

The larvae of *Allogamus gibraltarius* González & Ruiz, 2001 and *Allogamus mortoni* (Navás, 1907) (Trichoptera, Limnephilidae), two endemic species of the Iberian Peninsula

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The larvae of *Allogamus gibraltarius* González & Ruiz, 2001 and *A. mortoni* (Navás, 1907), two endemic species of the Iberian Peninsula, are described for the first time and compared with other known Iberian species. A key to the larvae of genus *Allogamus* including all Iberian species is given.

Keywords : Trichoptera, Limnephilidae, *Allogamus gibraltarius*, *A. mortoni*, larval key, Iberian species.

Introduction

González et al. (1992) listed four species of the genus *Allogamus* Schmid, 1955 in the Iberian Peninsula: *A. auricollis* (Pictet, 1834), *A. lignonifer* (McLachlan, 1876), *A. laureatus* (Navás, 1918) and *A. mortoni* (Navás, 1907). Recently, a new species, *A. gibraltarius* (González & Ruiz, 2001), has been described from specimens found in the south of the Peninsula, which means that the number of species present in the area is now five. The larvae of the first three species have already been described: *A. auricollis* (Frochot 1963, Hiley 1976, Moretti 1983, Wallace et al. 1990, Waringer & Graf 1997), *A. lignonifer* (Frochot 1963, Camargo & García de Jalón 1988, Waringer & Graf 1997) and *A. laureatus* (Vieira-Lanero et al. 1996). The aquatic stage of *A. mortoni* and *A. gibraltarius* are, as yet, unknown. Part of the larvae used in this paper were collected from a study carried out in the Los Alcornocales Nature Park (in the south of Spain). The rest, belonging to *A. mortoni*, originates from the Grazalema mountain range. The association between larva and adult could be demonstrated through mature pupae obtained from larvae at the fifth stage, kept in bottles and exposed to running water.

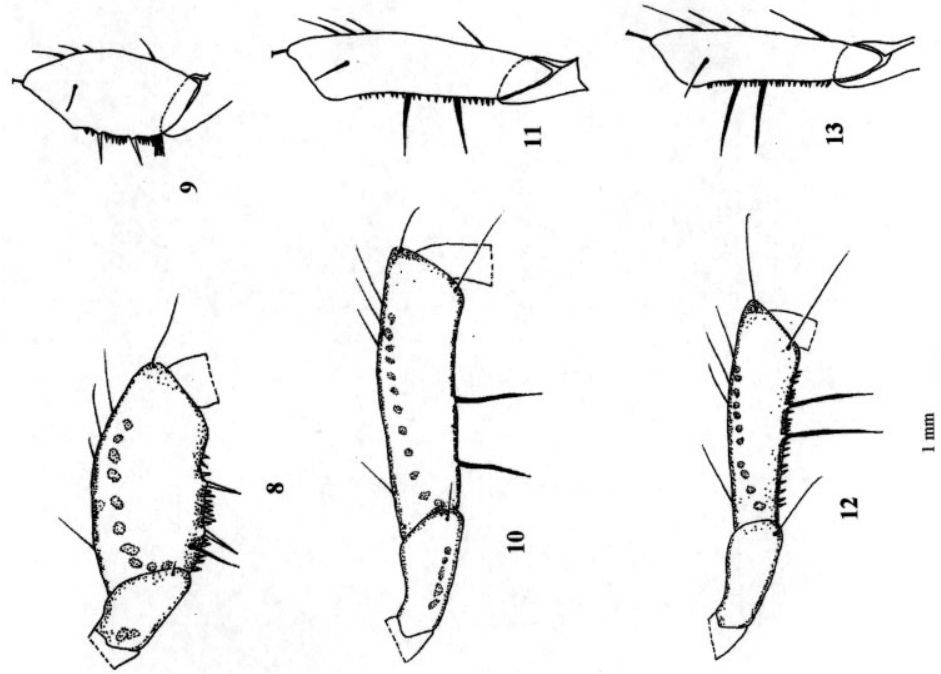
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Results

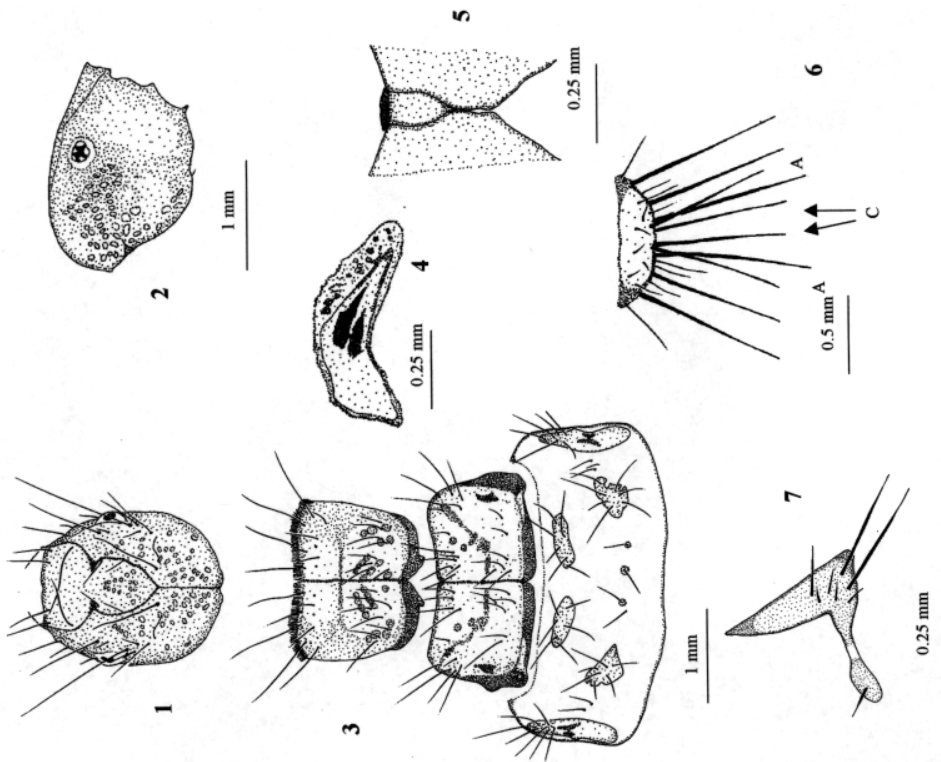
Allogamus gibraltarius González & Ruiz, 2001

Description of final instar larva

Material examined: 25 fifth instar larvae and 2 pupae, all from Andalucía. S of Spain. The body has an average length of 17.4 mm (range 16.3 - 20.2 mm). The head capsule (Fig. 1) is homogeneously brown in colour, except for a yellowish aureole around the eyes not reaching the muscular insertions of the ventro-posterior zone of the eye, with an average width of 1.66 mm (range 1.62 - 1.70 mm) and slightly longer than its width. It presents all the primary setae and two small transparent setae pointing anteriorly on the ventral surface (Fig. 2). The ventral apotome is as long as the ecdysial line (Fig. 5). The mandibles are black in colour, with four teeth and a tuft of setae in the concavity. The labrum has rounded anterior vertices, occupied by a tuft of setae flanked by two longer setae. On the upper side there are three more pairs of setae. The pronotum (Fig. 3) is uniformly brown in colour except for the posterior edge, which is black. It has a transversal groove which separates the anterior third from the posterior two thirds where the muscular insertions can be seen. The mesonotum (Fig. 3) is composed of two rectangular sclerites, brown in colour with a black band on the posterior and postero-lateral edges. The latero-



Figs 8-13. *Allogamus gibraltarius*. 8: femur of prothoracic leg, posterior face; 9: femur of prothoracic leg, anterior face; 10: femur of mesothoracic leg, posterior face; 11: femur of mesothoracic leg, anterior face; 12: femur of metathoracic leg, posterior face; 13: femur of metathoracic leg, anterior face.



Figs 1-7. *Allogamus gibraltarius*. 1: head, dorsal view; 2: head, lateral view; 3: pronotum, mesonotum and metanotum; 4: lateral metadorsal sclerite; 5: ventral apotome; 6: ninth abdominal dorsum; 7: mesopleurite, ventral half.

Table 2. *Allogamus mortoni* (fifth instar larva). Gill formula. Positions abbreviated as follows: ant: anterior; post.: posterior; D: dorsal; L: lateral and V: ventral.

Segment	II		III		IV		V		VI		VII	
	Ant.	Post.	Ant.	Post.	Ant.	Post.	Ant.	Post.	Ant.	Post.	Ant.	Post.
D	1	1	1	1	1	1	1	1	1	0-1	0-1	0
DL	0	0	1	0	1	0	0	0	0	0	0	0
VL	0	1	0	1	0	1	0	0	0	0	0	0
V	1	1	1	1	1	1	1	1	1	1	1	1

The legs (Figs. 21-26) are dark brown in colour. All the femora have a longitudinal row of dark spots and two large spines on the lower edge; the spines of the femur of the first leg are light-coloured and those of the second and third leg femora are black. All femora have only one seta on the inner dorsal half and 2 - 3 dorso-distal setae. There are additional setae on the anterior and posterior faces of the middle and hind leg femora. The lateral fringe extends from the third to the end of the eighth abdominal segment. The gills are composed of single filaments; their location is shown in Table 2. The dorsal hump of the first abdominal segment has setae arranged anteriorly, posteriorly and laterally to it. The posterior region of the lateral humps has a large sclerite without setae but with two holes, while the anterior region has a row of setae in median position. The ninth abdominal segment has a group of 4 - 7 postero-lateral setae and two ventral setae, the inner one being shorter than the outer (Vieira-Lanero et al. 1996, fig. 14); the dorsum bears a sclerite with two A setae and two C-intermediate setae of a similar length (Fig. 16).

The larval case, which is 18 - 19 mm long and 4 - 5 mm wide, is slightly curved and made up of grains of sand and plant remains.

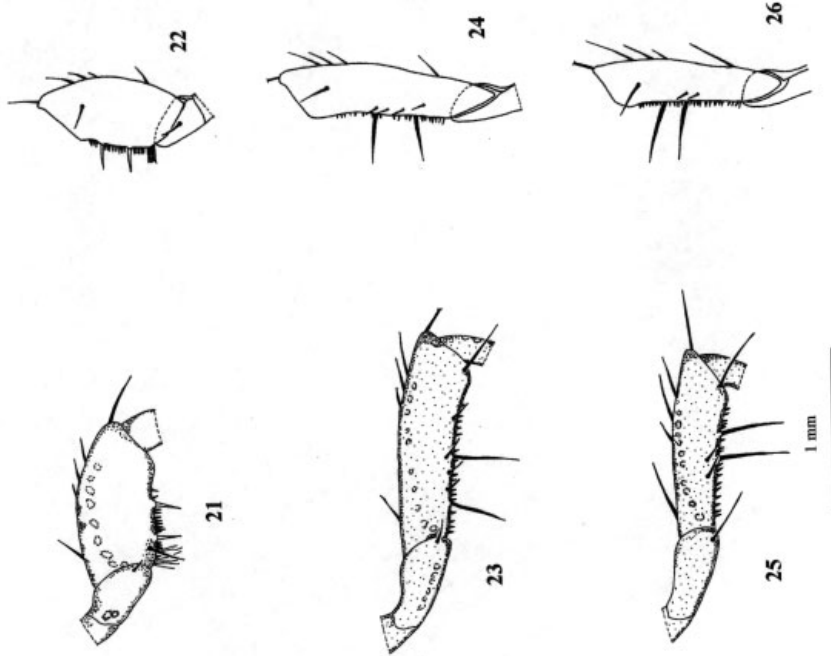
Discussion

In accordance with the set of characteristics proposed by Waringer (1993) for the separation of the groups of species of Stenophylacini, the larvae of *A. gibraltarius* and *A. mortoni* are included in the *cingulatus* group, together with the following Iberian species: *Potamophylax cingulatus* (Stephens, 1837), *P. latipennis* (Curtis, 1834) and *P. nigricornis* (Pictet, 1834), as well as *Allogamus ligonifer* (McLachlan, 1876) and *A. laureatus* (Navás, 1918) (Vieira-Lanero et al. 1996). The distinction between *A. mortoni* and *A.*

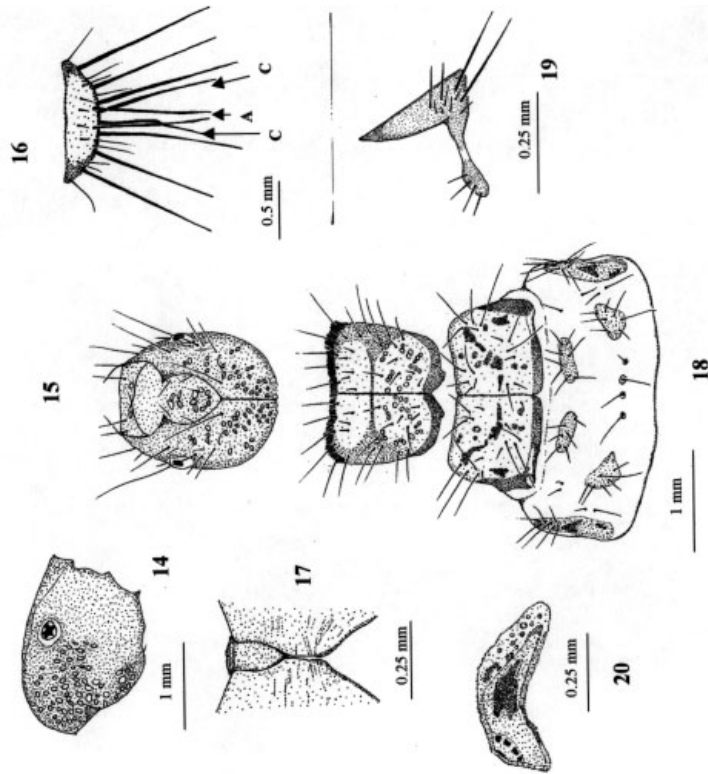
gibraltarius and the three species of *Potamophylax* can be made in terms of the distribution of the spines of the ventral side of the mesothoracic femur. In *Allogamus* the distal spine divides the femur into two equal parts (Figs. 10 and 23), whilst in *Potamophylax* the two spines are confined to the proximal half of the ventral edge (Higler & Solem 1986). Moreover, the larvae of *A. mortoni* can be differentiated from those of *P. latipennis* and *P. cingulatus* by the presence in the former of a row of small setae on the anterior edge of the lateral protuberance of the first abdominal segment. As regards *P. nigricornis*, the distinction from *A. gibraltarius* and *A. mortoni* can be made by the presence in the former of 2 - 3 dorso-proximal setae on the mesothoracic femur (Higler & Solem 1986). Another characteristic which differentiates *A. gibraltarius* from *P. nigricornis* is the absence of a row of setae on the anterior edge of the lateral protuberance of the first abdominal segment. Moreover, the larva of *A. gibraltarius* can also be distinguished from that of *P. latipennis* because the latter has six setae on the ventral process of the mesopleurite (Wallace 1980) and from the larva of *P. cingulatus* which has a yellowish wedge between the eye and the muscular insertions situated in the ventro-posterior zone of the eye (Waringer & Graf 1997 fig. 66.)

The identification of the Iberian genera of the Limnephilidae family can be carried out by means of the key proposed by Camargo & García de Jalón (1988). If we apply the key to the two species described here, *A. mortoni* is correctly classified, but *A. gibraltarius* is placed with genus *Potamophylax*. This is because the larvae lack a row of setae along the anterior edge of the lateral protuberance of the first abdominal segment, a characteristic shared by *P. latipennis* and *P. cingulatus* with *A. gibraltarius*, are grouped in the alternative 9.2. We suggest to modify the key as follows:

9.2.1. The spines on the ventral edge of the 2nd femur are confined to the proximal half...*Potamophylax*



Figs 21-26. *Allogamus mortoni*. 21: femur of prothoracic leg, anterior face; 22: femur of prothoracic leg, posterior face; 23: femur of mesothoracic leg, anterior face; 24: femur of mesothoracic leg, posterior face; 25: femur of metathoracic leg, anterior face; 26: femur of metathoracic leg, posterior face.



Figs 14-20. *Allogamus mortoni*. 14: head, lateral view; 15: head, dorsal view; 16: ninth abdominal dorsum; 17: ventral apotome; 18: Thorax, dorsal view; 19: mesopleurite, ventral half; 20: metathoracic lateral sclerite.

9.2.2. The distal spine on the ventral edge of the 2nd femur divides it in two equal parts.....*Allogamus*

The larva of *A. gibraltarius* can be distinguished from all the other Iberian species of the *Allogamus* genus for being the only one that does not possess setae on the anterior edge of the lateral protuberance of the first abdominal segment. This is the best characteristic for differentiating between the larvae of *A. gibraltarius* and *A. laureatus*. The larvae of *A. gibraltarius* and *A. mortoni* have a series of features which permit us to separate them easily. In *A. gibraltarius* the ventral process of the mesopleurite has 1 - 2 setae, additional setae on the anterior and posterior faces of the meso- and metathoracic femora are lacking, antero-lateral dorsal gills on the second abdominal segment are present and antero-dorsal gills on the sixth are lacking and lateral sclerites of the metathoracic segment which has two dark lines (Fig. 4); in *A. mortoni*, the ventral process of the mesopleurite has 4 - 5 setae, additional setae on the anterior and posterior faces of the meso- and metathoracic leg femora are present, antero-lateral dorsal gills on the second abdominal segment are lacking and the antero-dorsal gills on the sixth are present and lateral sclerites of the metathoracic segment without two dark lines (Fig. 20). Other characteristics which serve to separate *A. gibraltarius* from the rest of the Iberian species are as follows : it is distinguished from *A. auricollis* for possessing more than one dorso-lateral seta on the ninth abdominal segment; from *A. lignonifer* for having the pronotum uniformly brown in colour, the absence of additional setae on the anterior and posterior faces of the middle and hind leg femora, the presence of an antero-lateral dorsal gill on the second abdominal segment and the absence of an antero-dorsal gill on the sixth. Furthermore, in *A. lignonifer*, the ventral setae of the ninth abdominal segment are both the same length (Vieira-Lanero et al. 1996), whereas in *A. gibraltarius* the outer seta is longer than the inner one.

To differentiate the larva of *A. mortoni* from the rest of the Iberian species, we can proceed in the following way: we can distinguish it from *A. laureatus* by the absence in the latter of additional setae on the anterior and posterior faces of the middle and hind leg femora, the presence of antero-lateral dorsal gills on the second and the absence of antero-dorsal gills on the sixth abdominal segment (Vieira-Lanero et al. 1996).

The best way to distinguish *A. mortoni* from *A. lignonifer* is by the size of the ventral setae of the ninth abdominal segment, which are both the same length in *A. lignonifer* (Vieira-Lanero et al. 1996) whereas the inner is shorter than the outer in *A. mortoni*. A second cha-

racteristic that we can use is the colouration of the pronotum. In *A. lignonifer* the anterior third is uniformly lighter than the posterior two thirds (Waringer & Graf 1997 fig. 59), while in *A. mortoni* in some larvae the anterior third of the pronotum is similar in colour to the posterior two thirds whilst in others the anterior third is only dimly lighter than the posterior two thirds.

Finally, we can distinguish between *A. auricollis* and *A. mortoni* by the number of dorso-lateral setae of the ninth abdominal segment, one in the former and 6 - 7 in the latter.

KEY TO THE SPECIES OF THE IBERIAN PENINSULA

1. One postero-lateral seta present on the ninth dorsum*A. auricollis*
- More than one postero-lateral seta on the ninth abdominal dorsum2
2. Absence of a row of small setae along the anterior edge of the first abdominal lateral hump
.....*A. gibraltarius*
- Presence of a row of small setae along the anterior edge of the first abdominal lateral hump3
3. Without additional setae on faces of second and third femora*A. laureatus*
- With additional setae on faces of second and third femora4
4. Pronotum uniformly dark brown in colour or with the anterior third only dimly lighter than the posterior two thirds. The inner ventral seta of ninth abdominal segment shorter than the outer
.....*A. mortoni*
- Anterior third of pronotum uniformly lighter than the posterior two thirds. Ventral setae of ninth abdominal segment are both the same in length.....
.....*A. lignonifer*

Habitat and distribution

A. gibraltarius and *A. mortoni* are endemics of the Iberian Peninsula. *A. mortoni* has been reported in the type locality (S. Fiel, Beira Baixa, Portugal), Córdoba (SW Spain) (Vieira-Lanero et al. 1996) and possibly in the whole Mediterranean slope of the Iberian Peninsula (Bonada 2003). *A. gibraltarius* is only known from the provinces of Cádiz and Málaga (Los Alcornocales Nature Park) (González & Ruiz 2001).

Both larvae are frequent in small permanent mountain brooks of siliceous water of the Los Alcornocales Nature Reserve. Besides, *A. mortoni* inhabits some calcareous springs of the mountains of Grazalema.

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