

obtained his doctorate in science at the University of Odessa in 1884 and, after working with the physiologist, Moritz Schiff, at Geneva, went to the Pasteur Institute at Paris in 1889 as *préparateur*. Pasteur had introduced vaccine treatment for fowl cholera, and Haffkine in 1892 developed the first successful vaccine against human cholera. Through the influence of Lord Dufferin, British Ambassador at Paris and former Viceroy of India, Haffkine was sent to Calcutta in 1893. The results of his anti-cholera inoculations were so encouraging that the Government of India in October 1896 transferred him to Bombay, where plague had broken out. Haffkine began work at the Petit Laboratory of Grant Medical College; his accommodation consisted of one room and a corridor, and his staff numbered one clerk and three peons, none of whom knew anything of bacteriological methods and had to be trained by him. He succeeded in preparing a prophylactic plague vaccine from pure cultures, which he proved to be harmless on his own person. Its first trial on a plague-stricken community was made in the Bombay House of Correction at Byculla in January 1897. Of 172 untreated prisoners, twelve developed the disease and six died; of 147 inoculated persons, two contracted plague, but none died. During the season at which the plague was prevalent, up to October 1897, 8,142 inhabitants of Bombay applied for inoculation. In April 1897 Haffkine moved his laboratory to a house on Malabar Hill, and in November made another move to premises in Nepean Sea Road, provided by the municipality.

In the following February the Aga Khan placed at his disposal a large house, Khushru Lodge, in Nesbit Lane, Mazagaon. When orders for the prophylactic vaccine began to pour in from all parts of the world, the laboratory became an Imperial concern, and

larger premises had to be found at the Old Government House, Parel. The new laboratory was formally opened by the Governor of Bombay, Lord Sandhurst, on August 10, 1899, when Major W. B. Bannerman gave an account of the prophylactic and its action. Three years later Haffkine was appointed director of the Biological Laboratory at Calcutta. He left India in 1916 and lived in retirement at Boulogne-sur-Seine and at Lausanne, where he died on October 26, 1930, aged seventy. A charming, kindly and enthusiastic personality, an accomplished linguist, and a 'bacteriological wizard', Haffkine never married. He was created C.I.E. in 1917.

In 1925 the Government of Bombay decided to call the bacteriological laboratory at Parel 'The Haffkine Institute' to commemorate the name of its founder (*Nature*, 116, 551; 1925).

To-day, this Institute is the largest research institution of its kind not only in India but also in the East. It has a technical staff of more than one hundred scientists and a subordinate staff of more than five hundred workers, supervised by eight assistant directors and one director, Dr. H. I. Jhala. Its functions are medical research, training of research workers, supply of vital biologicals and diagnostic aids. The vaccine department collaborates with the Plague Committee of the Indian Council of Medical Research in research on plague, and with the World Health Organization in standardization of cholera vaccine. The department of virus diseases acts as a laboratory for an influenza centre in India, in the network of World Health Organization laboratories attached to the World Influenza Centre, London. The Institute is affiliated to the University of Bombay for degrees of M.Sc. and Ph.D. in microbiology, biochemistry, organic chemistry, pharmacology, pathology, bacteriology and zoology. W. R. BERT

UNIVERSITY OF OXFORD TANGANYIKA EXPEDITION

A PARTY from the University of Oxford, with the support of the Government of Tanganyika, made a preliminary scientific survey of the Kungwe-Mahali Mountains on the eastern shore of Lake Tanganyika (longitude 30° E., latitude 6° S.) during July-October 1958.

A herbarium collection was made of the plants of the southern two-thirds of the peninsula by J. G. B. Newbould, T. G. Jefford and B. E. Juniper, of the Botany School, Oxford. This is the first major collection from the area. The material will be assembled and identified at the Royal Botanic Gardens, Kew, for inclusion in the Flora of East Africa. In addition, live orchids were collected and are now in the orchid houses at Kew. Colour photographs were taken of the principal vegetation zones of the area and of many species of flowering plants.

H. F. Lamprey and A. J. Mence, of the Game Department, Tanganyika, and S. Ulfstrand, of the Zoologiska Institution, Lund, made a collection of birds and small mammals. This includes 305 birds, comprising about 135 species. Another 100 species were identified by sight. Among the birds collected were *Campethera taeniolaema* and *Psalidoprocné chalybea*. These records extend considerably the known ranges of these birds. One specimen, a wood-

pecker of the genus *Campethera*, with affinities to *C. abingoni*, fits no described species and still remains to be identified.

Among the small mammals, which are at present being examined at the British Museum, is the second specimen from Tanganyika of the ground squirrel genus *Protoxerus*.

A survey was also made of the isolated chimpanzee population. When further information is available about the flora, particularly of the forest species, further conclusions may be drawn about the affinities this region has with West Africa. These affinities are already apparent to a certain extent in the records of chimpanzees and *Protoxerus*.

T. E. Stevens completed a geological survey of the south, centre and west of the Mahali Range. Several interesting geomorphological features were observed and a collection of rock specimens was made which will be examined in the Department of Geology, Oxford.

P. L. Simkin, of the University of Oxford, and A. Roggenkämper, of the University of Bonn, made some preliminary anthropological observations among the Wahlohoholo of the Mahali Mountains. A census was made of the population of some of the villages south of Mount Kungwe. Studies were also made of

social habits and ceremonies, witchcraft and beliefs, with particular reference to the worship of the god Kungwe.

More than 7,000 ft. of 16-mm. ciné film was exposed during the field work of the expedition and on aspects of the village life of the Wahlohoholo. Songs, musical instruments, drumming, dances and conversation of the Wahlohoholo, bird song and animal

noises were recorded on tape by A. Roggenkämper.

A second expedition to the same area with a different emphasis is being planned for 1959. It will include a zoologist to work on the freshwater fauna and another zoologist, three geologists, one botanist, and probably a medical man and a soil scientist.

B. E. JUNIPER

RADIO TRANSMISSION BY WAVE-GUIDE

THE continually increasing demand for radio frequencies for new and expanding services makes it necessary to review periodically the possibilities of any alternatives to free-space radio circuits. The installation of the trans-Atlantic coaxial cable carrying a large number of telephone circuits has been an outstanding success; and wide-band coaxial cables are in use as alternatives to radio links for conveying television signals over shorter distances. But coaxial cables, using the materials and techniques at present available, are limited to an upper working frequency of about 25 Mc./s., beyond which the attenuation and phase characteristics become unacceptable. With the development in recent years of the technique of generation and reception of ever higher radio-frequencies, corresponding to wave-lengths down to a few millimetres, the hollow tubular wave-guide has become a serious competitor of the coaxial cable. It was therefore very timely that a well-attended convention on "Long-distance Transmission by Wave-guide" was held on January 29 and 30 by the Radio and Telecommunication Section of the Institution of Electrical Engineers.

At the opening session of the convention, Prof. H. E. M. Barlow gave a most interesting and lucid introductory survey of the present technique of guiding radio waves along the outside surface of a single wire and along the inside of a hollow tube. His presentation included demonstrations of the configuration of the electric field both along a wire and inside a tube using a neon gas discharge, of the effect of a dielectric coating on a wire to counteract the radiation from it, and of the manner in which transducers can be arranged to connect cables to wave-guides. One of the great advantages of a copper tubular guide, about 2 in. in diameter, is that its attenuation for circular electric modes decreases with increase of frequency of the radio waves. For

example, at a frequency of 40 Gc./s., corresponding to a wave-length of about 7 mm., the attenuation of the guide is about 6 decibels per mile.

At the remaining five sessions of the Convention more than thirty papers were presented; many of these were of a detailed technical nature and they illustrated the advance which is being made in this field in Great Britain and other countries. Some of these papers dealt with both theoretical and practical aspects of avoiding spurious modes of transmission of radio waves in the tube, and the need to discriminate carefully in the conduct of measurements on the characteristics of the guide. Special microwave equipment is being developed to generate the very short waves involved, and particularly to couple the source to the guide, so that waves of the desired mode may be launched with the minimum loss of energy. The last session was devoted to a discussion of the practical possibilities of wave-guides for long-distance transmission, including the economic aspects of such communication systems. The speakers here stressed the fact that not only must such systems have a high degree of stability, but that, so far as possible, they must also be compatible with existing signalling networks as regards facilities for the insertion and extraction of signals at terminals and intermediate points.

On January 31, demonstrations were given of a variety of experiments using millimetre waves associated with tubular wave-guides in the Electrical Engineering Department of University College, London, and at the premises of Standard Telecommunication Laboratories, Ltd., at Watton-at-Stone, near Stevenage.

The text of all papers presented at the convention, together with the associated discussion, will be published in a Supplement to Part B of the *Proceedings of the Institution of Electrical Engineers*.

R. L. SMITH-ROSE

HILL FARMING RESEARCH ORGANIZATION

REPORT FOR 1954-58

THE scientific investigation of the problems of hill farming remained largely sporadic and unco-ordinated until it became recognized that this sector of the British agricultural industry is a distinctive form of land-use, based on complex and varying interactions of plant and animal communities which in themselves merit concerted programmes of research to define them more clearly and to attack their major problems. This concept provides the background to the establishment in

1954 of a central research organization and to its objectives and activities; these are clearly and succinctly described in the first report of the Hill Farming Research Organization*.

The extensive distribution of the hill farming areas in Great Britain, and the great ranges in environmental conditions and husbandry systems offer wide scope for study; three factors have tended to restrict,

* Hill Farming Research Organization. First Report, 1954-58. Pp. 88. (Edinburgh: Hill Farming Research Organization, 1958.)