BIOLOGY OF THE TACHINID *WINTHEMIA DATANÆ* TNS.

By Frank L. Marsh

Union College, Lincoln, Nebraska

In a recent study of the parasites of Cecropia in the Chicago area based on the examination of over three thousand Cecropian cocoons collected in that region[1] some interesting facts were discovered in the life-history of the tachina fly *Winthemia datanae* Tns. For the identification of this insect the writer is indebted to Mr. J. M. Aldrich of the U. S. National Museum. In this instance every case of tachinid parasitization appeared to be the work of this single species. Over the entire area at least three percent of the mature Cecropian larvæ were destroyed by this insect.

Emergence, Breeding Habits, and Oviposition

During a normal season the first adults emerge the second week in July. This appearance happens to be well timed because at that juncture the earliest of the Cecropian larvae have molted the last time before spinning their cocoons. When considered over the whole area the parasitization is rather light but it is the habit of this tachinid to work in limited spots probably including a half dozen trees. In these sporadic areas the infestation is heavy often amounting to the total destruction of the host larvae. Where taller trees were infested by Cecropia six times as many of its cocoons were parasitized by this tachinid when spun below the fifteen-foot level as when spun above that level.

Copulation and egg-laying occur rather intermittently. The males rest on the leaves of the infected trees, at times engaging the females during temporary cessation of their

[1]Marsh, F. L. 1934. "A Regional Study of *Samia cecropia* and Nine Associated Parasites and Hyperparasites." An unpublished Master's Thesis in the Northwestern University Library, Evanston, Illinois.

egg-laying activities. During oviposition the female hovers over the back of the larva, clinging to its tubercles while the eggs are securely attached by their adhesive coating to the skin of the host along the dorsal line. The largest number observed on one larva was 76 while the average was 21. In every case observed larvæ in the earlier stages were passed by, eggs being placed only on those which had molted the last time before spinning. Because of this adaptive behavior the eggs are not shed with the larval skin at molting time. The host larvæ give little heed to the egg-laying, only temporarily stopping their feeding. Oviposition occured more commonly in the latter part of the afternoon on the shaded side of trees and bushes.

Egg and Larva

The eggs are white and measure about 0.8 mm. x 0.3 mm. In about thirty-six hours the endophagous larva gnaws an opening near one end on the adhering side of the egg and tunnels down directly into the cœlomic fluid of its host. Bacterial action causes a blackening of the area of the cuticle where the tunneling occurs and a characteristic dried patch appears around the egg shells in a few hours.

The larvae develop rapidly but due to the eggs having been laid on mature larvæ the host almost invariably completes at least the outer shell of its cocoon before being killed. Such cocoons are usually white in color. If few tachinid larvæ are present the cocoon may be fully completed before the host larva is killed. In every case observed the infected larva always died although it may have been parasitized by but a single tachinid larva. In instances of heavy infestation death of the host occurs in three or four days after the parasites emerge from the eggs.

The dead host turns brown in color and usually presents a distended appearance. Oxygen seems very essential to adult tachinid larvæ, evidenced by an opening which is invariably made in the skin of the host, usually on the ventral surface. This same hole is later used as an exit from the tough, dried skin of the host. The larvæ mature in from six to eight days and may crawl out immediately or may rest for a time in the dried host skin. If a cocoon containing adult

maggots is agitated even slightly the parasites appear much disturbed and usually crawl out immediately.

Once outside the dead host's skin, the larva finds itself still a prisoner in the Cecropian cocoon. It never punctures this cocoon and not uncommonly dies from dehydration before it can escape. The only way out is through the valve of the cocoon. The larva has no fear of dropping and its tough skin insulates it effectively from the shock of landing. In an experiment a handful of these larvae were tossed from a third-story window to cement below. Though bounding several feet with the force of the impact still they began to wriggle away immediately and in each case pupated later, apparently uninjured by the experience.

Upon reaching the ground the maggot at once begins to push into the soil. The depth to which it penetrates depends on how far it must go to find reasonably damp soil, usually from three to eight inches. At the proper depth the soil is pushed out till a cell is formed in which the larva will either pupate after a few days and emerge as an adult in about a week or the larva will hibernate through the winter and pupate the following July. In the region studied the second brood of this tachinid in a summer was the exception rather than the rule. Proper moisture appears to be very necessary for the survival of the larva or puparium. For that reason puparia formed in the host cocoon where the larvæ have failed to escape must immediately develop into adults or perish. If adults chanced to emerge in such situations, they could not escape from the host cocoon. In this study the only successful individuals were those which pupated in the ground.

Three reasons why *W. datanae* is not a more effective parasite of Cecropia in the Chicago area are its habit of ovipositing only on mature larvae, the failure of many of the maggots to escape from the host cocoon, and the great sensitiveness to dehydration on the part of both hibernating larvæ and the puparia.