

Re-description of *Cultroribula berolina* Weigmann, 2006 (Acari, Oribatida, Astegistidae) from Germany with a key for the European species

Gerd Weigmann

Gerd Weigmann, Institute of Zoology, Koenigin-Luise-Str. 1 – 3, 14195 Berlin, Germany;
e-mail: weigmann@zedat.fu-berlin.de

Abstract

The oribatid mite *Cultroribula berolina* Weigmann, 2006 (Astegistidae), recently briefly described in a determination key, is re-described in more detail and compared with similar congeners. Additionally, taxonomical remarks on the genus and discussions on some species are presented. The main characters of *C. berolina* are: rostrum distally with three distinct teeth, cusps of lamellae with rounded tips, tutorium blade-like with long acute tip, sensillus long-claviform with short stalk, 10 pairs of fine notogastral setae, legs monodactylous, body length about 255 – 285 µm.

Keywords: Taxonomy, systematics, Europe

Zusammenfassung

Von der kürzlich nur im Rahmen eines Bestimmungsschlüssels beschriebenen Art *Cultroribula berolina* Weigmann, 2006, wird eine ausführlichere Beschreibung vorgelegt und die Art wird mit anderen aus der Gattung verglichen. Weiterhin werden die Gattung und weitere Arten der Gattung diskutiert, über die in der Literatur Unklarheiten bestehen. Die wichtigsten Merkmale der neuen Art sind: Rostrum vorn mit drei deutlichen Zähnen, Cuspides der Lamellen am Ende gerundet, Tutorium blattförmig mit langer Spitze, Sensillus länglich-keulenförmig mit kurzem Stiel, 10 Paar Notogasterborsten kurz und fein, Beine einkrallig, Körperlänge 255 – 285 µm.

1. Introduction

In the course of a taxonomical revision of Central European oribatid mites, which resulted in a text book on German Oribatida (Weigmann 2006), the species *Cultroribula berolina* Weigmann, 2006 (Astegistidae) was described briefly, based on a single female specimen from a forest in Berlin. Recognition of this species only became possible with a modern re-description of *C. juncta* (Michael, 1885) (Luxton 1987, Weigmann 2006) and discussions on morphology and distribution of *C. confinis* Berlese, 1908. Probably, *C. berolina* has been confused in the past with each of the former species which have been described incompletely and in part incorrectly. To clarify this is the object of the discussion below. Now, further specimens of *C. berolina* are available, which allows more detailed studies as well as comparison with its congeners.

2. Materials and methods

The type specimen was collected in the litter layer on acidic sandy soil of a pine-oak-stand in the Grunewald Forest of Berlin, Jagen 24 (52°28' N, 13°13' E); collected by Dorothee Gehring 21 April 1990. (In 1992, at the time of the her diploma thesis, the species' identity was uncertain because a modern re-description of *C. juncta* was not available). Two further specimens were collected in the litter layer on acidic sandy soil of a pine-oak-stand in Bärenklau Forest near Oranienburg, north of Berlin, 13 May 1991. The mites were extracted using a modified MacFadyen apparatus. The specimens were stored in ethanol and after clearing they were studied in lactic acid in open hollow-ground microscope slides.

A series of collections was made by Georgia Erdmann, Görlitz, at the bark of oak trees near Görlitz in Germany (Klosterwald Marienthal at Ostritz, March 2005); one slide with two mounted specimens has been studied by me and is now deposited in my collection. Further specimens are deposited in the collection of the Staatliches Museum für Naturkunde Görlitz

The terminology of morphological structures follows van der Hammen (1980) and Weigmann (2006).

3. Re-description of *Cultroribula berolina* Weigmann, 2006

Figs 1, 2

Diagnosis: Body length 255 – 285 µm; rostrum with two very narrow incisions medial to rostral setae, dividing rostral apex into three teeth; lateral anterior edge of rostrum with two further very small teeth; lamellar complex as typical for the genus: lamellae moderately broad, joined medially; cusps long, moderately broad, rounded tip bearing lamellar setae, space between cusps very narrow. Tutorium long, posteriorly a rounded blade, anteriorly with long acute tip. Sensillus with elongated claviform, with short stalk. Shoulder blade of notogaster distinct; notogaster long-ovoid; with 10 pairs of fine setae. No specific characters on ventral side. Legs with 1 claw.

General characters: Body length 255 – 285 µm (five females studied); type specimen 280 µm in length, 147 µm in width. Colour pale yellow; cuticle of ventral plate with fine longitudinal striation, notogaster with similar striation, but very indistinct.

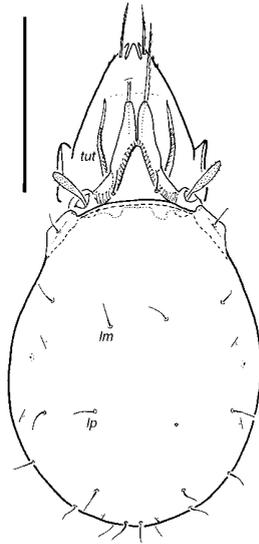


Fig. 1 *Cultroribula berolina*: dorsal aspect (legs not shown). – Abbreviations: *lm*, *lp* – notogastral setae; *tut* – tutorium. Scale bar: 100 μ m.

Prodorsum: Rostrum with two very narrow incisions medial to rostral setae; incisions about 8 μ m long, divide rostral tip into three triangular teeth; lateral anterior edge of rostrum with two further very small teeth, best visible in lateral view (Fig. 2). Lamellae moderately broad, converging and joining antero-medially; cavity present below lamellar blades in posterior part, near bothridia; cusps long, moderately broad, rounded tips bearing lamellar setae, space between cusps very narrow (Fig. 1). Tutoria long, posteriorly formed as rounded blade, anteriorly with long, acute cusps (Fig. 2). Sensilli claviform, with elongated, granulated heads and short stalks. Rostral and lamellar setae strong, setiform with distinct setulae; interlamellar setae short and fine (about 15 – 20 μ m length); small exobothridial setae located below bothridia and above large pedotecta I.

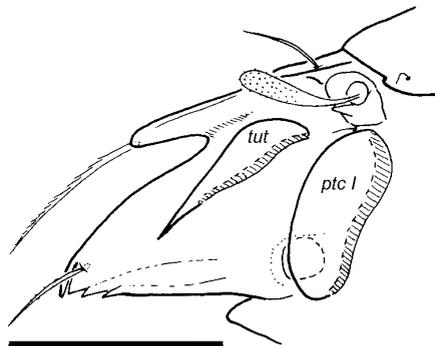


Fig. 2 *Cultroribula berolina*: lateral aspect of prodorsum (leg I and gnathosoma not shown). – Abbreviations: *tut* – tutorium; *ptc I* – pedotectum I. Scale bar: 50 μ m.

Notogaster: Shape ovoid; anterior border of notogaster convex, humeral corners with distinct, protruding small shoulder blades (Fig. 1). With 10 pairs of fine setae (length about 10 – 13 μm); anterior-most setae on shoulder blades, presumably representing setae c_3 ; setae lm and lp in centro-dorsal positions. Opisthonotal glands hardly visible. Five pairs of notogastral slit sense organs present.

Ventral region: Structure normal for the genus, without specific characters. Epimeral setal formula 3-1-3-3; with transverse grooves ('taenidium') between epimeres IV and ventral plate, as typical of family. Genital and anal plates large, only slightly separated; five pairs of fine genital setae, one pair of aggenital setae, two pairs of anal setae, three pairs of adanal setae.

Legs: With 1 claw.

Type material: The female holotype is mounted in a slide in Berlese liquid, deposited in the collection of the Staatliches Museum für Naturkunde Görlitz.

Etymology: This species name relates to the Latin name of Berlin.

4. Discussion

Ghilarov & Krivolutsky (1975) listed eight species of *Cultroribula* in the Palaearctic region, most of them reported without critical comments, based on the original descriptions: none of the species is similar to *C. berolina*. Subías (2007) listed 25 species worldwide, five of them with European distribution: the type species *C. juncta* (Michael, 1885), *C. bicultrata* (Berlese, 1905), *C. confinis* Berlese, 1908, *C. tridentata* Mihelčič, 1958, and *C. berolina*. Further species with European origin were described, but are junior synonyms or were recently transferred to other genera, e.g., *C. dentata* Willmann, 1950.

In the case of *C. tridentata* Mihelčič, 1958, which was originally reported from Carinthia, southern Austria, the description is too poor to decide even its genus: the number of claws, the position of notogastral setae and other important details are absent from the description (Mihelčič 1958); the body length of 580 – 620 μm would be extreme within *Cultroribula* and clearly gives reason to reject synonymy with *C. berolina*.

In contrast to *C. berolina* and other congeners, some species have tridactylous legs. *Cultroribula dentata* Willmann, 1950, was originally recorded from the Ukraine (Lubien Wielki; Willmann 1950). Similar in size, about 320 μm , it clearly differs from *C. berolina* by its tridactylous claws, longer interlamellar setae and having about 7 pairs of teeth on the anterior edge of the rostrum. Bayartogtokh (2007) re-described *C. dentata* from Mongolian soils with some minor conflicts with the original description regarding small teeth at the cusp tips, more numerous teeth on the rostral edge, and a body length of about 310 – 335 μm . The species is reported from Finland, the Ukraine, European Russia to Siberia, China and Mongolia, and from Alaska and Canada (see Ghilarov & Krivolutsky 1975, Marshall et al. 1987, Bayartogtokh 2007). *Cultroribula vtorovi* Krivolutsky, 1971, redescribed by Bayartogtokh (2007). It is similar to *C. dentata*, but has only three pairs of lateral teeth on the anterior edge of the rostrum in addition to the distal three teeth, has distal teeth on the lamellar cusps, and a body length of about 340 μm (Ghilarov & Krivolutsky 1975) or 305 – 320 μm (Bayartogtokh 2007). Mahunka (1983) created the subgenus *Mexicoppia* under *Furcoppia* with the type species *F. (M.) hauseri* Mahunka, 1983; this species from Mexico very much resembles *C. vtorovi* (same rostral teeth, same cusp), but is larger (about 360 – 390 μm in

length). Subías (2004) listed these three species within *Furcoribula* (*Mexicoppia*), but in my opinion the morphological contrast to classical *Furcoppia* species is greater than to classical *Cultroribula* species. The taxon *Mexicoppia* needs critical revision.

The genus type species *C. juncta* (Michael, 1885) was poorly known in morphological respect until the type was studied by Luxton (1987) and the species re-described by Weigmann (2006). Earlier records are based on the original description of Michael (1885 and 1888), or on information in Willmann (1931), Sellnick (1960) or Ghilarov & Krivolutsky (1975), none of which is sufficient for modern taxonomy. All of these references report the species to be monodactylous. However, Luxton (1987) re-described the type as heterotridactylous; he reported the number of notogastral setae as 12 pairs, erroneously, instead of the correct number of 10 pairs. The unpublished studies of Kunst, including his study of type material from the British Museum of Natural History, were the source for Fig. 381 in Ghilarov & Krivolutsky (1975) and also for some information obtained from Ladislav Miko, who helped me with the re-description of *C. juncta* (Weigmann 2006), which was based on German specimens that are deposited in the Staatliches Museum für Naturkunde Görlitz and originally labelled as '*C. confinis*'. The main characters of *C. juncta* in contrast to *C. berolina* are the following: incisions of rostral tip very short, so that three anterior rostral teeth are very short and hardly visible in dorsal aspect; interlamellar setae very short; tutoria without free acute tip; 10 pairs of notogastral setae short, mostly less than 10 µm long; notogaster shape at the shoulder region broader than in *berolina*; body length 235 – 280 µm; and heterotridactylous legs, of which the lateral claws are very thin.

The only record of *C. juncta* referred to by Willmann (1931) was from mosses on the bark of trees, collected in former Eastern Prussia, now Western Russia. Probably, this record of a monodactylous *Cultroribula* refers to *C. berolina*, which was collected recently by Georgia Erdmann (Görlitz) from tree bark (see 2. Materials and methods). This habitat may be the ecological preference of the latter species which therefore seems to be very rare in collections from forest litter. Certainly, all records in the Palaearctic outside the British Isles and in the Nearctic (see Marshall et al. 1987) are determined after older text books require critical revision.

Three monodactylous *Cultroribula* species with reported European occurrence are *C. bicultrata* Berlese, 1905, *C. confinis* Berlese, 1908 and *C. berolina*. The description of *C. confinis* from Northern America and its re-description with a poor drawing (Berlese 1910: Fig. 68) are not adequate for modern taxonomy, but sufficient for differentiation from *C. juncta*, *C. bicultrata* and *C. berolina* (sensilli claviform with long stalk, body length about 250 µm, notogaster shape broader than in *bicultrata*). Norton & Kethley (1989) discussed the Berlese species *C. confinis* and compared it with the description of another North American species, *Cultroribula divergens* Jacot, 1939, which is possibly a junior synonym of *C. confinis* (see Marshall et al. 1987: 178). The single record known to me of *C. confinis* from Europe, Northern Spain (Iturrondobeitia & Subías 1981; cited in Perez-Iñigo 1997; cf. Subías 2004), is questionable and needs to be restudied.

Cultroribula bicultrata was re-described accurately by Bernini (1969); it is widespread in forest soils of the Palaearctic and Nearctic regions (remarks on morphology, synonyms and distribution e.g. in Bernini 1969, Marshall et al. 1987, Perez-Iñigo 1997, Mahunka & Mahunka-Papp 2004, Weigmann 2006). It differs from other *Cultroribula* species mainly by the following character combination: three very long distal teeth at the rostrum, tutoria with

long acute tip, cusps of lamellae slender, interlamellar setae minute, sensillus head slender fusiform with elongated stalk, minute to vestigial notogastral setae, body length about 225 – 250 μm .

Key to the European species of *Cultroribula*

1. Legs with three claws 2
- Legs with one claw 3
2. Rostrum anteriorly with 2 – 3 large distal teeth and 6 – 7 pairs of smaller teeth; lamellar cusps long, with or without distal teeth; interlamellar setae long, reaching the cusp tips; tutorium relatively short, distally pointed; sensillus claviform, with long head and short stalk; 10 pairs of notogastral setae moderately short; 5 pairs of genital setae; body length 310 – 340 μm *C. dentata* Willmann, 1950
- Rostrum distally with very short incisions, delineating three short teeth, hardly visible in dorsal view; no additional lateral teeth; lamellar cusps long, rounded; interlamellar setae very short and fine; tutorium small blade-like without free distal tip; sensillus with fusiform head and short stalk; 10 pairs of very short notogastral setae; 5 pairs of genital setae; body length 235 – 280 μm *C. juncta* (Michael, 1885)
3. Rostrum distally prolonged and slender with long incisions, delineating three long teeth, no additional lateral teeth; lamellar cusps long, slender, rounded; interlamellar setae very short and fine; tutorium blade-like with long free distal tip; sensillus fusiform with long stalk; 10 pairs of very short to vestigial notogastral setae; 6 pairs of genital setae; body length 225 – 250 μm *C. bicultrata* (Berlese, 1905)
- Rostrum distally not prolonged, with moderately long incisions, delineating three teeth, two pairs of additional lateral teeth; lamellar cusps moderately long, slender, rounded; interlamellar setae short and fine; tutorium blade-like with long free distal tip; sensillus claviform, with long head and short stalk; 10 pairs of short notogastral setae; 5 pairs of genital setae; notogaster and ventral plate with fine longitudinal striation, body length 255 – 285 μm *C. berolina* Weigmann, 2006

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