

## UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The 202nd meeting of the Junior Scientific Club was held on May 26. After private business, Mr. J. M. Wadmore (Trinity) read a paper on caoutchouc; Mr. M. Burr (New College) exhibited some live walking-stick insects; and Mr. H. E. Stapleton (St. John's) read a paper on Dulong and Petit's law.

AN exhibition of practical work executed by candidates at the recent technological and manual training examinations of the City and Guilds of London Institute will be opened by the Duke of Devonshire, at the Imperial Institute, on Friday, June 9.

THE Edinburgh correspondent of the *Lancet* states that the court of the University of Edinburgh had recently before them a report from the committee appointed to draw up a statement and appeal for funds for University purposes, in which it was stated that the funds required for the equipment of the Public Health Laboratory and for the preparation of a library catalogue had been provided, the former by the generosity of Mr. John Usher of Norton, and the latter from the munificent bequests of the late Sir William Fraser. For the library, however, funds are still urgently required. The most pressing wants are: (1) a fire-proof room for the storage of rare books of the fifteenth and early sixteenth centuries and the MSS., which number about 7000; (2) a fund, amounting at the lowest figure to 25,000*l.*, for the purchase of scientific and literary journals and of larger works of reference; and (3) extensive structural changes and new book-cases, costing at least 5000*l.*, or a new and suitable building for the library. Another direction in which it will soon be necessary to spend money is the establishment of the Physical Laboratory. The construction and equipment of this laboratory will be a large undertaking, but it is one which will have soon to be faced if the scientific reputation of the University is to be maintained.

## SCIENTIFIC SERIALS.

*American Journal of Science*, May.—Some experiments with endothermic gases, by W. G. Mixer. The endothermic gases operated upon were acetylene, cyanogen, and nitrous and nitric oxides. A beautiful experiment described is one in which acetylene is decomposed at a dull red heat. The gas issues from a narrow tube into a wider tube, heated by a Bunsen burner. When the glass begins to glow there is a slight puff, and the stream of gas issuing from the narrow tube glows, or rather the carbon particles glow in it with the heat of dissociation of the acetylene.—A hypothesis to explain the partial non-explosive combination of explosive gases and gaseous mixtures, by W. G. Mixer. Detonating gas, a mixture of carbonic oxide and oxygen, one of cyanogen and oxygen, and other explosive mixtures of gases, do not explode below certain pressures when sparked. Explosions do not occur because of the infrequency of impacts of molecules having a velocity or internal energy adequate for chemical union. Some of the molecules combine, but the heat of their union is not sufficient to restore the energy lost by radiation, and the change is therefore not self-propagating.—Occurrence of palæotrochis in volcanic rocks in Mexico, by H. S. Williams. Origin of palæotrochis, by J. S. Diller. These two papers effectually dispose of the hypothesis of the organic origin of the siliceous formations described by Emmons as due to some primordial coral. Prof. Williams describes some specimens coming from an old eroded volcanic cone made up of altered porphyry and volcanic tuffs, situated north-east of Guanajuato in the Santa Rosa mountains. A microscopical study of thin sections reveals the fact that the nodules are spherulites, a common feature of acid igneous rocks.—Association of argillaceous rocks with quartz veins in the region of Diamantina, Brazil, by O. A. Derby. Red clay is always associated with the quartz veins of the diamond region of Minas Geraes, Brazil. The author describes a remarkable layer of that kind, one to two metres thick, which has received from the miners the name of *Guia* (Guide), because, as they state, diamonds were to be looked for below the outcrop of this layer, and not above it.—Volatilisation of the iron chlorides in analysis, and the separation of the oxides of iron and aluminium, by F. A. Gooch and F. S. Havens.

The fact that ferric oxide is completely volatile in HCl gas applied at once at a temperature of 500°, and at 200° if the acid carries a little chlorine, opens the way to many analytical separations of iron, notably to the separation of intermixed iron and aluminium oxides.—Preliminary note as to the cause of root pressure, by R. G. Leavitt. The author applies the latest researches on osmotic pressure to the known facts of plant physiology.

*Bulletin of the American Mathematical Society*, May.—Prof. Holgate gives an account of the April meeting, of the Chicago Section, at Evanston, April 1. There were two sessions in the day, and twelve papers were communicated.—Prof. Bôcher gives an elementary proof that Bessel's functions of the Zeroth order have an infinite number of real roots. This was read at the Society's February meeting (*cf.* Gray and Mathews' "Treatise on Bessel Functions," p. 44.) A generalisation of Appell's factorial functions (read at the December 1898 meeting), by Dr. Wilczynski, is a slight modification of Appell's proof. The writer proposes to discuss these functions more fully later on. A paper, read at the February meeting, by Prof. J. Pierpont, entitled "On the Arithmetization of Mathematics," is an attempt to show why arithmetical methods form the only sure foundation in analysis at present known. General reasons are indicated in a paper by Klein ("über Arithmetisierung der Mathematik," *Göttinger Nachrichten*, 1895). The paper enters into considerable detail. There is much metaphysics as well as mathematics.—Prof. E. W. Brown contributes an appreciative review of Prof. Darwin's work on the tides and kindred phenomena of the solar system, and also notices "Leçons sur la théorie des Marées," by Maurice Lévy.—The Notes give an account of a projected change in the "Annals of Mathematics," which is to be inaugurated in vol. xiii., and a full list of the subjects of lectures at a dozen German universities, besides some notes of personal matters.

*Wiedemann's Annalen der Physik und Chemie*, No. 4.—Pitches of very high notes, by F. Melde. The author reviews the various methods by which very high pitches have been determined. These include subjective methods like those by direct hearing and by difference tones, and objective ones like the various vibrographs and the author's own method of resonance. The author admits that the method of difference tones is untrustworthy, and points out certain advantages of the sensitive flame which might be utilised.—Viscosity of gases, by P. Breitenbach. Of the two methods for determining the viscosity of gases, that of transpiration through a capillary tube, and that of the oscillation of a solid, the latter indicates a greater increase of viscosity in the temperature. But in any case the increase is not quite proportional to the temperature.—Effect of electric oscillations upon moist contacts, by E. Aschkinass. Two pointed copper wires which just touch each other act as an ordinary coherer in air or alcohol, but when immersed in water, or when the points are only connected by a drop of water, the action is reversed, since electric waves have the effect of temporarily increasing instead of reducing the resistance. In another form of the experiment, a few drops of water are added to the copper filings of an ordinary coherer. This reversed action is as yet entirely unexplained.—Emission and absorption of platinum black and lamp black with increasing thickness, by F. Kurlbaum. The emission of blackened surfaces is compared with that of an "absolutely black body" in the shape of an orifice of a brass vessel blackened inside and kept at a constant temperature by circulating steam. A bolometer is exposed to radiation from this orifice and to films of black substances kept at the same temperature. It appears that platinum black has a higher absorptivity and emissivity at greater thicknesses, whereas that of lamp black is greater in very thin layers. Neither of these substances absorbs heat rays of great wave-lengths. For most purposes, platinum black is to be preferred, if only on account of the facility in controlling its electrolytic deposition.—Radius of molecular action, by W. Mueller-Erbach. Films of bees-wax or sealing-wax were protected by thin layers of gum against the dissolving action of carbon bisulphide vapour. The thickness of the layer of gum required for effectively protecting sealing-wax was 0.35 mm., whereas bees-wax was sufficiently protected by a layer only 0.14 mm. thick.

THE April issue (vol. lxx. part 4) of the *Zeitschrift für Wissenschaftliche Zoologie* contains five articles, of which, perhaps, the one by Messrs. Eimer and Fickert, on the evolutionary history of the Foraminifera, is the most generally interesting.

More than one hundred pages of the journal are devoted to this subject; and the elaborate genealogical tree given on p. 464 supplies in concise form the general results of the authors' investigations. The other articles include one on the Infusoria found in the stomachs of domestic Ruminants, by A. Günther; one on the urinogenital system of certain Chelonians, by F. von Müller; a third, by J. Meisenheimer, on the morphology of the kidneys of the Pulmonate Mollusca; and a fourth, by G. Forssell, on the Lorenzian system of certain Spiny Dogfish. After describing in detail the histology of these head-organs, the author considers that further experiments must be made before their precise function can be fully determined.

### SOCIETIES AND ACADEMIES.

#### LONDON.

**Physical Society**, May 26.—Mr. T. H. Blakesley, Vice-President, in the chair.—A paper, by Prof. S. Young and Mr. Rose-Innes, on the thermal properties of normal pentane (Part 2), was read by Mr. Rose-Innes. In the first paper on this subject, read before the Physical Society last December, it was shown that the relations existing between the volume temperature and pressure of normal pentane could be closely represented by the equation

$$p = \frac{RT}{v} \left\{ 1 + \frac{e}{v+k} - \frac{l}{gv^2} \right\} - \frac{l}{v(u+k)}$$

This formula was first used in connection with isopentane, and it has been shown that the values of  $R$  and  $l/e$  are the same for the two isomers. The authors find that if  $l$  and  $e$  be taken separately equal to each other, and if the constants  $k$  and  $g$  be calculated from experiments on normal pentane, errors of 2 per cent. occur between the calculated and experimental results. This point has been investigated both algebraically and graphically, and the supposition that these constants are separately equal has been thought incorrect. Taking the values of  $R$ ,  $l/e$ , and  $g$  as being the same in the two pentanes, the constants  $l$  and  $k$  have been determined, and by this means the relations between volume temperature and pressure have been represented by the formula to within 1 per cent. The authors conclude that the difference in pressure of two isomeric substances at a given volume and temperature is of the same order as the deviation from Boyle's law, and involves the second power of the density. Mr. Rose-Innes said the formula proposed was not an absolute solution of the problem, although it was the best of a large number which had been tried. It has been applied with success to Andrews' experiments on carbonic acid, and to experiments which have been made upon ether and hexane. In the latter case, the range in volume was too small to afford a rigorous test of the value of the formula. The range in volume in isopentane was from 4000 to 3'4; in normal pentane, from 300 to 3'4; and in ether, from 350 to 3'4. The temperature varied in different experiments from 40° C. to 280° C. Objections have been raised to the formula on account of the number of constants it contains and its complexity. Mr. Rose-Innes pointed out that it was necessary to have a complex formula, as they were not dealing with a simple problem, but with the results of experiments which went so far below the critical temperature that the volume occupied was only 3'4 times as great as the space which would have been occupied by the molecules at their closest packing. The reader of the paper compared the proposed formula with formulæ of Clausius, Sutherland, and Tait containing four, four, and six constants respectively, and finally with the original equation of Van der Waals applied to experimental results by Amagat. It was shown that the agreement was much closer and the range greater. Prof. Callendar expressed his interest in the wide applicability of the authors' formula, and asked if any theoretical significance could be assigned to the various constants which appeared. Mr. Rose-Innes said the  $R$  of their formula was the  $R$  of the perfect gas equation, and that the  $l$  and  $e$  corresponded respectively to the  $\beta$  and  $\alpha$  of the ordinary Van der Waals expression. So far as he knew, the  $k$  and  $g$  were meaningless.—A paper on the distribution of magnetic induction in a long iron bar, by Mr. C. G. Lamb, was postponed until the next meeting.

**Chemical Society**, May 18.—Prof. Thorpe, President, in the chair.—The following papers were read:—Corydaline (Part vi.), by J. J. Dobbie and A. Lauder. Corydaline,  $C_9H_7NO(OMe)_2$ ,

an oxidation product of corydaline, is shown to be closely related to oxyhydrastinine; the so-called corydaline acid is an acid ammonium hemipinate.—Oxidation of furfural by hydrogen peroxide, by C. F. Cross, E. J. Bevan and T. Heiberg. Furfural is oxidised by hydrogen peroxide in presence of iron salts to a hydroxyfurfural and the corresponding hydroxypropionic acid; the hydroxyfurfural reacts with phloroglucinol and resorcinol in a similar way to the lignocelluloses. It is shown thus that a furfuralphenol is a constituent of the lignocelluloses.—Note on the reactions between sulphuric acid and the elements, by R. H. Adie.—On the action of ethylene dibromide and of trimethylene dibromide on the sodium derivative of ethylic cyanacetate, by H. C. H. Carpenter and W. H. Perkin, jun. Improved methods for preparing tri- and tetra-methylene derivatives are given. Ethylic trimethylenecyanocarboxylate (1,1), is prepared by the action of ethylene bromide on ethylic sodiocyanacetate, and ethylic tetramethylenecyanocarboxylate (1,1), is obtained by the action of trimethylene bromide on ethylic sodiocyanacetate; the salts are hydrolysed by cold alcoholic potash with formation of the corresponding acids.—The maximum vapour pressure of camphor, by R. W. Allen. Experimental values for the maximum pressures of camphor vapour at 0–80° are given.

**Linnean Society**, May 4.—Mr. A. D. Michael, Vice-President, in the chair.—Mr. I. H. Burkill exhibited specimens of a daisy (*Bellis perennis*), found at Kew, in which the ray of the outer florets was so nearly absent that these consisted of scarcely more than ovary, naked style, and stigma.—Mr. F. G. Parsons read a paper on the position of *Anomalurus* as indicated by its myology. The paper contained an account of the muscles of *Anomalurus*, and a comparison of them with those of the different suborders of rodents. From previous examination of the muscles of rodents, the author arrived at the conclusion that *Anomalurus* should be placed among the Sciuromorpha, but that it had certain Myomorpha tendencies. He contrasted its muscles with those of *Pedetes caffer*, but found little reason to regard these two animals as nearly related.—Mr. George Murray, F.R.S., on behalf of Miss Ethel S. Barton, communicated a paper on *Nothelia anomala*, an obscure species of parasitic Alga, and described its mode of growth and reproduction, some remarks being made by Mr. W. Carruthers, F.R.S.—A paper by Mr. George West on variation in *Desmids* was read. The *Desmidiæ* was shown to be morphologically specialised and to exhibit a marked pattern and symmetry of form, major and minor symmetries being recognisable in many species. Variations in form and symmetry were specially dealt with, and a summary given of all that is known concerning the variation in the cell-contents and in the conjugation of these plants. Observations were also made on the variability of the pyrenoids and moving corpuscles in the genus *Closterium*.

**Geological Society**, May 10.—W. Whitaker, F.R.S., President, in the chair.—The geology of the Davos district, by A. Vaughan Jennings. Alpine geology has attracted many workers since the date of Prof. Theobald's classic memoir on the district of which Davos forms part, and new principles of interpretation have been established. The author has more especially studied (a) the age of certain rocks formerly classed as "Bündner Schiefer," but distinct from the grey shales variously regarded as of Jurassic or Tertiary age; (b) the origin and date of the serpentine near the Davoser See; and (c) the tectonic structure of the district. The author discusses at length the physical structure of the district. The general trend of the Davos Valley is rather oblique to that of the greater rock-masses, which, however, is somewhat irregular. He shows that these (which have a general dip towards the south and east) form three great acute and rudely parallel over-folds, the westernmost being the most complicated; of this fold, the serpentine forms a part. It is more recent than the crystalline schists and the Casanna Schiefer, and is associated with the red and green schistose rocks already mentioned, in a way which he considers indicative of intrusion; but it nowhere cuts the Haupt-Dolomit. Accordingly he considers it to be later than the Verrucano, and not earlier than the middle part of the Trias. Certain crystalline breccias occur in the neighbourhood of the serpentines; these the author considers to be due to earth-movement, and he goes on to give reasons for regarding them as the equivalent of the Casanna Schiefer of other localities. There is, in his opinion, no evidence of the presence of