

**Preimaginal stages of Iberian Sphecidae V.
Sphex rufocinctus Brullé and *Ammophila laevicollis* Ed. André
(Hymenoptera, Sphecidae)***

by J.D. ASÍS, Valencia, S.F. GAYUBO & J. TORMOS, Salamanca

J.D. ASÍS, S.F. GAYUBO & J. TORMOS: Preimaginal stages of Iberian Sphecidae V. *Sphex rufocinctus* Brullé and *Ammophila laevicollis* Ed. André (Hymenoptera, Sphecidae). – *Annls hist.-nat. Mus. natn. hung.* 1989, 81: 239–244.

Abstract – The mature larvae of two species of the Sphecinae subfamily are described: *Sphex rufocinctus* BRULLÉ, 1883, and *Ammophila laevicollis* ED. ANDRÉ, 1886. Their morphology is compared with that of the other species belonging to the genera *Sphex* LINNAEUS, 1758 and *Ammophila* W. KIRBY, 1798 described previously. With 15 figures.

Although several authors, in particular GRANDI, JANVIER, MANEVAL and MICHELI, studied the preimaginal stages of European Sphecidae, many species of the family are still almost unknown regarding this aspect. In view of this, we began a series of studies, mainly devoted to examining the larvae of Sphecidae. In the present article we describe the mature larvae of two species of Sphecinae: *Sphex rufocinctus* BRULLÉ, 1833, and *Ammophila laevicollis* ED. ANDRÉ, 1886.

Among the species included in the genus *Sphex* LINNAEUS, 1758, special attention has been paid to the preimaginal stages of North American (EVANS 1964, EVANS & LIN 1959) and Japanese (IDA 1967) species. As for the European species, FABRE (1856, 1879) studied the larva of *Sphex rufocinctus* – under the name of *Sphex flavipennis*, according to BERLAND (1925), although this author's description failed to include many of the structures that are essential for later comparison with other larvae of the genus or subfamily. We therefore think it necessary to give a description of the mature larva of this species.

The larvae of the European species belonging to the genus *Ammophila* W. KIRBY, 1798 are not very well known, since only those of *Ammophila campestris* LATREILLE, 1809 (GRANDI 1926) have been described; hence the interest in descriptions of larvae belonging to this genus.

MATERIAL AND METHODS

The description is based on specimens captured in nests located in Segorbe (Castellón, Spain) (TUM 30SYK 1614) at a height of 310 m a.s.l. on a sandy substrate. Three larvae of *Sphex rufocinctus* were obtained

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directly from nests excavated at the aforementioned locality. The larva of *Ammophila laevicollis* was obtained by breeding in the laboratory an egg of this species collected after oviposition. After removal from the nest, together with the prey accompanying it, it was placed on a sand-filled Petri dish in which a cell, similar to that observed in the field, had been constructed. The larva was fed with geometrid caterpillars killed by freezing, and the specimen was prepared for study just before it began cocoon spinning. The larvae were treated according to the method of EVANS & LIN (1956) by mounting the specimens in Entellan. The terminology employed here also follows that proposed by EVANS & LIN (op.cit.).

In the descriptions, we refer to some of the relationships extant between the observed structures; this relationships can only be used for orientation and should not be used for species differentiation – unless a previous study has already been conducted on them – since such structures often show an allometric behaviour. The following abbreviations have been used: d=diameter, h=height, l=length and w=width.

RESULTS

Sphex (Sphex) rufocinctus BRULLÉ, 1883

General description – Fusiform body (Fig. 1) (l=19 mm, w=5,5 mm). Pleural lobes very prominent, obliterating the intersegmental lines. Segments divided dorsally in two annulets. Along the whole body length there is a well-visible mediodorsal longitudinal line. Anus transversal. Thoracic spiracles (d=115–135 μ m, x=125 μ m) slightly smaller than the abdominal ones (d=120–145 μ m, x=135 μ m). Atrium walls (Fig. 2) with rings of spinules.

Integument covered with tiny papillae and spinules (l=5 μ m), denser in some areas: a transversal band on the centre of each segment and on the pleural lobes. A few tiny setae (l=15 μ m) at center of dorsal part of each segment (about 30 per segment). The aspect of the integument may vary slightly, regarding the presence of papillae and spinules, from one specimen to another, although both formations are always present.

Head (Fig. 3) – Slightly wider than high (w=1,61 mm, h=1,44 mm). Parietal bands present (l=0,59 mm). Integument with punctures distributed over almost the whole surface; from some of them emerge small setae (l=5–10 μ m). Antennal orbits (d=65 μ m) slightly ellipsoidal or rounded, with three antennal papillae (d=5 μ m). Clypeus (w=0,96 mm, h=0,41 mm) exhibiting numerous punctures; apical margin slightly emarginated.

Labrum (Fig. 4a) (w=0,68 mm, h=0,38 mm) with numerous punctures on the apical third; anterior edge fairly emarginated. Epipharynx spinulose (Fig. 4b), particularly on its apical third, with spinules (l=5–15 μ m) directed downwards on the external side and upwards at center on central part. Sensory areas situated on a zone lacking in spinules, with 6 sensitive papillae on each side (d=5–10 μ m). Some isolated papillae are also present on basal zone.

Integument light in colour, with the following parts in brown: antennal orbits and contiguous integument, parietal bands, two areas between the bands, close to the antennal orbits, four ones on the clypeus, and the surface contiguous to the mandibular articulation. The apical half of the mandibles, the labroclypeal suture, two areas on the upper part of the labrum and one at the centre of the lower margin, as well as the maxillary and labial palpi, the galeae and part of the maxillae are also light-brown in colour.

Mouth parts – Mandibles (Fig. 3) (l=0,66 mm, w=0,38 mm) with four teeth, appearing 6–7 punctures on the external part of the upper face.

Maxillae (Fig. 5) spinulose on the lacinial area, with spinules of 5–15 μ m in length; the basal part also shows spinules, although these are much smaller. External face, close to the maxillary palpi, with tiny setae (l=5–15 μ m). Galeae (l=100 μ m, w=60 μ m) considerably larger than the maxillary palpi (l=70 μ m, w=60 μ m).

Labium (Fig. 6) (w=0,37 mm) with papillous oral face, a few setae appearing on the lower face (l=5–15 μ m). Lips of spinnerets about 0,37 mm in width. Labial palpi (l=60 μ m, w=70 μ m) very broad, with four well-visible papillae on apex.

Ammophila laevicollis ED. ANDRÉ, 1886

General description – Fusiform body (Fig. 7), very thin on anterior part (l=13,2 mm, w=3,6 mm). Pleural lobes well-developed; dorsal rings well-visible. Thoracic spiracles situated slightly below the line of

the abdominal ones, all of them being similar in size ($d=80-95\ \mu\text{m}$). Atrium walls formed of rings and irregular polygons with spinules (Fig. 8).

Integument spinulose on its dorsal and pleural parts (Fig. 9), practically smooth on the ventral part. The spinules ($l=5-10\ \mu\text{m}$) are replaced by papillae on pleural lobes and on transversodorsal bands situated on the centre of each segment. Papillae numerous and slightly coloured.

Papillous areas of the integument with tiny setae ($l=5-10\ \mu\text{m}$) (Fig. 10), which are also present, though less densely, on other areas.

Head (Fig. 11) – Slightly wider than high ($w=0,99\ \text{mm}$, $h=0,93\ \text{mm}$). Parietal bands present ($l=0,23\ \text{mm}$). Integument fairly smooth, with tiny setae ($l=5\ \mu\text{m}$) on the clypeus, on the surface of the integument contiguous to mandibles and in the proximity of the antennal orbits and upper part of the head. Antennal orbits (Fig. 12) ($d=40\ \mu\text{m}$) slightly ellipsoid, with three sensory cones ($d=5\ \mu\text{m}$). Anterior edge of clypeus ($w=0,46\ \text{mm}$, $h=0,22\ \text{mm}$) slightly emarginated.

Labrum (Fig. 13a) ($w=0,38\ \text{mm}$, $h=0,185\ \text{mm}$) with sparse punctures, from some of them arising minute setae. Anterior end deeply emarginated.

Epipharynx (Fig. 13b) with numerous spinules ($l=5-10\ \mu\text{m}$) on its lateroinferior area, directed downwards. Sensory areas on the central area with 6–7 sensitive papillae ($d=5\ \mu\text{m}$) on each side.

Mouth parts – Mandibles ($l=0,371\ \text{mm}$, $w=0,176\ \text{mm}$) with four characteristically-shaped teeth; basal tooth split at tip. Interior part of upper face exhibiting a group of 20–25 spinules ($l=5\ \mu\text{m}$).

Maxillae (Fig. 14) ($l=0,39\ \text{mm}$, $w=0,185\ \text{mm}$) with spinulose lacinial area. Galeae ($l=65\ \mu\text{m}$, $w=45\ \mu\text{m}$) considerably larger than the maxillary palpi ($l=45\ \mu\text{m}$, $w=35\ \mu\text{m}$), with tiny papillae at the apex.

Labium (Fig. 15) ($w=0,42\ \text{mm}$, $h=0,19\ \text{mm}$) with setae ($l=10\ \mu\text{m}$) on its oral face. Lips of spinneret about 0,29 mm in width. Labial palpi ($l=40\ \mu\text{m}$, $w=30\ \mu\text{m}$) slightly smaller than the maxillary ones.

DISCUSSION

Among the larvae studied until the present belonging to the genus *Sphex* LINNAEUS, 1758, those of *Sphex rufocinctus* have fairly common characteristics with *Sphex inusitatus fukuianus* TSUNEKI, 1957 – described by IIDA (1967) – such as the appearance of the integument with papillae and spinules, the size of many of the cephalic structures – mandibles, galeae, maxillary palpi, antennal orbits –, the aspect of the epipharynx and the smaller size of the thoracic spiracles compared with the abdominal ones.

However, certain differences can be seen, such as the presence of tiny setae on the integument of *Sphex rufocinctus*, the form of the head and of the antennal orbits and the punctures on the front of the head and of the clypeus, that is denser than in the species reported by IIDA.

Other species with which *Sphex rufocinctus* shows morphological similarities are *Sphex ichneumoneus* (LINNAEUS, 1758), *Sphex tepanecus* SAUSSURE, 1867 and *Sphex argentatus formosus* KOHL, 1890, although such similarities are much less patent than those it shares with *Sphex inusitatus fukuianus*.

The larvae of the genus *Ammophila* W. KIRBY, 1798 described until now (EVANS 1959, 1964; EVANS & LIN 1956, GRANDI 1926, IIDA 1967, TSUNEKI & IIDA 1969) differ above all in their mandibles, the epipharynx and the antennal orbits.

The main differences between *Ammophila laevicollis* and the rest of the species lie in the fact that the central part of the epipharynx of this species has no spinules, while these do appear in the other species, and that the integument has setae on its surface; these setae have only been reported previously in *Ammophila campestris* LATREILLE, 1809 (GRANDI, 1926) and *Ammophila formosensis* TSUNEKI, 1971 (= *Ammophila clavus formosana* TSUNEKI, 1967 [TSUNEKI & IIDA 1969]).

The spinules appearing on the upper face of the mandibles are scarce in comparison with those observed in the rest of the species, their aspect resembling those found in *Ammophila harti* (FERNALD, 1931).

However, the length/width ratio of the mandibles is similar to that observed in *Ammophila harti* and *Ammophila pruinoso* CRESSON, 1865, and the ratio between the size of the galeae and the maxillary palpi is similar to that observed in *Ammophila urnaria* DAHLBOM, 1843, and *Ammophila alberti* HALDEMAN, 1952.

The only species with European distribution that has been described until now is *Ammophila campestris*, with which *A. laevicollis* shares certain similarities; the fact that GRANDI (1926) did not offer exact measurements of the different cephalic structures hinders more detailed comparisons between these two species.

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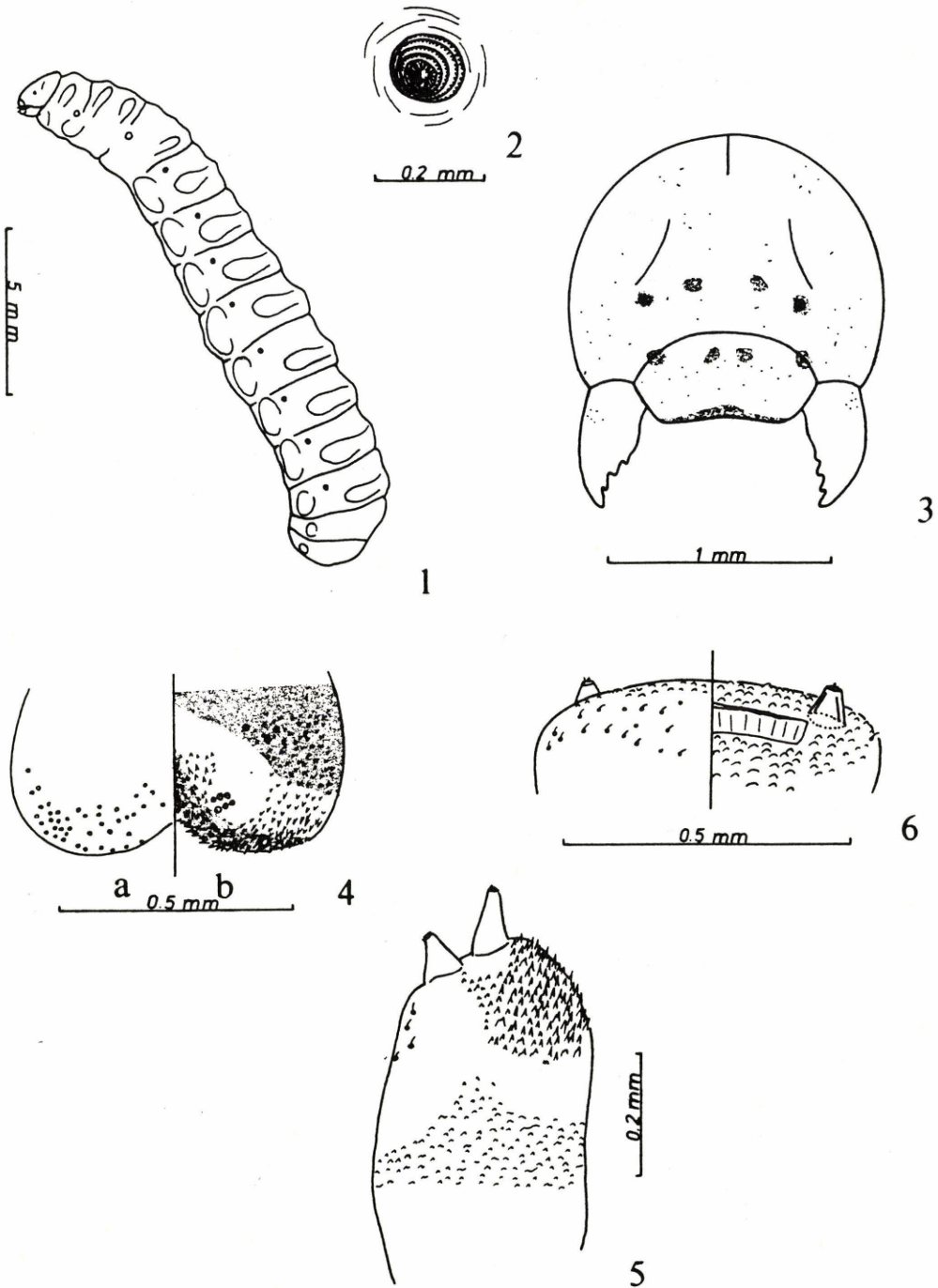
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Authors' addresses: Dr. J. D. Asís

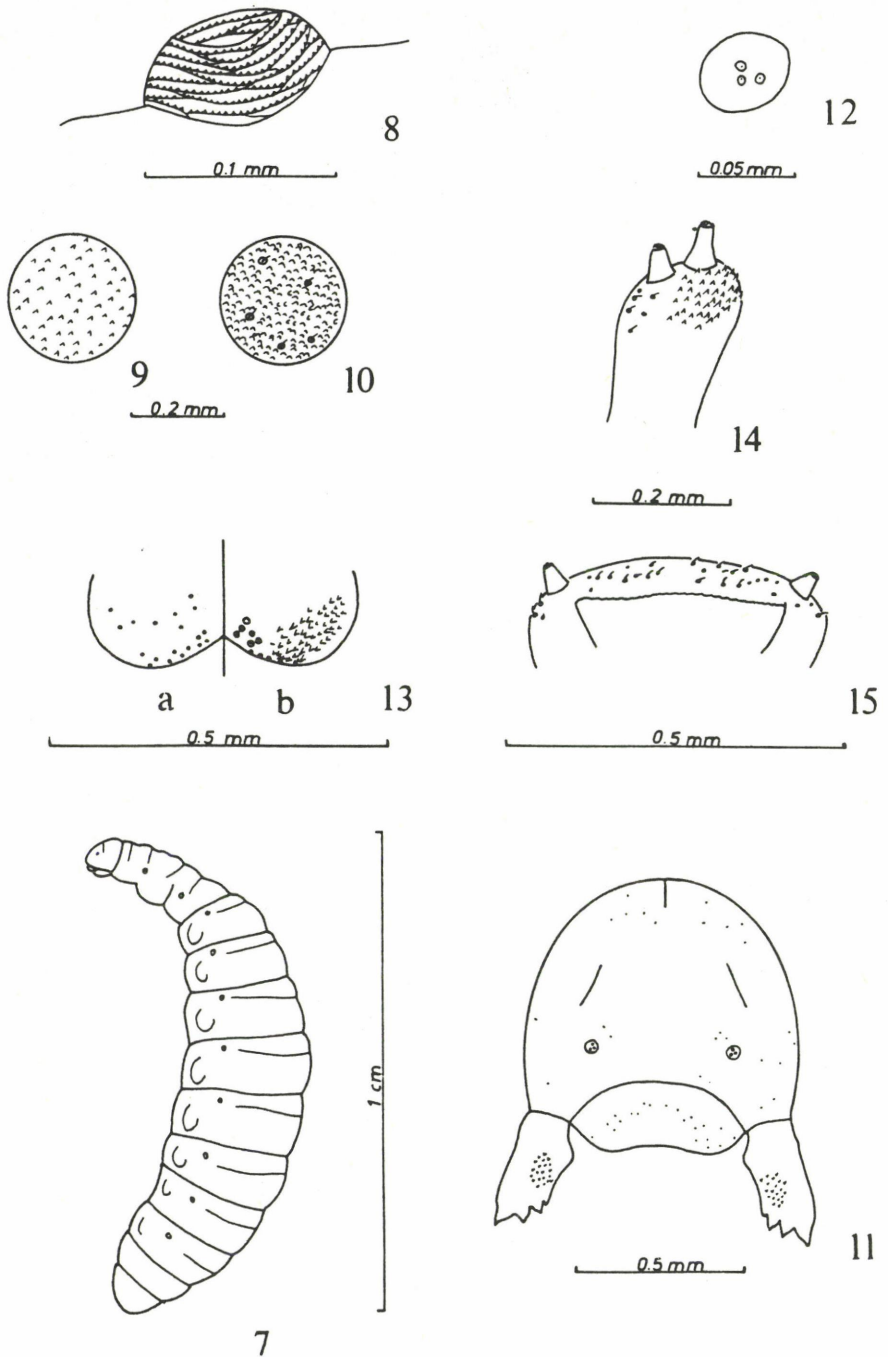
Departament de Biologia Animal, Biologia Cellular,
Genètica i Parasitologia
Facultat de Ciències Biològiques
Universitat de València
Dr. Moliner, 50, 46100 Burjassot, València
Spain

Dr. S. F. Gayubo and Dr. J. Tormos

Departamento de Biología Animal y Parasitología
Facultad de Biología
Universidad de Salamanca
37071 Salamanca
Spain



Figs 1-6. Mature larva of *Spheg rufocinctus* BRULLÉ: 1= body, 2= spiracle, 3= head, 4a= labrum, 4b= epipharynx, 5= maxilla, 6= labium (ventral and dorsal view)



Figs 7-15. Mature larva of *Ammophila laevicollis* ED. ANDRÉ: 7= body, 8= spiracle, 9= surface of the integument (dorsal part of the body), 10= surface of the integument (pleural lobes), 11= head, 12= antenna, 13a= labrum, 13b= epipharynx, 14= maxilla, 15= labium (dorsal view)