

be shown to an audience, as the opaque deposit over the greater part of the tube obscures them.

It has only been possible this evening to bring forward a selection of the results of two years' work on this subject at the Imperial College, with generous help from colleagues, and facilities provided by the governors.

Let me conclude by reading to you a prophetic passage from one of Faraday's letters to Schönbein:—"What of nitrogen? Is not its apparent quiet simplicity of action all a sham? Not a sham, indeed, but still not the only state in which it can exist. If the compounds which a body can form, show something of the state and powers it may have when isolated, then what should nitrogen be in its separate state? You see I do not work; I cannot. But I fancy, and stuff my letters with such fancies (not a fit return) to you."

#### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

A NEW chair of bacteriology is to be founded in Edinburgh University under a bequest from Mr. Robert Irvine, of Royston, Granton. At his death, eleven years ago, Mr. Irvine bequeathed 230 shares of 10*l.* each in a company for developing the resources of Christmas Island for the purpose of establishing the chair when the interest from the shares should reach 25,000*l.* or 30,000*l.* The accumulated dividends on these shares now reach more than 30,000*l.* It is understood that 25,000*l.* will go towards the maintenance of the professorship, and that the remaining 5000*l.* will be used in providing the class-rooms, laboratories, and the necessary equipment.

ATTENTION has already been directed to the progress which has been made in the provision of well-equipped laboratories for the study of electrical technology and kindred subjects in the University of Hong Kong. Prof. C. A. Middleton Smith has sent us an exhaustive list of engineering and other equipment which has been presented to the University by public-spirited manufacturing firms. Their generous support of the cause of higher technical education in the distant parts of the Empire is sure to be productive of excellent results, and is worthy of emulation by other firms. The greatest support seems to have been received for the department of heat engines, and the authorities in Hong Kong hope that more offers of apparatus will be received from firms interested in electrical engineering. A complete equipment is required for experiments in all branches of electrical work, and an appeal is made to manufacturers that this branch of engineering shall be represented worthily in the equipment presented to the University. It is impossible here to mention each of the gifts which have been made, but as indicative of the substantial character of the gifts, the complete spectrographic outfit presented by Messrs. Adam Hilger and Co., and the Sankey's hand-bending testing machine given by Mr. Casella, may be mentioned.

#### SOCIETIES AND ACADEMIES.

##### LONDON.

**Physical Society**, April 25.—Prof. C. H. Lees, F.R.S., vice-president, in the chair.—W. R. Bower: A graphical method of optical imagery. The paper contains a development of optical imagery based on elementary geometry, including limiting positions, but excluding cross-ratios, centres of perspective, &c. The method

adopted is useful for teaching the properties of optical systems to those who are not essentially students of pure mathematics, and can be satisfactorily used by those capable of draughtsmanship with mathematical instruments.—Dr. C. V. Burton: The spectroscopic resolution of an arbitrary function. An ordinary grating has periodic rulings, and a spectrum obtained by means of it is characteristic of the radiation entering the spectroscope-slit. But if the radiation is homogeneous, while the distribution of the rulings is arbitrary, we obtain a spectrum characteristic of the grating. It is thus found to be theoretically possible to resolve spectroscopically a given arbitrary function  $\phi(x)$  into its harmonic constituents. The theory of the proposed method of resolving functions is discussed, and is as complete as that of ordinary spectroscopy, while in one respect it is more simple; for, since the light entering the spectroscope-slit is entirely of one wave-length, the comparison of intensities of spectral lines (whether visually or photographically) is facilitated.

**Linnean Society**, May 1.—Prof. E. B. Poulton, F.R.S., president, in the chair.—Prof. P. Groom and W. Rushton: The structure of the wood of East Indian species of *Pinus*.—Dr. Winifred Brenchley: Branching specimens of *Lyginodendron oldhamium*, Will.—A. C. F. Morgan: A problem in Weismannism.—Mrs. L. J. Wilmore: *Sphenopus marsupialis*.—Papers on collections made by the Percy Sladen expedition to the Indian Ocean:—Miss Helen L. M. Pixell: Polychæta of the Indian Ocean, with some species from the Cape Verde Islands. The Serpulidæ, with a classification of the genera *Hydroides* and *Eupomatus*.—S. Hirst: Report on the Arachnida of the Seychelles.—Miss Marjorie Lindsay: *Gypsina plana*, Carter.—A. Grouvelle: Nitidulæ, Heterocidæ.—A. Raffray: Pselaphidæ de l'Archipel des Seychelles.—Dr. K. Jordan: Anthribidæ of the Seychelles.—S. Maulik: Hispinæ from the Seychelles.—Dr. K. Jordan: Certain changes in nomenclature of Lepidoptera proposed by Dr. Verity.

**Zoological Society**, May 6.—Dr. Henry Woodward, F.R.S. vice-president, in the chair.—Dr. F. E. Beddard: The anatomy and systematic arrangement of the Cestoidea. This paper, the tenth of the series, contained an account of two species of tapeworms found in a Dongolan genet, both of which were described as new, one being made the type of a new genus.—J. A. Milne: Pacific salmon: an attempt to evolve something of their history from an examination of their scales. Reasoning from the similarity of their appearance to the scales of the other Salmonidæ, the author pointed out that all the migratory species except *Onchorhynchus kita* remain for at least a year in fresh water before proceeding to the sea—in the Fraser River district, at any rate. He also showed the scale of a quinnat, and pointed out that it was scarcely possible to avoid the conclusion that that fish had already spawned once before it was captured.—Miss Kathleen Haddon: Notes on *Peripatoides woodwardii*, Bouvier. This paper was based on material collected in Western Australia, consisting of twenty specimens, male and female, ranging in size from 17 to 46 mm., thus considerably exceeding in length those described by Prof. Bouvier. Various types of coloration are exemplified, some being blue-green with small yellow spots, while others have the yellow pigment increased so as to give a tawny appearance to the animal; a dark variety of this latter type also occurs.—J. C. F. Fryer: Field-observations on the enemies of butterflies in Ceylon. It was concluded (1) that in Ceylon, with the exception of the

wood-swallow, birds are not formidable enemies to butterflies; (2) that owing to the propensity of the wood-swallow for members of the genera *Danais* and *Eupleca*, a resemblance to them would be not a safeguard but a danger.

**Mathematical Society**, May 8.—Prof. A. E. H. Love, president, in the chair.—Prof. W. Burnside: Some properties of groups the orders of which are powers of primes. Prof. H. S. Carslaw: The Green's function for the equation  $\nabla^2 u + k^2 u = 0$ .—Prof. W. H. Young: The usual convergence of a class of trigonometrical series.—W. F. Sheppard: (1) Factorial moments in terms of sums or differences; (2) fitting of polynomials by the method of least squares.—S. Lees: The effect of internal friction on stress-strain relationships for elastic solids.

**Royal Astronomical Society**, May 9.—Major Hills, C.M.G., F.R.S., president, in the chair.—Rev. A. L. Cortie: The mode of propagation of the sun's influence in magnetic storms. The author considered that the rays which proceed from the sun are not single kathode rays, as frequently assumed, but divergent. The solar corona as photographed at the eclipses of 1893, 1898, 1905, and 1908 showed systems of diverging rays apparently connected with spot groups. The study of these led to the conclusion that the mode of propagation of the influences which condition magnetic storms from the sun has the form of rays diverging from the foci of sun-spot disturbances. The sun-spots would not directly cause the storms, but rather condition them, perhaps by rendering the upper atmosphere a better electrical conductor.—H. Kimura: The harmonic analysis of sun-spot relative numbers.—H. H. Turner: The harmonic analysis of Wolf's sun-spot numbers, with special reference to Mr. Kimura's paper.—J. Jackson: The discordance between the observed and predicted positions of Jupiter's eighth satellite. The author made an appeal for further observations during the present year, which is a favourable occasion, as the satellite is now as much as  $3^\circ$  from the planet; the observations would have to be made in southern latitudes owing to the position of Jupiter.—R. A. Sampson: The correction of the field of a Newtonian reflector. The various defects of spherical aberration, coma, astigmatism, curvature of field, and distortion were separately dealt with, and an arrangement of three lenses was suggested, which would render the field of a Newtonian reflector practically perfect.—C. V. L. Charlier: An investigation on the motion of the stars.—**Royal Observatory, Greenwich**: The photographic magnitudes determined with the Greenwich astrophysical equatorial; corrections depending on distance from the plate-centre.

#### PARIS.

**Academy of Sciences**, April 28.—M. F. Guyon in the chair.—A. Haller and Edouard Bauer: The methylation of isovalerone by means of sodium amide and methyl iodide. Tetramethylisovalerone or 2:3:3:5:5:6-hexamethyl-4-heptanone. The di-, tri-, and tetramethylisovalerones were isolated from the crude product of the reaction between sodium amide, isovalerone, and methyl iodide. The tetra-derivative was reduced to the corresponding alcohol by means of sodium and ethyl alcohol.—A. Laveran and M. Marullaz: Contribution to the morphological study of *Toxoplasma gondii* and of *T. cuniculi*. From the morphological point of view the differences between *T. cuniculi* and *T. gondii* are not sufficiently marked to justify their distinction into two species.—M. Gouy was elected a non-resident member, M. Schwoerer a

correspondant for the section of mechanics (in the place of the late M. Dwelshauvers-Dery), and Prof. W. M. Davis a correspondant for the section of geography and navigation (in the place of the late Sir George Darwin).—M. Simonin: Results of the discussion of the observations made during the eclipse of the sun of April 16–17, 1912. From a discussion of all the available observations it is concluded that the first external contact was observed on the average six seconds too late, and the last contact three seconds too soon; the observations of the interior contacts appear to be free from systematic error.—G. H. Hardy and J. E. Littlewood: The Fourier's series of a squared function capable of summation.—Louis Roy: The movement of viscous media and quasi-waves.—Albert Turpain: The application of highly sensitive galvanometers to geodesy. A description of a special type of galvanometer capable of registering the time signals of the Eiffel Tower.—J. M. Laby: The rectification of records deformed by the circular movements of the inscribing point.—Georges Claude: The absorption of neon by the electrodes of luminescent tubes. Neon is characterised by a remarkable resistance to absorption by the electrodes, as compared with helium or nitrogen. This fact is of practical importance in connection with the use of neon tubes for lighting purposes.—Ed. Chauvenet and G. Urbain: The density of the double salts. The case of the chlorides of copper and ammonium.—Jean Bielecki and Victor Henri: The quantitative study of the absorption of the ultra-violet rays by ketones, diketones, and the ketonic acids.—A. Guyot and A. Kovache: The action of formic acid upon the colouring matters derived from triphenylmethane.—Gustave Chauveaud: The evolution of the conducting apparatus in *Veronica*.—Raoul Bayeux: The comparative resistance of the dog and the rabbit to intravenous injections of oxygen. In proportion to its weight, the dog can tolerate in its veins a quantity of oxygen more than twenty-five times greater than a rabbit.—H. Charrier: Some modifications of the muscular tissue at the moment of sexual maturity in *Nereis fucata*.—Bernard Collin: A new *Ellobiopsis*, a parasite of *Parallobiopsis coutieri*.—F. Picard and G. R. Blanc: A bacillary septicæmia in the caterpillars of *Arctia caja*.—R. Marcille: The use of ammoniacal salts in vinification. Musts deficient in volatile nitrogen and requiring an undue length of time for complete fermentation can be made to ferment normally by the addition of ammonium phosphate or sulphate.—H. Dorlencourt: Study on the urinary elimination of morphine injected into an animal not previously treated with the drug. A small proportion of morphine injected into the rabbit is always eliminated by the kidney. The morphine is recovered from the urine, unchanged, traces only of oxydimorphine being detected.—Ph. Glangeaud: The eight eruptive phases of the volcano of Puy de Côme.—M. Aubert: Beynes in prehistoric times.

May 5.—M. F. Guyon in the chair.—Armand Gautier and Paul Clausmann: Fluorine in the animal organism. The skin and its appendages. A method for the exact determination of minute amounts of fluorine was worked out by the authors and described about a year ago. This method is now being applied to the systematic examination of various parts of the body for the amount of fluorine. The results for the skin, hair, dental enamel, and nails are given in the present paper.—M. Bazin was elected a non-resident member.—Charles Nordmann: The effective temperatures of the stars. A comparison of the results obtained for twelve stars by Rosenberg and the author. Although

the methods used were based on different principles, with one exception (*a Lyra*), the agreement in the estimated temperatures is close, the differences being of the order of the experimental error. The results agree with the thermal classification of Sir Norman Lockyer, deduced from the qualitative study of stellar spectra.—**J. Guillaume**: Observations of the sun made at the Observatory of Lyons during the first quarter of 1913. Observations were possible on sixty-five days, and tables are given showing the number of spots, their distribution in latitude, and the distribution of the faculæ in latitude.—**Th. Anghelutza**: Some remarks on the exponential development of Cauchy.—**G. Bouligand**: Green's function for an indefinite cylinder.—**M. Hadamard**: Remarks on the preceding note.—**J. de Boissoudy**: The constant of the law of radiation.—**G. A. Dima**: The influence of the valency of the metal on the photoelectric effect of metallic compounds. In all the cases examined the compound in which the metal has the smallest valency appears to have the greatest photoelectric power.—**Louis Riéty**: The electromotive force produced by the flow of solutions of electrolytes through capillary tubes. Data are given for solutions of varying concentrations of potassium chloride, nitrate and sulphate, potash, hydrochloric and sulphuric acids.—**C. Gutton**: The determination of the time required for the establishment of electrical double refraction. The times found ranged from 0.6 to 1.4 hundred-millionth of a second. These are of the order of Maxwell's time of relaxation, and agree with the theory that double refraction is the result of a molecular orientation.—**H. Magunna**: A mechanical means for keeping tuning-forks or plates in continuous vibration.—**Em. Vigouroux**: The transformations of the alloys of iron and silicon. A discussion of a recent paper by G. Charpy and A. Cornu concerning the transformation point  $A_2$ .—**G. Reboul**: Chemical reactions and radii of curvature. It has been shown by the author that the chemical action of a gas on a solid depends on the form of the latter, the action being greatest at the points where the curvature of the solid is greatest. It is now found that if two copper wires of different diameter are placed close together in an atmosphere capable of forming a compound with the copper, the fine wire appears to exert a protective action on the coarser wire, the former only being attacked.—**Camille Matignon**: The preparation of barium. An intimate mixture of barium oxide and silicon in the proportion  $3BaO : Si$  is heated in a steel tube to  $1200^\circ C.$ ; barium is formed, and distils into the cooler portion of the tube. The yield is good, and the metal proved to be of 98.5 per cent. purity. Ferrosilicon with 95 per cent. silicon can replace the silicon.—**M. Hanriot** and **A. Kling**: The action of reducing agents on the chloraloses. Sodium and aluminium amalgams were used as reducing agents; compounds containing one and two atoms of chlorine were isolated and described.—**A. Wahl** and **P. Bagard**: Syntheses in the indigo group.—**Marcel Lantenois**: The preparation of carbon tetraiodids. Two methods were found practicable, the interaction of carbon tetrachloride and lithium iodide and the action of hypochlorite upon iodoform in strongly alkaline solutions. An advantageous method of purifying the crude product is given.—**C. Gaudetroy**: Dehydration figures.—**Aug. Chevalier**: The botanical origin of commercial Gabon woods.—**J. Beauverie**: The question of the propagation of rust in the Gramineæ. The presence of mycelium, uredospores, or teleutospores of rusts in the interior of the seeds of cultivated Gramineæ is very common, and it is necessary to take this fact into account in the study of the question of the propagation of rust.—**E.**

**Perrot**: Observations on the preparation of cocoa. Improvements are suggested on the method of preparing the cocoa bean for the market in current use.—**A. Pinard** and **A. Magnan**: Researches on sexuality in births.—**Henri Bécclère**: Pressure and thermometry in cryotherapy. An iron-constantan thermocouple has given good results, not only in determining the temperature in the freezing mixture (solid carbon dioxide), but also the temperature at the surface of application.—**Pierre Girard**: The osmotic relations of the red corpuscles with their medium: rôle of the electric state of the wall.—**Auguste Lumière** and **Jean Chevrotier**: The action of oxidising agents in general and alkaline persulphates in particular on the tetanus toxin. Remarks on a recent note by Marcel Belin. Details are given of the success attained in the treatment of tetanus by injections of sodium persulphate.—**Jacques Surcouf**: The transmission of the larvæ of *Dermatobia cyaniventris* by a mosquito.—**Albert Robin**: The retention of chlorides in the liver and the blood of cancerous subjects.—**E. Voisenet**: Cream of tartar as a food for the ferment causing bitterness in wine. The *Bacillus amaracrylus* can utilise sugars and glycerol as food, but is inactive in presence of tartaric acid and its salts.—**G. Malfitano** and **Mlle. A. Moschkoff**: Pseudo-crystals of starch and crystals of glucose.—**H. Labré** and **R. Maguin**: Contribution to the study of the conditions of precipitation of albumen by picric acid. Working with a constant excess of picric acid, the relation between the amount of albumen present and the quantity of picric acid combined with it is not a linear one, but can be represented by an equilateral hyperbola. The phenomenon would appear to be one of adsorption, but it can be made the basis of a practical method for the estimation of albumen.—**Jean Chautard**: The origin of petroleum at Wyoming.—**J. Bosler**: Magnetic storms and hysteresis phenomena.

## BOOKS RECEIVED.

- Ma Leçon—Type d'entraînement complet et utilitaire. By Lieut. G. Hébert. Pp. 208. (Paris: Vuibert.) 1.75 francs.
- La Sécrétion Pancréatique. By E. F. Terroine. Pp. 133. (Paris: A. Hermann et Fils.) 5 francs.
- I Fenomeni Magnetici nelle Varie Teorie Elettromagnetiche. By Silvio Magrini. Pp. 165. (Bologna: N. Zanichelli.)
- The British Empire with its World Setting. By J. B. Reynolds. Pp. viii+200. (London: A. and C. Black.) 1s. 4d.
- English History Illustrated from Original Sources, 1715-1815. By H. E. M. Icely. Pp. xv+101+viii+107. (London: A. and C. Black.) 2s.
- Elementary Algebra. By C. Godfrey and A. W. Siddons. Vol. ii. Pp. xi+227-530+xlvi. (Cambridge University Press.) With answers, 2s. 6d.; without answers, 2s.
- Four-Figure Tables. By C. Godfrey and A. W. Siddons. Pp. 40. (Cambridge University Press.) 9d. net.
- The Seashore I Know. Edited by W. P. Westell and H. E. Turner. Pp. 80. (London: J. M. Dent and Sons, Ltd.) 8d. net.
- Continuous Beams in Reinforced Concrete. By B. Geen. Pp. iv+210. (London: Chapman and Hall, Ltd.) 9s. net.
- Die deutschen Salzlagerstätten. By Dr. C. Rie-