

of technical chemists was opened with a paper by Mr. J. B. F. Herreshöf. The paper insists that before deciding on the best methods of training technical chemists, it must be seen that they are sufficiently educated on the proper lines to enable them readily to become technical chemists of great value. To achieve the greatest success in such work a technical chemist should perfect his mathematics and become thoroughly familiar with physics as well as with mechanical engineering. After men have gone through a regular course in chemical engineering they should be trained before leaving college in a practical manner in the application of chemistry as well as in examples of engineering problems. Later, the paper lays it down that to become a skilful investigator in a research chemical laboratory requires both a proper education at college as a chemical engineer, especially full in chemistry, and also a training at college in original thought as applied to practical investigation, and to working up and improving processes. Applied chemistry would be greatly benefited if colleges would come in closer touch with the manufacturer. A plan that has been in successful practice at Brown University for the last few years was then described. A separate committee for each department of study is carefully selected from the old students. These committees visit the college once or more a year; they consult and exchange views with the heads of the departments. Each member reports his recommendations to the chairman of his committee, who incorporates the same in his report to the president of the college. In this way the college authorities are kept in close touch with modern technical requirements.

SOCIETIES AND ACADEMIES.

LONDON.

Zoological Society, April 19.—Dr. Henry Woodward, F.R.S., vice-president, in the chair.—Mammals obtained by the late Mr. W. G. Doggett on the Anglo-German Boundary Commission: Oldfield **Thomas**, F.R.S., and Harold **Schwann**. Twenty-one species were enumerated, of which three were described as new.—Contributions to the anatomy of the Lacertilia, ii.: F. E. **Beddard**, F.R.S. The present part dealt with some points in the structure of the Teguxin (*Tupinambis*).—The Triassic reptile *Telerpeton elginense*, based on new material recently procured at Lossiemouth by Mr. William Taylor: G. A. **Boulenger**, F.R.S.—Descriptions of twenty-three new species of butterflies belonging to the family Erycinidae, from tropical South America: Herbert **Druce**.—The theriodont mandible and its mode of articulation with the skull: Dr. Robert **Broom**.

Royal Meteorological Society, April 20.—Captain D. Wilson-Barker, president, in the chair.—The variation of the population of India compared with the variation of rainfall in the decennium 1891–1901: W. L. **Dallas**. The author showed that during the four years 1891–5, the rainfall was generally normal or heavy over nearly the whole country, and during the six years 1895–1901 the rainfall was greatly deficient. During the former, or “wet” period, the rainfall was deficient over Upper Burma and Madras, was normal over the remainder of Burma, Assam, Bengal, and the west coast of the peninsula, and was excessive elsewhere; while during the latter, or “dry,” period, the rainfall was again deficient over Upper Burma, normal or excessive over the remainder of Burma, Assam, Bengal, the United Provinces, the North-west Frontier Province, and the south of Madras, and was deficient elsewhere, mostly so over Rajputana and neighbouring areas. The general census of India on March 1, 1901, showed the total population to be 293,475,477, which, excluding the territories not included in the 1891 census, was an increase of only 1.3 per cent. The population had thus failed to increase according to the normal rate during the decade. Part of this failure was, no doubt, due to epidemics. The author, however, shows that there is an unmistakable relationship between the variations of the population and the variations of rainfall during the dry years. The area within which the most serious decrease of population occurred coincides almost exactly with the area of greatest deficiency

of rainfall.—The cause of autumn mists: Dr. J. B. **Cohen**. The author describes experiments made by him on Coniston Lake some time ago.

DUBLIN.

Royal Irish Academy, April 25.—Prof. Atkinson, president, in the chair.—The secretary read a paper by Dr. J. L. E. **Dreyer** containing the results of a survey of the great spiral nebula Messier 33 in the constellation Triangulum; 431 stars and nebulous points of condensation found on a photographic negative taken by Dr. Isaac Roberts were micrometrically measured, and their standard coordinates computed.

PARIS.

Academy of Sciences, April 18.—M. Mascart in the chair.—On the horistic method of Gylden: H. **Poincaré**. In a work on the series employed in the theory of planets, Gylden has expounded two methods which he entitles horistic. The first of these has been shown to be open to grave objections, and in the present paper the second is examined, with the result that it is found to give not the general solution, but a particular solution, which the author calls a periodic solution. It differs numerically from the solution given by Gylden.—On the presence of argon in the gas from the fumerolles at Guadeloupe: H. **Moissan**. The gases were collected under conditions which precluded the possibility of any contamination by any atmospheric air, and proved on analysis to consist chiefly of carbon dioxide and nitrogen, together with small quantities of sulphuretted hydrogen, oxygen, and argon. This latter gas has been found in all samples of gases from fumerolles which have been analysed by the author up to the present.—The action of silicon upon water at a temperature near 100° C.: H. **Moissan** and F. **Siemens**. By the prolonged action of water at about 95° C. upon silicon, either crystalline or amorphous, a small quantity of hydrogen is evolved, and each particle of silicon is surrounded by a coating of hydrated silica. This effect was shown to be due to the minute amount of alkali dissolved from the glass, since it was stopped by the presence of a small quantity of acid, and no such effect could be observed in vessels of platinum or of fused silica.—On a new entire function: G. **Mittag-Leffler**.—Permanent modifications. On the properties of systems affected with both hysteresis and viscosity: P. **Duhem**.—The influence of lateral pressures on the resistance of solids to crushing: M. **Considère**. The crushing resistance of cement is increased by lateral pressure on the specimen. The curves given in the paper show that there is a linear relation between the crushing resistance and the external pressure on the sides of the test piece.—On certain ordinary differential equations of the second order: S. **Bernstein**.—On a series analogous to modular functions: M. **Lerch**.—On the theory of systems of differential equations: L. **Schlesinger**.—On the compensation of interferences and the measurement of small thicknesses: Georges **Meslin**. The retardation due to a thin isotropic plate is balanced by the retardation due to the rotatory polarisation of quartz. In this way a thickness of air of the order of 0.01 mm. is balanced by a piece of quartz several centimetres in thickness. The great sensitiveness of the method lends itself to the determination of the optical properties of crystalline bodies which can only be obtained in the form of thin plates.—On the spectrum of zinc: Maurice **Hamy**. The interference method has been recently subjected to criticism; the author has re-determined some of the wave-lengths of the principal rays of zinc, and shows that they are in absolute accord with the results of Perot and Fabry.—On some bodies acting on the photographic plate: Edmond **van Aubel**. A description of experiments with resin giving results analogous with those of Russell and Graetz on hydrogen peroxide and turpentine.—The action of the Hertzian oscillations on faintly luminous objects: C. **Gutton**. The action of the Hertzian waves is similar to that of the n -rays.—On a system of damping: MM. **Favé** and **Carpentier**. A system of very fine wires or glass capillary tubes is arranged radially round the moving needle, the damping effect being produced by the viscosity of the air. The

resistance to motion has been worked out experimentally as a function of the diameter of the wire, and the results compared with the theory of Stokes.—On the apparent diminution of energy of a feeble acid in the presence of its neutral salt: G. **Cheveau**. The incomplete precipitation of metallic acetates in the presence of sodium acetate by means of hydrogen sulphide appears to be due to the formation of small quantities of an alkaline sulphide, and it is unnecessary to resort to the electrolytic theory of dissociation to interpret this phenomenon.—On the methyl ether of acetol: Louis **Henry**.—On the acetate of methyl: André **Kling**.—Halogen ether oxides, $RO(CH_2)_nX$, and their magnesium compounds. New syntheses in the tetramethylene series: J. **Hamonet**.—On a new general reaction of aldehydes: L. J. **Simon** and A. **Conduché**. Aldehydes condense with oxalacetic ester and ammonia to give crystalline compounds, the constitution of which is not yet completely made out.—The chlorination of phenyl carbonate in the presence of antimony chloride: Et. **Barral**.—The action of sulphur and selenium on the organomagnesium compounds of aromatic hydrocarbons, with one or two halogen atoms in the ring: F. **Taboury**. Sulphur gives thiophenols and disulphides; selenium forms analogous compounds.—The purification and characterisation of alcohols: L. **Bouveault**. Pyruvic esters are readily formed, and give characteristic semicarbazones.—On two isomeric β -methylcinnamic acids: M. **Tiffenau**.—The action of organomagnesium compounds on phthalimide and phenylphthalimide: Constantin **Reis**.—On the hydrates of methyl alcohol and acetone: E. **Varenne** and L. **Godefroy**. The existence of several hydrates of methyl alcohol and acetone is inferred from a study of the viscosity of various mixtures of these substances with water.—On the perception of luminous radiations in nocturnal moths, and on the use of lamps as decoys: Joseph **Perraud**.—On the peduncle of some Vorticellæ: Emmanuel **Fauré**.—On the presence of a new American genus (Abronina) in the Tertiary flora of Europe: L. **Laurent**.—On the sulphur spring of Matsesta (Transcaucasia) and the relation between caves and thermomineral springs: E. A. **Martel**.—The histology and bacteriology of mud extracted from a depth of 10 metres in a well at the necropolis of Bernard (Vendée): Marcel **Baudouin**.—The influence of acidity on enzymes: P. **Petit**.—Chemical researches on the thyroid apparatus: Jean **Chenu** and Albert **Morel**. It is possible to differentiate by chemical analysis between the thyroid and parathyroid bodies, the latter containing much less iodine.—The effect of ablation of the liver on the coagulation of the blood: M. **Doyon** and N. **Kareff**.—Contribution to the study of sand filters: M. **Marboutin**.

DIARY OF SOCIETIES.

THURSDAY, APRIL 28.

ROYAL SOCIETY, at 4.30.—Further Experiments on the Production of Helium from Radium: Sir William Ramsay, K.C.B., F.R.S., and F. Soddy.—The Effects of Changes of Temperature on the Modulus of Torsional Rigidity of Metal Wires: Dr. F. Horton.—The Sparking Distance between Electrically Charged Surfaces. Preliminary Note: Dr. P. E. Shaw.—Studies on Enzyme Action. Part II. The Rate of the Change Conditioned by Sucroclastic Enzymes, and its Bearing on the Law of Mass Action. Part III. The Influence of the Products of Change on the Rate of Change Conditioned by Sucroclastic Enzymes: Dr. E. F. Armstrong.—Part IV. The Sucroclastic Action of Acids as Contrasted with that of Enzymes: Dr. E. F. Armstrong and R. J. Caldwell.—Enzyme Action as bearing on the Validity of the Ionic-dissociation Hypothesis, and on the Phenomena of Vital Change: Prof. H. E. Armstrong, F.R.S.—On the Changes of Thermolectric Power produced by Magnetisation, and their Relation to Magnetic Strains: Dr. S. Bidwell, F.R.S.—The Behaviour of the Short-period Atmospheric Pressure Variation over the Earth's Surface: Sir Norman Lockyer, K.C.B., F.R.S., and Dr. W. J. S. Lockyer.

ROYAL INSTITUTION, at 5.—Dissociation: Prof. Dewar, F.R.S.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Power Station Design: C. H. Merz and W. McLellan.

FRIDAY, APRIL 29.

ROYAL INSTITUTION, at 9.—Westminster Abbey in the Early Part of the Seventeenth Century: The Very Rev. J. A. Robinson.

MONDAY, MAY 2.

ROYAL INSTITUTION, at 5.—Annual Meeting.

ARISTOTELIAN SOCIETY, at 8.—Kant's Idealism: G. E. Moore.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—(1) The Determination of Minute Quantities of Bismuth in Copper and Copper Ores. (2) The Determination of Minute Quantities of Arsenic in Copper Ores and Metallurgical Products: T. C. Cloud.—The Estimation of Mercury: D. A. Sutherland.

TUESDAY, MAY 3.

ROYAL INSTITUTION, at 5.—Meteorites: L. Fletcher, F.R.S.

ZOOLOGICAL SOCIETY, at 8.30.—On the Osteology and Systematic Position of the rare Malagasy Bat *Mysopoda aurita*: Oldfield Thomas, F.R.S.—Contributions to the Anatomy of the Lacertilia. III. On some Points in the Vascular System of Chamaeleon and other Lizards: F. E. Beddard, F.R.S.—Notes on the Gill-rakers of Polyodon: A. D. Imms.

SOCIETY OF ARTS, at 4.30.—Canada and Great Britain: W. L. Griffith.

WEDNESDAY, MAY 4.

ENTOMOLOGICAL SOCIETY, at 8.—Some Breeding Experiments on *Catopsilia pyranthi*, and Notes on the Migration of Butterflies in Ceylon: Major Neville Manders, R.A.M.C.

SOCIETY OF ARTS, at 8.—Statistics of the World's Iron and Steel Industries: W. P. Digby.

SOCIETY OF PUBLIC ANALYSTS, at 8.—(1) Cod Liver Oils and other Fish Oils; (2) Note on Mushroom Ketchup: J. F. Liverseege.—Note on Some Constants obtained in the Examination of Margarine: E. Russell and V. H. Kirkham.—Note on the Estimation of Sugars in Concentrated Malt Extract: A. R. Ling and Theodore Rendle.

THURSDAY, MAY 5.

LINNEAN SOCIETY, at 8.—British Freshwater Rhizopoda: J. Cash.—On Coloration in Animals and Birds: J. Lewis Bonhote.

RÖNTGEN SOCIETY, at 8.30.—The Röntgen Society; its Past Work and Future Prospects: J. J. Vezev.—Some Experiments with Alpha Rays: F. H. Glew.

CHEMICAL SOCIETY, at 8.—The Slow Combustion of Ethane: W. A. Bone and W. E. Stockings.—Note on the Hydrolysis of Starch by Diastase: J. S. Ford.—The Resin Acids of the Coniferæ. Part I. The Constitution of Abietic Acid: T. H. Easterfield and G. Bagley.—The Action of Radium Rays on the Halides of the Alkali Metals, and Analogous Effects produced by Heat: W. Ackroyd.—The Dynamic Isomerism of Glucose and of Galactose. Solubility as a means of Determining the Proportions of Dynamic Isomerides in Equilibrium: T. M. Lowry.—A Study of the Substitution Products of *ar*-tetrahydro-*a*-naphthylamine, *ar*-4-bromo-tetrahydro-*a*-naphthylamine and *ar*-tetrahydro-*a*-naphthylamine-4-sulphonic acid: G. T. Morgan, Miss F. M. G. Micklethwait, and H. B. Winfield.—The Additive Products of Benzylideneaniline with Methylacetoacetic Ester and Acetoacetic Ester: F. E. Francis and Miss M. Taylor.

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