speeds, as already described, in order to see what the results are at the various speeds under this particular method of lighting.

Pinned adults may be photographed without the microscope if a series of extension tubes is on hand. The addition of special close-up lenses will shorten the focus. When using extension tubes, it is necessary to increase the exposure time as registered on a standard exposure meter. An exposure meter should always be used for taking pictures other than through the microscope.

MOSQUITO SURVEY OF HORN ISLAND, MISSISSIPPI

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Entomological surveys in connection with insect control activities were initiated at Horn Island Installation, Mississippi, in February, 1944, and were continued through July, 1945.[3] Considerable data were accumulated during this period on the insect fauna of Horn Island, including prevalence, seasonal distribution and breeding habitats of various species of mosquitoes. A summary of the mosquito surveys is presented as a further contribution to previously published accounts on the distribution of mosquitoes in the southeastern states. Although all species recorded in Table 1 have previously been reported from the state of Mississippi, only two species have been reported from the island chain just off the coast of Mississippi. These represent collections from Ship Island as follows: *Anopheles atropos* by Komp (1926) and *Aedes taeniorhynchus* by Dyar (1926). An examination of the records of the Fourth Service Command Medical Laboratory revealed several unpublished records that were submitted as miscellaneous collections from these islands. The collections are listed by species, number collected, type and date of collection and locality. The symbols in parentheses indicate the types of collection; (L) larval and (R) resting station: *Aedes sollicitans,* 22 (L) February 23, 1945, Ship Island; *Aedes vexans,* 1 ♂ (R) February 24, 1945; and 1 (L) February 23, 1945, Ship Island; *Anopheles crucians,* 3 (L) June 2, 1943, Cat Island; *Anopheles bradleyi,* 3 (L) June 2, 1943, Cat Island; *Culex salinarius,* 7 (L) February 23, 1945, Ship Island; *Culiseta inornata,* 42 (L) February 23, 1945, Ship Island.

Horn Island Installation occupies a central position on Horn Island which is located in the Gulf of Mexico approximately six to eight miles from the coast of Mississippi near Pascagoula. The island is twelve miles in length, varies from one-fourth to three-fourths of a mile in width and in shape resembles a slightly curved horn. The terrain is low and sandy with the exception of the longitudinal central portion which is slightly higher in elevation and covered irregularly by small groves of slash pine *(Pinus caribaea).* Several large lagoons and many smaller

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TABLE 1.—Mosquito species collected on Horn Island, Mississippi, in 1944 and 1945 arranged according to prevalence, numbers, months in which collected and collection methods *

Species	Number of specimens collected 1944	1945	Months in which collected and collection methods
Aedes sollicitans	1,801	10,782	Feb.–Nov. (T) (B) (L) (F) (H)
Culex salinarius	5	977	Feb.–Nov. (T) (B) (L) (F) (H)
Anopheles atropos	90	491	Feb.–Sep. (T) (B) (F) (H)
Anopheles crucians-bradleyi	277	181	Feb.–Nov. (T) (B) (F) (H)
Aedes taeniorhynchus	86	176	Apr.–Oct. (T) (B) (L) (F) (H)
Culex sp	158	93	July–Nov. (T)
Culex quinquefasciatus	179	0	Feb.–Nov. (T) (F) (H)
Uranotaenia sapphirina	35	94	March–Oct. (T) (L) (H)
Aedes vexans	17	105	March–Nov. (T) (F) (L)
Culiseta inornata	78	1	Oct.–Mar. (T) (L) (F)
Psorophora ciliata	27	20	Apr.–Aug. (T) (L) (F)
Uranotaenia lowii	43	0	Aug.–Nov. (T) (L) (H)
Psorophora howardii	1	29	Apr.–July (L) (B)
Psorophora confinnis	2	18	Feb.–June (L) (H)
Anopheles bradleyi	0	8	May (L)
Culex pilosus	6	0	Aug. (T)
Aedes mitchellae	4	1	Feb.–Oct. (T) (H)
Aedes infirmatus	0	4	Apr.–July (T) (L)
Culex restuans	3	0	March (L)
Psorophora discolor	0	2	May–July (T)
Psorophora sp	2	0	Aug. (L)
Aedes atlanticus	0	1	Apr. (L)
Aedes atlanticus-tormentor	1	0	Sep. (H)
Anopheles crucians	0	1	May (L)
Anopheles quadrimaculatus	1	0	Oct. (F)
Culex erraticus	1	0	Aug. (T)
Culex nigripalpus	1	0	Aug. (T)
Culex apicalis	1	0	Apr. (L)
Psorophora ferox	0	1	June (B)
Aedes aegypti	†	0	March †(Eggs)
Totals	2,819	12,985	

* Symbols for collection methods are as follows: (T), New Jersey type electric light trap; (L), larval; (F), fly trap; (B), biting; and (H), hand-collected.

ones are present. They are usually surrounded by marshes. The climate is subtropical with approximately 60 to 70 inches of rainfall annually. Prevailing winds are southerly with occasional periods of northerly winds.

The methods and frequency of collections varied somewhat for the two-year period. In 1944, the New Jersey light trap was usually operated only on Wednesday night of each week while in 1945, light trap collections were made each night. Twelve box-type resting stations measuring 2½′ x 1½′ x 1½′ were installed in March 1945. Although these stations were visited weekly from April to August, no mosquitoes were found in them during this period. This would indicate that those species commonly found in resting stations, such as *Anopheles quadrimaculatus, Culex quinquefasciatus, Culex restuans,* and *Culex (Melanoconion)* species, were absent or scarce during this period. Biting collections were made from March to August 1945 and were obtained by capturing all insects attempting to feed upon the collector during a ten minute period at each of ten designated biting stations. Special field trips were made in 1944 for the collection of biting or resting adult mosquitoes by the cupped vial method, and by sweeping nets. Numerous

field trips were involved in both 1944 and 1945 in collecting immature forms of mosquitoes for the purpose of sampling the larval populations and also as a check on control measures. Fly traps were operated from April, 1944 to August, 1945 primarily to sample the populations of house-frequenting flies and stable flies but incidentally trapped many mosquitoes. A standard molasses-yeast bait was used in the fly traps and weekly collections recorded.

Twenty-six species of mosquitoes are now known to occur on Horn Island. These are listed in Table 1 in order of abundance, months in which they were collected and methods of collection. Ecological notes on prevalence, seasonal distribution and breeding habitats on the more important species are as follows:

Aedes sollicitans (Walker). This species is by far the most abundant and troublesome species occurring on the island. It was predominant in all types of collections and comprised 63.90 percent of the total mosquito collections in 1944 and 83.38 percent of the collections in 1945. *A. sollicitans* larvae were most frequently encountered in low marshy areas and depressions which were inundated only at certain periods of very high tides. These areas for the most part are covered with the common reed, *Juncus robustus*. Observations on the flight habits of the adults in both years indicated that sudden and tremendous rises may occur in the adult population while the larval population remains extremely low. Such increases are apparently preceded by northerly winds and it is believed that such flights represent migrations from the marshy coast of the mainland six to eight miles to the north. *Aedes sollicitans* adults were encountered throughout the year but reached a peak abundance during July and August.

Culex salinarius Coquillet was second in prevalence for the two-year period but the species was of minor importance in causing discomfort to troops. *C. salinarius* adults appeared throughout the year 1944 but reached their maximum numbers during April. Comparatively few *salinarius* were collected in 1944 as compared with 1945. Larvae were collected in saline pools in association with *Aedes sollicitans* and to a lesser extent in small freshwater pools.

Anopheles atropos Dyar and Knab was the predominant anopheline in 1945 but was collected in smaller numbers than *crucians-bradleyi* in 1944. Females of this species are readily attracted to light at night and were observed to bite occasionally during the afternoon in shady woods. Adults of this species were collected from March to August but were encountered most frequently in midsummer.

Anopheles crucians-bradleyi. The nomenclature *crucians-bradleyi* is used here to designate a consolidation of the two species since there is, to date, no published account of an exact procedure to differentiate the adults of the two species. King (1939) has given characters for separating some *bradleyi* from *crucians* but it is believed that separation of the two species on this basis would not represent a true proportion of the two species. Out of the eight larvae of the *Anopheles crucians* group collected on Horn Island, seven were identified and verified as *bradleyi* and one specimen was *crucians*. Six large anopheline larvae collected on Cat Island, Mississippi, on June 2, 1943, were submitted to the 4th Service Command Medical Laboratory for identification. Three of these specimens were *bradleyi* and three *crucians*. Although such figures are too small to base an estimate of the true proportion it is the opinion of the authors that *bradleyi* makes up a greater proportion of the *crucians-bradleyi* than does *crucians*. Both species were collected as larvae from slightly brackish pools.

Aedes taeniorhynchus Wiedemann is similar in habits and seasonal prevalence to *A. sollicitans* but did not occur in sufficient numbers to be troublesome.

Culex quinquefasciatus Say occurred quite frequently in light trap collections throughout 1944 and upon one occasion was discovered breeding in a fire barrel.

The species was absent in 1945 with the exception of one female captured aboard a small aircraft rescue boat from Pascagoula which had recently docked at the island. The absence of this species in 1945 may be explained by two factors, (a) sanitary measures initiated in 1944 were rigidly enforced during the latter part of 1944 and 1945, and (b) screening on all buildings within the camp area was treated each month with a solution of 5 percent DDT in oil from July, 1944, to August, 1945. Considering the domestic habits of this species, it is quite probable that the residual toxicity of treated screens has more effect on populations of this species than on other mosquito species of a less domestic nature.

Two species of "gallinippers" *Psorophora ciliata* and *P. howardii* were abundant and troublesome during certain periods from April to August of both years. The adults were observed to be severe biters and were usually accompanied by *Aedes sollicitans*. The larvae were collected from freshwater pools where they were associated with *Aedes vexans* and *Psorophora confinnis*.

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PICTORIAL KEYS TO THE MOSQUITOES OF MEDICAL IMPORTANCE IV. ANGLO-EGYPTIAN SUDAN

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The accompanying keys are the fourth in a series being prepared under a transfer of funds by the Department of the Army to the Bureau of Entomology and Plant Quarantine. They are designed primarily to assist public health workers in rapidly separating and identifying the mosquito species of primary medical importance in various regions throughout the world. The keys are so constructed that they separate the important species not only from each other, but also from all others known to occur in the area concerned. The keys are presented (see also *Mosquito News*, Vol. 13, Nos. 1 and 2, 1953) in the hope they may elicit suggestions and comments, especially from persons having first hand information about the faunas or diseases of the areas concerned.

Anopheles gambiae, the most important