AEDES AEGYPTI SURVEILLANCE IN TOBAGO, WEST INDIES (1983–88)

DAVE D. CHADEE

Insect Vector Control Division, Ministry of Health, 3 Queen Street, St. Joseph, Trinidad and Tobago, West Indies

ABSTRACT. During 1983–88 *Aedes aegypti* were collected using larval surveys and ovitraps in Tobago, W.I. The main artificial containers used by *Ae. aegypti* were drums (35.4%) and small miscellaneous containers (23.4%). From a total of 15,600 ovitraps exposed, 183 ovitraps (1.3%) were positive, with 25 containing *Ae. aegypti* eggs and 158 with *Haemagogus equinus* eggs. No *Aedes albopictus* eggs were detected in Tobago during this study.

Tobago maintained its *Aedes aegypti* (Linn.) eradication status between 1960 and 1982, despite episodes of reinvasion (Chadee et al. 1984). The Insect Vector Control Division (IVCD), Ministry of Health detected *Ae. aegypti* at the Scarborough Wharves and at Lambeau, Tobago, in 1982 but quickly brought these reinfestations under control by ULV adulticiding (malathion), residual spraying (fenthion) and focal treatment (temephos). By the end of 1982, Tobago was again considered free of *Ae. aegypti* (Chadee et al. 1984).

Although *Ae. aegypti* was eradicated from the island, 14 other mosquito species were found in artificial containers, including the primary vector of malaria, *Anopheles aquasalis* Curry, and 2 sylvan vectors of yellow fever, *Haemagogus celeste* Dyar and Nunez Tovar and *Hg. equinus* Theobald. No cases of dengue or yellow fever have been reported from Tobago despite urban (dengue) and sylvan (yellow fever) outbreaks of these diseases in Trinidad (Hamilton 1979, Chadee 1984, Tikasingh et al., in press). This paper reports on the *Ae. aegypti* surveillance program conducted in Tobago from 1983 to 1988.

The geographical distribution and abundance of *Ae. aegypti* were studied throughout the island of Tobago, West Indies, on a house to house basis. To assess the distribution of *Ae. aegypti,* and to evaluate its association with other species occurring in drums and other types of artificial and natural containers, all containers were examined and immature mosquitoes collected following the PAHO (1968) guidelines.

All mosquitoes encountered were collected using strainers and dippers, placed into vials, labeled according to container type and locality and sent to the IVCD laboratory for rearing and identification. Twice each year, vigilance surveys were conducted by IVCD Trinidad staff as outlined in Chadee et al. (1984).

Fifty modified ovitraps (Fay and Eliason 1966) were used to detect the presence and distribution of *Ae. aegypti* and *Aedes albopictus* (Skuse) at all ports of entry and several vulnerable areas on the island. The placement of ovitraps was in accordance with the criteria suggested by Jakob and Bevier (1969). Ovitrap surveys were carried out for 6 years (1983–88) and paddles collected each week. At each inspection the paddle (labeled according to site number and locality) was removed and the contents of the ovitrap were examined for larvae. If larvae were present, they were collected and then the water was discarded. The ovitrap was washed, refilled with fresh water and an egg-free paddle added. Upon removal, each paddle was placed in a plastic bag and sent to the IVCD laboratory, where paddles were examined under a microscope (at ×40) for eggs. Egg-bearing paddles were soaked in water for hatching. The larvae obtained were reared to the adult stage to ensure correct identification.

Figure 1 shows the 6-year average monthly collections of *Ae. aegypti* immatures and rainfall measured in Tobago. Fluctuating patterns of container usage were observed and this coincided at times with the rainfall pattern (June, July, September and November).

The geographical distribution of *Ae. aegypti* in Tobago is shown in Fig. 2. The results show most of the island from Charlotteville to Bon Accord infested at one time or another with *Ae. aegypti.* The associated container breeding mosquitoes collected revealed that *Limatus durhamii* Theobald, *Cx. quinquefasciatus* Say and *Hg. equinus* were the 3 most common mosquitoes in Tobago.

Aedes aegypti larvae were found in many types of artificial containers and were associated with other mosquito species, namely *Ae. fulvithorax* (Lutz), *An. aquasalis* Curry, *Anopheles* sp., *Cx. quinquefasciatus, Haemagogus celeste, Hg. equinus, Lm. durhamii, Trichoprosopon digitatum* (Rondani) and *Toxorhynchites* sp. The collection of *Anopheles* species in artificial containers is rare, but the foci were in close proximity to their natural habitats (see Chadee et al. 1984).

The containers most frequently used by *Ae. aegypti* were steel drums (35.4%) and small mis-

cellaneous containers (23.1%); followed by tins (11.1%), vases (8.5%), flower pots (7.0%), tires (4.8%), water tanks (3.8%), live plants (3.3%) and brick holes (3.0%). Of interest were the collections of *Ae. aegypti* from live plants (natural containers) including tree holes, papaw stumps (*Carica papaya* (Linn.)), wild tania, (*Xanthosoma sagitofolium* (Linn.) Schott) and water lilies (*Lilium* sp.). The 2 latter natural containers may represent new habitat types for *Ae. aegypti* in the Caribbean region.

An analysis of the frequency of usage of small, medium and large artificial containers by *Ae. aegypti* showed fluctuations in the sizes of containers used. No distinct patterns or trends were found in any one year, but when data were summed, the large containers accounted for 44.4%, followed by 35.4% and 20.2% in small and medium-size containers, respectively.

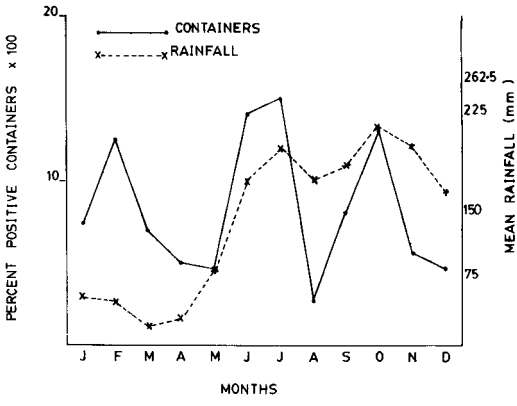

Fig. 1. Mean monthly rainfall and percent *Aedes aegypti* immatures collected in Tobago, W.I. (1983–88).

During 1983–88, 15,600 ovitraps were exposed; but only 12,974 ovitrap paddles were collected, of which 183 (1.4%) contained eggs. Of these, 25 were positive for *Ae. aegypti* eggs; and 19 of 25 (76%) contained between 3 and 30 eggs. No *Ae. aegypti* eggs were collected from 1983 to 1985. However, from 1983 to 1988, *Hg. equinus* eggs were frequently collected, with 158 (86%) of the positive ovitraps containing 4,797 eggs. No *Ae. albopictus* eggs were detected from Tobago during 1983–88.

The reinvasion of parts of Tobago by *Ae. aegypti* during the present study demonstrates the need for continuous port surveillance and public awareness. The first focus of *Ae. aegypti* detected was from larvae in a water drum transported to Tobago from Trinidad in January 1983; this was followed by further shipments in April and June 1984. This entire episode could have been avoided had the inner surfaces of drums been simply fired, that is, passing a lighting flame over these surfaces to scorch and destroy any eggs, or simply scrubbed prior to shipment and distribution within Tobago. Consequently, the drums were sold to persons from

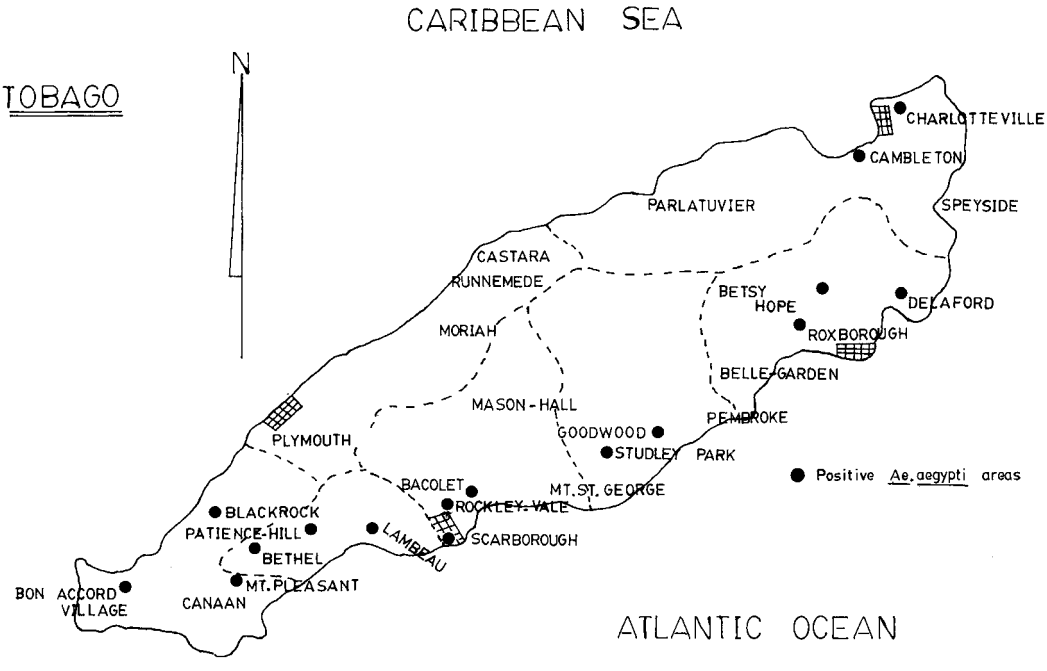

Fig. 2. Distribution of *Aedes aegypti* infestations in Tobago, W.I. (1983–88).

different parts of the island and thus both the drums and *Ae. aegypti* eggs were so distributed.

Chadee et al. (1984) collected 14 species of mosquitoes from artificial containers, but in the present study *Aedes berlini* Schick, *Ae. taeniorhynchus* (Wiedemann), *Wyeomyia arthrostigma* (Lutz), *Culex nigripalpus* Theobald, *Cx. coronator* Dyar and Knab and *Culex* species were not collected. Reductions in the number of different mosquito species collected in artificial containers in Tobago (Chadee et al. 1981, 1984; Chadee and Ferreira 1984) might be attributed to competitive displacement or avoidance of containers treated with insecticides. The latter feature has been reported among *Ae. aegypti* in Florida, Puerto Rico and Trinidad (Kellett and Omardeen 1957, McClelland 1967, Moore 1977).

At present a concerted effort is being undertaken to again eradicate *Ae. aegypti* from Tobago.

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