

the Society of Apothecaries and the Royal College of Physicians in turn, the Pharmaceutical Society of Great Britain and the Senate of the University of London. It is intended that the existing garden should be fully maintained, a suite of rooms being provided for lectures and experimental teaching, whilst the Trustees are to be given authority, if they think fit, to erect and fully equip a physiological laboratory.

To carry out the new scheme referred to above, an annual income of eight hundred pounds is to be provided by the Trustees, and it is proposed in addition that the committee shall be furnished with such a capital sum as may be necessary to enable them to enforce the scheme to its full extent. The committee is to appoint a curator for the scientific supervision of the garden, and other members of the staff. Further, the committee will be authorised by the scheme to provide instruction in botany by means of lectures, demonstrations, &c., with special reference to the requirements of elementary education; to arrange for the maintenance of botanical collections of living plants for teaching purposes, and, so far as practicable, for the supply of botanical specimens for the purpose of external instruction. Students of institutions receiving aid from the funds of the City Parochial Foundation are to be eligible for admission without payment of fees; and it is provided that, so long as a yearly payment of not less than one hundred and fifty pounds is made to the Trustees out of the moneys provided by Parliament, students of the Royal College of Science shall also be admitted to the garden without payment, while they, the professors and teachers of the College, shall be entitled to the use of the garden, the botanical collections, and the lecture rooms for such time as may be approved by the Charity Commissioners. It will thus be seen that the scheme is of a far-reaching character, and calculated materially to increase the usefulness of the garden.

SCIENTIFIC SERIALS.

Memoirs of the Kazan Society of Naturalists. Vol. xxx.—On the oro-hydrography of the Nizhne-Isset mining region in Middle Ural, by V. Rozhkoff, with an orographic map in which the plateau character of the region appears very well.—On intracellular growths in cancer, by A. Rebrovsky, with a plate. Sporiferous growths were not found in cases unaccompanied by wounds.—On the parasitism of the Rotatoria *Notomatta Wernercki* in the Vaucheria, by W. Rothert, with a plate.—On the geology of the water-parting between the Volga and the Don at Tsaritsyn, by M. Yanischewsky. A large development of old Post-Pliocene alluvial deposits was found.—Water in wells at Kazan, by Prof. Scherbakoff.—On crystal-bearing cells in cork membranes, by W. Rothert. The observations of Zacharias, Cederroy, and Meyer are confirmed by observations on *Agave*, *Fourcroya*, *Drocaena*, and several others.

Vol. xxxi.—On the structure of the membrane of the vessels in plants, by W. Rothert, with a plate. A preliminary report on extensive researches into this question.—On the pathological and anatomic changes in organs and tissues resulting in raphania, ergotismus, and similar diseases, by N. Vinogradov, with one coloured plate. A detailed investigation of many cases of these diseases, which often assume in Russia an epidemic character.—On investigations of the soil, made in 1896 by R. Rispolozhensky. Part of a wide system of investigation which is being carried on for many years in Russia.—Chemical and physical researches into the soils of Kazan, by V. Sorokin.—The fauna of the upper parts of the Permo-Carbonic formations on the Kama and Chusovaya rivers, by N. Romanov. Eighty-nine species are described, the following being new: *Aviculopecten Stuckenbergi*, *A. parvulus*, and *Pleurotomaria fluctuosa*. The deposits belong to the Kungur division of Prof. Stuckenberg.

Bollettino della Società Sismologica Italiana, vol. iv., 1898, No. 4.—On the investigation of seismic periodicity by the method of overlapping means, by C. Davison. A description (in English) of a rough method of harmonic analysis suitable for the investigation of the annual and diurnal periodicity of earthquakes, with examples worked out in illustration of the method.—On the increase of activity presented by Vesuvius in the montis of April and May, by R. V. Matteucci.—Notices of earthquakes recorded in Italy (September 1897), by G. Agamehnone. A long and valuable series of records of

three earthquakes, two of which originated at Labuan (Borneo) on September 20 and 21, and the third in the province of Ancona (Italy) on September 21.

Bulletin de la Société des Naturalistes de Moscou, 1897, No. 4. This volume contains one paper, "*De Aphodio scuticollis m. (nigrivittis, Rth.) ejusque cognatis*," in Latin, by A. Semenov. The remainder is taken up with the proceedings, which contain a number of shorter notes, and the yearly report. During the year 1897 a considerable number of members of the Society, chiefly botanists, explored various parts of Russia.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 17.—"The Electrical Conductivity and Luminosity of Flames containing Vaporised Salts." By Arthur Smithells, H. M. Dawson, and H. A. Wilson. Communicated by Sir H. E. Roscoe, F.R.S.

(1) The authors conclude from their experiments, that the conductivity of vaporised salt is of an electrolytic character, but that there are features connected with it that distinguish it from electrolytic conduction in aqueous solution. Thus Ohm's law is only obeyed within certain limits, and the general relation between current strength and electromotive force can only be represented generally by a more complex expression.

(2) The conductivities of different salts differ greatly, according to the electropositive constituent.

(5) Among different salts of the same metal differences of conductivity appear at the higher concentrations, but at low concentrations equivalent solutions have equal conductivity.

(4) The conductivity of the haloid salts as a group is distinct from that of the oxy-salts.

(5) The conductivity of the haloid salts of a metal among themselves increases with the increasing atomic weight of the halogen.

(6) The conductivity of the oxy-salts of a metal is approximately equal, and approaches that of the hydrates.

(7) The more easily oxidisable halogen salts are probably partly converted into oxide in the flame, so that their conductivity is composed of two parts.

(8) The behaviour of the salts in flames supplied with chloroform vapour seems to establish the fact that the conductivity and the colour produced by the salt vapour are not due to a common cause.

The coloration of a flame by an alkali salt does not seem therefore to be connected with the condensation of the salt. It must be attributed to the metal set free by a chemical process. This process consists probably in a reduction effected by the flame gases. An oxy-salt would, generally speaking, form in the first instance an oxide, which would then be reduced. In the case of haloid salts it seems also necessary to suppose that an oxide is intermediately formed, the metal being then liberated by reduction.

Physical Society, December 9.—Mr. Shelford Bidwell, F.R.S., President, in the chair.—Dr. C. Chree read a paper on longitudinal vibrations in solid and hollow cylinders. The ordinary formula for the frequency of longitudinal vibrations refers to an ideal rod of infinitely small section. This formula constitutes a first approximation, according to which the higher notes are exact harmonics of the fundamental note. Prof. Pochhammer, and Lord Rayleigh independently, over twenty years ago, arrived at a corrective term for solid isotropic rods of circular section, according to which the harmonic relation between the notes is no longer exact. During the last twelve years Dr. Chree has devoted several papers to the subject, confirming by independent methods the results obtained by Pochhammer and Rayleigh, and arriving at analogous results for other forms of section, and for material symmetrical round an axis but not isotropic. The first part of the present paper develops what appears to be a new method, based on expressions obtained some years ago by the author for the mean values of the strains in an elastic solid of any kind or shape, exposed to any system of forces. Besides confirming his previous results, Dr. Chree obtains new results applicable to material neither isotropic nor symmetrical round the axis of the rod. The second part of the paper treats of a hollow circular rod, or tube, of isotropic material. When the walls of the tube are thin, the correction to the ordinary formula is twice as large as for a solid

rod of the same diameter. The different methods all point to the conclusion that the ordinary formula supplies a close approximation to the truth only so long as the greatest diameter of the cross-section is small compared to the nodal interval in the rod.—A paper on the thermal properties of normal pentane, by Mr. J. Rose-Innes and Dr. Sydney Young, was then read. In 1894 the authors investigated the relations between the temperatures, pressures and volumes of isopentane, through a wide range of volume; the results are published in the *Proc. Phys. Soc.*, xiii, pp. 602-657. It is there shown that if a and b are constants depending on the nature of the substance and on the volume, the relation $p=(bT-a)$ at constant volume holds good with but small error from the largest volume (4000 cub. cms. per gramme) to the smallest (1.58 c.c. per g.). In the neighbourhood of the critical volume (4.266 c.c.), and at large and very small volumes, the observed deviations are well within the limits of experimental error, but at intermediate volumes they are somewhat greater. As they exhibit considerable regularity, it is a question whether they could be attributed entirely to errors of experiment. In any case, the above relation may be accepted as closely approximate to the truth. The present paper refers to a similar investigation on pure normal pentane obtained by the fractional distillation of the light distillate from American petroleum. The method employed for this separation is fully described in the *Trans. Chem. Soc.*, vol. lxxi, p. 442, 1897; the vapour pressures, specific volumes as liquid and saturated vapour, and critical constants are given in the same journal, p. 446. With regard to theoretical deductions from the present results, advantage is taken of the fact that a similar set of experiments had already been carried out with isopentane, which is an isomer of normal pentane. It was hoped that light would be thrown on the question of the influence exerted by difference of chemical structure on the thermal properties of a substance. The conclusion arrived at as most probable is that the coefficients of the second power of the density in the expansion of p must be different for the two substances. The slope of the curve obtained by plotting $(av^2)^{-1}$ against v^{-1} suggests discontinuity somewhere about vol. 3.4, as with isopentane. Mr. Lehfeldt asked whether the authors had observed any other singularity or discontinuity at vol. 3.4. He also asked whether the authors were satisfied with ordinary squared-paper in plotting their curves. It ought to be possible to design a machine for doing the work mechanically to one-fiftieth of a *m.m.* accuracy. Mr. Appleyard said the fractionating apparatus devised by Dr. Young was a great improvement on older forms; it ensured that there should always be sufficient and yet not too much liquid at each valve-trap. He hoped that details of the tube, in its latest form, would be included in the paper. In the separation of such a mixture as chloroform and alcohol the common method by water-extraction was imperfect; it was not desirable always to convert the mixture wholly into chloroform. Ordinary fractionating tubes yielded an impure distillate in this case. Perhaps the difficulty was inherent for those two liquids. Dr. Young's apparatus would put the question beyond doubt. Dr. Young, in reply, said that the only objection to curve-tracers was their cost. The curves he had obtained from his experimental results were all isothermals; he did not think isobars would indicate anything such as Mr. Lehfeldt had suggested. With regard to such mixtures as chloroform and alcohol, the chances of separation were difficult to predict. A distinction might, however, be drawn between liquids partially miscible, and liquids miscible in all proportions. Hexane (b.p. 69° C.) and benzene (b.p. 80° C.) for instance, were both hydrocarbons miscible in all proportions, and it might be thought possible to separate them by a fractionating apparatus. But experiment shows they cannot so be separated. If alcohol and chloroform should turn out to be miscible in all proportions, the probability was that they could not, effectively, be fractionated; if, on the other hand, they prove to behave like partially miscible liquids, the separation by a fractionating apparatus such as he had described was rendered possible.—The President proposed votes of thanks to the authors, and the meeting adjourned until January 27, 1899.

Chemical Society, December 1.—Prof. Dewar, President in the chair.—The following papers were read:—The oxidation of polyhydric alcohols in presence of iron, by H. J. H. Fenton and H. Jackson. In presence of iron, methylic, ethylic, propylic, isopropylic and amylic alcohols are not oxidised by hydrogen peroxide; but vigorous oxidation of ethylene glycol, glycerol, erythritol, mannitol, dulcitol and sorbitol is effected

by hydrogen peroxide in presence of, but not in absence of, ferrous salts.—The occurrence of hyoscyamine in the *Hyoscyamus muticus* of India, by W. R. Dunstan and H. Brown. The stem and leaves of *Hyoscyamus muticus* contain about 0.1 per cent. of hyoscyamine; the alkaloid can be extracted more readily from this plant than from henbane.—The comparative colour of the vapour of iodine in gases at atmospheric pressure and in a vacuum, by J. Dewar. By distilling and condensing iodine on a glass surface at -180° to -190° in vacuum test-tubes or bulbs, transparent films of iodine of varying thicknesses may be obtained. On enclosing pure iodine in half-litre flasks, a visible colour is imparted to the air, carbon dioxide, hydrogen or oxygen with which the flask is filled at ordinary temperatures; if the flask be evacuated, the colour of the atmosphere is markedly less, and this distinction remains even when the flasks are heated side by side on the water-bath.

PARIS.

Academy of Sciences, December 5.—M. Wolf in the chair.—Contribution to the theory of the safety bicycle, by M. J. Boussinesq. A mathematical investigation of the equilibrium of the rider.—On the anomalous dispersion and magnetic rotatory power of certain incandescent vapours, by M. Henri Becquerel. In a previous paper the author has explained the unusually great rotatory power observed by MM. Macaluso and Corbino for radiations from sodium vapour in the immediate neighbourhood of absorption bands by regarding the phenomenon as one of abnormal dispersion. In the present paper experimental details are given of a method of making the sodium flame act itself as a prism. The spectrum from an electric arc, which has passed through this flame, shows discontinuities in the neighbourhood of the D-lines. The results form a complete explanation of the results of MM. Macaluso and Corbino, and are in agreement with the theoretical views previously put forward by the author.—On the velocity of sound in air, by M. J. Violle. A discussion of the objections raised by M. Leduc to measurements of the velocity of sound made in the open air. It is shown that the presence of moisture leads to a correction which is smaller than the experimental error of the measurements.—On the synthesis of phenol from acetylene, by M. Berthelot. This synthesis is of interest on account of the comparatively low temperature (200° C.) at which it can be effected. Acetylene is passed into fuming sulphuric acid, the liquid diluted, and the potassium salt prepared of the acid thus formed. This salt, submitted to a potash fusion at 180° to 220° C. for twenty minutes, the mass acidified and distilled; phenol is readily recognisable in the distillate. A repetition of the process upon the residue in the retort yields more phenol.—Action of acetylene upon the metal-ammoniums, by M. Henri Moissan. The metals (sodium, potassium, lithium, and calcium) were dissolved in liquid ammonia at -40° to -80° C., and pure acetylene gas passed in. The residues obtained after evaporation of the excess of liquid ammonia had the compositions, respectively, of $C_2Na_2 \cdot C_2H_2$, $C_2K_2 \cdot C_2H_2$, C_2Li_2 , $C_2H_2 \cdot 2NH_3$, C_2Ca , C_2H_2 , $4NH_3$; all these compounds dissociate on heating, leaving the corresponding carbides, C_2Na_2 , C_2K_2 , C_2Li_2 , C_2Ca .—The colour of calcium carbide, by M. Henri Moissan. Absolutely pure calcium carbide is transparent and colourless; the presence of a minute trace of iron is sufficient to give it the reddish brown colour of the material obtained by the electric furnace.—On the properties of aluminium, by M. A. Ditte. Aluminium is readily attacked by many chemical reagents, acids, alkalis and salts; but in many cases a protecting layer of gas or oxide is formed, so that little or no action takes place in cases where thermochemical data would lead to the prediction of a very energetic attack. Circumstances which destroy this film, lead to rapid solution of the aluminium.—Histology of the skin, by M. L. Ranvier. A study of the fatty matter of the corneal layer of epidermis in man and other mammals.—The liver as a pigmented organ in the Invertebrates, by MM. A. Dastre and W. Floresco. A comparison of the differences and similarities of the hepatic organs in Vertebrates and Invertebrates.—On the prediction of the occultations of stars by the moon, and on the calculation of terrestrial longitudes by means of occultations, by M. G. Bigourdan.—Numerical results obtained for the latitude of the Observatory of Paris by observations made on the garden meridian circle, by MM. H. Renan, J. Perchot, and W. Ebert.—On the determination of gravity on the summit

of Mont Blanc, at Chamonix and at Meudon, by M. Hansky.—On differential equations of the second order with fixed critical points, by M. Paul Painlevé.—On the singular points of a function defined by a Taylor's Series, by M. Le Roy.—On the reduction of multiple integrals, by M. Ch. J. de la Vallée Poussin.—On a new phenomenon exhibited by light in traversing certain metallic vapours in a magnetic field, by MM. D. Macaluso and M. O. Corbino. A discussion of the theory advanced by M. Henri Becquerel.—Remarks by M. Becquerel on the preceding paper.—Absorption in a magnetic field, by M. A. Cotton.—Comparative study of the Hertzian field in air and in water, by M. Albert Turpain.—The Blondel-Carpentier hysteresimeter and its application to the static measurement of hysteresis, by M. A. Blondel. The paper is accompanied by diagrams of the apparatus. Measurements made by the ballistic method were in close agreement with the readings of the instrument.—On the transmission of sound by a wire capable of conducting electricity, by M. Dussaud.—Displacement of metals by hydrogen, by M. Albert Colson. Dry phosphate of silver absorbs hydrogen in the dark and at 12° C. with production of free silver and phosphoric acid. This change goes on more rapidly when the temperature is raised. Silver pyrophosphate, sulphate, and oxide behave similarly.—On the combination of acetone with mercuric sulphate, by G. Deniges. The compound formed has a very high molecular weight, and contains only one-seventeenth of its weight of acetone. Hence it is a suitable means of detecting and estimating small quantities of acetone.—Action of hydrocyanic acid upon epichlorhydrin, by M. R. Lespiau.—On the development of the dilator muscle of the pupil in the rabbit, by M. Ed. Grynfeldt.—On the digestion of starch in plants, by M. Leclerc du Sablon.—Elective absorption of some mineral elements by plants, by M. E. Demoussy. If nitrates and chlorides are simultaneously at the disposal of a plant, nitric nitrogen is absorbed in preference to chlorine.—Chlorophyll assimilation in terrestrial orchids, and in particular in *Limodorum abortivum*, by M. Ed. Griffon. Terrestrial orchids, considered from the point of view of carbon assimilation, are intermediate between plants such as *Epipactis*, in which carbon is taken from the air, and colourless species like *Neottia* and *Coralorhiza*, which are entirely saprophytic. In *Limodorum*, in spite of its richness in chlorophyll, its respiration of carbon dioxide is always greater than its assimilation.—On the toxic powers of chromium compounds with respect to the higher plants, by M. Henri Coupin.—On a new cupric broth, specially designed to combat the black rot, by M. Joseph Perraud. The addition of colophane imparts to the mixture great adhesive power and resistance to washing off by rain.

DIARY OF SOCIETIES.

THURSDAY, DECEMBER 15.

ROYAL SOCIETY, at 4.30.—(1) Application of Liquid Hydrogen to the Production of High Vacua, and their Spectroscopic Examination; (2) The Boiling Point of Liquid Hydrogen under Reduced Pressure: Prof. Dewar, F.R.S.—Ionic Velocities: Prof. O. Masson.—Note on the Densities of Atmospheric Nitrogen, Pure Nitrogen, and Argon: Prof. Ramsay, F.R.S.—The Preparation and some of the Properties of Pure Argon: Prof. Ramsay, F.R.S.; and Dr. Travers.—Observations on the Anatomy, Physiology, and Degenerations of the Nervous System of the Bird: Prof. Rubert Boyce and Dr. W. B. Warrington.—The Action of Magnetised Electrodes upon Electrical Discharge Phenomena in Rarefied Gases. Preliminary Note: C. E. S. Phillips.—On the Reciprocal Innervation of Antagonistic Muscles, Fifth Note: Prof. Sherrington, F.R.S.

LINNEAN SOCIETY, at 8.—Sketch of the Zoology and Botany of the Altai Mountains: H. J. Elwes, F.R.S.—A Description of some Marine and Freshwater Crustacea from Franz Josef Land, collected by W. S. Bruce, of the Jackson-Harmsworth Expedition: Thos. Scott.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.
CHEMICAL SOCIETY, at 8.—The Interaction of Ethylic Sodiomalonate and Mesityl Oxide: Dr. A. W. Crossley.—Derivatives of Camphoric Acid, Part III.: Dr. F. S. Kipping, F.R.S.—Synthesis of $\alpha\beta\beta$ Trimethylglutaric Acid: H. Perkin, jun., F.R.S., and Dr. J. F. Thorpe.

FRIDAY, DECEMBER 16.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Kentish Town Widening, Midland Railway: Walter Daniel.
QUEKETT MICROSCOPICAL CLUB, at 8.

TUESDAY, DECEMBER 20.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Paper to be further discussed: The Ventilation of Tunnels and Buildings: Francis Fox.—And, time permitting, Paper to be read with a view to discussion: High-Speed Engines: John Handley Dales.

WEDNESDAY, DECEMBER 21.

GEOLOGICAL SOCIETY, at 8.—On a Megalosauroid Jaw from Rhætic Beds near Bridgend, Glamorganshire: E. T. Newton, F.R.S.—The Torsion-Structure of the Dolomites: Dr. M. M. Ogilvie [Mrs. Gordon].—The Oceanic Deposits of Trinidad. W.I.: Prof. J. B. Harrison and A. J. Jukes-Browne.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—The West Indian Hurricane, September 1898: Captain A. Carpenter, R.N.—The Connection between the Winter Temperature and the Height of the Barometer in North-Western Europe: W. H. Dines.

ROYAL MICROSCOPICAL SOCIETY, at 7.30.—Exhibition of Binocular Microscopes.

THURSDAY, DECEMBER 22.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Telegraphy by Magnetic Induction: S. Evershed.—The Discussion on Dr. Lodge's Paper (Improvements in Magnetic Space Telegraphy, and on Mr. Evershed's Paper, will be opened by Dr. Fleming and Mr. Preece, with Experimental Demonstrations.

BOOKS and SERIALS RECEIVED.

BOOKS.—Wild Life at Home: R. Kearton (Cassell).—The Way the World went then: I. Barclay (Stanford).—Preliminary Report of an Investigation of Rivers, &c., of Ohio (Cleveland, Ohio).—The Witwatersrand Goldfields Basket, and Mining Practice: S. J. Truscott (Macmillan).—Zoological Record, Vol. xxiv. (Zoological Society).—Lecture Notes on the Theory of Electrical Measurements: Prof. W. A. Anthony (Chapman).—Elements of Sanitary Engineering: Prof. M. Merriman (Chapman).—Manual of Determinative Mineralogy: G. J. Brush, 15th edition (Chapman).—The Annals of Mont Blanc: C. E. Mathews (Unwin).—Michael Faraday: Prof. S. P. Thompson (Cassell).—The Life Story of the late Sir Charles Tilston Bright: E. B. and C. Bright, 2 Vols. (Constable).—An Experimental Course of Chemistry for Agricultural Students: T. S. Dymond (Arnold).—Annalen der Sternwarte in Leiden, Siebenter Band (Haag, Nijhoff).—A Cotswold Village: J. A. Gibbs (Murray).—Earth Sculpture: Prof. J. Geikie (Murray).—Marine Boilers: L. E. Bertin, translated and edited by L. S. Robertson (Murray).—Who's Who, 1899 (Black).—Band of Mercy, Vol. xx. (Partridge).—Animal World, Vol. xxix. (Partridge).—Annuaire, 1899: par le Bureau des Longitudes (Paris, Gauthier-Villars).—The Purification of Sewage: Dr. S. Barwise (Lockwood).—British Journal Photographic Almanac, 1899 (Greenwood).—An Atlas of Bacteriology: C. Slater and E. J. Spitta (Scientific Press).—Flashlights on Nature: Grant Allen (Newnes).—Knowledge, Vol. xxi. (High Holborn).

SERIALS.—Journal of Botany, December (West).—Geographical Journal, December (Stanford).—Zeitschrift für Wissenschaftliche Zoologie, lxx. Bd. 1 Heft (Leipzig).—Catalogus Mammalium: Dr. E. L. Trouessart, nova editio, fasc. 4 and 5 (Berlin, Friedländer).

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