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Review of the family Anthogonidae (Diplopoda, Chordeumatida), with descriptions of three new species from the Balkan Peninsula

DRAGAN ANTIĆ^{1,5}, TVRTKO DRAŽINA^{2,3}, TONČI RAĐA⁴, VLADIMIR T. TOMIĆ¹
& SLOBODAN E. MAKAROV¹

¹Institute of Zoology, Faculty of Biology, University of Belgrade, Studentski trg 3, 11000 Belgrade, Serbia

²Division of Zoology, Department of Biology, Faculty of Science, University of Zagreb, Rooseveltov trg 6, 10000 Zagreb, Croatia

³Croatian Biospeleological Society, Demetrova 1, 10000 Zagreb, Croatia

⁴Speleological Society “Špiljar”, 21000 Split, Croatia

⁵Corresponding author. E-mail: dragan.antic@bio.bg.ac.rs

Abstract

Three new species of the family Anthogonidae are described from caves in Croatia and Montenegro, respectively: *Egonpretneria vudutschajldi* Antić & Dražina **sp. n.**, *Haasia jalzici* Antić & Dražina **sp. n.**, and *Macrochaetosoma bertisceae* Antić & Makarov **sp. n.** All three subfamilies within Anthogonidae are diagnosed, with brief discussion of relationships between genera and notes on their biogeography. A map of the global distribution of Anthogonidae is presented, as well as maps of the distribution of each species of Balkan anthogonids, including numerous new locality data. The first SEM images are provided for some representatives of this family. A key is given to all seven anthogonid genera. The subfamily Haasiinae Hoffman, 1980 is a new synonym of Anthogonidae, **syn. n.**, while *Macrochaetosoma bifurcatum* Ćurčić & Makarov, 2001 becomes a new synonym for *M. troglomontanum* Absolon & Lang, 1933, **syn. n.**

Key words: Diplopoda, Anthogonidae, new species, caves, Balkan Peninsula, Croatia, Montenegro

Introduction

According to Fauna Europaea (version 2.6.2), the family Anthogonidae today includes seven genera: the western European *Anthogona* Ribaut, 1913, Pyrenean *Cranogona* Ribaut, 1913, *Escualdosoma* Mauriès, 1965, and *Vascanthogona* Mauriès & Barraqueta, 1985; and the troglobitic Balkan forms *Haasia* Bollman, 1893, *Macrochaetosoma* Absolon & Lang, 1933 and *Egonpretneria* Strasser, 1966. However, over a period of one hundred years, like many other chordeumatidan families, this family had a very turbulent history, with numerous relocations of taxa from one to another family or subfamily.

The family Anthogonidae was established by Ribaut in 1913, at which time he included four genera within it: *Anthogona* as the type genus; and *Cranogona*, *Origmatogona* Ribaut, 1913 and *Scutogona* Ribaut, 1913. In 1930, Verhoeff recognized the subfamily Anthogoninae with the genera *Anthogona* and *Cranogona*, and, together with the newly described subfamily Acherosominae with the genus *Acherosoma* (= *Haasia*) as well as the subfamily Anthroleucosomatinae, placed it within the family Anthroleucosomatidae. On the other hand, Brolemann (1935) placed the genera *Anthogona* and *Cranogona* in the family Xystrosomidae. Almost thirty years later, Attems (1959) reorganized Verhoeff's classification and placed two Balkan genera, *Haasia* and *Macrochaetosoma*, together with *Anthogona* and *Cranogona*, within the family Anthogonidae. The opinion of Attems was not supported by Mauriès (1966) when he introduced four subfamilies within the Anthogonidae: Anthogoninae, Origmatogoninae, Scutogoninae, and Chamaesominae, but without Balkan taxa in any of them. At the end of the same year, Strasser (1966b) described the genus *Egonpretneria*, closely related to *Haasia*, but apparently following Verhoeff's and Mauriès's opinion he did not place these two genera in the Anthogonidae, but in the Anthroleucosomatinae within the family Anthroleucosomatidae. Mauriès (1970) retained his own opinion from 1966 as to the four subfamilies, this time including the Balkan genera *Haasia* and *Egonpretneria*, but in two

6. Syncoxite of anterior gonopods with impressive rounded medial lobe. Posterior gonopods with uniramous medial sternal process. Metazonites with numerous warts. Macrochaetae very short and bacilliform. . . . *Egonpretneria* Strasser, 1966 (Croatia)
- Syncoxite without rounded medial lobe. Posterior gonopods with uni-, bi- or triramous medial sternal process. Metazonites without warts. Macrochaetae long and trichoid *Haasia* Bollman, 1893 (Croatia and Slovenia)

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References

- Attems, C. (1959) Die Myriopoden der Höhlen der Balkanhalbinsel. *Annalen des Naturhistorischen Museums in Wien*, 63, 281–406.
- Bakšić, D., Jalžić, B., Šmida, B. & Lacković, D. (1996/1997) Slovačka jama. *Speleolog*, 44–45, 3–13.
- Bakšić, D., Barišić, T., Božić, V., Buzjak, S., Čaplar, A., Jalžić, B., Lacković, D., Stroj, A., Šmida, B., Vrbek, B. & Vrbek, M. (2007) *Jamski sustav Lukina jama-Trojama (Cave System Lukina jama-Trojama)*. Hrvatski planinarski savez, Zagreb, 139 pp.
- Basara, D. & Cvitanović, H. (2013) Multidisciplinarna speleo-znanstvena istraživanja na srednjem Velebitu tijekom 2012. i 2013. godine. *Subterranea Croatica*, 15, 2–14.
- Brolemann, H.W. (1935) Myriapodes Diplopodes (Chilognathes 1). *Faune de France*, 29, 1–368.
- Casale, A., Jalžić, B., Lohaj, R. & Mlejnek, R. (2012) Two new highly specialized subterranean beetles from the Velebit massif (Croatia): *Velebitaphaenops* (new genus) *giganteus* Casale & Jalžić, new species (Coleoptera: Carabidae: Trechini) and *Velebitodromus ozrenlukici* Lohaj, Mlejnek & Jalžić, new species (Coleoptera: Cholevidae: Leptodirini). *Natura Croatica*, 21 (1), 129–153. [Zagreb]
- Ceuca, T. (1964) Zur Kenntnis der Höhlendiplopoden Jugoslawiens. *Fragmenta Balcanica*, 5, 8 (118), 37–46.
- Ćurčić B.P.M. & Makarov, S.E. (2001) *Macrochaetosoma bifurcata*, a new endemic diplopod from Montenegro (Diplopoda, Anthogonidae). *Archives of Biological Sciences, Belgrade*, 54 (3–4), 43–44.
- Enghoff, H. & Kime, R.D. (Eds.) (2013) Myriapoda. Diplopoda. In: *Fauna Europaea, version 2.6.2*. Available from: <http://www.faunaeur.org> (accessed 11 Januar 2015)
- Gregory, S.J., Jones, R.E. & Mauriès, J.-P. (1994) A new species of millipede (Myriapoda: Diplopoda: Chordeumatida) from the British Isles. *Journal of Natural History*, 28 (1), 47–52.
<http://dx.doi.org/10.1080/00222939400770051>
- Hoffman, R.L. (1980) *Classification of the Diplopoda*. Muséum d’Histoire Naturelle, Genève. 273 pp.
- Madžgalj, Ž. (2015) Najdublje pećine u Crnoj Gori. Available from: <http://www.speleologija.me> (accessed 11 January 2015)
- Makarov, S.E., Ćurčić, B.P.M., Tomić, V.T. & Mitić, B.M. (2007) The genus *Macrochaetosoma* Absolon & Lang, 1933 (Myriapoda, Diplopoda, Anthogonidae): Taxonomy, Biogeography, and Phylogeny. *Archives of Biological Sciences, Belgrade*, 59, 383–386.
<http://dx.doi.org/10.2298/ABS0704383M>
- Malez, M., Jalžić, B. & Lajtner, I. (1988) Ponor Sušik kod Drežnice kao primjer tafodeme špiljskog medvjeda. *Naš krš*, 14 (24–25), 119–127.
- Mauriès, J.-P. (1963) Sur deux diplopedes des Hautes-Pyrenées. *Bulletin de la Société d'histoire naturelle de Toulouse*, 98, 226–227.
- Mauriès, J.-P. (1966) *Vandeleuma* et *Vascosoma*, genres nouveaux des Grottes du pays basque Francais (Diplopoda-

- Craspedosomoidea). *Annales de Spéléologie*, 21, 631–641.
- Mauriès, J.-P. (1970) Diplopodes épigés et cavernicoles des Pyrénées Espagnoles et des Monts Cantabriques. I-III. Introduction, Polyzonides et Craspedosomides. *Bulletin de la Société d'histoire naturelle de Toulouse*, 106, 401–422.
- Mauriès, J.-P. (1975) Notes sur les Diplopodes Pyreneens. V. Le genre endémique *Cranogona* Ribaut, 1913. Une nouvelle espèce cavernicole. *Annales de Spéléologie*, 30 (2), 337–341.
- Mauriès, J.-P. (1982) Une famille nouvelle et deux genres nouveaux de Cleidogonoidea, avec notes sur la classification de la superfamille (Diplopoda, Craspedosomida). *Steenstrupia*, 8 (6), 165–176.
- Mauriès, J.-P. & Barraqueta, P. (1985) Myriapodes Diplopodes épigés nouveaux et peu connus de la Province de Viscaye (Espagne); *Vasacanthogona* et *Krauseuma*, genres nouveaux de Craspedosomides. *Bulletin du Muséum national d'Histoire naturelle, Paris, 7e Série*, 7 (section A 2), 433–449.
- Mršić, N. (1987) Diplopod fauna (Diplopoda: Myriapoda) Biokova. Fauna dvojnonožaca (Diplopoda: Myriapoda) Biokova. *Acta Biokovica*, 4, 267–276.
- Mršić, N. (1992) *Biokoviella mauriesi* gen. nov., sp. nov. (Biokoviellidae fam. nov.), Macrochaetosomatinae subf. nov. (Anthogonidae) and superfamily Cleidogonoidea of the western Balkans (Craspedosomidea, Diplopoda). *Razprave IV. Razreda SAZU*, 33 (3) 51–91.
- Mršić, N. (1994) The Diplopoda (Myriapoda) of Croatia. Dvojnonože (Diplopoda: Myriapoda) Hrvatske. *Razprave IV. Razreda SAZU*, 35 (12) 219–296.
- Ribaut, H. (1913) Ascospemphora (Myriopodes) (Première Série). *Archives de Zoologie Expérimentale et Générale*, Série 5e, 10, 399–478.
- Ribaut, H. (1951) Craspedosomides nouveaux des Pyrénées. I. *Bulletin de la Société d'histoire naturelle de Toulouse*, 86, 379–382.
- Shear, W.A. (2000) On the millipede family Heterochordeumatidae, with comments on the higher classification of the order Chordeumatida (Diplopoda). *Invertebrate Taxonomy*, 14, 363–376.
<http://dx.doi.org/10.1071/IT99016>
- Shear, W. (2011) Class Diplopoda de Blainville in Gervais, 1844. In: Zhang, Z.-Q. (Ed.), Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 159–164.
- Shelley, R.M. (2002) A revised, annotated, family-level classification of the Diplopoda. *Arthropoda Selecta*, 11, 187–207.
- Spelda, J. (2001) Review of the millipede genus *Pterygophorosoma* Verhoeff, 1897 (Diplopoda, Chordeumatida, Craspedosomatidae). *Andrias*, 15, 29–48.
- Strasser, K. (1935) Neue Acherosomen. *Prirodoslovne Razprave*, 2 (5), 231–244.
- Strasser, K. (1940) Diplopoden des jugoslavischen Draubanats. *Prirodoslovne Razprave*, 4, 13–85.
- Strasser, K. (1962) Diplopoden aus Bulgarien und Jugoslawien. *Senckenbergiana biologica*, 43, 437–470.
- Strasser, K. (1966a) Die Diplopoden Sloweniens. Kačice (Diplopoda) Slovenije. *Poročila (Acta carsologica)*, 4, 159–220.
- Strasser, K. (1966b) Neue Diplopoden aus Höhlen Jugoslawiens. *Senckenbergiana biologica*, 47 (5), 379–398.
- Strasser, K. (1971a) Catalogus Faunae Jugoslaviae. Diplopoda. *Consilium Academiarum Scientiarum rei Publicae Socialisticae Foederativae Jugoslaviae, Academia Scientiarum et Artium Slovenica*, III (5), 1–50.
- Strasser, K. (1971b) Über Diplopoden Jugoslawiens. *Senckenbergiana biologica*, 53, 313–345.
- Verhoeff, K.W. (1930) Arthropoden aus südostalpinen Höhlen gesammelt von Karl Strasser. 3. Aufsatz: *Acherosoma* und seine verwandtschaftlichen Beziehungen. *Mitteilungen über Höhlen- und Karstforschung*, 1, 1–12.
- Verhoeff, K.W. (1942) Eine neue, westbalkanische, cavernicole Familie der Ascospemphora und die fragwürdige Gattung *Macrochaetosoma* Abs. *Zoologischer Anzeiger*, 139, 54–66.
- Vicente, M.C. & Mauriès, J.-P. (1980) Un género y una especie nuevos de Diplópodos Cavernícolas de Guipúzcoa, España (Myriapoda - Diplopoda). *Speleon, Barcelona*, 25, 9–13.