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The ontogeny of morphological traits in three European species of *Cosmochthonius* Berlese, 1910 (Acari: Oribatida: Cosmochthoniidae)

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Abstract

The morphology of juvenile stages and ontogeny of *Cosmochthonius reticulatus* Grandjean, 1947, *C. foliatus* Subías, 1982, and *C. ugamaensis* Gordeeva, 1980 are described and illustrated for the first time, and compared to the adults. Juveniles of these species differ mainly by the number of cilia on hypertrophied setae of *e*- and *f*-series, the shape of seta h_1 in the larva, and the shape of posterior gastronotal setae in nymphs. *Cosmochthonius reticulatus* has the fewest cilia on these setae, while the larva of *C. ugamaensis* and the nymphs and adult of *C. foliatus* have the most. In all species the number of cilia increases during ontogeny, more so in *C. foliatus* than in *C. ugamaensis* and *C. reticulatus*. Adults of these species differ mainly by the pattern of cerotegument and cuticle, best seen in SEM micrographs. Apparent in light microscopy the pygidium of *C. reticulatus* is reticulate, that of *C. foliatus* has rounded foveae, while that of *C. ugamaensis* has small circles and semicircles. The cuticle of the latter species is covered with thin, granular cerotegument, while that of the other species has thick, netlike cerotegument; *C. foliatus* also has a cerotegumental collar. Adults of all species differ also by the shape of posterior notogastral setae, and the location of some genital setae.

Key words: oribatid mites, *Cosmochthonius reticulatus*, *C. foliatus*, *C. ugamaensis*, ontogeny, setation, keys

Introduction

The adults of *Cosmochthonius reticulatus* Grandjean, 1947, *C. foliatus* Subías, 1982 and *C. ugamaensis* Gordeeva, 1980 form rather consistent morphological group of oribatid mites, easily identified as members of *Cosmochthonius* Berlese, 1910. They are rather small (length 266–340 µm), light brown, of similar body shape, with many bushy or pinnate setae on the prodorsum and notogaster, and with two pairs of long, hypertrophied setae in each of the *e*- and *f*-series. The body is covered either with thick, netlike cerotegument, as in *C. reticulatus* and *C. foliatus*, or with thin, granular cerotegument, as in *C. ugamaensis*, and the ornamentation of the cuticle-proper is characteristic for each species.

Subías (2004, 2011) included in *Cosmochthonius* 29 species and three subspecies, of which 17 species are known from Europe. Most of them have a reticulate prodorsum and notogaster, but this is a combination of patterns in cerotegument and cuticle-proper, and therefore sometimes can create problems with determination of species. For example, *C. foliatus* and *C. reticulatus* are covered with thick, netlike cerotegument, but of different kind of structures that are poorly distinguished in light microscopy (Penttinen & Gordeeva 2005); identifying them without removing this cerotegument and unobstructed observation of setal shapes is risky. Penttinen and Gordeeva (2005) compared in detail the integument of these species with that of *C. lanatus* (Michael, 1885), and found them to be easily distinguished by details seen in SEM micrographs. However, these techniques are expensive and time consuming, and not commonly used in ecological investigations. Therefore, morphological investigations of both juveniles and adults of *Cosmochthonius* species are needed in order to find diagnostic characters that can be observed in light microscopy. Hitherto the morphology and ontogeny of *C. ponticus* Gordeeva, 1980 was described and illustrated (Seniczak & Seniczak 2009a).

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