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 Lorenzinian ampullæ in the 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

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

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 β and α 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. Corydaldine, $C_9H_7NO(OMe)_2$, an oxidation product of corydaline, is shown to be closely related to oxyhydrastinine; the so-called corydalinic 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 hydroxypyromucic 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 sodiocyanoacetate, and ethylic tetramethylenecyanocarboxylate (1,1), is obtained by the action of trimethylene bromide on ethylic sodiocyanoacetate; 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 Myomorphine 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 *Notheia 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 Desmidieæ 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

post-Jurassic strata such as Prof. Steinmann believes to exist.—Contributions to the geological study of County Waterford. Part 1, § i. The Lower Palæozoic bedded rocks of the coast, by F. R. Cowper Reed. This paper opens with an account of the previous publications on the geology of the district, and then goes on to describe the sections exposed along the coast at the following localities: Raheen and Newtown Head, Tramore Bay, Garrarus and Kilfarrasy, Annestown and Dunabrattin, Knockmahon, Ballydouane Bay, and Killelton Cove to Ballyvoyle. These sections expose shales and limestones with abundance of igneous rocks partly interbedded, but mainly intrusive; and the author is able to make out the following succession of rocks, tabulated in descending order: (4) Raheen Series. Mudstones, slates, felsites and tuffs, and fossiliferous shales. (3) Carrigaghalia Series. Graptolitic shales, thin flags, cherts, tuffs, and felsites. (2) Tramore Limestone Series. Divided into three stages. (1) Tramore Slates. Calcareous and argillaceous slates.

Zoological Society, May 16.—Dr. W. T. Blanford, F.R.S., Vice-President, in the chair.—The Secretary read extracts from letters received from Mr. J. S. Budgett, containing an account of the progress of his expedition to the Gambia, and announcing his proposed return in July next.—Mr. G. A. Boulenger, F.R.S., exhibited a specimen of the Bornean lizard (*Lanthanotus borneensis*), belonging to the Sarawak Museum, and remarked that it was the second example of this reptile that had reached Europe. An examination of the specimen had confirmed Mr. Boulenger's suspicion that its affinities were with the *Helodermatidae*, and that it was not, as its original describer (Steindachner) had supposed, entitled to family rank by itself.—Mr. G. E. H. Barrett-Hamilton exhibited the skins of two hares (*Lepus variabilis*), and made some remarks on the winter whitening of Mammals in connection therewith.—Mr. G. A. Boulenger, F.R.S., read an account of the fishes obtained by the Congo Free State Expedition, under Lieutenant Lemaire, in Lake Tanganyika, in 1898. Ten new species were described, of which three were made the types of new genera.—Mr. E. M. Corner read a note on the variations of the patella in the divers, grebes, and cormorants, by which the functions of the bones in these birds were explained.—A communication was read from Mr. Stanley S. Flower, containing notes on a second collection of reptiles made in the Malay Peninsula and Siam, from November 1896 to September 1898, and a list of the species recorded from those countries. The species enumerated in the paper were 221, of which one was the type of a new species, described under the name of *Typhlops floweri* by Mr. G. A. Boulenger.—A communication was read from Marquis Ivrea on the wild goats of the Egean Islands. A series of heads and some photographs of the goats of the islands of Antimilo and Joura were exhibited, with the object of showing that the effect of a cross between *Capra aegagrus* and *C. hircus* (such as had been proved to have occurred on the former island) was not to produce an animal corresponding to *C. dorcas* (Reichenow), and that consequently the goat of Joura had not, as was generally assumed, been so produced, but was, as a matter of fact, a local variety of the wild goat, for which the name *C. aegagrus*, var. *jourensis*, was suggested. Mr. W. Cunnington read a paper on a new Brachyuran Crustacean from Lake Tanganyika, obtained by Mr. J. E. S. Moore, for which he proposed the name *Limnothelphusa maculata*. The crab, unlike its nearest allies, was wholly aquatic, and would seem to be the most primitive member of the Thelphusine group.—A paper was read by Mr. W. T. Calman on some Macrurous Crustaceans obtained by Mr. J. E. S. Moore in Lake Tanganyika. A new genus (*Limnocaridina tanganyikae*) and a new species of *Palaemon* (*P. moorei*) were described, it being pointed out that neither of them furnished any particular facts bearing on the general question of the origin of the Tanganyikan fauna.

CAMBRIDGE.

Philosophical Society, May 15.—Mr. J. Larmor, President, in the chair.—Mr. J. J. Lister exhibited specimens of *Branchipus* and *Estheria* raised from dry mud, obtained from the upper pool of Gihon near Jerusalem. The mud had been placed in water, after remaining dry for three years, and three days later the water was found to be peopled with the nauplius larvæ of these genera. Representatives of species of *Daphnia*, *Ostracoda* and *Copepoda* had subsequently appeared, probably identical with those described by Baird from the same locality (*Annals and Magazine of Natural History*, series iii. vols. iv. and viii.). It was pointed out that in *Branchipus* food travels forward towards the mouth along the groove which separates the thoracic appendages of the opposite sides; and the suggestion was offered that a similar course of the food may explain the masticatory character of the basal inner lobes of the anterior thoracic appendages of *Apus*.—Notes on the Binney collection of carboniferous plants; (2) a new type of Palæozoic plant, by A. C. Seward. The author gave a brief description of a fragment of stem from the Coal-Measures of Lancashire, which exhibits anatomical features differing from those of any known genus. The primary structure agrees in certain respects with that of *Heterangium*; but there are definite peculiarities which render advisable the institution of a new generic name. Among the more important characteristics may be mentioned the large isodiametric metaxylem tracheids, the position of the protoxylem elements and the structure and course of the leaf-traces.—On the modification and attitude of *Idolum diabolicum*, a Mantis of the kind called "floral simulators," by Mr. D. Sharp. Mantises are voracious insects with the front legs of remarkable form, suited to the capture of living insects which form the sustenance of the Mantis. Certain of these Mantises assume attitudes and make movements that cause them to resemble flowers, and they are moreover possessed of some modifications of structure and colour that are believed to strengthen the illusion caused by their attitudes. The facts as regarded *Idolum diabolicum* were stated, and from a comparison with other Mantises the conclusion was deduced that the modifications of structure are really slight, and that the attitude is the important point. In reference to the origin of the peculiarities, he concluded that, granted that the instinct of the creature caused it to assume the attitudes, the slight structural modifications might follow from simple physical causes.—On the product $J_m(x)J_n(x)$, by Mr. W. McF. Orr.

PARIS.

Academy of Sciences, May 23.—M. Van Tieghem in the chair.—On the deformation of general surfaces of the second degree, by M. Gaston Darboux.—On some new compounds of camphor with aldehydes, by M. A. Haller. In continuation of previous work on the subject, the author has studied the action of piperonal and of meta- and para-methoxybenzaldehydes on the sodium derivative of camphor, and has prepared a number of new compounds. Metamethoxybenzylidenecamphor crystallises in long needles melting at 51°–52° and is reduced by sodium amalgam to metamethoxybenzylcamphor. Paramethoxybenzylidenecamphor forms large crystals melting at 125°, and is converted by reduction into paramethoxybenzylcamphor, which crystallises in prisms melting at 71°. Piperonylidenecamphor crystallises in needles melting at 159°·5, and yields, on reduction, piperonylcamphor, which forms small white plates melting at 70°. Piperonyl piperonylate, which is formed along with piperonylidenecamphor, crystallises in needles melting at 97°.—On isothermic surfaces and the deformation of the paraboloid, by M. A. Thybaut.—On the deformation of certain surfaces related to surfaces of the second degree, by M. Tzitzeica.—On the development of a uniform branch of analytic functions, by M. Paul Painlevé.—On the calculation of divergent series by Taylor's theorem, by M. Émile Borel.—On the calculation of the maximum available force at the draw-bar of a motor, by M. A. Petot.—On the decomposition of silicates by hydrogen sulphide, by M. P. Didier. The majority of silicates, when heated in a porcelain tube at about 1400° C., are decomposed and partially converted into sulphides. In some cases, the latter are easily separated, owing to the occurrence of volatilisation or of crystallisation, or by their solubility in dilute acids; in others, the sulphides obtained are only attacked by reagents which decompose the original silicate. The reaction is always incomplete, since the silicate becomes covered with a protective layer of sulphide, and in the greater number of experiments the somewhat remarkable formation of a small quantity of sulphuric acid was noted. A portion of the silica appears to be reduced to silicon, and this is also found to occur in the action of hydrogen sulphide on silica alone.—On di-isoamylacetic acid, by M. H. Fournier. Ethylic di-isoamylmalonate, obtained by the malonic ether synthesis from isoamylic bromide, is a colourless liquid boiling at 278°–280°, and the corresponding acid crystallises in white plates melting at 147°–148°. The latter, when heated to 175°, is converted into di-isoamylacetic acid, which crystallises in white needles melting at 46°–47°, and is insoluble in water but very

soluble in organic solvents. The corresponding amide crystallises in white, silky needles melting at 115°.—Fluorine in mineral waters, by M. Charles Lepierre. It is maintained, in opposition to M. Parmentier, that minute traces of fluorides have been detected in many natural waters, and that considerable quantities —equivalent to 10 or 12 milligrammes of fluorine per litre—are present in the mineral water of Gerez (North Portugal), which is much esteemed for its efficacy in diseases of the liver.—On the genesis of the iron ores of Lorraine, by M. P. Villain. Arguments are brought forward in support of the theory that the oolitic ore of Lorraine is a littoral deposit, the mineralisation of which has been effected by the action of hot springs in the bed of an ancient sea.—On a parasitic fungus in cancerous affections, by M. J. Chevalier. The author has succeeded in isolating what appears to be a specific fungus from cancerous tumours, from the blood of patients, and from the air of hospitals. A temperature of from 28° to 35° is most favourable to its growth, but it is highly resistant, the spores not being destroyed by ten minutes' heating at 100°. The parasite exists in the form of conidia, a mycelium, or spherules, according to the stage of development and the medium employed. Its specific character is confirmed by the results of inoculation experiments, but further study will be required before the causal connection between the parasite and cancerous affections is definitely established.

DIARY OF SOCIETIES.

THURSDAY, JUNE 1.

ROYAL SOCIETY, at 4.—Election of Fellows.—At 4.30.—The Parent-Rock of the Diamond in South Africa: Prof. T. G. Bonney, F.R.S.—Experimental Contributions to the Theory of Heredity. A. Telegony.—I. Introductory: Prof. J. C. Ewart, F.R.S.

ROYAL INSTITUTION, at 3.—Water Weeds: Prof. L. C. Miall, F.R.S.

LINNEAN SOCIETY, at 8.—On the High Level Plants of the Andes as illustrated by the Collections of Sir W. Martin Conway, Mr. Edward Whymper, and others: W. Botting Hemsley, F.R.S.—On some Australasian Collembola: Sir John Lubbock, Bart., F.R.S.

SOCIETY OF ARTS, at 4.30.—The Port of Calcutta: Sir Charles Cecil Stevens, K.C.S.I.

CHEMICAL SOCIETY, at 8.—The Hydrosulphides, Sulphides, and Polysulphides of Potassium and Sodium: W. Popplewell Bloxam.—On the Relative Efficiency of various Forms of Still-head for Fractional Distillation: Dr. Sydney Young, F.R.S.—The Salts of Dimethylpyrone, and the Tetravalence of Oxygen: Dr. J. N. Collie, F.R.S., and Thomas Tickle.

FRIDAY, JUNE 2.

GEOLOGISTS' ASSOCIATION, at 8.—The Pleistocene Deposits of the Ilford and Wanstead District: Martin A. C. Hinton.—The Pleistocene Mollusca of Ilford: A. S. Kennard and B. B. Woodward.—The Raised Beach and Rubble Drift at Aldrington, between Hove and Portslade-by-Sea, Sussex, with Notes on the Microzoa: Frederick Chapman.

SATURDAY, JUNE 3.

GEOLOGISTS' ASSOCIATION.—Excursion to Reigate. Directors: Miss M. C. Crosfield and Rev. Ashington Bullen.

MONDAY, JUNE 5.

ROYAL GEOGRAPHICAL SOCIETY, at 3.—Anniversary Meeting.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—A New Method for the Analysis of Commercial Phenols: Dr. S. B. Schryver.—A Demonstration of Printing by Electricity without the aid of Rollers or Ink: Dr. S. Rideal.—Notes on Cacao Butter: Dr. J. Lewkowitsch.—The Use of Iron as the Active Element in Primary Batteries and for Electrolysing: Colonel J. Waterhouse.

TUESDAY, JUNE 6.

ZOOLOGICAL SOCIETY, at 8.30.—An Account of a Collection of Fishes made by Mr. R. B. N. Walker on the Gold Coast: Dr. A. Günther, F.R.S.—On a Specimen of *Cervus belgrandi*, Lart. (*C. verticornis*, Dawk.) from the Forest-Bed of East Anglia: Dr. S. F. Harmer, F.R.S.—On a Few Points in the Structure of Laborde's Shark (*Euprotomicrus labordii*, Müll. and Henle): Dr. R. O. Cunningham.

WEDNESDAY, JUNE 7.

GEOLOGICAL SOCIETY, at 8.—On the Geology of Northern Anglesey: C. A. Matley.—On an Intrusion of Granite into Diabase at Sorel Point (Northern Jersey): J. Parkinson.

ENTOMOLOGICAL SOCIETY, at 8.

THURSDAY, JUNE 8.

ROYAL SOCIETY, at 4.30.—Meeting for Discussion.—*Subject:* On Preventive Inoculation: introduced by M. Haffkine.

MATHEMATICAL SOCIETY, at 8.—On Solitary Waves, Equivoluminal and Irrotational, in an Elastic Solid: Lord Kelvin, G.C.V.O.—On Several Classes of Simple Groups: Dr. G. A. Miller.—The Transmission of Stress across a Plane of Discontinuity in an Isotropic Elastic Solid and the Potential Solutions for a Plane Boundary: Prof. J. H. Michell.—On Theta Differential Equations and Expansions: Rev. M. M. U. Wilkinson.—Finite Current Sheets: J. H. Jeans.—On a Congruence Theorem having reference to an Extensive Class of Coefficients; and on a Set of Coefficients analogous to the Eulerian Numbers: Dr. Glaisher, F.R.S.

FRIDAY, JUNE 9.

ROYAL ASTRONOMICAL SOCIETY at 8.

MALACOLOGICAL SOCIETY, at 8.

BOOKS, PAMPHLET, and SERIALS RECEIVED.

BOOKS.—Handbuch der Anatomie und Vergleichenden Anatomie des Centralnervensystems der Säugetiere: Drs. E. Flatau and L. Jacobsohn, I. (Berlin, Karger).—Annales de l'Observatoire National: d'Athènes, Tome 1 (Athènes).—The Use of Lead Compounds in Pottery: W. Burton (Simpkin).—Catalogue of the Library of the Royal Botanic Gardens, Kew (London).—The Psychology of Reasoning: Dr. A. Binet (K. Paul).—An Introduction to the Study of Materia Medica: Prof. H. G. Greenish (Churchill).—La Crime, Causes et Remèdes: C. Lombroso (Paris, Schleicher).—The Coccidæ of Ceylon: E. E. Green, 2 Parts (Dulau).—The Geography of Mammals: W. L. Sclater and Dr. P. L. Sclater (K. Paul).—Animals in Motion: E. Muybridge (Chapman).—Antiquities from the City of Benin, &c., in the British Museum: C. H. Read and O. M. Dalton (London).

PAMPHLET.—Geology of the Country around Carlisle: T. V. Holmes (London).

SERIALS.—Quarterly Journal of Microscopical Science, May (Churchill). Papers read before the Engineering Society of the School of Practical Science, Toronto, No. 12, 1898–99 (Toronto).—Agricultural Gazette of New South Wales, April (Sydney).—American Geologist, May (Ginn).—Records of the Australian Museum, Vol. 3, No. 5 (Sydney).—Proceedings of the Royal Physical Society, Session 1897–98 (Edinburgh).—Himmel und Erde, May (Berlin).—Memoirs of the Geological Survey of India, Vol 28, Part 1 (Calcutta).—Journal of Applied Microscopy, April (Rochester, N.Y.).—North American Fauna, No. 14 (Washington).—Science Gossip, June (Strand).—English Illustrated Magazine, June (Strand).—Chambers's Journal, June (Chambers).—Bulletin of the American Mathematical Society, May (New York).—Good Words, June (Isbister).—Sunday Magazine, June (Isbister).

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