diate cause of the decline which has again set in is to be looked for in the war, though, as the report points out, the end of the war cannot of itself be expected to remedy the evil. A specially serious feature of the present situation is that the progressive decline now going on comes at the end of a series of years, during which the number of entrants has been altogether insufficient for the needs of the country. The report states emphatically that there is no hope of meeting this shortage except by a substantial increase in the salaries of adult teachers and by a general improvement in the prospects of the teaching profession. There is little hope at present of securing an increase in the length of the school-life of elementary-school pupils or of reducing the size of classes—two measures of crying importance—because both improvements depend upon an increased supply of teachers.

AN interesting and suggestive address on "A Londoner's Opportunity in Commerce," under the auspices of the Education Committee of the London County Council, was recently delivered in the Kingsway Hall to the students of the educational institutions in London by the Minister of Labour, the Rt. Hon. G. H. Roberts. The address dealt with the much-increased facilities now offered in London for the due education and training of those engaged in commerce, and it appeared that there were now in attendance as many as 100,000 students in fifty-nine senior and ninety-eight junior institutes. The Minister pleaded that full opportunity of a generous education based upon liberal lines should be available for all the children of the nation. Talent was widely diffused, and was centred in no particular stratum of society. The future abides with those peoples whose standard of education, both technical and moral, is of the highest order. The State must devise some means of ensuring that no child is wasted. Scientific training, not only vocational, but to fit the child for his full duties as a citizen, was indispensable if the nation is to be in a position to meet successfully the crucial problems and the severe competition which will inevitably arise at the close of the war. There must be a closer union and identification of interests between employer and employed and of Government departments concerned with the problems of labour and education, since the one reacts upon the other. If this be ensured, along with the diffusion of education amongst all classes of the community, the future of the country will give no cause for anxiety, since the British people, with their great traditions, and keen to exercise their great qualities, need not fear the rivalry of any existing race in the world. Out of the horrible evil which the war has brought in its train some good has at least arisen, since it has awakened our people to the value of education and to the necessity for measures to give it full and fruitful effect.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 30.—Sir J. J. Thomson, president, in the chair.—Prof. J. **Joly**: Method of avoiding collision at sea. The method of avoiding collision at sea now proposed involves the determination of distance between ship and ship at regulated intervals by means of synchronised signals (preferably wireless and submarine). The principle involved is that ships which are advancing so as to collide approach one another with constant velocity, *i.e.* the relative velocity is constant. If they are going to pass clear the relative velocity is not constant, diminishing to nothing when the vessels are at the passing distance, and then changing sign. The paper embodies tables and curves showing the variations of relative velocity for different passing distances. Assuming that a quarter of a sea-mile is distinguishable by the use of synchronised signals, the method appears to be certainly available for a passing distance of half a mile. Mechanical aids towards increasing the trustworthiness of observations and facilitating them are described. The advantages of the method are chiefly that it involves no special inter-communication between ship and ship (other than the regulated synchronised signal supposed to be emitted by all vessels navigating in fog or thick weather), and that the distance separating the vessels is necessarily kept under observation throughout.—Dr. R. A. **Houston**: A statistical survey of colour vision. The colour vision of seventy-nine students was tested by the method of Dr. Edridge-Green's colour-perception spectrometer. Three of the seventy-nine were found to be colour-blind. The number of observers containing a given number of patches was plotted against the latter, and a frequency curve obtained. If the Young-Helmholtz theory is true, this curve should have two maxima, one for normal colour vision and one for dichromatism. The results show, however, that normal colour vision has quite enough "scatter" to explain colour blindness as an outlying portion of itself, and that it is not necessary to assume the existence of a separate maximum. Various points of interest in connection with the observations are discussed, and it is suggested that a more extensive survey made on similar lines at different places might settle definitely once for all the vexed question of colour-vision theory.—Dr. A. E. **Everest**: The production of anthocyanins and anthocyanidins. Part iii. The paper is a continuation of the author's previous work, and deals with the mode of formation, in Nature, of the anthocyanin pigments. Available data concerning the co-existence of anthocyans and flavonol derivatives are discussed, and preliminary experiments with a view to the elucidation of the manner in which the anthocyanin pigments are formed in plants are described. For the first time direct chemical evidence is recorded which supports the prevailing view that the anthocyanin pigments are produced in Nature *via* flavonol derivatives, it being shown, with a very considerable degree of certainty, that in the flowers examined (purple-black viola) the anthocyanin pigment exists side by side with a glucoside of the flavonol derivative, from which the anthocyan would be produced by reduction. The isolation, from the purple-black viola (Sutton's "Black Knight") of a pigment identical with Willstätter's violanin, and experiments to show the presence of a myricetin glucoside in the same flower, are described.

Physical Society, May 10.—Prof. C. H. Lees, president, in the chair.—Dr. S. **Chapman**: The times of sudden commencement of magnetic storms. The paper is a discussion from a new view-point of the data, collected by Dr. Bauer, for fifteen magnetic storms. Maunder's work on the recurrence of magnetic storms at intervals equal to the rotation period of the sun suggests that storms are due to some solar agent transmitted along narrow, well-defined streams issuing from and rotating with the sun. This suggests the view that the relative time of commencement of a storm at different stations depends mainly on the orientation of the latter at the time relative to the sun, *i.e.* on the local time at the station. This forms the basis of the classification in the paper.—Dr. H. S. **Allen**: The entropy of a metal. An expression for the entropy of one gram atom of a substance in the solid state has been given by Ratnowsky. In a communication to the Physical Society in 1916 the author gave the correct form of the approximation required for high

values of the absolute temperature in terms of Bernoulli's numbers. The data required for testing the formula have been supplied in a recent paper by Lewis and Gibson, who have given values for the entropy of the elements under the condition of constant volume, and also under constant pressure. These values were deduced from observations on the specific heat assuming the truth of the heat theorem of Nernst, that the entropy of every actual substance in the pure state is zero at the absolute zero of temperature. It is found that the formula of Ratnowsky gives values for the entropy of a solid in very close agreement with those obtained by Lewis and Gibson. The hypotheses assumed in the theory of Ratnowsky are discussed, and the conclusion is drawn that these are probably justified as being at least approximately true. —T. **Smith**: Tracing rays through an optical system.

CAMBRIDGE.

Philosophical Society, May 20.—Prof. Marr, president, in the chair.—B. **Sahni**: The branching of the zygopteridean leaf, and its relation to the probable pinna-nature of *Gyropteris sinuosa*, Goeppert. (1) The supposed quadriseriate "pinnæ" of forms like Stauropteris and Metaclepsydropsis are Tertiary raches, the vascular strands of the secondary raches (pinna-trace-bar, Gordon) being completely embedded in the cortex of the primary rachis. All Zygopterideæ, therefore, have a single row of pinnæ on each side of the leaf. (2) This revives the suggestion that *Gyropteris sinuosa*, Goepp., is a free secondary rachis of a form like Metaclepsydropsis. (3) The genus Clepsydropsis should include Ankyropteris, because (*a*) a fossil described in 1915 (Mrs. Osborn, Brit. Assoc. Rep., p. 727) combines the leaf-trace of Clepsydropsis with the stem of Ankyropteris, the leaf-trace in both arising as a closed ring; (*b*) in *C. antiqua*, Ung., also the leaf-trace arose similarly, as shown by a section figured by Bertrand (Progressus, 1912, Fig. 21, p. 228), in which a row of small tracheides connecting the inner ends of the peripheral loops represents those lining the ring before it became clepsydroid by median constriction.—The structure of *Tmesipteris Vieillardi*, Dang. The most primitive (least reduced) of the Psilotales. Specifically distinct from *T. tannensis* in (1) erect terrestrial habit, (2) distinct vascular supply to scale-leaves, (3) medullary xylem in lower part of aerial stem.—Acmopyle, a monotypic New Caledonian Podocarp. Indistinguishable from Podocarpus in habit, vegetative anatomy, drupaceous seed, megaspore membrane, young embryo, male cone, stamen, two-winged pollen, and probably male gametophyte. Chief differences:—(1) Seed nearly erect; (2) epimatium nowhere free from integument, even partaking in formation of micropyle; (3) outer flesh with a continuous tracheal mantle covering the basal two-thirds of the stone.

DUBLIN.

Royal Irish Academy, May 13.—The Most Rev. J. H. Bernard, president, in the chair.—J. A. **McClelland** and J. **Enright**: Some properties of large ions. The paper deals mainly with the determination of certain constants in connection with large ions. One constant, for example, is measured, showing the rate at which small ions are attached to uncharged nuclei so as to form the large ions. The rates of recombination of large ions and of large and small ions are measured, and also the average charge on the large ions.

May 27.—The Most Rev. J. H. Bernard, president, in the chair.—H. C. **Plummer**: The symmetrical optical instrument. Schwarzschild has discussed the third-order errors of a symmetrical optical instrument on the basis of Hamilton's characteristic function. This treatment leads to the desired end by assuming the results of the Gaussian first approximation: In the present paper the order of development is reversed and a self-contained theory is obtained. This has the advantage of greater simplicity and directness, and it also makes clearer the actual degree of approximation, which would concern the development to a still higher order if required. The conditions for this further development are indicated. The aberrations for a mirror system are deduced directly from those for a refracting system.

Royal Dublin Society, May 28.—Prof. J. A. McClelland in the chair.—Dr. W. E. **Adeney** and H. G. **Becker**: The rate of solution of atmospheric nitrogen and oxygen by water. Part i.: The rate of solution by thin films of water. In this communication the authors deal with the question of the rate at which atmospheric nitrogen and oxygen are dissolved by the surface layer of a quiescent body of water, apart from that of the rate at which the same gases after solution pass downwards through the lower layers of the water. A new method of studying the rate of solution of these gases by water, when the latter is exposed to them in thin films, is described and discussed. The method is shown to give accurate and important results.—Dr. G. H. **Pethybridge** and H. A. **Lafferty**: A disease of flax seedlings caused by a species of Colletotrichum and transmitted by infected seed. The disease described was submitted as a form of "yellowing," but has proved to be one of the "damping-off" type. The parasitic fungus is described as a new species under the name of *Colletotrichum linicolom*. Dormant mycelium is present within the epidermis of the seed-coat of affected seeds, and seedling infection occurs from this during or subsequent to germination. Disinfection of the seed with formalin and with hydrogen peroxide gave good results, but did not entirely suppress the disease. Infected seed has been found in samples coming from Japan, Russia, Holland, Ireland, Canada, and the United States of America.

PARIS.

Academy of Sciences, May 27.—M. P. Painlevé in the chair.—G. **Bigourdan**: The astronomical station of the College of Clermont (first period) and the astronomical expedition to Siam. History of work done at this station between 1652 and 1685, and an account of the astronomical expedition to Siam in 1687.—H. **Le Chatelier** and B. **Bogitch**: The use of the Brinell ball for testing construction materials. For cements and silica bricks the method is modified by introducing a thin sheet of foil between the ball and the material under test, the impressions being then measured on the foil. Preliminary experiments with blocks of lead and copper proved that the use of the foil did not modify the diameter of the imprints. Tests with cement, plaster, silica brick, and clay brick showed that the variations from the mean were much less than in the usual crushing test. The fact was brought out that the opposite faces of the same brick often show marked differences in hardness.—C. de la Vallée **Poussin**: The maximum of the modulus of the differential of a trigonometrical expression of limited order and modulus.—M. **Balland**: Wheat substitutes in munition bread. Details of results with seventeen substitutes for wheat in bread are given.—M. Brachet was elected a correspondant for the section of anatomy and zoology in succession to the late M. Francotte.—J. **Martinet**: Syntheses in the α-naphthindol series.—Mme. Karen **Bramson**: The manufacture of paper pulp from dead leaves. The paper pulp required by France in an average year amounts to about one-tenth that obtainable from the dead leaves produced. As by-products 1000 kilograms

of leaves would give 200 kilograms of pure charcoal, 30 kilograms of tar, 1 kilogram of crude acetic acid, and 600 grams of acetone.—C. **Galaine** and C. **Houlbert**: The carbonisation and distillation of peat, sawdust, house refuse, and other light organic products. A continuous process of distillation is described with rotary retorts, securing uniformity of carbonisation, with recovery of gas and by-products.—H. **Colin** and Mlle. Y. Trouard **Riolle**: The graft of the sunflower on the Jerusalem artichoke.—F. **Morvillez**: The leaf-trace of the Chrysobalanæ.—A. **Guilliermond**: Mitochondria and vacuolar system.

MELBOURNE.

Royal Society of Victoria, April 11.—Mr. J. A. Kershaw, president, in the chair.—Miss A. **Osborne**: An abnormality of the frog, *Hyla aurea*. Although abnormalities in the arrangement of the anterior veins are fairly common in this genus, a departure from type is more rare in the case of the posterior vessels. In the specimen described there were two right renal portal veins, one connecting with the iliac in the ordinary way, the other—apparently due to longitudinal splitting of the original single vessel—draining the posterior pelvic region, from which there was a rather more developed venous system than is usual.

BOOKS RECEIVED.

Stoichiometry. By Prof. S. Young. Second edition. Pp. xiv+363. (London: Longmans and Co.) 12*s*. 6*d*. net.

Cookery under Rations. By M. M. Mitchell. Pp. 65. (London: Longmans and Co.) 2*s*. net.

A Medical Dictionary. By W. B. Drummond. Pp. ix+625. (London: J. M. Dent and Sons, Ltd.) 10*s*. 6*d*. net.

British Museum (Natural History). British Antarctic (*Terra Nova*) Expedition, 1910. Natural History Report. Zoology. Vol. v., No. 1. Cœlenterata. Part i., Actiniaria. By T. A. Stephenson. Pp. 1–68. (London: British Museum (Natural History).) 10*s*.

Essentials of Practical Geography. By B. C. Wallis. Pp. xv+213. (London: Macmillan and Co., Ltd.) 4*s*. 6*d*.

Field Book of Insects. By Prof. F. E. Lutz. Pp. ix+509. (New York and London: G. P. Putnam's Sons.) 12*s*. 6*d*.

The Dispensatory of the United States of America. by Prof. J. P. Remington and others. 20th edition. Pp. cxxii+2010. (Philadelphia and London: J. B. Lippincott Co.) 2*l*. 1*s*. net

Studies in Electro-Physiology (Animal and Vegetable). By A. E. Baines. Pp. xxix+291. (London: G. Routledge and Sons, Ltd.) 12*s*. 6*d*. net.

DIARY OF SOCIETIES.

THURSDAY, JUNE 13.

ROYAL SOCIETY, at 4.30.—Experiments on the Effect of the Vibration of a Stretched Wire forming part of a Closed Electric Circuit: Admiral Sir Henry Jackson.—The Effect of Wind Pressure on the Pitch of Organ Pipes: A. Mallock.—The Diamagnetism of Hydrogen and the Value of the Magneton: Dr. A. E. Oxley.

OPTICAL SOCIETY, at 7.—The Prevention of Filming in Enclosed Optical Instruments: H. S. Ryland.—A Chart for Finding the Number of Lenses in, and Size of, a Block: Horace Lee.—Charts for Assisting in the Selection of Suitable Glasses for Cemented Doublets: T. Smith.

MATHEMATICAL SOCIETY at 5.—Hellinger's Integrals: Prof. E. W. Hobson.—An Assumption in the Theory of Singular Solutions of Ordinary Differential Equations of the First Order: Prof. M. J. M. Hill.—Quartic and Cubic Residuacity Tables: Col. A. J. Cunningham and Th. Gosset.—Lucas's Process applied to Composite Mersenne Numbers: Col. A. J. Cunningham.—The Gaussian Period Numbers and the Conditions that 2 should be a Residue of a 16th or a 32nd Power: Dr. A. E. Western.—The Aberrations of a Symmetrical Optical System: T. W. Chaundy.—The Rotation-groups of the Regular Figures in Four or more Dimensions: T. Lindsay Ince.

FRIDAY, JUNE 14.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Literal Development of the Motion of the Lunar Perigee: R. Moritz.—William Herschel's Observations of Variable Stars and Stars suspected of Variability.—The Measurement of Time to the Thousandth of a Second: R. A. Sampson.—The Motion in Longitude of the Red Spot on Jupiter: Rev. T. E. R. Phillips.—The Stellar Magnitude Scales of the Astrographic Catalogue. 12th Note; Hyderabad, Perth, Edinburgh, and Cape Magnitudes: H. H. Turner.—An Example of the Determination of a Minute Periodic Variation as Illustrative of the Law of Errors: S. Chapman.—The Pulsation Theory of Cepheid Variables: F. A. Lindemann.—*Probable Papers*: The Proper Motions of the B Stars: Sir F. W. Dyson.—Observations of a New Star in Aquila.—W. H. Steavenson.—The Origin and Energy of Magnetic Storms: Dr. S. Chapman.

PHYSICAL SOCIETY, at 5.—*Discussion*: The Teaching of Physics in Schools: Opener, Sir Oliver J. Lodge.

MALACOLOGICAL SOCIETY, at 7.—Notes on Magilus and Allied Genera: G. B. Sowerby.—Note on an Unpublished Reprint of a Paper by J. W. Brazier, published in the *Sydney Mail* of December 2, 1871: H. O. N. Shaw.—On a Supposed New Genus of Pelecypoda from the Older Tertiaries of Southern Nigeria: R. Bullen Newton.

MONDAY, JUNE 17.

VICTORIA INSTITUTE, at 4.30.—Annual Address. The Future of Education: Prof. D. S. Margoliouth.

TUESDAY, JUNE 18.

ROYAL STATISTICAL SOCIETY, at 5.15.—Annual General Meeting.—Recent Economic Developments in Japan in their Relation to her Trade with the United Kingdom: K. Yamasaki.

MINERALOGICAL SOCIETY, at 5.30.—The Origin of Septaria: W. A. Richardson.—The Composition of the Nickeliferous Iron of the Meteorites of Lodran, Powder Mill Creek, and Holbrook: Dr. G. T. Prior.

WEDNESDAY, JUNE 19.

GEOLOGICAL SOCIETY, at 5.30.

ROYAL METEOROLOGICAL SOCIETY, at 5.—The Lunar Atmospheric Tide at Greenwich, 1854–1917: S. Chapman.—The Audibility of the Gunfire on the Continent at Chignal St. James, near Chelmsford, during 1917: Miller Christy.—Seasonal Variation in the Audibility of Distant Gunfire: F. J. W. Whipple.

ROYAL MICROSCOPICAL SOCIETY, at 8.—Photo-synthetic Processes: Prof. Benjamin Moore.—A New Type of Infusorian, *Arachnidiopsis paradoxa*: E. Penard.—Diatom Ooze from Deep Antarctic Waters: E. Heron-Allen and A. Earland.—Gnats and Gnat Larvæ: J. M. Offord.

THURSDAY, JUNE 20.

ROYAL SOCIETY, at 4.30.—Croonian Lecture: The Physiological Basis of Thirst: Major W. B. Cannon.

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