

HENRY JOHN CARTER was born at Dudleigh Salterton, Devonshire, on the 18th August, 1813. He studied medicine from the age of sixteen, when he entered the Devon and Exeter Hospital as an indoor pupil, and in 1835 he became a student at University College, where he gained two silver medals for Comparative and Human Anatomy. In 1839, after passing his examination at the College of Surgeons, he was appointed House Surgeon at University College, but shortly afterwards he gave up this appointment on account of a temporary failure of health, and became Conservator of the College Museum. In 1841 he studied in Paris, at the École de Médecine, and in the following year received the appointment of Surgeon, in the service of the East India Company.

Carter's Indian career began on the 12th February, 1842, when he landed in Bombay, and terminated in 1862. In the earlier portion of the twenty years he was engaged on military duty, in the course of which he was dispatched from Bombay to Calcutta by sea, and he returned by way of Mauritius, encountering a cyclone on each voyage. Soon after returning he was placed in medical charge of a battery of artillery that was ordered to join the army in Sind, under Sir C. Napier, and he was present at the battle of Hyderabad, on March 24th, 1843, for which he received the medal. Later in the year he was sent with a detachment of troops to Umarnot, and subsequently he proceeded in medical charge of H.M.'s 21st Regiment, to Nasirpur, in pursuit of Shah Mahomed. These expeditions, carried out in the Indian desert, at a very hot season of the year, entailed great sickness and mortality amongst the troops, and severe exertions on the part of the medical staff. When, towards the close of 1843, Carter returned with the 21st Regiment to Karachi, nearly every man was on the sick list.

His next service was of a pleasanter description and may be regarded as virtually the commencement of his scientific career. In 1844 he was appointed Medical Officer of the surveying brig, "Palinurus," then commanded by Captain Sanders, I.N., and for the next two years he remained with the vessel during the survey of the South East Coast of Arabia, from the entrance of the Persian Gulf, to the Straits of Bab-el-Mandeb, at the southern extremity of the Red Sea. The geological notes made by Carter, during these two years, were published in the Journal of the Bombay Branch of the Royal Asiatic Society, in 1852, and it may be remarked that even to the present day but few additions of importance have been made to them; for our knowledge of the Eocene and Cretaceous rocks, and of the associated igneous formations of Southern Arabia, we have still in great measure to depend upon Carter's account.

From July, 1846, when he was appointed Assistant Civil Surgeon in Bombay, the remaining sixteen years spent by him in India were

passed in the capital of the Western Presidency. Here he soon became a scientific leader amongst the small body of men, mostly belonging to the medical staff of the Presidency, who were interested in the geology of the country, and here he published a series of papers, many of them of considerable length, on various geological and biological subjects. The different offices filled by him in turn amply testify to his energy and to the esteem in which he was held. From 1847 till he finally left India, he was Honorary Secretary to the Bombay Branch of the Royal Asiatic Society, having previously been for a short time Hon. Sec. of the Medical and Physical Society. In 1851 he was Hon. Sec. to the Bombay Committee of the Great Exhibition in London, in 1854 he occupied a similar post in relation to the Paris Exhibition of that year; in 1859 he presided over a Committee appointed by the Government to establish an Economic Museum, and in the same year he was elected President of the Medical and Physical Society, was appointed a Fellow of Bombay University, and a Justice of the Peace for Bombay. On his retirement, in 1862, the Bombay Branch of the Royal Asiatic Society presented him with £100 for the purchase of a microscope in recognition of his services to the Society during the fifteen years that he had held the office of Honorary Secretary.

On his retirement from India, with the rank of Surgeon-Major, Carter settled in his native place, Dudleigh Salterton, and in 1864 he married an Irish lady, who, with an only child, a daughter, survives him. This marriage was eminently conducive to the happiness of his declining years, passed amidst the quiet surroundings of his early boyhood. On October 4th, 1888, he suffered from a paralytic attack, which impaired his powers of speech and his eyesight, and caused him to relinquish scientific and literary work, though he continued for more than six years afterwards to enjoy the society of a few intimate friends. In the spring of the present year his strength declined seriously, and on the evening of May 4th, he passed quietly away in sleep.

Although he was not the author of any large original work, the list of Carter's papers in the Society's catalogue to 1873 comprises 169 entries, a number that affords abundant evidence of his scientific industry, and that was greatly increased before his death, whilst the subjects of the papers testify to considerable versatility. The complete list of his contributions to science is classified by Mr. W. Theobald, his friend and executor, from whose notes most of the details here given are taken, under the following heads:—Ethnology, 4; medicine, 13; geology, 19; zoology and botany (exclusive of the two next categories), 47; foraminifera, 28; sponges, 127; total, 238. The best known of his earlier contributions to science, published

in India, were geological and paleontological, though the index to his original papers and compilations, published in 1862 ('Jour. Bom. Br. R.A.S.,' vi, p. 231) shows that even then his contributions to zoology, botany, and physiology, were more numerous than his geological writings. His best known and most important papers, besides that already noticed on the South-East Coast of Arabia, were on the geology of Bombay and the neighbouring islands; on the Fossil Foraminifera of Sind, Cutch, &c., and, above all, the 'Summary of the Geology of India between the Ganges, the Indus, and Cape Comorin.' In some cases, as in the 'Geology of Bombay Island,' later observers have seen reasons for coming to conclusions differing from those of Carter; and his admirable attempt, in the 'Summary of the Geology of India,' to classify the rock-formations of the Indian Peninsula, suffered from the disadvantage that not only had he had no opportunity of seeing the rocks of the greater part of the country, but he had to depend on the descriptions of local observers of varying geological powers, each acquainted with but a comparatively small area. But no writer better deserves the respect and gratitude of Indian geologists, or has contributed more effectively to the advancement of their knowledge. His especial service to the science consisted in his being for many years a centre of geological energy, in his obtaining from many local observers and thus rescuing from oblivion notes on various parts of Western India that have greatly facilitated later systematic work, and in his selection and publication, as editor for the Government of Bombay, of the collected 'Geological Papers on Western India' in 1857. The writer of the present notice can testify to the advantage he repeatedly derived from Carter's careful and conscientious compilation.

But it is upon his researches amongst sponges and foraminifera that Carter's scientific fame is mainly based. It was to the structure and classification of these, and more particularly of the sponges, that he devoted himself after his return to England in 1862, and his papers on various members of the groups appeared uninterruptedly, chiefly in the Annals and Magazine of Natural History, from before the date of his retirement from India to within a few years of his death. His last paper, which appeared in 1889, was a "Sketch of the History of known Fossil Sponges in relation to those of the present day." For many years he was occupied with the description and classification of the sponges in the National Collection, his aid in the work having been enlisted by the late Dr. J. E. Gray. Amongst other subjects he wrote on Eozoon, and was one of the first to support the views of King and Rowney as to the inorganic nature of that problematical fossil. He was a skilful microscopist and his ability as a draughtsman enabled him to record his microscopical observations with fidelity. Some years before his death he

presented his private collection of sponges and foraminifera to the British Museum.

Surgeon-Major Carter became a Fellow of the Society in 1859, and in 1872 received a Royal Medal "for his long-continued and valuable researches in zoology, and more especially for his enquiries into the natural history of the *Spongiadae*." He was a corresponding member of the Academy of Natural Sciences, Philadelphia, and of the Boston Society of Natural History.

W. T. B.

JAMES DWIGHT DANA was born on February 12, 1813, at Utica, New York, U.S.A., and in his 83rd year died suddenly, from heart failure, at New Haven, Connecticut, on April 14, 1895. He received his early education at Bartlett Academy, Utica, while there showing great interest in chemical experiments, and making frequent excursions in search of minerals; to the training received at this school he ascribed much of the success attained by him in after life. In 1833, attracted by the reputation of Professor Benjamin Silliman, he went to reside at New Haven, and entered at Yale College, where he not only studied classics and mathematics, but made much progress in the natural sciences, especially in mineralogy and botany. His mathematical distinction led to his appointment as instructor of mathematics to the midshipmen of the United States Navy, and in that official capacity he left New Haven, in 1833, to cruise in the Mediterranean. A visit made to Vesuvius in 1834, during this term of office, led to the publication of his first paper. In 1836 he returned to New Haven, and stayed there two years, acting for the greater part of that time as assistant to Professor Silliman. In 1837 he published the first edition of his Descriptive Mineralogy (580 pages). In the following year he was appointed mineralogist and geologist to the United States expedition, which sailed, under Charles Wilkes as commander, on an exploring voyage round the world. The expedition consisted of two sloops-of-war, a store ship, and a brig; the voyage extended over four years (1838-1842), and the scientific staff included, in addition to Dana, as mineralogist and geologist, Pickering, Coathouy and Peale as zoologists, Rich and Brackenridge as botanists, and Hale as philologist. On the return home of one of his colleagues, Dana further took upon himself the charge of the crustacea and zoophytes.

The study of the material collected by the expedition and the preparation of his reports occupied all the available time during the next 13 years; the first two or three years of this period were spent at Washington, but after his marriage, in 1844, to Henrietta Frances, third daughter of Professor Silliman, he thenceforward lived at New Haven, and was closely associated in his work with Professor Silliman,

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p61

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