

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The Junior Scientific Club held their 195th meeting in the Physiological Lecture Room of the Museum on Friday, November 25. Mr. M. Burr (New College) read a paper on "Collecting in South-Eastern Europe," which was illustrated by lantern slides from photographs taken during his recent journey through Herzegovina and Montenegro. Mr. J. M. Wadmore (Trinity) followed with a paper on "Sun-spots and Faculae." The number of new members this term has been forty-seven.

CAMBRIDGE.—The following summary of the results of the Cambridge Scholarship Competition is sadly instructive:—

SCHOLARSHIPS AND EXHIBITIONS AT CAMBRIDGE.

The allied Colleges.—Pembroke, Gonville and Caius, Kings, Jesus, Christ's, St. John's, Emmanuel.

		£
Classics	35 scholarships and exhibitions, value	1710
Mathematics ... 19	" " " "	1110
Modern languages 3	" " " "	120
History	2 " " " "	100
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Total for literature and mathematics	59 " " " "	3940
Natural science ... 9	" " " "	390

Of the scholarships: 50 per cent. are for classics, 32 per cent. mathematics, 4 per cent. modern languages, 3 per cent. history, and 11 per cent. natural science.

Trinity—

		£
Classics	9 scholarships, &c., value	475 (+ 2 senior scholarships)
Mathematics ... 5	" " " "	280 (+ 1 senior scholarship)
History	1 " " " "	40
Natural science ... 5	" " " "	235

Clare—

Classics	4 " " " "	160
Mathematics ... 3	" " " "	180
History	1 " " " "	30
Natural science ... 2	" " " "	120

Trinity Hall—

Classics	1 " " " "	60
Mathematics ... 2	" " " "	140

It will be seen that Trinity and Clare have again treated science quite fairly, as they did last year; but 3940*l.* in literature and mathematics, and only 390*l.* for science, is a very unsatisfactory distribution of prizes, and does not encourage scientific education in our schools and colleges.

MR. W. H. PREECE, C.B., F.R.S., will distribute the prizes to students at the Merchant Venturers' Technical College, Bristol, on December 21.

THE new building extension of the Borough Polytechnic Institute, including workshops and gymnasium, will be formally opened on Thursday next, December 8.

MR. F. P. BARNARD having found himself unable to accept the headmastership of University College School, London, the Council have offered it to Mr. J. Lewis Paton, assistant master at Rugby School, who has accepted it.

MR. E. H. TODD, a student at the South-Western Polytechnic Day College for men, has been appointed to an open exhibition in Physics and Chemistry at Christ Church, Oxford, of the value of 80*l.* per annum, tenable for four years.

ACCORDING to the twenty-fifth quarterly statement of the President of the University of Chicago, there were 1421 students in attendance during the summer quarter, of whom 591 were in the graduate schools. The assets of the University are valued at about 9,000,000 dollars. The income was 706,973 dollars, and the expenditure 678,399 dollars.

THE Commission appointed under the University of London Act, 1898, consisting of Lord Davey (chairman), the Bishop of London, Sir William Roberts, Sir Owen Roberts, Prof. Jebb,

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Prof. Michael Foster, and Mr. E. H. Busk, with Mr. Bailey Saunders as secretary, has commenced its sittings. The office of the Commission is No. 32 Abingdon Street, Westminster, S.W.

A SCHEME for the establishment of a Gordon Memorial College at Khartoum has been put forward by Lord Kitchener. It is proposed that the principal teachers should be British, and that the supervision should be vested in the Governor-General of the Sudan. The teaching, in its early stages, would be devoted to purely elementary subjects, such as reading, writing, geography, and the English language. Later, and after these preliminary stages had been passed, a more advanced course would be instituted, including a training in technical subjects, specially adapted to the requirements of those who inhabit the valley of the Upper Nile. The fund required for the establishment of the college Lord Kitchener estimates at 100,000*l.*, of which 10,000*l.* would be required for the initial outlay, and the remainder invested for the maintenance of the institution. He announces that the Queen has consented to become patron and the Prince of Wales vice-patron, of the movement, and that a general Council of the leading men of this country is in course of formation.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, November 25.—Mr. Shelford Bidwell, F.R.S., President, in the chair.—Mr. R. A. Lehfeldt read a paper on the properties of liquid mixtures, being Part iii. of his communications on that subject. It deals with partially miscible liquids. Measurements are given of the vapour-pressure of mixtures of phenol and water. This pair of liquids is completely miscible above 68° C., and incompletely miscible below that temperature. The law of equilibrium between incomplete mixtures and the vapour over them is investigated, especially at "the critical point," *i.e.* at the point where incomplete miscibility passes over into complete miscibility. It is pointed out that normal organic liquids always mix completely. Ethylene dibromide and formic acid mix on boiling, and separate into two layers when cold. The curves representing the cases of complete mixture are comparable in shape with those previously obtained by Mr. Lehfeldt for mixtures of alcohol and toluene, but they show a still flatter maximum; so much so that 60 per cent. to 70 per cent. of phenol may be added to water without appreciable effect on the vapour-pressure. To verify this point, a differential pressure-gauge was designed; the construction and method of using are given in the paper. The behaviour of the liquid is apparently the same above and below the critical point. At temperatures not too close to the critical point the vapour-pressure of a saturated mixture is approximately the sum of the partial pressures, calculated for the two saturated solutions according to Raoult's law. Diagrams are drawn showing the characteristic surface for phenol-water mixtures, with the freezing-points of water and of phenol traced out. Phenol melts under water at 1°·5 C., and forms a cryohydrate containing 4·83 per cent. phenol, melting at -1°·0 C. Prof. S. Young (abstract of communication): The statement of Mr. Lehfeldt that normal organic liquids always mix completely, should be qualified. There are pairs of normal organic liquids which, though miscible in all proportions, approximate closely to partially miscible liquids, *e.g.* benzene (b.p. 80° C.) and normal hexane (b.p. 69° C.). When American petroleum is fractionally distilled, the benzene which is present in small quantity does not come over at about 80°, but mostly at about 65°; the most probable explanation appears to be that benzene and hexane behave, as regards distillation, like miscible liquids, a view which is confirmed by an investigation of the boiling-points and also of the specific gravities of mixtures of the two hydrocarbons, an account of which has lately been read before the Chemical Society by Messrs. Young and Jackson. The boiling-point curve is similar in general form to that of phenol and water, as shown by Mr. Lehfeldt, though the deviation from the ordinary form is not so marked. Ten per cent. of benzene has practically no influence on the boiling-point of normal hexane, but 10 per cent. of hexane lowers the boiling-point of benzene nearly 3° C. Also there is always expansion on mixing benzene and hexane, the maximum reaching about 0·4 per cent. Dr. S. P. Thompson asked whether any relation

had been observed between the vapour-pressure and the surface tension of the mixtures. Mr. Leffeldt was not sure whether the surface-tensions of the components pass into one another at the critical point of mixture.—Mr. L. N. G. Filon then gave an account of his paper on certain diffraction fringes as applied to micrometric observations; it is to a great extent a critical investigation of a paper by A. A. Michelson on the same subject (*Phil. Mag.*, vol. xxx. pp. 1-21, July 1890). Michelson there describes a method for measuring the angular distance between the components of a double star, or the angular dimensions of very small celestial bodies, by means of interference-fringes, using two adjustable slits in front of the objective of a telescope. If the star is double, or if it has an appreciable disc, then by widening the distance between the slits, the fringes become fainter, and in some cases almost vanish. But, by still further widening the slit, the fringes reappear, disappear, and so on. In the paper (*l.c.*) Michelson develops the law of these appearances and disappearances, and gives an expression for the ratio of the angular distance between the components of the double star, or the angular radius of the single source, to the distance between the slits, on the assumption that the slits are infinitely long and infinitely thin. Mr. Filon considers that this assumption is unjustified by the conditions of measurement; he reviews the original investigation, and modifies the results. He then proceeds to find equations to represent the intensity of light in the focal plane, for a point source, and for a two-point source. These fringes are only visible over a certain rectangle, called "the rectangle of illumination" of the source. In the case of a two-point source, if the distance perpendicular to the slits, between the geometrical images of the two points, is an integer-multiple of the distance between two fringes, the maxima of one system correspond with the maxima of the other, the fringes overlap and their intensity is augmented. If, however, this distance should be an odd multiple of the half-distance between the fringes, the maxima of one system correspond to the minima of the other, and if the fringes that are superposed are of similar intensity, the fringing is nearly obliterated, a result that agrees with Michelson's law. But it is now shown that for this phenomenon to occur (1) the rectangles of illumination of the two sources must overlap to a very large extent, this consideration was neglected by Michelson, and (2) the angular distance between the two stars measured parallel and perpendicularly to the slits, must be less than a definite amount, depending upon the wave-length, and the length and breadth of the slits. In astronomical cases, the second condition is generally satisfied. If the rectangles of illumination do not overlap they can be respectively distinguished, and thus the star can be resolved by direct observation. If, however, an accurate measurement of the distance between the components is required, by Michelson's method, the rectangles must be made to overlap. The paper includes an investigation of a refractometer that Michelson (*l.c.*) proposed to use for increasing the effective aperture of a telescope; it is shown that Michelson's law is generally true for that instrument, but certain limitations are pointed out. Extended sources are next considered, and also the shape and size of the object. The paper concludes with the description of a method, by means of which the ellipticity of a very small disc may be measured by these diffraction fringes in the special case where Michelson's law holds good. In reply to a question from Prof. S. P. Thompson, Mr. Filon said that the minimum breadth of slit with which he had found it practicable to work, using monochromatic light with his telescope, was about half a millimetre.—The President proposed votes of thanks, and the meeting adjourned until December 9.

Chemical Society, November 17.—Prof. Dewar, President, in the chair.—The following papers were read:—Determination of the constitution of fatty acids; Part i., by A. W. Crossley and H. R. Le Sueur. The authors have devised a general method for determining the constitution of a fatty acid of the type $\text{CH}_2\text{X} \cdot \text{CH}_2 \cdot \text{COOH}$; the method has been proved upon valeric, isovaleric and isobutylic acid.—The crystalline form of iodoform, by W. J. Pope. Iodoform is deposited from acetone solution in magnificent hexagonal crystals, of which measurements are given.—The characterisation of racemic compounds, by F. S. Kipping and W. J. Pope. Ladenburg states that if a mixture of an externally compensated substance with one of its active components, deposits on fractional crystallisation fractions of different specific rotations, the compensated substance is racemic; if it is not racemic, the various fractions have the

same specific rotation. The authors show that this rule does not hold.—The occurrence of orthohydroxyacetophenone in *Chione glabra*, by W. R. Dunstan and T. A. Henry. The wood of *Chione glabra* has a strong somewhat foecal odour owing to its containing orthohydroxyacetophenone.—Preparation of hyponitrite from nitrite through oxyamidodisulphonate, by E. Divers and T. Haga. Sodium carbonate and sulphur dioxide convert sodium nitrite into oximidodisulphonate, which on hydrolysis yields sodium oxyamidodisulphonate; the latter is decomposed into hyponitrite and sulphite by potash. These facts lead to a good method of preparing hyponitrites.—Absorption of nitric oxide in gas analysis, by E. Divers. A concentrated alkaline solution of sodium or potassium sulphite rapidly absorbs nitric oxide, and may be used for this purpose in gas analysis.—Interaction of nitric oxide with silver nitrate, by E. Divers. Silver nitrate decomposes in a current of nitric oxide at lower temperatures than in air or carbon dioxide; the products are the same in the two cases, namely, silver, silver nitrite and nitrogen peroxide.—Preparation of pure alkali nitrites, by E. Divers. Nitrous gases containing excess of nitric oxide convert potassium or sodium hydroxide or carbonate into nitrite in absence of air; no nitrate is formed.—The reduction of an alkali nitrite by an alkali metal, by E. Divers.—Hyponitrites: their preparation by sodium or potassium, by E. Divers.—Paranitro-orthanisidine, by R. Meldola. A number of derivatives of *p*-nitro-*o*-anisidine are described.

Mathematical Society, November 10.—Prof. Elliott, F.R.S., President, in the chair.—The President feelingly alluded to the losses to the Society occasioned by the recent deaths of Mr. Walter Wren and Dr. J. Hopkinson, F.R.S.—The Treasurer read his report, which was a favourable one. Its reception was moved by Mr. A. B. Kempe, F.R.S., seconded by Mr. S. Roberts, F.R.S., and carried unanimously. The ballot was then taken, with the result that Lord Kelvin, G.C.V.O., was elected President, and Messrs. Elliott, F.R.S., H. Lamb, F.R.S., and Lieut.-Colonel Cunningham, R.E., Vice-Presidents. The other members of Council of the last session remain in office, with the exceptions noted on p. 602 (*NATURE*, vol. lviii.). The retiring President having vacated the chair, his place was taken by Lieut.-Colonel Cunningham, who called upon Prof. Elliott to read his address, entitled "Some Secondary Needs and Opportunities of English Mathematicians," of which the following is a brief abstract. The address congratulated the Society on the work it had done during the last two years, and in particular on the printing in its *Proceedings* of Sylvester's "Outlines of Seven Lectures on the Partitions of Numbers." It referred to some of the losses by death which had occurred during the two years among mathematicians and members of the Society. It expressed gratification at the holding at Zürich in 1897 of an international Congress of mathematicians, and at other signs of growing co-operation among mathematicians of different nationalities. This co-operation, which the history of the Society had proved to be so valuable at home, should in every way be encouraged on the widest possible scale. Reference was made to some advantages which had accrued from co-operation and mutual encouragement in the history of the Society, and it was in particular enforced that much stimulation had once been exercised by the actual meetings of the Society, in ways for which opportunity still presented itself. The influence which the Society had exercised in widening the scope of British enterprise in pure mathematics was dwelt upon at some length, and illustrated by reference to a former need for advanced and comprehensive treatises on modern subjects, which had been inspiringly exposed by one of the Society's earlier Presidents, Prof. Henry Smith, and since his time largely satisfied. Secondary work was necessary that the transition from narrow to widened views of mathematical opportunity be effected surely and without discouragement. The passion among us for examination into elegant incidentals, which shows itself in the fascination exercised by problem making and solving, must be reckoned with and, in the speaker's opinion, not discouraged. The effort must be to increase the range of interest among students without weakening the facility of acquiring that interest. Unambitious work of definitely educational intention, in subjects now made known to the select few by ambitious treatises, is needed. Instructors are required where leaders have been found. The logical improvement of elementary teaching is proceeding. Unassuming, partial and introductory books of didactic character on modern subjects are wanted. Opportunities for didactic work, and for the utilisation of our love of

detail, were illustrated by reference to subjects connected with the Theory of Functions, and with Lie's Theory of Continuous Groups. Greater attention to historical and bibliographical work, in order to disseminate interest in mathematical advancement, was also advocated. It was noticed with satisfaction that a great stimulus to the production of specialist literature of this kind in our own tongue had been given by the American Mathematical Society. In conclusion, thankful acknowledgment was made of the great debt owed by the Society to Mr. Jenkins and Mr. Tucker, who from the days of its infancy had been its honorary secretaries, and of whom the former found it necessary three years ago to claim rest from his arduous duties, and now has had further to ask to be relieved from service on the Council.—On the motion of the chairman, ratified by the members present, Prof. Elliott consented to the publication of the address in the *Proceedings*.—The following papers were formally communicated:—The structure of certain linear groups with quadratic invariants, Dr. L. E. Dickson; multiform solutions of certain differential equations of physical mathematics and their applications, Mr. H. S. Carslaw; on the null spaces of a one system and its associated complexes, Mr. W. H. Young; and on the functions Y and Z which satisfy the identity $4(x^p - 1)/(x - 1) = Y^2 \pm pZ^2$, Prof. L. J. Rogers.

Zoological Society, November 15.—W. T. Blanford, F.R.S., Vice-President, in the chair.—Prof. G. B. Howes, F.R.S., exhibited a series of embryos and five living eggs of the Tuatera Lizard (*Sphenodon punctatus*), which had been sent to him by Dr. A. Dendy, of Christchurch, New Zealand.—Messrs. E. W. L. Holt and L. W. Byrne exhibited specimens and drawings of a small Sucker-fish of the genus *Lepadogaster*, taken at Plymouth, and considered to represent an undescribed species, for which they propose the name *L. stictopteryx*.—Sir G. F. Hampson read a paper giving an account of the classification of the Moths of the subfamily *Pyraustinae* of the family *Pyralidae*, which contained 161 genera.—Mr. W. E. de Winton gave an account of the Mammals obtained by Mr. R. McD. Hawker during a recent visit to Somaliland.—Mr. Oldfield Thomas read a paper on the Mammals collected by Mr. J. D. La Touche near Kuantun, N.W. Fokien, China, which contained notes on twenty-seven species, two of which, viz., *Vespertilio discolor superans* and *Mus harti*, were described as new.—Mr. G. A. Boulenger, F.R.S., read a memoir entitled "A Revision of the Genera and Species of Fishes of the Family *Mormyridae*," and illustrated it by the exhibition of a fine series of specimens of the family which had been entrusted to him for examination by the authorities of the Congo Free State. According to the author's views the family of *Mormyridae*, as at present known, consisted of eleven genera and seventy-three species, all of which were defined in the paper.—A communication was read from Dr. A. G. Butler, containing a list of the butterflies obtained in the Harar Highlands by Captain H. G. C. Swayne, R.E., one of which (*Mylothris swaynii*) was described as new.—A second communication from Dr. Butler contained an account of a small collection of butterflies made in the Chikala District, British Central Africa, by Mr. George Hoare.—A third paper by Dr. Butler contained a list of twenty-one species of butterflies obtained by Mr. R. Crawshay in British East Africa at the end of 1897 and the beginning of 1898.—A communication from Prof. Sydney J. Hickson, F.R.S., contained some notes on the collection of specimens of the genus *Millepora* made by Mr. Stanley J. Gardiner at Funafuti and Rotuma.—Prof. F. Jeffrey Bell communicated a report by Mr. F. P. Bedford on the Holothurians collected by Mr. Gardiner at Funafuti and Rotuma. Eighteen species were enumerated and remarked upon, of which one (*Chiridota intermedia*) was described as new.—Prof. Bell also read a report on the Actinogonidiate Echinoderms brought home by Mr. Gardiner from the same localities. The collection comprised examples of twenty-one species, which were enumerated.—A communication was read from Herr Oscar Neumann containing the description of a new species of Antelope of the genus *Hippotragus* from East Africa, which he proposed to name *H. rufopalidus*.

Royal Meteorological Society, November 16.—Mr. F. C. Bayard, President, in the chair.—A report on experiments upon the exposure of anemometers at different elevations, was presented by the Wind Force Committee. The experiments have been carried out by Mr. W. H. Dines, and Captain Wilson-Barker, on board H.M.S. *Worcester*, off Greenhithe. Five

pressure-tube anemometers were employed, the first being at the mizzen royal masthead; the second and third at the ends of the mizzen topsail yardarm, and the fourth and fifth on iron standards 15 feet above the bulwarks. The results show that the ship itself affected the indications of the lower anemometers, while some low hills and trees, which are a quarter of a mile away from the ship, to the south, and south-west also affected the wind velocity from those quarters. The Committee are of opinion that the general facts deducible from these observations bearing on the situation of instruments for testing wind force are: (1) That they must have a fairly clear exposure to be of much value; and would appear that for a mile at least all round there should be no hills, or anything higher than the position of the instruments. (2) That on a ship the results may be considered fairly accurately determined by having the instrument 50 feet above the hull, but that on land it will generally be necessary to carry the instruments somewhat higher, to be determined entirely by the local conditions. (3) That no other form of anemometer offers such advantages as the pressure-tube, from the fact that it can be run up and secured easily at this height above a building, and that the pipes and stays can be slight so as to offer no resistance to the wind or cause any deflecting currents.—Captain D. Wilson-Barker read a paper giving the results of some observations which he had made on board ship with several hand anemometers with the view of comparing the estimated wind force with that indicated by instruments.—Mr. W. Marriott exhibited some lantern slides showing the damage caused by the tornado which burst over Camberwell about 9.30 p.m. on October 29. The damage was confined to an area of about half a mile in extent, and within that space chimney stacks were blown down, houses unroofed, trees uprooted, and windows broken.

Geological Society, November 9.—W. Whitaker, F.R.S., President, in the chair.—On the Palaeozoic radiolarian rocks of New South Wales, by Prof. T. W. Edgeworth David, and E. F. Pittman. Not only in the cherts and siliceous limestones, but also in the jointed claystones which form the prevalent sedimentary rocks of the Tamworth district, radiolaria are found to be distributed in vast numbers. The three chief areas of radiolarian rocks in New South Wales are Bingara, Barraba, and Tamworth, situated in the New England district, between 180 and 270 miles north of Sydney. The fourth area of radiolarian rocks is at the well-known Jenolan caves, about 67 miles due west of Sydney and about 200 miles south-by-west of Tamworth. It is at Tamworth that the radiolarian rocks are developed on a grand scale; their measured thickness amounts to 9267 feet, after allowing for an immense fault, and neither upward nor downward limit is shown. The rocks consist of jointed claystones, black cherts, lenticular siliceous radiolarian limestones, and coral-limestones. Numerous beds of submarine tuff also occur. The claystones are largely formed of radiolaria. In certain beds of the claystones, and in some of the tuffs as well, impressions of *Lepidodendron australe* are not uncommon; and beds of radiolarian limestone occur in close proximity to the beds with these plant-remains, and radiolaria moreover abound even in the same rock with the *Lepidodendron*-impressions. In their conclusions the authors point to the remarkably fine-grained character of the materials forming the base of the radiolarian cherts, jaspers, and shales, the constituent particles not being more than 0.05-0.025 mm. ($\frac{1}{2000}$ to $\frac{1}{4000}$ inch) in diameter. They are of opinion that the radiolaria were deposited in clear sea-water, which, though sufficiently far from land to be beyond the reach of any but the finest sediment, was nevertheless probably not of very considerable depth.—On the radiolaria in the Devonian rocks of New South Wales, by G. J. Hinde, F.R.S. Hand-specimens of the various radiolarian rocks discovered by Messrs. David and Pittman in New South Wales were forwarded to the author, and from them numerous microscopic sections were prepared. Fifty-four species belonging to 29 genera have been determined and figured; all the species and four genera are regarded as new; excepting a few primitive types of Nassellaria, the forms belong to the Spumellaria. The large majority may be included in the Sphaeroidea and Prunoidea with medullary tests and radial spines. They do not show any near relationship to the radiolaria described from Devonian rocks in Europe, but in some features they resemble the radiolarian faunas of Ordovician age in the south of Scotland, Cornwall, and Cabrières, Languedoc. No other fossils beyond a few simple sponge-spicules and, on two or three horizons, some fragmentary impressions of *Lepidodendron*

australe, have been found in association with the radiolaria. These New South Wales radiolarian deposits are by far the most extensive of any hitherto known, and they are remarkable not only for their great thickness, but also for the manner in which the radiolaria are preserved in the limestones, tuffs, and claystones.

CAMBRIDGE.

Philosophical Society, November 14.—Mr. J. Larmor, President, in the chair.—Orthogenetic variations in the carapace of *Chelonia*, H. Gadow. Dr. Willey had brought home twenty very young specimens of the Loggerhead Turtle, *Thalassochelys caretta*. This material has been supplemented by the examination of the specimens in the British Museum and the Cambridge Museum of Zoology. In all fifty-six specimens have been examined, consisting of forty-one very young, and others ranging from three inches to the full-grown turtle of about four feet in length of shell. This species exhibits a great amount of variation in the number and size of the epidermal shields which cover the shell. The variations are most numerous in the young, least so in the adult. They can be reduced to a system, each variation representing an atavistic or phyletically older stage, the greater number of shields being the more primitive. The reduction in numbers proceeds in a definite way, until the normal number (namely that which is found in most adult specimens) is reached. Hence the term "orthogenetic variation."—Some points in the morphology of the Enteropneusta, A. Willey. The body-wall of Enteropneusta is characterised externally by annulations determined by the zony disposition of epidermal glands and separated by interannular grooves. The potentialities of these structures are indicated by the external liver-sacculles of Ptychoderidae, which are enlargements of the annulations; and by the dermal pits of Spengelina, which are intergonadal depressions of the interannular grooves. In the Enteropneusta and in the Cephalochorda the gonads are more or less coextensive with the gill-clefts, both being primarily unlimited in number. A theory of gill-slits was developed, according to which gill-slits arose in the interannular depressions, while the gonads were disposed in zones corresponding with the epidermal annulations. The primary function of the gill-slits was the oxygenation of the gonads, their secondary functions being the respiration of the individual. In most cases the gonads have been secondarily emancipated from the gill-clefts in correlation with the elaboration of the vascular system. In the author's opinion the evidence in support of this theory is overwhelming. A collective name, Branchiotrema, was introduced to include all animals which possess gill-slits, whether in the adult or in the embryo.—On *Lepidodendron* from the Calciferous Sandstone of Scotland, A. C. Seward and A. W. Hill. A description was given of the anatomy of an unusually well preserved stem of *Lepidodendron Wuschianum* recently found in a railway cutting at Dalmeny in Linlithgowshire. The stem measures nearly 40 cm. in diameter, the outer bark is well-preserved, but the more delicate middle cortex was destroyed before petrification; the innermost cortex and the central cylinder show remarkably perfect structure. One of the important characters noticed in the stem was the structure of the leaf-trace bundles; these consist of a small strand of xylem more or less completely surrounded by radially disposed rows of secondary elements. The presence of numerous secretory canals in the outer cortex or phellogen was also referred to as a feature of some interest.

PARIS.

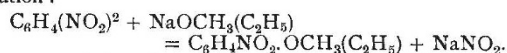
Academy of Sciences, November 21.—M. Wolf in the chair.—On some relations between luminous and chemical energy, and on the displacements between oxygen and the halogen elements, by M. Berthelot. The decomposition of iodic acid into its elements is a reaction which cannot be reversed by sunlight, either dry or in presence of water. The reaction between bromine and water is almost unmeasurable in the dark, but becomes sensible in sunlight. The reverse reaction between hydrobromic acid and oxygen can be shown to take place in sunlight to a small extent.—On the atomicity of boron, by Sir Edward Frankland. Some remarks on the substance described by M. Copaux in the last number of the *Comptes rendus*, arising from the reaction between sodium ethylate and ethyl borate. The formula $(C_2H_5)(ONa).B(OC_2H_5)_3$ would appear to be more probable than that suggested by M. Copaux.—On observations of the Leonid meteors, made from a balloon during the night of November 13 to 14, by M. J. Janssen.

Although, by reason of the cloudy state of the sky, the night of November 13 was very unfavourable for observations from the ground, good results were obtained from a balloon at a height of 150 to 200 metres, about twenty-five Leonids being noted.—On the determination of the latitude of the Observatory of Paris by the methods of M. Loewy, by MM. H. Renan, J. Perchot, and W. Ébert. The method used has the advantage over the usual one of measuring the superior and inferior culminations of circumpolar stars of giving results based on night observations only.—Observations of the planet DQ (433), made at the Observatory of Paris, by M. G. Bigourdan.—Elements of the planet DQ (433), calculated by M. G. Fayet.—Observations of Leonids, made on November 14 at the Observatory of Lyons, by M. Ch. André.—On differential systems of which the integration can be reduced to that of total differential equations, by M. Riquier.—An experiment reproducing the properties of magnets by means of combinations of vortices, in air or in water, by M. Ch. Weyer. The bars representing the magnets have a wooden axis, upon which are fastened strong paper vanes along its whole length. A similar bar set in rotation attracts or repels the first, according as the directions of rotation are the same or opposite; the two showing the neutral zone and other properties of magnets.—On the induction machines used as generators or receivers of alternating currents, either simple or polyphase, by M. Maurice Leblanc.—Characterisation of diabetic sugar in urine, by M. Le Goff. The sugar was isolated from the urine by filtration and evaporation in a vacuum to a syrup, from which crystals separated after a fortnight. These crystals were washed with alcohol, then dissolved and treated with animal charcoal, and crystallised out slowly *in vacuo*. The sugar thus obtained had the composition $C_6H_{12}O_6 + \frac{1}{2}H_2O$, for which the rotatory power was $(\alpha)_D = +49.46$. The osazone formed needles, melting at 230° , and oxidation yielded gluconic acid, $(\alpha)_D = +6.53$. These results show that the sugar present in diabetic urine is undoubtedly *D*-glucose.—The utilisation of the phosphoric acid dissolved in the waters of the soil by plants, by M. Th. Schloesing, jun. In sterilised soil, which has been treated with solutions containing all the elements necessary for plant growth except phosphoric acid, plants will not develop naturally, but in presence of solutions containing in addition quantities of phosphates of the order of those contained in arable earth, the plants flourish.—General conclusions on humic coals, by M. C. Eg. Bertrand.—On the constitution of peat, by M. B. Renault. The black peat studied consists of microscopical débris of plants arising from the tougher tissues, such as cuticle, spores, and pollen grains, the other tissues having generally disappeared under diverse influences, especially microbial action. The wood found in peat bogs has undergone a profound modification; its tissue is permeated with the mycelium of microscopic fungi, and numerous micrococci are present.—Artificial production of pearls in the *Halotis*, by M. Louis Boutan. By the introduction of foreign bodies into *Halotis*, true pearls can be produced.—On a method of colouring protoplasm by bacterial pigments, by M. L. Matruchot. By growing together on the same medium, a chromogenic bacterium (violet pigment) and a filamentous fungus, an impregnation of the protoplasm of the latter by the pigment can be obtained, and as the colouring matter is selective and is fixed only by a part of the protoplasm, this treatment constitutes a true method of coloration allowing the study of the structure of living protoplasm. This method has been applied by the author to a species of *Mortierella*.—On the black phosphates of the Pyrenees, by M. David Levat. A description of the nature of the deposit, and analyses of the phosphatic nodules. The nodules are black, resembling anthracite in appearance, and consist of nearly pure calcium phosphate.—On the presence of fossil layers containing species of *Physa* and *Limnoea* in the Lower Eocene of Corbières, by M. A. Bresson.—On the parallelism of the Urgeonian limestones with the Cephalopod layers in the Dephino-rhodanian region, by M. Victor Paquier.

AMSTERDAM.

Royal Academy of Sciences, October 29.—Prof. van de Sande Bakhuyzen in the chair.—Prof. D. J. Korteweg made some remarks upon the progress in the preparation for the International Catalogue since the Conference of July 1896. Special mention was made of some of the resolutions passed in the Conference of October 11 to 13.—Prof. Winkler made a communication entitled "Attention and Respiration," which will be inserted in the Report of the meeting.—Prof. van der

Waals gave a simple deduction for the formula (p, v, t) for substances whose molecules are compound, and must be considered small bodies of a certain magnitude. In this deduction, which is entirely founded upon the virial equation, a first approximation is given for the variation of the co-volume, and the way is pointed out in which a second approximation might be calculated.—Prof. Lobry de Bruyn made a communication, on behalf of Dr. Steger and himself, concerning the rate of substitution of a nitro-group by an oxyalkyl in accordance with the equation :



It was proved that the nitro-group is more rapidly substituted in paradinitrobenzol than in orthodinitrobenzol, and that sodium methylate acts more slowly than sodium ethylate. It was also determined that the decrease of concentration does not raise the reaction constant, a result opposed to that arrived at by Hecht, Conrad and Brückner as to the formation of ether from alkyl iodide and alcoholate.—Prof. Behrens made a communication concerning some anomalies in Mendeléeff's system, which will also be inserted in the Report of the meeting.—Prof. Hoogewerff and Dr. van Dorp found that the imides of bibasic acids, when heated with methylalcohol, are in many cases transformed into the ethers of amidic acids.—Prof. Kamerlingh Onnes described an open manometer of reduced height, placed in the Leiden Laboratory. The apparatus is composed of fifteen partial manometers of 4 atm., arranged in series. To obtain the requisite pressure in the connecting tubes between the consecutive monometers, compressed gas is introduced into them by needle cocks from a high-pressure cylinder. The apparatus ranges to 60 atmospheres at once, and by two further steps 100 atm. may be reached with part of it.—Dr. Hoek made a communication, on behalf of Mr. M. C. Dekhuizen of Leiden, concerning crater-shaped blood corpuscles (chromocraters). The observations described give ground for the opinion that the chromocrater is an ancestral inheritance from the worms, which has also been preserved in mammals and in man.—Prof. H. G. van de Sande Bakhuyzen presented a communication from Dr. E. F. van de Sande Bakhuyzen, entitled "Some observations on the 14-monthly movement of the terrestrial pole and on the length of its period."—Prof. van der Waals presented a paper on behalf of Mr. N. J. van der Lee, entitled "On the influence of pressure on the critical temperature of solution." Experiments were made with the mixture phenol-water, and the critical temperatures of solution appeared to rise by increased pressure. The rise was about 0.1° for 30 atm. In the case of this mixture theory points to a maximum in the line indicating the pressure of the vapour in contact with the liquid as function of the composition. This conclusion was confirmed by experiments.

DIARY OF SOCIETIES.

THURSDAY, DECEMBER 1.

LINNEAN SOCIETY, at 8.—On the Biology of *Agaricus velutipes*, Curt. : R. H. Biffen.—On the Gastric Glands of the Marsupialia: Jas. Johnstone.

CHEMICAL SOCIETY, at 8.—Ballot for the Election of Fellows.—The Oxidation of Polyhydric Alcohols in presence of Iron: H. J. H. Fenton and H. Jackson.

FRIDAY, DECEMBER 2.

GEOLOGISTS' ASSOCIATION, at 8.—Contributions to the Geology of the Thame Valley: A. M. Davies.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Sunlight Gold-bearing Reef, Lydenberg, Transvaal: Charles Benjamin Saner.

QUEKETT MICROSCOPICAL CLUB, at 8.

MONDAY, DECEMBER 5.

SOCIETY OF ARTS, at 8.—Acetylene: Prof. Vivian B. Lewes.

IMPERIAL INSTITUTE, at 8.30.—A National Photographic Record: Sir Benjamin Stone.

VICTORIA INSTITUTE, at 4.30.—Recent Discoveries on Babylonian Tablets: T. G. Pinches.

TUESDAY, DECEMBER 6.

SOCIETY OF ARTS, at 4.30.—The Yangtse Basin and the British Empire: Archibald Little.

ANTHROPOLOGICAL INSTITUTE, at 8.30.—Exhibition of Ethnological Photographs, with Remarks: Rev. H. N. Hutchinson.—On the Caves, Shell-Mounds, and Stone Implements of South Africa: George Leith.—On Worked Flints from Griqualand East: J. M. Frames.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Paper to be further discussed: The Effect of Subsidence due to Coal-Workings upon Bridges and other Structures: Stanley Robert Kay.—And, time permitting, Paper to be read with a view to discussion: The Ventilation of Tunnels and Buildings: Francis Fox.

RÖNTGEN SOCIETY, at 8.—A Discussion on Dermatitis, in relation to Röntgen Ray Work, will be introduced by Mr. Ernest Payne and Dr. Walsh.

ROYAL VICTORIA HALL.—Photography in Colours: Child Bayley.

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WEDNESDAY, DECEMBER 7.

SOCIETY OF ARTS, at 8.—Egypt and the Sudan, in 1897 and 1898: W. T. Maud.

GEOLOGICAL SOCIETY, at 8.—The Geological Structure of the Southern Malverns and the Adjacent Districts to the West: Prof. T. T. Groom.—The Permian Conglomerates of the Lower Severn Basin: W. W. King.

ENTOMOLOGICAL SOCIETY, at 8.

SOCIETY OF PUBLIC ANALYSTS, at 8.—The Use of the Micro-spectroscope, and the Methods of Detecting Blood in Chemical-Legal Investigations: A. H. Allen.

THURSDAY, DECEMBER 8.

ROYAL SOCIETY, at 4.30.

MATHEMATICAL SOCIETY, at 8.—On Groups of the Order p^2q^2 : Prof. Burnside, F.R.S.—On Simultaneous Partial Differential Equations: J. E. Campbell.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Improvement in Magnetic Space Telegraphy: Prof. Oliver Lodge, F.R.S.—And, if time permit: Telegraphy by Magnetic Induction: Sydney Everard.

FRIDAY, DECEMBER 9.

PHYSICAL SOCIETY, at 5.—Longitudinal Vibrations in Solid and Hollow Cylinders; Dr. C. Chree, F.R.S.—On the Thermal Properties of Normal Pentane: J. Rose-Innes and Dr. Sydney Young F.R.S.

ROYAL ASTRONOMICAL SOCIETY, at 8.

MALACOLOGICAL SOCIETY, at 8.

BOOKS and PAMPHLETS RECEIVED.

BOOKS.—Nichelatura: I. Ghersi (Milano, Hoepli).—Colorazione e Decorazione dei Metalli: I. Ghersi (Milano, Hoepli).—L'Alluminio: Dr. C. Formenti (Milano, Hoepli).—Ricettario Industriale: I. Ghersi (Milano, Hoepli).—Journal and Proceedings of the Royal Society of New South Wales, 1897, Vol. xxxi. (Sydney).—Schantung und Deutsch China: E. von Hesse-Wartegg (Leipzig, Webber).—Congrès National d'Hygiène et de Climatologie Médicale de la Belgique et du Congo, seconde partie, Congo (Bruxelles, Hayez).—Natalité et Démocratie: A. Dumont (Paris, Schleicher).—Human Immortality: Prof. W. James (Constable).—A New Astronomy: Prof. D. P. Todd (Low).—Quaero [some questions in Matter, Energy, Intelligence, and Evolution]: Dr. J. H. Keeling (Taylor).—Illustrated Catalogue of Balances and Weights, &c., Manufactured and Imported by W. and J. George, Ltd. (George).—University College, Sheffield, Calendar, Session 1898-99 (Sheffield).—Repetitorium der Zoologie: Prof. K. Eckstein, Zweite Auflage (Leipzig, Engelmann).—Grundriss der Psychologie: W. Wundt, Dritte Auflage (Leipzig, Engelmann).

PAMPHLETS.—Les Bases de la Météorologie Dynamique: Dr. Hildebrandsson and L. T. de Bort, 1^{re} Livⁿ (Paris, Gauthier-Villars).—Observations et Mesures de la Suède, i. and ii. (Upsala).—Das Mittelenglische Gedicht, the Boke of Cupide, Kritische Ausgabe: Dr. E. Vollmer (Berlin, Ebering).—Incubators and Chicken-Rearing Appliances (Cassell).

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