

FILAROID NEMATODES IN FIELD-COLLECTED MOSQUITOES IN MARYLAND¹

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While investigating transmission of *Dirofilaria immitis* (Leidy) by mosquitoes during the past few years many mosquitoes have been collected with CDC traps at a hunt club near Upper Marlboro, Maryland where the incidence of dog heartworm disease was known to be high (Mallack et al. 1971). Females were dissected and examined for the presence of filariae in various parts of the body. The number of specimens dissected is given after the name of each species as follows: *Anopheles crucians* Wiedemann (5), *An. punctipennis* (Say) (54), *An. quadrimaculatus* Say (3), *An. walkeri* Theobald (8), *Aedes vexans* (Meigen) (20), *Culex pipiens pipiens* Linnaeus (45), *C. salinarius* Coquillett (142), *Coquillettidia perturbans* (Walker) (35), *Psorophora fonninis* (Lynch Arribáizaga) (10), and *P. ferox* (Humboldt) (2). The following were found to be positive for the presence of filaroid nematodes in the sausage stage in the Malpighian tubules or in a more advanced (infective) stage in the head and/or mouthparts: *Anopheles punctipennis* (1 specimen), *Aedes vexans* (1 specimen), and *Culex salinarius* (2 specimens). The parasites observed were believed to be *D. immitis*, but the precise identification of the immature stages of filariae is not easily accomplished (Nelson 1959). The occurrence of complete larval development of *D. immitis* in these 3 mosquito species has been reported previously (Ludlam et al. (1970)).

References Cited

- Ludlam, K. W., Jachowski, L. A., Jr. and Otto, G. F. 1970. Potential vectors of *Dirofilaria immitis*. J. Amer. Vet. Med. Assoc. 157(10): 1354-1359.
- Mallack, J., Sass, B. and Ludlam, K. W. 1971. *Dirofilaria immitis* in hunting dogs from an area in Maryland. J. Amer. Vet. Med. Assoc. 159(2):177-179.
- Nelson, G. S. 1959. The identification of infective filarial larvae in mosquitoes: with a note on the species found in "wild" mosquitoes on the Kenya Coast. J. Helminthol. 33(2/3):233-256.

RESIDUAL EFFECTIVENESS OF FOUR NEW INSECTICIDES AGAINST ADULT MOSQUITOES¹

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We previously reported on the residual effectiveness of new synthetic pyrethroids for the control of mosquitoes (Haskins et al. 1974). We have continued to evaluate new materials for insecticidal activity, in an attempt to find biodegradable compounds as replacements for non-effective and non-degradable insecticides now in use for residual treatments. This paper compares the residual toxicity of resmethrin (standard), 1 new synthetic pyrethroid, and 2 new organophosphate compounds against mosquitoes.

Resmethrin⁴ [(5-benzyl-3-furyl)methyl *cis*, *trans*-(±)-2,2-dimethyl-3-(2-methylpropenyl)cyclopropanecarboxylate] and NRDC-147⁵ [*m*-phenoxybenzyl *trans*-(+)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate] were the 2 pyrethroid compounds evaluated. San I 197⁶ [O-(6-ethoxy-2-ethyl-4-pyrimidinyl)O,O-dimethyl phosphorothioate] and San I 201⁶ [O-(6-ethoxy-2-(1-methylethyl)-4-pyrimidinyl)O,O-dimethyl phosphorothioate] were the 2 organophosphate compounds evaluated.

Studies to determine the residual life of the compounds were conducted using 929.03 cm² (1 ft²) canvas tent panels. The panels were treated at the rate of 1 g actual chemical per m², using a 2.0% concentration of insecticide formulated directly in Freon 11 and 12 (1:1). Application was accomplished with aerosol cans fitted with fine spray valves. After treatment, the panels were maintained in a controlled, dark environment with a temperature of 101° F and a relative humidity of 84%.

A minimum of 20 DDT-susceptible adult fe-

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⁴ S. B. Penick Prop.

⁵ Roussel Uclaf-Croda Co.

⁶ Sandoz Co.

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male *Anopheles quadrimaculatus* Say, and 20 DDT-susceptible adult female *Aedes triseriatus* (Say) were used on each panel assay. All assays contained 2 panel replications of each compound and 1 control (non-treated) panel. Each group of test mosquitoes was placed under separate petri dish tops on the treated panel surface for 1 hour. After the 1-hour period, knockdown counts were conducted. The mosquitoes were transferred from the panels utilizing the procedures described by Haskins et al. (1974). The mosquitoes were held in the petri dishes and provided with a solution of 50% sucrose in water. A temperature of 82° F and a relative humidity of 58% were main-

tained until the 24-hour knockdown counts were made. Tests were continued until the residual failed to provide 90% knockdown after 24 hours.

The comparative residual effectiveness is presented in Table 1. Resmethrin provided in excess of 95% control of *A. quadrimaculatus* for 9 days and *A. triseriatus* for 5 days. This is in agreement with our previous findings (Haskins et al. 1974). The new synthetic pyrethroid, NRDC-147, provided in excess of 95% control of *A. quadrimaculatus* and *A. triseriatus* for 26 and 16 days, respectively. The organophosphates, San I 197 and San I 201, provided 100% control for 40 days against *A. quadrimaculatus*. San I 197 provided

Table 1. Residual effectiveness of 4 insecticides against the adults of 2 species of mosquitoes.

Age of Residual (days)	Control Alive (%)		Resmethrin Knockdown (%)		NRDC-147 Knockdown (%)		San I 197 Knockdown (%)		San I 201 Knockdown (%)	
			(Avg 2 reps)		(Avg 2 reps)		(Avg 2 reps)		(Avg 2 reps)	
	1 hr	24 hr	1 hr	24 hr	1 hr	24 hr	1 hr	24 hr	1 hr	24 hr
<i>Anopheles quadrimaculatus</i>										
5	95	79	100	100	100	100	11	100	11	100
7	100	68*	100	100	100	100	22	100	22	100
9	100	86	100	100	100	100	6	100	14	100
12	100	100	88	88	100	100	15	100	12	100
14	100	100	58	76	100	100	2	100	5	100
16	100	95	..	..	100	100	8	100	2	100
19	100	100	..	..	100	100	8	100	5	100
21	100	100	..	..	100	100	8	100	2	100
23	100	100	..	..	100	97	0	100	6	100
26	100	100	..	..	100	100	5	100	4	100
29	100	96	..	..	94	94	4	100	4	100
33	100	96	..	..	89	92	0	100	3	100
36	100	57†	..	..	95	100†	6	100†	0	100†
40	100	100	..	..	45	63	0	100	2	100
42	100	100	..	..	..	..	5	68	2	83
44	100	100	..	..	..	..	2	92	0	89
47	100	100	..	..	..	..	0	80	4	78
<i>Aedes triseriatus</i>										
5	100	100	97	100	100	100	16	100	21	100
7	100	94	95	78	100	100	16	100	15	100
9	100	100	23	21	100	100	20	100	20	100
12	100	100	..	..	100	100	0	100	2	100
14	100	96	..	..	100	97	0	100	4	100
16	100	95	..	..	92	100	0	100	0	100
19	100	100	..	..	97	92	0	100	0	100
21	100	100	..	..	88	77	2	100	0	100
23	100	100	..	..	91	89	0	100	0	100
26	100	100	..	..	72	70	0	85	0	100
29	100	100	..	..	..	..	0	93	0	95
33	100	100	..	..	..	..	0	100	0	100
36	100	0†	..	..	..	..	0	100†	0	100†
40	100	87	..	..	..	..	0	100	0	100
42	95	95	..	..	..	..	6	94	0	91
44	100	95	..	..	..	..	0	100	0	93
47	100	100	..	..	..	..	0	58	0	67

* Sucrose solution evaporated.

† Exposed to contaminated note cards.

100% control of *A. triseriatus* for 23 days, while San I 201 provided 95% control for 40 days.

As a residual, NRDC-147 was effective 3 times longer than resmethrin. These data indicate that NRDC-147 is superior to resmethrin for residual treatments. Provided it was cost competitive, this pyrethroid could be used for residual treatments against many mosquitoes.

This residual effectiveness of the organophosphate chemicals tested was longer than for the pyrethroids. Knockdown time for the pyrethroid compounds was shorter (<1 hr) than for the organophosphate materials (>1 hr). It can be seen that of the compounds tested, we have not

as yet found pyrethroids that equal the organophosphates in residual life. However, NRDC-147 does represent the type of compound we are beginning to receive in the pyrethroid class. It appears that we may soon have relatively "long life" pyrethroids available for insect control.

Reference Cited

- Haskins, J. R., R. H. Grothaus, R. Batchelor, W. N. Sullivan and M. S. Schechter. 1974. Effectiveness of three synthetic pyrethroids against mosquitoes. *Mosquito News* 34(4): 385-388.

A GYNANDROMORPH OF *Aedes vexans*

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Minson (1969) reported an *Aedes vexans* (Meigen) gynandromorph having a male head and female abdomen. The following is appar-

ently the second sexually aberrant example of this species reported.

A bipolar form of *A. vexans* (Fig. 1) was col-

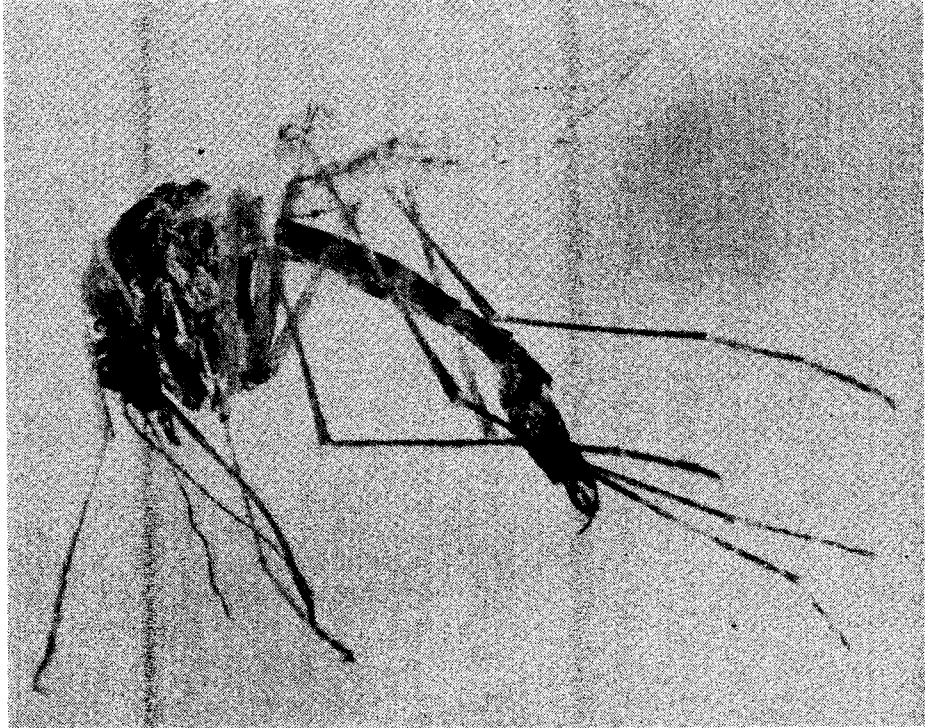


Fig. 1. Bipolar form of *A. vexans*.