Yellow Fever Measures In the United States

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SINCE the last outbreak of yellow fever in the United States more than 50 years ago, only occasional cases have been reported, all contracted outside this country. The last incident of urban transmission occurred in 1906. No cases have been reported since 1924.

Yellow fever is not indigenous to the United States. It was introduced to the region in the 17th century, causing frequent devastating epidemics for more than 200 years. In fact, an epidemic of yellow fever stimulated the establishment of one of our State health departments in 1855. After aggressive measures cleared up the problem a half century ago, urban yellow fever has remained under control through a combination of quarantine measures and improved sanitation.

Our natural environment favors us to some extent with regard to jungle yellow fever; although a mosquito vector, *Haemagogus*, is known to be present in one area of the United States, the monkey host is not native to our country.

We are fully aware, however, that yellow fever cannot be disregarded as a potential hazard. Modern means of transportation make it possible for a person to acquire yellow fever in an endemic area and to reach the United States within the incubation period of the disease. Against this eventuality we are continually on guard.

Precautionary Measures

Medical officers of the Division of Foreign Quarantine, Public Health Service, examine travelers to the United States who show signs of illness which might be yellow fever. Precautions are also taken to prevent the importation of infected animals. Pursuant to the International Sanitary Regulations of the World Health Organization, the division carries on a program of mosquito control and surveillance on carriers and around international airports and piers of seaports, as well as at border crossing points in receptive areas.

As a further safeguard against the free travel of insect vectors from one country to another, our foreign quarantine regulations require that airplanes, ships, and certain other vehicles on international routes be treated with insecticides. Technologists of the Communicable Disease Center are engaged in studies to improve such insect control measures.

A very important measure in the international control of yellow fever is vaccination. According to our foreign quarantine regulations, vaccination is required for persons leaving an infected area and proceeding to the United States. The United States recommends vaccination for travelers to all areas where exposure to yellow fever is a possibility. The Division of Foreign Quarantine is responsible for yellow fever vaccination centers in this country.

In addition, the Public Health Service keeps watch on *Aedes aegypti* mosquitoes in the portion of this country where they are known to be present, roughly, the area south of a line drawn from southern Virginia westward through northern Oklahoma and then southwestward to El Paso, Tex. During the Second World War, anti-*aegypti* campaigns were held in several cities in this area, principally in ports of entry. Data from a survey made in 1952 of 16 of these cities and 12 others in the *aegypti* area indicated a marked lessening of the *aegypti* population. Another survey made by the Communicable Disease Center in 1956 indicated a continued downward trend. General sanitation programs, which have eliminated breeding places, and increasingly common use of insecticides, as well as campaigns against mosquitoes generally, have contributed to reducing the density of this species.

Study Projects

Under conditions prevailing through most of the past 50 years, current precautions would

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probably suffice. Recent changes in the international picture of yellow fever, however, call for sharpened alertness. Jungle yellow fever has been found in many places in South and Central America, and a number of human cases have been reported in these areas in the past 10 years. In the light of these circumstances, we now have under way projects which will put us in a more favorable position to deal with new yellow fever problems if they arise. Surveys now being made in the historic yellow fever receptive areas, to determine the distribution and density of *A. aegypti*, will provide data for more accurate definition of the present problem area.

Because extensive programs to eradicate the *A. aegypti* mosquito specifically have not been attempted in the United States—only one city has been covered by an *aegypti* eradication campaign—we do not know if such programs are practical in our country. We have no way of determining whether methods successful in other countries are applicable here. We therefore hope to conduct a demonstration eradication project in a representative city in the *A. aegypti* zone. This includes inspection of premises, elimination of breeding places, and the application of insecticides; repeat visits will be made—with decreasing frequency as the area under control is extended and as areas remain free of *aegypti* mosquitoes.

While we have had no reports of yellow fever in the United States, it is possible that the disease has been present in a mild form that has escaped notice. The experience in Trinidad in 1953, when serologic tests indicated that yellow fever had occurred unnoticed 20 years previously, emphasizes this possibility. As a part of its surveillance program, the Communicable Disease Center is planning serologic surveys in areas where importation and transmission of yellow fever have been most likely in order to provide some estimate of exposure experience.

Studies at the Communicable Disease Center on the susceptibility of indigenous mosquito species to infection and their ability to transmit the virus will add to our ability to evaluate the likelihood of yellow fever transmission under both rural and urban conditions. Work is going forward in the Communicable Disease Center laboratory toward developing rapid diagnostic methods for yellow fever and other tropical virus diseases in which a number of relatively new techniques, such as tissue culture, are being explored.

Other Public Health Service research plans for overall studies of arthropod-borne viruses are now in the formative stage at the National Institutes of Health. These studies will be carried on at a basic laboratory in Bethesda, Md., in the Laboratory of Tropical Diseases, and at a field laboratory in the Canal Zone under the joint auspices of the Institutes and the Department of Defense. They will supplement the distinguished work of the Gorgas Memorial Laboratory in this field. As presently planned, the new project will have a permanent staff in the Canal Zone, and will provide space for visiting groups working on problems of mutual interest. Preliminary work is under way in Guatemala, where a staff member from the Laboratory of Tropical Diseases was assigned for liaison between the laboratory in the Canal Zone and field activities in Guatemala. Also involved in the work in Guatemala will be the Pan American Sanitary Bureau and the Gorgas Memorial Laboratory.

This work will help to preserve and improve professional competency in recognizing yellow fever in animals, diagnosing it in humans, and controlling the insect vectors responsible for its transmission.