physicist in charge, so that art is constantly guided and checked by science.

It must not, however, be supposed that perfection, scientific or otherwise, yet reigns in the camouflage world. In the first place, the Civil Defence Station is only one, albeit the largest, of the various organizations dealing with the problem. In addition, there is a large amount of private property not regarded as of sufficient importance to justify official action. In practice, however, owners of such property are consulting the Station in increasing numbers, with the result that there will be fewer unscientific monstrosities such as the cooling cylinders, mentioned in NATURE of June 22, the white surface of which was adorned with naturalistic trees.

Not all the different organizations are as yet equally scientific or efficient, and in some cases, notably ships at sea, far too much use has been made of the anti-scientific principle of uniformity of colour and tone, which gives the most conspicuous possible pattern.

In addition it would appear that in some quarters camouflage has become a sort of fetish, implying the application of green and brown blotches of one or two feet in diameter, whatever the object to be disguised and whatever its surroundings. But here, too, the situation is improving.

Then, as may be imagined, co-ordination and central direction are difficult so long as we have numerous separate organizations which, starting independently, tend to preserve their independence. Something, however, has been done to remedy this, by means of a new co-ordinating committee, attached to the Civil Defence Camouflage Station, but containing representatives of other organizations, both official and non-official.

But the most important enemy of efficiency has been delay—delay between the completion of a scheme and the beginning of the application of paint to the actual building, delay which may involve several wasted months. In part this would appear to have been due to official regulations and methods of working, in part to carelessness or inefficiency on the part of the private firms the buildings of which are being camouflaged, or of the firms undertaking the actual camouflage.

Another trouble is the habit of regarding camouflage as something you put on to a building when it is completed. The notion that it would be much easier and cheaper, and much more likely to achieve really good disguise, if buildings were designed from the outset in relation to the problem of their camouflage, has scarcely entered the mind of authority or of builders. Buildings of the utmost regularity, and therefore extremely difficult to disguise, still continue to be erected, simply because that is the recognized pattern for buildings for that particular purpose.

Photographs of one of the few buildings which has been designed from the outset in co-operation with camouflage experts make one realize what could be achieved. The huge structure is part of the English landscape, complete with fields, woods, roads and hedges, and is as nearly indistinguishable as could be imagined.

The camouflage services inevitably suffer from the high cost of many of their schemes, the shortage of supplies, and the fact that camouflage is low on the list of priorities. It is clear, however, that in spite of a slow start, the art of camouflage has in the last six months gone far in utilizing scientific knowledge and scientific methods.

J. S. H.

OBITUARIES

Sir Harold Carpenter, F.R.S.

SIR (HENRY CORT) HAROLD CARPENTER, professor of metallurgy in the Royal School of Mines, London, whose death at the age of sixty-five occurred on September 13, was regarded as the leader of the metallurgical profession in Great Britain. He came from a family which produced several distinguished men, and in view of his career it is particularly interesting that one of his great-great-grandfathers was Henry Cort, whose inventions did so much to establish the position of England at the head of the iron industry in the eighteenth and nineteenth centuries. Carpenter, however, was not originally trained as a metallurgist. He studied chemistry at Oxford and Leipzig, and became research fellow and demonstrator in Owens College, Manchester.

When the National Physical Laboratory was established in 1902, Carpenter was appointed to take charge of chemical and metallurgical work. The choice was fully justified by the production, in a very short time, of several important researches, the chief of which was the determination, with B. F. E. Keeling, of the range of solidification and the critical ranges of the iron-carbon alloys. Although much work has since been done on this system, the latest determination confirms the essential accuracy of their results, other investigators having been less successful in obtaining equilibrium. The aluminium-copper system was examined with similar minute accuracy, while other papers dealt with the heat treatment of high-speed tool steels and with complex alloys of iron—a remarkable output for the early

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.

H. BARRACLOUGH FELL.