

OBSERVATIONS OF *ODONTOPUS CALCEATUS* (COLEOPTERA: CURCULIONIDAE), A LEAF MINER DAMAGING YELLOW-POPLAR

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ABSTRACT

A small black weevil, *Odontopus calceatus* (Say), severely damaged yellow-poplar in some areas of Tennessee during 1965-66. Weekly observations in an area heavily populated with weevils revealed some of its biology. Injury of the trees occurs to the foliage as a result of adult feeding, egg laying and mining of the larvae. Hibernating adults become active about mid-April. Eggs are deposited in the leaf midrib and after eclosion the larvae move into the parenchyma tissue; here the larval stage as well as the pupal stage is completed. The new adults appear about mid-summer and they become the hibernating individuals; there is only one generation each year.

A leaf mining weevil, *Odontopus (Prionomerus) calceatus* (Say), has been causing extensive leaf injury and defoliation to yellow-poplar (*Liriodendron tulipifera* L.) in Tennessee since 1965. The weevil occurs throughout the state but exceedingly large populations occur in some localities in the eastern portion. Even though it appears that yellow-poplar was the preferred host plant, minor damage has been noted on sassafras (*Sassafras albidum* (Nutt.) Nees) and magnolia (*Magnolia grandiflora* L.).

Smith and Weber (1951) reported that this insect damaged both *M. grandiflora* and *M. virginia* in Louisiana. Bray noted damage on sassafras around Marblehead, Massachusetts in 1956. Whitten (1965) reported heavy infestations on both yellow-poplar and sassafras in some areas of Ohio. Neel and Gillespie (1966) reported that an outbreak of the weevil in Kentucky in 1962 damaged *M. grandiflora* and *L. tulipifera*. They stated also that this weevil caused damage in eastern Kentucky as early as 1960.

Beginning in February, 1966, weekly observations were made in an area in Union County that was known to have been heavily infested the previous year. Many habits were noted during the 29 weeks of this study.

Five sites were selected in that infested area and two yd.² duff samples were collected weekly from February 15 to June 28. The number of weevils appearing in the total samples (10 sq. yds.) each week ranged from 11 to 143 or about 5,000 to 70,000 per acre. Weevils were taken from the samples each week. Additional samples were taken on July 26 and August 31 which contained 133 and 13 weevils, respectively. The July 26 sample had the largest number of weevils. Adults had practically disappeared from the trees at this time as jarring of four trees resulted in finding only one adult. No adults were found on trees on August 31 but were recorded from the duff samples.

Nature of Injury. Adult feeding, egg laying, and the mining of the larvae is confined to the leaves. The adults

feed on both surfaces of the leaf mostly near the apex (Fig. 1). A characteristic "rice"-shaped area is eaten out of the epidermis. After a day or two the tissues in that area take on a reddish-brown hue and eventually a hole occurs in the leaf. The number of holes varies from few to as many as 70 or 80 per leaf. The small holes coalesce, resulting in only a few large holes (Fig. 2). Severe feeding by the adults causes the leaves to curl, crumple, and die (all or part), ending in almost complete defoliation (Fig. 3). Many leaves are killed when oviposition occurs near the base of the midrib (Fig. 4). Larvae damage the leaves by producing a mine that inflates as the epidermal tissues dry.

Adult. The adults are black weevils about $\frac{1}{4}$ inch in length. The females are somewhat larger than the males (Fig. 5). Adults overwinter and aestivate in the duff beneath or close to yellow-poplars, and they tend to congregate around ferns growing nearby.

Adults begin to emerge about mid-April with beginning of leaf formation and congregate in the uppermost regions of the trees on growing terminals. Feeding, copulation and oviposition occur soon after emergence. Adults are found on the foliage from mid-April until late July.

Egg. The females puncture the midrib and deposit eggs, usually in pairs (Fig. 6). Each oviposition site contains from two to six eggs in as many as three sites per leaf. The largest number of eggs found on any leaf was 13. Eggs are found from mid-April to about May 10 with the oviposition peak occurring the last of April. No eggs were found after May 17.

Larva. The larvae are dirty white and resemble dipterous larvae (Fig. 7). They are about $\frac{1}{4}$ inch in length and require from two to three weeks for development. The eggs at each oviposition site hatch almost simultaneously, and the larvae make their way from the midrib into the parenchyma tissue. Once they have gained access to the parenchyma tissue, they mine toward the apex of the leaf. They characteristically feed side by side making large mines which inflate as the tissue dries. Many of the leaves damaged eventually die and fall prematurely. By the time the larvae reach the apex they are in the last larval instar, and they pupate in that area. When the leaf is small, the larvae sometimes turn upon reaching the outer edge of the leaf and begin to feed around the leaf margin (Fig. 8). The larvae deposit a continuous string of fecal material in the mine. They always depart from the oviposition site on one

side of the midrib as a group. They were present from the last of April to the last of May.

Pupa. Pupation occurs at the end of the mine in small round cocoons which are constructed between the epidermal layers (Fig. 9). Normally there are six cocoons for each leaf; however, there may be from two to twelve. Pupation begins about the last week of May and continues until mid-June. The adults of the new generation emerge through holes in the lower epidermis. According to Neel and Gillespie (1966) they feed for about a week and then drop to the duff to aestivate.

SUMMARY

About mid-April adults of the leaf-mining weevil emerge from hibernation. They congregate in the uppermost regions of poplar trees where feeding, copulation and egg laying occur.

Eggs are deposited in pairs in the midrib and embryonic development requires from two to seven days. They may be found over a thirty day period—from mid-April to May 10.

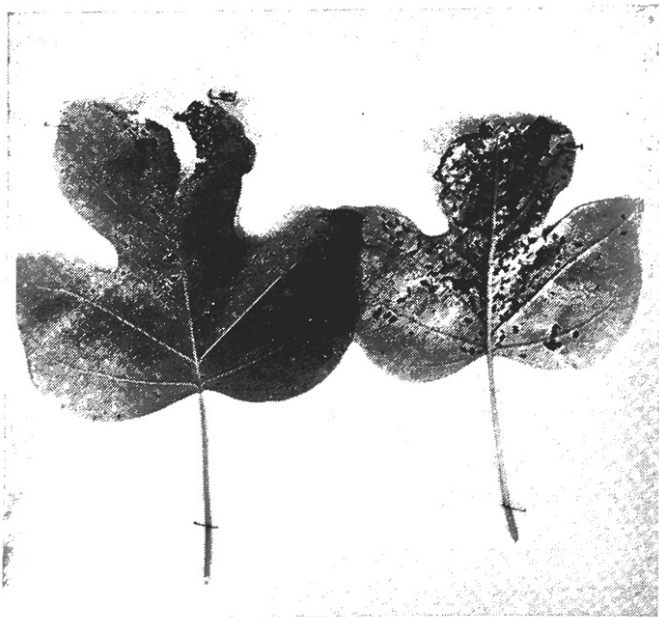


Figure 1. Severe feeding of adults on both lower and upper epidermis resulting in destruction at apex.

Larvae, which require from two to three weeks for development, are found from the last of April to the last of May.

Pupae, requiring about two weeks for development, are present from the last of May to mid-June. The adults of the new generation begin to emerge about the middle of June and continue to emerge until about the first of July, at which time they drop to the duff and aestivate.

This study indicates that in Tennessee there is only one generation of *O. calceatus* (Say) each year. Neel and Gillespie (1966) reported one generation per year for this insect in West Virginia.

LITERATURE CITED

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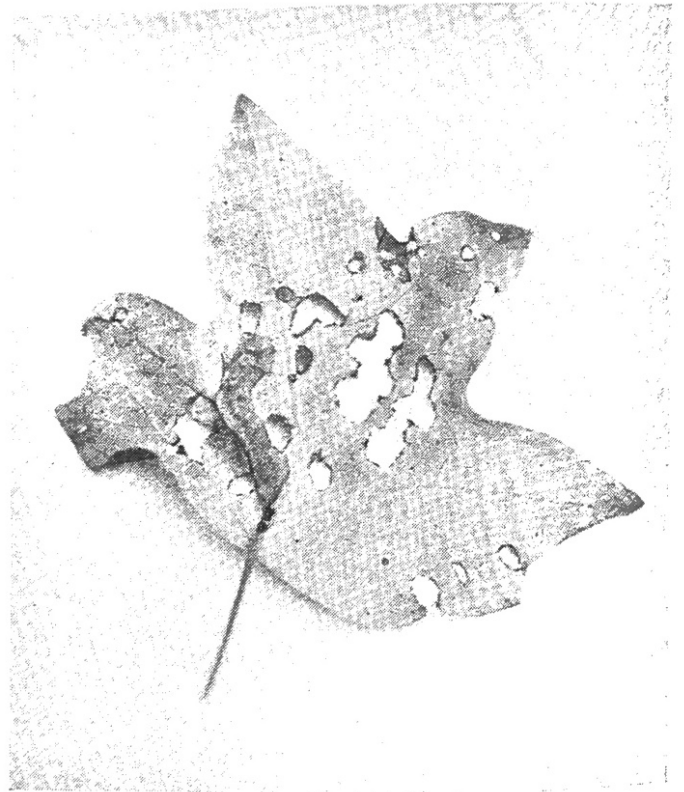


Figure 2. Coalescence of small holes resulting in larger holes. Note oviposition site on midrib and inflated larval mine.



Figure 3. Severe defoliation as result of weevil activities. Picture taken May 17, 1966.



Figure 5. Adult (female). Note characteristic spine on femur of right foreleg. Actual length 3-4 mm.



Figure 4. The dark leaves have been killed as a result of oviposition.



Figure 6. Ventral surface of leaf showing two eggs and broken midrib as a result of oviposition.

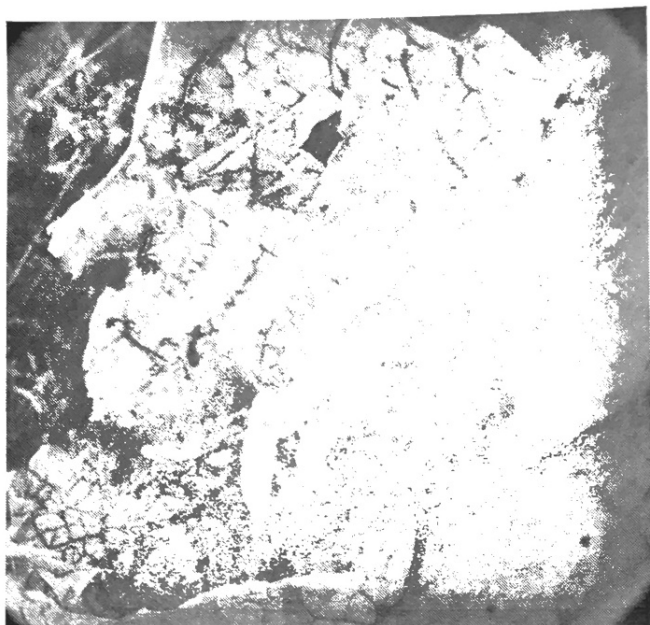


Figure 7. Seven larvae revealed by removal of epidermis. Note side-by-side characteristic feeding habit and excelsior like fecal material.

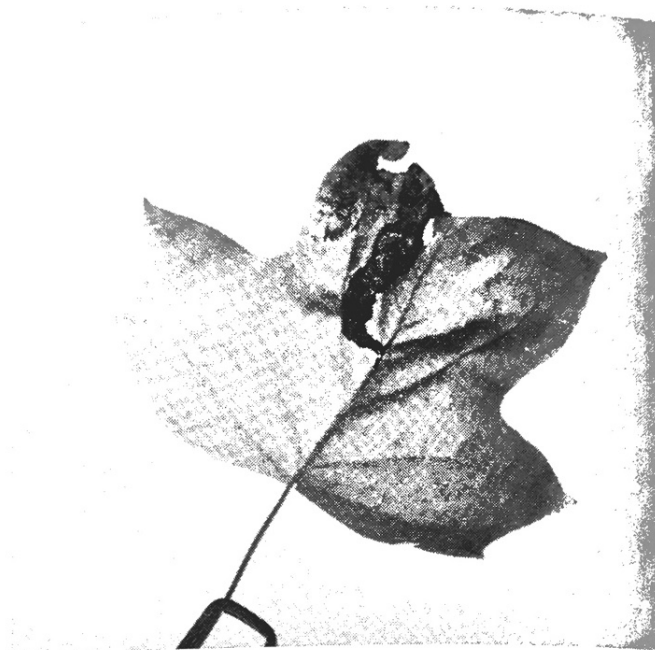


Figure 8. Characteristic mining pattern. The larvae have reached the apex and have turned and begun to mine down and around the leaf margin. Note 5 larvae at end of mine, side by side.

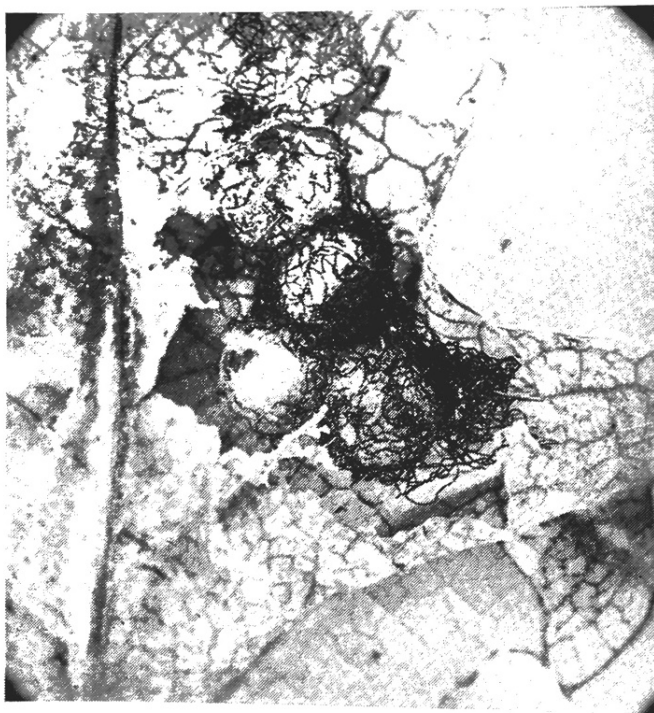


Figure 9. Four cocoons between lower and upper epidermis that have been constructed from leaf tissues and fecal material.