

industries; and (c) in Birmingham in respect of the fermentation industries; and, secondly, the lack of any really adequate provision in this country for the needs of equally important branches of industry which depend upon the extraction and refining of certain well-defined groups of natural (and chiefly vegetable) raw materials.

The technology of the following groups of natural products has been selected because of their increasing economic importance, and of their close relationships with the work already developed in the botany department. It can scarcely be doubted that the study and investigation of their chemical properties, treatment, and uses in the Department of Chemical Technology will constitute an important link, not only with the work of the botany department, but also with the economic development of the vegetable resources of the Empire, on which grounds their adoption by the college may be urged as specially appropriate. The products in question are as follows:—(i) Celluloses, sugars, starches, gums, dextrans, and resins; (ii) animal and vegetable oils and fats, and the manufacture of glycerine, soap, and food products (e.g. margarine) therefrom; and (iii) rubber and similar materials.

Industrial Connection.

In the development of the foregoing scheme as a whole, emphasis is to be laid upon the importance of everything possible being done, both now and in the future, by way of establishing and extending connection between the various sections of the Department and the industries which they are severally designed to serve. The Department will also keep in close touch with the various organised efforts that are now being made to solve general industrial and economic problems by co-operative investigation and research.

The additional financial requirements for the important developments outlined above are estimated at 100,000*l.* for buildings and equipment, and not less than 10,000*l.* a year for maintenance and working expenses.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

LONDON.—The following doctorate has been conferred by the Senate:—*D.Sc. (Engineering)*: Mr. Miles Walker, an external student, for a thesis entitled "Supply of Single-phase Power from Three-phase Systems."

TEACHERS have hitherto exercised but little influence on the public educational systems of this country. But if the public authorities that control this education are to exercise their growing power to the best advantage, they can scarcely do so without the increasing help of the teaching profession. The Teachers' Registration Council—"representative of the teaching profession"—was established in 1912. During its short life it has rendered valuable service to English education by preparing a register of teachers and by providing a teachers' parliament. But if the teaching profession is to take an effective part in directing a new national system of education, it can best do so by co-operating with the existing authorities on the lines indicated by the Whitley report. The initiative will probably have to come from the teachers. The Teachers' Registration Council can provide their side of the "Joint Industrial Council," but provincial councils of teachers are needed to provide their side of the "district councils." Accordingly a new step has been taken by the formation, at a meeting held in Manchester on October 26,

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of the first provincial council, representative of the teaching profession in Lancashire and Cheshire. The council consists of two representatives of each of the Universities—Manchester and Liverpool—and of the teachers' associations in these counties. It is anticipated that other provincial councils will quickly be set up elsewhere. Their establishment throughout the length and breadth of England will not only enable the teachers to exercise a profoundly beneficial influence upon the organisation of local education, but also be the means of securing a greater measure of life and liberty for the teaching profession.

SOCIETIES AND ACADEMIES.

LONDON.

Optical Society, October 10.—Prof. Cheshire, president, in the chair.—T. Y. Baker: Sources and magnitude of centring errors in a sextant. A centring error in a sextant is ordinarily due to the sextant being placed eccentrically on the dividing engine. In order to comply with the National Physical Laboratory's "A" class certificate, it is necessary that this eccentricity should not be such as to produce errors in the reading exceeding 40 seconds. This condition is satisfied provided the scale-centre lies within a certain ellipse the centre of which is the mechanical centre of the instrument, and the axes of which lie one along and the other at right angles to the line of the middle reading. The semi-axes of this ellipse for a 7-in. sextant reading up to 120 are 5.2 mils and 0.7 mil respectively, but the former figure needs reduction to about 3 mils in order to allow of the vernier not reading "long" at the two ends of the scale. The customary practice of sextant-makers has been to readjust the position of the mechanical centre after the instrument has had the scale engraved. The workshop method of testing whether such readjustment is necessary is customarily the method of trying the length of the vernier against the scale at different points along the arc. The author showed that this method is not a sufficiently delicate test for the purpose of complying with the "A" certificate. An alternative method was described, in which the correctness or otherwise of the centre is determined by the tracing of a mark engraved upon the vernier against a circular arc cut from the same centre and at the same time as the marking of the scale. This method is being adopted by the Admiralty, and is already embodied in their specification for cadets' sextants.—T. Chaundy: Astigmatism: interchangeability of stop and object. For an object at O and a stop at S on the axis of an optical instrument, the astigmatism (i.e. astigmatic separation divided by the square of the height of the object) is to least order

$$\mu(1 - FO.FS/f^2)/\mu'.SO,$$

together with a quantity symmetrical in O and S. The planes of stop and object may thus be interchanged without change in value of the astigmatism if $FO.FS = f^2$. In this case, with like end-media, F', S', O' (the images of F, S, O in the instrument) are symmetrically placed with respect to F, O, S. In particular, an object at one focus and a stop at the other are interchangeable. The astigmatism in this case is unaltered by reversal of the instrument; its consequent convenience in calculation is pointed out. In particular, all the primary aberrations may be determined by differentiation of its expression in terms of the powers and separations of the system.

Royal Microscopical Society, October 16.—J. E. Barnard: A new illuminant for microscopical work. Note on the reports of the Medical Research Committee on the standardisation of pathological methods.

SYDNEY.

Royal Society of New South Wales, August 7.—Mr. W. S. Dun, president, in the chair.—R. T. Baker: The technology and anatomy of some "silky oak" timbers. This paper covers an investigation into the technology and anatomy of five species of timber-yielding trees belonging to the natural order Protæcæ, and all vernacularly known as members of the "silky oak" family. Two belong to the same genus, viz. *Grevillea robusta* and *G. hilliana*, the others being *Orites excelsa*, *Cardwelli sublimis*, and *Embothrium wickhami*. Their economic applications are enumerated, and the suitability of some of them for flying machines adds a new timber to those valuable arms of the Empire—the Navy and Army. Breaking strains, specific gravities, and weights of each are given.—R. H. Cambage: Vertical growth of trees. From tests made for several years on very young trees it appears that after the branches are thrown out the trunk does not increase in length to any appreciable extent below such branches, but the prolongation comes from the terminal shoot or growing point at the summit. Nails which were driven into very young acacias, cinnamomums, and eucalypts at 4 ft. and 5 ft. from the base were not carried upwards during several years or while the little tree-stems grew to double their length.

BOOKS RECEIVED.

The Physical Society of London. Report on the Relativity Theory of Gravitation. By Prof. A. S. Eddington. Pp. vii+91. (London: The Flectway Press, Ltd.) 6s. net

Jungle Peace. By W. Beebe. Pp. 297. (New York: H. Holt and Co.)

What is War? and Two Other Essays. By H. B. Cowen. Pp. 38. (London: The Cursitor Publishing Co.) 9d.

Psychological Principles. By Prof. J. Ward. Pp. xiv+478. (Cambridge: At the University Press.) 21s. net.

On the Nature of Things. By H. Woods. Pp. v+248. (Bristol: John Wright and Sons, Ltd.) 10s. 6d. net.

The Life and Letters of Joseph Black, M.D. By Sir W. Ramsay. With an introduction dealing with the life and work of Sir William Ramsay by Prof. F. G. Donnan. Pp. xix+148. (London: Constable and Co., Ltd.) 6s. 6d. net.

The Ontario High School Laboratory Manual in Chemistry. By Prof. G. A. Cornish, assisted by A. Smith. Pp. vii+135. (Toronto: The Macmillan Co. of Canada, Ltd.) 25 cents.

The Ontario High School Chemistry. By Prof. G. A. Cornish, assisted by A. Smith. Pp. vii+297. (Toronto: The Macmillan Co. of Canada, Ltd.) 50 cents.

Far Away and Long Ago. By W. H. Hudson. Pp. xii+332. (London: J. M. Dent and Sons, Ltd.) 15s. net.

Interpolation Tables or Multiplication Tables of Decimal Fractions. By Dr. H. B. Hedrick. Pp. ix+139. (Washington: The Carnegie Institution of Washington.)

Dictionary and Grammar of the Language of Sa'a and Ulawa, Solomon Islands, with Appendices. By W. G. Ivens. Pp. vii+249+11 plates. (Washington: The Carnegie Institution of Washington.)

Papers from the Department of Marine Biology of the Carnegie Institution of Washington. Vol. ix. Pp. 362+105 plates. (Washington: The Carnegie Institution of Washington.)

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DIARY OF SOCIETIES.

MONDAY, NOVEMBER 4.

ARISTOTELIAN SOCIETY, at 8.—Dr. G. E. Moore: Presidential Address, Some Judgments of Perception.
SOCIETY OF ENGINEERS, at 5.30.—Sir Richard Cooper, Bart.: Obstacles to Post-war Trade.

TUESDAY, NOVEMBER 5.

MINERALOGICAL SOCIETY, at 5.30.—Anniversary Meeting.—Dr. G. F. Herbert Smith and Dr. G. T. Prior: A Plagionite-like Mineral from Dumfriesshire.—Lt. Arthur Russell: The Chromite Deposits in the Island of Unst, Shetlands.—Dr. G. T. Prior: The Nickeliferous Iron of the Meteorites of Bluff, Chandakapur, Chateau Renard, Cynth'ana, Dhurmsala, Eli Elwah, Gnadenfrei, Kabowa, Lundsgård, New Concord, Shelburne, and Shytal.

RÖNTGEN SOCIETY, at 8.15.—Dr. G. B. Batten: Presidential Address.
INSTITUTION OF CIVIL ENGINEERS, at 5.30.—Sir John A. F. Aspinall: Inaugural Address, and Presentation of the Medals recently Awarded by the Council.

ZOOLOGICAL SOCIETY, at 5.30.—Prof. H. M. Lefroy: The Sydney Zoological Gardens.—Dr. R. T. Leiper: (1) Diagnosis of Helminth Infections from the Character of the Eggs in the Fæces; (2) Demonstration of the "New" Rabbit Disease.—J. F. Gemmill: Ciliary Action in the Internal Cavities of the Ctenophore, *Pleurobrachia pileus*, Fabr.

WEDNESDAY, NOVEMBER 6.

SOCIETY OF PUBLIC ANALYSTS, at 5.—H. Droop Richmond: Note on the Graduation of Gerber Butyrometers.—B. G. McLellan and A. W. Knapp: The Estimation of Cacao Shell.

GEOLOGICAL SOCIETY, at 5.30.—Major Sir Douglas Mawson introduces Discussion on the Antarctic Ice-sheet and its Borders.
ENTOMOLOGICAL SOCIETY, at 8.

THURSDAY, NOVEMBER 7.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: Prof. G. E. Hale: The Nature of Sun-spots.—E. O. Hercules and T. H. Laby: The Thermal Conductivity of Air.—T. K. Chinmayanandam: Haidinger's Rings in Mica.

CHEMICAL SOCIETY, at 8.
INSTITUTION OF ELECTRICAL ENGINEERS, at 6.—Tenth Kelvin Lecture—L. B. Atkinson: The Dynamical Theory of Electric Engines.

FRIDAY, NOVEMBER 8.

ROYAL ASTRONOMICAL SOCIETY, at 5.
MALACOLOGICAL SOCIETY, at 7.—The Rev. Dr. A. H. Cooke: The Radula of *Thais*, *Drupa*, *Concholepas*, *Cronia*, *Rapana*, and the Allied Genera.—W. T. Webster: Notes on the Life-history of *Planorbis cornuus* and other Freshwater Mollusca.

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