

## OBSERVATIONS ON *ANACHARIS MELANONEURA* (HYMENOPTERA: FIGITIDAE), A PARASITE OF *HEMEROBIUS STIGMA* (NEUROPTERA: HEMEROBIIDAE)<sup>1</sup>

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**ABSTRACT:** Hymenoptera of the figitid genus *Anacharis* Dalman are frequently recorded as parasites of hemerobiids, but little is known about their biology. Figitid wasps, tentatively identified as *Anacharis melanoneura* Ashmead, were reared from field-collected larvae of *Hemerobius stigma* Stephens at Knoxville, TN. Wasps were allowed to parasitize *H. stigma* larvae from a laboratory colony. Developmental time from oviposition until adult emergence was 20 days (19-21, n=5). Adult longevity was 15.5 days (6 and 25, n=2) for field-collected specimens and 10.5 days (4-23, n=5) for laboratory-reared specimens. Oviposition behavior was noted and illustrations of the lateral habitus of the parasite female, last instar larva, and pupa are provided.

Literature pertaining to larval parasites of the Hemeroibiidae is not extensive. Killington (1936) summarized much of the early work relating to the species in Great Britain. In the Nearctic region, most references to parasites of hemerobiids (Muesebeck et al. 1951, Krombein et al. 1979a, b) lack specific identification of either the parasite or both parasite and host. Wegenek (1950) reared figitid wasps (*Anacharis* spp.) from *Hemerobius neadelphus* Gurney, *H. ovalis* Carpenter, and *H. pacificus* Banks. *Anacharis* sp. has also been reared from *Micromus posticus* Walker and *M. subanticus* Walker (Selhime and Kanavel 1968). Deyrup and Deyrup (1978) reared *Charitopes* spp., *Anacharis* sp., *Aegilips* spp., and an unidentified ceraphronid from *Hemerobius* cocoons. Despite the records of parasites reared from hosts, it is not always possible to distinguish a parasite as a primary or hyperparasite (Killington 1936).

In the few references to biologies of these parasites, Deyrup and Deyrup (1978) noted that *Charitopes* spp. oviposited on mature hemerobiid larvae (prepupal) within the cocoon. Wegenek (1950) provided general observations on *Anacharis* spp. host, pupation, and emergence of the adult. Later, Selhime and Kanavel (1968) recorded the developmental time and host preference for *Anacharis* sp. on *M. subanticus* and *M. posticus*. They

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considered *Anacharis* sp. to be a possible major factor in limiting populations of *M. subanticus* in Florida. Hymenoptera of the genus *Anacharis* Dalman are the most frequently recorded parasites of the hemerobiids (New 1982).

## MATERIAL AND METHODS

During a study of *Hemerobius stigma* Stephens at the University of Tennessee, Knoxville, two female *Anacharis melanoneura* Ashmead emerged from two larvae on 17 and 22 April 1982. The parasitized larvae had been collected as third instars on white pine, *Pinus strobus* L. Adult parasites were placed in 3.5 X 9.5 cm petri dishes lined with a 9.0 cm disk of coarse filter paper. Small droplets of honey were placed on the filter paper as a food source for adult parasites, and a 1/2-dram vial filled with distilled water and plugged with cotton was placed in a container. All specimens were maintained at 20-22°C under an approximate 12h photophase. After parasites were allowed to oviposit in *H. stigma* larvae, parasitized larvae were removed and placed in Falcon™ 1.0 X 5.0 cm culture dishes. Larvae were fed white pine aphids, *Cinara strobil* (Fitch), and allowed to develop. Data were recorded as averages, followed by ranges and number of observations in parentheses.

Tentative identification of *A. melanoneura* in this paper was made by A.S. Menke. Voucher material was deposited in the collection of the U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C., and the insect collection of Auburn University, Auburn, AL.

## RESULTS AND DISCUSSIONS

*Anacharis melanoneura* was strictly a larval parasite that oviposited in late second and third instar *H. stigma* larvae. The parasite occasionally palpated an early second or late first instar with its antennae, but did not oviposit. Early first instars were ignored. Selhime and Kanavel (1968) reported that *Anachris* sp. readily parasitized first instar *M. subanticus*. We observed that *A. melanoneura* occasionally palpated parasitized larvae without ovipositing. Prepupae<sup>4</sup> and pupae removed from cocoons did not

<sup>4</sup>The last instar is quiescent for a time before ecdysis to a pupa. This quiescent time has been referred to as the prepupa by Killington (1936) and occasionally as a quiescent third instar (e.g. Selhime and Kanavel 1968). Two molts are required for the metamorphosis of a larva with internal wings to an adult with functional wings (Hinton 1963). We are aware that this prepupal stage does not represent a separate morphological stage. We use Killington's (1936) terminology in order to associate the parasite's actions with a particular time during third instar development prior to the larval-pupal molt.

become parasitized, but the parasite would often palpate these potential hosts. This antennal palpation often elicited a wriggling response from the prepupa and pupa. Parasitized prepupae were also palpated and exhibited the wriggling response.

After a potential host was placed into the cage, the parasite responded quickly by increasing its activity and rapidly tapped the substrate with its antennae. When the parasite neared an *H. stigma* larvae, it palpated the hemerobiid a few times, then held its wings aloft, bent its abdomen between its legs, and inserted the ovipositor into the center of the hemerobiid's dorsum. One *H. stigma* larva was observed to rear back and "snap" at the parasite, then run off with the female ovipositing as it moved.

Laboratory parasitized larvae appeared to develop normally. They still readily fed on *C. strobi*, molted into a third instar, entered the prepupal stage and spun the typical two-layered hemerobiid cocoon. After 7.5 days (6-9, n=6), the larval parasite ate its way through the ventral or lateral portion of the host's abdomen. The larval stage outside the host (Fig. 1A) lasted 3.5 days (3-8, n=6). During this time, the host was completely consumed, including sclerotized areas such as the head capsule and mandibles. Handlirsch (1896, cited in Killington 1936) noted that *A. ensifera* Walker and *A. typica* Walker exited the host between the legs, sucked it dry and finally ate the entire remains. *Anacharis* spp. required two days to consume the entire prepupa and an additional 24h before it entered its own prepupal stage (Wegenek 1950). The larva of *A. melanoneura* remained within the host's cocoon and eventually pupated. This exarate pupal stage (Fig. 1B) lasted 7.3 days (4-10, n=6), but has been recorded as lasting up to 14 days for *Anacharis* spp. (Wegenek 1950). Pupae of *A. melanoneura* changed from cream color immediately after pupation to fuscous prior to adult emergence. The adult remained in the hemerobiid cocoon until it hardened and darkened, then chewed a hole through the silk and exited. The total time from oviposition until adult emergence for laboratory specimens was 20 days (19-21, n=5). A similar developmental time (18-19 days) was recorded for *Anacharis* sp. reared from *M. subanticus* by Selhime and Kanavel (1968).

Newly emerged females (Fig. 1C) reared from field collected larvae oviposited into *H. stigma* larvae within a day. None of the laboratory reared progeny of these females were observed to oviposit; they probably were all males. Attempts were made to mate the progeny with the parents in order to establish a colony, but no contact or mating behavior was observed. Adult longevity for specimens reared from field-collected hemerobiid larvae was 15.5 days (6 and 25, n=2), whereas that for laboratory-reared specimens was 10.5 days (4-23, N=5). Adults of *A. melanoneura* readily fed on the honey and visited the water that was provided in the rearing containers.

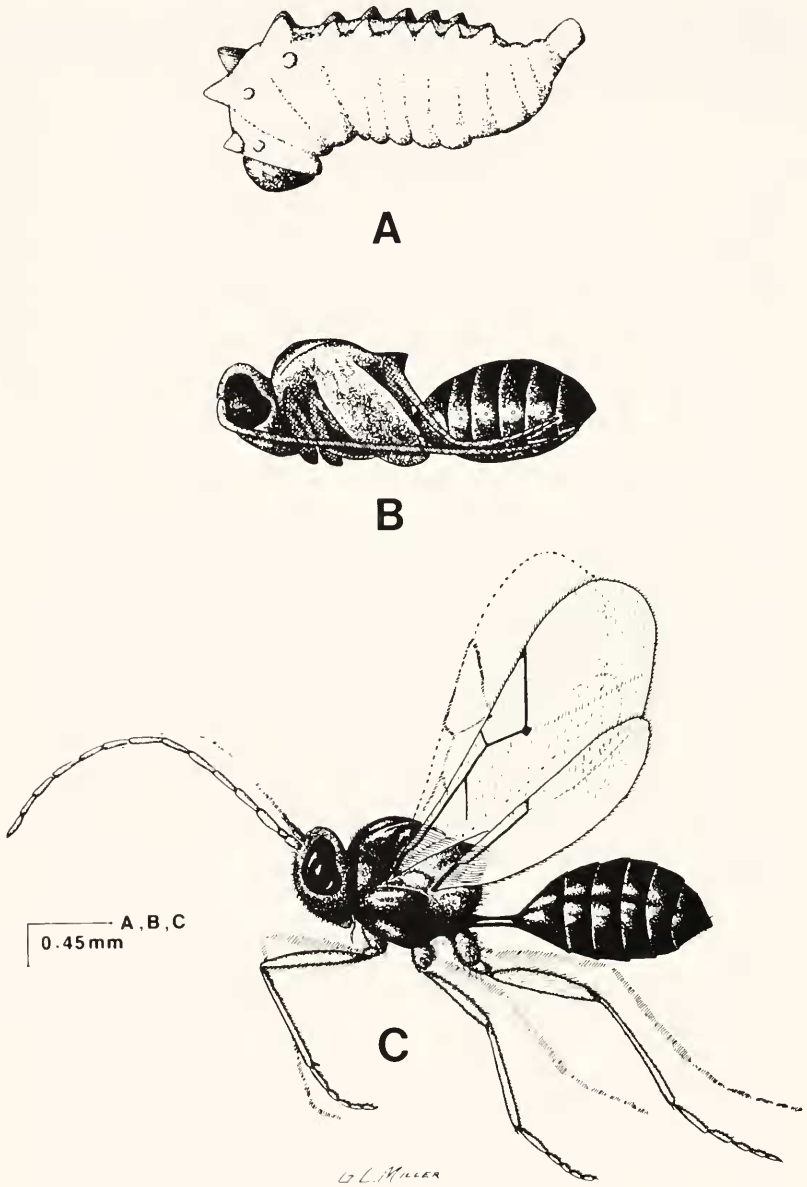


Fig. 1. Larval, pupal, and adult stages of *Anacharis melanoneura* Ashmead; A, Last stage larva after it consumed its host; B, Pupal stage; C, Lateral habitus of adult female.

Because *H. stigma* may be useful as a biocontrol agent for *C. strobil*, additional studies on the biology of *A. melanoneura* and its impact on the predator population are needed.

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#### EDITOR'S ANNOUNCEMENT

The September - October 1985 issue of ENTOMOLOGICAL NEWS may be late. It may not get published until sometime late in October or early November. This will mean, hopefully, a mailing around the middle of November. Please allow extra time for delivery of this issue before thinking your copy either was not addressed or was lost in the mail, and before writing a note of inquiry and/or a request for a duplicate copy. Thank you.

It is expected the November - December issue will be mailed late in December.