

done more than Lord Derby to further the movement for the establishment of the university. Lord Derby, on accepting the charter, said they could now hope that the new university would become the centre of learning of a great, active, industrious, and well-employed population. Sir Oliver Lodge, who took part in the proceedings, remarked in the course of a speech that something substantial must be done for higher education. Hitherto the country had been content to leave this to private munificence, and private munificence had done well, but unaided it was unequal to the burden. He trusted it was not impolitic for him to say, without regard to party questions, that he regretted that a registration duty which was doing no harm, and was hardly a subject of controversy, should have been flippantly thrown away when no longer needed for the Exchequer, instead of being ear-marked for higher education. That amount would have been sufficient to put the education of the country on a sound, thorough, and, indeed, magnificent basis, and would have enabled them to hold up their heads once more amongst the educated nations of the world. Referring to local support, Sir Oliver Lodge expressed the hope that whatever aid was given by the municipality, they would not abolish fees. It was only just, right, and natural that those who specially utilised the institution should make special contributions to it, but by all means they ought to provide scholarships for unmoneyed ability. His advice was that the scholarships should be provided as little as possible on the basis of competitive examination and as much as possible on the basis of nomination from schools and institutions to which the scholarships were assigned.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 18.—“On the Magnetic Expansion of the Less Magnetic Metals.” By P. E. **Shaw**, B.A., D.Sc. Communicated by Prof. J. H. Poynting, F.R.S.

Research has been made by various observers, notably Nagaoka and S. Bidwell, on the relation between field (H) and expansion per unit length ($\delta l/l$) resulting from that field of the metals iron, nickel and cobalt. Bismuth also has been tested, but the consensus of opinion is that it shows no expansion under any field so far applied to it. Outside the ferromagnetic group bismuth has the largest susceptibility (k) of any substance, and the tacit assumption seems to have been made that if bismuth shows no expansion, it is vain to look for it in less susceptible metals. But there is no direct relation between k and $\delta l/l$; iron has maximum k six times as much as nickel, and yet expands far less than it for any known field, and so on.

It seems possible, therefore, that there may be appreciable movement for large fields in the case of metals other than the ferromagnetics. This paper gives an account of tests applied to specimens of bismuth, silver, aluminium, copper, zinc, brass, bronze, lead and tin. It is very difficult in working with large fields to avoid movements due to induction and attraction of iron (if any) in the apparatus, or to solenoidal suction or to a straining of the magnetising coil to set itself in the earth's field. These movements are small, but the apparatus is very sensitive, as it measures any movement more than 4×10^{-9} of the length of the specimen (19 cm.). The measuring instrument was the electric micrometer. By great care and repeated change in the arrangement these sources of error were eliminated, and it was found that no movement (more than the amount stated), positive or negative, occurs for any field up to the large one of 1900 C.G.S. No previous tests have been applied to any of these metals except bismuth. Bidwell has tested this metal with a field of 1500 C.G.S., and with a measuring apparatus which would show a movement of 1.4×10^{-8} of the length of the specimen, yet no movement was found. No other test has been so searching as the above. This definite negative conclusion involves two corollaries. (a) It is generally supposed that the small impurity of iron occurring in commercial pure metals would produce expansion on its own account which would mask any small expansion of the metal, but these experiments show no such expansion, and do not confirm the simple

superposition theory. (b) The Maxwell strain $B^2/8\pi M$ cannot exist in the material rods tried, or it would have been easily detected, so we have fresh evidence that there is no mechanical connection, unless an extremely weak one, between matter and ether.

A note is appended to the paper in which Mr. G. A. Schott calculates the correction factor which must be applied to the ordinary expression for field $H = 4\pi n\gamma$, when the field is taken over the whole length of the coil used.

Royal Society.—“The Maximum Order of an Irreducible Covariant of a System of Binary Forms.” By A. **Young**. Communicated by Major P. A. MacMahon, D.Sc., F.R.S. Received September 26.

CAMBRIDGE.

Philosophical Society, October 26.—Dr. Baker, president, in the chair.—On nutrition and sex determination in man, by Mr. R. C. **Punnett**. Making use mainly of the London census of 1901, the author showed that if the various boroughs were divided into three groups of increasing poverty, the proportion of male to female births was least in the poorest and greatest in the wealthiest of these groups—in other words, the better the nutrition the greater the proportion of male births. It was shown, however, that there are certain factors, e.g. infant mortality, birth rate, and marriage age, which influence the above three groups unequally. When allowance is made for these factors it is likely that the proportion of the sexes produced in each group would be nearly identical, from which was inferred the improbability of different conditions of nutrition affecting sex determination in man.—Note on the action of radium rays and light on mercurous sulphate, by Mr. S. **Skinner**.—Note on the pulverisation of nickel grains in fuming nitric acid, by Dr. W. A. **Hollis**.—On the specific heat of gaseous carbon dioxide at high pressures under constant volume, by Mr. W. A. D. **Rudge**.—On some minerals from the Binnenthal, Switzerland, by Mr. R. H. **Solly**.—(1) The theory of the multiple gamma function; (2) the asymptotic expansion of integral functions of multiple linear sequence, by the Rev. E. W. **Barnes**.—The expression of the double zeta function and double gamma function in terms of elliptic functions, by Mr. G. H. **Hardy**.—On the kinetic theory of matter, by Mr. H. C. **Pocklington**.

PARIS.

Academy of Sciences, November 2.—M. Albert Gaudry in the chair.—On the non-regeneration of the spheridia in the sea-urchin, by M. Yves **Delage**. The experimental results described are in opposition to the hypothesis that the spheridia are the organs of equilibrium, since the removal of them does not permanently affect the powers of locomotion. Immediately after the removal of the spheridia the sea-urchins turn with more difficulty, but after some time it is impossible to distinguish them from others in this respect. This is not due to the regeneration of the spheridia, as there is no sign of them reappearing, three months after the operation.—Remarks on a communication of M. Raphael Dubois of October 19 last, by M. Edm. **Perrier**. Filippi was the first to state in 1852 that pearls were due to the presence of a parasite in the oyster, but his views were strongly contested. The results of the experiments of M. R. Dubois support this theory, and further confirmation is supplied from the laboratory of Rikitea.—Note by M. **Appell** on the second volume of his “Traité de Mécanique rationnelle.”—On new effects produced by the n -rays; generalisation of the phenomena originally observed, by M. R. **Blondlot**. The n -rays are rays given off by various sources of light, capable of passing through an aluminium screen, and recognisable by their action upon a small electric spark or upon a feebly phosphorescent screen. It has now been found that these rays cause a slight but distinct increase in the luminosity of a feebly illuminated paper screen, and this effect is retained by the rays after reflection at a polished metallic surface.—On the virtual sugar of the blood, by MM. R. **Lépine** and **Boulud**. The carbohydrate present in the blood, measured by its reducing power and expressed as glucose, is frequently more abundant in the blood from the right ventricle than in arterial blood, and this contains more than blood from the veins.—The influence of mineral food upon the production of the sexes in diceceous plants, by M. Émile **Laurent**.—On left-handed

curves of constant torsion, by M. W. de Tannenberg.—On the determination of singular classes of Taylor's series, by M. Émile Borel.—On some points in the theory of ensembles, by M. Ernst Lindelöf.—On the relation between the pressure and the rate of chronometers, by M. Paul Ditisheim. It has been found that the variations in the rate are proportional to the differences in the pressure of the air. The action increases as the balance wheel is diminished, but tends towards a limit when the wheel is very small.—Remarks on the preceding paper, by M. Ch.-Éd. Guillaume. The effect produced would appear to be due to a small mass of air carried round with the balance wheel.—On the magnetic storm of October 31, by M. Th. Moureaux. The extreme amplitude of the variation is 0.0068 C.G.S. units for the horizontal component, and 0.0052 for the vertical component, numbers corresponding to 1/29 and 1/81 of the absolute values of these components.—On a variety of filiform carbon, by MM. Constant and Henri Pélabon. This form of carbon is formed from heavy hydrocarbons by the action of a very high temperature. It is attacked by fuming nitric acid and potassium chlorate.—On the separation and estimation of iron and phosphoric acid in water, by M. H. Causse.—On a method of synthesis of symmetrical dihalogen derivatives of benzophenone, by M. F. Bodroux. *p*-Dibromo-benzene treated with magnesium in the presence of dry ether gives $\text{BrC}_6\text{H}_4\text{MgBr}$, and this with carbon dioxide gives a substituted benzoic acid and a ketone. Further examination of the latter has shown it to be symmetrical di-*p*-bromophenyl-ketone. At a very low temperature the acid is the chief product, the proportion of ketone produced increasing with the temperature.—The application of pyridine to the preparation of some amides, by M. P. Freundler.—On the use of magnesium amalgam in organic chemistry, by M. Louis Meunier. Details of the preparation of diphenylmethane and ethyl derivatives of malonic esters are given.—On ortho-toluic aldehyde, by M. H. Fournier. This aldehyde is prepared in the pure state by the oxidation of the corresponding alcohol.—On the coagulation of starch, by MM. J. Wolf and A. Fernbach.—The olfactory sense of the snail (*Helix pomatia*), by M. Émile Yung. The sense of smell is, as a rule, limited to a distance of 2 to 3 cm.—The osmotic regulation of the internal liquids in Echinoderms, by MM. Victor Henri and S. Lalou. The results show that all the membranes which separate the internal fluids of the sea-urchins from the external liquid are semi-permeable.—On the fatty materials and the acidity of flour, by M. Balland.

DIARY OF SOCIETIES.

THURSDAY, NOVEMBER 12.

MATHEMATICAL SOCIETY, at 5.30.—Annual General Meeting.—On Sequences of Sets of Intervals containing a Given Set of Points: W. H. Young.—On Spherical Curves: H. Hilton.—On the Weddle Quartic Surface: Dr. H. F. Baker.—A Formal Generalisation of Maclaurin's Theorem: Rev. F. H. Jackson.—Diffraction: W. H. Jackson.—A General Theorem concerning Absolutely Convergent Series: G. H. Hardy.—Note on Borgnet's Method of Dividing an Angle in an Arbitrary Ratio: Prof. J. D. Everett.—On an Expression of the Electromagnetic Field by Means of Two Scalar Potential Functions: E. T. Whittaker.—The Propagation of Wave-motion in an Isotropic Elastic Solid Medium: Prof. A. E. H. Love.—Notes on Quaternions, including a Simple Construction for *Va3y*: Prof. R. W. Genese.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Inaugural Address by the President, Mr. Robert Kaye Gray.

FRIDAY, NOVEMBER 13.

PHYSICAL SOCIETY, at 8.—(1) Means for Electrifying the Atmosphere on a Large Scale; (2) an Arrangement for driving Mercury Pumps: Sir Oliver J. Lodge and Benjamin Davies.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Observations of Mars in 1903: Rev. T. E. R. Phillips.—Observations of Variable Stars, edited by H. H. Turner: Sir C. E. Peek (the late).—Ephemeris for Physical Observations of the Moon, 1904: A. C. D. Crommelin.—Results of Double Star Measures, 1902: J. Tebbutt.—Systematic Proper Motions of Bright Stars relatively to Faint Stars in the Oxford Zones (+25° to +31°): H. H. Turner.—Measures of Southern Double Stars, 1902-3: J. L. Scott.—Observations of Borrelly's Comet (*c* 1903): Natal Observatory.—Remarks on a Paper by Mr. Cooke on a New Method of Determining Time, Latitude and Azimuth: E. B. H. Wade.—Preliminary Note on the Effect of the Direction of Gravity on Lunar Observations: E. B. H. Wade.—A Spectrographic Study of β Libræ: Rev. W. Sidgreaves.—Observations of White Spots on Saturn: A. S. Williams.—*Promised Papers*:—Note on a Method of Photographing the Moon and surrounding Stars: H. H. Turner.—Errors in the Moon's Tabular Longitude from 1750: P. H. Cowell.—On the Large Sun-spots of 1903 October and November, and Associated Magnetic Disturbances. Communicated by the Astronomer Royal: Royal Observatory, Greenwich.—Note on Photographs of Comet *c* 1903 (Borrelly). Communicated by the Astronomer Royal: Royal Observatory, Greenwich.

TUESDAY, NOVEMBER 17.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Discussion of Paper on Tensile Tests of Mild Steel, and the Relation of Elongation to the Size of the Test-bar: Prof. W. C. Unwin, F.R.S.

ZOOLOGICAL SOCIETY, at 8.30.—Note upon the Tongue and Windpipe of the American Vultures, with Remarks on the Inter-relations of the Genera *Sarcorhamphus*, *Pygypus* and *Cathartes*: F. E. Beddard, F.R.S.—On the Mammals of Cyprus: Miss Dorothy M. A. Bate.—Report on the Fishes collected by Mr. Oscar Neumann and Baron Carlo von Erlanger in Gallaland and Southern Ethiopia: G. A. Boulenger, F.R.S.

ROYAL STATISTICAL SOCIETY, at 5.30.—Annual Presidential Address: Major Patrick G. Craigie, C.B.

MINERALOGICAL SOCIETY, at 8.—On Sartorite, Anatase, Galena and other Minerals from the Binnenthal: R. H. Solly.—On the Pleochroism of Adamite: L. J. Spencer.

WEDNESDAY, NOVEMBER 18.

CHEMICAL SOCIETY, at 5.30.—Constitution of Ethyl Cyanacetate. Condensation of Ethyl Cyanacetate with its Enolic Form: P. Remfry and J. F. Thorpe.—The Action of Water and Dilute Caustic Soda Solutions on Crystalline and Amorphous Arsenic: W. T. Cooke.—The Union of Carbon Monoxide and Oxygen, and the Drying of Gases by Cooling: A. F. Girvan.—Note on a Double Chloride of Molybdenum and Potassium: G. G. Henderson.—Simplification of Zeisel's Method for the Determination of Methoxy- and Ethoxy-Groups: W. H. Perkin, Senr.—The Action of Benzamidine on Olefine β -Diketones: S. Ruhemann.

GEOLOGICAL SOCIETY, at 8.—On the Occurrence of Edestus in the Coal-measures of Britain: E. T. Newton, F.R.S.—Notes on some Upper Jurassic Ammonites, with special reference to Specimens in the University Museum, Oxford: Miss Maud Healey.

SOCIETY OF ARTS, at 8.—Opening Address of the 150th Session: Sir William Abney, K.C.B., F.R.S., Vice-President and Chairman of the Council.

ENTOMOLOGICAL SOCIETY, at 8.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—The Great Dustfall of February 21 and 22, 1903, and its Origin: Dr. Hugh Robert Mill and R. G. K. Lempfert.

ROYAL MICROSCOPICAL SOCIETY, at 8.—Microscopic Resolution: Prof. J. D. Everett, F.R.S.—The Mouth Parts in the Nemocera and their Relation to the other Families in Diptera: Walter Wesché.

THURSDAY, NOVEMBER 19.

ROYAL SOCIETY, at 4.30.—The Physiological Action and Antidotes of Colubrine and Viperine Snake Venoms: Dr. L. Rogers.—The Cell Structure of the Cyanophyceæ: H. Wager.—On the Rapidity of the Nervous Impulse in Tall and Short Individuals: Dr. N. H. Alcock.—Electrometer Records of Secretory Changes: Dr. A. D. Waller, F.R.S.—On the Nematocysts of Acolids: G. H. Grosvenor.

CONTENTS.

PAGE

The Scientific Work of the Imperial Institute. By C. Simmonds	25
Babylonian Demonology	26
Line Geometry. By J. H. G.	27
Our Book Shelf:—	
Sheppard: "Geological Rambles in East Yorkshire"	27
Cordemoy: "Les Produits coloniaux d'Origine animale (Bibliothèque Coloniale)."—R. L.	28
Strasburger, Noll, Schenck, and Schimper: "A Text-Book of Botany"	28
Conn: "Bacteria in Milk and its Products."—Prof. R. T. Hewlett	28
Finn: "Junior Algebra Examination Papers"	28
Letters to the Editor:—	
Hyksos-Hittites.—X.	29
Telegraphic Disturbances in Spain on October 31.—Prof. Augusto Arcimis	29
The November Leonids.—W. F. Denning	29
Leaf Decay and Autumn Tints.—Dr. P. Q. Keegan	30
Variation of Atmospheric Absorption.—J. Talbot	30
Rocket Lighting.—Prof. J. D. Everett, F.R.S.	30
Explosive Action of Lightning.—R. A. West	31
The "Sky-coloured" Clouds.—T. W. Backhouse	31
The Geology of Vanua Levu. (<i>Illustrated.</i>) By Prof. T. G. Bonney, F.R.S.	31
Electric Convection.	32
Notes	33
Our Astronomical Column:—	
Revision of Rowland's Wave-lengths	37
Parallax of β -Cassiopeiæ	38
Astronomy in Schools	38
Universities: Their Aims, Duties, and Ideals. By Prof. A. R. Forsyth, F.R.S.	38
Astronomy and Meteorology at the British Association. By Dr. W. N. Shaw, F.R.S.	42
Archæology of the Coast of North-west Florida. (<i>Illustrated.</i>) By A. C. H.	45
University and Educational Intelligence	46
Societies and Academies	47
Diary of Societies	48