

VOL 29



The Royal Society of London

H.K. Wolfenden del et st.

Bondon 1945

PROCEEDINGS

OF THE

ROYAL SOCIETY OF LONDON.

From May 1, 1879, to December 11, 1879.

VOL. XXIX.

LONDON:

HARRISON AND SONS, ST. MARTIN'S LANE,

Printers in Ordinary to Her Majesty.

MDCCCLXXIX.

LONDON:

HARRISON AND SONS, PRINTERS IN ORDINARY TO HER MAJESTY, ST. MARTIN'S LANE.

CONTENTS.

VOL. XXIX.

No. 196.—May 1, 1879.

Page List of Candidates for Election A Magnetic Survey of the Fortieth Parallel in North America between the Atlantic Ocean and the Great Salt Lake, Utah. By T. E. Thorpe, Ph.D., F.R.S., Professor of Chemistry, Yorkshire College, Leeds........ 1 On certain Definite Integrals occurring in Spherical Harmonic Analysis, and on the Expansion in Series of the Potentials of the Ellipsoid and of the Ellipse. By W. D. Niven, M.A., Fellow of Trinity College, Cambridge 2 On the Origin of the Parallel Roads of Lochaber, and their bearing on other Phenomena of the Glacial Period. By Joseph Prestwich, M.A., F.R.S., F.G.S., &c., Professor of Geology in the University of Oxford 6 May 8, 1879. On the Sensitive State of Electrical Discharges through Rarefied Gases. By William Spottiswoode, P.R.S., and S. Fletcher Moulton, late Fellow of Christ's College, Cambridge 21 On the Action of Solid Nuclei. By Charles Tomlinson, F.R.S. 24 On the Results of the Magnetical Observations made by the Officers of the Arctic Expedition, 1875-76. By Staff-Commander E. W. Creak, R.N., attached to the Admiralty Compass Department 29 On the Relation between the Diurnal Range of Magnetic Declination and Horizontal Force, as observed at the Royal Observatory, Greenwich, during the years 1841 to 1877, and the Period of Solar Spot Frequency. By William Ellis, F.R.A.S., Superintendent of the Magnetical and

Meteorological Department, Royal Observatory, Greenwich.....

May 15, 1879.

| | Page |
|---|------|
| Note on a recent Communication by Messrs. Liveing and Dewar. By J. Norman Lockyer, F.R.S. | 45 |
| Sur la Limite Ultraviolette du Spectre Solaire. Par Mons. A. Cornu | 47 |
| On an Induction-Currents Balance, and Experimental Researches made therewith. By Professor D. E. Hughes | 56 |
| Some Researches with Professor Hughes' new Instrument for the Measurement of Hearing: the Audiometer. By Benjamin Ward Richardson, M.D., LL.D., F.R.S. | 65 |
| Note on the Invention of a Method for making the Movements of the Pulse Audible by the Telephone: the Sphygmophone. By Benjamin Ward Richardson, M.D., LL.D., F.R.S. | |
| On the Capillary Phenomena of Jets. By Lord Rayleigh, F.R.S | 71 |
| | |
| May 29, 1879. | |
| On the Conduction of Heat in Ellipsoids of Revolution. By C. Niven, M.A., Professor of Mathematics, Queen's College, Cork | 98 |
| On a new Method of Investigating the Magnetic Lines of Force in Magnets, demonstrating the Obliquity of the Equator and Axis of Bar Magnets. By Richard C. Shettle, M.D. | |
| Preliminary Report to the Committee on Solar Physics on a Method of Detecting the Unknown Inequalities of a Series of Observations. By Balfour Stewart, F.R.S., Professor of Natural Philosophy in Owens College, Manchester, and William Dodgson | 106 |
| Researches on Explosives. No. II. (Fired Gunpowder.) By Captain Noble, late R.A., F.R.S., F.R.A.S., F.C.S., and F. A. Abel, C.B., F.R.S., V.P.C.S. | |
| Note on the Spectrum of Sodium. By J. Norman Lockyer, F.R.S | 140 |
| List of Presents | 141 |
| | |
| No. 197.—June 12, 1879. | |
| Annual Meeting for the Election of Fellows | 150 |
| | |
| June 19, 1879. | |
| On the Existence of Liebreich's Protagon in the Brain. By Professor Arthur Gamgee, M.D., F.R.S., Owens College, Manchester, and Ernst Blankenhorn, Ph.D. | 151 |
| Note on the Existence of a Milk-curdling Ferment in the Pancreas. By William Roberts, M.D., F.R.S., Physician to the Manchester Royal Infirmary | |
| On some Recent Improvements made in the Mountings of the Telescopes at Birr Castle. By the Earl of Rosse, D.C.L., LL.D., F.R.S | |

| | D |
|--|-----|
| The Measurement of the Ratio of Lateral Contraction to Longitudinal Extension in a Body under Strain. By A. Mallock | |
| The Motion of two Spheres in a Fluid. By W. M. Hicks, M.A., St. John's College, Cambridge | 162 |
| Microscopical Researches in High Power Definition. By G. W. Royston-Pigott, M.A., M.D. Cantab., F.R.S. | 164 |
| Note on Spectroscopic Papers. By G. D. Liveing, M.A., Professor of Chemistry, and J. Dewar, M.A., F.R.S., Jacksonian Professor, University of Cambridge | |
| The Determination of the Secular Effects of Tidal Friction by a Graphical Method. By G. H. Darwin, M.A., formerly Fellow of Trinity College, Cambridge | 168 |
| Researches in Chemical Equivalence. Part III. Nickelous and Cobaltous Sulphates. By Edmund J. Mills, D.Sc., F.R.S., and J. J. Smith | |
| On the Formation of Hydrocyanic Acid in the Electric Arc. By James Dewar, M.A., F.R.S., Professor of Chemistry to the Royal Institution | 188 |
| On the Production of Coloured Spectra by Light. By Captain Abney, R.E., F.R.S. | 190 |
| Relations between the Atomic Weights and certain Physical Properties (Melting and Boiling Points and Heats of Formation) of Elements and Compounds. By Thomas Carnelley, D.Sc., Assistant Lecturer on Chemistry in Owens College, Manchester | 190 |
| Separate Enumerations of Primes of the Form $4n+1$ and of the Form $4n+3$. By J. W. L. Glaisher, M.A., F.R.S., Fellow of Trinity College, Cambridge | 192 |
| On the Effects of Chloroform and Ether on the Radial Tracing. By C. Handfield Jones, M.B. Cantab., F.R.S. | |
| Preliminary Note on a new Tide-Predicter. By E. Roberts, F.R.A.S | 198 |
| Double Refraction and Dispersion in Iceland Spar. An Experimental Investigation with a Comparison with Huyghens' Construction for the Extraordinary Wave. By R. T. Glazebrook, M.A., Fellow of Trinity College, Cambridge | 202 |
| On the Vapour Densities of Potassium and Sodium. By Professor James Dewar, M.A., F.R.S., and Alexander Scott, B.A | 206 |
| The Physical Properties of Liquid Acetylene. By Gerrard Ansdell, F.C.S., Chemical Assistant to the Royal Institution of Great Britain | 209 |
| On the Origin of the Mineral, Structural, and Chemical Characters of Ophites and related Rocks. By Professors W. King, Sc.D., and T. H. Rowney, Ph.D. | 214 |
| Note upon the Behaviour of Oxalic Acid and the Oxalates of the Alkalies, and of Potassium Iodide in Sunlight. By Arthur Downes, M.D., and Thomas P. Blunt, M.A., Oxon | 219 |
| Preliminary Experiments on the Effects of Long-continued Stress on the Elasticity of Metals. By J. T. Bottomley, M.A., F.R.S.E. | 221 |

| | Page |
|--|---------------|
| Note on the paper (read April 24) A Summary of an Inquiry into the Function of Respiration at Various Altitudes on the Island and Pea of Teneriffe. By William Marcet, M.D., F.R.S. | e k 226 |
| Agricultural, Botanical, and Chemical Results of Experiments on the Mixed Herbage of Permanent Meadow, conducted for more that twenty years in succession on the same land. By J. B. Lawes, LL.D. F.R.S., F.C.S., and J. H. Gilbert, Ph.D., F.R.S., F.C.S., F.L.S | n ., 230 |
| On the Comparative Structure of the Cortex Cerebri. By Bevan Lewi L.R.C.P. Lond., Assistant Medical Officer West Riding Asylum, Wake field | 234 |
| An Account of Experiments on the Influence of Colloids upon Crystallin Form, and on Movements observed in Mixtures of Colloids wit Crystalloids. By William M. Ord, M.D. Lond., F.L.S. | h |
| Report to the Committee on Solar Physics on the Basic Lines common to Spots and Prominences. By J. Norman Lockyer, F.R.S | o 247 |
| On a New Method of Studying Metallic Vapours. By. J. Norma Lockyer, F.R.S. | n 266 |
| Supplementary Note on the Volumetric Estimation of Sugar by a Ammoniated Cupric Test giving Reduction without Precipitation. B F. W. Pavy, M.D., F.R.S. | y |
| About some General Laws of Animal Life. By Nicholas Wagner, Professor of Zoology, University, St. Petersburg | . 273 |
| List of Presents | . 274 |
| | |
| No. 198.—November 20, 1879. | |
| Experimental Researches on the Electric Discharge with the Chloride of Silver Battery. By Warren De La Rue, M.A., D.C.L., F.R.S., and Hugo W. Müller, Ph.D., F.R.S. | 1 |
| Researches on the Action of Organic Substances on the Ultra-Violet Ray of the Spectrum. Part III. On Examination of Essential Oils. B. W. N. Hartley, F.R.S.E., &c., Professor of Chemistry in the Royal College of Science for Ireland, Dublin, and A. K. Huntington, F.I.C. | V |
| F.C.S., Associate of the Royal School of Mines | 290 |
| Preliminary Note on Magnetic Circuits in Dynamo- and Magneto-Electri Machines. By Lord Elphinstone and Charles W. Vincent, F.R.S.E. F.C.S., F.I.C. | , |
| Further particulars of the Transit of Venus across the Sun, December 9 1874; observed on the Himalaya Mountains, Mussoorie, at Mary-Villa Station, Lat. 30° 28′ N., Long. 78° 3′ E., height above sea 6,765 feet with the Royal Society's 5-inch Equatoreal. Note III. By J. B. N. Hennessey, F.R.S. | , |
| Preliminary Report to the Committee on Solar Physics on the evidence in favour of the Existence of certain Short Periods common to Solar and Terrestrial Phenomena. By Balfour Stewart, F.R.S., Professor of Natural Philosophy in Owens College, Cambridge, and William | |
| Dodgson | 303 |

| On the Solubility of Solids in Gases. By J. B. Hannay, F.R.S.E., F.C.S., and James Hogarth | Page 324 |
|--|-------------|
| On the Action of Nuclei in producing the Sudden Solidification of Super- saturated Solutions of Glauber's Salts. By Charles Tomlinson, F.R.S. | |
| On Definite Integrals involving Elliptic Functions. By J. W. L. Glaisher, M.A., F.R.S., Fellow of Trinity College, Cambridge | 331 |
| Values of the Theta and Zeta Functions for certain Values of the Argument. By J. W. L. Glaisher, M.A., F.R.S., Fellow of Trinity College, Cambridge | |
| On Certain Definite Integrals. No. 5. By W. H. L. Russell, F.R.S | 361 |
| On the Normal Paraffins. Part III. By C. Schorlemmer, F.R.S., Professor of Organic Chemistry in Owens College, Manchester | 364 |
| The Geometric Mean, in Vital and Social Statistics. By Francis Galton, F.R.S. | 365 |
| The Law of the Geometric Mean. By Donald McAlister, B.A., B.Sc., Fellow of St. John's College, Cambridge | 367 |
| Note. By F. Chambers | 376 |
| | |
| | |
| November 27, 1879. | |
| On the Structure of Serous Glands in Rest and Activity. By J. N. Langley, M.A., Fellow of Trinity College, Cambridge | 377 |
| On the Changes in Pepsin-forming Glands during Secretion. By J. N. Langley, M.A., Fellow of Trinity College, Cambridge, and H. Sewall, B.Sc., Fellow of the Johns Hopkins University, Baltimore, U.S.A | 383 |
| Report on the Phyto-Palæontological Investigations on the Fossil Flora of Sheppey. By Dr. Constantin Baron Ettingshausen, Professor in the University of Graz, Austria | 388 |
| A Memoir on the Single and Double Theta Functions. By A. Cayley, F.R.S., Sadlerian Professor of Pure Mathematics in the University of Cambridge | 397 |
| On the Spectra of Sodium and Potassium. By G. D. Liveing, M.A., F.R.S., Professor of Chemistry, and J. Dewar, M.A., F.R.S., Jacksonian Professor, University of Cambridge | |
| On the Reversal of the Lines of Metallic Vapours. No. VII. By G. D. Liveing, M.A., F.R.S., Professor of Chemistry, and J. Dewar, M.A., F.R.S., Jacksonian Professor, University of Cambridge | 402 |
| | |
| Anniversary Meeting. | |
| | 100 |
| Report of Auditors | |
| List of Fellows deceased since last Anniversary | |
| elected | 301 |

| Address of the President | Page 407 |
|--|-------------|
| Presentation of the Medals | |
| Election of Council and Officers | |
| Financial Statement433- | |
| Trust Funds | |
| Account of Grants from the Donation Fund in 1878–79 | |
| Account of the Appropriation of the sum of £1,000 (the Government Grant) annually voted by Parliament to the Royal Society, to be employed in aiding the advancement of Science | |
| Account of Appropriations from the Government Fund of £4,000 made by the Lords of the Committee of Council on Education, on the recom- mendation of the Council of the Royal Society | 442 |
| Report of the Kew Committee | 445 |
| List of Presents | 465 |
| | |
| No. 199.—December 11, 1879. | |
| Thermo-Electric Behaviour of Aqueous Solutions with Mercurial Electrodes. By G. Gore, LL.D., F.R.S. | |
| Quantitative Spectroscopic Experiments. By Professor G. D. Liveing, M.A., F.R.S., and Professor James Dewar, M.A., F.R.S. | 482 |
| Further Experiments on the Vapour Densities of Potassium and Sodium. By Professor James Dewar, M.A., F.R.S., and Alexander Scott, B.A | 490 |
| On the Practical Solution of the Most General Problems in Continuous Beams, By John Perry and W. E. Ayrton | 493 |
| List of Presents | 506 |
| Index | |
| | |
| Obituary Notices :— Dr. Peyton Blakiston | i |
| William Froude | ii |
| Baron John Benjamin Heath | vi |
| Professor Kelland | vii |
| Sir Thomas Larcom | x |
| Sir John George Shaw-Lefevre | xv |
| | viii |
| Mr. Anthony Mervyn Reeve Story-Maskelyne | XX |
| Sir James Matheson | xxi |
| John Miers | xxii |
| | xiii |
| 7, 1 | XXV |
| John Waterhouse x | |
| Ernst Heinrich Weber xx | |
| Bennet Woodcroftx | xxii |