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OBSERVATIONS OF *AMORPHA*-FEEDING *CATOCALA* (NOCTUIDAE) IN WISCONSIN

Additional key words: Catocalinae, *abbreviatella*, *whitneyi*, *amestris*, Fabaceae, prairie.

Although recent efforts to preserve and restore Wisconsin prairies have focused attention on prairie *Catocala* whose larvae feed on lead plant (Fabaceae: *Amorpha*), little has been published recently on the early stages of these moths (see Dodge, E. A. 1925. Entomol. News 36:267–268 for larval notes). Here we report our observations in Wisconsin on three of the largely sympatric *Amorpha*-feeding *Catocala*: *C. abbreviatella* Grt., which occurs from Manitoba to Texas and east to central Wisconsin and Illinois; *C. whitneyi* Dodge, which ranges slightly farther southeastward to northern Kentucky; and *C. amestris* Stkr. which ranges further to Florida.

We first encountered *C. whitneyi* on 16 July 1978 when RJB flushed an adult out of the grass while observing *Hesperia ottoe* Edw. (Hesperiidae) on Muralt Bluff Prairie (Green Co., Wisconsin), a 62-acre dry prairie on a curved ridgetop of sandstone thinly capped with limestone. Over 100 species of prairie plants have been identified on this ridge, where managed fires have halted the invasion of encroaching woody plants (Department of Natural Resources, Wisconsin Scientific Areas. 1977. 52 pp.). Xeric conditions have fostered abundant growth of *Amorpha canescens* Pursh.

Subsequently, having obtained the necessary permits from the Wisconsin Department of Natural Resources, we attempted to attract adult *Catocala* at Muralt Bluff with artificial bait, fluorescent blacklights, and a 175-watt mercury vapor lamp. Although the open prairie was not conducive to baiting, short baitlines at the edges of the prairies attracted one *C. whitneyi* and three *C. abbreviatella* adults. Initially, *C. whitneyi* was thought to be uncommon; at least we seldom collected this species during the period between 2130 and 0030 h. Although never as common as *C. abbreviatella* during fifteen nights of observations over a six-year period (1986–91), *C. whitneyi* was, however, later found to be more common at its peak flight time between 0130 and 0300 h (*C. abbreviatella* numbers peaked between 2300 and 0200 h). Our earliest Wisconsin collection dates for *C. abbreviatella* and *C. whitneyi* were 27 June and 2 July, respectively.

We began our search for larvae on Muralt Bluff and neighboring prairies on 18 May 1990 between 1900 and 0100 h as larvae were thought to be crepuscular or nocturnal. Leaf buds of *Amorpha* were barely opening and no larvae were found on 18 May. The sites were revisited on 26 May, 1 June, and 19 June 1990. By 26 May the leaves had begun to unfurl and we found 36 *Catocala* larvae ranging in length from 13–47 mm (\bar{x} = 30, SD = 8 mm). Most larvae rested at the uppermost tips of old growth, with no more than one or two individuals per plant. The striped larvae appeared cryptic against the *Amorpha* stems and were capable of jumping when disturbed. On 1 June another search yielded 46 more *Catocala* larvae ranging in length from 15–53 mm (\bar{x} = 42 \pm 9 mm).

Larvae found on nearby north-facing slopes were significantly less advanced in their growth. By 19 June no more larvae could be found on mature leaves.

Captured larvae were reared individually on *A. canescens*. None of the field-collected larvae were parasitized. All adults reared from these larvae in 1990 proved to be *C. abbreviatella*. Its larval ground color was generally pale whitish brown, tinted with olive, orange, and yellow in the third, fourth, and fifth instars, respectively. Final instar larvae were marked with longitudinal double lines. Bands were separated by a stripe of the body color having a row of brown dots through the middle. A brown dorsal line was followed by a brown subdorsal band outlined in dark brown with a dotted brown line through the middle. The next band was much lighter. A distinctive dark brown spiracular band, which was outlined in black, had dark blue spiracles on the lower line. Below this was a broad pale yellow band and another subspiracular light brown band. Brown stripes extended onto the white head. The underside was greenish-white with a black spot on each body segment. Larvae were semi-loopers with prolegs retained and bodies tapered at both ends.

Larvae grew about 1.7 mm per day and upon reaching just over 50 mm wrapped themselves in leaves with silk, became quiescent, and assumed a curled prepupal position between 31 May and 18 June (\bar{x} = 7 June). Each larva remained as a prepupa for about five days prior to becoming a deep reddish-brown pupa measuring 20–25 mm long. The pupal stage lasted 15 to 25 days (\bar{x} = 20 \pm 2 days; n = 28), but those larvae pupating earliest spent five days longer in the pupal stage compared to the latest. Eclosion occurred only at night between 28 June to 11 July (\bar{x} = 1 July \pm 2 days; n = 28).

In 1991 we resumed our larval search in a season that was over a week advanced from normal due to continued warm temperatures. A daytime search by TSB between 1400 and 1700 h on 24 May 1991 produced only an old pupal shell at the base of *A. canescens*. The first larva was found at 1800 h resting on dead plant growth from a previous year. Between 2045 and 2130 h another ten larvae were found on nearby prairies and between 2230 and 2330 h 25 more larvae were noted on Muralt. Larvae generally were between 30 mm and 40 mm in length; nine of the largest were collected for rearing. Eight of nine larvae pupated between 26 and 31 May; three died in the pupal stage, but the remaining five eclosed as adult *C. abbreviatella* between 15 and 19 June 1991.

Returning to Muralt on 31 May 1991, RJB found no larvae before dark but between 2300 h on 31 May and 0200 h on 1 June 1991, he noted 19 larvae scattered over Muralt prairie resting above dew soaked vegetation on old *A. canescens* growth. Despite profuse new *A. canescens* growth on a recently burned section of the prairie no larvae were found on the burned area. Ten hours were then spent watching 3 individual larvae which were found resting on two *A. canescens* plants between 0200 and 1200 h. At 0425 h one 40 mm larva began feeding. It finished feeding at 0450 h whereupon it moved to the base of the plant where it continued to remain motionless. The other two larvae also had moved to the base of the plant as darkness faded at about 0445 h but each went up to feed for about 20 minutes, one at 0730 h and one at 1000 h, before returning to the base. No more larvae were found on subsequent trips to this prairie on 6 June 1991 when the temperature dropped to 9°C or on 14 June 1991.

Of ten larvae collected on 31 May and reared on *A. canescens*, seven pupated between 5 and 12 June 1991. On a hot 29 June night between 2230 and 2300 h three of the pupae eclosed, producing two *C. whitneyi* and one *C. abbreviatella*. When collected, we thought that all ten larvae were *C. abbreviatella*, but our later examination of larval photographs revealed that the creamy white *C. whitneyi* larvae with longitudinal bands matched the *C. whitneyi* description given by Dodge (*op. cit.*). Our photographs showed that *C. whitneyi* larvae had bands that were more irregular, more grey, and less clearly defined; and that those *C. whitneyi* larvae with reddish spiracles above a white stripe of body color lacked the pale yellow band found beneath the dark blue spiracles in *C. abbreviatella*. Three more *C. whitneyi* eclosed between 3 and 5 July 1991.

Also on 31 May 1991, at another dry prairie about 80 km east of Muralt in the southern Kettle Moraine, TSB found seven *C. amestris* larvae resting on *A. canescens* between 2200 and 2300 h. An additional five larvae were noted there on 1 June 1991 by RJB.

The seven larvae collected on 31 May were reared on *A. canescens*; they pupated between 2 and 5 June and eclosed between 22 and 25 June 1991.

These observations show that *C. abbreviatella*, *C. whitneyi*, and *C. amestris* all feed on *A. canescens* in Wisconsin. *Catocala whitneyi* and *C. abbreviatella* were found to be sympatric whereas *C. amestris* was found separately (except for one worn *C. amestris* adults taken at Muralt on 2 July 1988). We provided several eggs from adult female *C. abbreviatella* and *C. whitneyi* captured in 1990 to Wayne Miller who successfully reared them to adults. The two *C. whitneyi* he reared took about a week longer to develop than *C. abbreviatella*.

Six adults and two preserved larvae have been deposited at the Peabody Museum of Natural History at Yale University and at the Milwaukee Public Museum. We thank Larry Gall, Allen Young, and Mogens Nielsen for helpful suggestions on the manuscript.

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OBSERVATIONS ON *CATOCALA MARMORATA* (NOCTUIDAE)

Additional key words: underwing moths, behavior, Virginia, West Virginia, collecting techniques.

During the past decade I have been studying *Catocala marmorata* (Edwards) in Virginia and West Virginia. This moth is not as rare as sometimes implied (e.g., Sargent, T. D. 1976, *Legion of night*, Univ. Massachusetts Press, Amherst, 222 pp.; Covell, C. V. 1984, a field guide to the moths of eastern North America, Houghton Mifflin Co., Boston, 496 pp.), but rather has a somewhat localized distribution. Collecting methodology also greatly influences capture success. My field collection records for *C. marmorata* in Virginia and West Virginia span 68 days, from 28 June (1991) to 3 September (1981) and indicate that the moth is most common in mid to late August. Females retained for oviposition have lived as long as 81 days after capture, and as late as 30 October (1989), suggesting an unusually long flight period for this species, probably late June through October.

My introduction to *Catocala marmorata* was in Pendleton Co., West Virginia, between 26 and 30 August 1981, when I collected three specimens at the same location. On 3 September 1981, I collected seven *C. marmorata* in Montgomery Co., Virginia. All ten specimens were resting on tree trunks 0–3 m above ground, with ambient temperatures of 30–33°C. By contrast, *C. marmorata* was not seen during trips to the same two areas through the period 1982–85 (collecting between 14 August and 3 September), when ambient temperatures ranged between 21 and 28°C. (Collecting above 3 m on tree trunks was not attempted between 1981 and 1985.)

Between 21 and 23 August 1986 in Montgomery Co., Virginia, I collected six *C. marmorata* as they rested on tree trunks 3–5 m above ground, with ambient temperatures between 23 and 28°C. On return to the same locality on 17 August 1987, I collected 14 specimens on trunks within 1 m of the ground, when the temperature was about 35°C, but saw no moths on 16 August 1987 at the same locality when the temperature was about 28°C.

A total of 100 adults has been collected in Giles and Montgomery counties, Virginia, and Pendleton County, West Virginia, between 22 July 1988 and 24 August 1991. All of