

A new species of *Potamophylax* from Spain with a key to the Iberian species (Trichoptera: Limnephilidae)

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Abstract. A new species of the genus *Potamophylax* Wallengren 1891, *P. asturicus* sp. nov., from Spain is described and figured. This new species is a microendemic of the Spanish Cantabrian Mountains and is closely related to *P. albergaria* Malicky, 1976, from which it differs in a combination of genitalic features, especially those concerning the shape of segment IX and the inferior appendages. Additionally, we provide a taxonomic key to facilitate the identification of the males of all Iberian species of this genus.

Key words. Trichoptera, Limnephilidae, *Potamophylax*, caddisflies, taxonomy, new species, Iberian Peninsula, Spain, Palaearctic Region

Introduction

Potamophylax Wallengren, 1891 species are very common in mountain streams, and their ecology, larval biology, and taxonomy are currently relatively well known. The adults are orange or clear brown, being medium to large sized (13–20 mm) and are good fliers, therefore usually show a good dispersal capacity, except for some autumnal species that exhibit tendency to brachipterism (OLÁH & KOVÁČ 2012). Several species of this genus normally cohabit and their emergence periods overlap; usually they are univoltinuous (OTTO 1971, GÍSLASSON 1981, SOLEM 1983, WAGNER 1993) and in the Iberian Peninsula the emergence period extends from July to October (GONZÁLEZ 1988), while in the Pyrenees it extends to November (DECAMPS 1967).

Currently the genus *Potamophylax* includes 35 species (MORSE 2015) in the West Palaearctic, four of them inhabiting the Iberian Peninsula (GONZÁLEZ & MARTÍNEZ 2011, MARTÍNEZ 2014): *P. latipennis* (Curtis, 1834), *P. cingulatus* (Stephens, 1837), *P. nigricornis* (Pictet,

1834), and *P. albergaria* Malicky, 1976. The first three species are widespread across Europe (MALICKY 2013, GRAF et al. 2008) while *P. albergaria* is an Iberian endemic.

One of the most interesting aspects of this genus is the high polymorphism exhibited in adults (HIGLER & SOLEM 1986, SOLEM 1983), leading to the description of several European subspecies, among them *P. cingulatus ibericus* Szczesny, 1994 (MORETTI et al. 1994) from Portugal. Moreover, *Potamophylax mista* (Navás, 1918) was described by NAVÁS (1918) from Lérída (Pyrenees, Spain) as *Stenophylax nigricornis* var. *mista* Navas, 1918, but it has been considered as synonymous to *P. nigricornis* by several authors (FISCHER 1969, GONZÁLEZ 2010, GONZÁLEZ et al. 1992, GONZÁLEZ & MARTÍNEZ 2011). Nevertheless, recently OLÁH et al. (2013) proposed *Potamophylax mista* (Navás, 1918) as a valid species, but this opinion is not supported by a morphological revision of the type (types are not available). OLÁH et al. (2013) identified and described some Spanish and French specimens as *P. mista*, but we believe that this association is very confusing and we continue considering it synonymous to *P. nigricornis*.

Recent entomological expeditions across the Spanish Cantabrian Mountains revealed an unknown species of this genus, which increases the total number of Iberian species to five. In this article, we describe the male of the new species and provide a key to the males of all Iberian species.

Materials and methods

Genitalia of some specimens were cleared in 10% KOH at room temperature for 4–8 h. The photographs were taken using an Olympus CX40 microscope and a Canon 650D camera and processed with the software Helicon Focus V. Illustrations were made from the scanned photographs using Adobe Illustrator. All specimens, including the holotype, were preserved in 70% ethanol and deposited in the collection of Dr. Marcos A. González at the University of Santiago de Compostela.

The terminology used in describing male genitalia and wing venation follows that of BOTOSANEANU (1992) and SCHMID (1955), respectively.

Results

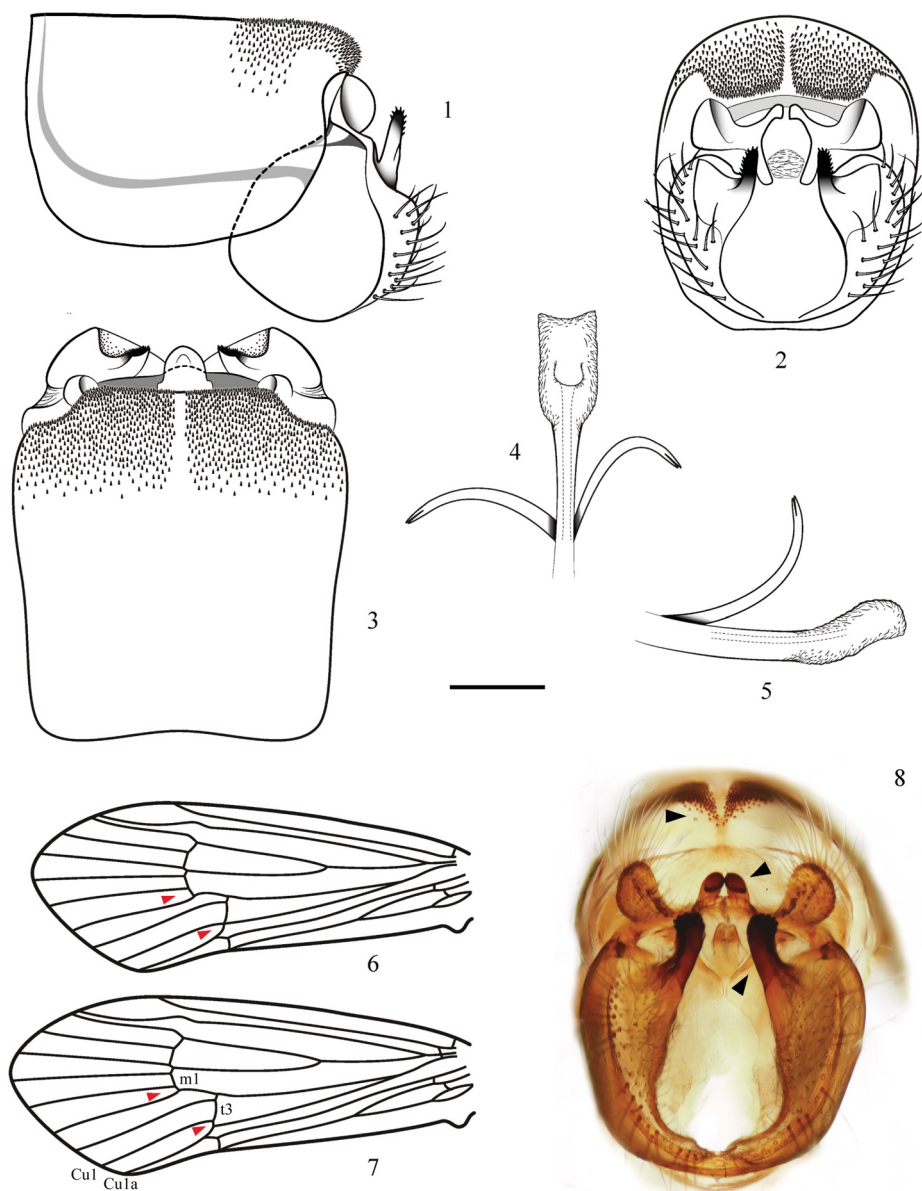
Potamophylax asturicus sp. nov.

(Figs 1–5)

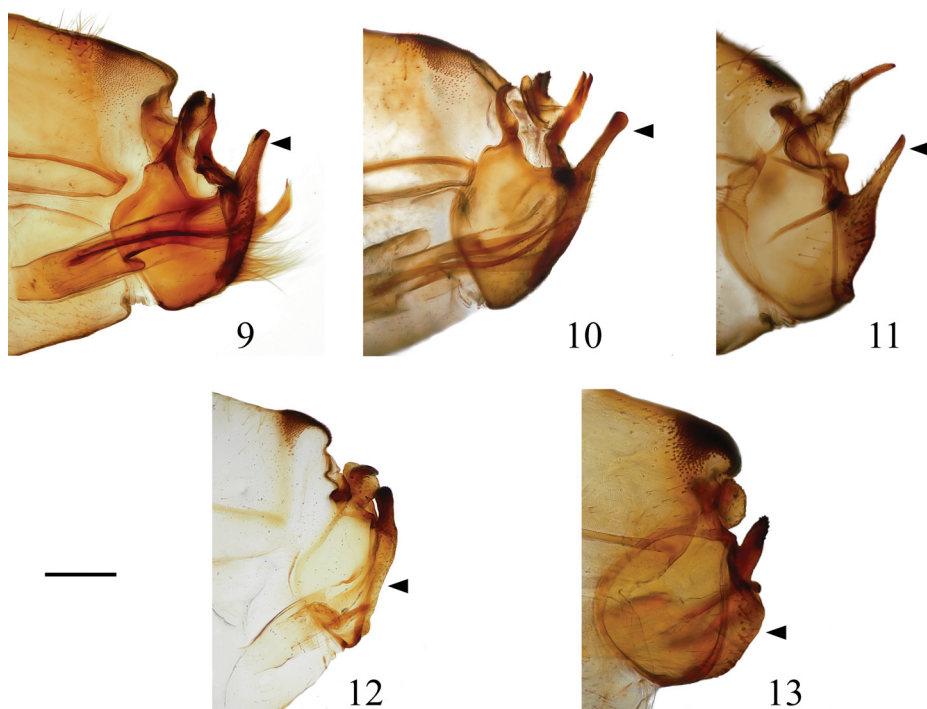
Potamophylax albergaria (misidentification): MARTÍNEZ & GONZÁLEZ (2011a): 240.

Type material. HOLOTYPE: 1 ♂, SPAIN: ASTURIAS: Ortigosa, río Ortigosa Páramo, Teverga, 43°4'38.68"N 6°2'2.15"W, 1263 m, 18.x.2009, leg. J. Martínez, collected with light traps (coll. M. A. González, University of Santiago de Compostela).

Description. Adult (in alcohol) general colour, including legs and antennae, light orange with brown spots; forewings partially coloured pale brown with clearer spots in the posterior border; length of forewing: 15 mm. Tibial spur formula: 1, 3, 4.



Figs 1–13. 1–5 – male genitalia of *Potamophylax asturicus* sp. nov.: 1 – lateral view; 2 – caudal view; 3 – dorsal view; 4 – phallus and parameres, ventral view; 5 – phallus and parameres, lateral view. 6–7 – forewings: 6 – *P. asturicus* sp. nov., 7 – *P. albergaria* Malicky, 1976. Arrows highlight some minor differences observed between the venation of these two species. 8 – *P. albergaria*, male genitalia in caudal view. Scale bars: 1–5, 8 – 3.85 mm; 6–7 – 3.73 mm.



Figs 9–13. *Potamophylax* spp., male genitalia, lateral view. 9 – *P. cingulatus* (Stephens, 1837); 10 – *P. latipennis* (Curtis, 1834); 11 – *P. nigricornis* (Pictet, 1834); 12 – *P. albergaria* Malicky, 1976; 13 – *P. asturicus* sp. nov. Scale bar: 5.5 mm.

Male genitalia (Figs 1–5). Posterior third of tergite VIII with dorsomedial part largely covered by two patches of dark spinules, roughly rectangular in dorsal view (Fig. 2), almost joining medially, with narrow and straight pale central area between them. Segment IX very broad laterally (Fig. 1), widest in middle, approximately ovoid. Superior appendages moderately developed, laterally rounded; in caudal view they are strongly concave and look ear-like (Fig. 2). The intermediate appendages are short (not protruding beyond superior appendages in lateral view); caudally they are slender, digitiform, convergent towards their tips (each appendage describing roughly a semicircle), where they are slightly dilated (Fig. 2).

Inferior appendages, in lateral view (Fig. 1), with posterior margin of its basal part prominent and markedly convex, clearly delimited from segment IX. Inner distal part protruding in characteristic dark lobe, strongly sclerotized, fringed by some fine black teeth; in lateral view, this lobe is straight and digitiform, obliquely directed upwards; in caudal view (Fig. 2), it is short, slender and acuminate.

Phallic apparatus (Figs 4–5) with aedeagus feebly sclerotized, enlarged at tip, almost rectangular in ventral view; in lateral view, its distal part slightly curved upwards. Parameres

regularly recurved upwards and tapered towards apex, clearly shorter than phallus; under high magnification, their apices are brush-shaped, bearing group of 6–7 tiny spines.

Female. Unknown.

Differential diagnosis. The new species is closely related to *P. albergaria*. The segment IX and the shape of the inferior appendages mainly distinguish the males of these two species. In lateral view, the segment IX is considerably wider in the new species. The posterior margin of the basal part of the inferior appendages is prominent and markedly convex in the new species while in *P. albergaria* it is only slightly sinuous, almost straight; the distal part is straight and directed obliquely upwards in the new species while in *P. albergaria* it is almost straight or slightly recurved outwards. In caudal view, the distal part is somewhat dilated apically in *P. albergaria*, clearly slenderer and acuminate in the new species.

The shape and extension of the spinose areas of the tergite VIII are also quite different. In dorsal view they are large and roughly rectangular in the new species, more reduced and clearly triangular-shaped in *P. albergaria*.

The morphology of the intermediate appendages is quite similar, but some differences are visible, especially when they are viewed caudally; in the new species they are clearly convergent at the tips (almost parallel in *P. albergaria*) while they are not visible in lateral view (their apices slightly protruding beyond the superior appendages in *P. albergaria*).

In the phallic apparatus there are only some minor differences in the parameres, which are apparently a little thicker in the new species.

Finally, concerning the forewing venation (Figs 6–7), we only recognise some minor differences in the apical forks III and V: m1 is longer in *P. asturicus* and as a consequence, the apical fork III is slightly broader. Besides, in the new species, both Cu1 and Cu1a converge directly, forming the apical fork V, while in *P. albergaria* they converge in a small transverse vein that goes to t3 (note that the new species is known only from a single specimen so far).

Etymology. The specific name is the latinized adjective *asturicus* (-a, -um), referring to Asturias, where the new species was collected.

Key to the Iberian *Potamophylax*

In this key, we considered only the males of the five Iberian species of *Potamophylax*. Females were not included because most of them are still unknown (*P. albergaria* and *P. asturicus*) or their differentiation remains unclear (*P. cingulatus* and *P. latipennis*).

We illustrate the lateral view of the male genitalia (Figs 9–13), because we consider the aspect of the inferior appendages to provide the clearest and most useful feature for correct identification of the species of this genus.

- 1 Inferior appendages with acute, rather narrow apices (Fig. 11). *P. nigricornis* (Pictet, 1834)
- Inferior appendages finger-like, mostly rounded, truncate or dilated at the apex. 2
- 2 Inferior appendages from the side slender and clearly blackened and dilated at the tip (Fig. 10). *P. latipennis* (Curtis, 1834)

- Inferior appendages from the side not clearly dilated at the tip. 3
- 3 Inferior appendages from the side broad and obliquely truncated at the tip (Fig. 9).
..... *P. cingulatus* (Stephens, 1837)
- Inferior appendages from the side digitiform at the tip. 4
- 4 Posterior margin of the basal part of the inferior appendages from the side prominent and
markedly convex; the distal part is acuminate, almost straight and directed obliquely
upwards (Fig. 13). *P. asturicus* sp. nov.
- Posterior margin of the basal part of the inferior appendages from the side almost straight;
the distal part is clearly digitiform, almost straight or slightly recurved outwards (Fig.
12). *P. albergaria* Malicky, 1976

Notes on the distribution of Iberian *Potamophylax*: the unknown Cantabrian biodiversity

Two species, *P. cingulatus* and *P. latipennis*, are widespread across the Iberian Peninsula, especially in its northern half, where their larvae frequently cohabit in many mountain streams (GONZÁLEZ 2008, GONZÁLEZ et al. 1992, VIEIRA-LANERO 2000, MARTÍNEZ 2014). *Potamophylax latipennis* has not yet been registered in Portugal, but it has been sporadically cited from some localities of the southeastern of Spain (GONZÁLEZ et al. 1992). *Potamophylax nigricornis* is restricted to the Pyrenean areas (Girona and Lleida provinces; Andorra) (GONZÁLEZ et al. 1992, MARTÍNEZ & GONZÁLEZ 2010). *Potamophylax albergaria* and *P. asturicus* are two endemic Iberian species with very limited distribution. We consider the new species a Cantabrian microendemic, closely related to *P. albergaria*, a very rare species described from the north of Portugal (Serra do Gerês) by MALICKY (1976). Later, a single male of *Potamophylax* collected from Asturias was misidentified by MARTÍNEZ & GONZÁLEZ (2011a) as *P. albergaria*, but a careful study of this specimens revealed that it in fact belongs to the new species described here. Nevertheless, recently, we have collected some additional specimens of *Potamophylax* that really belong to *P. albergaria* in Asturias, confirming the presence of this species in Spain (MARTÍNEZ et al. 2016).

Like most European high mountain systems, the Cantabrian Mountains harbour microendemic species and subspecies and their richness is comparable to other European mountain systems (Carpathians, Apennines, Massif Central, etc.) (SCHMITT 2009). The high number of endemics of the Cantabrian Mountains is well known, especially in plants (SÁINZ-OLLERO & MORENO-SAIZ 2002, JIMÉNEZ-ALFARO et al. 2009). In recent years several new species or subspecies of caddisflies were described from this region: *Tinodes dives cantabricus* Botosaneanu & González, 2001, *Wormaldia arriba* Sipahiler, 1999, *Rhyacophila pongensis* Sipahiler, 2000, *Annitella cabeza* Sipahiler, 1998 and *A. lalomba* Sipahiler, 1998 (BOTOSANEANU & GONZÁLEZ 2001; MARTÍNEZ & GONZÁLEZ 2011b; SÁINZ-BARIAIN et al. 2012; SIPAHILER 1998, 1999, 2000). These species are very rare and probably most of them are associated with very restricted areas. We are convinced that future studies will still discover new and interesting Cantabrian species of caddisflies.

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