

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

the collecting localities were in deciduous woods between 730 and 1130 m elevation and in the vicinity of a stream or pond. Daytime maximum temperatures during these collecting periods ranged from a low of 21°C on 7 August 1989 to a high of 35°C on 8 July 1991. On warmer days (30–35°C) adults often were collected 0–2 m above ground. On cooler days (21–29°C), adults were seldom encountered, and were usually resting 3–8 m above ground when flushed from trees. Often, moths were not found on tree trunks in the mornings, whereas many were found there in the warmer afternoons of the same day. Such behavior may be an attempt by moths to regulate body temperature by roosting higher in trees when the ambient temperature is cool and moving lower on the trees as the temperature rises. Such movements also may minimize desiccation as temperatures rise during the day.

My best collecting for *C. marmorata* was achieved by tapping large diameter white oak (*Quercus alba* L.: Fagaceae), maple (*Acer* sp.: Aceraceae), and hickory (*Carya* sp.: Juglandaceae) trunks during warm afternoons. Trees with diameters greater than 0.5 m were the most productive. I have also collected *C. marmorata* on white pine (*Pinus strobus* L.: Pinaceae), red oak (*Quercus rubrum* L.), tulip tree (*Liriodendron tulipifera* L.: Magnoliaceae), and other large trees with light-colored bark.

Unlike most underwings, *C. marmorata* rests head-up on the trunks of trees. When the moth alights on a tree, the dark forewing bands are carefully aligned with bark furrows before settling into a resting position. In this manner, adults become extremely cryptic and are almost invisible. The species is sluggish and, unless vigorously disturbed, seldom flies very far. The slow, fluttering flight is distinctive when compared to the flight of species of similar size found in the same area (*C. subnata*, *C. cerogama*, *C. ilia*, *C. vidua*, and *C. cara*).

I dissected 40 females that died in captivity. A female that survived for 81 days (collected 10 August 1989) had about 50% of the ova mature (mature ova are dark; immature ova are yellow). Dissections of other females show that the ova begin to enlarge and darken 4–6 weeks after capture, which suggests that these moths do not oviposit until the females have lived for 6–8 weeks. Thus, oviposition probably occurs mostly during September and October depending on the emergence date of the female. Of the 40 females dissected, only 4 (10%) had mature ova. Only two of these females had oviposited in captivity and their eggs did not hatch. Thus, to obtain viable eggs from *C. marmorata*, it appears that one must either be fortunate enough to collect an aged female or else keep a collected female alive for 6–8 weeks and induce it to oviposit.

Most of my collecting sites were distant (1.5–8 km) from suspected foodplants: willow (*Salix* sp.) and poplar (*Populus* sp.) (Salicaceae). Suspected foodplants (*Salix*) were in the immediate vicinity at only two of my six collecting sites. Thus, presence of large trees with light bark seems to be a better predictor for finding adult *Catocala marmorata* than presence of foodplants. Perhaps females move closer to foodplant sites later in the season when oviposition occurs. This could explain why worn females were seldom collected and why dissection of collected females usually resulted in finding only immature ova.

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