

resistance of most types of vessel can be reduced by about 30 per cent, while other improvements have been effected in the design of small coaster vessels as well as in the humble barge, the improved design showing on towing tests a 33 per cent improvement in speed for slightly less power. The National Physical Laboratory played an important part in designing the high speed seaplanes which won for Great Britain the 1931 race for the Schneider trophy, as well as in the development of new and safer types of aircraft. Other work assists in the provision of improved materials for industry, including steel and steel alloys capable of withstanding the high temperatures at which modern machinery such as turbines and aircraft engines must work, and workers in other sections of the Laboratory again are investigating the glare effect of different systems of street lighting, the best beams for traffic control signals, the transmission factors of coloured railway signal lights and the lighting of docks, quays and their approaches. It needs little imagination to realise what advance in these fields means not merely to industrial efficiency but even more in the elimination of much suffering and loss of life.

The field covered by the work of the Chemical Research Laboratory is almost equally wide, ranging from products for treatment of sleeping

sickness in human beings and in animals, to the preparation of synthetic resins, corrosion research, researches at high pressures, tar research and water pollution. With the latter subject a special board is concerned, and following on the survey of the River Tees recently carried out, one on the River Mersey is now projected.

Space does not permit further reference to many activities of the Department which are of scientific as well as of industrial and general interest. This brief review contains no account of important metallurgical researches for which the Department is responsible, or of its investigations on electro-deposition, lubrication or dental problems. Mention should, however, be made of the Geophysical Survey Research Committee, which has now completed its work and through the activities of which the danger that the development and use of this new applied science in Great Britain would be neglected has been dispelled. Sufficient has been said, however, to demonstrate the unique and invaluable contribution which the Department is making not merely to industrial efficiency but also to industrial development and the public welfare, and to indicate how essential it is in days when economy is the watchword that there should be no restriction of services which have been so productive.

Obituary

LIEUT.-COL. ALFRED W. ALCOCK, C.I.E., F.R.S.

WITH the death on March 24 of Alfred Alcock, there has passed away a type of doctor who in the past has so often graced the ranks of the Indian Medical Service—that of the surgeon-naturalist. Zoological science in India has been always enriched by the labours of distinguished medical men, of whom the late Sir Joseph Fayrer and Alfred Alcock may be taken as representing the acme of a period which will never be seen again.

Alfred Alcock was born in Bombay on June 23, 1859. His father, who was a sea captain in the days of windjammers, retired and lived at Blackheath, and there the subject of this memoir went to school and afterwards became a Westminster scholar. In the 'seventies, owing to ruinous losses due to the sudden depreciation of Egyptian Government bonds, he was taken away from school, in 1876, quite unexpectedly. He was then packed off in September of that year to Wynaad in the Malabar District of Southern India, to a coffee plantation, where he had an uncle engaged in this industry. He lived in the jungles of Wynaad and in the neighbouring native State of Cochin, and was able to observe all the operations connected with coffee-planting and also to study the birds and beasts.

As coffee planting was then obviously in the decline, Alcock obtained in September 1877 a post in a newly established firm of commission-agents in Calcutta, and on the voyage from Madras

to Calcutta, the ship that carried him, the *Duke of Buccleuch*, was rammed and almost sunk by a steamer, appropriately named the *Vixen*. The commission-agent business not proving a success, he next started as a freight-broker on his own account, but soon gave that up to proceed to Chota Nagpur as an assistant to a coolie-recruiting agent, where he remained until February 1880. It is necessary to mention this, as in some ways it proved the turning point of his career, for he met there a young Bengal civilian who lent him Michael Foster's "Primer of Physiology", which cost the sum of one shilling, and this little book proved to him to be what the light of heaven was to St. Paul. It set his face towards natural science, and throughout the rest of his life he thought of Michael Foster (whom he had never met) with the gratitude of a disciple. He next met the Deputy Sanitary Commissioner of Chota Nagpur, Lieut.-Col. J. J. Wood, and this good man took the young Alcock to his heart and hastened him on his way with an old microscope, several timely books and many long talks on botany, natural history and chemistry. This led him to do a little body-snatching on his own in places where the poorer natives disposed of their dead, and from that source he obtained bones to study and began to read Darwin's "Descent of Man" and "Origin of Species". He had now fully resolved to become a medical man.

Alcock next became assistant schoolmaster at a large school for European boys in Darjeeling.

He was justified in applying for this appointment since during the whole of his jungle life he had assiduously read his Horace and his Homer along with the "Canterbury Tales" and the "Golden Treasury". Fate was kind to him, because his "sanitary friend", Col. Wood, immediately rejoined him in the Darjeeling district, and actually entrusted him with the tuition of his eldest boy. Quite unexpectedly, he was helped financially by his sister, who had married a distinguished officer in the Indian Civil Service, and was able to proceed to Aberdeen, to begin work in the Marischal College of that University. In 1882 he had taken first place in the class, and the medal for natural history, and was appointed University assistant in zoology. In 1883 he obtained a bursary in natural science, and in April 1885 he graduated M.B. and C.M. with honourable distinction, while later on in that year he passed eighth into the Indian Medical Service, and in October of the same year, he joined the class at Netley Hospital, where he came under the influence of the celebrated Timothy Lewis, the professor of pathology.

Alcock's interest in the beginnings of tropical medicine had already been stimulated by the lectures of Sir Alexander Ogston, the professor of surgery in the University of Aberdeen. Ogston had discerned the great significance of the discoveries made by Patrick Manson in China on insect-borne disease, and this had impressed itself so much on his mind that it remained a guiding factor for the rest of his life.

In March 1886 Alcock again sailed for India, and was first stationed at Allahabad, and on June 6 of that year he was ordered to join the 1st Sikh Infantry at Dera Ismail Khan on the Punjab frontier. There he found himself soon shot out into the Punjab desert, and had many interesting adventures, during one of which he crossed the desert of 150 miles in the middle of the hot weather, and on another occasion he had the misfortune to break his leg and lay for some time with only a native hospital assistant to look after him. In this desert he observed many cases of snake bite, some fatal, by the horned viper. His promotion was very rapid, and in May 1888 he was gazetted to permanent medical charge of the 2nd Punjab Infantry.

Regimental life had been an extremely happy experience to Alcock, but a regimental hospital did not quite satisfy his ambitions for scientific work, and soon an unexpected opportunity presented itself when he was appointed surgeon-naturalist to the R.I.M.S. *Investigator* for the zoological section of the Indian Marine Survey of 1888-92. He joined his ship at Port Blair in the Andaman Islands on November 20, 1888. These four years he regarded always as the happiest of his life, and his experiences were summarised in that fascinating book "A Naturalist in Indian Seas" published in 1902, and it was this book that obtained the highest commendation from Sir Joseph Hooker. During this time he roamed the coastal inlets and Indian Seas, dredging for

Crustacea and describing the marine fauna, including many denizens of the deep hitherto unknown to science. During his travels he visited the Andaman Islands, the Cocos Keeling, Minicoy and other sparsely inhabited islands of the Indian Ocean, studying their human inhabitants and the island fauna.

In April 1893 Alcock began his association with the Indian Museum as professor of zoology in the Medical College of Bengal, and he served many happy years in this capacity until 1907. His period of service was broken in 1895 when he was appointed as surgeon-naturalist to the Pamir Boundary Commission, and spent one year at these alarming altitudes over 14,000 ft. He actually reached the tomb of Bazai at the eastern end of the Little Pamir. His report on the natural history results of the Pamir Boundary Commission was published in Calcutta in 1898, and received general recognition.

In 1896, after ten and a half years continuous service in India, Alcock returned to England on leave, and in July 1897 he married Margaret Forbes Cornwall of Aberdeen, whom he had known in his student days. In 1901 he was elected to the fellowship of the Royal Society and in 1903 was created a C.I.E.

There is no doubt that the finest work that Alcock performed in India was that of the organisation and rearrangement of the Indian Museum, which he made a model of its kind. It was here that he came under the notice of Lord Curzon, with whom he had some difference of opinion regarding the future of this Museum. He then made, too, a lasting and life friendship with Sir Leonard Rogers, and with him became greatly interested in the classification of the *Thanatophidia*, and collaborated with him on the toxicology of snake venoms. In the meantime, he had become the outstanding authority on the Crustacea of India, a group to which he had always paid special attention, and wrote the "Catalogue of the Indian Decapod Crustacea", a work for which he was awarded the Barclay medal of the Asiatic Society of Bengal in 1907. At this time he wrote numerous papers on the river crabs (*Potamonæ*) and was elected natural history secretary in 1888, general secretary in 1895, and vice-president in 1901 of the Asiatic Society. In 1906 he was on furlough in England, working through the major's course for promotion at the Royal Army Medical Laboratories and at the West London Post Graduate School, and also the Lister Institute. Here he made the acquaintance of Sir William Leishman, Sir Jonathan Hutchinson and Sir Charles Martin.

In 1907 Alcock retired from the Indian Medical Service, and immediately placed himself at the services of Sir Patrick Manson and of his new School of Tropical Medicine in London. Here he felt like a new man after what he considered to be his sad failure at the Indian Museum. Manson was the magnet which drew him, and the foundation of medical zoology on a proper basis, was

his aim. He became Manson's most faithful lieutenant and admirer; to him it was a pious task to defend Manson's reputation and to aid in preserving his memory, for, apart from all his discoveries and his greatness, he considered that Manson was the embodiment of the Hippocratic tradition. Henceforward he became the first teacher of medical entomology in the School of Tropical Medicine, and he added greatly to his reputation by the publication of his text-book, "Entomology for Medical Officers", 1912, which reached its second edition in 1920. This work was written in response to requests from students in his own School, and whilst directing its attention principally to the arthropods concerned in the dissemination of disease, it almost became an outline of zoology.

To thousands of post-graduate students of all nationalities, in his charming and unpretentious way, Alcock became guide, philosopher, and friend. Soon he became responsible for the foundation and establishment of the entomological collections of the School, and for the collection of poisonous snakes and other reptiles; in fact, the whole zoological fauna that make up the science of tropical medicine. He organised the Tropical Diseases Library of the School, and from 1912 onwards actively participated with Dr. A. G. Bagshawe in reviewing for the *Tropical Diseases Bulletin*, becoming the assistant director of the Bureau in 1921. He was very gratified in being elected in 1920 to the professorship of medical zoology in the University of London. His reviews of medical zoology, as indeed every letter and article he wrote, were characterised by a charming scholastic style, embroidered with a wealth of literary and classical allusions, which could scarcely be surpassed, and gave his work an air of great distinction.

Then came the War, and in his endeavours to serve his country, Alcock found himself appointed as surgeon to an Indian hospital at Brighton, but he found himself 'at sea' when armed with a scalpel, and instead devoted himself to instructing R.A.M.C. officers, proceeding overseas, in the elements of tropical medicine. The War being over, he returned to his active teaching, and in the following years he collaborated with Dr. P. Manson-Bahr in "The Life and Work of Sir Patrick Manson", which was published in 1927. He was thus afforded an opportunity of making clear the everlasting truth of medical biology as evidenced by the life story of Manson.

Alcock retired from active teaching in 1924, and had been living in seclusion at Belvedere in Kent, but in no wise did his zeal for his favourite subject abate.

It is scarcely necessary to enlarge further on his character—that of the true naturalist, and man of science, and a lover of his fellow creatures—in fact, a friend of all mankind. It was a common experience for a stranger on seeking his road in far away Belvedere to Alcock's house, to inquire the way of some whistling schoolboy, and to

receive as an astonished reply, "Oh, that's where Col. Alcock lives; he is a great pal of mine." It is appropriate to quote his favourite lines:

"Nature is made better by no mean,
But nature makes that mean; so, over that art
Which you say adds to nature, is an art,
That nature makes—The art itself is nature."

His philosophy of life, like that of old Pittacus, of Mitylene, was: "The greatest blessing a man can enjoy is the power of doing good." So, when he is gone, we realise that the era of the pioneers of tropical medicine is closed.

Alcock was an LL.D. of the University of Aberdeen, and a corresponding member of the Zoological Societies of London and of the Netherlands, and also of the California Academy of Sciences.

DR. JOHN BELLING

DR. JOHN BELLING, elder son of the late John Belling, inspector of Army Schools, who died on February 28 in San Francisco, was born at Aldershot, England, on October 7, 1866. He taught in various schools, attending lectures meanwhile at London and Birmingham, and obtained a London B.Sc. (Hons.). In later life he was given the honorary degree of Doctor of Science by the University of Maine in 1922. He lectured in the Horticultural College at Swanley, England; and later at Llanidloes, Wales, in 1900-1. Shortly after this he went to the British West Indies where he became investigator in the Department of Agriculture. In 1907 he went to the Florida Experiment Station as assistant botanist and carried out important researches there on hybrid beans.

Shortly after the War, Belling went to the Carnegie Institution of Washington as cytologist in the Department of Genetics, and was associated with Dr. A. F. Blakeslee in the investigation of the chromosomes of *Datura*. Here his genius in microscopy and his philosophical insight opened up a new field in the study of the behaviour of chromosomes and in the interchange of segments between non-homologous chromosomes. Belling was subject to periods of depression during which he did some of his most brilliant work. Believing that it was important for him to have a change of scene, he was transferred by the Institution to Berkeley, California, where he worked in a corner of Prof. E. B. Babcock's laboratory, continuing his fundamental researches on the structure of chromosomes in hyacinths and various lilies. In these investigations, under superlative technique, he believed he was able to see structures, which on account of their number and size, he identified with genes.

Belling was the author of a book on the use of the microscope, which has been eminently successful. He had also made considerable progress with a work on the study of the chromosomes.