Presence of *Aedes (Gymnometopa) mediovittatus* in Cuba: A New Factor to Be Considered in the National Campaign to Eradicate Dengue[1]

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To assess the presence of the potential dengue vector Aedes mediovittatus *relative to other mosquito species, data were examined from 44,199 larvitraps operating between January 1984 and December 1987 in the town of Mariel, Cuba. Of 1,068 larvitraps containing mosquitoes, 626 (58.6%) were positive for* Ae. mediovittatus. *Its relative presence increased each year except 1986, going from 37.9% of the positive traps in 1984 to 70.2% in 1987. More larvitraps were positive for* Ae. mediovittatus *than for* Culex quinquefasciatus, *which typically dominated breeding sites at the end of the intensive phase of the national campaign against* Ae. aegypti *in the early 1980s. The results appear to reflect* Ae. mediovittatus' *gradual infiltration into areas covered by the campaign, a factor that may need to be considered in efforts to control dengue in the Americas.*

The major 1981 dengue epidemic in Cuba sparked a national campaign to eradicate the *Aedes aegypti* vector mosquito. As a result, within a few months the vector population was reduced below epidemiologically dangerous levels.

Since then, the campaign has adopted a variety of approaches designed to deal with the challenge posed by the vector at different times. At present this work is in a consolidation and maintenance phase where the aim is to reduce application of pesticides while increasing the detection and physical destruction of the mosquito's actual and potential breeding sites in and around homes, workplaces, etc.

These efforts are assisted by a larvitrap surveillance system directed at detecting any remaining *Ae. aegypti* vectors as well as any that might be reintroduced. However, this larvitrap system is also able to detect mosquito species other than *Ae. aegypti*; and in fact it has become a source of information about other mosquito species that could be involved in communicable disease maintenance and transmission. The purpose of this article is to provide information about the increased presence of one such vector, *Aedes mediovittatus*, and its role relative to other mosquito species as indicated by larvitrap data.

MATERIALS AND METHODS

The data reported here were obtained by the surveillance system from larvitraps in the town of Mariel, some 30 ki-

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lometers west of Havana, from January 1984 to December 1987. The type of larvitrap employed, which has been described elsewhere (*1*, *2*), is that designated by the national campaign for use in Cuba.

The demographic conditions prevailing in Mariel provided no easy boundary between urban and rural zones. Therefore, the rural/urban classification was based on conditions found at each sampling site.

To help determine the degree of association between different mosquito species, we used a contingency table and the following formula:

$$C = \frac{ad - bc}{(a + b)(a + c)}$$

where C is the coefficient of association (*3*). The statistical significance of these associations was determined by means of a χ^2 test (*4*).

RESULTS

As Table 1 shows, of 44,199 larvitraps examined during the study period, 1,068 were positive and 626 were positive for *Ae. mediovittatus*. The data in the table also indicate that the relative presence of this potential dengue vector became greater in every year except 1986, when the percentage of positive traps containing *Ae. mediovittatus* declined from 52.0% to 42.5%.

The months yielding the highest numbers of larvitraps positive for *Ae. mediovittatus* were October and November, following the period of peak rainfall (Table 2, Figure 1); but initial increases in the vector's larval presence, coinciding with the start of the rainy season, were typically observed in May.

More larvitraps were positive for *Ae. mediovittatus* during the study period than were positive for the common vector *Culex quinquefasciatus*. As Table 3 shows, this was true in both rural and urban zones, despite the predilection of *Cx. quinquefasciatus* for urban areas (36% of the positive urban traps were positive for this vector, as compared to only 14% of the rural ones), and despite the fact that slightly more positive rural than positive urban traps (63% versus 58%) were positive for *Ae. mediovittatus*.

The 44,199 larvitrap examinations revealed that four mosquito species were sharing a trap with *Ae. mediovittatus* on one or more occasions. These species were *Cx. quinquefasciatus* (once); *Cx. nigripalpus* (once); *Cx. corniger* (seven times); and *Psorophora confinnis* (once). On the basis of these data, we found that the coefficient of association (C) with *Ae. mediovittatus* was −0.5 for *Cx. corniger* and −0.99 for each of the other three species.[4]

[4] $-1 < C < +1$; −1 indicates a zero or minimum association, while +1 indicates a maximum association (*3*).

Table 1. Number of larvitraps examined, 1984–87.

Year	Larvitraps examined	Larvitraps positive		Larvitraps positive for *Ae. mediovittatus*	
		No.	%	No.	% pos. traps
1984	7,878	103	1.3	39	37.9
1985	9,628	102	1.1	53	52.0
1986	11,829	259	2.2	110	42.5
1987	14,864	604	4.1	424	70.2
Total	44,199	1,068	2.4	626	58.6

Table 2. Larvitraps positive for *Aedes mediovittatus*, by month, and average monthly rainfall.

Month	No. of traps positive for *Ae. mediovittatus*						Mean rainfall (mm)
	1984	1985	1986	1987	Total	Mean	
Jan	1	1	2	18	22	5.5	60
Feb	0	1	0	15	16	4.0	83
Mar	0	4	0	26	30	7.5	121
Apr	1	1	0	24	26	6.5	80
May	4	6	0	39	49	12.25	69
Jun	0	12	4	43	59	14.75	105
Jul	4	4	12	42	62	15.5	100
Aug	1	8	12	54	75	18.75	62
Sep	3	7	19	31	60	15	164
Oct	16	5	23	47	91	22.75	155
Nov	6	2	23	54	85	21.25	108
Dec	3	2	15	31	51	12.75	77
Total	39	53	110	424	626		

DISCUSSION

Despite the fact that the larvitraps included in this study were deployed in a limited region, the growing presence of *Ae. mediovittatus* appears to reflect its gradual infiltration into areas covered by the national campaign against *Ae. aegypti*.

Bisset et al. (5) have previously shown that *Cx. quinquefasciatus* typically held sway

Figure 1. Positive larvitraps and average monthly rainfall at Mariel, Cuba, showing the number of positive larvitraps found each month during the 1984–1987 study period.

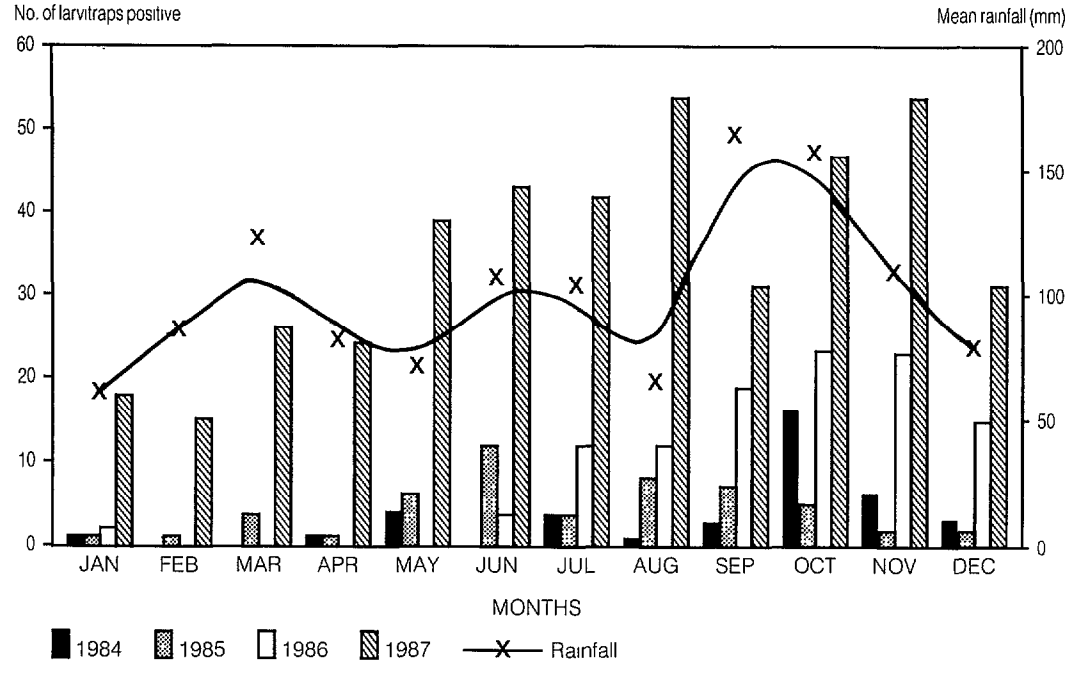

Table 3. Positive larvitraps found to contain *Ae. mediovittatus* and *Culex quinquefasciatus* in urban and rural areas.

	Urban		Rural		Total	
	No.	%	No.	%	No.	%
Larvitraps positive	940	100	128	100	1,068	100
Larvitraps positive for *Ae. mediovittatus*	545	58	81	63	626	59
Larvitraps positive for *Cx. quinquefasciatus*	334	36	18	14	352	33

at virtually all mosquito breeding sites at the end of the campaign's "intensive" phase, while *Ae. mediovittatus* was relegated to a secondary place and evinced relatively little competitive strength. However, for years *Ae. mediovittatus* has been on the increase at urban breeding sites lost to *Ae. aegypti* and later occupied by *Cx. quinquefasciatus*.

The observed degree of association between species was very slight. This could have been affected by the breeding site conditions afforded by the larvitraps. By and large, we feel that the larvitrap conditions were very similar to those of the tree holes where *Ae. mediovittatus* normally breeds. *Cx. corniger*, which generally breeds in rainwater caught in the axils of fronds of the Royal Palm (*Roystonea regia*), was the species most closely associated with *Ae. mediovittatus*.

The *Ae. mediovittatus* behavior found by the present study indicates a need to begin observing this species and for health authorities to take special interest in its surveillance and control.

In 1985 Gubler (6) showed that *Ae. mediovittatus* was a potential maintenance vector for dengue viruses, and indeed could serve as a more efficient experimental vector of dengue viruses than *Ae. aegypti*. In 1988 Freier and Rosen (7) reported that *Ae. mediovittatus* transmits all four dengue serotypes vertically, and does so at rates much higher than any previously described for a mosquito vector of dengue or other flaviviruses.

For these reasons, we are suggesting that *Ae. mediovittatus* is a new factor to be considered by the countries of our Region in the struggle against dengue.

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