

Aedes aegypti IN THE PUERTO RICAN RAIN FOREST: RESULTS OF A ONE-YEAR SURVEY¹

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ABSTRACT. A one-year survey for *Aedes aegypti* (L.) was conducted in the Luquillo National Forest, Puerto Rico. No evidence was found of a population reported breeding in the forest 5 years earlier, and it is concluded that the population died out following termination of a radiation ecology study in the forest. *A. aegypti* found breeding around laboratory buildings in a clearing

at the edge of the forest probably represented introduction via automobile from nearby communities. It is suggested that a basic behavioral pattern prevents *aegypti* from entering dense forest to oviposit and that, when accidentally introduced by man, this species is unable to maintain a breeding population in the forest.

Weinbren and O'Gower (1966) and Weinbren and Weinbren (1970) reported collections of *Aedes aegypti* (L.) from the Luquillo National Forest, Puerto Rico, using an artificial trechole oviposition sampling device. The oviposition samplers were located in the rain forest at a distance of about 2 miles from the nearest village, and were in operation during 1965 and 1966 as part of a long-term radiation ecology study (Odum 1970). In June, 1966, Regnier (cited by Weinbren and Weinbren 1970) obtained two positive collections of *A. aegypti* in the forest using CDC ovitraps.

Breeding inside dense forest is unknown in New World *A. a. aegypti*, and is only rarely encountered in the nondomestic *A. a. formosus* in Africa (Corbet 1964). Thus, reported successful penetration of the forest by a New World population of *aegypti* suggested an extreme change in basic behavior of the species. The existence of such a feral *aegypti* population would pose serious problems for any future large-scale control or eradication attempt. The potential importance of this discovery prompted us to carry out a 1-year survey for *A. aegypti* at the same location during

1970-71. Presence of *aegypti* in the forest 5 years after the first report would constitute reasonably sure evidence of successful colonization of the forest habitat.

MATERIALS AND METHODS. The work described here formed part of a larger study of seasonal population cycles in forest mosquitoes (Haber and Moore, in prep.). Our study was carried out at the El Verde Field Station (EVFS) of the Puerto Rico Nuclear Center (PRNC), as was the previous study (Weinbren and Weinbren 1970). Instead of 2 trap sites (Weinbren and O'Gower 1966), we used 10 trap sites located along a transect that began in a clearing at the Station headquarters and extended 600 meters into the forest interior. The sites were spaced approximately evenly along the transect. Thus we were able to sample a large area of the forest. The ecology of the study area is discussed in great detail in Odum (1970).

We used Weinbren's original traps, which had been in storage at EVFS, as well as new traps built to the original specifications. In addition to the Weinbren traps, we placed an ovitrap (Fay and Eliason 1966), a bamboo pot, and half of an automobile tire at each site. Weinbren traps at alternate sites received either horse manure or rabbit food infusion as the attractant. Other samplers received only fresh water. Samplers were serviced on a bi-weekly basis, and all stages of

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TABLE 1.—Collections of container-breeding mosquitoes by four types of oviposition sampler, Luquillo National Forest, Puerto Rico. Twenty-six bi-weekly collections between July, 1970, and June, 1971, 10 replicates each.

Species	Type of sampler			
	Tire	Bamboo	Ovitrap	Weinbren ^a
<i>Aedes aegypti</i> (L.)	0	0	0	0
<i>mediovittatus</i> (Coq.)	5034	790	164	0
<i>Culex antillumagnorum</i> Dyar	2065	1067	343	0
<i>secutor</i> Theobald	56,491	1233	623	0
<i>Orthopodomyia signifera</i> (Coq.)	1	0	0	0
<i>Toxorhynchites portoricensis</i> (Röder)	32	56	19	0
<i>Wyeomyia</i> sp.	1	0	0	0

^a Use of Weinbren traps discontinued November, 1970; 10 bi-weekly collections only.

all arthropods in the samples were returned to the laboratory for identification and counting.

RESULTS AND DISCUSSION. Results of the transect survey are shown in Table 1. During the period of operation of the samplers, no *A. aegypti* were collected within the forest. In contrast to the situation inside the forest, we did collect larvae and adults of *A. aegypti* from both artificial and natural containers in the clearing occupied by the Station headquarters (Table 2). Collections in the clearing were small and somewhat irregular in occurrence, suggesting that these represented importations from other populated areas. Most EVFS personnel commute from nearby Rio Grande or from Rio Piedras, both communities with large *aegypti* infestations.

It seems likely that the *A. aegypti* population encountered by Weinbren and O'Gower (1966) was the result of intensive

human activity inside the forest during and after the PRNC radiation experiment, as was first suggested to us by Dr. H. F. Schoof (personal communication). Some of the numerous items of equipment and materials taken into the forest could easily have supplied eggs for the inoculum. With the cessation of the majority of research activities and removal of much of the equipment, both habitats and hosts may have diminished below the level needed to support a breeding population (although on casual observation, both factors still appear to be present in sufficient quantity).

If introductions of *A. aegypti* were proportionately more frequent during the period of greatest research activity in the forest, it is possible that the *aegypti* collections from within the forest could have been due solely to importations of mated females. This could also explain the absence of larval breeding in the forest in

TABLE 2.—Larval and adult *Aedes aegypti* collected from various sources at EVFS headquarters, Luquillo National Forest, Puerto Rico.

Source of collection	Specimens	Times collected	
		Larvae	Adults
Tires	7	5	
Miscellaneous artificial containers	29	3	
<i>Cyathea arborea</i> (tree fern) stump	9+	2	
Light trap	1		1
Resting	1		1
Totals	47+		12

the presence of positive egg collections from the artificial treeholes.

There does appear to be some basic behavioral trait in *aegypti* that prevents penetration of dense forest for the purpose of oviposition, and the nature of this inhibition deserves further study. Corbet (1964) points out that this behavior cannot be due solely to shade, since oviposition occurs in the shade of small groups of trees. We have also recovered *A. aegypti* larvae from shaded treeholes along roads in Puerto Rico.

When artificially introduced by man, *aegypti* appears unable to colonize the forest habitat. This could be due to, among other things, the effects of low vertebrate host density on frequency of feeding and on mating (Hartberg 1971), or to disruption of oviposition behavior of the females.

Use of the Weinbren traps was discontinued in November, 1970, due to complete failure of the traps to collect mosquitoes of any kind. The Weinbren trap is apparently unattractive to the other container-breeding *Aedes* of Puerto Rico, *A. mediovittatus* (Coq.), since, although this species was present in large numbers, no eggs were deposited in the Weinbren traps. Laboratory tests using caged *A. aegypti* showed that this species oviposits in the Weinbren trap, but we have not compared

its efficiency to other traps such as bamboo pots or the CDC ovitrap.

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