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A DESCRIPTION OF THE MATURE LARVA AND COCOON OF THE BEE *THYGATER* (HYMENOPTERA; ANTHOPHORIDAE)

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Abstract.—The larva and cocoon of an undetermined species of the eucerine bee *Thygater* are described and the larva illustrated and compared with those of other eucerine genera. The conservatism in morphology exhibited by eucerine larvae extends to this genus.

During the course of excavations of the nests of halictine bees at Ocosingo, Chiapas, Mexico in January 1985 (Packer, 1985) three cocoons of an undetermined bee species were unearthed. Upon later dissection, two fully grown larvae and a partly decomposed adult female bee were found inside the cocoons. The bee has been identified by Professor C. D. Michener as a member of the genus *Thygater*. Unfortunately, its poor condition makes it impossible to identify to the species level. According to the larval apoid catalogue produced by McGinley (unpubl.), larvae of this genus have not been previously described, although the nest architecture of one species, *Thygater analis*, has been studied by Rozen (1974). This paper is the first description of the larva of a bee of this genus. Additional comparative notes are made between the larva of *Thygater* and those of other eucerine species.

NEST STRUCTURE

The nest site has been described elsewhere (Packer, 1985). The *Thygater* cells were discovered at a depth of about 60 cm. It is not known whether the nest entrance had been in level ground or in the vertical side of the bank. Because the cells were discovered accidentally, few details of the nest architecture are available. The cells were oriented vertically and placed singly at the ends of short vertical burrows that probably represented two separate branches from the main entrance burrow. The nest architecture appears to be similar to that of *Thygater analis* (Rozen, 1974) and other eucerines (Bohart, 1964; Miliczky, 1985; LaBerge and Ribble, 1966; Rozen 1964, 1969, 1974).

DESCRIPTION OF LARVA

The following description is in the format of Rozen (1965) and is based upon 2 mature, predefecating larvae that were preserved in alcohol. Because of time constraints on the day of excavation, no detailed description of the shape of the larvae was made. Furthermore, because of poor fixation, the preserved larvae do not retain

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their original overall shape. Nonetheless, in general habitus the larvae are of typical eucerine shape.

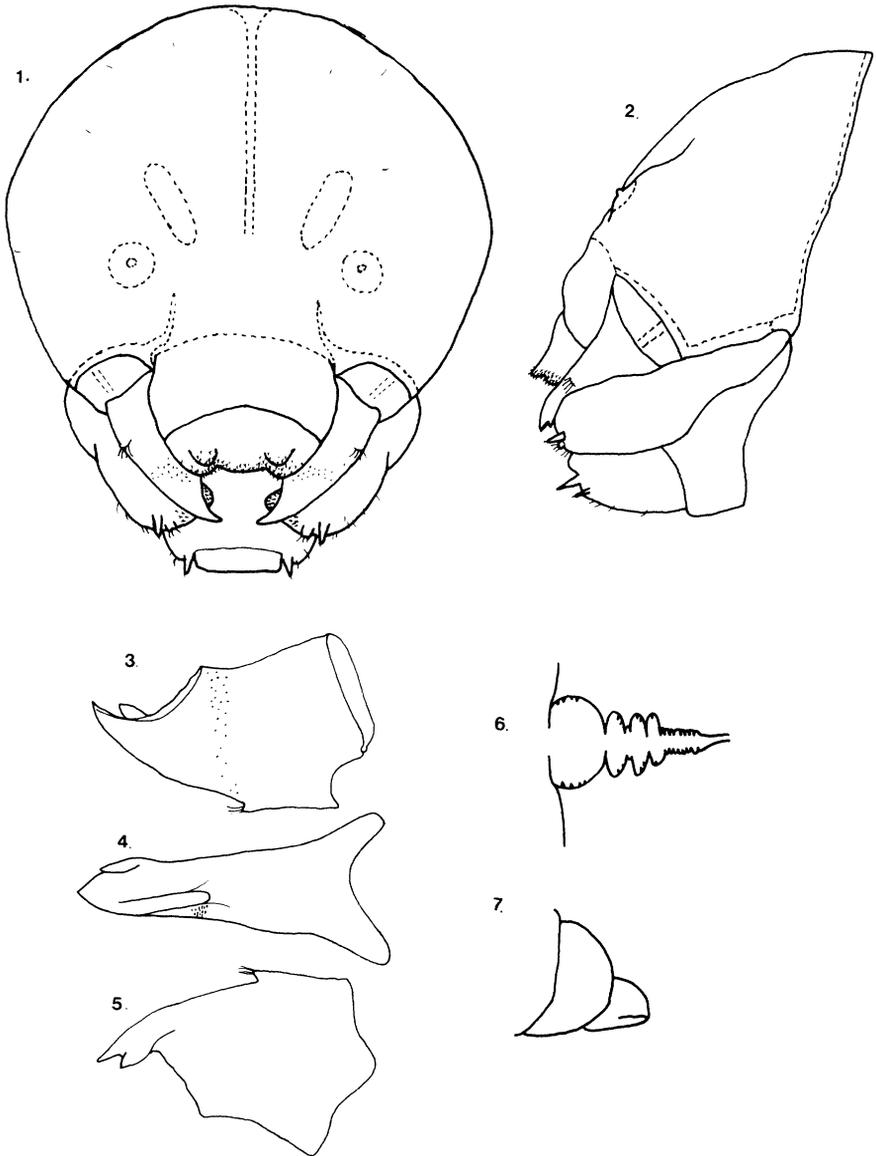
Head (Figs. 1, 2): Integument with a very few, short setae on head capsule, labium and maxillae; epipharyngeal and apical-dorsal surfaces of labrum, including labral tubercles, and apices of maxillae minutely spiculate; mandibular apices and articulations darkly pigmented; hypostomal ridges, labial and maxillary palpi, salivary lips and galeae weakly pigmented; abductor apodeme of mandible lightly pigmented and visible through mandibular corium in uncleared specimens; adductor apodeme with only a very small, apical section pigmented. Anterior and posterior tentorial arms and tentorial bridge well developed; dorsal arms less well developed, gradually narrowing to apex; posterior thickening of head capsule narrowly developed; pleurostomal and hypostomal ridges well developed; epistomal ridge weakly developed; median thickening well developed dorsally becoming weaker ventrally and disappearing below level of antennae (weakening is a result of the thickening becoming less deep, not less broad). Parietal band not visible. Broad depression evident between each antenna and median thickening. Antennal prominence low; papilla approximately three-quarters as long as basal diameter. Clypeus more than two and one-half times as broad as median length; median length subequal to that of labrum; clypeo-labral suture distinct throughout. Labrum short, more than twice as broad as median length; labral tubercles fairly well developed; lateral lobes extending beyond both labral tubercles and median lobe ventrally. Mandibles (Figs. 3–5) massive; dorsal surface with a few very short setae which form band at level of beginning of apical darkening; dorsal surface irregular but not denticulate; mandibular apex bidentate, both teeth sharp-pointed, dorsal tooth longer; aboral surface with well developed prominence that bears 3 or 4 strong setae. Maxillae broadly rounded apically, prolonged adorally with mesial surface rounded and dorsal oral surface straight; galeae shorter than basal diameter, appearing weakly bi- or tri-lobed; base of galea three-quarters as wide as base of maxillary palpus; maxillary palpus twice as long as its basal width. Width of prementum less than half that of the postmentum viewed from beneath, salivary lips broad, projecting, more than three times as wide as median length (upper and lower lips of equal length); labial palpi three times as long as basal width, only three quarters as long as maxillary palpi.

Body: Predefecating larva robust, body strongly C-shaped. Integument devoid of spicules and setae, without obviously sclerotized areas. Spiracular atrium (Fig. 6) with four rows of tiny denticles; outer subatrium with three or four sections, each bearing one or two rows of denticles; outer rim of atrium projecting very slightly above general body surface. Tenth abdominal segment (Fig. 7) with anus apical, dorsal surface convex.

A deutonymph of a histiostomatid mite was discovered on the body of one of the larvae.

COCOON

The cocoon was almost identical to that described for *Svastra obliqua obliqua* (Rozen, 1964) and *Tetralonia* (Rozen, 1969; Miliczky, 1985). There were three layers, the outer one was thin and "earthen" and probably represents the cell lining. The middle layer was red-brown and the inner layer amber and composed of fibers. The



Figs. 1-7. *Thygater* sp. mature larva: 1. Head—anterior view. 2. Head—lateral view. 3-5. Right mandible—dorsal, inner and ventral views. 6. Spiracle. 7. Apex of abdomen.

roof of the cocoon contained silken partitions with air spaces, as described for *S. obliqua* (Rozen, 1964), *Tetralonia minuta* (Rozen, 1969) and *Thygater analis* (Rozen, 1974). However, the roof was not as thick as that of *S. obliqua*, appearing more similar to those of *Tetralonia*.

Material examined. Two mature, predefecating larvae and two cocoons from Ocosingo, Chiapas, Mexico, collected on the 25th of January, 1985. Larvae and cocoons are in the collection of the author, the mite has been placed in the Cornell University Insect Collections under GCE #86-0212-2.

DISCUSSION

As noted by Rozen (1965), and confirmed by McGinley (1981, plate 22), there is little diversity in the morphology of the mature larvae of eucerine bees. Adult eucerines also exhibit little diversity, although *Thygater* is one of the more distinctive genera (Michener, pers. comm.). The larva of *Thygater*, described here for the first time, indicates that the morphological conservatism of the larvae extends to this genus. Nonetheless, the larva of *Thygater* does show some differences from the other known eucerine larvae and these are described below. In the following discussion, data for other eucerines comes from the following sources—*Melissodes* sp. (Michener, 1953), *Svastra* (Rozen, 1964), *Xenoglossa*, *Melissodes pallidisignata* and *Peponapis* (Rozen, 1965), *Florilegus* (LaBerge and Ribble, 1966), *Tetralonia minuta* (Rozen, 1969) and *T. hamata* (Miliczky, 1985).

The frontal outline of the head capsule is quite round, with only a narrow flattened area dorsally. The larvae of *Xenoglossa*, *Peponapis* and *Melissodes pallidisignata* appear similar in this respect, whereas that of *Florilegus* is widely flattened dorsally and those of *Svastra*, *Tetralonia* and *Melissodes* sp. are concave. The median thickening of the head capsule does not reach the epistomal suture. In this feature *Thygater* is similar to the larvae of *X. angustior*, *X. fulva* and *Tetralonia hamata*, but unlike the latter two species the thickening disappears by becoming gradually less deep rather than by tapering to a point. The depressions between the antennae and median thickening have not been reported for any other eucerine species.

The labrum of *Thygater* has the lateral lobes extending beyond the median lobe and the labral tubercles. In this respect *Thygater* appears to be similar to the larvae of *X. fulva*, *X. strenua*, *Peponapis* and *M. pallidisignata*. The other species either have the labral tubercles, median lobe or both extending beyond the lateral lobes.

The mandibles have a very well developed, seta bearing ridge on the aboral surface. Only the *Melissodes* described by Michener has such a strongly projecting ridge. The apices of the maxillae are prolonged adorally as in *Xenoglossa* and *Peponapis* but not as acutely as in *Svastra*.

The dorsal surface of the tenth abdominal segment of *Thygater* is more strongly and uniformly convex than in any of the other species.

In the tentative key to eucerine larvae produced by Rozen (1965) *Thygater* runs to the second half of the third couplet, along with *Xenoglossa fulva*, *X. strenua* and *Peponapis fervens*. *Tetralonia hamata* probably runs to this point also. The larva of *Thygater* can be distinguished from all of these species by the strongly projecting aboral mandibular ridge.

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