OBITUARIES

FRED L. SOPER

Dr. Fred L. Soper, internationally known for his work in the control of arthropod-borne disease, and especially a mentor to mosquito control workers for his leadership in the control of yellow fever and malaria, died at the age of 83 on February 9, 1977, in Wichita, Kansas, following a long illness. He had moved to Wichita last fall from Chevy Chase, Maryland, where he had resided for 30 years. He was a native of Hutchinson, Kansas.

Dr. Soper received his bachelor's and master's degrees at the University of Kansas, a medical degree at the Rush Medical College of the University of Chicago and a doctorate in public health at Johns Hopkins. After an internship at Cook County Hospital in Chicago, Dr. Soper joined the staff of the Rockefeller Foundation in 1920 and soon went to Brazil, where he worked until 1942, with the exception of 3 years, which he spent in Paraguay.

When Naples fell to the Allies in 1943, he was one of the leaders in the efforts which halted the spread of an epidemic of typhus there and later elsewhere in Italy. As civilian member of the United States Typhus Commission and as head of the Rockefeller Foundation's war-time typhus team, he took part in the continuing program to control body lice by means of DDT, a then-new insecticide, in Egypt and Algeria, and subsequently to halt incipient typhus epidemics throughout Europe. As the war moved to the Pacific and the problem of malaria became increasingly prominent, his advice and expertise as well as the power of his recognized leadership in disease vector control to command attention, were of inestimable assistance to workers in mosquito control both in the military and in the Public Health Service's arm, then called Malaria Control in War Areas.

In 1947 Dr. Soper was elected director of the Pan American Sanitary Bureau, which became the PAHO and a regional office of WHO. After his retirement in 1959 he continued to serve as a government consultant on public health problems.

In 1946, Dr. Soper had received the Lasker Award of the A.P.H.A. at its first annual presentation. He was also the recipient of the Grand Cross of the Brazilian Order of Merit, which was presented on his 80th birthday, as well as many other citations throughout his career. He was a former member of AMCA.

He is survived by a sister and three brothers. His wife, the former Juliet Snider, died in 1968.—Austin W. Morrill, Jr.

COMMENTS ON THE ACCOMPLISHMENTS OF FRED L. SOPER

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Among Dr. Fred L. Soper's outstanding accomplishments in the realm of international public health are 4 projects involving 3 species of mosquitoes: *Aedes aegypti, Anopheles gambiae* and *Haemagogus spegazzinii.*

The first of these was the step-by-step development in Brazil of a technology for the eradication of *Aedes aegypti* from that country, and later from almost all of SouthAmerica. Regrettably, there have been serious reinfestations of the eradicated area.

The second accomplishment was the demonstration that yellow fever could, and did, occur in rural areas in Brazil that were completely free of *aegypti.* The phenomenon was first discovered in 1932 in the coastal state of Espirito Santo, and is now known as jungle yellow fever.

The mosquito vector of the new epidemiological type of yellow fever—several species of the genus *Haemagogus*—is a tree-hole breeder. No measures exist for its control. It is now well established that jungle yellow fever is endemic in the vast tropical rain forests of South America. It is also endemic in the tropical rain forests of Central Africa, with feral species of *Stegomyia* the vectors.

The third mosquito that Dr. Soper attacked was

Anopheles gambiae, the African vector of malaria that was largely responsible for Africa's reputation as the "white man's grave." In Northeast Brazil, at Natal, Raymond C. Shannon, Rockefeller Foundation entomologist, found *gambiae* breeding profusely in 1930. He found the larvae in an irrigated hayfield near the anchorage of the fast little boats that then carried the air mail (sic) from Dakar, Senegal across the South Atlantic to Brazil and Argentina.

A severe and fatal epidemic of malaria had broken out in Natal, which normally had little malaria. The epidemic was soon controlled but not before *gambiae* had spread into the semi-arid inland areas, where it also caused more cases and deaths from malaria.

In 1938, after a quiescent period, *gambiae* made its presence known by transmitting a virulent type of malaria along the north coast of Brazil around the "hump" from Natal.

In 1939 *gambiae* reached the neighboring state of Ceará, and was spreading rapidly inland in spite of well-intentioned measures to stop it. If *gambiae* had continued to spread westward it could easily have reached the Amazon Valley and the rest of tropical America, which already had plenty of indigenous malaria vectors.

In early 1939, recognizing the seriousness of the *gambiae* emergency, the Government of Brazil created a new bureau in its Ministry of Public Health—the Malaria Service of the North East. Dr. Soper, who was then the Regional Director of the Rockefeller Foundation for eastern South America, was appointed Director of the new Service. He announced that the objective of the Service was the eradication of *gambiae* from Brazil, the technology for which would have to be perfected as the operations progressed.

That process was greatly facilitated by the late Dr. Marshall A. Barber, who happened to be in South America on a private trip. Dr. Barber is remembered for his demonstration in 1920 that paris green dust is an excellent larvicide for *Anopheles* larvae. With Barber's invaluable help the Service soon perfected techniques for the use of paris green against *gambiae*, formulated in dust in the dry season and in "kerosene-pebbles" during the long rainy season when three was no dust available.

Space spraying with pyrethrum inside houses was used against *gambiaw* adults which were present in clouds at the start of the field operations.

The last autochthonous *gambiae* was found in Brazil on November 14, 1940, less than two years after the start of operations in early 1939. There has been no known reappearance of *An. gambiae* in Brazil since that time.

Dr. Soper's 4th accomplishment also involved *An. gambiae*, in Egypt, which is not within the normal distribution range of the species. In January 1943 Dr. Soper arrived in Cairo as a civilian member of the United States of America Typhus Commission.

Soon afterward Egyptian health authorities asked his advice about their efforts to control *An. gambiae* which, in 1942, had spread down the Nile into Upper Egypt from its normal northern limit of distribution in the Sudan. Upper Egypt was well seeded with malaria, ready for *gambiae* to light up an epidemic of highly fatal malaria.

Dr. Soper visited the stricken area—with malaria transmission in abeyance because of the cold weather—and found that conditions in the area were very similar to those in Northeast Brazil. He recommended the use of the Brazilian technology, based on paris green and pyrethrum spraying—with the objective of eradicating the invading *gambiae*.

Dr. Soper also arranged for copies to be sent to Cairo of the pertinent literature about the *gambiae* eradication operations in Brazil. The Rockefeller Foundation also offered its cooperation in the effort.

However, the Egyptian authorities preferred to handle the situation themselves, using the information that Dr. Soper had provided. Unfortunately, they had had no experience with paris green as a larvicide, and followed the British tradition of relying entirely on larvicidal oil as the larvicide. They did much useful work, but, regrettably, the malaria epidemic in the summer of 1943 was much more severe and more extensive than it had been in 1942. (Dr. Soper left Egypt in mid-1943 to pursue his work on typhus control in Algiers.)

In early 1944 King Farouk visited Luxor, in the epidemic area, and saw for himself the desolation caused by the malaria epidemic. Soon thereafter the Egyptian authorities informed the Rockefeller Foundation that they would welcome its assistance. Dr. Soper was in Naples at the time, and in April he flew to Cairo with the authorization of the Foundation to accept the Egyptian invitation, but under some very unusual terms that had originally been proposed by Dr. Soper. The Egyptians accepted the unusual terms of the offer in toto, and in July 1944 a Rockefeller Foundation staff member arrived in Cairo and was appointed director of the Gambiae Eradication Service of the Egyptian Government.

As rapidly as possible, the Brazilian technology was implemented in the *gambiae*-infested area in Upper Egypt-with the whole-hearted support of the Egyptian Government. A supply of paris green was procured as soon as possible, and when it became available, it was used in place of the excessively cumbersome oil as the larvicide.

To make a long story short, the last *gambiae*, an adult, was found in February 1945, and in November 1945 the eradication of *gambiae* from Egypti was celebrated. Since that date there appears to have been no reinfestation of Egypt by *An. gambiae*.

As one looks back on the career of Fred Soper, it is evident that he had the "knack" of being in the right place at a time that was ripe for undertaking projects that he was especially qualified to organize and direct.