

BIOLOGICAL AND ECOLOGICAL OBSERVATIONS ON
MYDAS MACULIVENTRIS WESTWOOD (DIPTERA:
MYDAIDAE) AS A PREDATOR OF WHITE GRUBS¹

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Very little is known concerning the life histories and habits of flies of the family Mydidae. A perusal of the various indices and reviews shows that the literature is not extensive. Curran (1934) stated that probably larvae of all species live in rotten wood. Clausen (1940) reported that larvae of some species live in rotten wood and feed on coleopterous larvae in that environment. Howard (1903) mentioned several species as predators of insect larvae in wood and further mentioned that adults of several species are mimics of various wasps. Comstock (1949) reflected the general lack of knowledge on the habits of these flies by stating that "the larvae of some species at least live in decaying wood. . . .". Essig (1942) stated succinctly that little is known concerning the biology of these flies. Several authors mention that some species live in rotten wood, but none appears to have reported members of this family as being of subterranean habits. C. W. Johnson has listed several Florida species (1913) and has contributed a partial revision (1926) of the North American species of the family. According to most authors the Mydidae are largely tropical in their distribution.

The adult flies are known predators of various insects. It would appear from a search of the literature that any careful observations would be a contribution to our knowledge of the biology and habits of these diptera. The present paper is an effort toward that end.

In October and November, 1953, larvae of Scarabaeidae were observed in considerable numbers under garden sod at Lake Worth, Florida. Associated with these grubs were large dipterous larvae that the writer tentatively identified at the time as probably maggots of the related family Asilidae, known predators (Sweetman, 1936) of Phyllophaga and related scarab genera. The maggots were obviously predatory upon the grubs.

The sod under which this fauna occurred was composed of crabgrass, *Digitaria sanguinalis* L.; broad-leaved carpet grass, *Axonopus furcatus* (Fugge); Bermuda grass, *Cynodon dactylon* (L.) Pers.; and St. Augustine grass, *Stenotaphrum secundatum* (Walt.) Kuntze. There were scattered plants of goose grass, *Elusine indica* Gaertn; smut grass, *Sporobolus poiretii* (Roem. and Schult.) Hitchc.; and on the higher spots Natal grass, *Rhynchoselytrum roseum* (Nees.) Staff - Hubb. The area was partly shaded by some royal poinciana trees, *Delonix regia* (Boj.) Raf., and silk trees, *Albizia julibrissin* (Willd.) Durazz.

Several of the predatory maggots were confined for observation in soil with the host insects. The host grubs were killed rather slowly over a period of two or three days, apparently by having their body fluids withdrawn by the maggots until the host was reduced to a shrivelled skin.

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Several of the maggots were taken to the Everglades Experiment Station on November 5, 1953, for rearing. They were placed in jars fitted with screen wire lids, partly filled with soil from the collection site, and periodically supplied with larvae of phytophagous scarabs. Since earthworms were quite plentiful in the moister and more fertile portion of the collection area, one larva was supplied only these worms for food after the second feeding. Soil moisture in the containers was maintained at a moderate level, avoiding both excessive aridity and saturation. The level maintained was approximately equivalent to that in the collection area at time of collection.

Since maggots of several stages were present, only those that appeared more mature, about one inch in length, were collected for rearing. However, pupation of three individuals did not occur until August 24 of the following year, and emergence of the imagoes about three weeks later on September 21, 1954. Another maggot had pupated by September 5 and emerged by September 30. One maggot failed to complete its development. Thus it would appear that the life cycle may require at least two years. The larva supplied with earthworms also completed its development, although in the latter instance the host was not killed by feeding of the maggots. The adult flies that emerged were recognized as belonging to the Mydidae, not Asilidae as at first suspected. Specimens were sent to Dr. H. V. Weems of the Florida State Plant Board for determination. He identified the material as *Mydas maculiventris* Westwood, and subsequently had his determination confirmed by W. W. Wirth of the U. S. National Museum. A few adult flies of this species have been observed annually during August, September and early October since the above determination was made, and were of frequent occurrence in the vicinity of the 1953 collection in the late summer of 1955.

Johnson (1926) gives *M. incisus* Macq., *M. pachygaster* Westw. and *M. parvulus* Westw. as synonyms of *M. maculiventris*. In the earlier paper (1913) he reported *M. maculeventris* from Florida under these synonyms. According to Johnson male dimorphism in the species has contributed to this confusion. While Johnson (1926) gave *M. incisus* as an absolute synonym in the text of his paper, he listed it as a variety of *M. maculiventris* in the key to species. All of Johnson's specimens were collected near St. Augustine between 1880 and 1888.

Adult females of *M. maculiventris* have been observed in August and September alighting on the sod surface and bending the abdomen downward and forward, probably to oviposit, although search did not reveal eggs.

In view of the fact that the larval habitat of Mydidae is generally reported to be rotten wood, it is interesting to note that the larva of *Mydas maculiventris*, at least, is a soil inhabiting form predatory upon the larvae of phytophagous scarabs and have been observed on sandy soils with a relatively low organic content. This mydoid was observed in the Lake Worth area in numbers sufficient to indicate that, if the species were widely distributed in sod land areas, possibly the maggots would be of importance in helping to prevent development of serious white grub infestations. However, this mydoid probably is not generally common enough to be of much economic value.

The soil from which the maggots were collected was a very gently sloping, well drained to moderately drained Arzell or Davie fine sand. Only the lower end contained considerable organic content. This mydaid has not been observed on the organic soils, although larvae of *Cyclocephala borealis* Arrow, a probable host, constitute a conspicuous element of the soil fauna on much of these sod and pasture lands. The genus *Phyllophaga* must be extremely rare if it exists at all on the Everglades sawgrass peat and muck soils, except possibly where these lie adjacent to the mineral soils. Scarcity of suitable adult hosts in these areas may account for *Phyllophaga* scarcity. During a decade spent in the area the writer has not seen adult emergence of *Phyllophaga* on the organic soils. Species of *Phyllophaga* do occur commonly on certain adjacent sandy lands, and emergence of both *Phyllophaga* and *Cyclocephala* have been observed at the site of the 1953 collection of *M. maculiventris*.

Since scarab larvae other than *Phyllophaga* are quite plentiful and are occasionally economic pests on the organic soils of the Everglades, some soil factor may account for the apparent lack of these predatory Diptera in the Everglades.

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