

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, May 10.—Captain W. de W. Abney, President, in the chair.—Mr. Herroun read a paper on the iodine voltameter. After referring to the usual methods of determining the value of the small currents used in calibrating galvanometers and other apparatus for measuring small currents, and discussing the errors to which they are subject, the author gave his reasons for selecting iodine. He did this since, with the exception of mercury in the mercurous state, iodine has the largest electro-chemical equivalent, and in addition, by titration with sodium thiosulphate, it is possible to determine the quantity of iodine liberated with a greater accuracy than can be obtained by weighing a deposit of copper or silver with the balance. The solution employed in the voltameter contains 10 to 15 per cent. of zinc iodide. If care is taken to leave a small piece of metallic zinc in this solution, no free iodine is liberated on keeping, unless the solution is exposed to a strong light for some time. The anode consists of a plate of platinum at the bottom of a tall and fairly narrow beaker. The wire leading the current to the anode is encased in a glass tube, so that the iodine is only liberated at the bottom of the beaker, where, on account of its great density, it tends to collect. The kathode consists of an amalgamated zinc rod, which, to prevent loose particles of zinc falling down into the iodine, is surrounded by a piece of filter-paper or vegetable parchment. In an electrolysis lasting for as long as two hours, none of the iodine is found to diffuse up to the part of the solution near the zinc kathode. Where, on account of the extreme feebleness of the current employed, it is necessary to allow the electrolysis to continue for longer than two hours, a U-tube is used with two small plugs of asbestos at the bend, the anode being in one limb and the kathode in the other. With this form of voltameter, even after the current has flowed for several days, no signs of iodine have been found in the limb containing the kathode. On account of the production of electric convection currents, the iodine voltameter does not seem to be quite so suitable for the accurate measurements of strong currents. After the current is stopped the zinc electrode is immediately removed, the solution stirred, and the amount of iodine liberated determined by titration with sodium thiosulphate. The author finds that a convenient strength of the thiosulphate solution is one in which one c.c. corresponds to the amount of iodine liberated by five coulombs of electricity. This solution contains 12·8375 grms. of pure recrystallised sodium thiosulphate per litre. It is possible to perform the titration to within 0·1 c.c., which corresponds to 0·5 coulomb, or, if the electrolysis lasts one hour, to 1/7200 ampere. In a comparison made with a silver voltameter, the current as deduced from the silver was 0·0264 ampere, and that deduced from the iodine 0·0266. The author considers that part of the difference may be due to the effect of oxygen dissolved in the solution of silver nitrate. Prof. Carey Foster considered this process for measuring currents a most valuable one. The idea of using a volumetric method for measuring currents was to him new. He did not, however, see the advantage of using a substance with a high electro-chemical equivalent if a volumetric method was going to be employed to estimate the quantity of the substance liberated. It would be possible to use a chloride, though in this case the titration would probably be less accurate. Prof. Silvanus Thompson said he thought the method would be very valuable, but he would like to know if any error was likely to arise if too great a current density was employed. The number the author had assumed for the atomic weight of silver (108) was only approximate; if the more accurate value (107·7) were used, the agreement between the results obtained with the silver and iodine voltameters would be improved. Mr. Trotter asked what was the largest current that could be accurately measured. Mr. Enright said he had used porous diaphragms in iodine voltameters, and found that the iodine collected in the positive compartment, while the water was driven over into the negative compartment. With strong currents it was possible to get almost pure iodine left in one compartment. Mr. Watson thought that, since the value for the electro-chemical equivalent of iodine used by the author was deduced from Rayleigh's value of the electro-chemical equivalent of silver, and that Rayleigh's experiments were performed in air, the difference obtained with the silver and iodine voltameters could hardly be due to the cause suggested. Mr. Elder warned the members that volumetric measurements were not so accurate or easy as they seemed. He particularly mistrusted a solution

of sodium thiosulphate, since he had found a solution of this substance to change even in twenty-four hours. The difficulty of accurately reading the burette might be overcome by weighing the burette and its contents before and after the titration. The author in his reply said that with the size of electrodes he used (about 9 sq. cm. surface) 0·1 ampere was the maximum current it was safe to use. The only substance likely to be produced by too great a current density was periodate, which, since it was insoluble, would immediately be noticed. The influence of the dissolved oxygen was only appreciable with small currents where the electrolysis lasts some time, while in Rayleigh's experiments large currents were employed. The chairman, while returning thanks to the author for his paper, mentioned that in his experience he had found zinc salts to be very untrustworthy.—Mr. A. Sharp read a paper entitled a new method in harmonic analysis. The author, in this paper, applies the principle of the form of harmonic analysis for giving direct readings of the amplitude and epoch of the various constituent harmonic terms, previously described by him, to the performance of harmonic analysis without the use of an instrument. The kinematic principle is as follows: Let the curve to be analysed be drawn with a scale of abscissa such that the period is 2π . Let a wheel w roll on the paper and be connected with a tracing-point P in such a manner that as P moves uniformly in the x direction the axis of the wheel w turns uniformly counter clockwise in a horizontal plane, and the distance rolled through during any short interval is equal to the corresponding displacement of the tracer P in the y direction. The curve traced out by w the author calls the roller curve, and from the vector joining the initial and final points of this curve the amplitude and epoch can be determined. Suppose the periodic curve consists of a portion of the curve $y = a_0 + a_1x + a_2x^2 + \dots + a_mx^m$ repeated over and over again. Then, if the tracer is taken round this periodic curve you get a rolled curve which may be called the first rolled curve. If now the curve whose ordinates are $\frac{dy}{dx}$ is traced out, the roller curve

obtained is the evolute of the first, and so on for $\frac{d^2y}{dx^2}$, &c. The

author gives two worked examples, and compares the values of the coefficient obtained with those given by the harmonic analyses of the Guilds Central Technical College. Prof. Henrici said he had not received the paper in time to thoroughly master it, but he thought that, at any rate for curves where no discontinuity occurred, the relation found by the author between the roller curves was always true, the last evolute being a point, and the one before that a circle. The interesting point was whether the method was capable of being used for practical purposes, for it occupied a place with respect to harmonic analysis similar to that occupied by Simpson's rule in planimetry. Prof. Silvanus Thompson asked if the author had devised a form of mechanism capable of fulfilling the kinematical conditions given at the commencement of the paper. The author in his reply said he had devised such a mechanism, and that it was described in his previous paper. In addition he had since invented a more practicable form which he had patented. The chairman said the Society ought to congratulate itself on the large number of important papers dealing with harmonic analysis and planimetry that had lately been communicated.

Malacological Society, May 10.—Prof. G. B. Howes, President, in the chair.—On behalf of Miss de Burgh specimens were shown illustrating the variation of *Columbella mercatoria*, Linn.—Mr. Da Costa exhibited a collection of univalve mollusca from Lakes Tanganyika and Victoria Nyanza, and pointed out the entirely different characters of the molluscan fauna of these two lakes.—On behalf of Mr. C. S. Cox were exhibited living specimens of *Glandina* from Italy.—Mr. E. A. Smith exhibited an almost complete collection of the land and freshwater mollusca of St. Vincent, W.I.—Mr. E. R. Sykes exhibited specimens of *Achatinella variabilis*, Newc. and allied forms, from the Island of Lanai. The following communications were read:—Notes on *Trochonanina* and other genera of the land mollusca, with reference to the animals of *Martensia Mozambicensis*, Pfr., and other species, by Lieut.-Colonel H. H. Godwin-Austen.—Report on the land and freshwater shells collected by Mr. H. H. Smith at St. Vincent, W.I., by E. A. Smith.—Note on the larval oyster, by M. F. Woodward.

Victoria Institute, May 6.—Dr. Chaplin in the chair.—A paper on the so-called *Pithecanthropus* of Dr. E. Dubois was read by Prof. E. Hull, LL.D., F.R.S., after which a paper by

Sir J. W. Dawson, C.M.G., F.R.S., on the physical character and affinities of the Gauches, or extinct people of the Canary Islands, illustrated by photographs, was read. In it the author reviewed the historical facts as to the Canary Islands and these inhabitants, the characters of the crania found, and the weapons, ornaments, &c., and described the conclusions he had arrived at with reference to the relationship of the Gauches to ancient peoples of Western Europe and Africa, and their possible connection with the colonisation of Eastern America.

Royal Microscopical Society, May 15.—Mr. A. D. Michael, President, in the chair.—Mr. J. Swift exhibited an improved form of the Nelson microscope-lamp, fitted with mechanical movements; and also a Wales microscope which had been fitted with the new mechanical stage.—Mr. T. Comber read a paper on the development of the young valve of *Trachyneis aspera*. The subject was illustrated with lantern photographs exhibited upon the screen.—Miss Ethel Sargent's paper, "On the first nuclear division in the pollen mother cells of *Lilium martagon*, &c.," was communicated by Dr. D. H. Scott.

PARIS.

Academy of Sciences, May 20.—M. Marey in the chair.—The decease of M. C. Ludwig, correspondent of the Medicine and Surgery Section, was announced by the President. M. Ludwig will be chiefly remembered for his work on blood pressures and circulation, on artificial circulation, and on the physiology of the nervous system.—Reduction to sea-level of the values observed for gravity at the surface of the earth (Coast and Geodetical Survey), by M. G. R. Putnam. A translation of some passages of this work is given by M. H. Faye, in which it is shown that Faye's correction causes anomalies to more nearly disappear than Bouguer's correction. M. Faye then discusses the probable form of the earth's crust, and shows the bearing of his discussion on the theories of geologists.—New researches on the thermochemical relations between aldehydes, alcohols, and acids, by MM. Berthelot and Rivals. A *résumé* is given of the known thermochemical data connecting aldehydes with corresponding alcohols and acids.—Existence of phosphorus in notable proportion in oysters, by MM. A. Chatin and A. Müntz. Not only has phosphorus been found in the shells of different kinds of oysters in the form of tricalcic phosphate, but organic phosphorus has been found in oyster flesh in quantity, more in Portuguese oysters (*Gryphea angulata*) than in French natives (*Ostrea edulis*).—Classification of the chemical elements, by M. Lecoq de Boisbaudran. A theoretical paper discussing the author's system of classification and the genesis of elements from a primordial matter.—On the spectroscopic analysis of gases obtained from various minerals, by Mr. Norman Lockyer.—On the reducing properties of sodium alcoholates at a high temperature, by MM. A. Haller and J. Minguin. The results of heating together in sealed tubes at about 200° C. are given for: desoxybenzoin and sodium ethylate in absolute alcohol; benzophenone and sodium ethylate; anthraquinone and sodium ethylate, amylate, and butylate respectively.—On stereoscopic projections and the "stereojumelle," by M. Moëssard.—Studies on the activity of the diastole of the ventricles, on its mechanism, and its physiological and pathological applications. An abstract of a memoir by the author, M. Léon Germe.—A comparison between the spectra of the gases from cleveite and the spectrum of the solar atmosphere, by M. H. Deslandres. A list of wave-lengths of lines observed in the spectra of gases from cleveite is compared with a similar list of lines observed in the solar chromosphere spectrum (see p. 56). Twenty lines in the former list are recorded and thirteen lines in the latter list are shown to have the same wave-length, extending through the luminous and ultra-violet portions of the spectra. Two permanent chromosphere lines, 587.60 and 447.18, correspond to two of the principal gas lines, 587.60 (D₃) and 447.175. There now remain but two such chromosphere lines always obtainable, which do not correspond to lines obtained in terrestrial spectra.—On the isomeric transformations of mercury salts, by M. Raoul Varet. It is shown that black amorphous HgS disengages +0.24 Cal. in changing to the red amorphous variety, and yields a further +0.06 Cal. in becoming red crystalline HgS.—Action of nitrogen peroxide on the halogen salts of antimony, by M. V. Thomas.—Heats of formation of benzoyl chloride and toluyl chloride, by M. Paul Rivals. The substitution of the group (COCl) for a hydrogen in benzene or toluene results in an increase in the heat of formation of +58 Cal. and +55.3 Cal. respectively.—Study of senecionine and senecine,

by MM. A. Grandval and H. Lajoux. Two alkaloids have been prepared from *Senecio vulgaris*. Senecionine appears to have the composition C₈H₁₆NO₆, and does not possess very marked reactions. Senecine appears to possess much more definite reactions with the usual alkaloid reagents.—On phenylsulpho-orthotoluidine and some of its derivatives, by M. Ch. Rabaut. In conclusion, attention is drawn to the resistance of this substance to oxidation and to its great stability in presence of dilute acids and heat, notwithstanding its amide character.—Analysis of a mummy bone, by M. Thezard.—On a leucomaïne extracted from urine in cases of Angina pectoris, by M. A. B. Griffiths and C. Massey. A new poisonous base, causing death in two hours, of which the composition is given as C₁₀H₉NO₄.—On some improvements in the preparation and study of thin plates of sedimentary calcareous rocks, by M. Bleicher.—On the anomalous divisions of ferns, by M. Adrien Guébard.—The catastrophes of Titel in the Banat and of Mendoza (Argentine Republic), by M. Ch. V. Zenger. Arguments are adduced to show a connection between these seismic phenomena and sun-spot appearances on the sun.—The use of crude petroleum for prevention of incrustations in boilers is advocated by M. G. Liévin.

BOOKS AND SERIALS RECEIVED.

BOOKS.—The Telephone Systems of the Continent of Europe: A. R. Bennett (Longmans).—The Theory of Light: Prof. T. Preston, 2nd edition (Macmillan).—Dental Microscopy: A. H. Smith (Dental Manufacturing Company).—A Reader's Guide to Contemporary Literature: W. S. Sonnenschein (Sonnenschein).—A First Book of Electricity and Magnetism: W. P. Maycock, 2nd edition (Whittaker).—The Way about Middlesex (Iliffe).—The Way about Hertfordshire (Iliffe).—An Elementary Treatise on Elliptic Functions: Prof. A. Cayley, 2nd edition (Bell).—La Pluie en Belgique: A. Lancaster, Premier Fasc. (Bruxelles, Hayez).—Nature in Acadie: H. K. Swann (Bale).—The Linacre Reports, Vol. 2: edited by Prof. E. Ray Lankester (Adlard).

SERIALS.—Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie, Zwanzigster Band, 4 Heft (Leipzig, Engelmann).—Zeitschrift für Wissenschaftliche Zoologie, lix. Band, 2 Heft (Leipzig, Engelmann).—The Evergreen, Spring (Unwin).—American Naturalist, May (Philadelphia).—Papers read before the Engineering Society of the School of Practical Science, Toronto, No. 8, 1894-5 (Toronto).—Good Words, June (Isbister).—Sunday Magazine, June (Isbister).—Longman's Magazine, June (Longmans).—Chambers's Journal, June (Chambers).—Century Magazine, June (Unwin).—Journal of the College of Science, Imperial University, Japan, Vol. vii, Part 4 (Tokyo).—Journal of the Institution of Electrical Engineers, No. 117 (Spon).

CONTENTS.

	PAGE
The Spirit of Cookery	97
Weather Observation and Predictions	98
An Album of Classical Antiquities	100
A Desideratum in Modern Botanical Literature	101
Our Book Shelf:—	
"The Noxious and Beneficial Insects of the State of Illinois."—E. A. O.	102
Letters to the Editor:—	
The Origin of the Cultivated Cineraria.—W. Bateson, F.R.S.; Prof. W. F. R. Weldon, F.R.S.	103
Boltzmann's Minimum Function.—S. H. Burbury, F.R.S.	104
Research in Education.—Miss L. Edna Walter	105
The Bibliography of Spectroscopy.—Prof. Herbert McLeod, F.R.S.	105
An Aquatic Hymenopterous Insect.—Fred. Enock Halley's Chart.—Thos. Ward	106
On the Line Spectra of the Elements. (<i>With Diagrams</i> .) By Prof. C. Runge	106
Karl Vogt. By E. B. T.; G. C. B.; W.	108
Notes	110
Our Astronomical Column:—	
Mercury and Venus	113
The Total Solar Eclipse of 1898 January 21-22	113
The Astrophotographic Chart	113
Award of the Watson Medal	113
A Lecture Experiment. (<i>Illustrated</i> .) By Prof. W. C. Roberts-Austen, C.B., F.R.S.	114
The Life-History of the Crustacea in Early Palæozoic Times. (<i>With Diagram</i> .) By Dr. Henry Woodward, F.R.S.	114
Scientific Serials	118
Societies and Academies	119
Books and Serials Received	120