Tree-Hole Mosquitoes, in Tippecanoe County, Indiana

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During the first week in August it was brought to my attention by Dr. R. M. Cable that some mosquitoes were breeding in a tree hole located in West Lafayette.

The breeding place was in a cavity at the base of a very large American elm *(Ulmus americana* L.). The cavity contained approximately five to six gallons of water. The water contained an abundance of debris, including dead leaves, dead grass, much paper, and numerous cigarette butts. The water was a dark amber color and appeared to have a high concentration of tannin.

Four species of mosquitoes were found to be breeding in this habitat: *Orthopodomyia alba* Baker, *O. signifera* (Coq.), *Aedes triseriatus* (Say), and *Anopheles barberi* Coq.

Some of the larvae were brought into the laboratory, placed in round, enamel pudding pans covered with square pieces of plate glass, where they remained until they reached the adult stage. Some of the adults were killed with chloroform and mounted on card points for identification and study. A representative number of larvae were preserved in alcohol for further study.

Anopheles barberi Coq.

This is not a new record for the state. This species was taken in 1942 in Vigo and Allen county and again in 1943 in Vigo county in a light trap (Christensen & Harmston, 1944). This is a new record for Tippecanoe county, however. Since this species breeds only in tree holes, it is not taken very often.

In comparison to other anophelines this species is very small and delicate, measuring approximately 3.5 mm. in length. The wings are not pictured, as is the case with most species of anophelines occurring in Indiana, but are covered entirely with blackish brown scales.

The larvae are readily identified. It is the only species of Anopheles that has plumose, lateral hairs on the first six abdominal segments.

According to Matheson (1946) this species overwinters in the North as second-stage larvae frozen solidly in the ice in tree holes. The author first discovered larvae breeding in a tree hole during the first week in August. On the nineteenth of August the last of the larvae disappeared and to date (November) have not reappeared. This would tend to indicate that *A. barberi* overwinters in the egg stage in this section of the United States, particularly, since no adults have been observed in the vicinity of the breeding place. Much more study and observation will be necessary to determine the exact biology of *A. barberi.*

Aedes triseriatus (Say)

This is the only species of the four that has ever been taken in a light trap by the author. The females are very annoying biters. This species breeds continuously throughout the season. The winter is passed in the egg stage (Matheson, 1946). The eggs are laid upon the sides of the tree hole, just above the water line, singly or in small groups, attached firmly to the surface. When covered with water, the eggs hatch. There are probably several broods during the season but this has not been determined definitely. The appearance of adults throughout the summer may be due to the development of successive broods of larvae from overwintered eggs hatching at different times (Howard, Dyar, & Knab, 1917).

The water level in the tree hole became very low during the middle of September, at which time no larvae or adults were present. Shortly after that time a heavy rain filled the hole and during the first part of October the larvae started appearing again. This might indicate that the late fall larvae hatched from overwintered eggs which never received optimum conditions earlier in the season.

This is the only species of Aedes that breeds in tree holes in North America.

Orthopodomyia signifera (Coq.) and *O. alba* Baker

The members of this genus are very strikingly marked and easily distinguished from the other genera of mosquitoes. They are represented in the United States by only two species, *signifera* and *alba* which can not be distinguished accurately in the adult stage. The only published records of *alba* are from Ithaca, New York and Adams Dam, Alabama (Matheson, 1946). Since *alba* is indistinguishable from *signifera* in the adult stage, it is quite probable that *alba* enjoys a much wider distribution than the above records would indicate. The larvae of these two species are quite distinctive and can be readily identified.

The air tube of *signifera* larvae is about three times as long as wide while in *alba* it is only about twice as long as wide. The pecten is absent in both species. The hair tuft is large and multiple in the case of *signifera* and located just before the half. *Alba* has a small hair tuft located at the proximal fourth of the air tube. The anal segment of *signifera* is longer than wide and ringed by the dorsal plate. The anal segment of *alba* is about as wide as long and is not ringed by the dorsal plate. The sixth, seventh, and eighth abdominal segments of *signifera* have dorsal sclerotized plates. These are lacking in *alba*. The anal gills are much shorter in *alba* than in *signifera*.

Matheson (1946) states that the larvae of *O. alba* can survive freezing and that this species passes the winter in the larval stage. *O. signifera* larvae are all killed by freezing and it is not known how the latter species overwinters.

The eggs of both species are laid singly, close to the waterline on the side of the hole containing the water (Howard, Dyar, & Knab, 1917). The egg stage is very short, and larval development in the first two in-

stars is very rapid. However, development during the remainder of the larval stage is rather slow.

Both species have been breeding continuously since the first week in August under natural conditions as well as in the laboratory.

The adult mosquitoes are capable of mating and reproducing without receiving any food other than that which is obtained from the water in the breeding pans. A great deal more study and observation will be necessary to determine the exact life cycles of these two species of mosquitos.

Literature Cited

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