MOSQUITO INVESTIGATION AND CONTROL IN TOURIST DEVELOPMENT AREAS IN MEXICO: III. SPECIES, DENSITIES AND ASSOCIATIONS OF MOSQUITOES FOUND IN CANCUN, QUINTANA ROO FROM DECEMBER, 1972 THROUGH DECEMBER, 1975.

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ABSTRACT. Three years of collecting, principally with human bait, in the northeastern portion of the Yucatan Peninsula have yielded 52 species of mosquitoes in 12 genera. Nineteen species were found in both adult and immature stages, 26 only as adults and 7 only as larvae. Of the 46 non-anopheline species, 20 represent new records for Quintana Roo. Data are presented on densities of adults, seasonal occurrence, and associations of larvae of various species.

A previous paper (Pletsch, 1975) described the program of the Mexican government for providing infrastructural services in newly-selected tourist areas to stimulate private investment by hotel and associated interests. Priority areas were Ixtapa-Zihuatanejo in the state of Guerrero on the Pacific coast and Cancun, Quintana Rmo at the northeastern extreme of the Yucatan Peninsula. The present report summarizes the mosquito fauna found in Cancun through 1975, with details on concerning seasonal densities and associations of various mosquito species.

Preliminary surveys made in December, 1972 and in early 1973, plus intermittent sampling through April of 1974, included daytime examinations of potential breeding habitats and evening captures with human bait during the first 2 hr after sundown. Beginning in May, 1974, weekly larval collections became a routine part of the antilarval program. The weekly adult collections, using human bait, were extended to 5 fixed capture stations, of which 3 were in areas undergoing urbanization and 2 were in clearings in original forest areas.

Limited collections were made with New Jersey-type light traps at points similar to, and reasonably near, the human bait stations. A very few mosquitoes were captured in Manitoba-type traps, used with or without carbon dioxide, during collections aimed at capturing tabanids. Occasional daytime biting collections were made, particularly in sand dunes where terrestrial bromeliads were numerous. Limited daytime collections of resting mosquitoes were made in domestic and outdoor habitats. The prolonged schedule of weekly collections represented an intensity of study duplicated in Mexico only by the concurrent investigations in the Ixtapa-Zihuatanejo project on the Pacific coast.

As summarized in Table 1, identifications of adult and larval material have yielded 52 species in 12 genera. Of the 52 species, 7 were taken only as larvae and 26 were taken only as adults, chiefly in the human bait collections.

All of the 6 anopheline species represented had been recorded previously from the territory (now state) of Quintana Roo by Vargas and Martinez-Palacios (1956). Of the 46 species of non-anophelines, 20 species were new records for Quintana Roo since the publication of Diaz-Najera's and Vargas' distribution data (1973).

Only 5 species were represented in collections for all 12 months of the year. These were *Anopheles crucians, An. albimanus, Aedes taeniorhynchus, Ae. scapularis*

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Table 1. Mosquito species collected in Cancun, Quintana Roo (1972–1975)

Species	Larvae	Adults					No. of Months of Year Taken
		RFP	Rest.	Bite.	NJ	Manit.	
Anopheles atropos				+			2
An. bradleyi				+			1
An. crucians	+		+	+	+		12
An. pseudopunctipennis	+	+		+			2
An. vestitipennis	+		+	+			7
An. albimanus	+	+		+		+	12
* *Toxorhynchites* sp.	+		+				2
Wyeomyia celaenocephala	+	+	+	+	+		8
Wy. mitchellii	+	+					1
* *Wy. stönei*				+			1
* *Wy. personata*				+			1
* *Limatus durhami*				+			2
* *Sabethes chloropterus*				+			1
* *Mansonia indubitans*					+		1
Ma. titillans				+	+		5
Coquilletidia nigricans				+	+		9
Uranotaenia lowii		+			+		2
* *Psorophora ciliata*		+	+	+			7
Ps. ferox	+	+		+			10
Ps. cyanescens	+	+		+			10
Ps. lutzii		+		+			2
Aedes angustivittatus				+			10
Ae. atropalpus				+			1
* *Ae. bimaculatus*	+			+			4
Ae. fulvus	+						2
Ae. infirmatus	+	+		+			9
* *Ae. scapularis*				+	+		12
Ae. serratus				+			2
Ae. sollicitans				+			3
Ae. taeniorhynchus	+	+	+	+	+	+	12
Ae. tormentor	+	+					2
Ae. finlaya				+			1
Ae. cozumelensis				+			1
* *Culex chidesteri*		+					1
Cx. corniger	+						1
Cx. coronator	+			+			5
* *Cx. declarator*				+			3
Cx. interrogator	+						4
Cx. nigripalpus	+	+	+	+	+		9
Cx. quinquefasciatus	+	+		+	+	+	11
* *Cx. restuans*	+						2
* *Cx. salinarius*	+						1
* *Cx. thriambus*					+	+	9
* *Cx. virgultus*	+	+					3
* *Cx. anips*	+						1
* *Cx. educator*				+	+		6
Cx. erraticus		+					1
Cx. iolambdis				+			2
* *Cx. opisthopus*		+					1

(Continuation) Table 1

Species	Larvae	Adults					No. of Months of Year Taken
		RFP	Rest.	Bite.	NJ	Manit.	
* *Cx. peccator*		+					1
Deinocerites cancer	+	+	+	+	+	+	12
* *De. pseudes*				+			1

* New record for Cancum and Quintana Roo
Rest. = reared from pupa
Bite. = captured reposing indoors or outdoors
NJ = captured when attracted to human bait
RPF = captured in New Jersey-type trap
Manit. = captured in Manitoba-type trap

and *Deinocerites cancer*. In contrast, 16 species were taken only during one month of the year.

The following species were found associated during larval surveys:

Anopheles albimanus with *An. pseudopunctipennis* and *Culex nigripalpus*; *An. albimanus* with *Culex quinquefasciatus*; *An. albimanus* with *Culex anips*; *An. crucians* with *Cx. nigripalpus* and *Cx. virgultus; An. vestitipennis* with *Cx. erraticus*. *Aedes taeniorhynchus* larvae were found with those of *Psorophora ferox, Aedes fulvus* and *Ae. tormentor; Ae. taeniorhynchus* with *Ps. ferox* and *Cx. restuans; Ae. taeniorhynchus* with *Cx. quinquefasciatus; Ae. taeniorhynchus* with *Cx. nigripalpus; Ae. taeniorhynchus* with *Cx. salinarius;* and *Ae. taeniorhynchus* with *Deinocerites cancer.*

Culex quinquefasciatus were collected with *Cx. interrogator* and *Cx. corniger; Cx. quinquefasciatus* with *Cx. interrogator* and *Cx. restuans;* and *Cx. quinquefasciatus* with *Cx. interrogator* and *Cx. nigripalpus.*

Culex interrogator were also collected with *Cx. opisthopus; Cx. nigripalpus* with *Cx. virgultus; Psorophora cyanescens* with *Deinocerites cancer;* and *Ps. cyanescens* with *Cx. infirmatus.*

Larval habitats were most varied for *Aedes taeniorhynchus,* the principal mosquito pest in the area. Larvae of this species were found not only in the brackish water of mangrove swamps, freshwater forest pools, crab burrows and rock holes, but in numerous man-made breeding habitats. The latter included the cracks in hydraulic fill, bulldozer tracks, temporary water storage tanks used in construction activities and the manholes and temporary ditches of the telephone, potable water and drainage systems. More seriously, literally thousands of temporary forest pools were created by the demand for black soil for golf course and hotel gardening purposes. Hundreds of laborers invaded the still-forested areas of the project to scrape up the scarce organic earth from irregularities in the rocky forest floor. When the resulting cavities were filled by late summer rains, the majority of them produced large numbers of *Aedes taeniorhynchus* and *Culex nigripalpus.*

Two species of *Wyeomyia (celaenocephala* and *mitchellii)* were found in water collected from terrestrial bromeliads of the species *Tillandsia dasyliriifolia* Baker. Adults of *Wy. celaenocephala* were taken biting in full sunlight in areas where the bromeliads were numerous. A very few individuals were taken in early evening human bait captures and in New Jersey light traps.

Psorophora lutzii adults were reared from pupae collected in crab-burrows. This constitutes an addition to the only other species of *Psorophora (Ps. confinnis)* listed from crab-burrows by Bright and Hogue (1972).

On five occasions *Culex quinquefasciatus* males were collected associated with human bait during periods when females

of that species were being taken in some numbers.

As mentioned above, adult mosquito densities were monitored by weekly human bait catches of 2 hrs in each of 5 stations (3 in urbanized and 2 in still-primitive situations). An index of "mosquitoes per bait-hour" was used to compare densities by station, species and by fortnightly period. Figure I presents the density index variations for captures made from May, 1974 through December, 1975. The marked differences between the 1974 and 1975 patterns apparently reflect the unusually heavy rains during May, June and July of 1974. The maximum and minimum biting indices in 1974 were 151 and 17, respectively. The corresponding indices for 1975 were 326 and 9.

Since the initiation of the studies, *Aedes taeniorhynchus* have made up more than 80% of the human bait collection material. Table 2 presents the proportions of the principal species or genera in the total bait catches made in 1974 and in 1975.

As might be expected, the 5 human bait capture stations showed marked differences in yield of particular species or genera. Analysis of the 1974 data revealed, for example, that 96% of *Deinocerites cancer* came from the single station with an abundance of crab-burrows in the immediate vicinity.

One of the two stations in the still-primitive forest area yielded 86% of all *Coquilletidia nigricans* and 74% of all species in the genus *Culex*. In contrast, the more mobile *Aedes taeniorhynchus* were well represented in all 5 stations in proportions varying from 10% to 26%.

The detailed data derived principally from the prolonged series of human bait captures have added 20 species to the mosquito records for Cancun and for the state of Quintana Roo. They have also

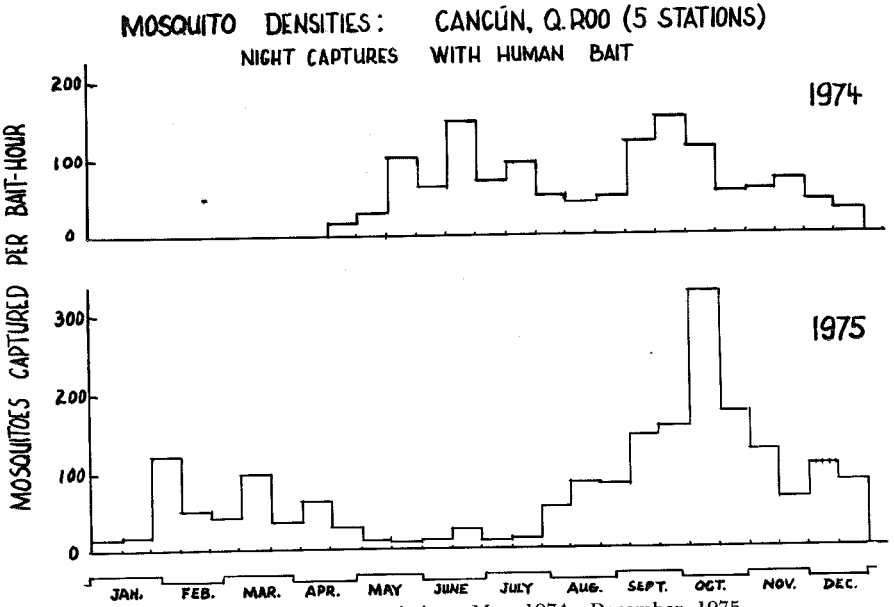

Fig. 1. Density index variations, May, 1974—December, 1975.

Table 2. Mosquito catches with human bait, 1974–1975

Species or Genus	1974		1975	
	% of total catch	Mosq.s/ bait-hour	% of total catch	Mosq.s/ bait-hour
Aedes taeniorhynchus	86.7	62	81.5	57
Deinocerites cancer	5.7	4	6.2	4
Anopheles (all species)	3.5	2	3.9	3
All others	4.1	3	8.4	7
Total catch	100.0	71	100.0	71
Total mosquitoes captured:				
May–Dec., 1974	19,588			
Jan.–Dec., 1975			32,910	

provided essential indices for management of antimosquito measures in a variety of habitats. Larval production and human bait capture indices are being continued as monitoring measures during the 1976 program, although the duration of each human bait capture has been reduced from 2 hr to 1 hr, beginning at sundown.

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ERRATUM

Mosquito News 37(1):141, col. 2, line 8 — for 44 read 4½. The editor apologizes to the author. Only a giant could handle a 44-gal back pack sprayer!