



## A new Central European species of the *Daphnia curvirostris* complex, *Daphnia hrbacki* sp. nov. (Cladocera, Anomopoda, Daphniidae)

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### Abstract

Although systematics of the cladoceran genus *Daphnia* (Cladocera: Daphniidae) has been intensively investigated for decades using both morphological and genetic approaches, new lineages are being discovered on all continents, including in well-studied regions. Among Holarctic daphnids, *Daphnia curvirostris* Eylmann, 1887 held an interesting position, sharing some morphological characters of both the *D. pulex* and *D. longispina* groups. Recently, additional species of the *D. curvirostris* complex have been discovered in the Eastern Palaearctic. Here, we describe a new species in this complex from Central Europe, *D. hrbacki* sp. nov. It was discovered in small, newly created fishless pools in the Czech Republic, and an additional sample of apparently the same taxon was collected in 1951 in Slovakia. *D. hrbacki* is the closest yet known relative of *D. curvirostris*, but remains genetically divergent from all members of the complex (based on the sequences of three mitochondrial genes: 12S, COI, and ND2). In general, adult females of this species are morphologically very similar to *D. curvirostris*. Unlike the latter species, *D. hrbacki* may develop a specific hump-shaped dorsal outline of the carapace, presumably an inducible defence against invertebrate predators. Juveniles of the new species occasionally form neckteeth, which may also be retained in adult individuals. The species also shows substantial variation in the size of spines in the middle pecten of the postabdominal claw, similarly as in the Japanese member of the species complex, *D. tanakai* Ishida, Kotov & Taylor, 2006. This variable character of spine size in the postabdominal middle pecten (a transition from the *pulex* to the *longispina* group character), as well as a bent and heavily setulated terminal seta on the male 2<sup>nd</sup> endopodite (considered as the *pulex* group character), are typical for the new species. *D. hrbacki* also differs from *D. curvirostris* as well as other members of the complex in the ephippial surface ultrastructure. Our study demonstrates the utility of such ultrastructural characters in *Daphnia* taxonomical studies.

**Key words:** taxonomy, new species, inducible defences, ephippia ultrastructure

### Introduction

Water fleas of the genus *Daphnia* (Anomopoda: Daphniidae) are an important group in the zooplankton of inland water bodies, particularly in temperate zones. Their position in pelagic food webs, linking primary producers in phytoplankton and planktivorous consumers, especially fish, makes daphnids some of the keystone taxa in lake ecosystems. In addition, several *Daphnia* species have become model organisms in a number of research fields, including evolutionary biology or applied sciences such as ecotoxicology (Peters & de Bernardi 1987; Benzie 2005). In comparison with other cladoceran taxa, the genus *Daphnia* can be considered extremely well-known (Forró *et al.* 2008), and is among the most intensively studied aquatic invertebrates. However, there are still substantial gaps in knowledge of the diversity and systematics of this ecologically important model taxon. As in other cladoceran groups, undescribed lineages are being discovered in all biogeographic regions (see, e.g., Adamowicz *et al.* 2009), and many apparently widespread taxa turn out to be cryptic species complexes if studied in detail (Forró *et al.* 2008).

Until recently, *Daphnia curvirostris* Eylmann, 1887 belonged to a group of rather unusual *Daphnia* species which turned out to belong to the same genetic lineage in different biogeographic zones, despite its very broad distribution including the Palaearctic, Africa and North America (Benzie 2005). However, two new closely related species from the *D. curvirostris* complex were recently described from the eastern Palearctic: *Daphnia tanakai*