TOXICITY OF CERTAIN INSECTICIDES TO HYDROPHILID LARVAE

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The chemical control of mosquito larvae is frequently required in habitats of long-standing water such as ponds or rice fields when natural vertebrate and invertebrate predators cannot keep pace with mosquito population increases. Under such circumstances, if a nonselective insecticide is employed to bring about control, natural enemies are destroyed along with the mosquito population. Tarzwell (1947) observed that larvicidal applications of DDT caused a decrease in some invertebrate predators after a period of time, while certain other invertebrates in the environment increased. Gerhardt (1955) studied the effects of a DDT treatment on the invertebrate predators of mosquito larvae in a rice field. After treatment, simultaneous recovery of mosquito and invertebrate predator populations occurred, but the predators recovered to a lesser extent.

The development of synthetic organic insecticides for the control of insect pests has revealed some striking examples of selectivity and non-selectivity. One of the primary objectives of the pesticide industry is the production of pest control agents that do not harm man, domestic animals, wildlife, and natural enemies of the pest at dosages required to control the pest. To a certain degree, this has been achieved with some of the organophosphorous compounds where it has been demonstrated that mosquito control can be obtained by applying appropriate dosages, without undue harm to vertebrate and invertebrate natural enemies (Lewallen and Brydon 1958; Lewallen 1959; Mulla 1961).

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TABLE 1.—Toxicity of insecticides to hydrophi larvae [1]

Compound	Dosage (ppm)	24 hr. perc mortality
Bayer 29493	0.005	20
Parathion	0.005	22
Hercules AC5727	0.04	28
Hercules 7522H	0.1	65
Trithion	0.25	68
Dimethrin	0.09	97
Cynem	0.03	97
Malathion	0.06	100

[1] *Tropisternus lateralis* (Fabr.).
[2] Two to 5 replications with 10 beetles in c replicate were used to obtain the averages gi in the table.

Beetle larvae of the family Hyd philidae are very effective predators mosquito larvae under natural conditi (Baldwin *et al.* 1955). In the studies ported here, larvae of *Tropisternus later* (Fabr.) were used. The primary object was to ascertain the relative toxicity several experimental and regularly u mosquito larvicides to this invertebr predator, recognizing that the results tained in the laboratory may not ne sarily hold in the field.

To prevent cannibalism during the te field collected larvae 1.0 to 1.5 cm. length were confined individually in ml. of distilled water in a four ounce pa cup.[2] One ml. of an acetone solution technical or purified insecticide was plied to each cup with ten cups compris a single test for each insecticide. Trea larvae were held at 70° F.±4° for hours at which time the mortality recorded. Concentrations of insectici approximating the 90 percent let dosage to fourth instar *Culex pipiens q*

[2] Dixie Cup Co., Anaheim, California.

CHEMICAL NAMES OF MATERIALS IDENTIFIED BY CODE OR COMMON NAME

Bayer 29493	O,O-dimethyl O-[4(methylthio)-*m*-tolyl] phosphorothioate
Parathion	O,O-diethyl O-*p*-nitrophenyl phosphorothioate
Hercules AC5727	*m*-isopropylphenyl N-methylcarbamate
Hercules 7522H	2-chloro-5-isopropylphenyl N-methylcarbamate
Trithion ®	O,O-diethyl S(*p*-chlorophenylthiomethyl) phosphorodithioate
Dimethrin	2,4-dimethyl benzyl ester of chrysanthemum monocarboxylic acid
Cynem ®	O,O-diethyl O-(2-pyrazinyl) phosphorothioate
Malathion	S-[1,2-bis(ethoxycarbonly)-ethy]O,O-dimethyl phosphorodithioate

quefasciatus Say were used. Results of the tests are presented in Table 1.

Bayer 29493, parathion and Hercules AC5727 appeared to have the least deleterious effect on hydrophilid larvae under conditions of the test. Hercules 7522H, and Trithion were moderately toxic. Malathion, Cynem, and dimethrin were the most toxic to hydrophylid larvae.

The results of these tests indicate that certain mosquito larvicides can be utilized in control programs without undue harm to invertebrate predators such as hydrophylids.

Literature Cited

BALDWIN, W. F., JAMES, H. G., and WELCH, H. E. 1955. A study of predators of mosquito larvae and pupae with a radio-active tracer. Canadian Entomologist 87(8):350–56.

GERHARDT, RICHARD W. 1955. The effect of an insecticide treatment on some natural invertebrate predators in rice fields. Calif. Mosq. Control Assn. Proc. and Papers 23:124–25.

LEWALLEN, L. L., and BRYDON, H. W. 1958. Field tests with organophosphate granular insecticides against mosquito larvae in Lake County, California. Mosquito News 18(1):21–22.

LEWALLEN, L. L. 1959. Toxicity of several organophosphorous insecticides to *Gambusia affinis* (Baird and Gerard) in laboratory tests. Mosquito News 19(1):1–2.

MULLA, M. S. 1961. Mosquito control investigations with emphasis on the integration of chemical and biological control in mosquito abatement. Calif. Mosq. Control Assn. Proc. and Papers 29: 101–5.

TARZWELL, C. M. 1947. Effects of DDT mosquito larviciding on wildlife. I. The effects on surface organisms of the routine application of DDT larvicide for mosquito control. Public Health Reports 62(15):525–54.

The Proceedings papers included in this issue of *Mosquito News* comprise all of the papers that had been received in final form for publication on the date of going to press, May 14, 1962. It had been planned to group the contributions to the three symposiums together under the subject matter headings, with introductory remarks by the moderators. However, since all the papers were not available in time, owing to delays in clearance and revision for publication, this proposal could not be carried out. It is expected that approved Proceedings papers that were not available for the June number will be published in September.

It is further noted here, as a kind of an Editorial," that the June issue each year may contain papers of a more general and less technical nature, frequently by members who do not contribute at other times, as well as invitational papers by non-members. These papers are welcomed at this time not only because they are a part of the Proceedings, but because often they serve the useful purposes (1) of being educational to the lay public who support mosquito control and form an important part of the membership of the Commission; and (2) they recall to the technically trained workers and to the operators in old, well organized Districts the fact that in many areas mosquito control is still a novelty and a mystery, where the elementary facts of mosquito control, including how to obtain it and how to enlist public support for it, may well be repeated. One of the stated purposes of the AMCA is to provide just such information.