an inscription has already been set up on the Banne d'Ordenche, a viewpoint above the valley of the Dordogne; it explains briefly that the Banne itself is a volcanic neck, and indicates its relation to the volcanic system of the Auvergne generally, most of the members of which are visible from it. The inscription is stated greatly to interest those who ascend the Banne. "Tables d'orientation" are rare in our own country; there is no organisation specially concerned to provide them, but if such as exist were equipped with explanations of the scenery on M. Glangeaud's lines, they would probably become objects of pilgrimage not only for tourists, but for students and school classes.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 23.—Sir Archibald Geikie, K.C.B., president, in the chair.—H. S. **Hele-Shaw**: Theory of a new form of the chamber crank chain. The paper commences by showing in what way the mechanism is derived from the ordinary type of crank mechanism, its various phases being indicated diagrammatically. One feature of the mechanism, which is of practical importance, is that the crank is fixed, and so a variable stroke can be obtained by very simple means. The new feature of the mechanism, which results in somewhat remarkable properties, is the employment of what is called "a floating guide ring." This device largely reduces the friction of the contrivance when working under high pressures.—Prof. R. A. **Sampson**: A new treatment of optical aberration. A method is developed by which Gauss's method of relating original and emergent rays in a coaxial optical system

$$\left.\begin{aligned} y &= \beta x + b, \\ z &= \gamma x + c, \end{aligned}\right\} \qquad \left.\begin{aligned} y' &= \beta' x' + b', \\ z' &= \gamma' x' + c', \end{aligned}\right\}$$

by means of a transformation,

$$b' = Gb + H\beta, \quad \beta' = Kb + L\beta, \quad c' = Gc + H\gamma,$$
$$\gamma' = Kc + L\gamma,$$

where $GL - HK = \mu/\mu' = N$, may be applied so as to include the aberrations of the third order. The method is adequate for the numerical calculation of telescopic objectives, and offers a remarkable economy in the work hitherto necessary.—Sir W. de W. **Abney**: The extinction of light by an illuminated retina. In this communication the author describes an apparatus adapted for illuminating the retina with known amounts of light, coloured or white, and for extinguishing the sensation of the light in the different colours of the spectrum. Confining himself to the stimulation of the retina by white light only, he shows the movement in the spectrum of the rays requiring the maximum amount of diminution to extinguish their light according as the retina is more or less illuminated.—Dr. W. **Wahl**: Optical determinations at high pressures. *Diagram of state of carbon tetrabromide.*—The melting point of CBr_4 is raised 1° by a pressure of 16 kg. cm.^{2} The transition point from monoclinic to regular crystal form is raised 1° by 32 kg. cm.^{2} The melting-point curve and the transition-point curve do not, therefore, intersect at high pressures to form a "triple point." In consequence, the monoclinic form of carbon tetrabromide cannot be caused to melt at any temperature or pressure whatever. *Diagram of state of α-β-dibrompropionic acid.*—Two modifications of the acid are known, a stable one melting at 64° and an unstable melting at 51°. The unstable modification is not spontaneously transformed into the stable one so readily as in most other cases of "monotropy," and as only very small quantities are employed for these optical determinations, it has been possible to determine the melting-point curve of the unstable modification also. During *isothermal melting* of the unstable modification the pressure may be reduced as much as about 150 kg. cm.^{2} below the true melting-point pressure before melting takes place rapidly. This pressure difference corresponds to a superheating of 2·5°. The melting point of the stable modification is raised 1° by a pressure of 51·3 kg. cm.^{2} The difference between the absolute melting points of the two polymorphic modifications is at any pressure similar to the difference between the absolute melting points at ordinary pressure.—T. R. **Merton**: The changes in certain absorption spectra in different solvents. (1) The absorption spectra of uranous chloride in a number of organic solvents have been measured quantitatively, the results indicating that the differences cannot be considered as a shift of the bands, since the entire character and intensity of the absorption varies in different solvents. (2) The apparent gradual shifts observed when one acid radicle is replaced by another can be simply explained by the superposition of absorption curves, and evidence has been found in support of this explanation. (3) A marked change in the character of the absorption has been found in the presence of free acid, more especially in solvents containing a ketone group. The addition of another solvent to these solutions causes a slow disappearance of the lines without shift, in accordance with the results of Jones and Strong. (4) The influence of pressures up to 750 atmospheres on the absorption spectra of solutions has been investigated with negative results.—W. C. **Ball**: Changes in the absorption spectra of "didymium" salts. The absorption spectra given by aqueous solutions of "didymium" salts, such as the nitrate, chloride, &c., were observed to be considerably altered by sodium hyposulphate, $Na_2S_2O_4$, the lines and bands being altered in position, width, and intensity. These alterations were found to be independent of any reducing action of the very strongly reducing hyposulphite, but to be connected with changes in the ionisation of the didymium; for similar effects on the spectra of the didymium salt of strong acids were produced under conditions likely to diminish such ionisation.—Dr. P. **Phillips**: The viscosity of carbon dioxide. In this experiment the method of determining the viscosity is that described before the society by A. O. Rankine in January, 1910. The viscosity of carbon dioxide is determined for temperatures of 20°, 30°, 32°, 35°, and 40° C., and for a range of pressures from 1 to 120 atmospheres. When the viscosity is plotted against the pressure, the form of the isothermals is very similar to the form of the density-pressure isothermals, but the former cross, whereas the latter do not. When the kinematic viscosity is plotted against the pressure, it is noticed that at the saturation pressure the kinematic viscosity of the gas is the same as that of the liquid. The minimum value of the kinematic viscosity being approximately 0·00069 at 30°, 32°, and at 35° C., this is taken as the critical value of the kinematic viscosity, and therefore multiplying it by the critical density, 0·464, the critical value of the coefficient of viscosity is found to be 0·000320. When the viscosity is plotted against the square of the density it is found that, for a considerable range of density near to the critical point, the viscosity is a linear function of the square of the density. This would seem to show that the viscosity is proportional to the molecular attraction between two adjacent layers of the fluid, that is, to the a/v^2 term in Van der Waals's equation.

Zoological Society, May 21.—Sir Edmund G. Loder, Bt., vice-president, in the chair.—Major J. Stevenson **Hamilton**: The local races of Burchell's zebra. The author pointed out that it was possible to shoot in one herd individuals presenting the characters of various subspecies as described by systematists. In the Transvaal, for example, he obtained skins exhibiting features claimed to be distinctive of such races as *E. burchelli wahlbergi*, *E. b. transvaalensis*, and *E. b. chapmanni*; and from his experience he expressed the opinion that these subspecies had been based upon inadequate museum material.—Dr. William **Nicoll**: Two new trematode larvæ found encysted in enormous numbers in the mesentery of several striped snakes (*Tropidonotus ordinatus sirtalis*).—Dr. W. T. **Calman**: A new genus and species of the crustacean order Branchiura.—G. A. **Boulenger**: Second contribution to our knowledge of the varieties of the wall-lizard. This paper was a continuation of one published in the society's Transactions in 1905, and dealt chiefly with the variations of *Lacerta muralis* in south-eastern Europe and south-western Asia. It also contained a supplement to the first part, thus completing an account of the varieties, of which about thirty were regarded as more or less definable, the author endeavouring to show the inconstancy of the characters adduced by some herpetologists in assigning specific rank to a number of these forms, connected by many gradations.—Sir Charles **Eliot**: The rare British nudibranch *Hancockia eudactylota*, Gosse.

EDINBURGH.

Royal Society, May 6.—Sir William Turner, K.C.B., president, in the chair.—Dr. J. G. **Gray**: Walking and climbing gyrostats and novel illustrations of gyrostatic action; and, in conjunction with George **Burnside**: Motor-spun gyrostats and accessories for demonstration of the properties and practical applications of the gyrostat. New models of gyrostats were described, and a number of curious experiments shown in illustration of their behaviour.—G. H. **Gulliver**: The effect of vibration upon the structure of alloys. The paper gave an account of the microscopic changes produced in certain alloys by the application of a few millions of light blows. The changes were in the direction of an increased size of crystal, and to a less marked degree in the direction of chemical homogeneity, resembling the alterations due to annealing.—H. **Levy**: The singular solutions of partial differential equations of the first order.

May 13.—Dr. Horne, F.R.S., vice-president, in the chair.—Dr. B. N. **Peach**: Report on rock specimens dredged by the *Michael Sars* in 1910, by H.M.S. *Triton* in 1882, and by H.M.S. *Knight Errant* in 1880. The stones, which were obtained from various places in the North Atlantic, were for the most part glaciated. Those which were found in the globigerina ooze were probably deposited from floating ice, and came originally from the west of Scotland and the north and west of Ireland. Those found in stony clay were probably deposited by land ice. They probably came from the north of Scotland and from Orkney and Shetland.—Dr. A. A. **Lawson**: Chromosome reductions in plants: a study of the changes which occurred in cells which ultimately became pollen cells.—Dr. F. A. **Bather**: Caradocian Cystidea from Girvan. The specimens were the property of Mrs. Robert Gray. Eight species were described, and these fell into two limited groups. In both groups there was evidence of a similar gradual modification to accord with the same mode of life. This modification consisted in a change from the erect habit of a typical pelmatozoan attached to the sea floor by its stem to a free-moving habit accompanied by a superinduced bilateral symmetry. This mode of life appeared suited to a littoral environment; and the Girvan fossil bed seems to have been part of a highway skirting the Atlantic basin, along which forms were slowly migrating in each direction from east to west and from west to east, meeting on the way, and becoming modified as they passed.

PARIS.

Academy of Sciences, May 28.—M. Lippmann in the chair.—Paul **Sabatier** and M. **Murat**: The preparation of phenylcyclohexane and dicyclohexyl: the direct hydrogenation of diphenyl. Starting with 1:1-phenylcyclohexanol, this is converted by means of phenylmagnesium bromide into 1:1-phenylcyclohexene; the latter can be reduced to phenylcyclohexane without difficulty by hydrogen in the presence of reduced nickel. Dicyclohexyl is prepared by a similar method starting with 1:1-cyclohexylcyclohexanol, and can also be obtained by the direct reduction of diphenyl by the Sabatier and Senderens method.—Ch. **Gallissot**: Photometric and colorimetric observations of the new star in the Twins made at the Observatory of Lyons.—The secretary announced the death of Eduard Strasburger, correspondant for the section of botany.—M. **Luizet**: The variations in brilliancy and colour of the new star in the Twins proved at the Observatory of Lyons. There is a general resemblance between the new star in the Twins and that in the constellation of Perseus; the changes in brilliancy and colour are less regular in the former than in the latter.—Costa **Lobo**: The kinematographic registration of the eclipse of April 17. These results tend to show that the eclipse was total at the point of observation in the direction of motion of the moon, but annular in a perpendicular direction. The figures can be explained by assuming a flattening of 12 kilometres on the moon's diameter.—G. **Demetresco**: A new variable star. During the examination of a negative (taken by P. Henry in 1900) for statistical purposes it was noticed that there was a star of which the three images were unequal. Further negatives of the same region have proved that this star is variable.—M. **Rouyer**: Surfaces of constant curvature.—Patrick **Browne**: Some functional equations.—Paul **Lévy**: Green's function relative to the cylinder of revolution.—M. **Duchêne**: Concerning an apparatus, called *Tourne-Sol*, designed to facilitate the observation of the ground from an aëroplane.—F. **Croze**: Contribution to the study of the Zeeman phenomenon in the spectra of hydrogen and nitrogen.—L. **Riéty**: The difference of contact potential of glass and an electrolyte.—H. **Pélabon**: Selenide batteries. The battery is made up consisting of metal, a saturated solution of a salt of this metal, and a bar of an alloy of the metal and selenium. The electromotive forces of such cells were studied for the cases of silver, lead, copper, and tin. The resulting data confirm the conclusions drawn from a study of the fusibility of the same series of alloys.—A. **Blondel**: The oscillations of alternators.—H. **Pecheux**: An attempt at the determination of some atomic weights. A comparison of the amounts of silver, lead, copper, and zinc deposited electrolytically by the same current.—Albert **Colson**: The necessity of revising the law of mass action and of homogeneous equilibria.—Ph. A. **Guye**, G. **Kovacs**, and E. **Wourtzel**: The weight of a normal litre of atmospheric air at Geneva. Slight variations of density from day to day were observed, and corresponding with this the proportion of oxygen was also found to vary, 20·93 and 21·04 per cent. being the limiting values found.—Jacques **Duclaux**: The mechanism of coagulation. The coagulation of

colloidal solutions is explained by the author as due to osmotic phenomena.—Jean **Bielecki** and René **Wurmser**: The action of the ultra-violet rays on starch. Exposure of solutions of highly purified starch to the light from a Cooper Hewitt lamp caused a reduction of the rotatory power. Dextrins, reducing sugars, pentoses, formaldehyde, and some acids were detected in the solution.—Mme. Paul **Lemoine**: Calcareous algæ collected during the Charcot Expedition, 1908–10.—Mme. **Phisalix**: The natural immunity of the hedgehog towards the poison of *Heloderma suspectum*. The immunity of the hedgehog against the poison of the lizard is due to the resistance of its cells; it is a cytological immunity.—Ch. **Gravier**: The Pterobranchs described by the second French Antarctic Expedition, and a parasitic crustacean on one of them.—E. **Bataillon**: New analytical researches on the experimental parthenogenesis of amphibians.—A. **Trillat** and M. **Fouassier**: Study of the properties of a distillate from a culture of *B. proteus* upon the vitality of micro-organisms.—L. **Lematte**: The estimation of mono- and bi-metallic phosphates in the presence of organic compounds of acid nature. Evaluation of the total urinary acidity.—R. **Fosse**: Syntheses of urea by oxidation of ammonia and the carbohydrates, of glycerol, and of formaldehyde.—Gabriel **Bertrand** and F. **Medigreceanu**: The presence and the distribution of manganese in the organs of animals. With the exception of white of egg of birds, manganese has been found in all the organs and in all the animal products examined.—J. **Deprat**: The discovery of the Ordovician with Trinucleus and the Dinantian in North Annan, and on the general geology of this region.—E. **Rothé**: The possible influence of solar radiations on the propagation of Hertzian waves. A study of the intensity of wireless signals during the recent eclipse of the sun.—Albert **Turpain**: The influence of the eclipse of the sun of April 17, 1912, on the propagation of electric waves.—M. de Montessus **de Ballore**: The non-existence of isoseistic curves.

CALCUTTA.

Asiatic Society of Bengal, May 1.—Dr. **Annandale**: Frogs and snakes from the Abor foot-hills. The collection exhibited forms a very interesting addition to our knowledge of the fauna of the Himalayas, illustrating a district (the eastern extremity of the great range) hitherto almost unknown. Specimens of at least twenty species of frogs, mostly arboreal in habits, were obtained, and of these more than a third are new to science, while several (notably species of the two peculiar Burmese genera Chirixalus and Phrynoderma) are of considerable interest from a geographical point of view. No fewer than twenty-three kinds of snakes were obtained, including three apparently new to science, one of which represents a hitherto undescribed genus.—S. W. **Kemp**: Specimens of Peripatus from the lower Abor hills. Peripatus is a very primitive arthropod which shows relationships with both worms and insects. It had not previously been found within the limits of the Indian Empire nor, in the eastern hemisphere, in any locality north of the Malaya Peninsula. The specimens from the Abor country show some affinity with those from the latter region, but they evidently represent a species hitherto undescribed.—W. **Kirkpatrick**: A comparative vocabulary of the language of European Gypsies or Romnichal and colloquial Hindustani. Although the linguistic test is not an infallible test of pedigree, it seems possible to account for the similarity of Romnichal or the language of European Gypsies and colloquial Hindustani by the fact that the Gypsy folk of Europe came originally from India. The Gypsy words given in the vocabulary show in most cases an obvious identity with Hindustani. The Gypsy terminal or affix *Engro* or *Mengro* corresponds to the Hindustani *Walláh*.—D. N. **Mallik**: Note on the secular cooling of the earth and a problem in conduction of heat.

BOOKS RECEIVED.

A Handbook of Nursing. By M. N. Oxford. Sixth edition. Pp. viii+319. (London: Methuen and Co., Ltd.) 3*s*. 6*d*. net.

Les Nomogrammes de l'Ingénieur. By R. S. de la Garza. Pp. xii+195+lxxxv plates. (Paris: Gauthier-Villars.) 12 francs.

Tierpsychologisches Praktikum in Dialogform. By Prof. K. C. Schneider. Pp. iii+719. (Leipzig: Veit & Co.) 16 marks.

Mémoires Scientifiques: I. Sciences Exactes dans l'Antiquité, 1876–1884. By P. Tannery, J. L. Heiberg, and H. G. Zeuthen. Pp. xix+466. (Toulouse: É. Privat; Paris: Gauthier-Villars.) 15 francs.

Fossilrekonstruktionen. By Dr. F. König. Pp. 70+10 plates. (München: E. Dultz & Co.)

Smithsonian Institution, U.S. National Museum. Report on the Progress and Condition of the U.S. National Museum for the Year ending June 30, 1911. Pp. 147. (Washington: Government Printing Office.)

Report of the Commissioner of Education for the Year ended June 30, 1911. Vol. i. Pp. xviii+675. (Washington: Government Printing Office.)

Diary of Birds' Nests and Eggs. Pp. iii+22 pp. of ruled paper. (London: Hugh Rees, Ltd.)

Concrete Costs. By Dr. F. W. Taylor and S. E. Thompson. Pp. xxii+709. (New York: J. Wiley and Sons; London: Chapman and Hall, Ltd.) 21*s*. net.

Chemical Research in its Bearings on National Welfare (incorporating a lecture delivered by Prof. Emil Fischer in Berlin, January 11, 1910). Pp. 80. (London: S.P.C.K.) 1*s*. 6*d*.

The Dynamics of Particles, and of Rigid, Elastic, and Fluid Bodies: being Lectures on Mathematical Physics. By Prof. A. G. Webster. Second edition. Pp. xii+588. (Leipzig: B. G. Teubner; New York: G. E. Stechert and Co.; London: Williams and Norgate.) 14*s*. net.

Memoirs of the Connecticut Academy of Arts and Sciences. Vol. iii. March, 1911: A Study of Chiriquian Antiquities. By Dr. G. G. MacCurdy. Pp. xx+249+xlix. (New Haven, Conn.. Yale University Press.)

Problems in Practical Chemistry for Advanced Students. By G. F. Hood. Pp. vi+265. (London: Mills and Boon, Ltd.) 5*s*.

University of London. Francis Galton Laboratory for National Eugenics. Eugenics Laboratory Memoirs, XVI.:—Treasury of Human Inheritance. Name and Subject Indices to Vol. i. By J. Bell. Pp. xiv+575–591. (London: Dulau and Co., Ltd.) 3*s*. net.

The Cinematograph and Natural Science. By L. Donaldson. Pp. 88. (London: Ganes, Ltd.) 2*s*. 6*d*. net.

Advanced Calculus. By Prof. E. B. Wilson. Pp. ix+566. (Boston, New York, Chicago, and London: Ginn and Co.) 20*s*. net.

Elements of the Differential and Integral Calculus. By Dr. W. A. Granville. Revised edition with the