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# The Larva of *Allogamus laureatus* (Navás, 1918) (Trichoptera: Limnephilidae)

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The larva of *Allogamus laureatus* (Navás, 1918), an endemic of the Iberian Peninsula, is described for the first time and compared with other known Iberian species. The most important diagnostic features are illustrated and some zoogeographical and ecological notes are included.

Keywords: Trichoptera, Limnephilidae, *Allogamus laureatus*, larva, description, Iberian Peninsula.

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## INTRODUCTION

So far, four species of the genus *Allogamus* have been reported from the Iberian Peninsula (González et al., 1992). Within the region, there is a very distinct distribution pattern. *A. auricollis* (Pictet, 1834) is found only in some localities of the Spanish Pyrenees area. *A. laureatus* (Navás, 1918) and *A. mortoni* (Navás, 1907) are endemics of the Iberian Peninsula: the former is confined to the north-west quarter while *A. mortoni* has been reported only in the type locality (S. Fiel, Beira Baixa, Portugal). Recently, however, we have seen (González, personal observation) a few specimens of this species collected in Córdoba (Southern Iberia). *A. ligonifer* (McLachlan, 1876) is widespread throughout the Iberian Peninsula, especially in the northern half where *A. laureatus* and *A. ligonifer* often occur together (González, 1988; González et al., 1992; Terra, 1994).

The larva of *A. ligonifer* has been described by Frochot (1963) and some figures and details of setation are also available in Camargo and García de Jalón (1988). The larva of *A. auricollis* has been variously figured and described (Frochot, 1963; Hiley, 1976; Kiauta and Kiauta, 1979; Moretti, 1983; Wallace et al., 1990); however, aquatic instars of *A. mortoni* and *A. laureatus* are still unknown.

In recent years, larvae and pupae of *A. laureatus* and *A. ligonifer* have been collected in various streams in the north-western quarter of the Iberian Peninsula. Larvae of *A. ligonifer* collected show characters as in Frochot (1963). Larval

exuviae of *A. laureatus* collected from mature pupae with distinct genitalia were examined, thereby ensuring the association between larval and adult specimens. The objective of this paper is to describe fifth instar larvae of this species. Setal nomenclature follows Willians and Wiggins (1981) and Wallace et al. (1990).

## DESCRIPTION OF THE FINAL INSTAR LARVA

*Material examined*: fifth instar larval exuviae of 2 males reared in the laboratory; 62 fifth and 125 fourth instar larvae, all from Galicia, NW of Spain.

Mean body length 16.7 mm (range 15.1-20.0 mm).

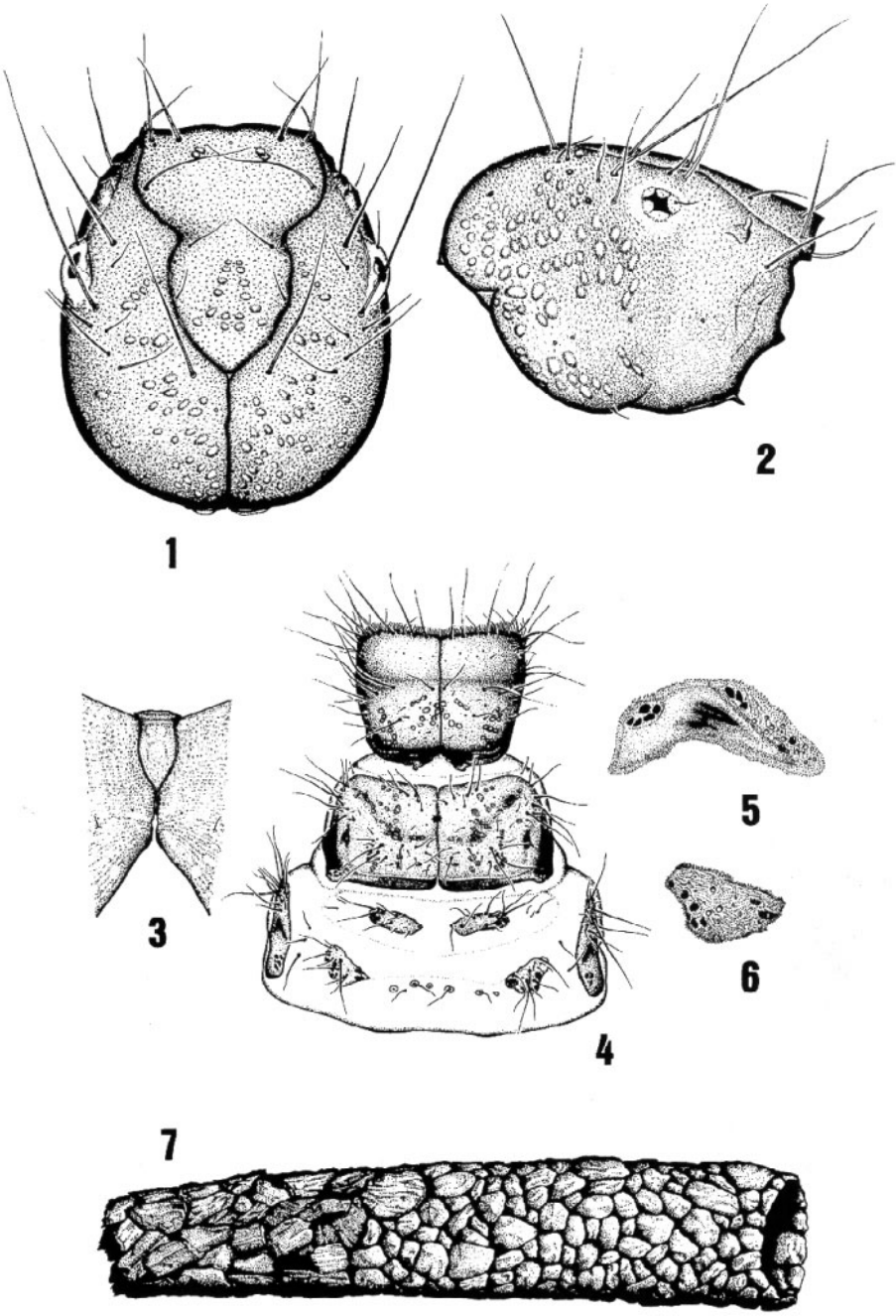
Head capsule (Figs. 1,2): Mean head width 1.65 mm (range 1.62-1.68 mm). Slightly longer than wide; all primary setae are present. We remark, as has been pointed out by Frochot (1963), that seta 16 is thin, transparent and bent down over the side of the head capsule, and that clypeal seta 5 is as short as in *A. ligonifer* and *A. auricollis*. Colour dark brown, except for the posterior corner of fronto-clypeal apotome (just behind cibarial muscle attachment spots) and the posterior region of the head (around the occipital foramen) which are slightly paler. Mandibles black, with four teeth along edges and with ridges in central concavity as in *A. ligonifer* (cf. Frochot, 1963: Figs. 34,35). Ventral apotome longer than posterior ventral ecdysial suture (Fig. 3).

Pronotum (Fig. 4) uniformly brown with a transverse furrow separating the anterior third from the posterior two thirds. Mesonotum brown with the postero-lateral and posterior margins strongly sclerotized and black in colour, and metanotum with three pairs of sclerotized patches (Figs. 4-6).

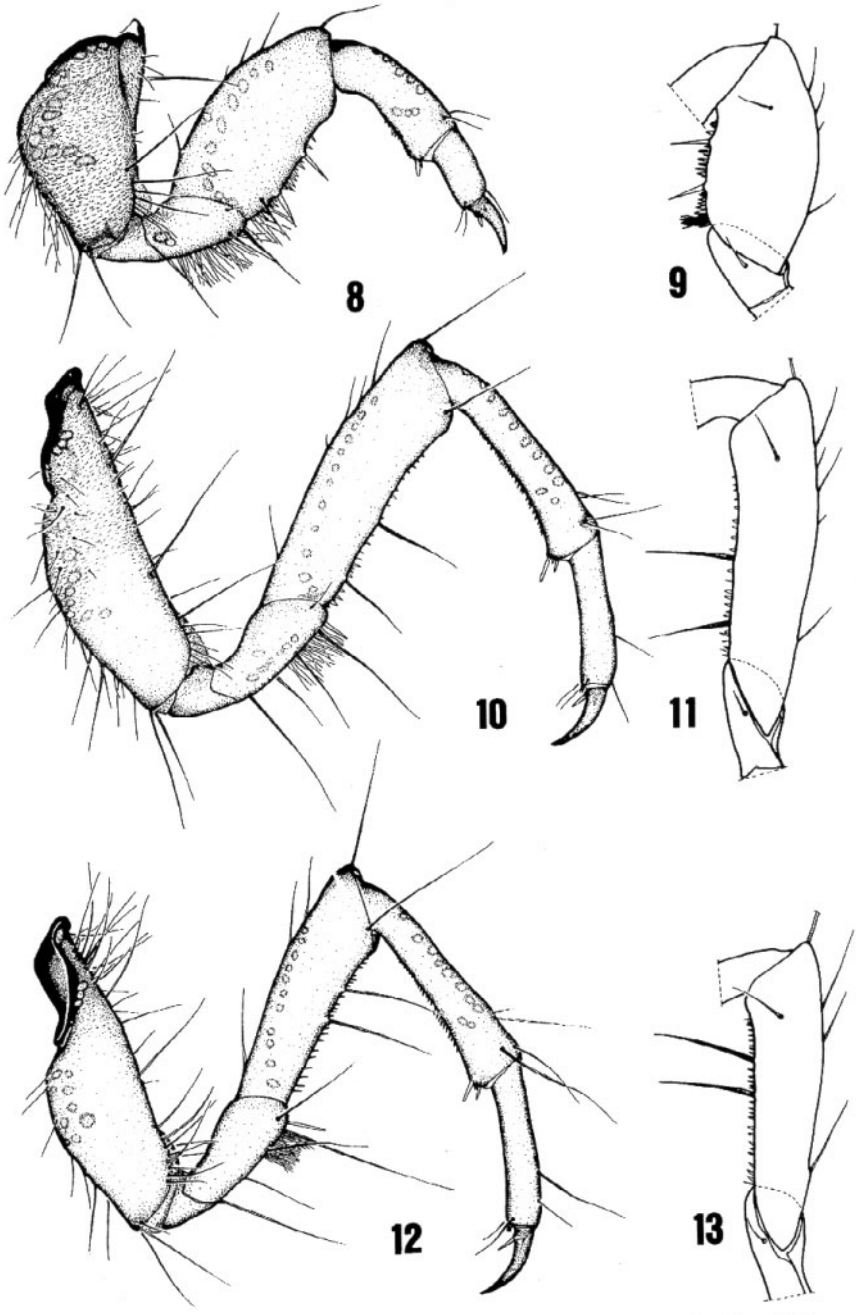
Legs (Figs. 8-13) brown in colour. Mesothoracic leg is slightly longer than metathoracic leg. Coxal combs are well developed reaching different extension, depending on the leg. Femur of 1st leg with two strong ventral edge setae pale in colour. Femora of both 2nd and 3rd legs with two long ventral edge setae uniformly black in colour. All femora with only one seta on inner dorsal half. Neither femur has any additional setae on either the anterior or posterior face.

On the abdomen, the lateral fringe extends from the beginning of the third segment to the extreme end of the eighth. All gills consist of single filaments and occur as in the Table 1. First abdominal segment with setae as follows: lateral humps with 25-35 setae, dorsal hump with 55-65 setae arranged anterior, posterior and laterally to it; setal counts on first abdominal sternum are 80-100. The posterior region of the lateral humps has a large sclerite without setae but with 2 holes, while the anterior region has a row of setae in median position. The ninth abdominal segment has a group of 2-6 posterior-lateral setae, ventrally with two setae (Fig. 14), the inner shorter than the outer; dorsum bears a sclerite with two C-intermediate setae (Fig. 15).

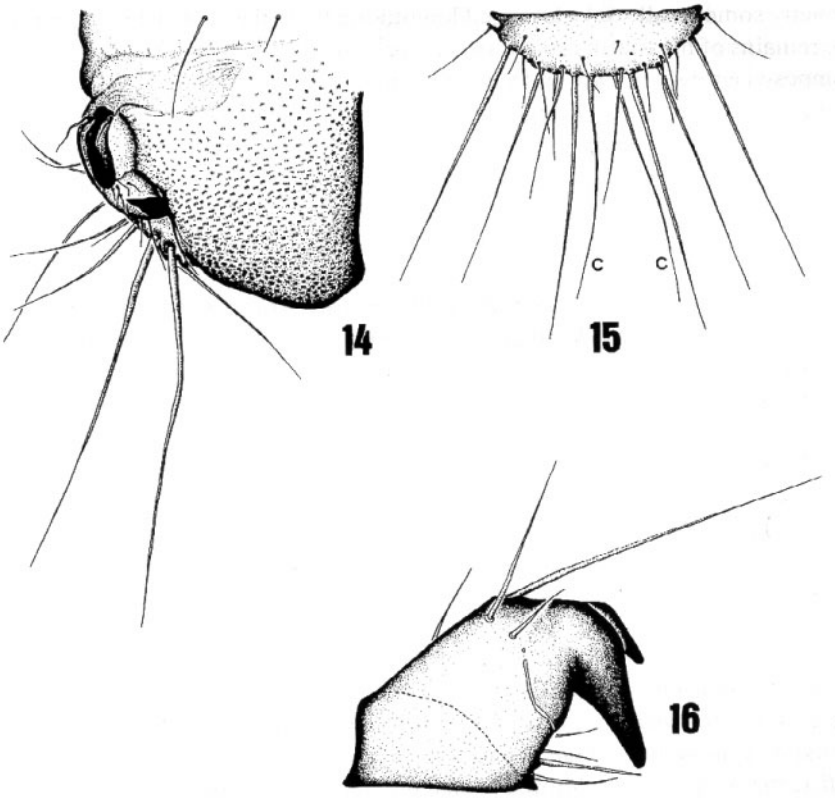
Case (Fig. 7): Total length 15-19 mm, maximum width 4-5 mm, sligtly conical and curved, composed of flattish small mineral particles of similar size. The grains are arranged in an homogeneous manner around the case. Normally, the posterior third of the case consists of fragments of vegetable debris, and occa-




Figs. 1-7. *Allogamus laureatus* (fifth instar larva). 1: Head, dorsal view; 2: Head, lateral view; 3: Ventral apotome and adjoining areas of genae; 4: Thorax, dorsal view; 5: Lateral metadorsal sclerite; 6: Posterior metadorsal sclerite; 7: Larval case.




Figs. 8-13. *Allogamus laureatus* (fifth instar larva). 8: Prothoracic leg, posterior face; 9: Femur of prothoracic leg, anterior face; 10: Mesothoracic leg, posterior face; 11: Femur of mesothoracic leg, anterior face; 12: Metathoracic leg, posterior face; 13: Femur of metathoracic leg, anterior face.




Figs. 14-16. *Allogamus laureatus* (fifth instar larva). 14: Right anal hemisegment of abdomen, ventral view; 15: Sclerite of ninth abdominal segment, c = central intermediate setae; 16: Left anal claw, external face.

Table 1. Number of filaments in tracheal gills and arrangement on abdominal segments 2-7 of final instar larva of *Allogamus laureatus*. Positions abbreviated as follows: (A) anterior, (D) dorsal, (P) posterior, and (V) ventral.

| | Segment | | | | | |
|---|---|---|---|---|---|---|
| Gill | 2 | 3 | 4 | 5 | 6 | 7 |
| AD | 1 | 1 | 1 | 1 | 0 | 0 |
| PD | 1 | 1 | 1 | 0-1 | 0 | 0 |
| ADL | 1 | 1 | 1-0 | 0 | 0 | 0 |
| PVL | 1 | 1 | 0 | 0 | 0 | 0 |
| AV | 1 | 1 | 1 | 1 | 1 | 1 |
| PV | 1 | 1 | 1 | 1 | 1 | 1-0 |

sionally some small sticks arranged longitudinally to the case (which seems to be the remains of the fourth instar case) are present. Cases of fourth instar larvae are composed entirely of bark and vegetable debris of different sizes and small sticks along part of its length; however, some small mineral particles may also be present. Pupal case entirely composed of mineral particles.

## DISCUSSION

Sets of diagnostic characters typical for species groups within Stenophylacini have been presented by Waringer (1993). According to these characters, *A. auricollis* definitely belongs to the species group *auricollis*, whereas *A. laureatus* and *A. ligonifer* belong to the species group *cingulatus* together with another three Iberian Stenophylacini species: *Potamophylax cingulatus* (Stephens, 1837), *P. latipennis* (Curtis, 1834) and *P. nigricornis* (Pictet, 1834). The larvae of *A. laureatus* may be easily distinguished from those of *P. cingulatus* and *P. latipennis* by the absence in these of small setae along the anterior edge of the first abdominal lateral hump (cf. Wallace et al., 1990), and, in the case of *P. nigricornis*, by the presence in the latter of 2-3 proximo-dorsal setae on femora of the middle leg (cf. Higler and Solem, 1986).

Diagnostic characters and a key to Iberian Limnephilidae genera have been published by Camargo and García de Jalón (1988). However, the diagnosis for the genus *Allogamus* is inaccurate because two of the diagnostic characters selected by Camargo and García de Jalón (1988) exclude *A. ligonifer* and *A. auricollis*: the presence of additional setae on anterior and posterior faces of meso- and metafemora (cf. Frochot, 1963) excludes the former whereas the presence of only one postero-lateral seta on ninth abdominal dorsum excludes the latter.

When using Camargo and García de Jalón's (1988) key (wich is based on a selection of characters, not all characters used in the diagnoses) to the Iberian Limnephilid larvae, it follows that *A. laureatus* and also, paradoxically, *A. ligonifer* are clearly recognized as members of genus *Allogamus* (couplet 10), but *A. auricollis* - because of the single postero-lateral setae on the ninth abdominal dorsum (couplet 8) - will run to couplet 12, in which no alternative fits. We therefore suggest modification of the key to include this species, by adding a third option to couplet 12:

12. First abdominal lateral hump without a posterior sclerite ..... *Micropterna*
– First abdominal lateral hump with a large posterior sclerite ..... *Allogamus*
– First abdominal lateral hump with 2-3 small posterior sclerites well-delimited ..... *Stenophylax*

The coloration of pronotum is the chief feature that distinguishes *A. ligonifer* from *A. laureatus*; in the former, the anterior third of pronotum is uniformly lighter than the posterior two thirds, while in *A. laureatus* the anterior third is

similar in colour to the posterior two thirds. We can also distinguish both species by the absence in *A. laureatus* of additional setae on the anterior and posterior faces of the middle and hind leg femora. Furthermore, in the case of *A. ligonifer*, ventral setae of ninth abdominal segment are both the same in length in. Gill arrangement is similar to that of *A. ligonifer* (cf. Frochot, 1963), but differs by the presence of an anterolateral dorsal gill on the second abdominal segment and the absence of an anterodorsal gill on the sixth. In relation to the case, size and arrangement of mineral particles have the effect of giving the fifth instar case of *A. laureatus* a smoother apperance than that of *A. ligonifer* and small sticks (when present) are arranged longitudinally, whereas in *A. ligonifer* these are arranged tangentially to the case. The fourth instar case in *A. ligonifer*, unlike *A. laureatus*, is composed of small mineral particles also.

*A. laureatus* and *A. auricollis* larvae are, howewer, much alike morphologically: head and thorax are similar in colour in both species, and the setal arrangement on femora is also very much alike. Nevertheless, it should be noted that in *A. auricollis* the metadorsal antero-median sclerites are broader; only one postero-lateral seta is present on the ninth abdominal dorsum and the posterolateral ventral gills are present on the fourth abdominal segment.

## HABITAT AND DISTRIBUTION

Very little information has been published on the habitat of *A. laureatus*. According to Terra (1981) and Terra and Molles (1987), the typical habitat in Portugal consists of small mountain brooks with a good flow of water. In Galicia, our sampling sites confirm these observations; the species is reported from many localities -about 200 to 1500 m. a.s.l. – with rapidly flowing streams, where *A. laureatus* and *A. ligonifer* often occur together.

In Galicia, *A. laureatus* larvae in instars IV-V were present during most of the spring and summer, from late March to July. Mature larvae were collected from early June to late July. Terra (1981) and González (1988) recorded adults from August to November.

*A. laureatus* is an endemic species of the Iberian Peninsula, where it is confined to the north-western quarter. In this area, the species has been recorded in several localities of Galicia and adjacent provinces (León and Zamora), central and northern Portugal as well as in other provinces of central Spain (Madrid and Segovia).

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