ferent insecticides for use in delaying resistance to DDT and dieldrin by Indonesia's primary malaria vectors.

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LABORATORY EVALUATION OF MATERIALS AS LARVICIDES AGAINST MOSQUITOES IN NEVADA[1]

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Agricultural chemicals are not extensively used in Nevada and the direct use of these materials against mosquitoes is even less common. The State possesses no organized mosquito abatement districts. Fogging and spraying operations are sometimes conducted by various urban and military groups in an attempt to provide temporary relief against the hordes of *Aedes* mosquitoes that are often produced by flooded situations. Practically all of these efforts are directed against adult mosquitoes. The public clamor for some form of control measure against mosquitoes fluctuates with the amount of water available for irrigation during the growing season and has recently largely subsided because of 3 consecutive years of drought (1959–61).

The following studies were conducted in 1960 to obtain baseline data on th toxicity of some commonly used larvicide against several of the more important pe species.

METHODS. Fourth instar larvae of *Aede dorsalis* (Meigen), *A. melanimon* Dya *A. nigromaculis* (Ludlow), *Culiseta in ornata* (Williston), *Culex erythrothora* Dyar, and *Culex tarsalis* Coquillett we collected in the field and carefully tran ported to the laboratory. The test proc dure consisted of placing 25 larvae i 400-ml. glass jars containing 250 ml. acetone-distilled water suspension of th various toxicants. Mortality counts we taken after 24 hours, the criterion fo mortality being the inability of the larv to surface. Those pupating were not in cluded in the counts. Controls (distille water) were included in the counts. Th tests were conducted at approximate 75° F. The data are based on 4 to replications with each compound.

[1] In cooperation with the Nevada Agricultural Experiment Station, Reno, Nevada.

TABLE 1.—Dosages expressed in parts per million of various larvicides required to obtain 50 and 90 percent 24 hour mortality in six mosquito species (25 larvae per test—4–10 replications)

		Lindane		DDT		Malathion		Parathion		Bayer 29493	
Mosquito species	Area	LC-50	LC-90	LC-50	LC-90	LC-50	LC-90	LC-50	LC-90	LC-50	LC-90
Aedes dorsalis	Fallon	0.0076	0.015	0.0078	0.022	0.023	0.043	0.002	0.0038	..	..
melanimon	Yerington	.0072	.0086	.0098	.0375	.0225	.076	.0019	.0047	..	..
nigromaculis	Fallon	.0043	.0084	.007	.0155	.012	.032	.0015	.0035	..	..
Culiseta inornata	Fernley	.035	.14	.027	.11	.09	.31	.0052	.0096	0.0056	0.011
Culex tarsalis	Reno	.008	.032	.014	.041	.02	.043	.0019	.0042	.002	.0037
erythrothorax	Hazen	..	..	.028	.048	.022	.054	.0028	.013	..	..

Results and Discussion. The results of the tests are presented in Table 1. A comparison of the LC-50's and LC-90's obtained with the various materials and species indicated that parathion was the most toxic insecticide, followed by lindane, DDT, and malathion, respectively. Bayer 29493 (*o,o*-dimethyl *o*-[4-(methylthio)-*m*-tolyl] phosphorothioate) was tested against *Culex tarsalis* and *Culiseta inornata* only, the results were comparable with those obtained with parathion.

Larvae of *Culiseta inornata* were the most difficult to kill, followed by those of *Culex erythrothorax, C. tarsalis,* and the *Aedes* spp., respectively. *Aedes nigromaculis* was slightly more sensitive to all of the toxicants than *A. dorsalis* and *A. melanimon.* There were no clear-cut differences in susceptibility indicated between these last two species.

Differences in laboratory techniques, laboratory temperatures, and sources of larvae (whether obtained as eggs, first, or fourth instar) probably vitiate any valid comparison with results obtained fron untreated areas, such as those in Californi in the early and mid-1950's. It is, howeve interesting to note that the results obtaine in Nevada generally fall within or belo the ranges reported by various writers fo the same materials from uncontrolled area in California. As an example, the follow ing LC-50 ranges were reported for *Cule tarsalis* larvae by Gjullin and Peters (1952 and Gjullin and Isaak (1957); DD 0.0093–0.0154 p.p.m.; lindane, 0.0118–0.0 p.p.m.; malathion, 0.02–0.035 p.p.m.; an parathion, 0.0032–0.0052 p.p.m. It can b concluded from this study that resistanc to insecticides appears to be no immediat problem in the mosquitoes of Nevada.

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TRAPPING OVERWINTERING ADULTS OF THE MOSQUITOE *CULEX TARSALIS* AND *ANOPHELES FREEBORNI*

ROBERT F. HARWOOD [1]

Introduction. There continues to be considerable interest in finding natural overwintering sites of *Culex tarsalis* Coq. This is desirable in order to determine definitely whether the viruses of western equine and St. Louis encephalitis survive through the winter in this mosquito. As *C. tarsalis* is involved in summer maintenance and transmission of these viruses, it is also desirable to kno when the mosquito emerges from wint diapause, and how large a populati has successfully overwintered. The fin ings related here are primarily direct towards these latter problems. Observ tions on *Anopheles freeborni* Aitken a included since this mosquito was fr quently encountered in overwinteri quarters.

Study Area and Methods. The i vestigation took place in the U. S. Fi and Wildlife Service's Columbia Wildli Refuge near Othello, Washington. T refuge lies approximately twenty mil

[1] Associate Entomologist, Washington State University. This study was supported by a grant (E–2253) from the National Institutes of Health, U. S. Public Health Service. Washington Agricultural Experiment Stations Scientific Paper 2169, conducted under Project 1434.