

**THE GENUS *MACROCHAETOSOMA* ABSOLON & LANG, 1933 (MYRIAPODA,
DIPLOPODA, ANTHOGONIDAE): TAXONOMY, BIOGEOGRAPHY, AND PHYLOGENY**

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Abstract — Two “subspecies” of the diplopod genus *Macrochaetosoma* Absolon & Lang, *M. troglomontanum biokovense* Mršić & *M. troglomontanum deelemanorum* Gulička are synonymized and attributed to *M. troglomontanum* Absolon & Lang. Abundant material from Montenegro and Herzegovina led us to reanalyze taxonomic relationships of member of the genus *Macrochaetosoma* (as well as these of some related taxa); some biogeographic and phylogenetic details are also briefly discussed.

Key words: Diplopoda, *Macrochaetosoma*, taxonomy, biogeography, evolution, Montenegro, Herzegovina

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591.9

INTRODUCTION

The genus *Macrochaetosoma* Absolon & Lang, 1933 was erected for *Macrochaetosoma troglomontanum* Absolon & Lang, 1933 (Absolon and Lang, 1959). After that, Verhoeff (1942) described a new genus and three new species: *Antroremya aristofer* Verhoeff, 1942; *A. fritzii* Verhoeff, 1942; and *A. gracilipes* Verhoeff, 1942. He also established the new family Antroremyidae Verhoeff, 1942. The genus *Antroremya* was subsequently synonymized with *Macrochaetosoma* (Attems, 1959) and all its species were relegated to the family Anthogonidae Ribaut, 1913. Strasser (1962) described a new form from Eastern Herzegovina: *Macrochaetosoma drinae* Strasser, 1962. Gulička (1964) established a new subspecies from the Vodena Pećina Cave near Gacko: *M. gracilipes deelemanorum* Gulička, 1964. Later, Strasser (1971) classified three of Verhoeff's species as subspecies of *M. troglomontanum* and *M. gracilipes deelemanorum* as a subspecies of *M. troglomontanum*. It is interesting that in another work published in the same year, Strasser (1971a) classified all three of Verhoeff's subspecies as synonyms of the species *M. troglomontanum*. To date, neither Strasser (1971, 1971a) nor Hoffmann (1980) have re-

egated the genus *Macrochaetosoma* to any family. Mršić (1987) described *M. troglomontanum biokovense* Mršić, 1987 as a new subspecies, but retained the status of subspecies for another four taxa. Subsequently, Mršić (1992) accepted the opinion of Strasser (1971a) and admitted the existence of only three valid subspecies (*M. troglomontanum troglomontanum*, *M. troglomontanum deelemanorum*, and *M. troglomontanum biokovense*) and one species (*M. drinae*). In the same paper, he indicated the existence of great variability of gonopod structure in different populations of *M. troglomontanum troglomontanum*. Furthermore, he established the new subfamily Macrochaetosomatinae Mršić, 1992 under Anthogonidae. Recently, Ćurčić and Makarov (2001) described a new species from Montenegro — *M. bifurcatum* Ćurčić and Makarov, 2001 — and included it in the family Anthogonidae. Finally, Enghoff (2005) retained only three species of the genus *Macrochaetosoma* (*M. bifurcatum*, *M. drinae*, *M. troglomontanum*) and placed them in the family Anthogonidae.

Abundant material from Montenegro and Herzegovina led us to reanalyze taxonomic relationships of members of the genus *Macrochaetosoma*, as well as its biogeography and phylogeny. All ana-

lyzed material is deposited in the collection of the Institute of Zoology, Faculty of Biology, University of Belgrade, Serbia.

RESULTS AND DISCUSSION

ANTHOOGONIDAE RIBAUT, 1913

MACROCHAETOSOMA ABSOLON & LANG, 1933

MACROCHAETOSOMA TROGLOMONTANUM ABSOLON & LANG, 1933

Syn.: *Antroremya aristofer* Verhoeff, 1942
Antroremya fritzii Verhoeff, 1942
Antroremya gracilipes Verhoeff, 1942
Macrochaetosoma troglomontanum
deleemanorum (Gulička, 1964), n. syn.
Macrochaetosoma troglomontanum
biokovense Mršić, 1987, n. syn.

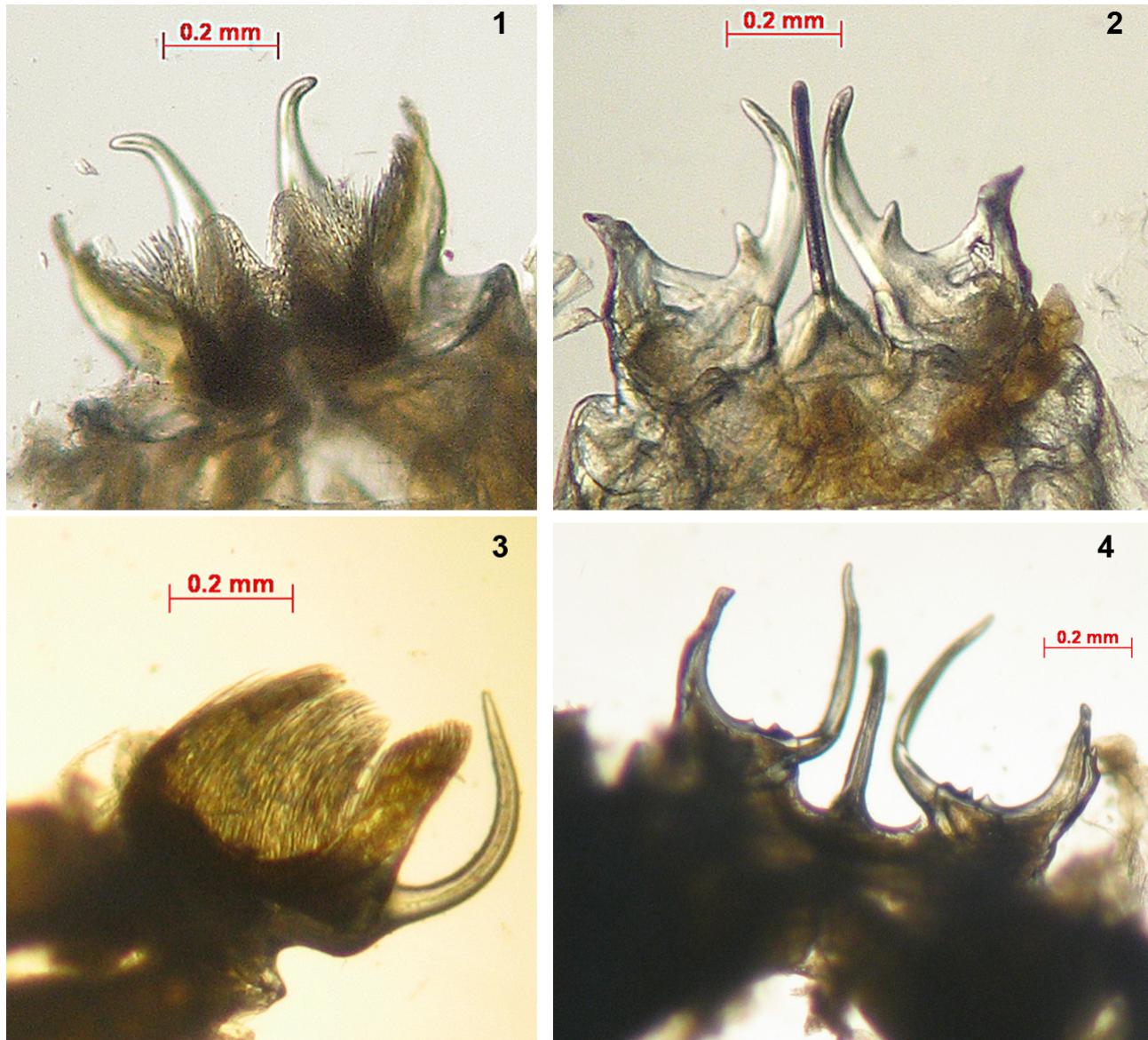
Material examined. — Two females and one juvenile female from the Bukarička Pećina Cave near Risan, Montenegro, collected on 7 July 1997 by I. Karaman; one juvenile male from the Golubija Špilja Cave, village of Gornja Seoca near Virpazar, Montenegro, collected on 31 January 1997 by I. Karaman; one male, two females, one juvenile male, and one juvenile female from the Mijatova Torina Cave, Bijela Gora, Mt. Orjen, Herzegovina, collected on 12 June 2005 by M. Popović; three juvenile males from the Jama Duboki Do Pit, Njeguši, Montenegro, collected on 5 September 2003 by S. Ognjenović; two males from the Pećina u Mravinjci Cave, Turica, Herzegovina, collected on 8 June 2004 by S. Ognjenović; and one female from the Jama pod Pločnikom Pit, village of Brestice, Korita, Herzegovina, collected on 10 June 2004 by S. Ognjenović.

Discussion. — We retain the terminology of Mršić (1992) in order to avoid confusion in the assignation of some aspects of gonopod structure. After carefully examining of males from different localities, we noted following facts. The presence of bristles on the apex of the posterior paramedial oval coxal process on anterior gonopods in the male from the Mijatova Torina Cave is typical only of *M. drinae* (Fig. 3). In the same specimen, shape of the bristled

apparatus on the lateral branch of the anterior coxal stem is almost the same as in *M. troglomontanum aristofer*. Also, shape of the inner or paramedial main branch of the anterior coxal stem in the analyzed male is similar to that of the same structure in *M. troglomontanum aristofer*. In the posterior gonopods, the male from the Mijatova Torina Cave has a paramedial coxal process very similar to that in the subspecies *M. troglomontanum troglomontanum* and *M. troglomontanum biokovense* (Fig. 4). The analyzed male shared the presence of nodes in the base of the paramedial coxal process with *M. troglomontanum troglomontanum*. Also, this male has an elongated lateral coxal process, as in *M. troglomontanum troglomontanum*. Furthermore, males from the Pećina u Mravinjci Cave have an inner main branch of the anterior coxal stem like the one in *M. troglomontanum biokovense*. On the other hand, the posterior paramedial oval coxal process is similar to the same structure in *M. troglomontanum troglomontanum*. It is interesting that the bristled apparatus in both males from the Pećina u Mravinjci Cave is almost identical to the same in *M. troglomontanum aristofer*; bristles on the posterior paramedial oval coxal process are similar to those in *M. troglomontanum fritzi* (Fig. 1). As far as the posterior gonopods are concerned, the paramedial coxal process in the analyzed males is like the same in *M. troglomontanum gracilipes*; the lateral coxal process is similar to that in *M. troglomontanum fritzi* (Fig. 2).

It is evident that we are dealing with only one species characterized by great interpopulation variation, and that all earlier described subspecies are synonyms of *Macrochaetosoma troglomontanum*. This means that at the moment we distinguish only three valid taxa (species): *Macrochaetosoma troglomontanum*, *M. drinae*, and *M. bifurcatum*.

Unfortunately, there are no data on vulval structure. Only Attems (1959) noted vulval morphology, but with a very schematic drawing. Generally, his description is in agreement with our analyzed females from different localities. Also, all analyzed females possess very constant structure of the bursa and operculum, and we could not find any variability in these structures.



Figs. 1-4. *Macrochaetosoma troglomontanum* Absolon & Lang, 1933. Male from the Pećina u Mravinjci Cave, Herzegovina: 1 – anterior gonopods, caudal view; 2 – posterior gonopods, caudal view. Male from the Mijatova Torina Cave, Herzegovina: 3 – anterior gonopods, caudal view; 4 – posterior gonopods, oral view. Scales in mm.

Biogeographically, the genus *Macrochaetosoma* is typical of Dinaric elements. Its distribution is limited to numerous caves in Southern Dalmatia, Southern Herzegovina, Western Montenegro, and Northern Albania. All species have numerous adaptations for life in caves (absence of eyes and pigment, elongated antennae and legs, numerous sensitive setae on the gnathochilarium, etc.). Distribution of the genus

Macrochaetosoma represents the easternmost outpost of the family Anthogonidae, although in the southeastern part of the Adriatic Coast it coincides with that of some anthogonid genera (*Hassia* Latzel, 1884 and *Egonpretneria* Strasser, 1966).

M r š i ć (1992) postulated that the main characteristics of the genus *Macrochaetosoma* are reduction in volume of the front (= anterior) gonopods

and increase in volume of the rear (= posterior) gonopods, and that the posterior gonopods play a significant role in sperm transfer. For these reasons, he established the subfamily Macrochaetosomatinae. However, we disagree with this opinion. It is much more likely that the anterior gonopods are simplified in comparison with congeners. This may be only a result of adaptation to life in caves or retention of some ancestral features. A phylogenetically important character is the presence of a bristled apparatus or row of bristles on the anterior gonopods, which also exist in the genera *Haasia* and *Egonpretneria*. Comparison of the posterior gonopods in *Macrochaetosoma* and *Haasia* shows that a similar general "ground-plan" exists in both genera. Both genera are characterized by development of sternal projections (simple, bifurcated, three-lobed, straight, curved, etc.). Lateral coxal elements in the genus *Macrochaetosoma* consist of two distinct parts, but in almost all haasians they are single (with different degrees of differentiation). It is very problematic to say that the posterior gonopods in *Macrochaetosoma troglomontanum deleemanorum* are much larger than in *Haasia largescutata parallelum* (Strasser, 1940). We only agree that the posterior gonopods have a specific role in sperm transfer, to judge from their specific associating with the coxal glands of leg-pairs X. All of the mentioned facts are in our opinion insufficient grounds for establishing a new subfamily. We believe that the only correct position of this genus is in the family Anthogonidae.

Finally, the absence of a telopodite on the anterior gonopods and its reduction on the posterior gonopods in the genus *Macrochaetosoma* support

the idea of coxal origin of the gonopods in many chordeumatidans.

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РОД MACROCHAETOSOMA ABSOLON & LANG, 1933 (MYRIAPODA, DIPLOPODA, ANTHOGONIDAE): ТАКСОНОМИЈА, БИОГЕОГРАФИЈА И ФИЛОГЕНИЈА

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Две подврсте рода *Macrochaetosoma* Absolon & Lang, *M. troglomontanum biokovense* Mršić и *M. troglomontanum deleemanorum* Gulička су синонимизоване са врстом *M. troglomontanum* Absolon

& Lang. На основу обимног узорка диплопода из Црне Горе и Херцеговине анализирани су таксономски, биогеографски и филогенетски односи представника рода *Macrochaetosoma*.