

of the American system. In no English university is there a field of real-life activity within which an agronomist in the broad sense can be trained. None of the university faculties of agriculture is large enough to provide the necessary range, especially since the advisory service, with its husbandry farms, has been separated from the universities. In some university departments, the trend of research interest, which inevitably comes to dominate teaching, is consequently forced away from the primary analysis and solution of practical problems towards narrow specialization and academic fundamentalism. In many agricultural research institutes it is very difficult for young research workers to qualify for higher degrees. Whatever one may think of the relative values of published papers and paper qualifications, it is undeniable that the discipline and criticism of a well-conducted higher degree course can play an important part in a research apprenticeship. Few British universities and research institutes have an active interest in tropical countries; neither the Agricultural Research Council nor any British university has a tropical field station for research on crops and soils; and no reciprocal arrangements for teaching or research exist between tropical centres and their British counterparts.

Thirdly, there are administrative reasons of which one or two may be mentioned. Secondment arrangements for tropical service and experience are rare, though secondment would often be possible without cost to home institutions, and secondment contracts of a suitable type could be a powerful aid to recruitment for overseas service. The formation of the Overseas Research Service does not yet appear to have increased the stability or sense of career security of overseas staffs, nor is the Overseas Research Council playing any effective part. The new Technical Assistance Department has an inspiring task and good leadership; if it can steer a way through the jagged reefs of its terms of reference it could have a great future—provided its course is outwards, to the deep blue waters of the stormy ocean, and not inwards to the sheltered calm of the lagoon.

This report of the Rockefeller Foundation under review can be recommended as wholesome and salutary reading for all who are concerned with the British effort in developing countries. United States participation in this field is increasing; and so powerful a reinforcement must be sincerely welcomed, particularly if it leads to a clear-sighted re-appraisal of the British position, and provides a stimulus to Britain's future efforts.

## OBITUARIES

### Sir K. S. Krishnan, F.R.S.

THE sudden death on June 14 of Sir K. S. Krishnan, director of the National Physical Laboratory of India, at the age of sixty-two, is a grievous loss to Indian science in which he has been a leading figure for many years. Following his training at the American College, Madura, the Christian College, Madras, and the University College of Science, Calcutta, and a short period as demonstrator in chemistry at Madras, he joined the Indian Association for the Cultivation of Science, Calcutta, as a research associate in 1923. In association with C. V. Raman (later Sir C. V. Raman) he undertook a variety of researches in optics culminating in the discovery of the Raman effect in 1928, which was not only of immediate significance in itself, but also proved later to be an important tool for the study of molecular structure.

Shortly after, he became reader in physics in the University of Dacca and began a systematic study of the magnetic properties of dia- and para-magnetic crystals. This work continued and indeed bore its main fruit when he returned to the Indian Association as Mahendralal Sircar research professor in 1933. It is described in a series of papers, published in the *Philosophical Transactions of the Royal Society*, by Krishnan and his students during the 1930's. These are distinguished by the elegant simplicity of the experimental methods described (mostly devised by himself), and by the ingenuity of interpretation and the clarity of exposition. The results threw much new light on questions lying on the border between chemistry and physics, such as the arrangement of molecules in organic crystals, the structure of molecules, and the influence of crystalline fields on the paramagnetism of ions. During 1942-47 he was professor of physics in the University of Allahabad,

and while still continuing experimental work on optics and magnetism began to interest himself more in theoretical problems such as the resistivity of solid and liquid metals. His election as Fellow of the Royal Society in 1940 and his knighthood in 1946 were very well-deserved recognitions of his scientific achievements.

In 1947 he was appointed director of the newly created National Physical Laboratory of India and with vigorous support from the late Sir S. S. Bhatnagar nursed it through its teething troubles to make it one of the largest and best-equipped scientific institutions of India. The award of the first Bhatnagar Medal to Krishnan shortly before his death was particularly appropriate and gave him much pleasure. During this time Krishnan gradually became one of the elder statesmen of Indian science: no official committee was complete without him, and he was much in demand for opening ceremonies and took an increasing part in international scientific affairs. He was, for example, vice-president of the International Council of Scientific Unions from 1955 and of the International Union of Pure and Applied Physics during 1951-57, and chairman of the Unesco Scientific Advisory Committee in 1955.

However, it must be admitted that though he felt keenly his responsibility as a public figure, administration was not really to his taste. In spite of all the calls on his time, he managed to keep going some active theoretical research of his own, to cultivate his mathematical talents and to read widely in many fields, by no means confined to science. I had the good fortune to spend a year at the National Physical Laboratory a few years ago, and the informal chats I had with Krishnan, particularly over lunch in the canteen, provide some of my most vivid recollections of that time. He never seemed to forget anything he had once read or heard, and had an encyclopædic

knowledge in all sorts of unexpected fields. To illustrate an argument he was fond of quoting anecdotes about the great classical figures of physics, and this he could do in the most entertaining way. But he was equally at home in the latest developments of science and was a shrewd commentator on people and politics.

All this erudition was combined with great charm, good humour and kindness. His kindness, however, had its drawbacks when it came to administration, for he could not bring himself to say anything which would disappoint his hearer, and preferred to defer a difficult decision indefinitely rather than cause anyone disappointment. Another idiosyncrasy was that he could scarcely ever be persuaded to write a letter; thus a visit from him usually came as a surprise, preceded at the best by a telegram, but more often introduced by an apologetic chuckle as he explained that he had meant to write. His genial presence both at home and abroad will be sadly missed by a host of friends. He leaves a widow, two sons, four daughters and three grandchildren.

D. SHOENBERG

#### Dr. N. S. Shatsky

DR. NIKOLAI SERGEEVICH SHATSKY, member of the Academy of Sciences of the U.S.S.R. and director of the Institute of Geology, died in Moscow in November 1960. He was born there on August 28, 1895. He began his geological career as a stratigrapher, carrying out a detailed geological survey in the Donetz basin, and in the Caucasus and Volga regions. This work led him to the study of geological formations as stratigraphical units. At the same time, Shatsky was writing of oil and coal-bearing strata, iron ores, manganese ores and phosphorites. It was, however, in the field of tectonics that Shatsky excelled, and it is not without reason that he is considered to be the founder of a new tectonic school in the U.S.S.R.

His tectonic and palaeogeological investigations in the European and Asiatic parts of the U.S.S.R. led him to establish a new Upper Proterozoic system, which he named the Rhiphaean system, and a new

orogenic epoch, coeval with this system, which he named the "Baikalian" epoch. However, his greatest achievement, shared with numerous collaborators, was a tectonic survey of the whole territory of the U.S.S.R., leading to the publication in 1956 of a most original, and in a sense most beautiful, tectonic map of the U.S.S.R. on the scale of 1 : 5,000,000. This map was the first of its kind. In it different colours were used for the major orogenic epochs and a number of tectonic structures were indicated by special signs. The Rhiphaean system and the tectonic map were briefly reviewed in Britain (*Proc. Geol. Soc., Lond.*, No. 1501, 108; 1953; and No. 1557, 29; 1958). Shatsky was also interested in the history of geology, and in 1941 he published, in Russian, a book on the life and work of the famous British geologist, R. I. Murchison, who greatly advanced the progress of geology in Russia. In March 1960, Shatsky was elected an Honorary Fellow of the Geological Society of London.

S. I. TOMKIEFF

#### Mr. B. Welbourn

MR. B. WELBOURN, formerly director and chief engineer of British Insulated Cables, died on July 1 at the age of eighty-five. He retired in 1945 on the formation of British Insulated Callender's Cables, Ltd., through the amalgamation of the British Insulated Co. and Callender's Cable and Construction Co.

Mr. Welbourn graduated from King's College, London, in 1896. After a period of service with the Electrochemical Co. of St. Helens, he joined, in 1897, the British Insulated Wire Co., of Prescott, becoming contracts manager in 1902, in which capacity he travelled widely. In 1927 came his appointment as chief engineer, and in 1942 he was elected to the board of the British Insulated Co.

In a life-time spent in the electrical industry, in which he had such a notable career, Mr. Welbourn had served as a member of the Council of the Institution of Electrical Engineers, was a vice-president of the Institution and past chairman of the Manchester and Liverpool centres.

## NEWS and VIEWS

#### Canadian Scientific Attaché in Washington:

##### Dr. E. O. Hughes

DR. E. O. HUGHES, of the National Research Council of Canada, has been appointed as scientific attaché to the Canadian Embassy in Washington. While in Washington, Dr. Hughes will also serve as Canadian liaison officer at the British Commonwealth Scientific Office. Born in Wales, in 1916, Dr. Hughes received his initial education in Winnipeg, Manitoba, and Halifax, Nova Scotia. After undergraduate training in biology at McGill and Dalhousie Universities, he received an M.A. degree in 1939 from the University of Western Ontario. In 1942 he was granted a Ph.D. degree at the Ohio State University. During 1942-45 he was engaged in the administration of medical research for the National Research Council of Canada and the Royal Canadian Army Medical Corps. In 1945, Dr. Hughes became assistant professor of plant sciences in the University of Oklahoma, Norman, Oklahoma. In 1952 he returned

to Canada as a research biologist and editor in the Division of Applied Biology of the National Research Council. His work was primarily concerned with the classification and physiology of freshwater algae. During 1956-60 he was assistant to the director of the Biology and Health Physics Division of Atomic Energy of Canada Limited, Chalk River, Ontario. For the past year he has been acting chief of the public relations office at the National Research Council of Canada.

#### C.S.I.R.O. National Standards Laboratory:

##### Mr. N. A. Esserman

MR. NORMAN A. ESSERMAN, director of the National Standards Laboratory of the Commonwealth Scientific and Industrial Research Organization (Australia), has retired after twenty-three years service. Mr. Esserman graduated from the University of Sydney in 1916 with first-class honours in mathematics. He went to England in 1917 and worked in the Arsenal Branch of the