

days of a new institution with very limited staff and equipment.

In 1906 Carpenter was appointed to the chair of metallurgy in the Victoria University of Manchester, and in 1914 he moved to the Royal School of Mines, after a tour of metallurgical centres in the United States with the object of seeing industrial smelting processes at first hand. Under his guidance both these laboratories became active centres of research. Besides the determination of the equilibrium diagrams of binary and ternary alloy systems, and studies of the growth of cast iron, his work dealt largely with the growth of metallic crystals after mechanical strain. In this way, as the result of a series of well-planned experiments, he was led to the study of single crystals, and this new method of preparation proved to have many advantages over that of solidification from the melt. Partly with collaborators, he undertook a thorough examination of the modes of deformation of single crystals, and thus opened up a new and very important field of research. His interest in the processes by which metallic structures are formed was further shown by a series of papers in which the mode of separation of ferrite and pearlite from austenite in steels was studied in detail, and by an investigation, illustrated by beautiful photo-micrographs, of the structures of native copper and silver.

Carpenter was an admirable teacher. He had the faculty of interesting his students, who always held him in the greatest respect and affection. His courteous manner and wide interests made him an excellent chairman, an office which he held in the Metallurgy Research Board and the Gas Cylinders Committee, among other bodies. He had the unique distinction of having occupied the presidential chair of all three of the institutes connected with his science: the Iron and Steel Institute, the Institute of Metals and the Institution of Mining and Metallurgy. To all of these he gave devoted service. When, in 1929, the Treasury set up a committee to inquire into the position of scientific staffs in Government departments, he was appointed chairman, and the "Carpenter Report", with its far-reaching recommendations, has served as the charter of the scientific side of the Civil Service. The tact of its chairman had much to do with its success. In later years his services were more and more called upon as an adviser on matters of scientific administration.

When war broke out in September last, the Metallurgy Department of the Royal School of Mines was transferred to Swansea, where professor and students found a congenial home with Sir Harold's former assistant and collaborator, Principal C. A. Edwards. Shortly before, with Dr. J. M. Robertson, he had completed a book which had been long in preparation, and forms an enduring monument of his work. This two-volume treatise on "Metals" covers an extraordinarily wide range, from crystal structure to industrial processes. In spite of its size, it has nothing of the encyclopædia in its character, but is a clear and most readable survey of the field of metallurgy, accurate in detail but never allowing

the main lines to be obscured. Only the unavoidably high cost of so large a book prevents its more extensive use by students.

Many honours came to him. He was elected fellow of the Royal Society in 1918 and knighted in 1929. He received honorary degrees from the Universities of Wales and Sheffield and was a corresponding member of the Royal Swedish Academy of Science and of the Société d'Encouragement, and an honorary member of the American Institute of Mining and Metallurgical Engineers. He was awarded both the Bessemer and Carnegie Gold Medals of the Iron and Steel Institute, the Institution of Mining and Metallurgy and the Thomas Turner Gold Medals, the Carl Lueg Gold Medal of the Verein deutscher Eisenhüttenleute, the Platinum Medal of the Institute of Metals and, only this year, the Honda Gold Medal of the Japanese Institute of Metals.

Lady Carpenter, formerly Miss Ethel Lomas, was his devoted and constant companion, and in acknowledging the award of the Bessemer Medal, he paid tribute to her constant support and aid in his work. Mr. Headlam-Morley's account of him in *The Times* of September 26 gives a striking picture of the impression which his personality and character made on his many friends. He was a lover of walking and of the mountains, and had seemed to be well in health, but although there were no external signs of arterial disease it was well advanced and his death from heart failure occurred while on a country walk near Swansea.

C. H. DESCH.

Mr. F. Hutchinson

IN the death on April 6 of Francis Hutchinson, New Zealand loses one more member of that distinguished band of naturalists who were the forerunners of present-day scientific research in that country. He lived during the period which saw the transition from the pioneering work of Colenso, Haast, Hochstetter and others to the present age of specialists and research laboratories, and like his friend Guthrie-Smith (whose death was recently recorded in *NATURE*) most of his studies were made in the field.

Hutchinson was for some years editor of the *East Coast Naturalist*, a pioneer journal conducted in manuscript, and occupying a unique place in the scientific literature of New Zealand. He also contributed occasionally to the *Transactions of the New Zealand Institute*. He will, however, be chiefly remembered for the moulding influence he exerted on many of the present-day generation of research workers of his country; he had a genius for expressing the facts of Nature in language calculated to stimulate the imagination of the boy, and the number of younger scientific workers who owe their first teaching to him is itself a tribute to his memory.

A few years ago Hutchinson presented to the nation a tract of virgin forest at the foot of the Birch Mountains for preservation as a scientific reserve. Mrs. Hutchinson, who survives him, was his companion on many naturalist expeditions in the mountains of Hawkes Bay, and is at present engaged on a study of the lichen dyes of New Zealand.

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