

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, January 14.—"On the Depression of the Filament of Maximum Velocity in a Stream flowing through an Open Channel." By A. H. **Gibson**. Communicated by Prof. J. E. Petavel, F.R.S.

In a stream flowing through an open channel the filament of maximum velocity is not, as might be expected, in the surface and in the centre of the stream, but is usually at some distance below the surface. No satisfactory explanation of the reason for this has hitherto been given. In this paper the phenomenon is attributed to the effect of transverse currents which sweep up each side of the stream, along the surface towards the centre, down near the centre, and outwards near the bottom. These currents, the existence of which may be foretold from theoretical considerations, and which have been observed by the author in a number of streams and open channels, spread a layer of slowly moving water over the surface of the stream, and so depress the filament of maximum velocity.

This explanation also accounts for several subsidiary phenomena which are observed in river gauging, such as the effect of the roughness of the sides and of the bottom, and of the ratio of breadth to depth on the depth of this filament.

January 21.—"The Leakage of Helium from Radio-active Minerals." By the Hon. R. J. **Strutt**, F.R.S.

In a paper published in Roy. Soc. Proc., A, vol. lxxxii. (1908), p. 272, the author showed that phosphatised bones and similar materials were notably radio-active, and that helium could be detected in them. The quantity of helium found was not, however, uniformly greater in the geologically older materials than in younger ones of equal activity. This was hypothetically attributed to escape of helium in certain cases. The author desired, if possible, to observe directly the escape of helium from radio-active minerals at the ordinary temperature.

It was found that after a radio-active mineral had been powdered, helium was evolved from it, rapidly at first, then at a diminishing rate. The following observations illustrate this.

A quantity (337 grams) of monazite from the Transvaal was powdered and passed through a wire gauze sieve of 120 threads to the inch. This took about one hour. Immediately afterwards it was put in a bottle and the air pumped out. The rate of evolution of helium in cubic millimetres per day per kilo. of material was as follows:—

Time (days)	Rate
0.031	261
0.59	76.6
1.6	17.1
2.6	12.3
4.6	9.57
10.6	4.38
33.0	1.14

The whole quantity which has escaped while the mineral has been under observation is but an insignificant fraction (probably less than a 500th¹) of the whole quantity present.

Moss (Roy. Dub. Soc. Trans., vol. viii., p. 153) has observed that quantities up to 1 per cent. of the helium contained in a mineral can be liberated by grinding in a vacuum. The present observations show that this is but the first rapid stage of a long-continued leakage of helium from the newly created surfaces. The view that heat generated in grinding is the important factor appears untenable, for in that case escape of helium should cease on cooling.

It was found that pieces from the same stock of monazite, about the size of a lump of sugar, which had not been fractured since they came into the possession of the author two years ago, evolved helium at the rate of 0.002 c.mm. per kilo. of material per diem.

This rate, though quite insignificant in comparison with that exhibited by the powdered material, is much in excess of the probable rate of generation of helium by radio-active

¹ This sample of monazite was very poor in helium, containing only $\frac{1}{10}$ c.c. per gramme.

change. It follows that the present stores of helium could never have been accumulated had the present rate of evolution prevailed throughout the life-history of the mineral.

With the view of testing a mineral more nearly in its natural condition, experiments were made on thorianite, which occurs in gravels, in detached cubic crystals, washed out of their original matrix. This, too, showed a considerable leakage of helium (0.069 c.mm. per kilo. per diem).

Under laboratory conditions the rate of escape of helium from minerals always far exceeds the rate of production by radio-active change. Therefore the conditions under which the life of the minerals has been mainly passed, deep down in the earth, where atmospheric agencies have no place, must be supposed more favourable to retention of helium, for otherwise the present accumulation could never have been formed. The observations here recorded leave little room for surprise that fossilised bones and other materials do not always contain as much helium as would be expected from their radio-activity and geological age.

Geological Society, March 10.—Prof. W. J. Sollas, F.R.S., president, in the chair.—Some notes on the neighbourhood of the Victoria Falls (Rhodesia): T. **Codrington**. An account is given of the way in which the basalt lies in the valley of the Zambezi below and above the Victoria Falls, and how this determines the features of the river is pointed out. The basalt through which the Batoka Gorge has been cut appears in the course of the Zambezi for two miles above the Victoria Falls, causing rapids. It then disappears, and the river above flows quietly between alluvial flats for five miles, the basalt being traceable here and there below the water until above Candahar Island it again rises and constitutes the bed of the river from bank to bank, causing rapids. The discovery of stone implements and artificially worked stones in the gravel and the bed of the Maramba is noted. The majority of flakes and flaked stones having no trace of design over those that can be considered as implements suggests that the manufacture of stone tools on a large scale was here carried on for use in the sand-covered country on both sides of the Zambezi, where there is no stone. There appears to be no evidence as to the age of the implements found near the Zambezi.—A contribution to the petrography of the New Red Sandstone in the west of England: H. H. **Thomas**. The paper is supplementary to one dealing with the mineralogical composition of the pebble-bed. A list of minerals identified, and tables showing their distribution, are given. It is suggested that anatase occurs both as detrital crystals and as crystalline groups formed in the rocks since their deposition. The forms presented by grains of staurolite, as well as certain crystals of tourmaline with an unusual habit, are described. It is recognised that the divisions of the New Red Sandstone, although linked together by a similarity of mineralogical composition, present differences indicative of variations in the source of supply and conditions of deposition. With regard to the vertical and horizontal distribution of minerals, staurolite is abundant in the Lower Breccias and Sandstones of the extreme south of Devon, but less plentiful northwards; garnet is present in all the New Red rocks of North Devon and Somerset, but in south and central Devon only occurs in the Lower Marls and in the Upper Marls and Sandstones.

Physical Society, March 12.—D. C. Chree, F.R.S., president, in the chair.—The effect of radiations on the brush discharge: A. E. **Garrett**. Willows and Peck in 1905 found that radium radiations can extinguish a brush discharge produced by a Wimshurst machine when the gap is greater than 3-4 cm. These experiments show that the phenomena can be produced by an induction coil giving a 6-inch spark. The observation that the β rays are responsible for the effects produced is confirmed. The effect of the nature of the anode on the sensitivity of the positive brush is dealt with. It has been found that the sensitive nature of the brush depends upon the oscillatory nature of the discharge, and probably a side discharge takes place when the brush is extinguished by the radium.—Pirani's method of measuring the self-inductance of a

coil: A. E. **Snow**. In this method the coil the self-inductance L of which is to be measured is joined in series with a condenser of capacity C , and the combination forms one arm of a Wheatstone's bridge. The condenser is shunted by a non-inductive resistance r . The result $L = Cr^2$, whence the value found for L is independent of the inductance of the galvanometer, has been proved for the case in which the discharge of the condenser is continuous. In this paper the case in which the discharge of the condenser is oscillatory is dealt with, the applied E.M.F. being constant. It is shown that the discharge of the condenser is of the same nature as that through the galvanometer. In the case of an oscillatory discharge of the condenser the value found for the inductance of the coil is not affected by the inductance of the galvanometer. If the same method is applied to the case of an alternating E.M.F., a result is obtained which involves the inductance of the telephone used to indicate the current. From general considerations this can be shown to be impossible. The method used in the case of a constant E.M.F., therefore, is not available for the investigation of the case in which the E.M.F. is alternating.—Exhibition of a high-potential primary battery: W. S. **Tucker**. The object of the battery is to maintain at known potentials such conductors as the needle of the quadrant electrometer, for charging condensers in capacity and insulation tests, and so on. It is composed of a large number of elements in series, the elements consisting of carbon and pure zinc with a nearly saturated solution of calcium chloride as electrolyte. It is found possible to obtain 1.02 volts per element, so that a total of more than 900 volts is given. Since the terminals are well insulated, a very steady voltage is obtained, and this has been kept within one-tenth per cent. variation for two hours and 1 per cent. for half a day, the temperature of the room remaining steady. The battery has fitted to it an arrangement whereby any desired voltage from that of one to that of all the cells can be obtained by steps of one cell. A special feature of the battery is its careful insulation.—The least moment of inertia of an angle-bar section: H. S. **Rowell**.

Linnean Society, March 18.—Dr. D. H. Scott, F.R.S., president, in the chair.—The "dry-rot" of potatoes: Miss Sibyl **Longman**. The author pointed out, as the result of her researches, that the disease of the potato tuber, known as "dry-rot"—due to the fungus *Fusarium Solani*—is not necessarily preceded by "wet-rot," but may be set up in sound tubers by inoculation with spores or mycelium of *Fusarium Solani*, which species is not a parasite of the resting tuber only; it may also attack and kill the shoots of potato plants. The fungus, which probably exists as a widely distributed saprophyte in the soil, infects the growing potato plant *via* the root; it also spreads from tuber to tuber during storage, and diseased tubers may produce diseased plants. Heat sterilisation of the resting potato tuber, with respect to *Fusarium Solani*, is impracticable, for the death-temperature of the fungus is higher than that of the potato. A pycnidial stage occurs in the life-history of *Fusarium Solani*, which should therefore be placed in the highest group of the Fungi Imperfecti, the Sphaeropsidaceæ, and not, as is the case at present, in the Hyphomycetes.—The structure and affinities of *Davidia involucreta*, Baill.: A. S. **Horne**. The paper deals with the structure and affinities of a genus referred to the natural orders Combretaceæ, Cornaceæ, and Hamamelidaceæ by various authorities, in the light of original observations carried out under the direction of Prof. J. B. Farmer, upon material brought by Mr. E. H. Wilson from Szechuen in 1904. Evidence is advanced in favour of interpreting the inflorescence as consisting of a number of congenitally fused, apetalous, multi-staminate male flowers, or of male and in addition a single obliquely situated, apetalous, hermaphrodite flower with epigynous stamens arranged in series. From a detailed study of the flower, ovary, ovule, and seed, the author is inclined to believe that *Davidia* is distantly related to Alangiaceæ and Nyssaceæ, and still more distantly related to the Araliaceæ; that the genus occupies a somewhat isolated position owing to having pursued an independent course of development from the plexus of primitive groups, which included the ancestral forms of the Araliaceæ, Nyssaceæ, and Alangiaceæ.

EDINBURGH.

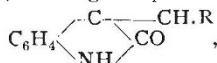
Royal Society, March 1.—Dr. R. H. Traquair, F.R.S., vice-president, in the chair.—The systematic motion of the stars, second paper: Prof. **Dyson**. Following up a previous paper on the subject, the author, by application of a statistical method, found that the two streams were moving with velocities which were in the ratio of 2 to 3. The stars belonging to the two streams did not appear to have any other distinguishing characteristics.—Preliminary note on *Cynomacrus Piriei*, a new deep-sea fish discovered by the Scottish National Antarctic Expedition: Prof. **Dollo**. This new fish, named after Dr. Pirie, surgeon and geologist to the *Scotia*, belonged to the Macruridæ, a family closely allied to the cod. The existence of Macruridæ within the Arctic Circle had been known since 1837, when Sven Lovén recorded *Macrurus burglax* from Hammerfest, Finmark. In 1892 Prof. Dollo recorded the first macrurid from the Antarctic, namely, the new species *Nematoneurus lecontii*, brought home by the *Belgica*. The new species now described differs generically from these. It was obtained in lat. $71^{\circ} 50' S.$, long. $23^{\circ} 30' W.$, at a depth of 2102 fathoms.

March 15.—Dr. Traquair, F.R.S., vice-president, in the chair.—The glacial deposits of western Carnarvonshire: Dr. T. J. **Jehu**. The Lleyn promontory lay outside the paths followed by the native glaciers. Hence, instead of the lowest Boulder Clay of the district east of Snowdonia, there is a "rock rubble" or "head" which underlies all the drift deposits, and is the result of subaerial waste under severe climatic conditions. It is succeeded by (1) a Lower Boulder Clay with northern erratics and shells; (2) sands and gravels; (3) an Upper Boulder Clay with northern erratics and shells. The Lower Boulder Clay, which is the most widely spread of all these deposits, is the product of a *mer-de-glace* coming from the north, which overwhelmed Lleyn as far east as a line running from Carnarvon to Cardigan Bay, in the neighbourhood of Pwllheli. The sands and gravels were accumulated during a retreat of the ice, while the Upper Boulder Clay marks a re-advance. So far as Lleyn is concerned, the two Boulder Clays might be regarded as the product of one *mer-de-glace* which was subject to considerable oscillations, but a review of the Irish Sea basin as a whole renders it more probable that they are the products of the ice-sheets of two Glacial epochs separated by an inter-Glacial epoch.—The Glenboig fireclay: its halloysite and sideroplesite: Prof. J. W. **Gregory**. Evidence was adduced to show that this fireclay was laid down in a wide lagoon in the beginning of the Millstone Grit period. It contains lenticular crystals of sideroplesite, which have been built up by zonal deposition around rhombohedra, which probably crystallised in the water of the lagoon. The clay substance which forms the base of the fireclay is isotropic, and is referred to the mineral halloysite. The clay contains no kaolinite.—Tuesite, a Scottish variety of halloysite: Prof. **Gregory**. Tuesite was founded as a mineral species by Thompson in 1836 for material described as occurring in beds in the New Red Sandstone on the banks of the Tweed, and has been identified with kaolinite. The absence of china clay from Scotland has been used as a strong argument in favour of the pneumatolitic origin of that material, and the reported nature and occurrence of tuesite would have been inconsistent with that origin. Re-examination of the material shows, however, that the tuesite occurs as an alteration product in a volcanic neck; it is not kaolinite, but halloysite, and its formation is consistent with the deep-seated origin of the great china-clay masses found in many parts of the world.

PARIS.

Academy of Sciences, March 15.—M. Bouchard in the chair.—Systems of homogeneous differential equations: Gaston **Darboux**.—The flow of rivers: Bouquet de la **Grye**. It is generally assumed in works on hydraulics that in water in motion under the action of gravity the elementary strips move in a straight line, the flow being expressed as a time function of the fall. This does not correspond with practice; the motion is in curved lines. By applying the principle of least action, it is found that the strips of liquid would have a tendency to turn to the

side where the friction is a minimum.—The magneto-kathode rays: M. **Gouy**. The resistance of rarefied gas under the action of the magneto-kathode rays has been measured, and found to be much smaller than in the absence of the rays.—Remarks by M. B. **Baillaud** on the twentieth *Bulletin de l'Observatoire de Besançon*.—Comparison of the lines of the spectrum of the electric arc and of the sun. Pressure of the reversing layer in the solar atmosphere: Ch. **Fabry** and H. **Buisson**. The comparison has been made by the interference methods previously described by the authors, and only the finest lines in the spectrum were utilised. The numerical results accord with those of Jewell, and are not completely explained by the theory of displacement by pressure. Assuming the average displacement to be a pressure effect, it results that in the region of the solar atmosphere where the iron lines are absorbed the pressure is between 5 and 6 atmospheres.—Certain triple orthogonal systems: J. **Haag**.—The singularities of analytical functions beyond the circle of convergence: Paul **Dienes**.—The fundamental equations for the experimental study of aeroplanes: D. **Drzewiecki**.—Measurements of the coefficient of resistance of air carried out by means of experiments made on an aeroplane: A. **Etévé**. There is a large discrepancy between the coefficient k of the resistance of the air as determined by physicists and by experiments with aeroplanes, the latter number being about ten times the former. It is shown that this discrepancy is largely due to an unjustifiable assumption made in calculating k from the aeroplane results.—The decomposition of water by radium salts: A. **Debiere**. The author's experiments do not confirm the loss of the power to produce hydrogen and oxygen by a radium salt, recently announced by Sir William Ramsay. The amounts of hydrogen and oxygen evolved by a gram of radium have been found to be regular and of the order of 13 c.c. per day. Some of this is shown to be due to the action of the β and γ rays.—The chemical action of the penetrating rays of radium on water: Mirosław **Kernbaum**. By the action of the β and γ rays on distilled water for one month, 200 cubic mm. of gas was obtained, which on analysis proved to be hydrogen. The residual water responded to the potassium iodide and starch test, from which the conclusion is drawn that hydrogen peroxide is formed simultaneously with hydrogen.—The question of the emission and absorption of incompletely polarised light in a magnetic field and on the Zeeman phenomenon in fluted spectra: Jean **Becquerel**.—The utility of the graphical method in the study of ancient musical instruments: M. **Marage**.—The electromotive forces of magnetisation: V. **Posejpal**. The electromotive force of a metallic thermocouple changes when the neighbourhood of the junction becomes the seat of an intense magnetic field. This change is not related to the presence of a ferromagnetic metal, and is independent of the direction of the field. The electromotive force thus produced increases with the strength of the field, but not proportionally.—The cryoscopy of colloids: Jacques **Duclaux**. The measurements of the osmotic pressure (P) and lowering of the freezing point (A) of colloidal solutions of the hydrates of iron and thorium satisfied the theoretical relation $P=12 \cdot 2 \cdot \Delta$.—A new isomeride of indigo: A. **Wahl** and P. **Bayard**. Oxindol (the lactam of *o*-amidophenylacetic acid) reacts with aromatic aldehydes, forming compounds of the type



for which the name iso-indogenides is proposed.—The condensation of the mesoxalic esters with phenol ethers: A. **Guyot** and G. **Estéva**.—The action of caustic potash on borneol, camphor, and isoborneol: racemic campholic acid: Marcel **Guerbet**. The production of campholic acid by the interaction of borneol and anhydrous caustic potash has been described in an earlier paper. The only other substance obtained from the reaction product was thought to be unaltered borneol, but this has since been found to contain a considerable quantity of camphor.—The genesis and optical properties of the neogenic felspar of the sediments of the Paris basin: F. **Grandjean**.—The nitrification of soils: MM. **Pouget** and **Guiraud**.—The influence

of mineral manures on some Cyperaceæ: J. B. **Gèze**.—The manostatic centres and the physiological treatment of arteriosclerosis: P. **Bonnier**.—Contribution to the study of hypo-anæsthetics: A. **Brissemoret** and J. **Chevalier**.—A parasitic microsporidian of *Frenzelina conformis*: L. **Léger** and O. **Duboscq**.—The Mosquero spider: Léon **Diguet**.—The Mosquero spider: Eugène **Simon**.—Extension of the Coal-measures under the Trias and Jurassic strata in the basin of Alais (Gard): G. **Fabre**.—The earthquakes of December 28, 1908, and January 23, 1909: D. **Eginitis**.—A luminous phenomenon observed at Brest on the night of February 22: Thierry **d'Argenlieu**.

March 22.—M. Bouchard in the chair.—Systems of homogeneous differential equations: Gaston **Darboux**.—Contribution to the search for planets beyond Neptune: A. **Gaillot**.—M. Termier was elected a member of the section of mineralogy in the place of the late M. A. Gaudry. —The spectrum of the comet 1908c (Morehouse): A. **de la Baume-Pluvinel** and F. **Baldet**. A continuation of work already published. In the later photographs a greater dispersion was obtained (10.9 mm. between F and H), and special arrangements were made to secure the yellow and ultra-violet ends of the spectrum. The greater part of the lines in the spectrum of this comet is furnished by a single gas, presenting a system of bands the heads of which follow the law of Deslandres. These bands cannot be identified with any known spectrum.—Another method of dealing with the problem of the integration of partial differential equations of the second order: E. **Goursat**.—An application of the functional calculus to the study of linear partial differential equations of the third order and hyperbolic type: R. **d'Adhémar**.—The stability and displacement of equilibrium: C. **Raveau**.—Particular solutions of the equation $\frac{\partial^2 \phi}{\partial x^2} - \frac{\partial \phi}{\partial t} = 0$: Henri **Larose**.—Resonator sparks.

Their spectroscopic analysis: G. A. **Hemsalech** and A. **Zimmern**. From the point of view of spectroscopic analysis, there is a great difference of constitution between the best long resonance spark and the short spark. The former is the capacity spark; the air lines predominating in the latter, there is a predominance of bands, the air lines being absent.—The normal and abnormal Zeeman phenomenon in vapour spectra. Reply to the note of M. J. Becquerel: A. **Dufour**.—The magnetic properties of some iron compounds: M. **Wologdine**. Results of the determination of the temperatures of magnetic transformations of magnetite, pyrrhotine, iron carbide, carbide of iron and tungsten, franklinite and phosphide of iron.—The approximation of black bodies used as receivers: C. **Féry**. A comparison of the behaviour of platinum black and lampblack as absorbents. The differences are shown graphically, and the conclusion is drawn that a re-determination of the coefficient in Stefan's law is necessary.—Contribution to the study of radiation: G. **Milochau**. The researches of the author, in collaboration with M. Féry, have led to a value of 9.5 for Stefan's coefficient, whilst Kurlbaum found in 1898 5.25 for the same coefficient and Scheiner (1908) 4.78. The causes of this divergence are discussed in the present paper, and it is shown that the actinometers in current use, in which the receiver is a thermometer covered with black, do not measure the absolute value of the radiation which they receive, but only a part of it. To obtain an absolute actinometer it must be furnished with a receiver really possessing the properties of an integral radiator.—The phosphorescence and combustion flames of sulphur: L. **Bloch**. The phosphorescence of sulphur is accompanied by the formation of ozone, and this in larger quantity than with phosphorus. This production is the more remarkable in that it takes place at a temperature (200°–250°) generally indicated as causing the destruction of ozone. At about 360° C. the blue flame of sulphur appears, and this flame is entirely deprived of electrical conductivity.—The experimental study of the coefficient of distribution and its application to the estimation of the volatile acids in wines: Philippe **Malvezin**.—A new method of preparation of the β -halogen derivatives of naphthalene: G. **Darzens** and E. **Berger**. The sodium derivative of β -naphthol is treated in boiling toluene solution with the phosphorus halide, the corresponding chlorine or bromine

derivative of naphthalene being obtained. The best yield (55 per cent.) was obtained with phosphorus trichloride.—The function of magnesia in the transformation of saccharose at different temperatures: J. **Tribot**.—Biochemical researches on the development of anthocyanine in plants: R. **Combes**.—Study of the action of iron on wine: M. **Trillat**. In contact with iron or its salts, the production of aldehyde in wine is very rapid. The quantities produced are sufficient to precipitate the colouring matters of the wine.—The penetration of pulverised liquids into the respiratory tracts: M. **Cany**. The experiments were carried out on sheep which had inhaled arsenical water, and the results clearly showed that an increase in the normal amount of arsenic in the lungs was produced. It is necessary for the success of similar experiments that the drops should be of the smallest possible dimensions.—The skeleton of the posterior member of *Bradypus torquatus*: A. **Menegaux**.—The geology of the basin of Ogdoué: H. **Arsandaux**.—The age and the nature of the most recent folds of the interior reliefs of the eastern Tellian Atlas (Algeria): L. **Joleaud**.

CALCUTTA.

Asiatic Society of Bengal, March 3.—Studies in the experimental breeding of Indian cottons; an introductory note, part ii., on buds and branching: H. Martin **Leake**. The author has in hand observations on the effect of making crosses between types with the secondary branches sympodial and types with monopodial—observations of considerable importance, because early-flowering races are wanted for profitable cultivation in the neighbourhood of Cawnpur, and if the delaying of flowering, *i.e.* of forming main sympodial buds, should be dominant in crosses over the other condition, any other improvements brought in by the crossing would be rendered locally valueless. However, it was found that on crossing a monopodial by a sympodial, the offspring differed very slightly from the sympodial parent, though there might be some increase in number of secondary branches, and in the second (F_2) generation (the flower of the first generation being self-fertilised) the full sympodial type was dominant; but every proportion of sympodial and monopodial branches occurring on a single stem was found.—Notes on the theory of souls among the Malays of the Malay Peninsula: Dr. N. **Annandale**. A summary and revision of the author's views as expressed in an account of the animistic beliefs of the Patani Malays in "Fasciculi Malayenses."—Tamarisk manna: D. **Hooper**. Historical references to Gazagabin or Tamarisk manna in Persia and Arabia. Names and distribution of manna-yielding species of Tamarix in Asia. Chemical composition and properties of the manna.

DIARY OF SOCIETIES.

THURSDAY, APRIL 1.

ROYAL INSTITUTION, at 3.—Aerial Flight in Theory and Practice: Prof. G. H. Bryan, F.R.S.
 LINNEAN SOCIETY, at 8.—The Amphipoda Hyperidea of the *Sealark* Expedition to the Indian Ocean: A. O. Walker.—The Marine Mollusca from the same Expedition: J. Cosmo Melville.—The Land and Fresh-water Mollusca of the Seychelles Archipelago: E. R. Sykes.—On a Blind Prawn from the Sea of Galilee, *Typhlocaris galilea*, g. et sp. n.: Dr. W. T. Calman.
 INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Electrical System of the L.C.C. Tramways: J. H. Rider. (*Adjourned discussion*).—The Theory and Application of Motor Converters: H. S. Hallo.
 RÖNTGEN SOCIETY, at 8.15.—The Origin, History and Development of the X-Ray Tube: J. H. Gardiner.

FRIDAY, APRIL 2.

ROYAL INSTITUTION, at 9.—Electrical Striations: Sir J. J. Thomson, F.R.S.
 CIVIL AND MECHANICAL ENGINEERS' SOCIETY, at 8.—Storms, and their Effect Upon the Sea Coast: Dr. J. S. Owens.
 INSTITUTION OF CIVIL ENGINEERS, at 8.—Reinforced Concrete on Railways: W. E. R. Gurney.
 GEOLOGISTS' ASSOCIATION, at 8.—The Valleys of the Cotswold Hills: Prof. W. M. Davis.—The Ancient Land of Egypt: Mary S. Johnston.

SATURDAY, APRIL 3.

ROYAL INSTITUTION, at 3.—Properties of Matter: Sir J. J. Thomson, F.R.S.
 ESSEX FIELD CLUB (at Essex Museum of Natural History, Stratford), at 6.—The Head as an Index of Race: J. Gray.

MONDAY, APRIL 5.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—The Scenery of Cuba, Haiti, and Jamaica: Sir Harry Johnston, G.C.M.G., K.C.B.
 ROYAL SOCIETY OF ARTS, at 8.—Steam Turbines: G. G. Stoney.
 SOCIETY OF CHEMICAL INDUSTRY, at 8.—Vapour Galvanising: S. Cowper Coles.—The Action of Sulphuric and Nitric Acids in the Nitration of Cellulose: C. N. Hake and M. Bell.

TUESDAY, APRIL 6.

ZOOLOGICAL SOCIETY, at 8.30.—Notes on an Ichthyosporidian causing a Fatal Disease in Sea-trout: Muriel Robertson.—A Collection of Fishes made by Dr. C. W. Andrews, F.R.S., at Christmas Island: C. Tate Regan.—Description of a New Form of *Ratel* (Mellivora) from Sierra Leone, with Notes upon the described African Forms of this Genus: R. I. Pocock.—On some New and Little-known Hesperidae from Tropical West Africa: H. H. Druce.
 ROYAL SOCIETY OF ARTS, at 4.30.—Ceylon: Its Industries and Material Progress: Hon. John Ferguson, C.M.G.
 INSTITUTION OF CIVIL ENGINEERS, at 8.—Further Discussion: Construction and Wear of Roads: A. Mallock, F.R.S.—Probable Paper: The *New York Times* Building: C. T. Purdy.

WEDNESDAY, APRIL 7.

SOCIETY OF PUBLIC ANALYSTS, at 8.—The New Standards for Sewage Effluents: Dr. S. Rideal and W. T. Burgess.—The Determination of the 'Oxygen Absorbed' by Sewage and Effluents by a Modification of Kubel's Method: W. Carter.—A Note on Enkabang and Teglam Fats and Katio Oil, from Sarawak: C. J. Brooks.—The Composition of Milk: H. D. Richmond.
 ROYAL ASTRONOMICAL SOCIETY, at 5.
 GEOLOGICAL SOCIETY, at 8.
 ENTOMOLOGICAL SOCIETY, at 8.—On Reciprocal Mimicry: Guy A. K. Marshall.

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