cheer reverberated through his whole being, and left such deep impression as doubtless would be with him to the end.

In the evening of his long life, when he stood apart from the honours which had been showered upon him, there remained to him the greatest of all rewards, a clear conscience and the knowledge that he had devoted his life to and had achieved a great work for the good of humanity.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

DR. A. D. ROSS, lecturer on natural philosophy in the University of Glasgow, has been appointed to the chair of mathematics and physics in the University of Western Australia.

AT a special meeting of the council of Hartley University College, Southampton, held on December 30, Dr. Alexander Hill, late master of Downing College, Cambridge, was unanimously elected principal at a salary of 1000*l*. a year.

MR. FRANK ROSCOE, who for the past twelve years has been master of method in the Day Training College of the University of Birmingham, has been appointed secretary of the Teachers' Registration Council.

THE general meeting of the Association of Public School Science Masters will be held at the London Day Training College, Southampton Row, W.C., on January 8 and 9; in connection with the meeting Dr. T. P. Nunn will deliver a series of addresses on the afternoons of January 6 and 7, upon "The Theory of Science Teaching, with Special Reference to the Conditions in Boys' Schools." On Wednesday, January 8, the president of the association, Sir Archibald Geikie, K.C.B., P.R.S., will deliver an address, and there will be a discussion upon the aims and uses of school science societies. On January 9 the subjects to be discussed are:—Practical examinations in science, the teaching of mechanics, and the value of presenting the historical aspect in teaching science. A paper urging that the teaching of density should be placed in the background and be superseded by the idea of "Roomage," or specific volume, will be read by Mr. G. F. Daniell.

WE learn from *Science* that by the will of the late Prof. Morris Loeb, formerly professor of chemistry in the New York University, large bequests are made to scientific and educational institutions. Subject to the life interest of Mrs. Loeb, 100,000*l*. is bequeathed to Harvard University for the advancement of physics and chemistry, 5000*l*. is left to the American Chemical Society for the establishment of a type museum of chemicals, to be established in the Chemists' Club of New York City, the U.S. National Museum, or the American Museum of Natural History, and 500*l*. is bequeathed to the National Academy of Sciences. The Hebrew Technical Institute receives 10,000*l*. The residuary estate, subject to Mrs. Loeb's life interest, is to be divided equally among the Smithsonian Institution at Washington and certain New York institutions, including the American Museum of Natural History, the Hebrew Technical Institute, and the Educational Alliance. The Smithsonian Institution receives its bequest to further the exact sciences. The American Museum of Natural History is to secure a collection for the illustration of the industrial use of natural products in ancient and modern times. The Hebrew Technical Institute is to establish technical courses for mechanics.

THE report of the hundred and sixteenth session of the Royal Technical College, Glasgow, which used to be known as the Glasgow and West of Scotland Technical College, is a record of satisfactory progress. The number of day students for the session 1911–12 was 572; of evening students, 4691; and of students in affiliated continuation classes, 8682. The college is therefore the centre of an organisation responsible for the education of 13,945 individuals. The corresponding number for the preceding session was 13,473. The increase in the number of day students was twelve. The roll of students contained the names of 157 graduates of the four Scottish universities, and of the Universities of Oxford, Cambridge, London, Manchester, Durham, Leeds, Sydney, Adelaide, Calcutta, Allahabad, and Heidelberg. Although seven large laboratories were provided for pure and applied chemistry in the new buildings recently opened, they have already proved insufficient, and, in consequence, an additional chemical laboratory, to accommodate seventy-two students, has been provided by transferring to the corridors on the same floor the contents of the museum of technical chemistry. Such rapid development of an industrial department is good evidence that the college maintains its position as possessing one of the leading schools of applied chemistry. The new lectureship in sugar manufacture, founded with the aid of subscriptions from firms and individuals interested in this industry, has been established. Proposals have been made for the establishment of a lectureship dealing with leather-tanning, but the governors are obliged to postpone taking steps in this direction until subscriptions are forthcoming to meet at least one-half of the probable expense, as was done in the case of the lectureship in sugar manufacture. In other departments of the college there are similar developments, and the report makes it clear that under its new name this Scottish technical college is entering on a career of increased usefulness.

SOCIETIES AND ACADEMIES.

LONDON.

Linnean Society, December 19, 1912.—Prof. E. B. Poulton, F.R.S., president, in the chair.—Cecil H. **Hooper**: Experiments on the pollination of hardy fruits, with observations on the insect visitors to the blossoms. Strawberries, provided there is wind, set fruit well without insects. Raspberries and loganberries set fruit imperfect in shape if insects are excluded. Currants and gooseberries, owing to the construction of their flowers and pollen, cannot be pollinated and set their fruit without the visits of insects. All these plants set fruit perfectly with pollen of the same variety or even of the same flower; but in the case of the apple, pear, plum, and cherry, this is not always the case, many varieties being self-sterile, and almost all produce more abundant and finer fruit with pollen of another variety. In these trees there is little transference of pollen by the wind, and even if a self-fertile tree is enclosed in muslin whilst in blossom (there being ample movement of the wind, insects only being excluded), it is the exception for any fruit to set; it is the same with gooseberries and currants. In trials with apples, only nineteen varieties out of sixty-five proved self-fertile; in pears, four out of thirty; in plums, twenty-one out of forty-one; in cherries, five out of twelve; whilst, when cross-pollinated, in three-quarters of the trials one or more fruits set on a truss. There seems to be a preference as to pollen, some varieties setting better with pollen of one variety than with that of another;

and some varieties will not set with certain pollen. Out of nearly 3000 insects observed last spring visiting the blossoms of the various fruit bushes and trees, 88 per cent. were hive-bees, 5½ per cent. bumble and other wild bees, and 6½ per cent. flies, ants, beetles, wasps, and other insects; but the latter group have not fluffy bodies for carrying pollen, and amuse themselves eating the pollen.—H. M. **Chibber**: The morphology and histology of *Piper Betle*, Linn.

MANCHESTER.

Literary and Philosophical Society, November 26, 1912.—Prof. F. E. Weiss, president, in the chair.—Prof. F. E. **Weiss**: The root-apex and young root of Lyginodendron. This genus, one of the Coal-Measure plants, the remains of which are frequently preserved in the calcareous nodules of the Lancashire coal seams, is of peculiar interest, owing to the position assigned to it and allied genera. Fern-like in appearance, it is known to have borne seeds of considerable complexity, and it has therefore been placed in a newly established group of Pteridospermæ, between the true ferns and the flowering plants. As among other characters, these two groups are distinguished by the possession of a single cell or multiple group of such cells at the apex of their roots, an investigation of the root-tip of Lyginodendron is of some interest. Careful examination of numerous sections tends to prove that the structure of the root-tip of Lyginodendron agrees more closely with that of the ferns than that of the flowering plants.—Dr. Kurt **Loewenfeld**: The importance of autograph documents for the history of science (part ii.). The author dealt chiefly with letters by Priestley and Lavoisier. These included letters to Sir Joseph Bank and Josiah Wedgwood, and others relating to the Birmingham riots in 1791. The draft of a letter of the French chemists, offering to make good all Priestley's losses through the riots, was read. It is noteworthy, especially considering the scientific relations between Lavoisier and Priestley, that this draft had corrections by the hand of A. L. Lavoisier, which makes it evident that this letter originated from him.

DUBLIN.

Royal Dublin Society, December 17, 1912.—Prof. James Wilson in the chair.—J. **Adams**: The germination of the seeds of some dicotyledons. Investigations were made to determine how long the seeds of a particular species of plant remain in the ground before they germinate. Observations were made on 278 different species of plants belonging to 190 genera, and representing fifty-eight families. In some cases the seeds germinated after a few weeks, while in others, such as the hawthorn, a year and a half was required. The characters of 158 species not included in Lubbock's treatise are given. The majority of the seeds used were of British species, but a few exotic species, such as almond, fig, &c., were included.—Prof. T. **Johnson**: *Bothrodendron* (*Cyclostigma*) *Kiltorkense*, Haughton, sp. The paper treats of specimens obtained by the author at Kiltorkan, co. Kilkenny, and of others in the collections in Dublin and London. An attempt is made to prove that *B. Kiltorkense*, abundant at an epoch when Lepidodendron and Sigillaria were either non-existent or, if formed, still relatively rare, and showing pronounced calamitoid characters—including transverse zonation (nodal diaphragms?) and vertical fluting—is the earliest and best representative of the ancestral stock from which the Lycopodiales and Equisetales took their common origin.—Prof. J. **Joly**: A method of microscopic measurement. This is one which apparently has not hitherto been applied in microscopy; it consists in observing with the camera lucida the object to be measured, in such a manner that its image appears upon a sheet of paper on which two lines have been drawn slowly diverging from a point. By shifting the paper the image is made to fit exactly between the lines, the position where it fits being marked. A similar operation is performed with a suitably divided millimetre scale. From the data so obtained a simple calculation gives the diameter of the object. —Prof. H. H. **Dixon** and W. R. G. **Atkins**: Osmotic pressures in plants. (*a*) Methods of extracting sap from plant organs; (*b*) osmotic pressures and electrical conductivities of the saps of plant organs. (*a*) Various methods of obtaining sap for microscopic conductivity measurements are discussed. It is shown that the sap pressed from living tissues may have a concentration very different from that in the vacuoles of the cells, the protoplasm of which must be rendered permeable before the unaltered sap can be pressed. Exposure to heat, toluene vapour, or chloroform is open to objection. Treatment with liquid air seems free from objection, renders the membranes permeable, and allows the unaltered sap to escape. Cryoscopic and conductivity measurements on this true sap show that it is usually much more concentrated than that pressed from the untreated organs. An extreme example of this is afforded by the leaf of *Chamaerops humilis*. (*b*) The fundamental error in previous cryoscopic and conductivity measurements of the sap of plants, which was pointed out in the foregoing paper (*a*), renders revision of previous results necessary. The present paper contains a number of results of cryoscopic determinations, osmotic pressures resulting from them, and conductivity measurements made on saps obtained from organs treated with liquid air.

EDINBURGH.

Royal Society, December 16, 1912.—Prof. Bower, vice-president, in the chair. Irvine **Masson**: The precipitation of salts by corresponding acids. If B is the initial solubility in pure water, and *b* the solubility for acidity *a*, then within fairly wide limits it is found that the ratio $a/(B-b)$ is a constant, on which the change of temperature seems to have little effect. Its value is very nearly unity for the chlorides and nitrates experimented with. The main object of the paper was to connect by means of this empirical formula the two recognised methods for studying experimentally these relations, namely, the "solubility" method, which determines directly the solubility of a salt in water containing the acid in varying concentrations, and the "precipitation" method, as used by Gibson and Denison, which aims at ascertaining the minimum concentration of aqueous acid which when added in small quantities to the saturated aqueous salt solution causes deposition of salt. Prof. **Seward** and N. **Bancroft**: Jurassic plants from Cromarty and Sutherland. The material included Hugh Miller's collection in the Royal Scottish Museum, a section of a cone in Dr. Kidston's collection, petrified wood from Helmsdale lent by Dr. Horne, and two fossils found by Dr. Nathorst on the Sutherland coast. The examination of the material had led to the recognition of six new species, *Thinnfeldia scottica*, *Brachyphyllum eathiense*, *Masculostrobus Woodwardi*, *Conities Juddi*, *Cedroxylon Hornei*, and *Strobilites Milleri*. Prof. F. J. **Cole**: A monograph on the general morphology of Myxinoid fishes, based on a study of Myxine. Part V.—The anatomy of the gut and appendages. C Tate **Regan**: Antarctic fishes of the Scottish

National Antarctic Expedition. The fishes, which were collected in the vicinity of the South Orkneys, Falkland Islands, and Gough Island, include forty-eight species, of which ten are new to science. The report is supplemented with a monograph on the Notothenioidæ and related families, a revision of the Zoarcidæ, and notes on the systematic position and distribution of the Galaxiidæ. It also includes an account of a new genus taken in South Georgia and named *Chaenocephalus salvesent*. Prof. Emile **Topsent**: the Porifera of the Scottish National Antarctic Expedition. Several new genera and many new species are described from high southern latitudes and also from great depths.

PARIS.

Academy of Sciences, December 23, 1912.—M. Lippmann in the chair.—Gaston **Darboux**: Surfaces of translation.—G. **Lippmann**: An electric time-measuring apparatus for the comparison of two periodic phenomena. An arrangement of two electrical contacts on a tube rotating at a known uniform rate, and each separately adjustable, so that the time elapsing between the two contacts can be made any fraction of a second, read directly from the instrument. As examples of applications of the instrument are given the comparison of two sidereal clocks, the reception of Eiffel Tower signals, and the emission of time signals.—Th. **Schlœsing, Jun.**: The detection and estimation of free white phosphorus in phosphorus sesquisulphide. The method is based on extraction with a low boiling petroleum ether, and subsequent determination of the ratio of phosphorus to sulphur in the residue left after evaporating the ether.—M. **Gouy**: The spontaneously ionised gases. A reply to some criticisms by C. G. Darwin.—M. **Guntz** was elected a correspondant for the section of chemistry in the place of the late M. Cannizzaro, and M. **Lehmann** a correspondant in the section of mineralogy in the place of the late M. Zirkel.—Kr. **Birkeland**: The source of the electricity of the stars. A discussion of the possibility of the stars and the sun becoming negative by the loss of positive electrons.—E. **Belot**: The material of satellites with respect to the density of the planets, their time of rotation, and their superficial structure.—D. Th. **Egoroff**: The integration of functions.—N. **Lusin**: The properties of Denjoy's integral.—P. **Montel**: The existence of derived functions.—W. H. **Young**: Fourier's series convergent nearly throughout.—S. **Lattes**: The reduction of linear substitutions.—M. **Nörlund**: Linear equations with finite differences.—Witold **Jarkowski**: The equation of the barogram of the ascent of an aeroplane.—Jules **Roux**: The law of Stokes and the charge of an electron. A study of the fall of sulphur spheres of small radius in xylene and the application of Stokes's formula, modified by Cunningham, to the results.—M. **Jouguet**: The stability of equilibrium of a system enclosed in a cover impervious to heat.—E. **Briner** and E. L. **Durand**: The action of temperature on the equilibrium of nitric and nitrous acids, formed by starting with the oxides of nitrogen and water. An increase in the pressure of the NO and lowering of temperature both favour the formation of nitric acid.—Auguste **Piccard**: The constitution of water and the thermal variation of its magnetisation. On the assumption that any body has a constant diamagnetism so long as there is no change of state the temperature coefficient of magnetisation described in an earlier paper has been applied to determine the constitution of water. The results are in general agreement with those deduced from the change of density with temperature.—J A **Muller**: The mode of ionisation of sulphuric acid in dilute aqueous solution. A discussion of the experimental data given appears to show that in dilute aqueous solution sulphuric acid ionises into the ions H and HSO_4, and this ionisation takes place with evolution of heat within the limits of temperature studied.—M. **Hanriot**: Tempering of metals without deformation.—Marcel **Ostwald**: Some properties of the alkaline nitrites. A description of the mode of preparation of the pure nitrites, followed by data relating to the appearance, melting points, densities of solids and solutions of sodium and potassium nitrite.—Daniel **Berthelot** and Henry **Gaudechon**: The photolysis of various bioses and trioses by the ultra-violet rays.—Jacques **Duclaux**: The polymerisation of bodies at low temperatures.—Œchsner de **Coninck**: The determination of the atomic weight of uranium. The value 238·4 is derived from the ignition of the oxalate.—Leon **Guillet**: The copper-zinc-nickel alloys.—Leo **Vignon**: The fractional distillation of coal. Five samples of coal were heated successively to 400°, 600°, 850°, 1000°, and 1200° C., and analyses made of the gas given off at each temperature.—Maurice **Lanfry**: The action of hydrogen peroxide on oxythionaphthene, oxythionaphthene-carboxylic acid and thioindigo.—P. **Carre**: Contardi's glycerotriphosphoric acid. An adverse criticism of Contardi's results.—Marcel **Godchot** and Felix **Taboury**: The bromination of *cyclo*pentanone.—A. **Mailhe**: The nitro-derivatives of the oxide of meta-cresyl.—Georges **Tanret**: The presence of stachyose in the bean and in the seeds of some other Leguminosæ. Stachyose forms a strontium compound, and this was utilised in the detection of this sugar in various Leguminosæ.—G. **André**: The hydrolysis and displacement by water of the nitrogenous and mineral matters contained in leaves.—Marin **Molliard**: The hypertrophiant action of the products elaborated by *Rhizobium radicicola*. An account of comparative experiments on the growth of the pea in water and in water containing the secretory products of the above-named parasite.—L. **Armand**: Germination and development of the embryo in the Lobeliaceæ.—Pierre **Teissier** and Pierre Louis **Marie**: Attempts at variolic serotherapy.—J. **Renaut**: The direct connective filiation and development of arterial muscular cells.—Jacques **Mawas**: The form, direction, and mode of action of the ciliary muscle in man.—Jacques **Pellegrin**: New contribution to the ichthyological fauna of Lake Victoria (Africa).—A. **Magnan**: The functional adaptation of the intestine in ducks. A reduction in the length of the intestine has been obtained experimentally by change of food.—D. **Keilin**: The structure of the pharynx in the larvæ of some Diptera as affected by the nature of the food.—M. **Javillier**: The substitution of various chemical elements for zinc in the culture of *Sterigmatocystis nigra*. Cadmium is the only element analogous to zinc in its action on the growth of this fungus. The presence of a ten-millionth part of cadmium increases the yield 2·6 times.—Em. **Bourquelot** and H. **Hérissey**: The synthetical reaction between galactose and ethyl alcohol under the influence of kephir.—L. C. **Maillard**: The formation of humus and of mineral combustibles without the intervention of atmospheric oxygen, of micro-organisms, of high temperatures, or of strong pressures. The interaction of amino-acids with sugars gives brown condensation products containing nitrogen, and regarded by the author as analogous with the humus extracted from soil. Carbon dioxide is evolved in this reaction, which takes place in the absence of oxygen. This reaction is regarded as explaining the natural formation of humus.—Gabriel **Bertrand** and F. **Medigreceanu**: The temporary fixing and mode of elimination of manganese in the rabbit.—H. **Bierry** and Mme. Z. **Gruzewska**: A new method for the determination of glycogen in the liver. A modification of Pfluger's method, permitting more rapid estimations without loss of accuracy. Comparative figures are given for

results obtained by the proposed method and that of Pfluger.—Maurice **Nicloux**: An experiment realising the mechanism of the passage of carbon monoxide from the mother to the fœtus.—Ch. **Pussenot**: The middle Westphalian in the alpine axial zone.—G. Goure de **Villemontée**: A case of globular lightning.—E. A. **Martel**: The displacement of the thermal springs at Roosevelt Dam, Arizona.

CALCUTTA.

Asiatic Society of Bengal, December 4, 1912.—Dr. Sten **Konow**: Fragments of a Buddhist work in the ancient Aryan language of Chinese Turkestan. This paper gives an account of six MSS. leaves (forming part of a bulky work containing about 400 leaves) recovered from Khotan, and written in verse in what is provisionally designated as the ancient Aryan language.—Dr. N. **Annandale**: Contributions to the biology of the Lake of Tiberias. No. 1, an account of the sponges. The paper is the first in a series based on a visit to Palestine made in October, 1912, with the object of discovering whether the peculiar fauna characteristic of fresh water in tropical Africa and Asia, especially as regards the lower invertebrates, extends northwards up the Jordan valley. Considered as a whole the sponge fauna of the lake provides evidence (1) that a peculiar fauna of closely related species is being evolved therein; (2) that in this lake, as in others, there is a tendency for the Spongillidæ to lose their characteristic gemmules; and (3) that as the gemmules disappear the skeleton of the sponges becomes harder and more compact.—D. **Hooper**: The Ash of the plantain (*Musa sapientum*, Linn.). The ash of plantain leaves and stalks is used in India for various industrial purposes: as a mordant in dyeing, as a soap, medicine, table salt, and manure. Analyses of authentic samples show a variation in composition and alkalinity, and do not exhibit a greater value than ashes of other plants. There is evidence that the composition of the ash is influenced by the soil in which the plants are grown.—M. H. **Sastri**: A short note on Āyi Pantha, a newly discovered cult in the Bilada District of the Marwar State. The new religion was preached by women in the fifteenth century A.D. Its chief seat is at Bilāda in Marwar. It has a perfect administrative organisation, and it has about a lac of adherents. The chief object of worship is a light kept up for the last 450 years fed by ghee. It emits no smoke, but a yellow substance called "Kesara," which means saffron. The lady preacher is known as "Āyi," and the cult is therefore called "Ayipantha." As Shams Tabrez is an object of reverence, this cult seems to be a survival of the ancient fire-worship of Irān.

BOOKS RECEIVED.

Handworterbuch der Naturwissenschaften. Edited by E. Korschelt and others. Lief. 26 to 34. (Jena: G. Fischer.) Each 2.50 marks.

Beziehungen des Lebens zum Licht. By Dr. C. Neuberg. Pp. 63. (Berlin: Allgemeine Medizinische Verlagsanstalt G.m.b.H.) 1.50 marks.

The Moorlands of North-Eastern Yorkshire: their Natural History and Origin. By F. Elgee. Pp. xvi+361+illustrations+maps. (London and Hull: A. Brown and Sons, Ltd.) 12*s*. 6*d*. net.

The British Bird Book. Edited by F. B. Kirkman. Section x. Pp. 188+plates. (London and Edinburgh: T. C. and E. C. Jack.) 10*s*. 6*d*. net.

Notes on the Natural History of Hornsea Mere. By G. Bolam. (London and Hull: A. Brown and Sons, Ltd.) 1*s*.

Untersuchung und Nachweis organischer Farbstoffe auf spektroskopischem Wege. By Prof. J. Formanek. Zweite Auflage. Zweiter Teil. 2 Lief. Pp. 165–366+plates. (Berlin: J. Springer.) 14 marks.

Abregé sur l'Hélice et la Résistance de l'Air. By M. Gandillot. Pp. 188. (Paris: Gauthier-Villars.) 10 francs.

Bergens Museums Aarbok, 1912. 2det Hefte. Pp. 84+plates xxvii+152+plate i. (Bergen: J. Griegs.)

Bergens Museums Skrifter. Ny Rœkke. Band ii., No. 1. Vestlandske Graver fra Jernalderen. By H. Schetelig. Pp. iii+242. (Bergen: J. Griegs.)

DIARY OF SOCIETIES.

FRIDAY, JANUARY 3

GEOLOGISTS ASSOCIATION, at 8.—Some Valleys and Moraines in the Bergen District, Norway: H. W. Monckton.

MONDAY, JANUARY 6.

ARISTOTELIAN SOCIETY, at 8.—Intuitional Thinking: Prof. Frank Granger.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—The Estimation of Glyceryl Acetate in Essential Oils: S. Godfrey Hall and A. J. Harvey.—The Estimation of Moisture: F. H. Campbell.—The Determination of Moisture in Foods, etc.: W. P. Skertchly.—The Determination of Water: G. N. Huntly and J. H. Coste.

TUESDAY, JANUARY 7.

RONTGEN SOCIETY, at 8.15.—Spark Photographs at High Pressure: Prof. A. W. Porter, F.R.S., and W. B. Haines.—Some Relations between Kathode and Rontgen Rays: Dr. R. Whiddington.

WEDNESDAY, JANUARY 8.

GEOLOGICAL SOCIETY, at 8.—The Geological History of the Malay Peninsula: J. B. Scrivenor.—A Mass of Anhydrite in the Magnesian Limestone at Hartlepool: C. T. Trechmann.

THURSDAY, JANUARY 9.

CONCRETE INSTITUTE, at 7.30.—Concrete in its Legal Aspect: W. Valentine Ball.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—The Design of Apparatus for Improving the Power Factor of A. C. Systems: Prof. Miles Walker.

MATHEMATICAL SOCIETY, at 5.30.—The Reduction of Ideal Numbers: W. E. H. Berwick.—Proofs of Certain General Theorems Relating to Orders of Coincidence: J. C. Fields.

FRIDAY, JANUARY 10.

ROYAL ASTRONOMICAL SOCIETY, at 5.

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