after several months, when the cuts have healed, the treatment can be repeated. An area of forest containing two vines per acre is regarded as a rich source of rubber, so that 1 lb. of rubber per acre is an excellent yield. A cautious tapping treatment would probably have little effect on the life of the vine; but the tendency is to get as much rubber as possible with the least effort, so that it will not be surprising if the yield of vine rubber reaches a peak and then diminishes as the sources of supply are destroyed.

In normal circumstances vine rubber cannot hope to compete with plantation rubber produced in the Far East, chiefly because the harvesting of the rubber involves the same type of operations with much smaller yields and more difficult conditions. This comment does not apply, however, to some species of Landolphia, etc., particularly *Landolphia thollonii*, which, growing in poor soil in open country, does not develop into a climbing plant, but throws out long underground stems ramifying in all directions, with small tufts of foliage above ground at irregular intervals. The bark of these stems contains about 15 per cent rubber and in some areas, particularly in French Equatorial Africa, there is such a mat of stems that every footstep covers a treasure of buried rubber. The stems have been known to reach sixty yards in length, and as they are only a few inches below the surface they are not difficult to gather and cut off near the tap root. They are then dried a little to coagulate the latex, cut into convenient lengths and smashed with a mallet so as to facilitate the removal of bark. Finally comes the laborious operation of pounding the bark, so as to convert it into a powder and mass the rubber together into small lumps. It is estimated that 15 hours beating is required to produce 1 lb. of rubber. Since the supply of labour is limited, such a process cries out for mechanization. One method is to run the bark for some time through heavy grooved mangles, that is, ordinary rubber washing machines; but these machines are difficult to obtain under present conditions, and there is only a small output for a given input. A study of the problem in Great Britain and in South Africa suggests that the most suitable type of grinding machine is a rod mill, consisting of a revolving cylinder containing loose rods which rise and fall and rotate as the cylinder revolves. The mechanical method is essential to the success of several of the new sources of rubber, such as the Russian dandelion, root rubber, the bark of vine rubber from which the latex does not flow freely and even for bark shavings obtained on plantations in Ceylon, which were often thrown away because they contained only 5 per cent rubber. On a large scale it should be a fairly cheap method of obtaining rubber, particularly if a continuous process can be devised.

A survey of competitive rubber plants would not be complete without a reference to Castilloa and *Ficus elastica*. Both have been cultivated on a small scale in different parts of the Empire, but on account of small yields, and for other reasons, cannot hope to compete with Hevea after the War. The whole trend of this paper shows that trees which have to go through the same cycle of operations as Hevea in order to obtain rubber are hopelessly outclassed by the latter with regard to yield, quality and ease of treatment. Small plants may be more successful, however, because their cultivation and treatment can be mechanized, and operations can be based on an annual instead of a daily cycle.

# OBITUARIES

## Prof. W. W. C. Topley, F.R.S.

WILLIAM WHITEMAN CARLTON TOPLEY was born in 1887. He was educated at the City of London School, St. John's College, Cambridge, where he obtained a first class in the Natural Sciences Tripos, and St. Thomas's Hospital, London, and qualified in medicine in 1909. In 1910 he was appointed director of the Pathological Department at Charing Cross Hospital, and started a private practice in Harley Street.

In 1914 he accompanied Colonel Hunter to Serbia, where an epidemic of typhus was raging. There is little doubt that his sensitive nature was stirred by the tragedies he saw in a community affected by infectious disease, and that this experience decided his main line of research, namely, an experimental study of the factors involved in the spread of epidemic disease. He returned to England in 1916 and rearranged his life so that he could devote himself entirely to research and teaching. He quickly set to work and showed from the very outset how hard and fast he could work, a characteristic which has staggered all those who have followed his activities.

In 1919 Topley's researches were attracting much attention, and he made a preliminary report of them in the Goulstonian Lectures. In 1922 he accepted the chair of bacteriology at Manchester, and for five years rigidly limited his interests; with a small group working devotedly around him he studied the spread of epidemic disease in mice.

In 1927 he became professor of bacteriology and epidemiology at the London School of Hygiene. Here, in association with Greenwood and other colleagues, he carried on his researches, the results of which and the views which emanated from them he wrote up in his clear, forceful and interesting style. He delivered the Milroy and Harben Lectures, and in 1930 the importance of his work was recognized by his election to the Royal Society. In addition, he threw great energy into the academic diploma course of bacteriology which he had started, and wrote with G. S. Wilson a large text-book of bacteriology. He began, moreover, to take an interest in committee work, and allowed his scientific interests to develop more widely by seeking contacts with scientific men working in other branches of biological research.

In a very short time Topley was serving on the Council of the Royal College of Physicians, the Council of the Royal Society, the Medical Research Council, and the Animal Diseases Committee of the Agricultural Research Council. His book had been an outstanding success; and scientific workers from every side were asking for his time, help and advice. He responded to these added burdens by increasing the tempo of his work and thought, by working harder, and by arranging and rearranging his mode of life so as to attain maximum efficiency.

In 1939, certain that war was coming, Topley was determined to prevent, if possible, the tragedy of infectious disease spreading through the community. Largely due to his efforts, the Emergency Public Health Laboratory Service was set up in Great Britain to combat this danger. At the same time he gave his help to a group of pathologists who, as a result of the experiences of air-raiding in the Spanish War, were pressing for an effective blood transfusion service for the London area, and the London Emergency Blood Supply Depots came into being. As

the Medical Research Council was administering both these services on behalf of the Ministry of Health, he worked during 1939–41 at the Council's head office, developing both services and engaging himself in a host of other war problems with which the Council was concerned. In addition, he was available to all and every scientific worker who, in the stress of war, questioned whether his services were properly employed, or required moral support for carrying on. Even in the midst of all this work, he gave the Croonian Lecture before the Royal Society in 1941, entitled "The Biology of Epidemics". Those who heard him may have felt that this was the swan song of his research experience, but none thought that it was the last time they would hear him, in public, develop a story in his clear, logical and arresting manner.

In 1941 the Agricultural Research Council asked Topley to become its secretary. Few would have considered such a change or such an exacting post unless prepared to sever their old scientific life completely, but Topley could never view it in this light. He believed that if he but drove himself harder, he could master his new duties and keep his old interests and friendships alive. How well he mastered his new work in the two years allotted to him it is not yet possible to judge, but it is clear that revolutionary changes in veterinary research were impending. How anxious he was not to lose his old interests is shown by the very active interest he took in the part that he considered the University of Cambridge should play in the medical, veterinary and bacteriological sciences.

As a man in science, Topley was outstanding. The mainspring of all his activity was devotion to science. Disregarding, save for a caustic remark, those whose scientific integrity was in doubt, he gave without stint his sympathy, understanding and help to all other workers. No matter what it cost him, nothing was too much trouble if his help would increase a worker's efficiency and devotion. He was probably happiest when the young men of science sought his aid, for he knew that the future of science was in their hands and that the young were slightly scared of him. He did not understand why, and nor did they, when after a short time they always spoke of him as "Bill". A talk with him was not easily forgot en, for the ideas bubbled out of his bold and original mind, and he left a sense of exhilaration and enthusiasm which lessened difficulties and made the goal so much more worth the effort. He had that rare quality of brain which, though severely critical, was essentially constructive. He stimulated the hesitant, and spurred on the keen. His honesty of purpose and loyalty continually drew new friends to him, and he excelled in bringing groups of workers together. Frequently responsible for the inception and planning of a research, and for the guidance of the worker throughout, his generous nature allowed no recognition of the fact in the published work.

No one would have used so profitably (or enjoyed more) the period of reconstruction after the War, to further his wide scientific interests and the welfare of scientific workers and their technical assistants. This has been denied him, but his influence lives in so many that much that he desired must come to pass.

As a man, Topley was at times delightfully simple, and at others curiously complex. He had a strong sense of loyalty; nothing gave him more pleasure than his election to an honorary fellowship of his old College, and no man was more staunch to his friends. Yet he feared such loyalties lest they should hinder his service to science. He enjoyed recognition and praise for his election to the Royal Society, and the award of the Royal Medal of the Royal Society delighted him, yet he shunned these delights lest an undue taste for them should chance to warp his judgment. Severely critical as he was of others, he was much more critical of himself. No one was less in need of self-criticism, but this may have been responsible for the curious complexity which he sometimes exhibited.

Those of us who visited him in his home believe we hold the happiest memories. Topley was still the wise man of science, arguing and discussing; but he allowed more latitude to his exuberance, to his puckishness of mind, and he fitted so well into the delightful home background which his wife so unselfishly created for him.

Topley died suddenly at work in his office chair on January 21. Thus passed away, in a manner which he himself would have chosen, an outstanding man of his generation. A. N. DRURY.

## Sir Aurel Stein, K.C.I.E., F.B.A.

SELDOM can there have been an instance of a task pursued so constantly, so indefatigably and with such zest through so long a life as by Sir Aurel Stein, who died on October 26, aged eighty. Oriental research, he acknowledged, had claimed him from his student days. More than that, the campaigns of Alexander the Great had fascinated him from first to last, so that he found a special satisfaction in following in his tracks, and, in some of his latest writings published since the beginning of the War in the *Geographical Journal*, turned again to the unravelling of his campaigns.

This pursuit of Oriental research and this fascination felt for the most dramatic incident in the intercourse of East with West, personal though they were, corresponded to a general urge in a period which has probably reached its close, so that, while from one point of view it is possible to regard his career as the fruit of his early self-preparation by work in the study and of persistent concentration on his aims, from another it was one of the main fruits of the impetus given to archæological studies by the viceroyalty of Lord Curzon and the reform of the Archæological Survey of India under Sir John Marshall. Though Stein was born in Budapest and educated in Vienna and Germany before first coming to England, his field-work was made possible by the Government of India.

It was under the Punjab Education Department that Stein first entered Indian Government Service, and while at Lahore he gave his spare time to the translation from the Sanskrit of Kalhana's "Chronicle of Kashmir" (Rājatār angīnī). Meanwhile, the vast regions of Central Asia were attracting explorers from many lands. The journey that claimed most attention at the time was that of the Swede, Sven Hedin, during the years 1893–97. This was undertaken mainly as geographical exploration, but he also carried out some archæological investigations in eastern Turkestan and on the Keriya River east of Khotan. It was, however, the linguistic interest of some birch-bark manuscripts brought back from Khotan in 1893 by Dutreuil de Rhins, to which Bühler directed Stein's attention, that led Stein in 1897 to plan his first journey to Central Asia. He found that antiquities were being brought in to Sir