

that, in the opinion of this Association, it was both undesirable and impracticable to draw any line of separation between secondary and technical education in any legislation concerning central or local authorities, and another to the effect that in no case should a permanent consultative committee be attached to the Board of Education.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, December 15, 1898.—“The Action of Magnetised Electrodes upon Electrical Discharge Phenomena in Rarefied Gases.” Preliminary Note. By C. E. S. Phillips. Communicated by Sir William Crookes, F.R.S.

The experiments described in this paper were undertaken in order to study, more especially, the action of magnetised electrodes upon the phosphorescent afterglow which is often seen to illuminate the inner surface of the glass walls of vacuum tubes when an electrical discharge has passed within them.

The apparatus employed consisted of a glass bulb, nearly spherical in shape and about 2½ inches in diameter, open at both ends, for the purpose of inserting and sealing into position, two soft iron electrodes, so placed that their pointed ends were within 1/16 inch of one another.

Each electrode had a screw-thread of suitable pitch cut upon it in order that two brass cups, when screwed into position and sealed with cement to the glass, might serve to keep the electrodes central, to reduce the possibility of their rushing together under the influence of strong magnetic forces, and to seal airtight the two ends of the bulb.

Suitable arrangements having been made for strongly magnetising the electrodes by means of a powerful external electro-magnet, the bulb was then connected to a Sprengel air-pump and slowly exhausted. During this process the usual luminous phenomena were observed whenever a discharge was passed through the bulb; while on magnetising the electrodes the results obtained were, in some cases, very remarkable.

A rarefaction having been obtained such that a three-inch spark from a ten-inch Apps induction coil could scarcely start the glow, it was observed that, after a strong stimulation of the bulb had taken place and then been stopped (the electrodes meanwhile remaining unmagnetised), on exciting the magnet a luminous ring suddenly appeared within the bulb, between the pointed ends of the electrodes, and in a plane at right angles to the direction of the magnetic lines of force. It shone brightly for a moment, when the magnet circuit was “made,” and it was more sharply defined at high exhaustions—becoming, in fact, hazy and indefinite if the pressure within the bulb were slightly increased. Even with the connecting wires between the coil and the bulb completely removed after stimulation, the ring formed as well as ever when the magnet was turned on. At the moment the ring appeared within the bulb the glass walls became electrically charged so strongly that, in some cases, a spark could be seen to pass between the glass and either of the exposed ends of the electrodes at the moment the magnet was excited. It was further noticed that the ring was in rapid rotation and also very sensitive to variations in the electrical charges, upon the bulb.

Under certain conditions a second ring formed concentrically with the first. Experiments were also made with external magnetic electrodes, and irregular green splashes and puffs of white cloudy light appeared in the interior of the exhausted vessel when the electrodes were magnetised.

Geological Society, January 4.—W. Whitaker, F.R.S., President, in the chair.—Capt. A. W. Stiffe exhibited a fossil *Cardium* (?) from the beach at the foot of the cliffs of Ormara (Makran Coast).—“Geology of the Ashbourne and Buxton Branch of the London and North-Western Railway: Ashbourne to Crake Low,” by H. H. Arnold-Bemrose. The southern part of the new railway from Ashbourne, through Tissington and Crake Low to Buxton, exhibits several sections in Trias, Boulder Clay, Mountain Limestone, and Yoredale Beds. Interstratified with the latter is a thick bed of volcanic ash, with thinner intercalations of tuff. Within a mile of Tissington ash is exhibited four times in the cuttings, and according to the view of the author it is the same bed repeated by basins and domes, one of the latter of which is faulted. While the rocks succeeding the ash in some places are limestones, cherts, and shales of

Yoredale type, in one section they resemble more closely the upper beds of the Mountain Limestone. The limestones are often dolomitised.—“The Oceanic Deposits of Trinidad,” by Prof. J. B. Harrison and A. J. Jukes-Browne. The object of this communication was to present some observations on the succession and geological relations of the beds which have long been known in Trinidad as the Naparima Marls. In his historical introduction Mr. Jukes-Browne deals with the writings of Mr. Guppy and Prof. Harrison, and shows that three definite issues are thus raised: (1) Are the Nariva Beds above or below the Naparima Marls? (2) Do the *Globigerina*-marls occur in the Naparima district, and, if so, are they connected with the Radiolarian marls, or are they part of a separate formation? (3) What is the relation between the San Fernando Beds and the other groups? Mr. Guppy and Prof. Harrison agree in answering the first part of the second question in the affirmative, and in stating that the two marls are closely connected together. It appears that the *Globigerina*-marls occupy the place of the basal chalks of Barbados, but are much thicker, while the radiolarian rocks are thinner, and the interbedded volcanic ashes so frequent in Barbados are wanting in Trinidad. Chemical and microscopic analysis of the *Globigerina* and radiolarian beds are given, and, compared with similar analyses of the Barbadian deposits, they show that more quartz and argillaceous matter occur in Trinidad. The following correlation is proposed:—

BARBADOS.		TRINIDAD.		
Coral Rocks.	}	Moruga Series.	}	Pleistocene and
Bissex Beds.		Naparima Marls.		Miocene.
Oceanic Beds.				Miocene.
	}	San Fernando Beds.	}	Oligocene and
Scotland Beds.		Nariva Series.		Eocene.

The Oligocene and Eocene Beds are of shallow-water origin, and seem to be unconformably covered by the Naparima Marls.

PARIS.

Academy of Sciences, January 9.—M. van Tieghem in the chair.—On the hysteresimeter constructed by MM. Blondel and Carpentier, by M. Marcel Deprez. The author describes an instrument for the measurement of hysteresis, constructed by him about four years ago for the *Conservatoire National des Arts et Métiers*, the principle of which is identical with that of the hysteresimeter recently invented by MM. Blondel and Carpentier, the only differences being that the author's instrument was of dimensions suitable for measuring the hysteresis of iron rings of the size actually used in dynamos, and contained an electro-magnet instead of a permanent magnet.—The cryoscopy of urine, by M. Ch. Bouchard. From the observed depression of the freezing point of urine, suitably diluted if necessary, the depression due to sodium chloride present is subtracted, and the mean molecular weight of the rest of the solid matter determined in the usual manner. In a man in a normal state of health the value of this mean molecular weight is about 62, rarely falling below 60, or rising above 68. In disease the value of this constant is usually raised, varying from 68 to 112.—Histology of the skin. Definition and nomenclature of the epidermal layers in man and mammals, by M. L. Ranvier. Seven distinct layers are described as existing in the epidermis of man and mammals, each layer being characterised by perfectly clear physical characters and chemical reactions. The names given to these strata are: *Germinativum*, *filamentosum*, *granulosum*, *intermedium*, *lucidum*, *corneum*, and *disjunctum*.—Observations of the total eclipse of the moon of December 27-28, made at the Observatory of Bordeaux, made by MM. G. Rayet, E. Doublet, and F. Courty, by M. G. Rayet.—Report on a memoir of M. Partiot on the choice of a velocity formula.—Generalisation of the analytical prolongation of a function, by M. Eugène Fabry.—On the singular points of a function defined by a Taylor's series, by M. Servant.—On the correspondence between right lines and spheres, by M. E. O. Lovett.—On the bending of a cylinder with circular base, by M. Ribière.—On the experiment of Lord Kelvin and Joule, by M. A. Leduc.—On the variations of resistance of an electrolytic conductor in a magnetic field, by M. H. Bagard. The author has succeeded in showing that the resistance of a solution of copper sulphate, suddenly placed in a magnetic field of about 5000 C.G.S. units, undergoes an increase of about one per cent. its original value.—On the absolute value of the magnetic elements on January 1, 1899, by M. Th. Moureaux.—On the preparation and properties of calcium arsenide, by M. P. Lebeau. This

substance can be obtained in a state of purity in two ways, by the interaction of calcium and arsenic at a low red heat, and by heating carbon and calcium arsenate in the electric furnace. The arsenide has the composition Ca_3As_2 , and is readily decomposed by water giving pure AsH_3 , mixed, however, with a little acetylene when the product from the electric furnace is used. It is readily attacked by the halogens, but is unaltered in dry air or oxygen.—On the decomposition of carbon monoxide in presence of ferric oxide, by M. O. Boudouard. The decomposition is a function of the time, and also depends upon the quantity of oxide of iron present.—Volumetric estimation of cerium, by M. André Job. Ceric salts can be accurately determined in acid solution by titrating with aqueous hydrogen peroxide, the end of the reaction being indicated by the disappearance of the yellow coloration. An estimation of the cerium contained in the crude mixture of oxalates from monazite can be carried out in a few minutes by this method.—The variation of entropy in the dissociation of similar heterogeneous systems, by M. Camille Matignon. From the measurements of MM. Isambert and Bonnefoi of the heats of combination and the temperatures at which the dissociation pressure reaches 760 mm., it is shown that these quantities are proportional in the case of compounds of the type $\text{CaCl}_2 \cdot 4\text{NH}_3$. This result is expressed by the statement that when similar systems dissociate with the same dissociation pressure, the variation of entropy is the same.—Constitution and chemical properties of ethylideneimine, by M. Marcel Delépine. The constitution ethylideneimine ($\text{CH}_3\text{CH}=\text{NH}$)₂, is assigned to aldehyde ammonia, and it is shown that all the reactions of this compound agree well with the formula.—Derivatives of synthetic methyl-heptenone, by M. Georges Leser.—Synthesis of dimethyl-heptenol, by M. Ph. Barbier. This synthesis is easily effected from methyl-heptenol and methyl-iodide, by a modification of Saytzeff's method, using magnesium instead of zinc.—Studies on filtration, by M. J. Hausser.—On a mode of formation of ureas, by M. A. Jouve. If a solution of carbon monoxide in ammoniacal cuprous chloride is heated under pressure at 105°, urea is formed. The substitution of fatty and aromatic amines for the ammonia gives the analogous substituted ureas.—On an absinthine, a new substance extracted from absinthe, by MM. Adrian and A. Trillat.—On the formation of sugar from egg albumen, by M. Ferdinand Blumenthal. By the action of baryta water upon white of egg, a sugar is obtained giving a phenyl-glycosazone on treatment with phenyl-hydrazine.—Modifications undergone by toxins when introduced into the digestive tube, by MM. Charrin and Levaditi.—The sexual law of the smallest coefficient, by M. F. Le Dantic.—On the culture of monstrosities in plants, by M. Hugo de Vries.—The leucite volcanic rocks of Trebizonde, by M. A. Lacroix.—On the laws governing macles properly so called, by M. Fred. Wallerant.—On the conditions of culture in Tunis, by M. J. Dybowski.

DIARY OF SOCIETIES.

THURSDAY, JANUARY 19.

ROYAL SOCIETY, at 4.30.—Observations upon the Normal and Pathological Histology and Bacteriology of the Oyster: Prof. Herdman, F.R.S., and Prof. R. Boyce.—On the Formation of Multiple Images in the Normal Eye: S. Bidwell, F.R.S.—On the Vibrations in the Field round a Theoretical Hertzian Oscillator: Prof. K. Pearson, F.R.S., and Miss Lee.—On the Refractive Indices and Densities of Normal and Semi-normal Aqueous Solutions of Hydrogen Chloride, and the Chlorides of the Alkalies: Sir J. Conroy, F.R.S.

ROYAL INSTITUTION, at 3.—Tibet and the Tibetans: A. H. Savage Landor.

SOCIETY OF ARTS (Indian Section), at 4.30.—Railways in Burma, and their proposed Extension across Yunnan: J. Nisbet.

LINNEAN SOCIETY, at 8.—New Peridiniaceae from the Atlantic: G. R. Murray, F.R.S., and Miss F. G. Whitting.—On the Structure of Lepidostrobilus: Arthur J. Maslen.—Some Observations on the Caudal Diplospondyly of Sharks: Dr. W. G. Ridewood.

CHEMICAL SOCIETY, at 8.—Researches on Moorland Waters I. Acidity: W. Ackroyd.— α -ketotetrahydronaphthalene: Prof. F. S. Kipping, F.R.S., and Alfred Hill.—A New Method for preparing *as*-dimethyl- and Trimethyl-succinic Acids: William A. Bone.—Reduction of Optically-active Mono- and Di-alkyloxysuccinic Acids from Malic and Tartaric Acids: Prof. Thomas Purdie, F.R.S., and William Pitheathly.—Action of Ammonia on Ethereal Salts of Organic Bases: Dr. Siegfried Ruhemann.—Esterification Constants of Substituted Acetic Acids: Dr. J. J. Sudborough and Lorenzo L. Lloyd.—Di-ortho-substituted Benzoic Acids. Part IV. Formation of Salts from Di-ortho-substituted Benzoic Acids and different Organic Bases: Lorenzo L. Lloyd and Dr. J. J. Sudborough.—The Thermal Effects of Dilution: J. Holmes Pollok.—The Changes of Volume due to Dilution of Aqueous Solutions: F. B. H. Wade.

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FRIDAY, JANUARY 20.

ROYAL INSTITUTION, at 9.—Liquid Hydrogen: Prof. J. Dewar, F.R.S.

EPIDEMIOLOGICAL SOCIETY, at 8.30.—Epidemic Cerebro-spinal Meningitis: Dr. Bruce Low.

QUEKETT MICROSCOPICAL CLUB, at 8.

SATURDAY, JANUARY 21.

MATHEMATICAL ASSOCIATION, at 2.—Annual Meeting.—On the Expression "Motion at an Instant": S. A. Saunder.—Porismatic Equations: R. F. Davis.—Arithmetical Division: E. M. Langley.

MONDAY, JANUARY 23.

SOCIETY OF ARTS, at 8.—Bacterial Purification of Sewage: Dr. Samuel Rideal.

IMPERIAL INSTITUTE, at 8.30.—The Work and Wealth of Western Australia: E. T. Scammell.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—The Plan of the Earth, and its Causes: Dr. J. W. Gregory.

TUESDAY, JANUARY 24.

SOCIETY OF ARTS (Foreign and Colonial Section), at 4.30.—Rhodesia and its Mines: W. Fischer Wilkinson.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Effects of Wear upon Steel Rails: William G. Kirkaldy.—On the Microphotography of Steel Rails: Sir William Roberts-Austen, K.C.B., F.R.S.

ROYAL PHOTOGRAPHIC SOCIETY, at 8.—The Development of Gelatino-chloride Papers: John Sterry.

ANTHROPOLOGICAL INSTITUTE, at 8.30.—Anniversary Meeting.

WEDNESDAY, JANUARY 25.

SOCIETY OF ARTS, at 8.—Tuberculosis in Animals: W. Hunting.

THURSDAY, JANUARY 26.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: Contributions to the Theory of Simultaneous Partial Differential Equations: Prof. A. C. Dixon.—On the Structure and Affinities of Fossil Plants from the Palaeozoic Rocks. III. On *Medullosa anglica*, a New Representative of the Cycadofilices: Dr. Scott, F.R.S.—On the Nature of Electro-Capillary Phenomena. I. Their Relation to the Potential Differences between Solutions: S. W. F. Smith.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Rules for the Regulation of the Wiring of Premises for Connection to Public Supply Mains: J. Pigg.—The Regulation of Wiring Rules: C. H. Wordingham.—The Institution Wiring Rules: R. E. Crompton.

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