

In this work on the fossil vertebrates, in its relation to the course of evolution, Watson has not confined his attention to morphological details, but, with an enterprise remarkable in a paleontologist though characteristic of his outlook, has considered where possible the functional significance of the structures preserved in the rocks; thus he has considered the mode of action of the shoulder girdle and deduced the nature of the musculature of a group of marine fossil reptiles.

Pursuing his study of mammalian origins, Watson was led to study the most primitive of living mammals, the oviparous Monotremes, and to discover that characters in which their skulls differ from those of other mammals can be regarded as extreme developments of features observed in the skulls of certain fossil, mammal-like reptiles.

Watson's work has continued in full vigour into recent years, and has brought two further contributions of major importance to the study of evolution in the vertebrates. One is concerned with the origin of the frogs from more primitive amphibian types, while the other shows that a group of fishes from the Old Red Sandstone constitutes a separate class of vertebrates, equal in rank to and ancestral to the remaining fishes.

Tracing, in this brilliant series of researches, the main stages of the descent of the mammals from their earliest fish-like ancestry, Prof. Watson has certainly performed "work of acknowledged distinction in the field in which Charles Darwin himself laboured".

Buchanan Medal

The Buchanan Medal has been awarded to Sir Wilson Jameson, formerly dean of the London School of Hygiene and Tropical Medicine and since 1940 the chief medical officer to the Ministry of Health and the Board of Education.

In both capacities Jameson has shown himself to be a man of stimulating influence and leadership, determined and persistent in his efforts to ensure that advances of medical knowledge in the laboratory, the clinic and the field shall receive prompt application in administrative practice.

Largely to Jameson's vigorous policy is due the hope that active immunization against diphtheria, which has banished the disease from many large communities of North America, will at length find systematic and effective application in Great Britain, where many of the discoveries were made which have rendered it safe and practicable. In the prompt official adoption of methods using modern technical resources to deal with the recent increase of tuberculosis under war conditions, and in the recognition of adequate and scientifically planned nutrition of the people as a central item of an effective health policy, Jameson's active and enlightened influence can again be discerned.

Of the grounds on which the founder of the Buchanan Medal desired the awards of it to be made, Sir Wilson Jameson's high claim to it is based on "administrative and constructive work" of outstanding merit in the service of hygienic science.

Hughes Medal

The Hughes Medal has been awarded to Prof. Enrico Fermi, now of New York.

Prof. Fermi has made most notable contributions both to theoretical and experimental physics. In the early days of the modern quantum theory he was one

of the first theoretical physicists to appreciate the generality of the considerations put forward by Pauli and known as the 'exclusion principle'. This led him to discuss the statistical theory of a perfect gas of particles in equilibrium, obeying this principle, with results which were obtained independently and almost simultaneously by Dirac by similar methods. These results of Fermi and Dirac are of the utmost importance in the modern theory of assemblies of similar particles, such as electrons, protons, and neutrons. Following this outstanding personal contribution, Fermi played a great part in building up at Rome a distinguished school of theoretical physics, where he himself made one of the earliest successful attempts to construct a theory of radioactive β -ray change. This theory shows the most profound insight into the theoretical nature of the quantum theory.

His interest in the atomic nucleus led Fermi naturally to his experimental studies in this field. Immediately after the discovery of the neutron, he realized that it provided a new possibility of attack on the nucleus and of stimulating nuclear change by neutron bombardment. This work opened up the fruitful modern field of study concerned with the transformations of nuclei of medium and great atomic number, and led directly to the most exciting transformations of all, the nuclear fission of uranium and thorium.

Prof. Fermi's work is characterized throughout by profound insight and great experimental skill. In the fields which he has made his own he is universally acclaimed a leader.

ANALYSIS AND TESTING OF COAL

THE testing of coals for their suitability in use, even after many years of effort, continues to give rise to investigation. This is due to the great economic importance of fuels, change in methods of utilization, and also to the fundamental complexity of the nature of coal. Unlike many raw materials, every coal contains several constituents, recognizably distinct, which vary in composition and character according to their origin and geological age. Moreover, they contain inorganic matter which varies widely in chemical composition and physical properties.

These complexities make the actual chemical composition of secondary importance, with the possible exception of the sulphur content. The so-called 'proximate analysis' is of prime importance as a guide to the usefulness of a coal. This involves the measurement of the quantity of combustible and of incombustible matter. Each is further subdivided—the combustible into 'fixed' carbon and volatile matter, the incombustible into 'ash' and 'moisture'. By means of these empirical tests, the observant and experienced analyst can reach useful conclusions as to the suitability or unsuitability of a coal for many purposes. Standardization of such a test is essential and more than forty years ago the American Chemical Society drew up a standard procedure. A few years later the United States Bureau of Mines made a start on this work, which has been continued in other industrial countries until a vast literature has been collected.

Dr. A. C. Fieldner, chief of Fuels and Explosives Services, U.S. Bureau of Mines, in his Melchett Lecture to the Institute of Fuel, delivered by talking film on October 13, traced the development of testing

methods in the United States. It was early found that the kind and quantity of inorganic constituents greatly influenced the serviceability of a coal. Fieldner himself was closely associated with the necessary tests. As time went on, further specialized tests have been developed—a work in which British chemists have largely participated, particularly in association with the British Standards Institution. Only recently the Institution has issued a new edition of British standard methods for the sampling and analysis of coal. It reveals a noticeable increase in the elaboration of method, even in regard to the simple 'proximate analysis'. This is doubtless due to the fact that the simplicity is more apparent than real, and the complexity of coals provides many pitfalls.

The wisdom of over-elaborating the apparatus and method of the 'proximate analysis' is open to question. There is a place—the largest place—for a test in which a crucible is heated over a Bunsen burner. If a greater precision is required, it is possible that a more precise test than that now prescribed is preferable. Time has brought more and more specialized tests designed to judge the suitability of a fuel for defined applications, for example producers, hand- or machine-fired, mechanical stokers, carbonization processes. War-time conditions have emphasized the need for these. In peace-time, coals tended to gravitate into appropriate channels, which war-time difficulties have choked or diverted. This has forced some industries to give thought to the more exact determination of their needs in order to secure that substitutes shall be really effective. All this has emphasized the importance of the subject of coal testing.

H. J. HODSMAN.

FORTHCOMING EVENTS

(Meetings marked with an asterisk are open to the public)

Saturday, December 5

SOCIETY OF CHEMICAL INDUSTRY (YORKSHIRE SECTION) (in the Hotel Metropole, Leeds), at 2.30 p.m.—Dr. G. W. Scott Blair: "Some Rheological Problems in Industry".

Saturday, December 5—Sunday, December 6

ASSOCIATION OF SCIENTIFIC WORKERS (with the support of the BRITISH ASSOCIATION) (at Gas Industry House, 1 Grosvenor Place, London, S.W.1)—Conference on "Scientists of the United Nations and the War Effort".*

Saturday

At 2.30 p.m.—"Allied Scientists" (Chairman: Sir Richard Gregory, Bart., F.R.S.).

Sunday

At 11 a.m.—"Free National and Refugee Scientists" (Chairman: Prof. John Marrack).

At 2.30 p.m.—"British Scientists" (Chairman: Sir John Russell, F.R.S.).

Monday, December 7

SOCIETY OF CHEMICAL INDUSTRY (at the Chemical Society, Burlington House, Piccadilly, London, W.1), at 2.30 p.m.—Dr. W. D. Jones: "Powder Metallurgy".

ROYAL GEOGRAPHICAL SOCIETY (at Kensington Gore, London, S.W.7), at 5 p.m.—Dr. L. Dudley Stamp: "The Scott Report on Land Utilization in Rural Areas".

Tuesday, December 8

CHADWICK PUBLIC LECTURE (at the Royal Society of Tropical Medicine and Hygiene, 26 Portland Place, London, W.1), at 2.30 p.m.—Dr. W. Norwood East: "The Differentiation, Prevention and Treatment of Anti-Social Behaviour Disorders".*

ROYAL INSTITUTION (at 21 Albemarle Street, London, W.1), at 3 p.m.—Prof. J. C. Drummond: "The History of our More Important Foods", (iii) Dairy Produce.*

ILLUMINATING ENGINEERING SOCIETY (at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2), at 5 p.m.—Discussion on "Lighting and Post-War Reconstruction (Guidance, Specification and Legislation)", to be opened by Mr. A. G. Higgins.

Wednesday, December 9

ROYAL SOCIETY OF ARTS (at John Adam Street, Adelphi, London, W.C.2), at 1.45 p.m.—Dr. George Yeh: "The Cultural Life of War-time China".

PHYSICAL SOCIETY (in the Cavendish Laboratory, Cambridge), at 2.30 p.m.—Prof. E. N. da C. Andrade, F.R.S.: A lecture on Newton (in celebration of the Tercentenary of Newton's Birth).

INSTITUTE OF PHYSICS (in the Lecture Theatre of the Royal Institution, Albemarle Street, Piccadilly, London, W.1), at 5 p.m.—To celebrate the Three-hundredth Anniversary of the birth of Sir Isaac Newton. Dr. H. Lowry: "Life of Newton"; Dr. H. F. Buckley: "Some Historical Aspects of Newton's Published Works".

Thursday, December 10

INSTITUTE OF FUEL (at the Connaught Rooms, Great Queen Street, Kingsway, London, W.C.2), at 2.30 p.m.—Mr. H. E. Partridge: "Fuel Economy at Collieries".

PHARMACEUTICAL SOCIETY (at Friends House, Euston Road, London, N.W.1), at 2.30 p.m.—Dr. R. Melville: "Medicinal Indigenous Plants".

Friday, December 11

ROYAL SOCIETY OF ARTS (INDIA AND BURMA SECTION) (at John Adam Street, Adelphi, London, W.C.2), at 1.45 p.m.—Kahn Bahadur Sir Azizul Hugue: "Rural Self-Governing Bodies in India".

PHYSICAL SOCIETY (COLOUR GROUP) (at the Lighting Service Bureau of the E.L.M.A., 2 Savoy Hill, Strand, London, W.C.2), at 2.30 p.m.—Dr. John W. Strange: "Fluorescent Materials and their Colours"; Mr. G. T. Winch: "The Photometry and Colorimetry of Fluorescent Lamps"; Mr. H. G. Jenkins: "Commercially Useful Fluorescent Substances"; Mr. F. W. Coppin: "The Use of Fluorescent Pigments in Colour Printing".

ROYAL INSTITUTION (at 21 Albemarle Street, London, W.1), at 5 p.m.—Mr. E. R. Davies: "The Photographic Analysis of Motion".

Saturday, December 12

BRITISH MYCOLOGICAL SOCIETY (at the Linnean Society, Burlington House, Piccadilly, London, W.1), at 2 p.m.—Miss E. M. Blackwell: "On Germinating the Oospores of *Photophthora cactorum*" (Presidential Address).

FREE GERMAN INSTITUTE OF SCIENCE AND LEARNING (at 16 Buckland Crescent, Hampstead, London, N.W.3), at 5 p.m.—Prof. M. Polanyi: "The Scientific Community" *

APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

ASSISTANT DAIRY BACTERIOLOGIST FOR THE LONDON AREA—The Acting Principal, The College, Wye, Ashford, Kent (December 8).

LECTURER IN BIOLOGY—The Registrar, Technical College, Sunderland, Co. Durham (December 11).

LECTURER IN PHYSICAL CHEMISTRY—The Registrar, The University, Bristol (December 12).

INSTRUCTOR IN BEEKEEPING—The Education Officer, County Hall, Wakefield (December 14).

LECTURER IN CHARGE OF MINING at the St. Helens Municipal Technical College—The Director of Education, Education Office, Cotham Street, St. Helens (December 14).

HEAD OF THE DEPARTMENT OF SCIENCE AND TECHNOLOGY, and HEAD OF THE COMMERCE DEPARTMENT, of the Southend-on-Sea Municipal College—The Chief Education Officer, Education Office, Warrior Square, Southend-on-Sea (December 18).

HEADMASTER of the King Edward VI Grammar School—Mr. John B. Hales, Clerk to the Governors, The Close, Norwich (December 18).

ASSISTANT LECTURER AND DEMONSTRATOR IN BOTANY—The Secretary, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow (December 28).

REGIUS PROFESSOR OF GEOLOGY at Edinburgh University—The Private Secretary, Scottish Office, Fielden House, 10 Great College Street, London, S.W.1 (January 11).

ASSISTANT MASTER WITH GOOD QUALIFICATIONS IN MATHEMATICS AND ENGINEERING, and an ASSISTANT MASTER (OR MISTRESS) TO TAKE GEOGRAPHY AND GENERAL SCIENCE—The Principal, Technical Institute, Gravesend.

ASSISTANT (MALE OR FEMALE) TO THE PUBLIC ANALYST—The Secretary, Health Department, Grey Friars, Leicester.

VETERINARY INVESTIGATION OFFICER—The Principal, University College of Wales, Aberystwyth.

PHYSICS INSTRUCTOR in a leading Technical College in Chile—The British Council, 3 Hanover Street, London, W.1 (endorsed 'Chile').

PHYSICS MASTER, AND A CHEMISTRY MASTER, in the Victoria College, Alexandria—The British Council, 3 Hanover Street, London, W.1 (endorsed 'Alexandria').

RESEARCH ASSISTANT (MALE) WITH ZOOLOGICAL OR AGRICULTURAL QUALIFICATIONS TO WORK ON PEST CONTROL—Wood Pigeon Investigation, Edward Grey Institute, 39 Museum Road, Oxford.

ASSISTANT ANALYST—The Medical Director, Evans Biological Institute, Runcorn, Cheshire.

LABORATORY ATTENDANT—The Laboratory Superintendent, Department of Chemistry, Imperial College of Science and Technology, South Kensington, London, S.W.7.