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Description of the mature larvae of *Symmorphus bifasciatus* (L., 1758) and *S. crassicornis crassicornis* (PANZER, 1798)

(Hymenoptera, Vespidae, Eumeninae)

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Abstract

The mature larvae of *Symmorphus bifasciatus* (L.) and *S. crassicornis crassicornis* (PANZER) are described. The number and arrangement of the sensilla and setae on labrum and epipharynx are the characters which best permit a distinction of these species and the other one described previously: *Symmorphus apiciornatus* (CAMERON). Other differences between all three species can be observed in: number of setae on the clypeus; number of sensilla on the maxillary palpi; presence/absence of papillae in the area ventral to palpi; and presence/absence and arrangement of setae and spinules on integument.

Introduction

Although several authors, fundamentally REID (1942), GRANDI (1961) and EVANS (1977), have studied the preimaginal states of Eumeninae, only the mature larvae of over 40 species have been described. For the genus *Symmorphus* WESMAEL, 1836, three authors have studied the preimaginal states: ENSLIN (1921) and JORGENSEN (1942) described succinctly the mature larva of *Symmorphus bifasciatus* (L., 1758), and KOJIMA (1991) described that of *Symmorphus apiciornatus* (CAMERON, 1911).

In this paper we describe the mature larvae of *Symmorphus bifasciatus* (L., 1758) and *Symmorphus crassicornis crassicornis* (PANZER, 1798), obtained in 1992 during a study on the fauna of rubicolous species in the northern subplateau of the Iberian Peninsula.

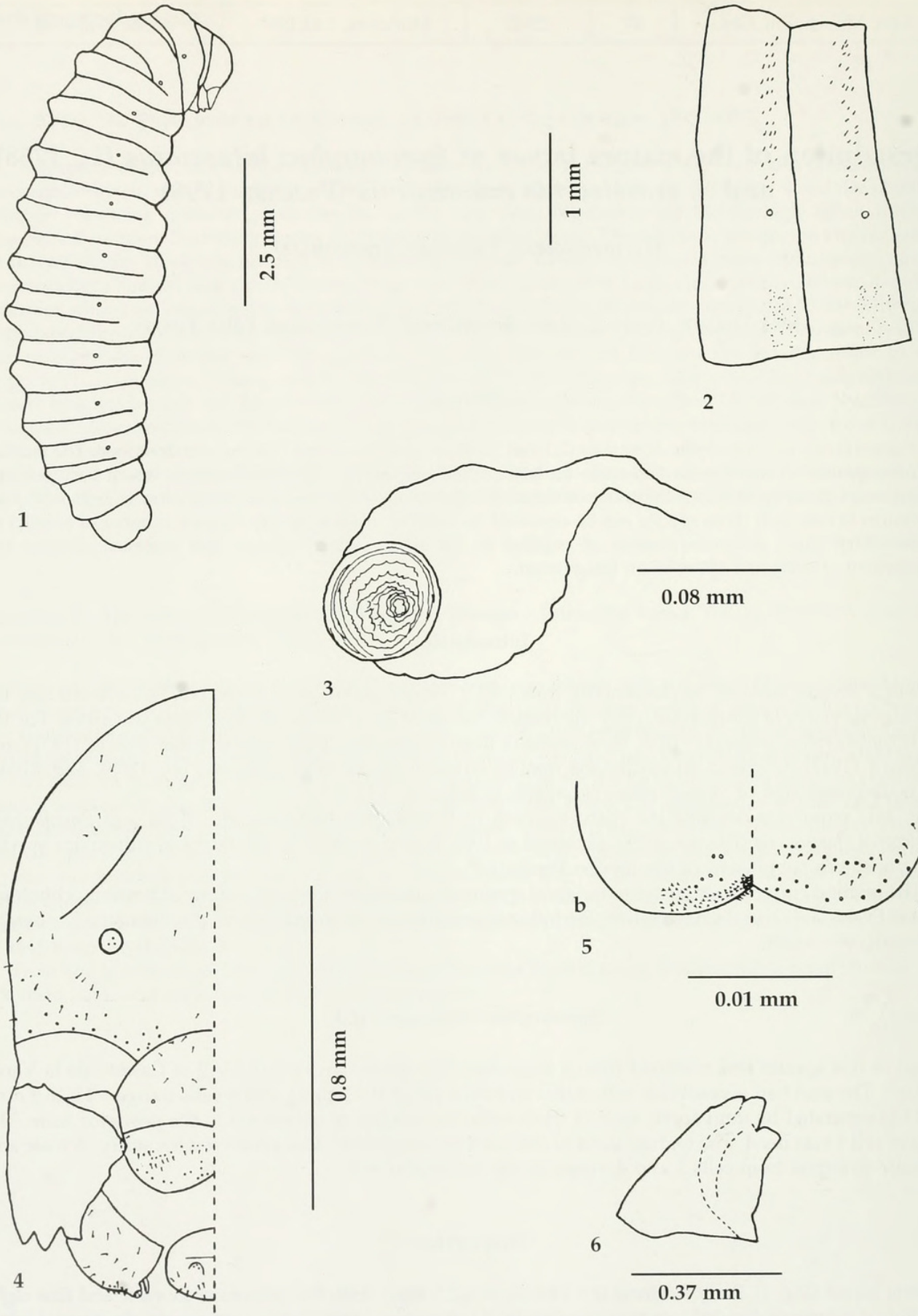
The method employed to prepare the larval specimens, as well as the terminology of larval morphology, follows EVANS (1987). In the description, the following abbreviations are employed: d = diameter, h = height, l = length, w = width.

Symmorphus bifasciatus (L.)

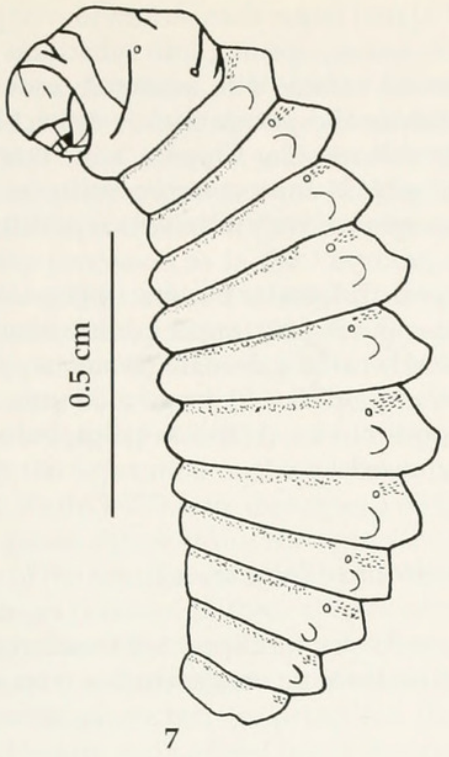
A nest of this species was obtained from a cane stem [*Phragmites australis* (CAV.)] at Caserío de la Venta (Teruel). The nest had a vestibular cell, initial and final plugs (l = 2 mm), and 4 cells (range = 11-16.5 mm, x = 14.6) separated by mud septa, each of them with the remains of excrement in the posterior zone. The larva of cell 1 was dead. The mature larva of cell 3 (reference: 920401) was preserved for study. A male and a female emerged from cells 2 and 4, respectively, in March 1993.

Description

General aspect (Fig. 1). Body fusiform (l = 11 mm, w = 2.5 mm), with the dorsum of thoracic and first eight abdominal segments divided into two annulets by a transverse crease. Anus a transverse slit. Pleural lobes weakly developed. Dorsum with scattered, minute setae (l = 10 µm), arranged in a transverse band on anterior margin of each segment; sterna with spinules, distributed as the setae on dorsum (Fig. 2).



Figs 1-6: Mature larva of *Symmorphus bifasciatus* (L.): 1. General aspect; 2. Terga and sterna 6 and 7 in lateral view; 3. Anterior thoracic spiracle (atrium and subatrium); 4. Cranium in frontal view; 5. Labrum (a), Epipharynx (b); 6. Mandible.



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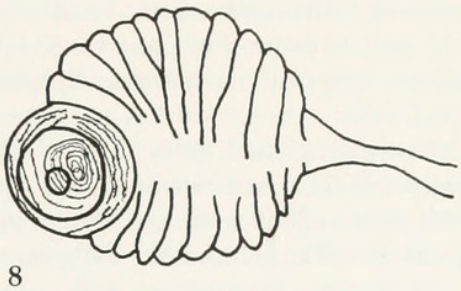
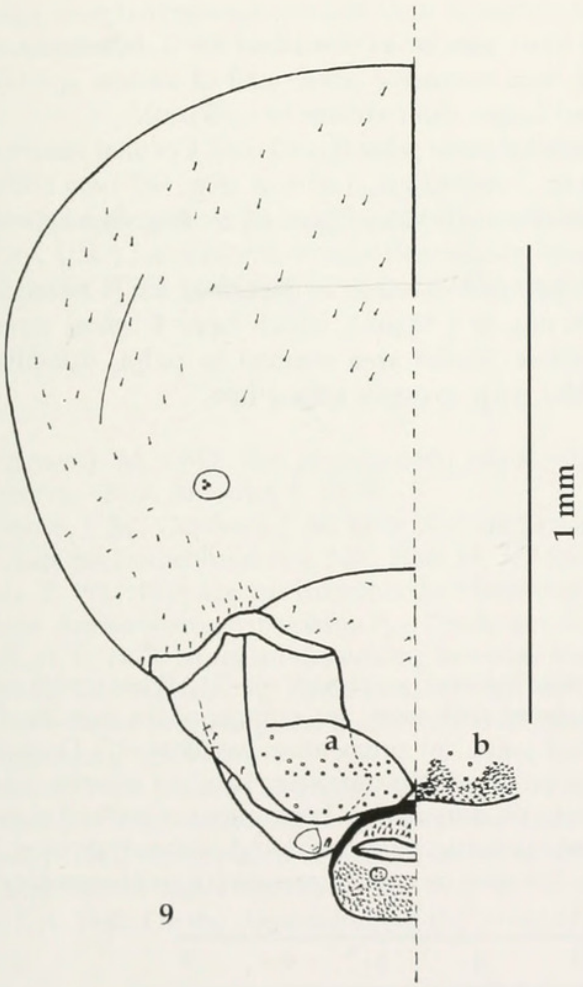


8

0.2 mm



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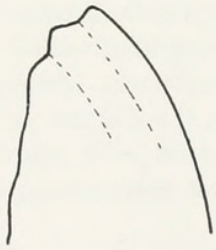

10

0.2 mm

Figs 7-10: Mature larva of *Symmorphus crassicornis crassicornis* (PANZER): 7. General aspect; 8. Anterior thoracic spiracle (atrium and subatrium); 9. Cranium in frontal view, Labrum (a), Epipharynx (b); 10. Mandible.

Spiracles (Fig. 3). First two spiracles with subatrium (d = 90 µm) larger than atrium (d = 60 µm), and 1.3 times wider as successive ones; walls of atrium armed with spines; opening into subatrium unarmed.

Cranium (Fig. 4) (w = 1.2 mm, h (excluding of labrum)=1.1 mm), with scattered setae (l = 20 µm); 14 punctures above insertation of each mandible. Coronal suture and parietal bands distinct but not well pigmented. Antennal orbits circular (d = 80 µm), with 3 small sensilla. Clypeus with numerous setae (l = 10 µm). Labrum (Fig. 5a) (w = 530 µm) strongly bilobed, with 24 short conical sensilla (w = 5 µm) and 14 setae (l = 15 µm) on each side. Epipharynx (Fig. 5b) spinulose medioventrally, with 6 sensilla (w = 5 µm) on each side.

Mouthparts. Mandibles (Fig. 6) (l = 450 µm, w = 320 µm) tridentate, brown; upper tooth truncate apically. Maxillae truncate at apex, external surface with setae (l = 20 µm), upper surface of apical portion spinulose; maxillary palpi (l = 50 µm; w = 45 µm) with 3 apical sensilla; galeae (l = 40 µm; w = 30 µm) with 2 apical sensilla. Labium (l = 240 µm, w = 280 µm) with short palpi (l = 40 µm, w = 50 µm), which have 3 apical sensilla; prementum with numerous setae (l = 15 µm) in area ventral to palpi, but not between palpi; spinneret a transverse slit (l = 190 µm) with strongly raised lips.

Symmorphus crassicornis crassicornis (Panzer)

The description of the mature larva of this species is based on five mature specimens removed from nests established in cane stems at Castillejo (Salamanca, Spain). The absolute measurements refer to the specimen 94090803019.

Description

General aspect (Fig. 7). Body fusiform (l = 13 mm, w = 4 mm), similar as described for *S. bifasciatus*.

Spiracles (Fig. 8). First two spiracles 1.2 times wider than succesive ones; wall of atrium spinulose; opening into subatrium unarmed; subatrium (d = 170 µm) larger than atrium (d = 85 µm).

Cranium (Fig. 9) (w = 1.5 mm, h = 1.3 mm), with scattered minute setae (l = 10 µm). Coronal suture and parietal bands distinct. Antennal orbits and clypeus as in *S. bifasciatus*. Labrum (Fig. 9a) (w = 650 µm) strongly bilobed, with 30 short conical sensilla (w = 5 µm) on each side. Epipharynx (Fig. 9b) spinulose medioventrally, with 3 sensilla (w = 5 µm) on each side.

Mouthparts. Mandibles (Fig. 10) (l = 400 µm, w = 250 µm) and maxillae as described for S. bifasciatus. Labium (l = 250 µm, w = 400 µm) with short palpi (l = 30 µm, w = 35 µm), which have 4 apical sensilla; prementum with numerous setae (l = 10 µm) and papillose in the area ventral to palpi, dorsally to spinneret spinulose; spinneret a transverse slit (l = 280 µm) with strongly raised lips.

Table 1. Differences between the mature larvae of *Symmorphus* (present: ×; absent: –): (1) clypeus with setae; (2) number of the short conical sensilla on the labrum; (3) labrum with setae; (4) number of the sensilla of the epipharynx; (5) number of the sensilla on apex of the maxillary palpi; (6) prementum papillose; (7) Dorsum of thoracic and abdominal segments with scattered minute setae arranged in a transverse band on anterior margin of each segment; venter with spinules, distributed as the setae on dorsum (a). Integument of each of thoracic segments to 6th abdominal segment with sparse setae arranged in median transverse band, without spinules; 7-10 abdominal segments with scattered setae and sparse minute spinules on anterior margin of each segment (b).

Species	1	2	3	4	5	6	7
S. apiciornatus	–	8	×	20	4	–	b
S. bifasciatus	×	50	×	12	4	–	a
S. crassicornis	×	60	–	6	3	×	a

Discussion

The few number of species of Vespidae for which the mature larva has been described do not permit reliable establishment of the apomorphies for each subfamily. In their cladistic analysis of the Vespidae, CARPENTER (1982) and CARPENTER & CUMMING (1985) indicated that most larval characters are highly variable or display homoplasy. Apart from the characters used by them, one could add the ventral margin of the clypeus, medially protruded in the Euparagiinae. Likewise, the spiracular atrium in the Eumeninae may have collar-like processes, as in the Vespinae, although such processes are not branched.

Nevertheless, the mature larvae of *Symmorphus* closely resemble that of other Eumeninae, with the characters established by REID (1942) and GRANDI (1961) to differentiate eumenine larvae from those of the rest of the Vespidae well defined: labrum almost as wide as the clypeus; distance from the antennae to the bases of the mandibles less than that from the centre of the anterior edge of the labrum to the centre of a line joining the bases of mandibles; and deeply bilobed labrum.

Although the separation at the generic and specific levels by means of larval characters is difficult (GRANDI 1961, EVANS 1977), and, therefore, a certain morphological uniformity is noted when comparing the larva of the genus *Symmorphus*, diferences do exist. The most important ones refer to the number and arrangement of the sensilla and setae on the labrum, as well as to the number of sensilla on the epipharynx. Other differences between all three species described can be observed in: number of setae on the clypeus; number of sensilla of the maxillary palpi; presence/absence of papillae in the area ventral to palpi, and presence/absence and arrangement of setae and spinules on integument (Table 1).

The following characters are present in the three species studied until now: cranium with scattered setae; coronal suture and parietal bands distinct; clypeus broadly rounded dorsally; mandibles tridentate, the upper tooth truncate apically; maxillae truncate at apex, the external surface with setae; galeae with 2 apical sensilla; prementum with numerous setae in the area ventral to palpi; labial palpi with 4 apical sensilla; first two spiracles wider than succesive ones; wall of atrium spinulose; and opening into subatrium unarmed.

Acknowledgements

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