New species of Limnephilidae (Insecta: Trichoptera) from Europe: Alps and Pyrenees as harbours of unknown biodiversity

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Abstract

New species are described from the genera Consorophylax and Anisogamus (Trichoptera, Limnephilidae, Limnephilinae, Stenophylacini). Additionally the larva of the genus Anisogamus, and the larval stages of Anisogamus waringeri sp. nov. and A. difformis (McLachlan 1867) are described. The new species Consorophylax vinconi sp. nov. is a microendemic from the Southern Alps and differs from its congeners in the shape of the parameres, which are distinctly straitened in the distal quarter in the new species. The new species Anisogamus waringeri sp. nov. represents the second species in the hitherto monospecific genus Anisogamus. Compared to Anisogamus difformis, the male of A. waringeri sp. nov. has more slender superior appendages; a more-rounded basal plate of the intermediate appendages, lacking pointed protuberances; and parameres shorter than the aedaegus, proximally with one dorsal and several ventral tines. Further, the two species are disjunctly distributed in the European mountain ranges (A. difformis: Alps, A. waringeri sp. nov.: Pyrenees). Larvae of species in the genus Anisogamus are characterized by the lack of a dorsal protuberance on abdominal segment I, a unique feature among Eurasian Limnephilidae. Anisogamus difformis and A. waringeri sp. nov. larvae differ in pronotum shape. The discovery of two new species demonstrates the significance of taxonomic studies in Europe, and the importance of adequate training for young scientists in order to assess an incompletely described biodiversity under threat of extinction.

Key words: endemism, species description, Consorophylax, Anisogamus, caddisflies

Introduction

Both the Alps and the Pyrenees are centres of biodiversity in Europe. Particularly patterns of plant, vertebrate and terrestrial invertebrate diversity in European alpine ecosystems have been extensively studied (e.g., Wohlgemuth 2002; Nagy et al. 2003; Iserbyt et al. 2008; Huemer 2011). Increasingly, aquatic invertebrates (and EPT-taxa in particular) have become the focus of attention in both the Alps and the Pyrenees (e.g., Sipahiler 1999, 2000; Graf 2005; Graf et al. 2008a; Malicky 2004, 2008; Brown et al. 2009). The genus Consorophylax Schmid 1955 currently comprises seven cold-stenotherm species (Malicky 2004, 2008). Larvae of the genus prefer crenal to epirhithral segments of alpine to montane springs and brooks, and mainly behave as shredders (Graf et al. 2008b). Consorophylax species show a complex distribution pattern, with several microendemics and two widespread species inhabiting the majority of the Alpine arc. In particular, the southern slopes of the Alps can be identified as centres of species richness in the genus, as microendemics have been found exclusively on the southern slopes of both the Western and Eastern Alps (Kimmins & Botosaneanu 1967; Graf et al. 2008b).

The genus Anisogamus McLachlan 1874 is currently represented by a single species, A. difformis (McLachlan 1867). The species is known predominantly from the Alps, but has also been recorded in the Pyrenees. As the larva was hitherto not described, ecological parameters of adult collection points indicated a cold-stenotherm species
TABLE 1. Inter- and intraspecific genetic distances of two mitochondrial cytochrome oxidase I (mtCOI) gene fragments recorded for Anisogamus species. Values below diagonal in second and third columns indicate number of nucleotide differences and above diagonal uncorrected pairwise distances (p) (shown as percents), respectively. Abbreviations are used to denote life stages; IM/M = adult male, L = larva.

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<th>Stage</th>
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<th>mtCOI &quot;barcode&quot;</th>
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<th>Ansp01</th>
<th>fAns0101L</th>
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TABLE 1. (Continued)

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Distribution & biogeography of Anisogamus species. The genus Anisogamus was established by McLachlan in 1874 based on the species A. difformis, and its type locality is situated in the Eastern Alps (Austria, Carinthia, Saualpe, Stelzing (Kimmins 1949)). Collated distribution data for A. difformis suggest a panalpine presence of the species (Fig. 3D).

Specimens of A. waringeri were collected at the Col de Jou, Mont Canigou, Pyrenees-Orientales, France. At a location close by, Décams (1967) found putative A. difformis to be present (but very rare) in the valley of the Neste d’Aure at 1600 m a.s.l. and in the tributaries of the Têt river at 1100 m a.s.l. Specimens of A. waringeri sp. nov. were collected in the watershed of the Têt river, whereas the Neste d’Aure is some 125 km west of the recent collection points. Menéndez & González (2009) recorded A. difformis from the eastern Prepyrenees (Girona, Setcades), some 20 km south of the type locality of A. waringeri sp. nov., and were re-identified by M. A. González as A. waringeri sp. nov. (pers. comm. M. A. González). From the same area, Stenophylax nurianus was described by Navás (1917), illustrating a specimen similar to the genus Anisogamus, but the type specimen is lost (pers. comm. M. A. González), and the description and the figure itself do not allow certain identification. Further, this species was proposed by Schmid (1949) to be a synonym of A. difformis, based on his own collection and identification of 2 putative A. difformis specimens. Thus, we consider Stenophylax nurianus a nomen dubium in concordance with Malicky (2005), justifying the description of A. waringeri sp. nov. We further conclude that A. waringeri sp. nov. is the single representative of the genus Anisogamus in the Pyrenees.

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