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SCIENTIFIC NOTE

DOES *S*-METHOPRENE AFFECT OVIPOSITION BY *AEDES AEGYPTI* IN AN OVITRAP?

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ABSTRACT. We conducted a field study to test if the addition of a pellet of *S*-methoprene (Altosid® pellets) to an ovitrap would affect oviposition by *Aedes aegypti* or *Ochlerotatus notoscriptus*. In 2 trials conducted near Cairns, Queensland, Australia, no significant difference ($P > 0.05$) was found in the number of eggs of *Ae. aegypti* or *Oc. notoscriptus* laid in ovitraps with or without a methoprene pellet. These results suggest the addition of an *S*-methoprene pellet to ovitraps or sentinel tires could be employed to eliminate the risk of mosquito production by ovitrap surveys.

KEY WORDS *Aedes aegypti, Aedes albopictus,* dengue, ovitrap, surveillance

Queensland Health and the Australian Quarantine and Inspection Service use oviposition traps (Service 1993) (ovitraps) and sentinel tires (Bradshaw and Holzapfel 1985, Service 1993), set on a weekly rotation, to monitor for *Aedes aegypti* (L.) and *Ae. albopictus* (Skuse) in Australia. The latter is an exotic mosquito of high risk for introduction into Australia. Although both ovitraps and sentinel tires are effective monitoring systems (Service 1993), they have the potential to produce adult mosquitoes. Ritchie (1984) found that only 2 adult *Ae. aegypti* were produced by 300 weekly ovitrappings in Naples, FL. However, sentinel tires pose a greater risk. In sentinel tires, water is poured from a 2-cm-diameter hole in the tire into a tray and the larvae are collected. Thus, some larvae, particularly 1st instars, possibly remain within the tire and subsequently can complete development. Furthermore, unless eggs are carefully scrubbed from the inside of the tire, they may hatch upon reflooding. Finally, tires and ovitraps both may produce considerable numbers of adult mosquitoes if inadvertently left unserviced for longer than a week.

Pellets of *S*-methoprene (Altosid® pellets; Pacific Biologics, Scarborough, Queensland, Australia) could provide extended control of mosquito larvae in ovitraps but may affect mosquito oviposition. Ritchie and Broadsmith (1997) obtained 100% control of *Ae. aegypti* in the tank bromeliad *Bilbergia pyramidalis* treated with 3 pellets (0.5 g) of Altosid pellets for 6 months, whereas a single pellet provided almost complete control of *Ae. albopictus* for 116 days in tires (Becnel et al. 1996). Laboratory studies suggest that *S*-methoprene does not influence oviposition by *Ae. aegypti* (Beehler and Mulla 1993). However, Carroll (1979) found that *Ae. aegypti* laid significantly more eggs in 40 paired ovitraps treated with a 0.5-g methoprene miniature briquet than in untreated controls (mean = 23.23 and 12.75, respectively; $P < 0.001$). Because of the relative similarity of Carroll's results, we reanalyzed the data and, having found that they were not normally distributed, compared the 2 treatments by using a nonparametric Mann–Whitney rank-sum test (SigmaStat version 2.03; SPSS Science, Chicago, IL). The treatment and control groups were not significantly different ($P = 0.097$).

Thus, to confirm that *S*-methoprene does not affect oviposition by *Ae. aegypti* in an ovitrap, we conducted 2 trials near Cairns, Queensland, Australia. Trials were conducted from February 27 to March 20, 2001, in 2 Cairns suburbs, Machans Beach and Parramatta Park, with a history of dengue and high populations of *Ae. aegypti*. In each suburb, treatment and control ovitraps were set at 10 properties. The control ovitrap consisted of a 1.2-liter black plastic bucket filled with 500 ml of tap water to which a 0.5-g pellet of alfalfa was added to create an infusion to enhance oviposition (Ritchie 2001). A wooden tongue depressor that had been roughened with sandpaper served as the oviposition substrate (Ritchie 2001). Treatment ovitraps were identically prepared but received a single Altosid pellet (~0.13g of 40 g/kg *S*-methoprene). A treatment ovitrap and a control ovitrap were set on opposite sides of the property to each other to minimize interference. Traps were set for 1 wk, with their position swapped with each subsequent trapping over 4 wk for a total of 40 paired trappings/trial. Tongue depressors were returned to the laboratory and the number of eggs was counted microscopically. Positive paddles were air dried for 7 days then flooded with a dilute yeast solution to induce hatching. Larvae were reared to 4th instar then identified. The respective proportions of larvae of *Ae. aegypti* and *Ochlerotatus notoscriptus* (Skuse) were multiplied by the total number of eggs on the paddle to estimate the number of eggs for each species. For each species, the mean num-

Table 1. Oviposition in ovitraps treated with a single *S*-methoprene pellet set for 1 wk in Parramatta Park, Cairns, Queensland, Australia, from February 27 to March 20, 2001 (40 paired trappings).[1]

	Total		*Aedes aegypti*		*Ochlerotatus notoscriptus*	
	Control	*S*-methoprene	Control	*S*-methoprene	Control	*S*-methoprene
% positive	70.0	80.0	67.5	80.0	17.5	7.5
Mean no. eggs (± SD)	61.9 ± 98.3 a	49.2 ± 68.0 a	50.0 ± 87.5 a	47.7 ± 68.1 a	11.5 ± 43.5 a	1.5 ± 7.9 a
Median	20.5	31.0	18.8	29.0	0	0
Range	0–423	0–377	0–423	0–377	0–263	0–50

[1] Means followed by the same letter are not significantly different with the Mann–Whitney rank-sum test.

Table 2. Oviposition in ovitraps treated with a single *S*-methoprene pellet set for 1 wk in Machans Beach, Cairns, Queensland, Australia, from February 27 to March 20, 2001 (40 paired trappings).[1]

	Total eggs		*Aedes aegypti*		*Ochlerotatus notoscriptus*	
	Control	*S*-methoprene	Control	*S*-methoprene	Control	*S*-methoprene
% positive	55.0	65.0	52.5	60.0	17.5	17.5
Mean no. eggs (± SD)	42.3 ± 83.4 a	37.0 ± 65.1 a	36.5 ± 81.9 a	31.1 ± 59.1 a	5.6 ± 19.1 a	7.0 ± 20.8 a
Median	7.0	9.0	4.4	8.0	0.0	0.0
Range	0–386	0–327	0–386	0–327	0–109	0–88

[1] Means followed by the same letter are not significantly different with the Mann–Whitney rank-sum test.

ber of eggs in each suburb was compared by using a Mann–Whitney rank-sum test (SigmaStat version 2.03).

The addition of a single Altosid® pellet had no significant effect upon oviposition by *Ae. aegypti* or *Oc. notoscriptus* at either site (Tables 1 and 2). For *Ae. aegypti,* oviposition in treatment and control ovitraps ($n = 40$) was not significantly different at either Parramatta Park ($P = 0.379$) or Machans Beach ($P = 0.733$). Comparable results were obtained for *Oc. notoscriptus* at Parramatta Park ($P = 0.423$) and Machans Beach ($P = 0.961$).

The results confirm that the addition of a single Altosid pellet to an ovitrap will not significantly effect oviposition by *Ae. aegypti* or *Oc. notoscriptus,* a likely vector of Ross River virus in north Queensland (Harley et al. 2001). Examination of these data suggests that *S*-methoprene will not significantly influence oviposition by *Ae. albopictus* either, although we have no data to support this. Nonetheless, *S*-methoprene pellets should be considered for use in ovitrap programs, especially sentinel tires, to minimize the threat of mosquito production in the traps.

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