

building and equipment of new departments for coal-tar colour chemistry and for dyeing; the addition to the textile department of new sections for (1) carding and spinning, and (2) cloth finishing, providing at the same time improved facilities for weaving and testing, along with a textile museum; the extension of the departments of mechanical and electrical engineering, especially as regards facilities for practical and experimental work. Space would thus become available for necessary extensions in other departments. To carry through these proposals it is estimated that a sum of 85,000*l.* will be required. The Technical College should then be in a position to deal adequately with the varied educational needs of the leading industries of the district, both for advanced teaching and for research. The principal donations promised to date are:—British Dyes, Ltd., 5000*l.*; Sir J. F. Ramsden, Bart., 3000*l.*; Mr. J. A. Brooke, 1000*l.*; Mr. J. E. Crowther, 1000*l.*; Messrs. Simon-Carves, Ltd., 1000*l.*; Messrs. Walter Sykes, Ltd., 1000*l.* Furthermore, the Huddersfield engineers have undertaken to provide the complete equipment of the new engineering section.

LAST February, by the passing of the Smith-Hughes Act, the United States embarked on a national scheme of State-aided vocational education. We learn from the *Scientific American* of August 25 that the Act is similar in its features to the Agricultural Extension Act of 1914. There is the same provision for increasing grants, beginning with 340,000*l.* in 1917, and rising to 1,440,000*l.* in 1925. The available money will be distributed among all States which agree to contribute sums equal to their share of the grants and to conform to the terms of the Act. The grant provides for the creation of three distinct funds, viz. for paying salaries of teachers, supervisors, or directors of agricultural subjects; for paying the salaries of teachers of trade, home economics, and industrial subjects; and for training the teachers and other educational workers concerned. The Act creates a Federal Board for Vocational Education, consisting of the Secretaries of Agriculture, Commerce, and Labour, the U.S. Commissioner of Education, and three other members, to be appointed by the President, of whom one is to represent manufacturing and commercial interests, one agricultural interests, and one labour interests. The board, besides administering the Act, will carry out investigations relating to vocational education, co-operating with the Departments of Agriculture and Commerce and the Bureau of Education. There has been some fear in the United States that the spread of vocational training may disturb the principle of compulsory general education. But every boy and girl will be required to get the same minimum amount of "book learning" as at present, and those who, under conditions now prevailing, would enter the trades and industries as unskilled labourers will, for the future, receive specialised training that will enable them to command higher wages and make them more useful members of society.

THE address delivered to the members of the United Tanners' Federation at the Leather Sellers' Hall, London, on July 17 last by Dr. Sadler, the Vice-Chancellor of the University of Leeds, deserves the serious consideration not only of the protagonists on classical *versus* scientific education, but also of all who are engaged in industries in which science is a prime factor. It puts with force and precision the necessity of an all-round general education in which science, broadly conceived, shall take its due place in the education of all classes of the people, and especially that it shall be made "a stimulating and energetic force in the education of every boy and girl in our secondary schools," and that whilst not claiming that science, as ordinarily understood, should have the last word in

settling our view of life, yet that it should be a powerful ingredient in the intellectual ferment which determines the final judgment. It insists that technical education must be preceded by a good general education, and that it "should include three elements—scientific discipline, a study of processes of manufacture, and the study of the relationships, moral and economic, which should be established between the employer and his subordinates and between the industry and the community as a whole." In short, the address conceives the possibility of such a training being itself the core of a liberal education. The importance of scientific research and of a much closer relationship between the industries and the scientific resources of the universities is strongly stressed. "The gulf between the practical man and the scientific investigator is not yet bridged. To span it will be a costly business." In no country is there need for a more intimate union, for the solution of the grave industrial and social problems which beset us, between those practically engaged therein and the patient, scientific investigator. We are "rich in shrewd experience, but almost barbarous," says Dr. Sadler, in our "conception of the service that science can render to practice."

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, October 8.—M. Camille Jordan in the chair.—E. Branly: The electrical conductivity of mica. A detailed account of experiments proving the conductivity of mica in thin sheets (0.003 mm.) when under the electromotive force of a single thermoelement (0.004 volt). A special method of testing the mica sheets for holes is described.—G. A. Boulenger: Considerations on the Permo-Triassic reptiles of the order of the Cotylosaurians.—W. H. Young: The theory of trigonometrical series.—M. Guilleminot: Dosimetry and X-radio-therapy in the services of the Army.—G. Sizes: The Pythagorean scale from the point of view of musical acoustics.—M. Guillery: The Brinell hardness test of metals. For this test it is necessary that the conditions, size of ball, total pressure, and duration of the pressure should be rigorously defined. The last condition, not fewer than five minutes, is practically impossible under works conditions where some 10,000 tests a day have to be carried out. The author has worked out a method by means of which the time is reduced from five minutes to two seconds, the imprint being the same as if working under the standard conditions. This is secured by working with an excess pressure above the standard 3000 kg., and a machine is figured and described by means of which the desired pressure is automatically realised; 600 tests per hour can be made with one machine, and data are given proving the accuracy of the results to be within one per cent. of the Brinell standard.—L. F. Navarro: The Flyde peak and Cañadas cirque of Teneriffe.—R. Anthony: The primitive embryonic circulation of the Teleostean fishes; study of the embryo of *Gasterosteus gymnurus*.—E. Bordage: The transformation phenomena of larval tissues in reserve tissues observed during the metamorphoses of insects.—MM. Baudisson and A. Marie: The spondylotherapy of asthenic and post-traumatic vasomotor or commotional troubles.

CAPE TOWN.

Royal Society of South Africa, August 15.—Dr. L. Crawford in the chair.—Sir Thomas Muir: Note on the resolvability of the minors of a compound determinant.—J. Moir: Colour and chemical constitution (part ii.): the spectra of the mixed phtaleins and of the sulphonephtaleins.

Mixed phthaleins, containing two different phenol residues, one of which is $C_6H_4 \cdot OH$, are made with extraordinary ease by boiling *para*-oxybenzophenone-*o*-carboxylic acid with any phenol or amine, whether free or substituted. The spectra of eighteen new phthaleins of this class are described, and the laws governing the colour elucidated. The method is an excellent analytical one for identifying phenols and amines and their ethers and derivatives. The spectrum of phenolphthalein is not exactly half-way between those of phenolphthalein and thymolphthalein. The spectra of five sulphonephthaleins made from "saccharin" are also described, also six more new derivatives of ordinary phenolphthalein. A new general formula for the coloured substances is put forward.—J. R. Sutton: Kimberley diamonds, especially cleavage diamonds. This paper is a general and statistical account of the diamonds produced in the mines under the control of the De Beers Company at Kimberley. It describes the outstanding differences in size, colour, and type between the yields of the different mines; speaks of coloured diamonds, bort, and, especially, cleavage diamonds; and advances the view that many diamonds have been naturally broken by the unequal expansion of themselves and mineral inclusions. It appears that brown diamonds have shown a particular disposition to come up broken from the deeper levels of the Wessleton mine (though the ratio of colourless cleavage to colourless stones also increases with depth of mining), but the author doubts the common assertion that brown or smoky diamonds are markedly liable to spontaneous fracture.—S. Schönland: The phanerogamic flora of the divisions of Uitenhage and Port Elizabeth. This paper is meant to be a companion to the papers published by the late Dr. Bolus and Major Wolley Dod on the flora of the Cape Peninsula, and by the late Dr. J. Medley Wood on the flora of Natal. There are 2290 species recorded, of which ninety-eight are considered by the author not to be native. They are distributed over 128 natural orders and 712 genera. There are, however, still large tracts of this area unexplored. Most of the localities quoted are contained in about 600 sq. miles, while the total area is about 2500 sq. miles; much of the remaining tract is, however, covered by fairly uniform karroid succulent vegetation.—J. R. Sutton: A lunar period in the rates of evaporation and rainfall. This paper directs attention to the possibility of a lunar influence governing the evaporation from a water surface, and a lunar period in the incidence of rainfall. Tables are given showing that as the result of hourly observations of evaporation and rainfall during the 120 lunar months from August, 1899, to April, 1909, rainfall has its maximum frequency about the time of moonrise, and its minimum just after moonset; also that the rate of evaporation has a maximum and minimum, respectively, shortly after the moon passes the meridian above and below the horizon.

BOOKS RECEIVED.

Two Summers in the Ice-Wilds of Eastern Karakoram. By F. B. and W. H. Workman. Pp. 296+3 maps+illustrations. (London: T. Fisher Unwin, Ltd.) 25s. net.

University of London. University College. Abridged Calendar. Session 1917-18. (London: Taylor and Francis.)

The Pasteurization of Milk from the Practical View point. By C. H. Kilbourne. Pp. iv+248. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd.) 6s. net.

Modern Propagation of Tree Fruits. By Prof. B. S. Brown. Pp. xi+174. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd.) 6s. net.

NO. 2504, VOL. 100]

Elliptic Integrals. By Prof. H. Hancock. Pp. 104. (Mathematical Monographs, No. 18.) (New York: J. Wiley and Sons, Inc.; London, Chapman and Hall, Ltd.) 6s. net.

A Text-Book of Inorganic Chemistry. By Prof. A. F. Holleman. Issued in English in co-operation with H. C. Cooper. New edition. Pp. viii+507. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd.) 10s. 6d. net.

Dairy Cattle Feeding and Management. By Profs. C. W. Larson and F. S. Putney. Pp. xx+471. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd.) 11s. 6d. net.

Rustic Sounds and other Studies in Literature and Natural History. By Sir F. Darwin. Pp. 231. (London: J. Murray.) 6s. net.

The Faith of a Farmer: Extracts from the Diary of William Dannatt, of Great Waltham. Edited, with an Introduction, by J. E. G. de Montmorency. Pp. xliii+249. (London: J. Murray.) 5s. net.

DIARY OF SOCIETIES.

FRIDAY, OCTOBER 26.

PHYSICAL SOCIETY, at 5.—A Class of Multiple Thin Objectives: T. Smith. —The Radius of the Electron, and the Nuclear Structure of Atoms: Prof. J. W. Nicholson.

THURSDAY, NOVEMBER 1.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: The Reflexion of Light from a Regularly Stratified Medium: Lord Rayleigh.—Two Cases of Congenital Night-blindness: Sir William Aneuv.—Duration of Luminosity of Electric Discharge in Gases and Vapours. Further Studies: Hon. R. J. Strutt.—Surface Reflexion of Earthquake Waves: G. W. Walker.—Characteristic Frequency and Atomic Number: Dr. H. S. Allen.

CONTENTS.

	PAGE
A Retrospect of Modern British Science	141
The Rarer Elements. By J. H. Gardiner	142
The Study of Life. By D. W. T.	143
Our Bookshelf	143
Letters to the Editor:—	
Transparency of the Atmosphere for Ultra-violet Radiation.—Hon. R. J. Strutt, F.R.S.	144
The Cure of the Isle of Wight Disease in the Honey Bee.—E. E. Lowe	144
Tidal Energy Dissipation.—R. O. Street	145
Stereo-Radioscopes.—Harry W. Cox and Co., Ltd.	146
An Optical Phenomenon.—C. Carus-Wilson; H. M. Atkinson	146
Infant and Child Mortality. By R. T. H.	146
The Study of a Genus of Land-snails. By S. J. H.	148
Continuative Education and its Objects. By A. D.	148
Notes	149
Our Astronomical Column:—	
The Hunter's Moon	154
The Orbit of Comet 1914c	154
Maximum of Mira Ceti	154
Brester's Theory of the Sun	154
The New Physics. By G. B. M.	155
Meteor Orbits	155
Geology of the Witwatersrand Gold Field	156
Organised Knowledge and National Welfare. By Dr. P. G. Nutting	156
University and Educational Intelligence	158
Societies and Academies	159
Books Received	160
Diary of Societies	160

Editorial and Publishing Offices:

MACMILLAN AND CO., LTD.,

ST. MARTIN'S STREET, LONDON, W.C.2.

Advertisements and business letters to be addressed to the Publishers.

Editorial Communications to the Editor.

Telegraphic Address: PHUSIS, LONDON.

Telephone Number: GERRARD 8830.