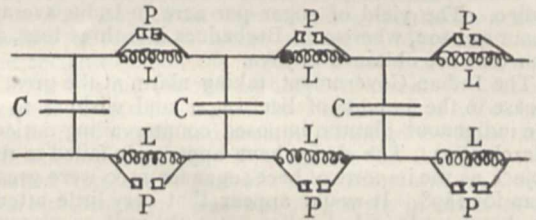


FIG. 8.

inductance produced. An artificial cable was built up with condensers in the usual way in 250 sections, each section representing a mile of cable; between each section were placed induction coils which could be short-circuited by plugs. A diagram of this cable is given in Fig. 8; as before, the capacity is represented as if it consisted of condensers, C, C ; the induction coils are shown at L, L ; these coils are short-circuited by inserting the plugs at the contacts P, P . When all the coils were in circuit telephonic communication could be carried on with perfect ease over the whole length, 250 miles, of the cable; when, however, the coils were short-circuited conversation was good up to 50 miles only, fair up to 75, impracticable at 100 and impossible beyond 112. It must be remembered in considering these results that the cable was an artificial one and that possibilities of error are consequently great, so that the results must not be transferred with too much confidence to the case of an actual cable.

Apart from this, however, the results are extremely good, and Dr. Pupin is to be congratulated on having obtained experimentally a practically distortionless circuit. It is perfectly true, no doubt, that Mr. Heaviside had obtained the solution already theoretically; but the engineers generally require to have their attention attracted by actual experiment and are not too prone to make changes on a theoretical basis only, however sound. Whether a cable can be commercially constructed on the lines of Dr. Pupin's artificial cable is a question for the practitioners; we have no doubt that, now its advantages have been demonstrated, they will be able to find a way. The enormous advantage of Transatlantic telephony can never

¹ See the *Electrician*, August 1893, p. 439.

for a moment be questioned ; it means much more than that we shall be able to telephone to America ; it means that we shall be able to telegraph at the speed of the automatic transmitter. The present speed of Transatlantic telegraphy is something like 20 words a minute, and there are 12 duplexed cables having, therefore, a carrying capacity of about 500 words a minute. A single distortionless cable, built on Dr. Pupin's plan and working with an automatic transmitter, would have, therefore, a carrying capacity equal to that of all the existing cables.

INDIGO AND SUGAR.

THE Behar Sugar Commission, which was appointed in October of last year to see whether improvements might not be made in the cultivation and manufacture of cane sugar, has completed its task. The report has been issued with commendable promptitude—scarcely five months having elapsed from the appointment of the Commission to the presentation of its report. The Commission was primarily appointed because of the perilous position of the indigo industry, to see whether it might not be possible to grow the sugar cane and indigo crops in rotation.

The *Times* of April 15 contains an article upon this report. One thing the Commission seems to have made clear is that the methods employed in the sugar industry have been on the same happy-go-lucky slipshod fashion as those until lately used in the manufacture of natural indigo. The yield of sugar per acre in India averages about one ton, whereas in Barbadoes it is three tons, and four tons are obtained in Java.

The Indian Government, taking alarm at the great increase in the imports of beet sugar and wishing to aid the indigenous planter, imposed countervailing duties in March 1899. The duties have apparently failed in their object, as the imports of beet sugar for 1900 were greater than for 1898. It would appear that very little attempt has been made in India "to treat the soil or plant the canes on scientific principles," and that the methods of refining the sugar are rough, crude and wasteful, so that under such conditions the yield of the finished article is not what it should be, and the quality is poor ; Indian sugar is, therefore, unable to compete with sugar refined by modern scientific methods and appliances.

It is further stated that there is an increasing tendency in India to prefer sugar which has been refined to unrefined sugar. The Commission recommend the employment of modern and up-to-date apparatus. We are glad to note that they do not recommend indiscriminate help to the individual planter or refiner, but suggest that such assistance as is desirable should be given in helping systematic experiments at a central station.

Turning now to the indigo industry, which was the primary cause of the appointment of the Commission, we find that the indigo planter, now thoroughly alive to the danger which threatens him, is exerting himself to improve the yield of indigo. In the first place, by the employment of artificial manures, principally superphosphates, an increased plant production of from 50 to 100 per cent. has been obtained. In manufacturing indigo, it will be remembered (*NATURE*, November 1) that it is usual, when the plant has reached maturity, to cut it near to the ground and to steep the whole plant. After a few months the fresh shoots which have sprung up are again cut, but the yield of indigo from this second crop is inferior to that obtained from the first. It has been suggested, seeing that almost the whole of the colouring matter is contained in the leaves, that the plant should not be cut down, but that the leaves only should be stripped off and steeped. It is calculated that four or five strippings could be obtained during the manufacturing

season, and thus a very much larger quantity of indigo would be produced than by the methods at present in vogue.

The old beating process for oxidising the liquors obtained after the plant has been steeped is gradually being replaced by the use of the "blower." In this method air is blown through a number of perforated pipes which are placed at the bottom of the vats, with the result that oxidation is more rapid and complete, and about 25 to 30 per cent. more colouring matter is produced than by the old process. Mr. Rawson, in addressing a meeting of those interested in the indigo industry at Calcutta on February 20, said that the output of indigo in North Behar last year amounted to about 60,000 maunds,¹ and that at least 12,000 maunds more would have been produced had the new "blowing" process been employed.

A manufacturing industry, such as that of indigo, which is to a large extent dependent upon atmospheric conditions, has naturally seen many dark days. But when the supply has been short there has generally been an enhancement in prices. The Commission is of opinion that a rise of price owing to bad seasons or short supplies can no longer be looked for, and say in their report : "It is reasonable to anticipate that the competition of synthetic indigo will prevent any future increase in the price of vegetable indigo, that it will soonest and most injuriously affect the finest and most expensive indigo, which is that of Behar, and cause a further reduction in price, which would hardly clear the planter in a good season, while a bad season would be ruinous to him." They go on to say, "it is obviously expedient that indigo planters should possess in sugar and other products resources which, if they are carefully and intelligently utilised, will enable them to contemplate the future of indigo with equanimity."

In order to aid the Indian indigo industry, the Bengal Government has formally agreed to grant an annual subsidy of 50,000 rupees for three years for further chemical and scientific researches with regard to indigo cultivation.

Indigo planters claim that at present the natural dye can be placed on the market at prices which can undersell the synthetic product. This is good news, but it is difficult to see how it is in the long run to hold its own against the artificial product, which is of uniform quality, requires no grinding, and is unaffected by vicissitudes of weather.

Prof. Armstrong, in a long letter to the *Times*, says that "The truly serious side of the matter, however, is not the prospective loss of the entire indigo industry so much as the fact that an achievement such as that of the Badische Company seems to be past praying for here."

Whether or not the natural indigo industry is to become a thing of the past remains to be seen, but if the replacement of natural indigo by a synthetic article produced in Germany leads British manufacturers to realise more fully the importance of trained scientific assistance, the decline, although in itself a great calamity, might not be entirely without its compensations.

Since writing the above, I have received a copy of an address upon "The Synthesis of Indigo," delivered by Prof. Meldola before the Society of Arts on April 17. In introducing the subject Prof. Meldola says that it is now often considered unpatriotic to "call public attention to any branch of industry in which we are being beaten by foreign competitors." He, however, considers that "The real enemies of British industry are those who, by virtue of their positions as politicians, economists, or as men of science, try to blind the public and to allure the manufacturer and merchant into a fool's paradise of false security."

¹ The Bengal factory maund is 74·66 lbs.

Then follows a very lucid and interesting historical survey of the chemistry of synthetic indigo. Attention is called to the fact that the first patent bears the date of March 19, 1880, and that although we knew that artificial indigo prepared by this, the cinnamic acid synthesis, could not compete with the natural product, yet its appearance caused much consternation among indigo planters. But because the threatened storm did not break, the planters evidently quickly forgot their fright and returned complacently to their old rule-of-thumb methods. Not so the chemists; they steadily and perseveringly plodded on, and in 1882 von Baeyer and Drewson brought out another synthesis, viz. the condensation of acetone and orthonitrobenzaldehyde in presence of caustic alkali. This process, or a modification of it, is employed at the present by the firm of Messrs. Meister, Lucius and Brunning; but as the supply of the raw material—toluene—is limited, Prof. Meldola, speaking as an individual, says: "Were I a planter, I should have no anxiety whatever with respect to a competing product which starts from toluene." Every 1000 gallons of coal tar yields about $6\frac{3}{4}$ gallons of benzene and $3\frac{1}{4}$ gallons of toluene, therefore any process which started with benzene as the out-going product should be better able to compete than one in which toluene is the starting material. However, although there are several syntheses which start from aniline (produced from benzene), the methods employed are so costly that at present the planter has very little to fear in this direction.

Naturally the chief portion of the paper is devoted to Heumann's synthesis, as at present worked by the Badische Company. This process, which starts from naphthalene, the supplies of which are practically unlimited, was described in NATURE, November 29.

In his references to the Badische Company Prof. Meldola quoted the following facts from the official report prepared for the Paris Exhibition:—

"The factory at Ludwigshafen employs 148 scientific chemists, 75 engineers and technical experts, and 305 members of the mercantile staff. In 1865 they commenced with 30 workmen, and they now employ over 6000. The consumption of coal is about 243,000 tons per annum; water is supplied to the factory to the extent of some 20,000,000 cubic metres annually; they make 12,000,000 kilogrammes of ice, and over 12,000,000 cubic metres of coal gas in the course of the year. The electric installation consists of eight dynamos, the currents from which serve for illumination, motive power and electrolytic processes. Steam is supplied from 102 boilers, which serves for heating purposes and for driving 253 steam engines."

Let the British manufacturer and the Indian indigo planter try to digest these hard facts and figures. I wonder whether there are 148 scientific chemists employed by manufacturers in the whole of the United Kingdom. Let them also remember that these figures only refer to one firm.

Finally, Prof. Meldola refers to the natural product *versus* synthetical indigo. He is unable to hold out the hope that the natural article will in the long run be able to compete with the product of the German factory. "The planters have allowed twenty years of activity on the part of the chemists to pass by with apathy and indifference, and at the last moment only have they called in expert assistance."

It is truly marvellous that only the British planter should have been so lethargic. In Java the Dutch planters "have had the wisdom to avail themselves of the resources of the botanical gardens for experimental purposes, and their chemists and bacteriologists working in Holland in co-operation with the planters have, as is well known, for many years past been contributing to chemical literature the results of their investigations."

Reference is made to the contradictory opinions as to

what goes on in the steeping vats, as to whether the resolution of the glucoside indican into indigotin is due to bacterial fermentation, or whether it is one of ordinary zymolysis. Attention is also directed to the drying process, which often extends over several weeks, and during which time it is stated that a fungus grows on the cakes and ammonia is evolved. Prof. Meldola asks whether this may not be due to the destruction of indigo by a micro-organism. I have myself often wondered that in all the suggestions for improving the yield and quality of indigo no one appears to have drawn attention to this apparent decomposition. It seems possible that more thorough washing and rapid drying in a current of hot air would perhaps prevent this. In his closing remarks Prof. Meldola refers to the antiquity of the industry, and questions whether the methods at present employed in India are very different to those used in the time of the Pharaohs.

F. MOLLWO PERKIN.

THE OLDER CIVILISATION OF GREECE.¹

THE sixth volume of the *Annual of the British School at Athens* contains matter of extraordinary interest to students of the history, not only of Greece, of Egypt and Western Asia, but also of mankind in general. The culture which now dominates the world is the child of the civilisation of Ancient Greece, and any archaeological discovery which tends to increase our knowledge of the beginnings of Greek civilisation possesses an importance and an interest far greater than that of any other possible discovery whatever in the archaeological field.

For the last twenty years, since Schliemann first unveiled the treasures of the citadel of Mycenæ, it has been recognised that the culture of classical Greece as we know it is but the second epoch of Greek civilisation. Classical Greece had a past the true history of which had been half forgotten, had been preserved in confused and contradictory legends. The culture of the past had bloomed from end to end of the Greek world, in cities, some like Athens or Knôssos, of renown in classical as well as præ-classical days, others like Mycenæ and Tiryns, cities whose fame ceased to be when the Dorians entered Greece. This culture was bronze-using, and was, in fact, the Greek phase of the European culture of the Bronze Age, a phase earlier in date than the phases of Central and Northern Europe, and in all probability not only their forerunner, but to a great extent their forbear. This culture itself developed out of a stage of transition from Neolithic barbarism, which we call "præ-Mycenæan," during which stone, copper, and occasionally bronze, were used side by side, pottery was rude and unpainted, and the dead were buried in *cist-graves*. This stage shades off on the one side (as in the first city of Troy) into the Neolithic culture, on the other (as in Cyprus) into Mycenæan civilisation, which marks the first stage of real "civilisation," properly so-called, in Europe. The earliest stages of the Mycenæan culture are known to us from discoveries of settlements with pottery, &c., in Thêra, at Phylâkopê in Melos, at Kamárais in Crete, and other isolated spots, chiefly in the Southern Ægean islands. The civilisation which we find at Mycenæ, at Vaphio, at Ialysos and elsewhere, is the same as that of Phylâkopê and Kamárais, but is more highly developed in many ways. This can only be the culture of the heroic Achæans, which was overthrown by the Dorians; its date must, then, be placed certainly before 900 B.C., even if, as is very possible, it continued to exist in Western Asia Minor and Cyprus till the eighth century. We can be more certain about its date than this; Mycenæan culture was by no means confined to

¹ *The Annual of the British School at Athens*; No. VI. Session 1899-1900. Pp. viii + 156. With illustrations and two maps. Printed for the subscribers and sold on their behalf by Macmillan and Co., Ltd. Price 10s. 6d.

Greece, and there were ships and sailors in those days as bold and venturesome as any of the time of Elizabeth. We know from the Egyptian State archives of the reign of King Akhnaten (B.C. 1430: date determined by synchronism with Burraburiyash of Babylonia, B.C. 1430) that in the XVth century B.C. the Phœnician cities already traded with many lands across the seas, with Egyptian Thebes, with Alashiya or Cyprus (?), and with *Keftiu*. The people of *Keftiu* came to the court of King Thothmes III. of Egypt (B.C. 1550) with gifts.

Where was *Keftiu*? Mr. A. J. Evans tells us this in this sixth volume of the *Annual of the British School at Athens*.

Mr. Evans's excavations at Kephala, the site of Knóssos, in Crete, are the culmination of many attempts, pursued during several years past under difficulties of all kinds, to elucidate the early history of Greek civilisation in Crete. The traditions of the island point to its having occupied a position of especial prominence in the Mycenaean world, and Mr. Evans's hopes of great results from Cretan exploration have not been disappointed. He has not only discovered at Knóssos a Mycenaean palace of the first

"Kamárais-period," continued to be occupied down to the period of its sudden sack and destruction by fire towards the end of the Mycenaean age, at which time only vessels of the later type were in use, while in the town we have two strata of settlement, the one containing the vases of the earlier period, the other those of the later generations of inhabitants. There need be no question of a change of race here, though Mr. Hogarth seems to suggest it. Alteration of style in art is no proof of racial change. Such changes are simply due to an alteration of fashion, suddenly started by some artist. We have an example of a sudden alteration of the kind in Egypt in the early years of the XVIIIth Dynasty. But we do not therefore in this case assume the violent substitution of one race of inhabitants by another. Even alteration of burial customs is no clear proof of change of race.

Important as the relics of the "Kamárais-period" from the Knóssian town are, however, they pale before the importance of the discoveries made in the palace itself. The excavation of this, probably the most important Mycenaean building yet discovered, is only begun, and we know not how Mr. Evans may increase our knowledge



FIG. 1.—Protomycenaean Vases from Knóssos: probable date before 1600 B.C.

rank, which is very probably identical with the legendary "Labyrinth" of Minós, but has also discovered that the Mycenaean of Crete were in all probability the same people as the "Men of *Keftiu* and of the Isles in the midst of the Very Green" (*i.e.* the Mediterranean), who make their appearance in Egyptian history *c.* 1550 B.C., thus giving the earliest trustworthy date for the Mycenaean civilisation.

Not only the palace, but also the Mycenaean town of Knóssos was discovered in the course of these excavations. The exploration of the town ruins was carried on by Mr. D. G. Hogarth, late Director of the British School at Athens, Mr. Evans busying himself more especially with the exploration of the palace. It is noteworthy that vases and fragments of vases found in the town ruins were of the early Mycenaean or "Kamárais" type, while those found in the palace mostly belonged to the fully-developed Mycenaean types so well known to students of early Greek art from the great work of Messrs. Furtwängler and Löschcke. This does not necessarily mean that the town-ruins are all older than the palace; all that is implied is that the palace, which from various indications was evidently already in existence in the

of the older civilisation of Greece in the course of his diggings this year. What he found last year, however, gives us material enough to think about! The plan of the palace shows a vast labyrinth of chambers, halls, corridors and passages; a true labyrinth indeed, for it is the only genuine and original Labyrinth itself, as the constantly-recurring symbol of the double-axe, the emblem of the later Zeus of *Δαβραν-νδα*, which is etymologically the same word as *Λαβύρινθος*, "The Place of the *Δάβρος* or Double-Axe" (for the earliest Mycenaean of Knóssos and elsewhere were not Aryan Hellenes, but "Pelasgians" allied to the non-Aryan peoples of Asia Minor), the emblem of the Knóssian Zeus, *Zeús ἀναξ, Πελασγικός*, shows. This is the labyrinth of Minós: is the bull-headed Minotaur, child of Zeus, of whom legends passed to the succeeding Hellenic inhabitants of the land, the recollection of some Mycenaean deity to whom human sacrifice was offered at Knóssos? We know the love of the Mycenaean for bulls, we see the *protomae* of bulls at Mycenae and among the gifts of the *Keftiu*, we find pictures of *τροφοκαθήψια*, bull-catching, at Tiryns and elsewhere, we have the splendid life-sized relief of a bull's head in painted *gesso duro* from Knóssos itself (Fig. 10

of the work under review); there are hundreds of other instances. The bull was the beast of Zeus: the idea of a Phœnician origin of the Minotaur is just so much rubbish; he is a purely Mycenaean conception. And his master, Minôs? What would Mr. Grote have said had he been told that in 1901 the name of Minôs would pass

fast gaining ground, that Egypt exercised no little influence upon the development of Mycenaean culture. On the other hand, the use of clay for the tablets is a sure sign of the influence of the rival civilisation of Babylonia. Many of the tablets evidently contain simply lists of ships, chariots, horses, swine, &c.; so much we

can guess from the pictures. The numerical system is evident; further than this we cannot go. It had long seemed curious that the highly-developed civilisation of Mycenaean days should have been ignorant of the art of writing; but we had no conclusive proof of Mycenaean writing before Mr. Evans's epoch-making discovery. Now here are the records of the Mycenaean writing before our eyes; *σηματα λυγρὰ*, indeed! They will not want for energetic "Bearbeitung," and the Clarendon Press is already preparing a fount of Mycenaean type! But the omens are bad.

We have remarked that Mr. Evans has shown that the *Kestiu* who brought gifts to the court of Thothmes III. of Egypt, *c.* 1550 B.C., were Mycenaean Cretans. This conclusion is a legitimate one. Some of the finest known examples of Mycenaean fresco-painting have been found in

the Knössian palace, and among them are representations of processions of men bearing vases, &c., who in dress are absolutely identical, on the one hand, with the bull-catchers of the Vaphio cups, on the other with the *Kestiu* who are depicted on the walls of Rekhmarâ's tomb at Thebes, in Egypt. No doubt of the identity is possible; the further presumption that the pictures of Rekhmarâ's tomb are roughly contemporaneous with the frescoes of Knössos is backed up by the cumulative force of all the rest of the chronological evidence, besides being inherently probable from the almost exact similarity of costume, &c. The date of *c.* 1550 B.C. for the later portions of the Mycenaean palace at Knössos is thus clearly indicated.

These frescoes give us an inkling of the racial type of the Mycenaean. They are not fair-haired Aryans



FIG. 2.—The Fifth Magazine, showing Great *Pithoi* and Receptacles in the Floor.

from the realms of pure myth into those of historical probability? Yet we have what look very much like the remains of a great Cretan power dating long before the Return of the Herakleids, in fact the power and kingdom of Minôs. The evidence of Greek legend can no longer be scoffed at, and the tradition of the Minoan thalassocracy may yet be shown to contain a substratum of historical fact. Those *Kestiu* went far afield: they reached Egypt. Sicily and Kamikos are no farther.

The records of Knössos have much to tell us, but as yet they are dumb. There they lie before us, those queer characters incised on tablets of sun-baked clay, but we cannot read them yet. How long we shall continue in this state of tantalising ignorance it is impossible to tell. The lamentable failure to read the so-called "Hittite" script of Eastern Asia Minor is no good augury.

This discovery of inscribed tablets is the most important in the field of early Greek antiquities since the excavation of the graves at Mycenæ. The tablets, good illustrations of which are given by Mr. Evans, were found in a number of deposits or "hoards" in the palace, mostly packed away in sealed boxes placed in large *pithoi* or handleless vases (a specimen of the kind, brought from Rhodes, is in the First Vase Room of the British Museum), which were stored in special chambers. The writing is of two kinds, hieroglyphic ("pictographic") and linear: in both remarkable resemblances to Egyptian characters are noticeable, and give further proof of the idea, now

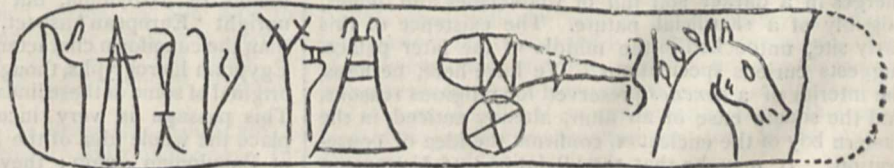


FIG. 3.—Linear Tablet referring to Chariot and Horses and, perhaps, Cuirass. (Size of original.)

at all. They are brunett, black-haired, un-Aryan people like the modern Italians, Greeks and Anatolians; they belong, in effect, to the "Stirpe Mediterranea" of Sergi, the race which we may, if we like, call Pelasgian, which preceded the Aryans in Greece as well as in Asia Minor, and of whose peculiar language-type Karian and Lycian give us a good idea. The Aryan

conquerors gave Aryan languages to Italy, Greece and Phrygia, but the modern speakers of Italian, of Greek, and of Armenian much more closely resemble their non-Aryan ancestors than their Aryan conquerors.

The palace of Knossos was built of great gypsum and limestone blocks, and when complete must have been a most imposing building. One of the most curious facts with regard to it is that it is really built round a small open space, which Mr. Evans speaks of as "The Central Clay Area." "This enclosure," says Mr. Evans (p. 17) "turned out to be entirely devoid of foundations, and its floor was composed of the pale clay already noticed as being of artificial accumulation and as probably due to the disintegration of the clay platforms and wattle-and-daub huts of a very primitive settlement. It was found to be full of Neolithic relics, and a shaft sunk near the N.W. corner showed that the deposit was at this point 7.50 m. in thickness. On the south side this clay deposit

middle of the north wall was an interval between two of these stone benches, the central post of which was occupied by a gypsum throne. The throne rested on a square base and displayed a high back of undulating leaf-shaped outline. . . . Its total height is 1.06 m., and the level of the seat 0.56, or 21 cm. above that of the stone benches. . . . The lower face of the throne presented a curious architectural relief, consisting of a double moulded arch springing from flat, fluted pilasters, expanding upwards in the Mycenaean fashion. The upper part of this arch was traversed by a moulded band forming a counter-curve. But the most interesting feature remains to be described. The lower part of the mouldings of the arch on either side were, by a strange anticipation of later Gothic, adorned with bud-like crockets. The architectural features, indeed, revealed by these reliefs are in almost every respect unique in ancient art."



↑ End of Stone Bench in Front of Tank. ↑ Doorway of Inner Room. ↑ Stone Bench and Fallen Fresco. ↑ Throne between Stone Benches. ↑ Wall-projection and Door-jamb.

FIG. 4.—Throne-Room as seen from Antechamber.

merges in a darker soil full of wood-ashes and bones, possibly of a sacrificial nature. The existence of this early site, untouched in the middle of the later palace, suggests curious speculations. We have here, perhaps, the interior of a *temenos* preserved for religious reasons, and the square base of an altar, already noticed, in the eastern bay of the enclosure, confirms the idea of consecration. It may be that the 'Palatine' of Mycenaean Knossos also had its 'Casa Romuli'—a sacral survival of a prehistoric dwelling."

A chamber of great importance in the palace was the Throne-room, of which Mr. Evans gives a description (p. 35 ff.): "The chamber . . . was in many ways as perfect as the room of a Pompeian house, though some fourteen centuries earlier in date. On the south side opened an impluvium and steps leading down to a fine stone tank. . . . Breasting this, and along two other sides of the room, ran gypsum benches with pilasters. . . . At the

tablets of Babylonia, but the letters here are of free upright 'European' aspect, far more advanced in type than the cuneiform characters. They are equally ahead of Egyptian hieroglyphs, though here and there the pictorial original of some of these linear forms can still be detected." This passage is very incomprehensible. In the first place the whole idea of the Knossian tablets is obviously of Babylonian origin: they are not merely "distantly analogous" with the tablets of Babylonia. In the second place, what does Mr. Evans mean by the Mycenaean letters being "of free upright 'European' aspect"? What characters can be called free or unfree? Why is the erect position specially "free" or "European"? The Egyptian hieroglyphs and their hieratic developments stood bolt upright unless a crocodile or a snake were pictured; cuneiform was upright and spiky enough, in all conscience. They are not European. With what European script is he comparing the Mycenaean writing? Surely

A splendid idea of this room and of the now famous "Throne of Minos," can be obtained from the photographs published in the *Annual*, one of which is shown in Fig. 4. In general it may be said that the illustrations are extremely good—the plans also. But for finality in these latter we must wait till Messrs. Evans and Hogarth have brought their excavations to an end. Enough has now been said to give the reader an idea of the immense importance of the discoveries at Knossos, and it is a matter of congratulation that their discovery has fallen to the lot of an Englishman. Our knowledge of early Greek civilisation in Crete now rests on a much surer foundation than it did when Mr. Evans strove to draw a connected story from the evidence of the "Seal-stones" alone.

To one small point only in Mr. Evans's discussion of his discoveries must we take exception. When speaking of the inscribed tablets he says (p. 57): "Some distant analogy may be recognised with the

not with the Greek alphabet, which was of Phœnician, and ultimately of Egyptian, origin. And how are the Knössian characters more advanced in type than the cuneiform characters? Obviously they are nothing of the kind; they are in the same stage of development as the Egyptian hieratic writing, to which they bear a strong resemblance; so far, then, it may be said that they are "ahead" of the Egyptian hieroglyphs; but cuneiform was far more conventionalised, far "ahead" of either Egyptian hieroglyphic and hieratic or Mycenaean linear. The people who used the Knössian script may turn out to have had not one drop of Aryan "European" blood in them, and European-Greek culture may be as thoroughly of non-Aryan (and equally non-Semitic) origin as Semitic culture was in its origin absolutely non-Semitic.

The work of Messrs. Evans and Hogarth at Knossos has been supplemented by the latter with the very interesting results of his excavation of the famous cave of Zeus on Mount Diktê, an account of which appears on p. 94, ff. Mr. Hogarth's story of his operations, of the blasting of the rocks, the unveiling of the most ancient sanctuary of Zeus, the recovery of small bronze double-axes and other votive objects, belonging to the same period as the Knössian palace, from the crevices of the stalagmitic deposit in which they had remained undisturbed for nearly four thousand years, the finding of a little Egyptian bronze statuette of Amen-Râ, which shows that somewhere about 1000 B.C. King Zeus was already identified with Amonrasuntiru, Amen-Râ, king of the gods—all this is of the highest archæological interest, and may be recommended to the notice of students of Greek religion.

It remains to speak of the articles of less importance which also find a place in this number of the *Annual*. That by Mr. F. B. Welch on "The Influence of the Ægean Civilisation on South Palestine" is important as chronicling the occurrence of Mycenaean pottery at a Palestinian site, Tell es-Safi. "This," says Mr. Welch, "was certainly a Philistine stronghold, a fact which is suggestive in view of the probable north-western origin of the Philistines" (p. 119). This is quite true, and it may be remarked that the old tradition of the Cretan origin of the Philistines has lately, in view of the Egyptian records of attacks by the Peoples of the Sea, among whom figure the *Pulesatha* or Philistines, and a great deal of other evidence, both archæological and legendary, come once more to the front, and probably represents a historical fact. But Mr. Welch should note that Semitic authorities such as Delitzsch, Jensen, Mayer and Tiele uncompromisingly claim the Philistines as Semites, and specifically Aramæans. The Egyptian evidence, however, as Mr. Welch rightly implies, goes absolutely against the Semitic claim, which will probably have to be given up. Still, the Greek archæologists have no right to ignore the opinion of the Semitists on such a question as this. Mr. Welch seems, by the way, to attach rather too much importance to purely "typological" arguments derived solely from the study of pottery, which can never be an absolutely infallible guide.

Mr. J. C. Lawson's note on "A Beast-Dance in Scyros" (p. 125) will be of great interest to anthropologists. In carnival time the young men of Scyros array themselves in goat-skin capes—"each does his best according to his lights and his means to look like a goat"—hang goat-bells round their persons and solemnly dance through the town, often stopping "at some friendly door to imbibe spirituous encouragement to further efforts." This is undoubtedly a very ancient survival, and possibly goes back to Mycenaean times, a surmise with which anybody who knows what a great part goat-headed and other theriomorphic figures play in Mycenaean art will probably agree. But alas, "thanks to the steadily increasing

influx of Western culture during the last few years," the goat-mask is often replaced nowadays by "an Ally Sloper mask"! The modern Japanese wears a billycock or a deerstalker on the top of his national historical costume. So the free and upright civilisation of modern Europe dominates the world!

It may be finally noted that the knowledge which the contributors to this number of the *Annual* possess of the German language appears to be defective. If German terms are used at all, their proper plural forms should be given to them. "Bügelkannes" may be Dutch, but is neither German nor English; Mr. Welch gets over the difficulty, which might have been solved by reference to a German grammar, by giving his German words no plural form at all. He speaks of "Bügelkanne" and "Schnabelkanne" when he means *Bügelkannen* and *Schnabelkannen*.

Despite these little imperfections, the sixth number of the *Annual of the British School at Athens* is undoubtedly the most important contribution to our knowledge of the early history of mankind that has appeared for many years.

MAGNETIC OBSERVATIONS DURING TOTAL SOLAR ECLIPSE.

THE effect produced by a solar eclipse on the meteorological conditions of the atmosphere has on many occasions in the past been the subject of observation, but in the number of *Terrestrial Magnetism* just received we find an account¹ of a systematic examination of the influence of such an eclipse on magnetic conditions also. It had appeared to Dr. Bauer, chief of the U.S. Magnetic Survey, that magnetic observations might on such an occasion be usefully undertaken; and the occurrence of the solar eclipse of May 28 of last year, the total phase of which was visible in the United States, afforded an excellent opportunity of carrying such design into execution. For the needs of the magnetic survey simultaneous magnetic observations are made on certain days throughout the year at the different magnetic stations, and it was arranged that such observations should be made, on the day of eclipse, at stations as near as possible to the path of totality. Six stations were selected; three of them—Union Springs, Rocky Mount and Cape Charles—were situated within the path of totality, the remaining three—Salem, Bayard and Gaithersburg—being outside. The observers received instructions to occupy such stations as their special work permitted for the due accomplishment of the object in view, accompanied by a detailed scheme of the observations to be made. The prescribed course was carried out by all the observers excepting the one at Gaithersburg, who for some reason failed to receive his instructions in time; but he made observations according to directions sent him previously, relating to other work. The detailed scheme of observations is given with the view of aiding observers making preparations for similar work on future occasions. The observations made are discussed at considerable length, being accompanied by numerous graphical illustrations, and it is stated that there can be no question that some kind of magnetic disturbance made itself felt on May 28 at every one of the stations.

Finally, the conclusions arrived at are given under eleven separate heads, the principal points of which are contained in the following summary:—A small magnetic oscillation made itself felt at various stations situated in the eastern part of the United States during the time of the eclipse. It was detected by various persons, at various stations, with different instruments, under different conditions, and was also automatically recorded.

¹ *Résumé* of magnetic observations made chiefly by the United States Coast and Geodetic Survey on the day of the total solar eclipse May 28, 1900.

The various phases of the oscillation did not take place at the different stations at the same absolute time, or local time, but in every instance were associated with the time of maximum obscuration of the sun. The duration of the oscillation was apparently about the same as that of the eclipse, about two and a half hours. The range of the oscillation was about one minute in arc for declination, and about eight units in the fifth decimal C.G.S. for horizontal intensity, that is, to about $1/28000$ part of the absolute horizontal intensity. The general effect was to deflect the declination needle to the west, and decrease the horizontal intensity, before the time of maximum obscuration, the movement afterwards being in both cases in the opposite direction. The analysis indicates that the cause producing the magnetic oscillation was situated outside of the earth's crust, the presumption being very strong that the oscillation is to be referred to some change produced in the upper atmospheric regions by the abstraction of the sun's rays, due to interposition of the moon.

Dr. Bauer expresses himself as having been in doubt before making the observations as to whether any magnetic effect referable to the eclipse would reveal itself, and adds that he was afterwards slow to conclude that the magnetic oscillation observed was not accidentally connected with the eclipse, until he had made such exhaustive examination of every point involved as justified him in formulating a definite conclusion. The result is interesting, and makes it desirable, as he says, that every opportunity should in future be taken to obtain, during eclipses, simultaneous magnetic, atmospheric-electric and meteorological observations at as many stations as possible.

It is to be remarked that, although Dr. Bauer eventually speaks with some confidence as to the magnetic movement observed having relation with the eclipse, the movement in question was small, and, abstractedly speaking, much too small on which to found any certain conclusion, considering the abundance of magnetic movements of similar and even greater magnitude. The circumstance that seems really to give weight to the conclusion drawn is the statement that the various phases of the magnetic oscillation were associated with the time of maximum obscuration of the sun. Confirmation of this circumstance is therefore what is now to be desired.

Following the paper there is printed an appeal for international co-operation in magnetic and allied observations during the total solar eclipse of May 17 next.

WILLIAM ELLIS.

PROF. H. A. ROWLAND.

HENRY AUGUSTUS ROWLAND was born in 1848. He was educated as an engineer, and graduated at the Rensselaer Polytechnic at Troy, New York, in 1870. After one year's experience as a railway engineer on the Western New York line, and a second spent as instructor in natural science at Wooster, Ohio, he returned to his college to share in its teaching, becoming an assistant professor in 1874. Two years later, in 1876, after spending a year under Helmholtz in Berlin he took office as the first professor of physics at the newly founded Johns Hopkins University. Baltimore remained his home until his death, on April 16, at the early age of fifty-three years.

His work at Berlin on the magnetic efforts due to a moving body when carrying an electric charge brought him at once into fame. The result was published by von Helmholtz in 1876, and is thus described by Maxwell in a metrical letter to Tait, written in June, 1877. Tait had inquired, also in verse, as to the electric effects to be expected if a disc of ebonite carrying a charge were made to rotate in its own plane, and Maxwell writes :

The mounted disk of ebonite
Has whirled before nor whirled in vain,
Rowland of Troy, that doughty knight,
Convection currents did obtain,
In such a disk, of power to wheedle
From its loved north the subtle needle.

Rowland showed by the direct effects produced on a magnetic needle that a charged body in motion gave rise to a magnetic field just as though it were a current whose strength depended on the product of the charge and the velocity.

This result is of fundamental importance to electrical theory; it was confirmed by Rowland and Hutchinson in 1889, and has been generally accepted as an established fact. Within the last few months, however, Cremieu has published an account of a repetition of Rowland's experiments which has led him to a negative result; the question just at the present moment appears to need further investigation.

Rowland's appointment at Baltimore was rapidly followed by a series of brilliant researches, each of the first importance. His determination of the unit of resistance came first. This was published in 1878. The original B.A. units were constructed by the Electrical Standards Committee in 1863-4 to represent 10^9 C.G.S. units of resistance; according to Kohlrausch's results in 1870 they were 2 per cent. too high, while according to Lorenz (1873) they were 2 per cent. too low. Rowland's paper contains an able criticism of the old experiments and a detailed account of his own which led him to the number 9912×10^9 C.G.S. units as the value of the B.A. units. Further experiments in 1887 reduced this to 9864×10^9 . The value now generally accepted is 98653×10^9 . Rowland himself employed a modification of Kirchhoff's original method, in which the induction current in a secondary circuit produced by reversing a measured primary current in a neighbouring circuit is observed.

In 1879 Rowland presented to the American Academy of Arts and Sciences his paper on the mechanical equivalent of heat, with subsidiary experiments on the variation of the mercurial from the air thermometer, and on the variation of the specific heat of water. To attempt to give any account of the contents of this classic work would occupy too much space. To appreciate its value and to realise the skill and the ingenuity of its author it must be studied itself. More is known now about exact thermometry and the precautions necessary in using a mercury thermometer, and so it has come about that some corrections are necessary in Rowland's work, specially in that part of it which deals with the relation between the scales of the mercury and the air thermometer. These corrections were made at the Johns Hopkins University by Messrs. Day and Wardner and Mallory; but this fact detracts nothing from the importance of his investigation, and among the many determinations of the value of Joule's equivalent, Rowland's will always remain in the first rank.

Passing over, for the present, much work of great value, among which we may note his investigations into the magnetic permeability of various substances, published in the *Philosophical Magazine* for 1873 and 1874, and his theory of Hall's effect, we come next to the year 1882, when Rowland gave to the Physical Society of London an account of his concave grating. This is published in the *Philosophical Magazine* for September, 1883.

The results of this discovery are well known. A new weapon was placed in the hands of spectroscopists; it became possible to photograph spectra directly without the use of prisms or lenses, and with a greatly increased dispersion and resolving power; the beautiful maps issued at a later date by Rowland himself, and by Higgs of Liverpool, are striking evidences of the value of the grating; the additions to our knowledge arising from this one discovery are already enormous; much has been achieved which, without it, would have been impossible.

Rowland's own researches with his grating are summed up in his map of the solar spectrum and his table of the wave-lengths of the elements, published in 1893 (*Phil. Mag.*, July, 1893, reprinted from *Astronomy and Astro-Physics*.)

Of late years he gave much time and attention to a system of multiple telegraphy; this was shown working at the Paris Exhibition last year.

Enough has been written, perhaps, to indicate the debt physical science owes to Rowland; it is said he never received any regular instruction in physics; he was an engineer, and to this, in great measure, his success is due. The accuracy of his work on the ohm depends on the care he took to construct his induction coils so that their dimensions could be accurately measured; he dealt with the determination of the mechanical equivalent as an engineering problem; he employed a large mass of water and used steam power to rotate his paddle at a speed sufficient to make the resulting rise in temperature one that could be measured with accuracy.

The theory of the concave grating was his, but its success was due to the fact that Rowland had made an almost perfect screw; the method he employed in this is given in his article, "Screw," in the "Encyclopædia Britannica."

He lived for his work, but in his earlier days he was passionately fond of riding. Some years after the publication of the paper on the mechanical equivalent he was awarded a prize for it by one of the Italian Academies; about the same time he won a steeple chase, riding his own horse; he hardly knew which event gave him the greater pleasure. Another time, passing through England on his way home from the Continent, he had three days to spare. One of these was passed at Cambridge discussing electrical measurements, the other two were spent in a hurried visit to Exmoor to get a run with the staghounds. Twenty years ago he was a frequent visitor to England, and attended several of the meetings of the British Association; recently his visits were much less frequent. His friends here were aware that he was not well; some few weeks ago it was known that he had had a serious illness, but the news then was that he was better and on the road to recovery; however, an operation proved necessary, and he never recovered from its effects.

Thus within the last few months physical science is the poorer by the deaths of two of the most brilliant of the followers of Maxwell—Fitzgerald and Rowland; two who were foremost among those who have given to the theory of Faraday and Maxwell the right to claim the position of the theory of the electro-magnetic field.

R. T. G.

PROF. FRANÇOIS MARIE RAOULT.

FRANÇOIS RAOULT, professor of chemistry at Grenoble, died there on April 1 after a short illness. In him France has lost one of her most distinguished men of science, whose discoveries have supplied material for theoretical considerations which, within the past fifteen years, have had a most profound influence on chemistry and physics.

Raoult was born on May 10, 1830, at Fournes (Nord). His father, an officer in the local customs' service of Villers Cotterêts (Aisne), sent the boy to school at Laon, with the intention of his afterwards entering Government service. But Raoult's tastes lay in a different direction; and with the full consent of his father he finished his school career at Paris, and entered the scholastic profession. He began his teaching career at the age of 23 in the Lycée at Reims, and was shortly afterwards transferred to the Collège of Saint Dié; while there he

graduated as B. ès Lettres, and B. ès Sciences, passed his "Licencié" examination, and was appointed "Agrégré" of special secondary instruction. On presenting a thesis on "The Electromotive Forces of Voltaic Cells" he gained the title of "Docteur ès Sciences Physiques," and four years later, in 1870, he obtained the chair of chemistry at Grenoble, where he passed the rest of his life in constant labour in teaching and research during a period of 31 years. In 1889 he was elected "doyen," or dean of the faculty, and was re-elected to this important office four times. He occupied himself largely during the last dozen years in the reorganisation of the Faculty of Science, leading to the creation of a local university at Grenoble in 1896.

The author of this notice was once informed by Raoult that he independently discovered Faraday's and Ohm's laws; he had begun to experiment on the passage of electricity through solutions before he had acquired any real knowledge of what had already been achieved. On mentioning the fact to his scientific friends at Paris he learned, to his great disappointment, that his discoveries had been anticipated; but he took comfort in the thought that if he were able to make such discoveries, of which the importance is universally recognised, he must also be able to advance science in other directions. His first scientific work, published as his thesis for the doctorate, has already been mentioned; it was published in 1863, and until 1870 he devoted himself to a study of the chemical effects of the electric current, trying to distinguish between the heat evolved by chemical reactions and that due to the electric current in the voltaic cell. From 1870 to 1886 his attention was given to subjects of a more purely chemical nature, such as the extent of inversion of cane sugar under the influence of solar radiation; the absorption of ammonia by saline solutions; the presence of copper and zinc in the animal organism; the carbonates of calcium, strontium and barium; and the influence of carbonic anhydride on respiration. His work on the absorption of ammonia led him to consider the freezing-points of the saline solutions of that gas (1878); and from that date onwards he busied himself with the freezing- and boiling-points of solutions in water and in other solvents of salts and organic compounds, publishing his results in no less than 57 memoirs in various scientific journals. His last publication, "La cryoscopie," was published in the present year (*Collection Scientia*, Carré et Naud).

Most of Raoult's apparatus was constructed with his own hands; he was rather given to accurate experimentation than to the evolution of theories. The vast mass of evidence which he accumulated relative to the lowering of the freezing-points and of the vapour-pressures of solvents by the presence of dissolved substances made it possible for van 't Hoff to draw the important deductions relative to the connection of these phenomena with osmotic pressure and with the ionic theory of Arrhenius, which will ever shed lustre on his name. And to the practical chemist Raoult's work furnished a means of determining the molecular weights of non-volatile substances—methods familiar to every student of chemistry.

His labours met with ample, though tardy, recognition. In 1889 he was awarded the *Prix Lecaze*, of 10,000 francs; and in the same year he was made *correspondant de l'Institut de France*. In 1895 he received the biennial prize of the Institute; in 1892 he was the Davy medallist of the Royal Society, and in 1898 he was elected a Foreign Fellow of the Chemical Society of London. He was chosen *Chevalier de la Légion d'Honneur* in 1890, raised to *Officier* in 1895, and last year obtained the much-coveted title of *Commandeur*. He was a member of many foreign academies and scientific societies.

Though modest and retiring, Raoult's devotion to his work, dignity of character and sweetness of temper gained him many friends. He was not an ambitious

man, but was content to work on, happy if his discoveries contributed to the advancement of science. It is to the labours of such men that the progress of the world, both scientific and industrial, is due; for the methods which he introduced have led, not merely to a knowledge of the structure of many compounds which would otherwise have remained unknown, but have also had a profound influence on chemical theory, and have led to many discoveries of the utmost practical utility. He lived a happy and contented life, and even in his death his desire was satisfied; for in his discourse at the grave of his predecessor in the office of dean of the Faculty of Science at Grenoble, Lory, he gave utterance to the words:—"Puisque la mort est inévitable, ne vaut il pas mieux tomber ainsi tout entier, que de sentir la diminution lente et progressive de ses forces et de son intelligence?" Raoul died, after a few days' illness, without pain.

W. R.

DR. A. HIRSCH.

INFORMATION has reached us from the president of the Council of State for the Republic and Canton of Neuchâtel of the death, at Neuchâtel on April 18, of Dr. Adolph Hirsch, aged 71, the director of the observatory at Neuchâtel since its foundation in 1859. Dr. Hirsch was also secretary to the International Committee of Weights and Measures, established at Paris under the Metric Convention of 1875.

Dr. Hirsch contributed largely to our knowledge astronomy and meteorology, his earlier papers on the former subject having appeared in Berlin and Vienna, and his later papers, particularly with reference to the establishment and position of the new observatory in the Neuchâtel *Bulletin*. ("Établissement de l'Observatoire à Neuchâtel," *Bul.* v. 1859-1861; "Recherchés sur des Pendules Astronomiques," *Bul.* v. 1859-1861; "Découverte de deux nouvelles petites planètes," *Bul.* v. 1859-1861; "Relation des phénomènes météorologique avec la marche, des instruments magnétiques," *Bul.* vi.; "Influence des taches du Soleil sur la température de la Terre," 1877; Sur le passage de Venus," 1883, etc.). In more recent years Dr. Hirsch has been closely identified with the introduction of the metric system of weights and measures as an international system. He was a member of the original Commission International du Metre of 1872, of which the present eminent director of the Imperial Observatory, Dr. W. Foerster, and Dr. Von Lang, of the University of Vienna, were also members. On the establishment of the new International Committee of Weights and Measures in 1875, Dr. Hirsch became its secretary, a position which he filled until his death. A master in metrological science and a prince of secretaries, his loss will be deeply deplored by all whose opportunity it was to seek his valuable advice and to be guided by his profound experience.

NOTES.

THE gentlemen's soiree of the Royal Society will be held next Wednesday, May 8. The ladies' conversazione will not be held this year, in consequence of the death of Queen Victoria.

THE position of affairs at Coopers Hill College is most unsatisfactory. We understand that the Members of Parliament who are interested in the higher education of the country had obtained permission to move the adjournment of the House in order to discuss the latest report on the management of this institution laid before Parliament by Lord George Hamilton, but that some M.P., presumably at the instigation of the India Office, which shuns inquiry, has "blocked" this permission. This proceeding, which, unfortunately, the rules of the House allows,

is but another instance of the diminishing power of the private member and the increasing domination of the Government. Lord George Hamilton stated last week that he had asked the Universities of Oxford, Cambridge and London to nominate representatives on the Board of Visitors. When reconstituted the Board is to appoint a committee to hold an inquiry into the whole working of the College. This committee can do nothing to lessen the gravity of the recent action of the Board of Visitors in the matter of the dismissed teachers. They may, however, be able to secure some sort of recognition of the professoriate in the management and policy of the College, and some diminution of the absolute power of one individual, which has recently wrought such harm both at Coopers Hill in England and at the Leland Stanford University in America.

THE reality of the connection between rats and plague is prominently brought into notice by the issue of a circular by the Local Government Board, instructing the sanitary authorities of seaports to take precautions against the entrance of plague-infected rats into this country. On the arrival in port of a vessel upon which, during the voyage, plague or sickness suspected to be plague has occurred, measures are to be taken to secure the destruction of the rats on board the vessel, and to prevent them from reaching the shore. In the case of vessels that have come from places infested with plague, strict inquiry is to be made on their arrival in port as to mortality or sickness among rats during the voyage. In the event of rats on board any ship being found to be infected with plague, all parts of the vessel frequented by those animals are, so far as possible, to be disinfected. The authorities of seaport towns invaded by plague are advised to endeavour to secure the destruction of the rats in the town, not least those inhabiting the docks and quayside warehouses. In connection with these instructions, it is worth while to bear in mind that plague is not usually transmitted by the bite of a diseased rat, but by fleas living on such rats. Experiments have shown that a healthy rat will quickly contract plague if caged with a diseased rat infested with fleas, but will not do so if the diseased rat is free from fleas. Perfectly healthy rats harbour very few fleas and are very expert in removing them, but these insects are abundant on sick rats. After death, as the body becomes cold, the fleas leave the rat, and if they reach another rat or human being they may inoculate their new host with the bacilli of plague.

PROF. BROUARDEL, Dean of the Paris Faculty of Medicine, has announced that at the end of his present term of office—namely, in February 1902—he will not accept re-appointment.

THE Rev. James Chalmers, who is reported to have been murdered in New Guinea, with the Rev. O. F. Tomkins and twelve students, was known to many anthropologists, and made some noteworthy contributions to our knowledge of the natives of New Guinea, where he passed twenty-three years of his life. His death has often been reported before now, and there is always a possibility that rumours from New Guinea will prove to be untrue; but we fear that in this case the news will be confirmed.

THE founders' medal of the Royal Geographical Society has been awarded to the Duke of the Abruzzi for his expedition to Mount St. Elias and for Arctic exploration. Dr. A. Donaldson Smith has been awarded the patrons' medal for his African expeditions and the important scientific observations made in connection with them. Awards have also been made to Mr. Louis Bernacchi and Captain Colbech for their aid in the *Southern Cross* Antarctic expedition, and to Captain Cagni for his journey to 86° 33' N., on the Duke of the Abruzzi's expedition.

WE are reminded by the *British Medical Journal* that on October 13 Prof. Rudolf Virchow will complete his 80th year, and preparations are already being made by his numerous friends and pupils to celebrate that interesting anniversary with appropriate pomp and circumstance. A committee has been formed for the purpose of collecting subscriptions, to be applied to the development of the Rudolf Virchow Stiftung, which was established for the furtherance of science in 1881. The president of the committee is Prof. Waldeyer, the distinguished anatomist of Berlin; the secretary is Prof. Posner.

THE committee appointed by the International Congress of Geologists in August last has, says *Science*, announced as the subject proposed for the Spendiarioff prize for 1903 "A Critical Review of the Methods of Classification of Rocks" (*Revue critique des méthodes de classification des roches*). The value of the prize is 456 roubles, or about 64*l.* Manuscripts should be addressed to M. Charles Barrois, secrétaire général du Congrès Géologique International, 62, Boulevard Saint Michel, Paris. At least two copies of papers submitted in competition are required, and they should be sent, at the latest, a year before the next session of the Congress in 1903.

THE erection of a memorial to the late Prof. Huxley in Ealing, where he was born and received his early education, is contemplated. On the initiative of the council of the Ealing Natural Science Society, a committee of those persons connected with the district who are interested in the project has been formed. The first meeting of this committee was held on March 29, when an executive committee was appointed with the Rev. Prof. G. Henslow as chairman. A bronze medallion portrait has been advocated for the central feature of the design, which may take the form of a simple mural tablet or of a more worthy monument, as funds are obtainable, while should that support be forthcoming for which its projectors hope, an annual grant or medal might also be founded. Subscription to the fund is not confined to residents in Ealing, and persons who may be desirous of assisting in the endeavour to show honour to the memory of Huxley in the place of his birth should communicate with the treasurer of the fund (Mr. T. Simpson, Fennymer, Castle Bar, Ealing), or with the secretary (Mr. B. B. Woodward, 120 The Grove, Ealing).

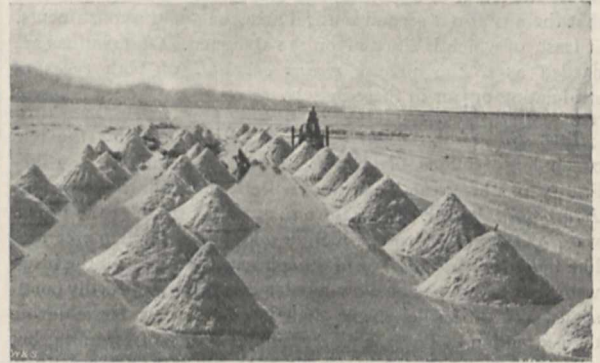
THE investigation of the Louisiana Gulf Coast, made by Prof. Beyer for the American Ornithological Association for the purpose of stationing wardens to protect the sea birds, shows that action was not taken a moment too soon. Prof. Beyer found that nearly all the breeding places of the birds had been destroyed by killing the birds themselves and taking their eggs. Not a trace of birds was found on either Brush or Caillou Islands, at one time the home of millions of sea fowl. The same was true of Calumet and Castelle Islands, on which every living thing had been killed. A few gulls and hens were found left on Timbalier Island, and there are said to be a few on Last Island, which, however, could not be visited on account of the severe weather. Wardens were appointed wherever birds were found, and the fishermen of the neighbourhood promised to co-operate with the wardens in preventing the killing of the birds in the breeding season and the stealing of eggs.

THE annual general meeting of the Zoological Society was held on Monday. In the report of the council, reference was made to the publication of the fifteenth volume of the Society's *Transactions*, consisting of a monograph of the genus *Casuarus*, by the Hon. Walter Rothschild. A new pheasantry was built during the past year, and is now tenanted by a full series of members of the pheasant family. The number of visitors to the Gardens in 1900 was 697,178, showing a slight increase over the corresponding number in the previous year. The number

of animals living in the Society's Gardens at the end of December last was 2865, of which 758 were mammals, 1495 birds, and 612 reptiles and batrachians. Amongst the additions made during the past year thirty-one were specially commented upon as being of remarkable interest, and in most cases new to the Society's collection. The Duke of Bedford was re-elected president of the Society.

WE learn from the *Electrician* that, in response to the complaints of a number of leading shipping companies, including the White Star, Cunard and American Lines, the Board of Trade has instructed the Marconi Company to erect a signalling station on the mainland close to the Fastnet Rock, at the western extremity of Ireland. All vessels fitted with wireless transmitting apparatus will henceforth be able to report to the shore when many miles outside the Fastnet, and this will, of course, abolish the waste of time and labour caused by the necessity for incoming steamers to pass inside the Fastnet in order to report to Lloyd's station on the mainland.

THE deposits of salt at Salton, California, U.S.A., forms one of the sights of America. They occur in a depressed portion of the Colorado Desert, parts of which are as much as three hundred feet below sea-level. The deposits cover as much as a thousand acres, and the company in possession of the area has shipped from it annually about two thousand tons of salt. The salt is cut by means of a plough and is piled into heaps such as those shown in the accompanying illustration, repro-



duced from the *Scientific American*. Each plough harvests about seven hundred tons of salt per day. A singular characteristic of the bed is that the salt is being deposited daily by springs which run into the basin, and as the water evaporates it leaves behind a crust of almost pure sodium chloride, which ranges from ten to twenty inches in thickness over the area. Geographers will remember that the deposits occupy part of the area of the desert of California flooded to the extent of hundreds of square miles in 1892, when the Colorado River broke its barriers.

THE origin of coal and the extent to which the coalfields of Great Britain have been worked were the scientific questions dealt with by Mr. E. B. Wethered in his presidential address to the Cotteswold Naturalists' Field Club on April 23. It was pointed out that the extent of our present exportation of coal was not contemplated by the Royal Coal Commission in 1871. In 1867 the amount of coal exported was 10,233,135 tons, and it was thought that no considerable increase would take place, whereas nearly fifty-six million tons were exported in the year 1899, including about twelve million tons consumed by steamers engaged in foreign trade. In the matter of home consumption the Commissioners were remarkably correct, their estimate for 1899 being 162,400,000 tons, the actual figures being 164,284,757

tons. Mr. Wethered suggests that another Commission should be appointed to consider the probable duration of the coalfields. Another point on which information is required is as to what natural stores of coal are under the Secondary rocks, and at what depths. It is of national importance that this information should be obtained.

Simons's Meteorological Magazine for April contains what purports to be the first tables of the climate of Pemba ever published. They were taken by Mr. T. Burt at Banani, during the years 1899 and 1900. The small island of Pemba forms, with Zanzibar, that portion of the British East Africa Protectorate nominally under the rule of the Sultan of Zanzibar, the position of Banani being approximately $5^{\circ} 15' S.$, $39^{\circ} 43' E.$ The temperature is of course very uniform, the mean of the monthly maxima being $83^{\circ} \cdot 4$ and of the minima $70^{\circ} \cdot 8$, the absolute maximum being 95° and the minimum 65° . The rainfall is copious, averaging about 98 inches. The two rainy seasons are well marked, the greater being March to May, and the less November to January.

MR. G. W. KIRKALDY has favoured us with a copy of his paper on the stridulating organs of water-bugs, recently published in the *Journal* of the Quekett Microscopical Club. The males of these insects, which alone produce the sounds, can mostly be referred to their proper species from the stridulating organs alone. Generally it seems that the sound is produced by drawing the comb-like structure situated on the tarsus of one leg across the femur of the other, and *vice versa*. But it is believed that there is also a second musical area, one of the constituents, at least, of which is situated on the abdomen. Observations are needed as to the precise *modus operandi* of both types of stridulating organs in these insects.

THE *Biologisches Centralblatt* of April 1 contains the two concluding sections of Dr. C. Rengel's account of the life-history of the great black-water-beetle commonly known as *Hydrophilus piceus*. It is shown that, unlike those of the brown water-beetles (*Dytiscus*), which devour free-swimming creatures like tadpoles and the larvæ of other insects, the larvæ of the black water-beetle subsists on slow-moving organisms, especially pond-snails. In the earlier stages of their existence the larvæ devote their attention to Physa and the smaller kinds of Lymnæa, but when full grown they do not hesitate to attack the comparatively large *Planorbis cornuus*. The idea that these larvæ always seek a hole in the ground in which to pupate is shown to be incorrect, the transformation having been observed to take place among a mass of weeds. It seems also that when a hole is selected, this is not excavated by the larvæ themselves. By an inadvertence the title of this paper occurs in the table of contents of the *Centralblatt* of April 15.

THE issue of the *Revue Scientifique* of April 20 contains the first instalment of an interesting article by M. Henri Coupin on the song of birds. The author commences by referring to the large proportion of tuneful species met with among the birds of Europe, which he sets at ten per cent., whereas in the tropics it falls as low as one per thousand. The gorgeous birds of the tropics he compares to actresses without talent, who depend for success on the richness of their toilets. Stress is then laid on the fact that, in spite of its simplicity, bird-song cannot be imitated by any known musical instruments. It is possible, indeed, to reproduce the pitch and intensity of the notes, but not the *timbre*, which includes such a multitude of sounds as to defy imitation. Indeed, the observations of M. F. Lescuyer have shown that although the notes of birds correspond to those of our musical scale, yet they also include a number of vibrations occupying the intervals between our notes, and it is this which renders imitation impossible. In most birds

the duration of the song is very brief; in the thrush and the chaffinch it lasts only two or three seconds, in the blackcap from four to five seconds, and from two to five minutes in the lark. The author then proceeds to analyse the sounds constituting the songs of birds, and to distinguish between their songs and their alarm-cries.

WE have just received Part vii. of the bibliography of the more important contributions to American economic entomology, issued by the U.S. Department of Agriculture (Division of Entomology), extending from December 31, 1896, to January 1, 1900. This part, prepared under the direction of Prof. L. O. Howard, the entomologist, by his assistant, Mr. Nathan Banks, contains an alphabetical index, under authors' names, of 1383 papers in different American periodicals, and a subject-index extending to thirteen pages (double columns) in small type. The book is a good illustration of the energy with which economic entomology is pursued in the United States, where, however, it must be remembered that insects are much more numerous and destructive than in Europe, or at least in England.

THE issue of *Die Umschau* for April 20 contains a short illustrated article on the ship *Gauss*, which has been built for the German Antarctic Expedition. A photograph from a model and some views of the vessel in various stages of construction are reproduced.

DR. E. FRIEDRICH contributes a paper on the india-rubber production of Africa to the *Deutsche geographische Blätter*. The export statistics of twenty-five African colonies are dealt with, and the results exhibited graphically on a sketch-map, from which some interesting geographical conclusions are drawn.

THE *Verhandlungen* of the Berlin *Gesellschaft für Erdkunde* contain a brief abstract of a lecture, by Dr. K. Kretschmer, on the physical development of the North Sea coasts during historic times. The author refers specially to the regions near the mouths of the rivers Ems and Jade, and describes changes recorded by various authorities since Roman times.

WITH reference to Mr. T. W. Kingsmill's letter in last week's issue (p. 608), Prof. Haddon writes to say that he appreciates its value, but at the same time he wishes to disclaim any first-hand knowledge of Chinese authorities, and to remark that in his article he merely gave an account of M. Ujfalvy's views.

A VOLUME on the history of physiology during the sixteenth, seventeenth and eighteenth centuries, by Sir Michael Foster, will shortly be published in the Cambridge University Press Biological Series, edited by Mr. A. E. Shipley. The book will consist of lectures delivered by the author last autumn before the Cooper Medical College in San Francisco. Without claiming to be a complete history of the subject the book will contain a full account of the chief advances made in physiology from the time of Vesalius until the beginning of the nineteenth century. In the same series Prof. Marshall Ward is issuing a work on grasses on a somewhat novel plan. It is essentially a practical book, to be used in the field and in the laboratory, and should be of use, not only to the botanist, but also to the farmer and the gardener.

WE have received from Messrs. A. E. Staley and Co. a catalogue of microscopes manufactured by the well-known Bausch and Lomb Optical Co. of Rochester, New York, U.S.A. From the description of their works contained in the catalogue it is evident that the method of production is essentially American. Machine tools of the most modern description and specialisation of the manufacture of component parts should result in every article being of the highest class. The instruments listed of the so-called "Continental" type do not call for

special notice. Of the cheap stands, the American type microscope (F.) is undoubtedly of good design. The horse-shoe foot is replaced by one of a much more stable tripod form, and the arm carrying the tubes and adjustments is particularly well made, giving freedom all round the stage while securing a firm support for the body-tube. All the usual microscope accessories are listed, but there is nothing of such special design as to call for particular notice.

THE additions to the Zoological Society's Gardens during the past week include two Wild Swine (*Sus scrofa*, ♂ ♀), European, presented by H.M. the King; a Leopard (*Felis pardus*) from West Africa, presented by Captain Guy Burrows; an Eland (*Orias canna*, ♂) from South Africa, presented by the Duke of Bedford; two Grey-breasted Parrakeets (*Myopsittacus monachus*) from Monte Video, presented by Mrs. Brownrigg; two Ground Snakes (*Typhlops exocoeti*) from Christmas Island, presented by Sir John Murray, K.C.B., F.R.S.; a Grey-checked Mangabey (*Cercocebus albigena*) from West Africa, a Brazilian Tree Porcupine (*Sphingurus prehensilis*) from South America, two Black Tortoises (*Testudo nigra*) from the Galapagos Islands, three Dark Green Snakes (*Zamenis gemonensis*), two Smooth Snakes (*Coronella austriaca*), European, deposited; a Sambar Deer (*Cervus aristotelis*, ♂) from India, two Javan Peafowls (*Pavo spicifer*, ♂ ♀) from Java, two Peacock Pheasants (*Polyplectron chinquus*, ♂ ♀) from British Burmah, two Australian Sacred Ibises (*Ibis strictipennis*) from Australia, two Summer Ducks (*Ex sponsa* ♂ ♀) from North America, two Blood-breasted Pigeons (*Phlogaenas luzonica*) from the Philippine Islands, four Ruffs (*Machetes pugnax*, ♂ ♂, ♀ ♀), twelve Green Lizards (*Lacerta viridis*), European, purchased.

OUR ASTRONOMICAL COLUMN.

COMET *a* (1901).—The Sydney correspondent of the *Times* reports that a brilliant comet was seen early on Tuesday morning (April 23) at various stations throughout the Australian continent. It was stated to have been near the star Aldebaran (*α Tauri*).

On Friday, the 26th ult., a telegram received from Dr. Gill announced that the new comet had been observed from the Cape Observatory. It was very brilliant, having a compound triple tail about 10° long. The comet was observed on the eastern horizon some two hours before sunrise and was rapidly approaching the sun, so that it may be expected to become more brilliant as perihelion is passed. It was seen by the observers at the Yerkes Observatory at Wisconsin early on Saturday morning last, about 15° north of the sun. This indicated that it had made a very rapid north-westerly movement in relation to its position when seen at the Cape. It was visible for fully twenty minutes before sunrise and about fifteen minutes after, and is considered the brightest comet seen for the last nineteen years. No account has yet been received of the comet having been seen in this country.

THE APRIL METEORS OF 1901.

A SERIES of very clear nights enabled these objects to be looked for in favourable circumstances this year. Moreover, the moon was absent, so that the smaller class of meteors could be well seen projected on the dark blue of the cloudless sky. Meteors are usually very rare in April, and it is only the shower of Lyrids, occurring in past years on about the 20th, that has made the month interesting to meteoric observers. The display apparently returns annually, but it is often inconspicuous and rarely proves as rich as the August Perseids.

On April 13, 17, 18 and 19 I maintained a watch of the north-east region of sky, but found meteors scarce and there were very few Lyrids. The minor showers of the epoch gave little sign of their presence; in fact, meteoric apparitions were so few and far between that observers found their patience sorely tested. Prof. Herschel watched perseveringly at Slough on the nights

of April 10, 13, 14, 15, 16 and 17, and, in the aggregate, only recorded twenty meteors in 8½ hours.

On April 20 at Bristol the sky was brilliantly clear, and I kept a look-out during about five hours of the period from 9h. 50m. to 15h. 30m, but observed only twenty-nine meteors. Not a single Lyrid was included amongst them, though several bright, swift-moving meteors fell from a bordering radiant at 261° + 36° in Hercules.

On April 21 the firmament was less favourable, but soon after commencing to watch at 9h. 45m. I found meteors extremely numerous. Several of the minor showers were very active, and the Lyrids formed a pretty rich display. During 3¼ hours' watching, up to 14h. (allowing for occasional interruptions by clouds), I counted fifty-two meteors, and of these there were twenty-five Lyrids from a radiant about 5 degrees in diameter with 270° + 33° as a centre. But while registering the observed paths of the meteors seen, many others must have eluded detection. The horary rate of meteoric apparitions for a continuous watch of the firmament by one observer would have been about 25 and the proportion of Lyrids 12. The figures represent rather an unusual display, though falling far short of the strength of the Perseids and some other periodical showers. It must be remembered, however, that at the epoch of the Lyrids meteors are generally very rare, and that the principal shower is itself sometimes very feeble, if not quite invisible.

The fact of the maximum being so definitely marked on April 21, while there was a comparative absence of Lyrids on April 19 and 20, shows that for some time in future we must expect these meteors on the former date. This is, no doubt, owing to 1900 not having been a leap year. And the shower appears to be a very fugitive, short-lived one, or it must have exhibited more decided traces on April 19 and 20. Though I saw no Lyrids whatever at Bristol on April 20, Prof. Herschel informs me that he observed 5 during the night.

Nearly all the Lyrids seen this year were accompanied with streaks; this feature was, indeed, as well shown as it usually is in the case of the Perseids, Orionids and Leonids. When the radiant was rather low on April 21, the apparent motions were estimated as slow and slownish; but in the later hours of the night, with increasing altitude of the radiant, the velocity appeared much swifter.

Some of the meteors from Lyra and other constellations were very interesting, and in the following list I have made a few selections in the hope that the objects may have been observed elsewhere, and that the requisite data may be obtained for computing their real paths in the air.

	h.	m.	Mag.	From	To	
April 21 ...	10	9	2½	278½ + 52	304 + 70	Lyrid
	10	41	3	202 + 40	213½ + 7	α-β Perseid
	10	50	2	210 + 50	171 + 40	Lyrid
	10	59	2	218 + 52	255 + 75	Virginid
	11	23	1	70 + 57	88 + 50	Cassiopeid
	12	47	2	269 + 46	305 + 49	Virginid
	13	7	2½	242 + 74	130 + 74	Lyrid

On April 20, at 10h. 35m., I noticed a brilliant double flash, caused probably by a large meteor at a low altitude, and hidden from my view by houses in this locality.

Two meteors appearing on April 18 were mutually observed at Slough and Bristol. The first was seen at 13h. 19m., and it fell from an altitude of 83 to 55 miles over Oxfordshire. The radiant was at 266° + 33°, so the meteor was an early Lyrid, and it having been well seen at both stations, the direction of its flight was recorded with considerable accuracy. The position of its radiant at 266° + 33°, as compared with the general Lyrid centre at 270° + 33° three nights later, on April 21, proves that this shower, like that of the August Perseids, exhibits a radiant moving eastwards at the rate of about one degree per day. The second meteor doubly observed was registered at 14h. 47m., and it descended from 58 to 44 miles over the borders of Gloucestershire and Oxfordshire. The radiant was at 247° ± 0°, so the meteor belonged to one of the minor showers of the epoch.

Since writing the above I have learnt that two bright meteors, the 1st and 5th in the above list, were observed by Mr. C. L. Brook at Meltham, near Huddersfield, as well as at Bristol. The first was a Lyrid with radiant at 268° + 30°, and it fell from 79 to 54 miles in height over the Midlands. Its length of path was 60 miles and velocity 40 miles per second. The other meteor was a Cassiopeid belonging to a radiant at 21° + 59°.

and falling from 66 to 44 miles over Merioneth and Cardigan, Wales. Its observed length of path was 55 miles and velocity 14 miles per second. It is remarkable that though few, if any, of the smaller class of shooting stars diverge from this radiant near δ Cassiopeia in the spring months it yet furnishes many fireballs. In the General Catalogue of Radiants, No. xv. p. 228, the radiants of five fireballs appearing in April and May give a mean centre at $20^{\circ} + 57'$, which is almost identical with that of the bolide of April 21 last. W. F. DENNING.

CHEMISTRY IN ITS RELATIONS TO ENGINEERING.¹

THE engineer of fifty years ago can hardly be said to have received any special educational training; he forced himself to the front in virtue of his qualities and industry alone. But the youth who to-day intends to become an engineer feels it wise, if not necessary, to decide where he shall receive, not only his general, but also his engineering education. While he was at school he will have learnt much about the simpler and more general laws and facts of mechanics and natural science, both by description and by practical work in the laboratory and in the workshop; he will also have attained to some proficiency in mathematics, in one or more of the modern languages, in drawing and in other usual school subjects. When he passes on to his college career his knowledge of these subjects will undergo expansion in the class-room and especially in the laboratory and workshop. It is satisfactory to find that many of our leading schools for training engineers exist in connection with institutions in which pure and applied mathematics, natural science and modern languages are efficiently taught even in their higher stages. The engineering student is thus afforded the opportunity of following up the higher study of any one of these subjects, if his taste and energy lead him to wish him to do so. But even his ordinary course of instruction always includes the opportunity of obtaining lecture and laboratory instruction in chemistry.

Chemistry in Engineering Education.

It appears to be the general feeling of those who have had experience in teaching chemistry to engineering students that it is useless to attempt very much in the small amount of time which can be allotted to the subject in the regular curriculum; it is evidently felt, however, that a student who wishes to attain to any considerable proficiency in the subject should be encouraged to join certain additional courses which are included in the ordinary chemical curriculum.

Probably all that can be expected of the average engineering student is that he shall become generally conversant, during his college course, with chemical language, with chemical principles and laws, and with the chemical nature of the materials with which he has to deal; and that he should obtain such an insight into chemical analysis as to be able to confer with the trained chemist, and to understand the meaning of a general statement of the results of chemical analyses bearing on metals, alloys, fuel, lubricants, cements and other materials which are frequently used by the engineer.

It is beyond question that the engineer has too many calls upon his time and energy, both in his training and in his subsequent career, to allow of his becoming a chemist or a chemical analyst; but he should at least be sufficiently conversant with the science to enable him to appreciate the important bearings of chemistry on his varied requirements, and to enable him to avail himself intelligently of the results of chemical investigation and analysis. He should be able to watch and to appreciate any chemical inquiry and investigation, even if he is not qualified to suggest its methods of procedure or to carry it out himself.

It has been stated to me by a German manager of large English works, who has frequently occasion to call in the professional advice and assistance of both engineers and chemists, and who is himself well educated in both departments, that he has to lament in this country the "absence of useful engineering knowledge among chemists, and of useful chemical knowledge among engineers." Another informant states that Germany employs many more trained chemists working in conjunction with her engineers than England does.

Applications of Chemistry to Engineering.

In order to illustrate some of the advantages which engineers have derived from chemical coadjutors, one or two instances may

¹ Abstract of the 'James Forrest' lecture delivered at the Institution of Civil Engineers on April 25 by Prof. Frank Clowes.

be selected from different fields of engineering activity and enterprise.

In the matter of supplying the engineer with suitable constructive materials, the most striking case is that of the introduction of cheap steel of varying qualities in substitution for costly steel and other less suitable forms of iron.

The Bessemer process owed its original suggestion, as well as its salvation from failure, to the chemical knowledge which was supplied to those who were interested in the procedure. It further owed the extension of its application to all the commonest, cheapest and most abundant kinds of impure English cast iron to the further utilisation of chemical knowledge and suggestion.

At the present time the metallurgical chemist and the chemical metallurgist are engaged in furnishing metals and alloys, new to commerce, which can rank in importance with cheap steel, only in a somewhat minor degree; and the engineer in every department of his activity is now continually having placed at his disposal alloys which are more suitable for his various designs than any which he has hitherto employed.

It is scarcely necessary to point out the absolute necessity of chemical knowledge and chemical advice to the gas engineer. In the matter of water supply, also, both the engineer and the chemist find their respective but closely connected spheres of duty.

There is another direction in which the constant relation of chemistry to engineering, and in which the association of the chemist with the engineer must be maintained, if success is to be secured and expensive failures are to be avoided.

In no application of chemical and engineering principles is the co-operation of chemist and engineer more necessary for the attainment of success than in securing the suitable purification of our town sewage. Such co-operation has enabled London, Manchester and other large centres of population in recent years to carry out on an experimental scale most important trials of the natural or bacterial treatment of sewage, and has led to reports on this method being published which will probably become classical. This experimental work has led to considerable and valuable development and improvement of the bacterial method. There is now no doubt that this process can inexpensively dispose of a large proportion of the putrescible sediment or sewage-sludge, and can render the effluent, not only non-putrescible and suitable for maintaining the life of fish, but even pure if necessary. The process is therefore destined to effect great reforms in our sewage-disposal problem and considerable improvements in the condition of our watercourses.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Rede Lecturer for the present year is Dr. F. W. Maitland, Downing professor of law. Dr. Haddon, F.R.S., gives this term a course of lectures on studies in Papuan ethnology and the races of Oceania, on Mondays and Fridays at 2.30 p.m.

The Medical School Buildings Syndicate recommend the acceptance of tenders for the erection of the Downing Street wing and the Humphry Museum, amounting to more than 26,000*l.*

The Frank Smart studentship in botany at Caius College, of the annual value of 100*l.*, will be vacant at Michaelmas. Candidates must have taken honours in Part i. of the Natural Sciences Tripos. Further information may be had from the senior tutor of the College.

A meeting was held in St. John's College on April 27 for the purpose of procuring a portrait of Prof. Liveing, F.R.S., as a memorial of his lifelong services to the University. The meeting was largely attended by members of the Senate, and a warm tribute was paid to the professor, who began his teaching of chemistry fifty years ago, and who during that time has in many ways, public and private, benefited the University, town, and county of Cambridge. A strong committee was formed to carry out the purpose of the meeting.

Prof. Newton announces that there are vacancies for workers at the University tables in the Plymouth and the Naples zoological stations. Applications are to be sent to him by May 23.

Twenty-one candidates have passed the half-yearly examination in sanitary science for the diploma in Public Health, held in April.

Dr. J. N. Langley, F.R.S., is re-appointed deputy-professor of physiology until Michaelmas 1903, in the place of Sir M. Foster, M.P.

MR. R. T. SMITH has been appointed principal of the Northern Polytechnic Institute. He organised and equipped the South African College, Capetown, and acted as professor of mathematics and physics in the College for several years; and, more recently, was lecturer in mathematics and physics in the Goldsmiths' Institute, New Cross.

THE Secretary of State for War has appointed a committee to consider the education of candidates for commissions in the Army and the system of training at Woolwich and Sandhurst, and to report whether any changes are desirable in the present methods of entrance into the Army. The following will form the committee:—The Right Hon. A. Akers-Douglas, M.P. (chairman); the Rev. Dr. Warre, headmaster of Eton; Mr. F. W. Walker, high master of St. Paul's School, Hammer-smith; Colonel Jelf, C.M.G., Royal Engineers; Lieutenant-Colonel Hammersley, Lancashire Fusiliers; Captain Lee, M.P., late professor of strategy and tactics, Royal Military College, Canada; and Captain W. E. Cairnes, Royal Irish Fusiliers (secretary).

ADVOCATES of improvements in geometrical teaching will be glad to know that the Civil Service Commission has lately introduced a change of importance to all who are concerned with Civil Service examinations. Before this year an instruction at the head of examination papers in geometry stated that "Proofs other than Euclid's must not violate Euclid's sequence of propositions." Upon recent papers, however, this has been superseded by the note that "Correct demonstrations, whether those of Euclid or not, will be accepted." It thus becomes possible for teachers preparing pupils for the Civil Service to be independent of Euclid's sequence or proofs. Recent questions also encourage teaching of a less abstract character than that usually associated with Euclid's geometry. We understand that the Board of Education will accept alternative proofs of propositions in future examinations in geometry.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, April 26.—Dr. R. T. Glazebrook, foreign secretary, in the chair.—A paper on the thermodynamical correction of the gas thermometer was read by Prof. H. L. Callendar. This paper commences by giving a short historical sketch of the thermodynamic correction of the gas thermometer, describing some of the solutions to Thomson's fundamental equation for the Joule-Thomson plug experiment. The assumptions made in the solutions have sometimes been erroneous and wrong corrections have been obtained. From 1885 to 1888 Chappuis made a series of careful comparisons between various gas thermometers and a very delicate mercury thermometer, and drew up a table of differences between the hydrogen and the nitrogen thermometer. The author has taken the observations of Chappuis and calculated a new table of differences. The index " n " in the modified Joule-Thomson equation is not constant. For steam it is about 3.5 and for carbonic acid about 2. The thermodynamic correction is very small, especially in the case of hydrogen and helium, and is very much less than the correction for the expansion of the thermometer bulb. Prof. Herschell asked whether the co-volume came into the correction. Dr. Harker looked forward to the experiments which Prof. Callendar proposes to make with a constant pressure thermometer. The chairman expressed his interest in the extreme delicacy of the observations of Chappuis.—A paper on the production of a bright-line spectrum by anomalous dispersion and its application, the "flash-spectrum," by R. W. Wood, was read and experimentally illustrated by Mr. Watson. It has been suggested by W. H. Julius that the "flash-spectrum" seen immediately at totality may be due to photosphere light abnormally refracted in the atmosphere of metallic vapours surrounding the sun. The light which will be thus abnormally refracted will be of wave-lengths almost identical with the wave-lengths which the metallic vapours are themselves capable of radiating. The sun is supposed to be surrounded by an atmosphere of metallic vapours, the refractive index of which decreases with increasing distance from the surface. In this atmosphere the rays of light coming from the photosphere move

in curved paths. The refractive index is, however, very small, except for wave-lengths very near those absorbed by the vapour, consequently the light which resembles that emitted by the vapours, is most strongly refracted, and therefore curves sufficiently to reach us after the photosphere has been hidden by the moon. The flash-spectrum of sodium was shown by focussing the light of an arc lamp on a horizontal slit in front of a flat metal plate supported so that the plane in which its under-surface lay coincided with the plane of the slit. At a distance of about two metres a direct vision spectrocope was arranged to give a vertical spectrum and placed at such a height that the prism barely caught the rays coming from the slit and grazing the plate. On looking into the spectrocope a bright continuous spectrum is seen. A Bunsen burner was then placed underneath the metal plate and fed with sodium. This produced a layer of sodium vapour of varying refractive index. On raising or lowering the spectrocope bright sodium lines are seen due to anomalous dispersion. By arranging screens these lines can be obtained so that, on cutting out the arc lamp, the flash-spectrum vanishes. Prof. Herschel expressed his interest in the experiments and their application to the case of the flash-spectrum seen at totality.

PARIS.

Academy of Sciences, April 22.—M. Fouqué in the chair.—On the residues and periods of double integrals of rational functions, by M. Émile Picard.—On an apparatus designed to move the photographic plate which received the image furnished by a siderostat, by M. G. Lippman. In an image given by a siderostat only one point is really fixed, the other points appearing to move round this with a variable velocity. It is shown that a suitable motion can be given to the photographic plate capable of overcoming this defect by means of a gear driven by the clockwork of the siderostat.—On the existence of nitrides, argonides, arsenides and iodides in crystalline rocks, by M. Armand Gautier. The finely powdered granites and basalts were decomposed by heating at 100° with phosphoric acid. Determinations are given of the amount of nitrogen, arsenic and iodine in various rocks.—Comparison of the work done by a muscle in sustaining and lifting a charge, by M. A. Chauveau.—On the propagation of discontinuities in a viscous fluid; extension of the law of Hugoniot, by M. P. Duhem.—On a question relating to a displacement of a figure of invariable size, by M. R. Bricard.—On entire functions of several variables and their modes of growth, by M. Émile Borel.—Some isotherms of ether between 100° and 206°, by M. Edouard Mack. The pressure of the ether vapour was balanced by a piston floating on a very viscous liquid, and the volume of the ether, which was completely surrounded by a mercury bath, was deduced from the motion of the piston.—Cryoscopic researches, by M. Paul Chroustchhoff. An account of some of the precautions necessary in applying the platinum thermometer to the measurement of the lowering of the freezing-point of dilute solutions.—On a new system of ammeters and voltmeters independent of the intensity of their permanent magnets, by M. Pierre Weiss. In an instrument of the d'Arsonval type a decrease in the strength of the permanent magnet causes a decrease in the sensibility of the instrument; in instruments having a movable magnetic needle controlled by a permanent magnet the opposite is the case. If, in an instrument of the moving coil type, the coil carries a small piece of soft iron, these two effects may be made self-compensating. It was found possible to construct a galvanometer of this type in which the sensibility was practically invariable.—On the influence of self-induction upon spark spectra, by Mr. G. A. Hemsalech. Three photographs are given showing the progressive changes produced in the spark spectra of cobalt, lead and magnesium by an alteration in the self-induction of the spark circuit.—Periodic oscillations productions by the superposition of an alternating current on a continuous current in an electric arc, by M. E. Kœnig.—On an apparatus which imitates the effect of luminous fountains, by M. G. Trouvé.—On barium hydride, by M. Guntz. Barium hydride, the existence of which was first indicated by Winkler, has been obtained in a pure state and found to have the composition BaH₂. This compound is of remarkable stability; it can be slowly sublimed in a current of hydrogen at 1400° C. without decomposition. Heated in a current of nitrogen, barium nitride is formed.—The estimation of nitric acid in waters by means of stannous chloride, by M. H. Henriet. The fact discovered by Divers and Haaga that nitrates react with stannous

chloride giving hydroxylamine chloride has been applied by the author to the quantitative determination of nitrates in potable waters.—The action of various alcohols upon some acetals of monovalent alcohols, by M. Marcel Delépine.—On three new alkaloids from tobacco, by MM. Amé Pictet and A. Rotschy. Further particulars of the physical and chemical properties of the three alkaloids nicotine, nicotimine and nicotelline.—The action of phenylhydrazine and of hydrazine upon the two isomeric methyl butyrylacetylacetates, by M. Bongert. On paroxyhydratropic acid, by M. J. Bougault.—Some new reactions of organometallic derivatives, by M. E. E. Blaise.—On a new base derived from glucose, by MM. L. Maquenne and E. Roux. The base, which is termed glucamine, is obtained by reducing glucosoxime with sodium amalgam.—Action of the alkylcyanacetic esters on the diazochlorides, by M. G. Favrel.—Reduction of the nitro-derivatives of the azoic colouring matters, by M. A. Rosenstiehl.—On two new acetylenic acids. Synthesis of caprylic and pelargonic acids, by MM. Ch. Moureu and R. Delange.—On the indoxylic origin of certain red colouring matters of urine, by M. L. Maillard.—The calculation of the results of milk analyses, by MM. Louise and Riquier.—Segmentation in the genus *Trochus*, by M. A. Robert.—Action of isotonic solutions of chlorides and of sugar on the eggs of *Rana fusca*, by Mme. Ronfeau-Luzeau.—The stimulation of nerve and muscle by waves of very short duration, by M. G. Weiss.—Action of alcohol upon the gastric secretion, by MM. Albert Frouin and M. Molinier. The increased secretion of the gastric juice caused by alcohol is shown experimentally not to be due, as has been usually supposed, to a direct local action, nor is it due to an effect produced upon the nerves of taste.—On the second fermentation of the wines of Champagne, by M. E. Manceau.—Apparatus for the exact measurement of the skeleton and of other organs giving a clear image in radiography, by M. G. Contremoulins.—On the origin and mode of formation of the Oolitic iron ore of Lorraine, by M. Stanislaus Meunier.

DIARY OF SOCIETIES.

THURSDAY, MAY 2.

ROYAL SOCIETY, at 4.30.—On the Variation in Gradation of a Developed Photographic Image when impressed by Monochromatic Light of Different Wave Lengths: Sir W. de W. Abney, F.R.S.—Ellipsoidal Harmonic Analysis: Prof. G. H. Darwin, F.R.S.—On the Small Vertical Movements of a Stone laid on the Surface of the Ground: Horace Darwin.—On the Intimate Structure of Crystals. Part V. Cubic Crystals with Octahedral Cleavage: Prof. W. J. Sollas, F.R.S.
 LINNEAN SOCIETY, at 8.—Studies in Heterogenesis: Prof. H. C. Bastian, F.R.S.
 CHEMICAL SOCIETY, at 8.—The Synthetical Formation of Bridged-Rings. Part I. Some Derivatives of Bicyclopentane: Prof. W. H. Perkin, jun., F.R.S., and Dr. J. F. Thorpe.—Ballot for the Election of Fellows.
 INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—An Instrument for Measuring the Permeability of Iron and Steel: C. G. Lamb and Miles Walker.—A Watt-Hour Meter: Frank Holden.
 RÖNTGEN SOCIETY, at 8.—Some X-Ray Improvements: James Cadett.

FRIDAY, MAY 3.

ROYAL INSTITUTION, at 9.—Memory: C. Mercier.
 SOCIETY OF ARTS, at 8.—Polyphase Electric Working: A. C. Eborall.
 ANATOMICAL SOCIETY, at 4.—(a) Additional Notes on the Articulations between the Occipital Bone, Atlas, and Axis in the Mammalia: (b) On the Development of Digits in Cetacea; (c) Observations on the Development of the Human Brain before and after Birth: Prof. Symington.—A Contribution to the Study of the Morphology of Adipose Tissue: Dr. H. Batty Shaw.—A Lantern Demonstration showing the Origin and Nature of the Hydatiform Bodies of the Testicle and Broad Ligament, with Special Reference to the Fate of the Mullerian Duct in the Epididymis: J. H. Watson.—Relation of Structure to Function, as illustrated by the Growth of the Inferior Femoral Epiphysis: Prof. Arthur Thomson.
 GEOLOGISTS' ASSOCIATION, at 8.—Geology and the Growth of London: A. Morley Davies.

SATURDAY, MAY 4.

ROYAL INSTITUTION, at 3.—Climate: its Causes and its Effects: J. Y. Buchanan, F.R.S.

MONDAY, MAY 6.

SOCIETY OF ARTS, at 8.—Alloys: Sir W. C. Roberts-Austen, K.C.B., F.R.S.

TUESDAY, MAY 7.

ROYAL INSTITUTION, at 3.—Cellular Physiology: Dr. A. Macfadyen.
 SOCIETY OF ARTS, at 4.30.—The Coal Problem—its Relations to the Empire: Lieut. Carlyon W. Bellairs, R.N.
 ZOOLOGICAL SOCIETY, at 8.30.—On the Spiders of the Family Attidae found in Jamaica: Mr. G. W. Peckham and Mrs. E. G. Peckham.—On the Hymenoptera collected during the "Skeat Expedition" to the Malay Peninsula, 1899-1900: P. Cameron.—On the Arachnida collected during the "Skeat Expedition" to the Malay Peninsula, 1899-1900: M. Eug. Simon.

WEDNESDAY, MAY 8.

SOCIETY OF ARTS, at 8.—School Work in Relation to Business: Sir Joshua Fitch.
 GEOLOGICAL SOCIETY, at 8.—The Influence of the Winds upon Climate during the Pleistocene Epoch: a Palæo-Meteorological Explanation of some Geological Problems: F. W. Harmer.
 IRON AND STEEL INSTITUTE, at 10.30.—Annual Meeting.

THURSDAY, MAY 9.

ROYAL SOCIETY, at 4.30.
 MATHEMATICAL SOCIETY, at 5.30.—(1) A Case of Algebraic Partitionment; (2) On the Series whose Terms are the Cubes and Higher Powers of the Binomial Coefficients: Major MacMahon, R.A., F.R.S.—A Property of Recurring Series: G. B. Mathews, F.R.S.—The Product of Two Spherical Surface Harmonic Functions: J. B. Dale.
 INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Storage Batteries in Electric Power Stations, controlled by Reversible Boosters: J. S. Highfield.
 IRON AND STEEL INSTITUTE, at 10.30.—Annual Meeting.

FRIDAY, MAY 10.

ROYAL INSTITUTION, at 9.—The Response of Inorganic Matter to Mechanical and Electrical Stimulus: Prof. J. C. Bose.
 SOCIETY OF ARTS, at 8.—Polyphase Electric Working: Alfred C. Eborall.
 ROYAL ASTRONOMICAL SOCIETY, at 8.
 MALACOLOGICAL SOCIETY, at 8.

SATURDAY, MAY 11.

ROYAL INSTITUTION, at 3.—The Rise of Civilisation in Egypt: Prof. W. M. Flinders Petrie.

CONTENTS. PAGE

The Physician as Physiologist. By E. A. S. 1
 A German Naturalist in the West Indies and America. By R. L. 2
 A Biblical Encyclopædia. By T. G. B. 3
 Our Book Shelf:—
 Schleiermacher: "Plato's Staat"; Siegert: "John Locke's Versuch über den menschlichen Verstand"; Ueberweg: "Berkeley's Abhandlung über die Prinzipien der Menschlichen Erkenntnis"; Richter: "Berkeley's Drei Dialoge zwischen Hylas und Philonous."—H. W. B. 4
 Jordan and Evermann: "The Fishes of North and Middle America"; a Descriptive Catalogue of the Species of Fish-like Vertebrates, found in the Waters of North America, North of the Isthmus of Panama."—A. G. 4
 Ostwald: "Die Wissenschaftlichen Grundlagen der analytischen Chemie elementar dargestellt" 5
 Lassar-Cohn: "An Introduction to Modern Scientific Chemistry."—A. S. 5
 Drinkwater: "First Aid to the Injured" 5
 Letters to the Editor:—
 Solution of Cubic and Biquadratic Equations.—Prof. G. Chrystal 5
 Electro-Chemistry.—John Hill Twigg; Dr. F. Mollwo Perkin 5
 Unusual Agitation of the Sea.—Hon. Rollo Russell 6
 Recent Developments in Electric Signalling. (Illustrated.) 6
 Indigo and Sugar. By Dr. F. Mollwo Perkin 10
 The Older Civilisation of Greece. (Illustrated.) . . 11
 Magnetic Observations during Total Solar Eclipse. By William Ellis, F.R.S. 15
 Prof. H. A. Rowland. By R. T. G. 16
 Prof. François Marie Raoult. By W. R. 17
 Dr. A. Hirsch 18
 Notes. (Illustrated.) 18
 Our Astronomical Column:—
 Comet *a* (1901) 21
 The April Meteors of 1901. By W. F. Denning . . 21
 Chemistry in its Relations to Engineering. By Prof. Frank Clowes 22
 University and Educational Intelligence 22
 Societies and Academies 23
 Diary of Societies 24