

reader who takes the trouble to work his way slowly and carefully through this article will be repaid by the acquisition of a clear idea of the present state of knowledge on this subject, and also with a respectful feeling that biology is developing into an exact science. The article is a thorough-going account of the modern developments of Mendelism, but, with all possible respect to the work which it summarises, one is left with a feeling of the immensity of the super-structure which is now borne on the shoulders of the chromosome theory, and with a doubt as to whether some future edition of the "Encyclopædia" may not contain accounts of underlying principles of heredity as yet unsuspected.

Prof. F. A. E. Crew also provides an excellent summary of modern knowledge on sex, but, with somewhat more tractable material at his disposal, he is not quite so successful in his presentation. By some oversight, his long article contains no illustrative diagrams or graphs. It is doubtful whether the general reader, however painstaking, will really acquire a clear idea of the subject from this article, but to the biologist it can be recommended as a masterly summary of the facts.

Two articles, one on ecology by Mr. C. S. Elton and the other on experimental embryology by Mr. G. R. de Beer, bear testimony to the development of work on these subjects of recent years. The general reader will find Mr. de Beer's article full of surprising and unexpected information, and few biologists, outside the limited number who work on this subject, will fail to profit by the reading of it. Mr. Elton's article is interesting and well written but rather surprisingly long—the result, not of excess of knowledge, but of too little and a consequent lack of sum-

marising generalisations. But it is a little difficult to understand why this article should be so long, when Prof. C. Lloyd Morgan is so restricted in his article on animal behaviour that his statements are condensed almost to the point of being unintelligible.

Prof. J. S. Huxley gives most interesting and well-written accounts of the courtship of animals and of sexual selection, and Sir J. Arthur Thomson is equally successful in his treatment of parasitism. Indeed, all the articles on what might best be described as natural history are excellent.

In his article on marine biology, Prof. J. Johnstone has largely confined himself to a clear but very general account of the different zones and conditions of life in the sea. The general reader is unfortunately left largely in ignorance of some of the recent advances in this subject, notably on the factors which control the abundance of the plankton and its variations throughout the year and in different regions.

It remains only to mention the articles on special groups of the animal kingdom, three of which, on protozoa, sponges, and tunicata, have been examined. The information therein contained is as concise and authoritative as the names of the respective authors, Dr. K. Bélař, Dr. G. P. Bidder, and Prof. W. Garstang, would lead us to expect. They all, in greater or less measure, give an account of the functioning of the animals, as well as of their structure and systematics, and so bear witness to the slow but ever-increasing accumulation of knowledge which, as Prof. Watson states in his article on zoology, is gradually building up a science of comparative physiology, of which, it may safely be prophesied, the next edition of this great "Encyclopædia" will have much to say.

Fuel Research in Great Britain.

THE Report of the Fuel Research Board for the year ending Mar. 31, 1930 (London: H.M.S.O., 1930; 2s. net), is an interesting document, because it seems to touch upon almost every technical problem of fuel in the British Isles.

One of the original plans of the Board was the prosecution of a survey of the national coal resources. The report shows that the recent establishment of a laboratory at the University of Leeds to study the West Yorkshire coalfield brings under survey areas producing 96 per cent of the coal raised, and the remaining 4 per cent can be handled by the existing organisation. The value of this work will be increasingly recognised as time goes on. One example is given in the report, namely, the publication of a hasty survey of Scottish coals made during the War, when the need arose to increase the production of furnace coke in Scotland, and it was found that the data had to be sought as an emergency measure.

The report gives a survey of the position of low temperature carbonisation, leading to the conclusion that its true place in the carbonisation industries cannot yet be defined, although several processes are being worked on a considerable scale and making good solid fuel products. The world prices for oil fuels have fallen so much recently as to make the economic position of these processes worse. Motor spirit is the most valuable by-product; but the yields of this are usually small, and the most hopeful line appears to be the conversion of a larger portion of the tar into this product. The tars themselves have such a character that they are largely inapplicable for the purposes to which tars are normally used. In order to find a basis for exploitation, their chemistry is being studied at the Chemical Research Laboratory, Teddington. Two methods are suggested for promoting the utilisation of tar. The first is the use of 'cracking', following the

practice of the petroleum industry; but the tendency to form large quantities of coke and gas is unfavourable to the use of these tars as 'cracking stock'. Alternatively, the tars may be hydrogenated under pressure, which may be regarded as a form of 'cracking' in which coke formation is prevented by the union of hydrogen with the fragments. Very interesting experiments in this direction are recorded. By means of controlled hydrogenation, it has been possible to convert nearly the whole of a low temperature tar into motor spirit and neutral oil—the yields of the former working out at 16 gallons per ton of coal carbonised. The Admiralty staff has also examined the possibility of using low temperature tar oil as fuel for steam raising and for Diesel engines, with encouraging results.

The hydrogenation of coal and its products is obviously a subject of great potential importance nationally and to the coal industry. Though much has been done by private interests, the amount of authentic published experience is not great. The report describes the results of experiments—both static and continuous—on the hydrogenation of coal. With the use of suitable catalysts, it is found that Continental experience can be repeated with British coals and satisfactory yields of oil obtained. The character of the product is such that its after-treatment is difficult. A modification of the process, in which the coal is treated with a rapid stream of preheated hydrogen, has shown that much better products can thus be obtained. Indeed, it is stated that yields of motor spirit up to 120-130 gallons per ton of coal could be realised in a suitable plant. Another interesting scientific observation is the possibility of converting non-coking coal into coking coal by partial hydrogenation.

Much is hoped from the use of pulverised fuel as a

means of promoting the use of coal on board ship. In land practice, coal-dust firing has been made possible by the use of large combustion chambers; but at sea this is impossible. In essence, the problem is to bring air for combustion into contact with finely divided suspended particles—a problem in aerodynamics which is being systematically studied. By attention to these requirements very high rates of heat release in small burners have been obtained, which should contribute to the solution of this problem.

The staff of the Board has carried out laboratory work on the properties of coal, and also supported investigations by independent workers in the universities and elsewhere who have originated special techniques. Thus Mr. C. A. Seyler has been enabled to develop methods for studying polished surfaces of coal by reflected light. His work has recently been published as a special report. Mr. Lomax is studying the distribution of spores in coal seams by examination of their sections. This work, in association with that of the South Yorkshire Survey Laboratory, suggests the possibility of identifying and correlating seams by identification of the spores contained. Interesting work in association with the Building Research Station is reported which should place the calculation of the heat requirements of buildings on a quantitative basis.

In conclusion it may be said that the report comments on so many points that the reader can gather from it a very good idea of the status of British fuel problems in general.

H. J. HODSMAN.

University and Educational Intelligence.

CAMBRIDGE.—In a report of the Council of the Senate on the future of mineralogy, petrology, and crystallography in the University it is recommended that, upon the retirement of Prof. A. Hutchinson from the professorship of mineralogy, the professorship of mineralogy be discontinued, and that there should be established in the University a professorship of mineralogy and petrology, assigned to the Faculty of Biology "A", and that a department of the same title be constituted, to include also the subject of crystallography.

The Council of the Senate recommends that the Downing professorship of medicine be discontinued.

Mr. H. H. Brindley, University demonstrator in zoology, has been elected to a fellowship at St. John's College.

LEEDS.—Courses of lectures on literary and scientific subjects will be given in the University during the Easter vacation, on April 15, 16, and 17, 1931. The lectures are intended primarily to meet the needs of those who find it difficult to keep in close touch with recent developments, and will also give opportunities for discussion. Graduates of the University of Leeds will be admitted free, but for others a fee of £1 will be charged. The science courses include lectures on the electronic theory of valency and on modern views on colloids, acids and bases, and the ionisation of electrolytes, and on the relationship between philosophy and various aspects of natural science. Applications for admission to the course should be sent not later than Mar. 21 to The Registrar, the University, Leeds, and should be accompanied by a remittance where payable.

LONDON.—Mr. W. B. R. King has been appointed as from Aug. 1 next to the Yates-Goldsmid chair of geology tenable at University College. Since 1922 he has been fellow and Charles Kingsley lecturer at Magdalene College, Cambridge.

A University (part-time) chair of medical psychology tenable at the London School of Hygiene and Tropical Medicine is to be instituted.

ST. ANDREWS.—The Court has approved generally plans prepared by Mr. J. D. Mills for a new building to provide accommodation for the departments of botany and geology at St. Andrews, to be erected adjoining the group of buildings presently occupied by the Bute Medical School and the Bell-Pettigrew Museum. Plans have also been approved for the adaptation of Deanscourt, St. Andrews, as an additional residence hall for men students.

Dr. W. F. Harper, hitherto assistant in anatomy, has been appointed a lecturer in regional anatomy in the University.

THE American University Union (British Division), which has recently moved its London office from Russell Square to 1 Gordon Square, W.C.1, announces, in a leaflet entitled "14 Points", the nature of the service it offers to American students and to British university graduates and others interested in American universities. It facilitates meetings of British scholars with Americans; supplies, upon request from British societies, American college lecturers upon American subjects; and keeps a register of applicants for university posts in the United States. Through the Institute of International Education (2 W. 45th Street, New York), which publishes a monthly *Bulletin*, it undertakes arrangements for exchange professorships, visiting professorships, and exchange scholarships between British and American colleges. It maintains personal touch, by visits, with each of the universities in Great Britain and Ireland, and tells them of the ways and aims of education in America. It keeps on file the latest calendars of all representative American colleges, and answers questions about them, put by British educational authorities. It co-operates with the Continental Division of the Union (173 Boulevard St. Germain, Paris) in the endeavour to help visiting scholars to acquaintanceships in any educational centre in Europe. The director is W. Connelly.

UNIVERSITY education in India is briefly discussed in the official pamphlet, "Education in India, 1927-1928", recently published (Calcutta: Gov. India Cent. Pub. Branch, 1.12 rupees). The rate of increase in the number of students in universities and arts and professional colleges (0.8 per cent of the total number of scholars in all kinds of institutions) is recorded as 0.84 per cent in twelve months, during which time the total of scholars of all kinds increased by 5.5 per cent. Expenditure on university and collegiate education, which is 13 per cent of the total expenditure on education, increased at the rate of 7 per cent, as compared with an increase of 5 per cent in the total expenditure on education of all kinds. The Indian Institute of Science, Bangalore, with its 100 students, accounts for 1.5 per cent of the expenditure on university and collegiate education. Of four of the seventeen universities—Allahabad, Andhra, Lucknow, and Madras—it is recorded that they have adopted the principle of compulsory physical training for their students. There are two religious denominational universities, the Aligarh Muslim and the Benares Hindu. To each of them the United Provinces Government gave a recurring grant of 50,000 rupees to enable them to maintain departments of, respectively, Unani and Ayurvedic medicine. In another direction the Benares Hindu University has broken away from the traditions of Indian universities by providing advanced courses which prepare for industrial life, and its diploma in engineering is recognised by employers as a guarantee of a sound training in mechanical and electrical engineering.