

ARTICLES

MALARIA AND *ANOPHELES* ARE STILL IMPORTANT¹HARRY D. PRATT,² HANS O. LOBEL,³ AND ROBERT L. KAISER⁴

Malaria was formerly one of the most important diseases in the United States. An estimated million or more cases a year occurred early in this century, but since the 1940's the number of cases has dropped sharply, reaching a low of 50 cases in 1959.

Mosquito control workers and public health authorities in this country have grown complacent about malaria and relegated the malarial mosquitoes, *Anopheles*, to a secondary role—and rightly so. Most mosquito control districts in the United States have been created with and supported by public funds to control *Culex* and *Aedes* mosquitoes, both vicious biters of man. In addition, *Culex* often serve as vectors in encephalitis outbreaks in man and horses.

The engagement of U. S. military personnel in malarious areas of the world has often been followed by an increase of imported malaria cases in the United States. This was observed during both World War II and the Korean conflict. Table 1 shows a marked increase of malaria cases in 1966 and 1967. This increase reflects malaria among returning servicemen who have been stationed in Vietnam.

Despite the widespread presence of

anopheline mosquitoes, a susceptible human population, and the importation of malaria cases from abroad, there have been only eight local episodes of introduced malaria, i.e., malaria due to local transmission from an infected individual coming into the United States. These have included a total of 53 individuals in the United States since 1944. All cases were caused by *Plasmodium vivax*.

The first of these episodes was in 1944, when two cases of *vivax* malaria occurred at Grave Creek, Oregon (Osgood, 1945). These individuals lived near a veteran of the South Pacific campaigns, who had experienced an attack of *vivax* malaria in an area with *Anopheles freeborni* and *punctipennis*.

Fifteen years ago, in 1952, a sizable epidemic of malaria occurred in California, originating from a Korean War veteran. This man slept outdoors on the Fourth-of-July weekend near a Camp Fire Girl camp while having a malaria attack. He apparently infected *Anopheles* mosquitoes. A total of 35 individuals later became infected, 9 of whom became ill in August and September, while the remainder did not develop clinical symptoms until the

TABLE 1.—Cases of malaria reported to NCDC 1957-1967.

Year	Number of Cases	Year	Number of Cases
1957	101	1963	148
1958	70	1964	171
1959	50	1965	156
1960	62	1966	678
1961	82	1967*	1355
1962	115		

* Preliminary data through July 20, 1967.

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following spring (Brunetti *et al.*, 1954). This prolonged incubation period is characteristic of the Korean strain of *vivax* malaria.

Four cases in Arizona in 1954 were also associated with a veteran who had served in Asia. Three cases in California in 1956 and three cases in 1957 were considered to be related to the presence of Mexican agricultural workers.

Two cases of introduced malaria occurred at Fort Benning, Ga., in 1964 and 1965. The probable source of these infections was an army sergeant who had served in South Korea, and the vector was *A. quadrimaculatus*.

In the spring of 1966, two children at Fort Knox, Ky., who had never been outside the United States developed *vivax* malaria. The source of their infection was probably a serviceman who had been stationed in Asia, and the vector, again, was *A. quadrimaculatus*.

On July 5, 1967, the diagnosis of *vivax* malaria was made in two soldiers at Fort Campbell, Ky., who had never been in areas where malaria transmission occurs. Adult *Anopheles quadrimaculatus* were found underneath the barracks where the two men resided and under an adjacent barracks. Epidemiological evidence indicates that transmission occurred on the Post.

Six of these episodes of introduced malaria were related to military personnel who had served in endemic malaria areas. The number of military personnel with malaria in the United States has recently shown a marked increase, as shown in Table 2.

TABLE 2.—Reported malaria cases in the United States, 1962–1967.

Year	Military	Civilian	Annual Total
1962	75	40	115
1963	58	90	148
1964	52	119	171
1965	51	105	156
1966	563	115	678
1967*	1316	39	1355

* Preliminary data through July 20, 1967 for military personnel in the United States with malaria acquired overseas.

Anopheles mosquitoes capable of transmitting malaria are present in most of the country, and transmission of malaria can occur. Mosquito control personnel should take renewed interest in anopheline mosquitoes. Mosquito control districts and health departments should pay increased attention to recording the number and species of *Anopheles* in their areas, particularly the important vectors *A. quadrimaculatus* and *A. freeborni*.
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