AN ADDITIONAL UNITED STATES RECORD OF *HAEMAGOGUS EQUINUS*

R. B. EADS [1] AND L. G. STROM [2]

Following the report by Trapido and Galindo (1956) of the recovery of *Haemagogus equinus* from near Brownsville, Texas, we have made extensive efforts to determine its distribution and prevalence. The presence in the United States of this mosquito implicated as a reservoir and transmitting agent of jungle yellow fever in Central America is of considerable interest even though monkeys, the primary vertebrate hosts, are not indigenous. Other animals, notably several species of marsupials, have been shown to be susceptible to experimental infection with the yellow fever virus (Strode, 1951). Numerous species of wild animals abound in the Brownsville area including a marsupial, *Didelphis marsupialis*.

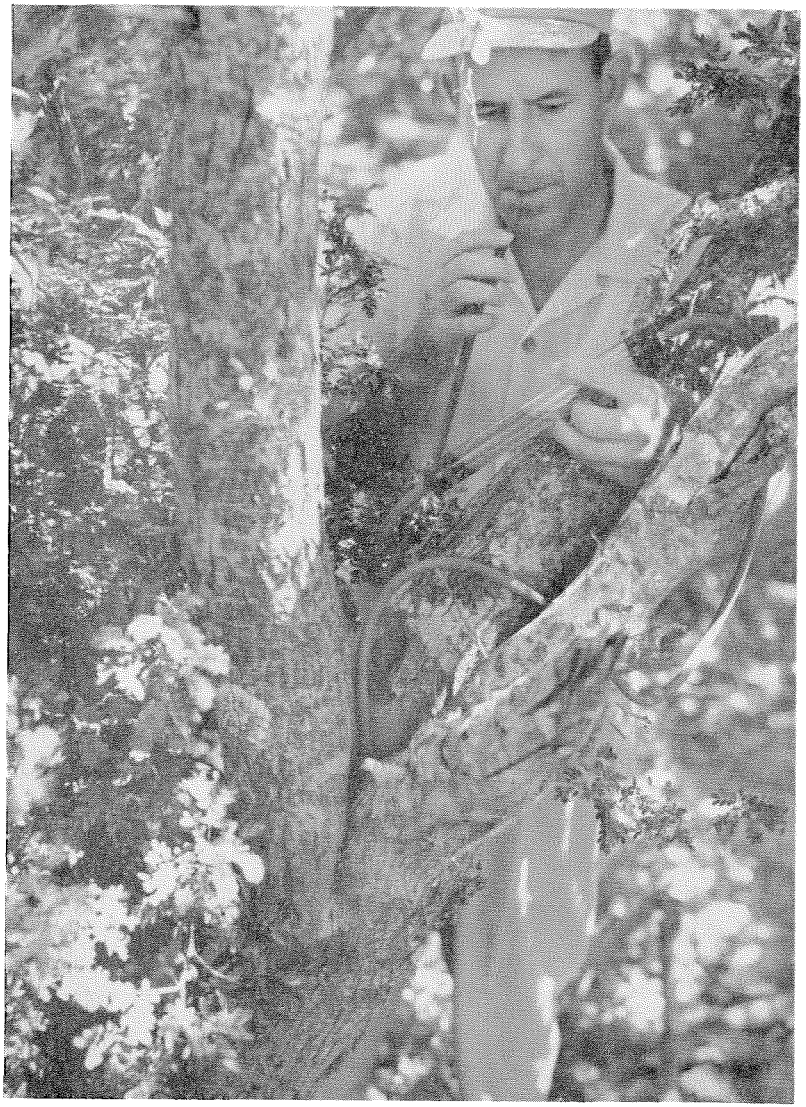
Brownsville, with an elevation of 16 feet, is located at the extreme southern tip of Texas about 18 miles west of the Gulf of Mexico. The alluvial soil was deposited by the Rio Grande River which separates the contiguous populations of Brownsville and Matamoros, Mexico. The semiarid area has an average rainfall of only 29.55 inches. The precipitation is poorly distributed with the maxima in May, June and September; frequently a single thunderstorm will account for a month's rainfall.

The estimated 1955 population of Cameron County was 148,952, with a majority of the residents engaged in irrigation agriculture. Principal products are citrus, vegetables and cotton. Normal temperatures during the summer and fall are in the lower nineties in the daytime and middle seventies at night; during February, the coldest month, the normal daily minimum is only 52° F.

It is the purpose of this paper to recount the circumstances concerning our collection of *H. equinus* together with a list of the other species of mosquitoes recorded from Cameron County. Collections of *equinus* were made by Trapido and Galindo from 2 locations on September 4 and 6, 1956. Over 8 inches of rain had fallen in Cameron County during the latter part of August and the first few days in September mainly as a result of a minor and 2 major hurricanes that moved into the Mexican coast 150–300 miles south of Brownsville.

Following publication of this informa-

[1] Texas State Department of Health, Austin.
[2] Sanitarian (R), Quarantine Station, U. S. Public Health Service, Brownsville, Texas.



"Photo Texas State Department of Health"

FIG. 1.—Utilizing siphoning device to remove *Haemagogus* larvae from tree hole.

tion a continuous search has been made for *Haemagogus* in South Texas by personnel of the United States Public Health Service Quarantine Station in Brownsville, supplemented by several field trips by investigators of the State Health Department and other agencies.

The week beginning June 18, 1956, 20 representatives from the International Cooperation Administration, U. S. Public Health Service, Pan American Sanitary Bureau, the Texas State Department of Health and the Mexican Ministry of Health made an extensive mosquito survey of the Brownsville—Matamoros area with particular reference to yellow fever vectors. A 2-inch rain fell on June 18 in scattered areas in Cameron County and filled tree holes in some of the thorn scrub. Several hundred tree hole breeding larvae were taken but all were *Aedes triseriatus* and *A. zoosophus*. *Aedes scapularis* were biting freely in the shaded areas and an occasional *A. bimaculatus* was noted.

It was not until March 5, 1957, that we were able to duplicate the findings of Trapido and Galindo. At that time, 10 days after heavy rains, *Haemagogus equinus* pupae were collected from a tree hole about 4 feet from the ground in a Texas ebony, *Pithacolobium flexicaule*. The tree was not a large one—only some 15 feet high and 8 inches in basal diameter. The tree hole was 8 or 10 inches deep and was smaller than one's fist. (Fig. 1). When full, it would probably hold a pint of water, but at the time we drained it only about half this amount was taken. The collection locale was some 16 miles from Brownsville on the Boca Chica beach road and was apparently in the same vicinity as one of the 2 original recovery sites.

The tree from which the pupae were taken was in a fairly thick stand of thorn scrub; entry would have had to be effected by means of a machete or other cutting tool except that trails had been hacked out to most of the Texas ebony trees scattered about in the brush in order that the leaf mold under these trees might be removed for use in dressing lawns and flower beds. Other plants in the area are *Karwinskia humboldtia*, *Zizyphus obtuuifolia*, *Phaulothomnus spinescens*, *Prosopis juliflora*, and *Yucca* spp.

We spent a considerable amount of time sitting motionless in the area at ground level but were not attacked by *Haemagogus*. It scarcely seems likely that they are canopy feeders under these conditions as the tree holes are only a few feet off the ground. Mosquitoes should have little difficulty in obtaining blood meals as a variety of potential hosts were seen, including a large bird fauna, *Neotoma* rats, *Peromyscus* mice, domestic cattle, horses and a coyote. Raccoon tracks were common in the brush and opossums are said to be prevalent. This section is sparsely settled, with only one farm home within miles of the *Haemagogus* collection site.

The significance of the presence in Texas of this mosquito implicated as one of the reservoirs and transmitting agents of jungle yellow fever is difficult to evaluate. Our studies would indicate that large populations are not likely to develop due to the constantly decreasing acreage of thorny brush and the semi-arid climate.

The spread of yellow fever into Mexico which appears imminent might well have serious economic consequences in both the United States and Mexico. A quarantine would probably restrict the movement of Mexican National contract laborers who are brought to the United States each year. Almost half a million of these agricultural workers from throughout Mexico are utilized in harvesting our crops. Some 100,000 are used in the Lower Rio Grande Valley alone. Texas reception centers are in Hidalgo, Eagle Pass and El Paso and large concentrations of prospective workers congregate in Mexico across from these towns.

These contract workers are given a physical examination prior to admittance to the United States and are housed under supervised conditions, greatly reducing

the possibilities of their introducing exotic agents such as yellow fever virus. A much greater problem is presented by the appreciable number of aliens who cross the Rio Grande illegally. They usually hide in the brush in their efforts to escape the Border Patrol officers. Not infrequently, during our *Haemagogus* surveys we have found these people at their primitive campsites, completely accessible to the bites of mosquitoes.

As a result of favorable ecological conditions, the mosquito fauna of Cameron and adjacent counties is diverse and abundant. Mosquito related diseases have always been troublesome in the area; yellow fever was rampant in the latter part of the 19th. century; a few apparently indigenous cases of malaria are still being reported; an outbreak of dengue involving several hundred cases occurred as late as 1941; and a major outbreak of St. Louis encephalitis was experienced in the late summer and fall of 1954.

Of the 75 species of mosquitoes reported from Texas, 44 have been collected in Cameron County in addition to *H. equinus*. They are: *Culex coronator, C. tarsalis, C. declarator, C. thriambus, C. territans, C. peccator, C. erraticus, C. chidesteri, C. restuans, C. interrogator, C. quinquefasciatus, C. nigripalpus* and *C. salinarius; Psorophora ciliata, P. cyanescens, P. confinnis, P. signipennis, P. discolor, P. longipalpus, P. horrida,* and *P. mexicana; Aedes aegypti, A. sollicitans, A. vexans, A. zoosophus, A. taeniorhynchus, A. nigromaculis, A. thelcter, A. bimaculatus, A. scapularis,* and *A. triseriatus; Anopheles quadrimaculatus, A. bradleyi, A. crucians, A. pseudopunctipennis, A. punctipennis* and *A. albimanus; Uranotaenia lowii; U. sapphirina,* and *U. anhydor; Deinocerites spanius; Mansonia titillans* and *M. perturbans;* and *Culiseta inornata.*

Our current mosquito studies have indicated that *Culex tarsalis* is rare in the Rio Grande Valley. The 1954 outbreak of St. Louis encephalitis was shown to be associated with the prevalent *C. quinquefasciatus*. No *Aedes aegypti* have been found in Brownsville during recent surveys and only an occasional specimen has been taken in the rest of the valley. The *Anopheles quadrimaculatus* index remains high and adults in natural resting places can be found with little difficulty. *A. albimanus* is rarely encountered although it was abundant during the 1940–45 period.

SUMMARY. A second record of the collection of the jungle yellow fever mosquito, *Haemagogus equinus,* in the United States is given, together with a list of the other mosquitoes found in the collection locality.

ACKNOWLEDGMENTS. Confirmation of the specific identification of the *Haemagogus* was made by Dr. Alan Stone of the U. S. National Museum. Mr. Dudley Johnson, Cameron County Health Unit, has assisted in the *Haemagogus* surveys as have Mr. F. J. Von Zuben, Mr. R. E. Peal, Mr. J. S. Wiseman and Mr. Neal Herron of the Texas State Department of Health.

Literature Cited

TRAPIDO, H. and GALINDO, P. 1956. Genus *Haemagogus* in the United States. Sci. 123:634.

STODE, G. K. 1951. Yellow fever. McGraw-Hill Co. New York. 710 pp.