

## Preliminary Field Experiments on the Oviposition of *Aedes albopictus* in Water with Different Qualities

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**Abstract:** Oviposition preference of *Aedes albopictus* was examined by placing ovi-traps with conditioned water, which had been left outside for a long time without a cover, and with deionized water. The females preferred to deposit their eggs in ovi-traps with conditioned water. Another experiment using diluted conditioned water revealed that the intensity of attractiveness for oviposition depended on the concentration of the water.

*Key words:* Oviposition preference, *Aedes albopictus*, Ovi-trap, Water quality

The attractiveness of larval holding water to females for oviposition has been found in several aedine mosquitoes, and some chemicals and several extracts from animal and plant materials have been examined as to attractiveness (Gubler, 1971; Bentley *et al.*, 1976; Trimble and Wellington, 1980; Consoli and Teixeira, 1988).

In *Aedes albopictus*, Gubler (1971) found that females avoided to oviposit in water with ammonia and casein hydrolysate, but were attracted to water with leaf, fresh and dried grass infusions, or larvae. There is no need to say that such analytical studies are important to understand the behavioral aspects of oviposition. In the present paper, results of a preliminary study are reported as to whether or not the attractiveness of water to *Aedes albopictus* changes with the lapse of time under natural condition and how the females respond to ovi-traps with different attractiveness.

Two experiments were conducted in the campus of Nagasaki University School of Medicine, where grasses, shrubs and trees furnished abundant shelter for the mosquitoes at the experimental sites.

In the first experiment twenty ovi-traps of round plastic jars (14cm diameter, 17.5cm height) were placed. Ovi-traps with 300ml of conditioned water and deionized one (control) were set in pairs on the ground. The inside of the ovi-trap was lined with a strip of filter paper for oviposition, and one, two or three days after setting up, the paper strips were collected to examine the number of eggs deposited. The conditioned water was prepared by leaving dechlorinated tap water in a vessel with many leaves and grasses at least for a

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Received for Publication, September 28, 1989.

Contribution No. 2260 from the Institute of Tropical Medicine, Nagasaki University.

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month until it became colored and to retain a lot of larvae of *Ae. albopictus*. Before using the water, it was filtered in order to remove the immature stages.

In the second experiment 25 ovi-traps were placed on the ground as a latin square pattern. Different concentrations of conditioned water were obtained by diluting with deionized water and used to compare the attractiveness for oviposition. The paper strips were renewed every day, and the number of eggs was counted.

Results obtained by the first experiment was summarized in Table 1. The average number of eggs deposited on a filter paper strip in ovi-traps with conditioned water was nearly four to ten fold more than in ovi-traps with deionized control water. The average did not increase when the period of exposure was prolonged up to four days in ovi-traps with deionized water (control). The fact clearly indicates that *Ae. albopictus* prefer to lay eggs in containers with conditioned water, which was left outside for a long period and a stable 'microcosm' might have been established in it together with the immature stages of the species, though it is still unknown what is the effective attractant(s).

**Table 1.** The number of eggs of *Aedes albopictus* deposited on a paper strip of ovi-traps with conditioned water and deionized control water.

Experimental period	Days of exposure of paper strips for oviposition	Replication	No. of eggs / trap / day $\pm$ SD	
			Conditioned water	Control water
Jul. 4–Jul. 8	1	3	17.07 $\pm$ 19.23	2.07 $\pm$ 3.49 *
Jul. 20–Jul. 29	2	3	14.93 $\pm$ 11.90	4.05 $\pm$ 4.45 *
Jul. 1–Aug. 1	3	3	14.31 $\pm$ 9.37	2.78 $\pm$ 2.70 **
Jul. 27–Jul. 1	4	1	27.05 $\pm$ 27.59	2.68 $\pm$ 5.97 *

\* Significant ( $P < 0.05$ )

\*\* Significant ( $P < 0.01$ )

**Table 2.** The number of eggs of *Aedes albopictus* per trap per day on a paper strip of ovi-traps with various concentrations of conditioned water and deionized control water.

Experimental period	No. of eggs / trap / day $\pm$ SD				
	Conditioned Water				Control water
	100%	25%	12.5%	6.25%	
Aug. 2–Aug. 3	19.20 $\pm$ 13.33	8.20 $\pm$ 11.28	5.00 $\pm$ 4.24	3.40 $\pm$ 6.50	2.80 $\pm$ 1.92
Aug. 3–Aug. 4	17.20 $\pm$ 12.54	2.60 $\pm$ 2.70	10.60 $\pm$ 11.78	5.20 $\pm$ 9.09	8.40 $\pm$ 5.73
Aug. 16–Aug. 17	6.00 $\pm$ 9.03	0.00 $\pm$ 0.00	0.80 $\pm$ 1.79	0.00 $\pm$ 0.00	0.00 $\pm$ 0.00
Aug. 31–Sept. 1	6.20 $\pm$ 9.83	1.60 $\pm$ 3.05	0.00 $\pm$ 0.00	1.80 $\pm$ 3.03	0.00 $\pm$ 0.00
Sept. 1–Sept. 2	7.80 $\pm$ 5.67	0.40 $\pm$ 0.89	3.40 $\pm$ 7.60	2.60 $\pm$ 5.27	1.20 $\pm$ 2.16
(Average)	11.28 $\pm$ 11.18	2.56 $\pm$ 5.77	3.96 $\pm$ 7.15	2.60 $\pm$ 5.48	2.48 $\pm$ 4.13

To evaluate the intensity of attractiveness of the conditioned water, the second experiment was conducted. Results were summarized in Table 2. Analysis of variance revealed that the intensity was dependent on the concentration of the original conditioned water. It was shown that the critical concentration of the attraction for oviposition was higher than 25%, because the average number of eggs per trap per day in ovitraps of any diluted conditioned water (6.25–25%) was nearly the same as that in traps with deionized water. Only traps with original conditioned water prominently gained more eggs than the other traps.

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