

SURVEILLANCE FOR *Aedes aegypti* IN TOBAGO, WEST INDIES (1980-82)¹

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ABSTRACT. Larval surveys were conducted during 1980-82 to determine the presence of *Aedes aegypti* in Tobago, W.I. Larvae were found once in an abandoned tire in November 1982. Fourteen other species of mosquitoes were collected from artificial containers. Ovitrap were used to monitor the presence of artificial container breeding mosquitoes at the seaport, airport and all major townships. Eggs recovered from the traps included *Haemagogus equinus*, *Hg. celeste*, *Aedes taeniorhynchus* and *Ae. berlini*.

INTRODUCTION

By 1960, *Aedes aegypti* (Linn.) appeared to be eradicated from Trinidad and Tobago, but as early as 1961 Trinidad had become reinfested (Ministry of Health 1962). Tobago presumably remained free of *Aedes aegypti* and maintained that status through active surveillance from 1961 to 1982. However, in November 1976, a focus of *Ae. aegypti* larvae was found near the seaport of Scarborough, the capital of Tobago (Ministry of Health 1977). The Insect Vector Control Division (IVCD) immediately reinstated an island-wide survey but *Ae. aegypti* larvae were found in an abandoned tire at the Works Department at Scarborough Wharf, and an island-wide survey found three other foci in Mason Hall and in Crown Point, 6 km and 3 km respectively, from Scarborough. An extensive control program was initiated using malathion and temephos, and by the end of 1977, *Ae. aegypti* again was considered eradicated from Tobago (Ministry of Health 1978). In 1978, the Caribbean Epidemiology Centre established an ovitrapping program in Tobago, to monitor the airport and surrounding areas for *Ae. aegypti* mosquitoes. However, *Ae. aegypti* eggs were not collected during that study (Tikasingh and Laurent 1981.)

This paper reports on the *Ae. aegypti* surveillance program in Tobago from 1980 to 1982.

MATERIALS AND METHODS

Larval surveys were conducted routinely from 1980 to 1982 by IVCD Tobago staff following PAHO (1968) guidelines. These surveys involved house-to-house inspection of all containers including tree holes and other natural containers which might harbor *Ae. aegypti* and

other mosquitoes. Mosquito specimens encountered were collected, placed in vials, labeled and sent to the IVCD—Trinidad Laboratory for identification. Twice each year, vigilance surveys were conducted in Tobago by IVCD—Trinidad staff as an independent evaluation program. Random inspections were made throughout the island.

In addition, 152 modified ovitraps (Fay and Eliason 1966) made of local material were used to detect the presence of *Ae. aegypti* in Tobago. These traps were set at ground level throughout the island and most were serviced weekly. Each exposed paddle when collected was placed into a plastic bag and sent to IVCD—Trinidad for microscopic examination for eggs. All eggs were hatched and the resultant larvae reared to the adult stage for identification.

RESULTS

IDENTITY OF LARVAE AND CONTAINERS. Routine larval surveys among the 12,000 premises in Tobago collected larvae of 14 mosquito species: *Ae. aegypti*, *Ae. berlini* Schick, *Ae. taeniorhynchus* (Wiedemann), *Anopheles aquasalis* Curry, *Culex quinquefasciatus* Say, *Cx. nigripalpus* Theobald, *Cx. coronator* Dyar and Knab, *Cx. sp.*, *Haemagogus equinus* Theobald, *Hg. celeste* Dyar and Nunez Tovar, *Limatus durhamii* Theobald, *Trichoprosopon digitatum* (Rondani), *Toxorhynchites* sp. and *Wyeomyia* sp.

Foci found with larvae included discarded tires, drums, cans and other artificial containers. The commonest site was the 208 liter metal drum used for water storage (54%), while small miscellaneous containers were the second most common (14%). The only collection of *Ae. aegypti* came from an abandoned used tire which was the third most common artificial container supporting mosquito breeding in Tobago (8%). These tires were often found in shaded areas, around houses, behind buildings, in high grass, in cemeteries and in vacant lots.

SPECIES ASSOCIATIONS AND ABUNDANCE. Table 1 presents larval associations of mosquitoes

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collected during the 3-year survey. *Limatus durhamii* larvae were found in association with 10 other mosquito species. *Culex quinquefasciatus* and *Lm. durhamii* were by far the most common larvae in containers. The collection of *Ae. taeniorhynchus* and *Ae. aquasalis* in artificial containers is unusual but the foci were in close proximity to their natural habitats.

OVI TRAP SURVEILLANCE. During 1980–82, 12,010 paddles were collected from ovitraps and all were negative for eggs of *Ae. aegypti*. In 1980 there were 168 positive paddles with 4,661 eggs of *Hg. equinus* and *Hg. celeste*. *Haemagogus equinus* eggs were the most common and were found on 139 of the 168 positive paddles (72%). Ovitrap in 1981 and 1982 produced respectively, 150 and 166 positive paddles with *Hg. equinus*, *Hg. celeste*, *Ae. taeniorhynchus* and *Ae. berlini* eggs. The ovitraps results are summarized in Table 2.

DISCUSSION

Tobago has maintained an *Ae. aegypti* surveillance program from 1960 to 1982. Its importance was demonstrated by the discovery of the *Ae. aegypti* larvae in tires and other containers. In 1977 *Ae. aegypti* larvae were found in a tire at the Works Department on the Scarborough Wharf and in 1982 at the Works Department Yard in Lambeau. Within recent years the importation of tires from Trinidad for the recapping industry has resulted in the possible transportation of *Ae. aegypti* into Tobago. Tinker (1964) has shown that tires are favored as a larval site by *Ae. aegypti*, and Haverfield and Hoffman (1966) reported that tires are the most effective means of shipping and dispersing *Ae. aegypti*. To avoid this situation recurring in Tobago, it has been recommended that all tires be treated prior to shipment to Tobago.

Table 1. Associated larval specimens collected in artificial containers in Tobago, W.I. (1980–82).

Associated species	No. of associations	<i>Ae. taeniorhynchus</i>	<i>An. aquasalis</i>	<i>Hg. celeste</i>	<i>Hg. equinus</i>	<i>Cx. coronator</i>	<i>Cx. nigripalpus</i>	<i>Cx. quinquefasciatus</i>	<i>Cx. sp.</i>	<i>Lm. durhamii</i>	<i>Tr. digitatum</i>	<i>Tx. sp.</i>	<i>Wy. sp.</i>
<i>Ae. taeniorhynchus</i>	2									x	x		
<i>An. aquasalis</i>	1									x			
<i>Hg. celeste</i>	3							x		x	x		
<i>Hg. equinus</i>	2							x		x			
<i>Cx. coronator</i>	3							x		x	x		
<i>Cx. nigripalpus</i>	2							x		x			
<i>Cx. quinquefasciatus</i>	7			x	x	x	x			x		x	x
<i>Cx. sp.</i>	3									x	x	x	
<i>Lm. durhamii</i>	11	x	x	x	x	x	x	x	x		x	x	x
<i>Tr. digitatum</i>	5	x		x		x			x	x		x	x
<i>Tx. sp.</i>	4								x	x			
<i>Wy. sp.</i>	3							x		x		x	

¹ Two species, *Aedes aegypti* and *Ae. berlini*, were collected alone and were not associated with other species.

Table 2. Summary of collections in Tobago, W.I. using 152 ovitraps per week (1980–82).

Year (Total paddles collected)	Species	No. of eggs	No. of paddles with eggs
1980 (4,573)	<i>Hg. equinus</i>	4,251	139
	<i>Hg. celeste</i>	410	29
	Total	4,661	168
1981 (3,788)	<i>Hg. equinus</i>	4,463	128
	<i>Hg. celeste</i>	300	18
	<i>Ae. taeniorhynchus</i>	20	2
	<i>Ae. berlini</i>	8	2
	Total	4,791	150
1982 (3,649)	<i>Hg. equinus</i>	5,230	139
	<i>Hg. celeste</i>	489	22
	<i>Ae. taeniorhynchus</i>	40	2
	<i>Ae. berlini</i>	32	2
	<i>Ae. sp.</i>	4	1
	Total	5,795	166

The factors which influence habitat segregation among mosquito larvae are not well understood (Lounibos 1981). Several interspecific associations among mosquito larvae collected in our survey suggest different species preferences among artificial containers. Most of the mosquito larvae collected were found in drums except *Haemagogus celeste*, *Aedes taeniorhynchus* and *Wyeomyia* species which were found in tires and boats. Although *Culex quinquefasciatus* and *Limatus durhamii* were collected in most habitats, *Anopheles aquasalis* and *Ae. taeniorhynchus* were not collected with most of the common species.

The three most common species found in containers were *Culex quinquefasciatus*, *Lm. durhamii* and *Hq. equinus*, *Haemagogus equinus* is a proven laboratory and forest vector of sylvan yellow fever (Waddell and Taylor 1945, Waddell 1949, de Rodaniche et al. 1957), while *Cx. quinquefasciatus* is a known vector of filariasis in Trinidad (Nathan 1981).

A result of the discovery of the focus of *Ae. aegypti* in Lambeau in 1982, the area was treated immediately using house-to-house, focal, perifocal and residual applications of 1% temephos and fenthion (55% emulsifiable concentrate) insecticides. In addition, ultra low volume application of malathion (95% technical grade) was used. No larvae were found in a later survey conducted in January 1983 and Tobago is again considered free of *Ae. aegypti*.

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