



Differentiation of external morphology of Oribatulidae (Acari: Oribatida) in light of the ontogeny of three species

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Abstract

In this paper the differentiation of external morphology and ontogeny of Oribatulidae were investigated, on the basis of *Phauloppia lucorum* (C. L. Koch, 1841), *Lucoppia burrowsi* (Michael, 1890), and *Oribatula tibialis* (Nicolet, 1855), which ontogeny is described and illustrated here for the first time. The juveniles of these species have smooth cuticle, a clavate sensillus with barbed head, and similar formulae of coxisternal, genital and aggenital setae, but differ mainly in body size, formulae of gastronotal setae, number of setal excentrosclerites on the gastronotum, and shape of some setae. The number of setal excentrosclerites and presence of seta h_3 in larva differ the juveniles of *Ph. lucorum* and *L. burrowsi* from those of *O. tibialis*, and seem to have generic value, and are also associated with the number of notogastral setae in adults (14 pairs in two former species, 13 pairs in latter species). The juveniles of *O. tibialis* lack excentrosclerite at seta lm , comparing to those of *Ph. lucorum* and *L. burrowsi*, and this morphological character is shared with *Schelorbitates* Berlese, 1908 and *Liebstadia* Oudemans, 1906 from the family Schelorbitatidae. The larva of *O. tibialis* lacks seta h_3 , similarly as that of *Schelorbitates*, while the larvae of *Ph. lucorum*, *L. burrowsi*, and *Liebstadia* have this seta. Presence of setal pair c_3 in adult of *Zygoribatula* cf. *frisiae* (Oudemans, 1900) is recorded here for the first time, which indicates the order of loss of setae of *c*-series in Oribatulidae according to Grandjean (1951, 1958, 1968).

Key words: oribatid mites, setation, juveniles, ontogeny, phylogeny *Phauloppia lucorum*, *Lucoppia burrowsi*, *Oribatula tibialis*

Introduction

The family Oribatulidae forms a large group of oribatid mites, which includes 201 species and eight subspecies, with about 60 species found in Europe (Subías 2004, 2011). Their juveniles are poorly known, and therefore the family diagnose bases on morphological characters of adults (Bulanova-Zachvatkina 1975; Weigmann 2006). The adults are morphologically differentiated, and divided into 18 genera and two subgenera. For example, *Phauloppia lucorum* (C. L. Koch, 1841), *Lucoppia burrowsi* (Michael, 1890), and *Oribatula tibialis* (Nicolet, 1855) investigated here differ in the body size, appearance of lamellae and presence of translamella, number and length of notogastral setae and shape of anterior porose area (*Aa*), and the number of genital setae (Bulanova-Zachvatkina 1975; Weigmann 2006).

The Oribatulidae are rather common, and sometimes abundant in terrestrial ecosystems, especially in forests, but nevertheless their juveniles are poorly known, and therefore are usually omitted in species analyses, which lowers the density of species and their position in the dominance structure of oribatid mites in ecosystems. Having the diagnostic characters of the juveniles of particular species, it is possible to investigate their age structure and influence of species on decomposition of organic matter. The more so, because the juveniles of Oribatida have higher metabolism than the adults (Berthet 1964) and more active microflora in their gut canals (Stefaniak & Seniczak 1976, 1981, 1983), which actively acts on pectins, saccharose, cellulose, lignin and also chitin.

There are few papers concerning the morphology of the juveniles of Oribatulidae. Tuxen (1943) illustrated a nymph of *Oribatula tibialis*, while Grandjean (1958) described and illustrated the ventral part of hysterosoma of the larva of *O. tibialis* and lateral aspects of palps of its larva, proto- and deutonymph, and used this information to