

## H. B. WOODWARD F.R.S.

BY the death of Mr. Horace B. Woodward we have lost a geologist with an unrivalled experience of the stratigraphy of the British Isles. His father, Dr. S. P. Woodward, was engaged in the British Museum; and Horace, who was born in 1848, began his geological career at the age of fifteen in the employment of the Geological Society of London, as assistant in the Library and Museum. In 1867 he obtained an appointment on the Geological Survey under Sir Roderick Murchison, and continued in that department until the end of 1908. During the last seven-and-a-half years of his service he occupied the post of assistant director, and was in charge of the work in England and Wales.

In the course of this period of forty-one years Woodward did much towards developing the work of the Survey, in the direction of both precision and utility. The early surveying was carried out for the greater part of England and for all Wales on the Old Series 1-in. map. By no one were the difficulties of precise mapping on so small a scale and so obsolete a basis more successfully met than by Woodward, and it was not until his career as a member of the field-staff was drawing to a close that 6-in. ordnance maps became available. His duties lay at first in adding detail to the mapping of the Rhaetic and other secondary strata in the south-west, but later on he spent many years in Norfolk and the adjoining counties in mapping superficial deposits and the underlying Tertiary and Cretaceous strata.

Woodward was author of many valuable memoirs. The results of his early field-work are incorporated in the Geological Survey Memoirs on the East Somerset and Bristol Coalfields, on the Geology of Norwich, and the Geology of Fakenham. But the most important of his official publications were the three volumes on the Jurassic Rocks of Britain, which appeared in 1892-5. This work was the outcome of a project to bring together all that is known of each British formation. Yorkshire was otherwise provided for; but as regards the rest of the country, the heavy task of gathering all that was worth preserving from copious literature, of examining the principal sections throughout the country, and of presenting the whole in an intelligible form, was carried out single-handed by Woodward.

At this period of his official career he was temporarily engaged in Scotland in applying his knowledge of the Jurassic rocks of England to the elucidation of the occurrences in Raasay and Skye. The commercial development of the iron-ores of Raasay was due in the first place to his suggestion that there occurred there iron-ores of economic value on the same horizon as the Cleveland ores.

His more statistical memoirs, such as those on the water-supply of Lincolnshire, and of Bedfordshire with Northamptonshire, are valued as works

of reference; but he showed, too, a happy facility for putting geological information into a form that was agreeable to the general reader in his account of Soils and Subsoils, and of the Geology of the London district.

Outside his official work his most important publication was the "Geology of England and Wales," first published in 1876, but revised and enlarged in 1887. An untiring industry and a wide experience of the subjects on which he was writing enabled the author to produce a work that is indispensable both to the student of the science and to those who are interested in its practical applications. No less useful in their respective subjects are his "Geology of Water-Supply," of "Soils, and Substrata," and his contributions to the Victoria County Histories.

In 1904, when the Geological Society was preparing for its centenary celebration in 1907, it was decided to prepare a volume in which the birth, development, and influence of the Society might be traced. It was felt that the writing of the historical part of such a volume could be safely entrusted to one who claimed close connection with the Society and its work for half a century.

Woodward was elected to the Geological Society in 1868, and was the recipient of the Murchison Fund in 1885, the Murchison Medal in 1897, and the Wollaston Medal in 1909. He was also one of the most active members of the Geologists' Association, and served as president in 1893-4. He was elected to the Royal Society in 1896.

His health had begun to fail at the time of his retirement from the Geological Survey, but he worked on with untiring industry until within a few hours of his death, on February 6, 1914.

## COL. A. R. CLARKE, C.B., F.R.S.

IT is with more than usual regret that we record the death, on February 11, at eighty-five years of age, of Colonel Alexander Ross Clarke, one of the foremost geodesists of our time. Born in 1828, he was commissioned second lieutenant in the Corps of Royal Engineers in 1847, and was appointed to the Ordnance Survey in 1850. From this date onwards to his retirement in 1881 his energies were devoted to the work of the Survey with the exception of a three-year tour of service in Canada (1851-4). Throughout this period the work of the Ordnance Survey was in a most interesting stage, and it was fortunate that he was available to assist in the development of its scientific labours.

In 1856 Clarke took charge of the trigonometrical and levelling departments. The work of the Principal Triangulation was complete in the field, and in 1858 Clarke published the final results. The reduction of the observations by the method of least squares was in itself a laborious task, but in this volume is published in addition his first investigation into the figure of the earth.

In 1861 appeared, in two volumes, the abstracts