THE ROLE OF *MOCHLONYX CINCTIPES* (COQUILLETT) IN THE REDUCTION OF WOODLAND POOL MOSQUITOES IN OHIO (DIPTERA: CULICIDAE) [1]

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The larvae of *Mochlonyx cinctipes* (Coquillett) are predaceous on mosquito larvae as well as other forms of aquatic life in semi-permanent woodland pools, and the adults do not bite man. In these respects the species may be classed as a beneficial insect. Matheson (1944) writes that the larvae of this species are frequently very abundant in the spring in woodland pools where they are very destructive to mosquito larvae. Cook (1956) believes that the members of the sub-family Chaoborinae, to which *M. cinctipes* belongs, exert considerable control on the numbers of biting species of mosquitoes. He adds that although the actual extent of this natural control has not been investigated thoroughly, his personal observations indicate that the predaceous larvae destroy large numbers of mosquito larvae. James (1957), in his study of *Mochlonyx velutinus* (Ruthe), concluded that it is not a significant predator of biting mosquitoes in the vicinity of Chatterton, Ontario.

During the course of observations conducted on the life history of *M. cinctipes,* a study was made of the economic importance of this species with regard to mosquito reduction in semi-permanent woodland pools in Ohio.

In laboratory feeding tests, third and fourth instar *Mochlonyx* larvae, which were maintained in three-inch shell vials, consumed three to four first and second instar *Aedes aegypti* larvae per day. One particularly voracious specimen disposed of five of these larvae in six minutes. Twinn (1931) obtained comparable results. He found that four *M. cinctipes* larvae ate 46 *Aedes vexans* larvae in nine days. These observations only reveal the biological control potential under experimental conditions. Under natural conditions, the diverse sources of available food tend to reduce such spectacular results.

Hintz (1951) lists ecological situations in order of mosquito production as: (1) floodwater remnants, (2) artificial containers, (3) woodland pools, (4) swamp ponds, and (5) streams and ditches. He adds that this is roughly in reverse order to the abundance of predators. Mead (1949) states that the worst pest species in central Ohio are temporary pool breeders. In semi-permanent pools where *M. cinctipes* is found there are two factors other than predators which limit the size of mosquito populations: (1) Many members of the pool fauna compete with mosquito larvae for available food. Weed (1924), in his study of a pond, felt that cladocerans completely prevented mosquito breeding by utilizing all of the food. (2) Larger animals create an unfavorable environment for mosquito larvae by their movements. Hintz (1951) states that constant escape reactions by larvae and pupae can slow down their development and expose them to predation.

During the study of the immature stages of *M. cinctipes,* it was found that although large quantities of first and second instar *A. aegypti* larvae were consumed in the laboratory, several factors served to mitigate predation in the field. The relative size of the prey is very important. The eggs of *M. cinctipes* hatch at about the same time as those of the pest species in the woodland pools. First instar larvae of biting mosquitoes were dipped from the pools when *M. cinctipes* first emerged. The larvae of *Aedes stimulans,* the most

[1] This work was done while the author was employed as a research assistant in the Department of Entomology at the Ohio Agricultural Experiment Station.

numerous biting species found in the pools, exhibits a greater mean length in each instar than those of the predaceous species. This intrinsic difference in length and the fact that the immature biting mosquitoes develop more rapidly than those of *M. cinctipes* tend to inhibit predatory action. A low degree of predation may occur in the case of large *Mochlonyx* larvae and small pest larvae, since the range of larval lengths is extensive.

The feeding habits of the larvae are another factor which mitigates their value as biological control agents. The crop contents of 80 third and fourth instar *Mochlonyx* larvae which were killed immediately after collection, were placed on slides for examination. Remains of biting mosquito larvae were found in the crop contents of only two larvae. Both mature and immature copepods and ostracods predominated.

The sparse distribution of *M. cinctipes* is another factor which limits its value in the control of biting mosquitoes. There are relatively few situations in Ohio which provide the semi-permanent pools necessary for the completion of the long life cycle of this species. On the other hand, the most important pest species in this state breed in temporary pools.

For the reasons discussed in the previous paragraphs, *Mochlonyx cinctipes* is not considered a significant predator of biting mosquitoes in Ohio.

SUMMARY. A study was made of the economic importance of *Mochlonyx cinctipes* (Coquillett) with regard to mosquito reduction in semi-permanent woodland pools in Ohio. It was found that, although *Mochlonyx* larvae consume many biting mosquito larvae in the laboratory, their omnivorous habit, sparse distribution, and long life cycle make them economically unimportant in the control of pest mosquitoes under field conditions.

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