

The Secretary of the Royal Commission on Oxford and Cambridge Universities gives notice that all members of the University who desire to submit representations on matters falling within the terms of reference of the Commission should forward written memoranda in triplicate to him at 22 Carlisle Place, S.W.1, if possible by the middle of April.

Fresh regulations for the diplomas in agriculture and forestry have been drafted. It is proposed to establish a diploma in horticulture, and, further, to include horticulture in the subjects to be examined upon for the degree of B.A. in agriculture, estate management, and forestry.

THE Senate of the University of Dublin has decided to grant the following honorary degrees:—*D.Litt.*: Dr. William Crooke. *LL.D.*: Lord Bryce and Sir Donald MacAlister. *M.D.*: Sir Archibald E. Garrod, Regius professor of medicine in the University of Oxford. *D.Sc.*: Prof. W. H. Bragg, Quain professor of physics in the University of London, and Prof. R. A. Millikan, professor of physics in the University of Chicago.

A ROYAL COMMISSION has been appointed to inquire into the financial resources and working of the University of Dublin and of Trinity College, Dublin, and to consider the application which has been made by the University for State financial help. The members of the Commission are:—Sir Archibald Geikie, Sir John Ross, Dr. A. E. Shipley, Prof. J. S. E. Townsend, and Prof. J. Joly. Prof. G. Waterhouse is to be the secretary to the Commission.

THE governing body of the Imperial College of Science and Technology has made arrangements for the provision, partly from its own funds and partly from the gifts of donors for this special purpose, of six post-graduate scholarships for advanced work and research to be held in the coming year at American universities. It is hoped that arrangements may be made for interchange by the reception at the Imperial College of a corresponding number of university students from America. Lord Crewe, chairman of the governing body, has received the following letter from Viscount Grey:—"It is most desirable that young men of the rising generation, who will do much of the public work here and in America in the coming years, should get to know each other's universities. It will help both countries to realise how much the British and American peoples have in common, not merely in language, but in thought and in political views and aspirations. I am sure the interchange of students between British and American universities is most valuable both to individual students themselves and generally in promoting friendship based upon true understanding."

A WELL-ATTENDED meeting of teachers of the Incorporated Colleges and Schools of the University of London was held at King's College on Friday, March 12, under the chairmanship of Prof. W. A. Bone, of the Imperial College of Science and Technology, to consider the position of university teachers in relation to the Teachers (Superannuation) Act. The chairman pointed out that, as the Act is framed, university teachers are expressly excluded from its benefits. This exclusion will inevitably set up a barrier between the schools and the universities, and prevent the free transition of teachers from the one to the other, especially as the salaries of university lecturers compare most unfavourably with those in the better secondary schools. Financially, the benefits under the Teachers Act are much greater in almost all respects than under the existing contributory scheme for university teachers, which

makes no provision in respect of the years of service of a teacher prior to his joining the scheme, whereas the Act is retrospective and takes account of all years of recognised service. As the scheme was only instituted in 1913 this is a matter of serious concern to the older university teachers, for whom the provision on retirement is totally inadequate. The new scales of salaries and the Teachers Superannuation Act have made the school-teaching profession much more attractive than in the past, and unless the universities are placed in a position to offer salaries and retiring allowances at least comparable with those offered to teachers in secondary schools, they cannot maintain their efficiency and attract the abler graduates to their service. After discussion the following resolution was passed with only five dissentients:—"That this meeting of whole-time teachers in the Incorporated Colleges and Schools of the University of London hereby requests the Government to extend to university teachers and administrative officers all the benefits of the School Teachers (Superannuation) Act, 1918." A committee was appointed to take further action in conjunction with the Association of University Teachers.

Societies and Academies.

LONDON.

Royal Society, March 4.—Sir J. J. Thomson, president, in the chair.—Dr. F. F. Blackman: The protoplasmic factor in photo-synthesis. The centre of interest in problems of the photo-reduction of CO₂ in green photo-synthesising cells is shifting from the chlorophyll to the protoplasm. The quantitative control of photo-synthesis in the normal green cell is determined protoplasmically. This is illustrated by the temperature relations, which are not those of a photo-chemical reaction, but of a dark reaction. The photo-synthetic activities of leaves of different varieties (green *v.* golden leaves) and at different stages of development show no relation to the amount of chlorophyll that they contain, as is brought out by the "assimilation numbers" of Willstätter. The relation between chlorophyll development and photo-synthesis development, described in the next communication, furnishes another instance of the dominance of factors other than the pigment. In many lower organisms we find the power of reducing CO₂ to form organic matter by chemical energy in the absence of pigment or light. This chemo-synthesis may be the sole or only an alternative source of the carbon for the living cell. The process involves, of course, no cosmic gain of energy. In these cases the efficiency of energy transference from the oxidation of various substances to the reduction of CO₂ seems to be as great as or greater than in the utilisation of light energy for photo-reduction of CO₂.—G. E. Briggs: The beginning of photo-synthesis in the green leaf. In young leaves development of the power of photo-synthesis is found to lag behind development of chlorophyll, so that a green leaf when young may exhibit very slight or zero photo-synthetic power. This means that photo-synthetic activity demands development of some other internal factor than chlorophyll. The potentiality of this other factor rapidly increases with age day by day, even when the leaf is kept in darkness continuously. By keeping a leaf in a very low partial pressure of oxygen, further development of chlorophyll can be completely arrested, even in continuous light. Here also, starting with a leaf of feeble green tint, there is similar day-by-day increase in photo-synthetic power in spite of there being no further greening. Experiments were carried out by

means of a new apparatus designed by Dr. F. F. Blackman for measuring a small output of oxygen in photo-synthesis. The leaf is illuminated in a closed circuit in an atmosphere of hydrogen and carbon dioxide. In part of the circuit gases are carried over palladium black, so that oxygen produced unites with two volumes of hydrogen. The threefold reduction of volume resulting is measured by a gas burette in the circuit. In this apparatus oxygen pressure is kept so low that no further development of chlorophyll takes place, while photo-synthetic production of oxygen can be measured with great accuracy. If a leaf is cut from a seedling growing in the dark at an early stage of development, and then partially greened by exposure to light in air, its photo-synthetic activity when transferred to the apparatus will be very small or nothing. If exactly the same procedure is repeated a few days later, the photo-synthetic activity may be nearly as great as in the normally developed leaf.—Dr. B. Moore, E. Whitley, and T. A. Webster: Sunlight and the life of the sea. [Studies of the photo-synthesis in marine algæ. (1) Fixation of carbon and nitrogen from inorganic sources in sea-water; (2) increase of alkalinity of sea-water as a result of photo-synthesis and as a measure of that process; and (3) relative photo-synthetic activity of green, brown, and red seaweeds in light of varying intensity.] The vernal outburst of green life which occurs at the spring equinox is occasioned by the rapid change in intensity of daily illumination. A study of the seasonal variations in plankton around Port Erin, Isle of Man, has now been carried on for many years by Prof. W. A. Herdman and his co-workers. In many years the great outburst of diatoms occurs before the temperature of the water has even begun to move from its winter level. It thus becomes clear that it is the longer, brighter day, with increased altitude of the sun, which is the primary factor in the sudden dawn of the life of the sea each spring. This is illustrated by a chart upon which are shown for each month (1) temperature of the sea, (2) number of diatoms, (3) hours of bright sunshine, (4) total radiant energy, and (5) the amounts of nitrogen peroxide present in the air (formerly called "ozone of the air" or "active oxygen"), as taken at Radcliffe Observatory, Oxford, by Schönbein's "Ozone" papers. A sudden rise in radiant energy in March is accompanied by (1) the diatomic outburst and (2) increased nitrite content. It has been shown that the growing diatoms capture this enormous increase of light, and utilise it for building both carbon and nitrogen into their organic substances. The source of the nitrogen is the atmospheric elemental nitrogen dissolved in the sea-water, and not ammonia, nitrites, or nitrates. The source of the carbon is the carbon dioxide of the bicarbonates of calcium and magnesium dissolved in sea-water. As this carbon is removed in photo-synthesis the sea becomes always more alkaline, and the change of reaction can be used as a rough measure of the marine crop. Although the increase of alkalinity is small, yet the volume of sea-water is so immense that, as has been pointed out by Moore, Prideaux, and George Herdman, supposing this to happen to a depth of 100 metres over the surface of the sea, then the crop of moist plankton per square kilometre would amount to about 1,500,000 kilograms. This corresponds roughly to about 10 tons per acre.

Royal Microscopical Society, February 18.—Prof. John Eyre, president, in the chair.—Dr. Agnes Arber: (1) Studies on the binucleate phase in the plant-cell. Rudolf Beer and Dr. Agnes Arber: (2) Multinucleate cells: an historical study (1879-1919). These two papers were read as one. It was pointed out that in

1844 Nägeli first stated that the plant-cell is essentially uninucleate. Those botanists who have from time to time directed attention to exceptions to Nägeli's rule, usually attributed little importance to them, but recent work has made it clear that a binucleate or multinucleate condition is a very constant character of young and active tissues. The authors' observations on the subject were then discussed, the case of the nuclei of the young inflorescence axis of *Eremurus himalaicus* being described in detail. It was shown that the binucleate condition arises by mitosis. The division is normal up to the formation of the daughter-nuclei and the initiation of the cell-plate. At this point the mechanism apparently breaks down, the cell-plate is resorbed, and the spindle-fibres and associated cytoplasm—the "phragmoplast" of Errera—become transformed into a hollow sphere which encloses the two daughter-nuclei, and eventually, by gradual expansion, merges with the cytoplasm lining the cell-wall. For this hollow shell, derived from the phragmoplast, the authors have proposed the term "phragmosphere" (Proc. Roy. Soc., B, vol. xci., 1919, p. 10). The question as to how the binucleate condition of these young cells passes into the uninucleate condition characteristic of mature tissues, was then considered. It was shown that, although bilobed nuclei often occur, which at first sight suggest that the two nuclei have fused together, more critical examination indicates that these nuclei are *single nuclei*, the lobing of which is an indication either of senility (axis of Asparagus) or, in some cases, of an effort by young and active cells to increase their nuclear surface (stellar parenchyma of roots of *Stratiotes*, leaf epidermis of *Hemerocallis*). The authors think it more probable that the uninucleate condition is restored by degeneration and resorption of one nucleus, than by the fusion of the two nuclei. The paper closed with a brief reference to the significance of the multinucleate phase.

MANCHESTER.

Literary and Philosophical Society, February 3.—Sir Henry A. Miers, president, in the chair.—Prof. E. Knecht: Alpine insolation effects on unprotected wood. Effect of direct sunshine on the wood of Alpine chalets. When exposed for about a hundred years the surface of the wood was sometimes charred or scorched to a uniform black, presenting under the microscope the appearance of coal. The changes were probably brought about more by thermo-chemical than by photo-chemical action. By prolonged heating of wood to 93° C. the author had produced incipient blackening of the surface. The temperature of decomposition of wood appeared to have an important bearing on the question of coal-formation.—W. Thomson and H. S. Newman: The behaviour of amalgamated aluminium and aluminium wire. Investigations on the fine feathery growths produced when aluminium wire is brought into contact with mercury. No such growths are obtained from amalgamated magnesium, although it undergoes oxidation more readily than aluminium at the ordinary temperatures of the air.—C. E. Stromeyer: The after-effects of cannibalism. Cannibalism would not be indulged in by people with vegetarian tastes, or by those who, having a craving for animal food, could satisfy it. Others who had this craving, but no animals to eat, would become cannibals. No State in which indiscriminate man-eating was indulged in could have flourished. Officials were therefore appointed who invented rites which became religious ceremonies. Human sacrifices were, to a certain extent, discontinued, but the rites were con-

tinued. Religious animal sacrifices of the ancients were an after-effect of human sacrifices, as is possibly our practice of saying grace before meat.

PARIS.

Academy of Sciences, February 23.—M. Henri Deslandres in the chair.—M. L. Mangin gave an account of the life-work of Emile Boudier, correspondant in botany.—H. Andoyer: The method of Gauss for the calculation of secular perturbations.—L. Maquenne and E. Demoussy: The absorption of calcium by plant-roots and its antitoxic properties towards copper. Calcium does not prevent the absorption of copper by the roots of plants, and copper does not prevent the assimilation of calcium. The antitoxic action of calcium, experimental proofs of which are given, is of a physiological order; it prevents a dangerous accumulation of the poisonous metal.—Y. Delage: Suggestion for the reason for the double fovea of certain birds of prey.—W. Kilian: The repartition of the facies of the Palæo-Cretaceous in the structural units of the south-east of France. J. Hadamard: Report on the works examined and retained by the Ballistics Committee during the period of the war.—Prof. Michelson was elected a foreign associate in succession to the late Lord Rayleigh, and M. Camille Viguier a correspondant for the section of anatomy and zoology in succession to the late Gustaf Retzius.—N. Sakellariou: The oblique linear and surface curvature of a surface.—H. Villat: Certain cyclic movements with or without vortices.—C. Rabut: Light concrete: the calculation of increase of power resulting from its use in building. Slag concrete is lighter than concrete made up with sand or gravel. A sketch of the theory of its application is given.—P. Le Rolland: The influence of the deformation of the knife-edge and of the plane of suspension on the time of swing of a pendulum.—H. Georges: A new alternating mercury arc. A description of a new quartz mercury lamp which with electromotive forces of more than 500 volts starts cold.—L. Guillet: The alloys of copper, zinc, and nickel. An account of the mechanical properties of alloys containing copper, 46 and 40.5 per cent.; zinc, 43.2 and 44.7 per cent.; and nickel, 10.4 and 14.4 per cent. Comparisons with brasses free from nickel are added. Compared with brass, these alloys possess advantages in colour, greater resistance to oxidation, and facility of forging at high temperatures.—C. Matignon and M. Fréjacques: The dissociation of ammonium carbamate. Dissociation pressures are given for temperatures ranging from 100° to 150° C.—M. Tiffeneau and A. Orekhoff: The transposition of the phenyl group in the tetrahydronaphthalene series.—R. Souèges: The embryogeny of the Chenopodiaceæ. Development of the embryo in *Chenopodium Bonus-Henricus*.—L. Emberger: The evolution of the chondriome in the formation of the sporangium in ferns.—J. Pottier: The generality of the foliar asymmetry in mosses.—P. Dangard: The evolution of the vacuolar system in Gymnosperms.—P. Portier and Mme. Lucie Randoïn: The creation of vitamins in the intestines of rabbits receiving nourishment sterilised at a high temperature.

Books Received.

Card Test for Colour Blindness. By Dr. F. W. Edridge-Green. 24 cards. (London: G. Bell and Sons, Ltd.) 25s. net.

The Development of the Atomic Theory. By A. N. Meldrum. Pp. ii+13. (London: Oxford University Press.) 1s. 6d. net.

The Social Worker. By C. R. Attlee. Pp. viii+286. (London: G. Bell and Sons, Ltd.) 6s. net.

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Smithsonian Meteorological Tables. Fourth revised edition. Pp. lxxii+261. (Washington: Smithsonian Institution.)

The Summer Line, or Line of Position as an Aid to Navigation. By G. C. Comstock. Pp. vi+70. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd.) 6s. net.

Blank Reduction Forms for Line of Position Observations (Marc St. Hilaire Method). By G. C. Comstock. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd.) 2s. 6d. net.

Silvanus Phillips Thompson, D.Sc., LL.D., F.R.S.: His Life and Letters. By J. S. and H. G. Thompson. Pp. ix+372. (London: T. Fisher Unwin, Ltd.) 21s. net.

Wild Life in Canada. By Capt. A. Buchanan. Pp. xx+264. (London: J. Murray.) 15s. net.

Collected Scientific Papers. By Prof. J. H. Poynting. Pp. xxxii+768. (Cambridge: At the University Press.) 37s. 6d. net.

The Principles of Aërography. By Prof. A. McAdie. Pp. xii+318. (London: G. G. Harrap and Co.) 21s. net.

General Science: First Course. By L. Elhuff. Pp. viii+435. (London: G. G. Harrap and Co.) 5s. net.

Quantitative Analysis by Electrolysis. By A. Classen and H. Cloeren. Revised English edition by Prof. W. T. Hall. Pp. xiii+346. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd.) 17s. 6d. net.

Practical Histology. By Prof. J. N. Langley. Third edition. Pp. viii+320. (Cambridge: W. Heffer and Sons, Ltd.) 10s. 6d. net.

Fuel Production and Utilization. By Dr. H. S. Taylor. Pp. xiv+297. (London: Baillière, Tindall, and Cox.) 10s. 6d. net.

History of the Great War, Based on Official Documents. Naval Operations. By Sir Julian Corbett. Vol. i. Pp. xiv+470+vol. of 18 maps. (London: Longmans and Co.) 17s. 6d. net.

Nature and Super-Nature: A Key to the Spiritual World. By J. Leslie. Pp. 80. (Aberdeen: W. Jolly and Sons, Ltd.) 2s.

DIARY OF SOCIETIES.

THURSDAY, MARCH 18.

ROYAL INSTITUTION OF GREAT BRITAIN, at 3.—Stephen Graham: The Spirit of America after the War.

ROYAL SOCIETY, at 4.30.—W. B. Brierley: A Form of *Botrytis cinerea* with Colourless Sclerotia.—R. R. Gates: A Preliminary Account of the Meiotic Phenomena in the Pollen Mother Cells and Tapetum of Lettuce (*Lactuca sativa*).

LINNEAN SOCIETY, at 5.—Dr. J. Small: The Chemical Reversal of Geotropic Response in Roots and Stems.

ROYAL COLLEGE OF PHYSICIANS, at 5.—Sir John R. Bradford: The Clinical Experiences of a Physician during the Campaign in France and Flanders, 1914-1919 (Lumleian Lecture).

ROYAL INSTITUTE OF PUBLIC HEALTH, at 5.—Dr. S. V. Pearson: Suggested Reforms in the Campaign against Tuberculosis.

INSTITUTION OF MINING AND METALLURGY (at Geological Society), at 5.30.—W. R. Jones: Tin and Tungsten Deposits: The Economic Significance of their Relative Temperatures of Formation.

INSTITUTION OF ELECTRICAL ENGINEERS (at Institution of Civil Engineers), at 6.—Adjourned Discussion on the Papers of W. H. Patchell and S. H. Fowles read at the Meeting on March 11.

CHEMICAL SOCIETY, at 8.—I. Masson and R. McCall: The Viscosity of Nitrocellulose in Mixtures of Acetone and Water.—H. Stephen, W. F. Short, and G. Gladding: The Introduction of the Chloromethyl Group into the Aromatic Nucleus.—H. E. Cox: The Influence of the Solvent on the Velocity of Reaction between certain Alkyl Iodides and Sodium β -Naphthoxide.—H. Crompton and P. L. Vanderstichele: The Use of 1:2-Dichlorovinylethyl Ether for the Production of Chloroacetates and Acid Chlorides.

SOCIETY OF ANTIQUARIES, at 8.30.

FRIDAY, MARCH 19.

ROYAL SOCIETY OF ARTS (Indian Section), at 4.30.—Sir William S. Meyer: The Indian Currency System and its Developments.

CONCRETE INSTITUTE, at 6.—Dr. O. Faber: The Practical Application of Reinforced Concrete.

INSTITUTION OF MECHANICAL ENGINEERS, at 6.—D. Brownlie: Exact Data on the Performance of Mechanical Stokers, as applied to "Lancashire" and other Narrow-flued Boilers.