

Wertheimer writes to say that the system has prevailed for many years, and that it has resulted in a great increase of efficiency and in an improved prestige of the college in the eyes of the heads of the firms which employ students who have gone through their engineering training at Bristol.

THE King has appointed a new Royal Commission for the following purposes:—To inquire into and report on the methods of making appointments to and promotions in the Civil Service, including the Diplomatic and Consular Services, and the legal departments; to investigate the working and efficiency of the system of competitive examination for such appointments, and to make recommendations for any alterations or improvements in that system which may appear to be advisable; and to consider whether the existing scheme of organisation meets the requirements of the Public Service, and to suggest any modifications which may be needed therein. The members of the Commission are as follows:—Sir H. B. Smith (chairman), Duke of Devonshire, Bishop of Southwark, Sir J. P. Hewett, Sir Donald Macalister, Sir J. A. Kempe, Mr. S. J. G. Hoare, Mr. A. C. T. Beck, Mr. A. A. Booth, Mr. A. Boutwood, Mr. J. R. Clynes, Mr. C. Coward, Mr. R. D. Holt, Mr. P. E. Matheson, Dr. A. E. Shipley, Mr. P. Snowden, Mr. Graham Wallas, Miss E. S. Haldane, and Mrs. L. A. E. Streatfeild.

#### SOCIETIES AND ACADEMIES.

LONDON.

**Royal Society**, January 28.—Sir William Crooks, president, in the chair.—W. W. C. Topley: The influence of salt-concentration on hæmolysis. The method employed in this investigation has consisted in varying the percentage of sodium chloride present in a mixture of sheep's red cells, hæmolytic anti-body and complement. The hæmolytic anti-body was obtained from an immunised rabbit, and fresh guinea-pig serum, previously absorbed with sheep's red cells at 0° C., furnished the complement. Where hypotonic percentages of sodium chloride have been employed, the solutions have been made in 7.8 per cent. saccharose solution. The results have confirmed the observations of other workers that, when the percentage of salt is increased beyond the normal limit, hæmolysis is inhibited, owing to the failure of union between the complement and the red-cell anti-body complex, and that, if the amount of anti-body present in the mixture be increased, the effect of the increased salt concentration may to a certain extent be overcome. It has further been shown that, if the salt concentration be decreased below the normal limits, less and less anti-body becomes necessary in order to bring about the union of red cells and complement, and that, in the almost entire absence of electrolytes, guinea-pigs' complement can hæmolyse sheep's red cells without the intervention of hæmolytic anti-body.—G. Smith: The life-cycle of Cladocera, with remarks on the physiology of growth and reproduction in Crustacea. As the result of breeding experiments, it is shown that the effects of isolation, crowding, and temperature are the same for *Daphnia pulex* as previously reported for *Moina retrostris*, viz., isolation combined with high temperature completely inhibits the production of sexual individuals, reproduction being entirely parthenogenetic. Crowding, combined with low temperature, results sooner or later in the production of males and ephippial females.—T. Goodey: Investigations on protozoa in relation to the factor limiting bacterial activity in soil. Two different

lots of soil were taken and inoculated with cultures of protozoa originally obtained from soil, in order to determine whether the added protozoa would cause a decrease in the numbers of bacteria in the soil. One soil was free from protozoa to begin with, having been bottled since 1846, whilst the other was freed from protozoa by partial sterilisation. Separate lots of each soil were inoculated with cultures of ciliates, amœbæ, and flagellates, and suitable control samples were set up. Periodical bacterial counts were made in order to ascertain if the protozoa were exerting a limiting action on the soil bacteria, and these counts were continued over a period of about eighteen months. The general conclusion drawn from the investigations is that ciliates, amœbæ, and flagellates do not act as the factor limiting bacterial activity in soil.—S. Hattia: The mesodermic origin and fate of the so-called mesectoderm in petromyzon. The name mesectoderm has given to a loose aggregation of mesenchymatous tissue, in some places assuming the character of an epithelium intervening between the myotomes and the ectoderm in the head and branchial region of the embryo of petromyzon. As the name implies, it has been confidently asserted that this tissue is derived from the ectoderm. In this paper, however, it is shown that this tissue originates from the ventral edge of the myotome and corresponds to the ventral extension of the myotome in the trunk region which grows downwards towards the mid-ventral line outside the splanchnocœle and gives rise to the ventral muscles of the trunk.—Prof. J. C. Bose: The influence of homodromous and heterodromous electric currents on transmission of excitation in plant and animal. The action of an electric current in inducing variation of conductivity may be enunciated under the following laws, which are equally applicable to the conducting tissue of the plant and the nerve of the animal:—(1) The passage of a current induces a variation of conductivity, the effect depending on the direction and intensity of current. (2) Under feeble intensity, heterodromous current enhances and homodromous current depresses the conduction of excitation. (3) The after-effect of a feeble current is a transient conductivity-variation, the sign of which is opposite to that induced during the continuation of current. (4) The normal conductivity-variation undergoes a reversal under a strength of current above the critical value. The heterodromous current then induces a depression while the homodromous current induces an enhancement of conductivity.

**Geological Society**, January 20.—Dr. A. Smith Woodward, president, in the chair.—Prof. O. T. Jones and W. J. Pugh: The geology of the district around Machynlleth and the Llyfnant Valley. An account is given of the physical features, general succession, and structure of the area. The rocks are sharply folded, and sometimes overfolded, towards the east. Their axes range approximately north-north-east and south-south-west; the folds in the central area pitch northwards, but north of the Dovey a southerly pitch sets in. Each large fold is composed of a number of smaller folds having parallel axes, and changing in pitch more frequently than the larger folds. Strike-faults of considerable magnitude range nearly parallel with the folding axes, and are in all cases overthrusts towards the east. Of interest are the transverse faults ranging nearly east-north-east and west-south-west. Two of these faults, the Pennal and Llyfnant Faults, are shatter-belts. The Llyfnant Fault displaces several folding axes, and overthrusts to the east on the north side. Its vertical displacement is on an average about 300 ft., but its horizontal displacement is usually more than 3000 ft. It may therefore be called a "tear-fault."—Dr. A. H. Cox: The geology of the district

between Aberdeydy and Abercastle (Pembrokeshire). The stratigraphy and structure of the greater part of the district is described for the first time. Aberdeydy itself has been, since the time of Hicks, a type-locality for the Llanvirn Beds. It has been found that the Ordovician rocks of the district do not succeed one another in a simple upward sequence, but that they have been thrown into great folds and sometimes even overfolded. The limbs of the folds increase in steepness as the pre-Cambrian massif is approached. This folding brings up strips of Cambrian rocks, the presence of which on the North Pembrokeshire coast was previously unsuspected. There is a complete sequence of Ordovician rocks from near the base of the Arenig Series to high up in the Glenkiln Group.

**Linnean Society**, January 21.—Prof. E. B. Poulton, president in the chair.—W. J. Dakin: Structure and fauna of the Abrolhos Islands. Percy Sladen Trust Expedition. The islands are situated 40-50 miles off the coast of West Australia. They are interesting because of the almost complete lack of knowledge concerning the marine fauna of that part of the world. In addition, however, they possess many peculiar features of their own. Although they are coral islands (the most southern in the world), the land fauna is decidedly continental and indicates a comparatively recent connection with the mainland of Australia. Again, although the coast is only forty miles east of the islands, one has to travel some hundreds of miles north of the latitude of the Abrolhos to find a marine fauna on the coast with such tropical characters. The collections have not yet been worked out, but not the least interesting of the discoveries is a new species of Enteropneusta, *Ptychodera felsarti*, closely allied to varieties of *Pt. flava*. This is the first Enteropneust known from the West Coast of Australia.

**Institution of Mining and Metallurgy**, January 21.—Mr. Bedford McNeill, past president, in the chair.—J. A. L. Henderson and W. H. Henderson: Inflammable natural gas as an economic mineral. The authors set out to show that natural petroleum-gas is the only inflammable natural gas of economic value, in its two divisions of "dry" or gas-well gas, and "wet" or "casing-head" gas, which is chiefly produced from oil wells. The former is of chief commercial importance, as it is capable of direct use for heating, power, and lighting purposes as it comes from the well. The occurrence of natural petroleum is co-extensive with that of petroleum, though the reverse is not always true, as is shown by the relative acreages of gas and oil fields in the United States in 1911, which were 11,132,642 and 8,322,862 respectively. The greatest and most extensive natural gas deposits of economic importance, so far as known, are found in the older, drier, and more consolidated porous sedimentary rocks from the Cretaceous downward. In the United States the industry has developed to such an extent that in 1913 the value of natural gas produced almost equalled that of the gold produced. Natural gas has within the last ten to fifteen years become a formidable rival to petroleum in output, and even in value, despite the enhanced prices that the oil has commanded in recent years. In addition to the gas production of the United States, which easily stands first, the authors direct attention to the occurrences in Canada, Russia, Galicia, Italy, Transylvania, and even in England.—J. Cook: Investigations in ore milling to ascertain the heat developed in crushing. As the result of carefully conducted experiments with an electrically driven stamp mill the author established the following data: Of the E.H.P. supplied to the motor only 76 per

cent. was apparently stored in the raised stamp; the ore crushed was raised in temperature an average of 4.8° C., while the water used was raised an average of 0.438° C. Of the actual E.H.P. put into the motor, practically 61 per cent. was returned as heat in the pulp. Of the energy which reached and was stored in the lifted stamp, practically 80 per cent. was returned as heat in the escaping pulp. In the latter case the author allocates the remaining 20 per cent. unaccounted for as heat to (a) loss by friction of the guides, (b) loss in sound and vibration, (c) loss in radiated heat, and (d) the larger proportion, loss due to the energy with which the pulp is delivered through the screens. The test was borne out by the fact that the screens had in places a perceptibly higher temperature than the pulp. The author asks: Is the energy used in tearing the ore particles asunder entirely returned as heat, and do some electrical phenomena exist?

**Mineralogical Society**, January 26.—Dr. A. E. H. Tutton, president, in the chair.—S. Kōzu: The dispersion of felspar. By the most refined methods the dispersions in the three principal directions were determined for various members of the felspar group.—F. P. Mennell: Note on the colour of some alluvial diamonds and of pyrrhotite. The colour, usually green, of the diamonds in the gravels of Somabala, Rhodesia, is superficial, and probably due to infiltration, presumably of iron salts, while the stones were lying where they now occur. Pyrrhotite is tin-white in colour when fresh. The cause of its rapid alteration was discussed.—Prof. G. Cesàro: Crystals of calomel from Spain. The crystals, which were pale-yellowish in colour, imperfectly transparent, from 1-3 mm. in size, and displaying the forms 100, 111, 311, were most irregularly developed.—Prof. G. Cesàro: General formula for the birefringence of a crystal-plate in terms of the angles which its normal makes with the principal optical axes. The approximate formula is obtained by supposing the mean index of refraction to become infinite, while the differences between it and the greatest and least indices remain constant.—Prof. G. Cesàro: A numerical relation of the sum of the symmetry-axes situated in the symmetry-planes of a polyhedron. If  $N, \Lambda_n, P, \Lambda_p, Q, \Lambda_q, \dots$  are the axes of symmetry lying in the planes of symmetry, then—

$$4\{Nn(n-1) + Pp(p-1) + Qq(q-1) + \dots\} + I = C,$$

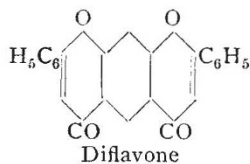
and the number of planes of symmetry is given by  $X = \frac{1}{2}(C+1)$ .

DUBLIN.

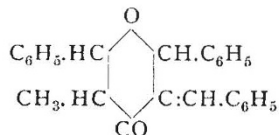
**Royal Irish Academy**, January 11.—Rev. J. P. Mahaffy, president, in the chair.—S. B. Kelleher: A three-dimensional complex variable. Some properties of expressions of the form  $P+Q\theta+R\theta^2$  where  $P, Q, R$  are functions of three independent variables and  $\theta^3$  is equal to unity, but  $1+\theta+\theta^2$  is not zero.—R. Southern: Summary on marine distribution (Clare Island Survey). This paper is in the nature of a summary of the results obtained by the investigation of the marine fauna of the Clare Island area. The nature of the coast-line and sea-bottom is described, and the various types of habitat and the associations of animals inhabiting them are discussed. The distribution of the fauna from the geographical point of view is then considered. Some observations on the period of reproductive activity of various species are included. A description of the hydrographical results obtained in the course of the survey is given. The total number of marine species of animals obtained in the course of the survey is approximately

two thousand, a much larger number than has hitherto been found in any similar area.—**R. Lloyd Praeger**: Summary on terrestrial distribution (Clare Island Survey). The work of the Clare Island Survey now closing has occupied just six years, the first three being devoted to field-work and the last four to publication, there being an overlap of one year in the two sections. More than one hundred workers took part, and without exception the authors of the sixty-eight reports in which the results are embodied themselves visited the area. Besides papers on almost every group of the plant and animal kingdoms, the report includes contributions on the history and archæology of the area, on Gaelic names of animals, plants, places, and human families, climatology, and geology. The total number of species of animals obtained is about 5100, and of plants about 3200, total more than 8300. Of these no fewer than 1825 are additions to the fauna or flora of Ireland. More than 400 are new records for the British Isles, and more than 120 are new to science. Two new families and fifteen new genera are described.

January 25.—**Dr. F. A. Tarleton**, in the chair.—**H. Ryan** and **Miss P. O'Neill**: Studies in the diflavone group.—**I.**, Diflavone. With the view of extending our knowledge of the relations between constitution and colour in the oxygen dyes, the authors have prepared a substance which has, as its formula, two flavone rings in a condensed form. It was obtained from diacetoresorcinol in two ways:—(1) Diacetoresorcinol dimethyl ether was condensed with benzaldehyde to dihydroxydichalkone dimethyl ether which reacted with aluminium chloride to give dihydroxydichalkone and the tetrabromide of the diacetate of dihydroxydichalkone on treatment with alcoholic potash yielded diflavone. (2) Dibenzoylaceto-resorcinol dimethyl ether was formed by condensation of benzoic ester with diacetoresorcinol dimethyl ether, and was converted by hydriodic acid into benzoylaceto-methoxyflavone, and finally into diflavone. The latter formed



pale yellow crystals, which gave a beautiful blue fluorescence with concentrated sulphuric acid.—**H. Ryan** and **Rev. J. Dunlea**: In endeavouring to synthesise dicinnamoylmethane the authors condensed benzaldehyde with mono- and di-methylacetylacetone by means of gaseous hydrochloric acid. The product in both cases was identical, being a chlorinated body which, on treatment with pyridine, yielded a substituted pyrone of the formula:—



The substance did not form an oxime, but added on hydroxylamine apparently at the unsaturated linkage. It formed a dibromo-derivative.

#### PARIS.

**Academy of Sciences**, January 23.—**M. Ed. Perrier** in the chair.—**G. Bigourdan**: Description of a new instrument for the differential comparison of great angular distances in the sky. A movable platform

carrying two telescopes is fixed to an equatorial mounting in such a manner that the axis about which the platform can move coincides with position usually occupied by the optical axis of the equatorial. The two telescopes can turn round axes normal to the platform, and are furnished with ocular micrometers. The use of the instrument, which forms a sort of angular comparator, is described. It will prove specially suitable for the direct determination of refraction, the measurement of the annual aberration constant, and correcting the fundamental star catalogues by comparison of large differences of right ascension, independently of clocks and of variation of instrumental constants.—**André Blondel**: The useful effect of projectors. Additional remarks.—**E. Delorme**: New treatment of nerves wounded by projectiles. The general principles underlying nerve operations are stated, together with full details of the methods employed.—**J. Bosler**: The red region of the spectrum of stars of the Wolf-Rayet type. Photographs of the red end of the spectrum of fifteen stars of this type, utilising plates sensitised by means of dicyanine. Comparison of the spectra confirms the view that stars of the Wolf-Rayet type represent waning Novæ of past ages. New stars appear generally in dense star clusters, and the Wolf-Rayet stars also have the same peculiarity.—**F. Devoto**: Observations of Delavan's comet (1913f) made at the Paris Observatory. Observations and positions of comparison stars are given for December 24, 28 (two), 29, January 8, 11, 18.—**S. Stoilow**: Quadruply periodic functions.—**Paul Mansion**: Demonstration of the law of large numbers.—**Stanislas Meunier**: A remarkable consequence of volcanic theory.—**Emile Belot**: Orogenic theory arising from the physical theory of the formation of oceans and primitive continents.—**Edmond Gain** and **A. Jungelson**: Maize seeds resulting from the growth of free embryos. The embryos were extracted from the seeds, carefully cleaned from all reserves of albumen, and sown in natural soil. The plants obtained produced seed of normal type.—**H. Jumelle** and **H. Perrier de la Bâthie**: A slightly known Cucurbitaceæ of Madagascar.—**MM. Rivier and Dupoux**: A new method for the rapid production of radiographs on ferrotype plates.—**P. Carnot** and **B. Weill-Hallé**: Culture in sand tubes for the rapid diagnosis of typhoid fever, and searching for germ-carriers.—**Henri Coupin**: The organic nutrition of a marine bacterium. **A. Trillat**: Study on the aqueous microbial dusts of inhabited places.

#### BOOKS RECEIVED.

- University of Melbourne. Medical School Jubilee. Pp. 108. (Melbourne: Ford and Son.)  
 The Observer's Handbook for 1915. Pp. 76. (Toronto: Royal Astronomical Society of Canada.)  
 Anuario del Observatorio de Madrid. Para 1915. Pp. 703. (Madrid: Bailly-Baillière.)  
 Memoirs of the Geological Survey. England and Wales. The Geology of the South Wales Coalfield. Part xi. The Country around Haverfordwest. Pp. viii+262. (London: H.M.S.O.; E. Stanford, Ltd.) 3s. 6d.  
 Memoirs of the Geological Survey. Scotland. The Geology of the Country round Beaully and Inverness, including a Part of the Black Isle. Pp. vi+108. (London: H.M.S.O.; E. Stanford, Ltd.) 2s.  
 Genetic Studies on a Cavy Species Cross. By Prof. J. A. Detlefsen. Pp. 134+10 plates. (Washington: Carnegie Institution.)  
 A Pilgrim's Scrip. By R. Campbell Thompson. Pp. xii+345. (London: J. Lane.) 12s. 6d. net.