BULGARDICUS BUCARESTENSIS N. SP. WITH A NOTE ON THE FAMILY ANTHROLEUCOSOMATIDAE (DIPLOPODA, CRASPEDOSOMATIDA)

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The study provides the description of a new species of the genus *Bulgardicus* Strasser, 1960, known until now only by a sole species found in a cave from North-Western Bulgaria. Also, we analyze the family Anthroleucosomatidae which contains mostly troglobitic species.

1. INTRODUCTION

The family Anthroleucosomatidae was established by K.W. VERHOEFF for the troglobitic genus *Anthroleucosoma* with the species *A. banaticum* Verhoeff, 1899 collected by himself from Peştera Mare de la Soronişte (= Tatarzy – Höhle) nearby Băile Herculane (Banat, Romania).

In the Romanian fauna, the family Anthroleucosomatidae is represented by four strictly troglobitic species, all belonging to endemic genera. Beside *A. (A). banaticum*, the following species were described from Romania: *A. (Heteranthroleucosoma) spelaea* CEUCA, 1964 (descriebed from Peştera de la Piatra Arsă a Cernişoarei, Biospeologica 1089), *Banatosoma ocellatum* (TABACARU, 1967) from caves from the Banatului Mountains and the species *Dacosoma motasi* Tabacaru, 1967, found in caves from the Căpăţânii Mountains (Southern Carpathians).

As such, the finding is surprising of a new species of the genus *Bulgardicus* STRASSER, 1960, a genus established for the species *B. tranteevi* Strasser, 1960. Distinguished by the features of the gonopods, this species seems to be rare as a sole male was found by the well-known Bulgarian speologist P. Tranteev in the Bankowitza Cave from Karlukowo in north-western Bulgaria. On the occasion of his researches concerning the Oniscidea and the Diplopoda of Bucharest, one of the authors (A. G.) collected a small ascospermophoran Diplopod which proved to be the second species of the genus *Bulgardicus*.

2. GENUS *BULGARDICUS* STRASSER, 1960

K. STRASSER defined the genus *Bulgardicus* both in the identification key of the Anthroleucosominae genera as well as in a comparison (in a table) with the genus *Prodicus* Attems, 1899 (recte *Anamastigona* Silvestri, 1898) by the following characters:

Thin and short macrochaeta. Male front slightly flattened. Male seventh legpair thickened and elongated, inner part of the coxa with an extended prolongation; without claws. Male ninth legpair with only one internal process. Male eleventh legpair incrassated and elongated. Anterior gonopodes syngonopodite twice as wide as high without protruding lateral sides but with narrow and strongly protruding processes curving toward the exterior. Behind each of these processes, there is a fringed lobe. Posterior gonopodes sternite separated from the coxites. Coxites thightly joined medially and partially coalesced. There are no membraneous prominences. Telopodites rudiments big and situated on the terminal external margin of the coxites.

The characters of the new species described here generally correspond with this genus diagnosis. However, STRASSER places a great importance in the definition of the genus *Bulgardicus* to the conformation of the posterior gonopods. Subsequently, in a determination key based only on their features, he defines the posterior gonopods of *Bulgardicus* in comparison with those from the genera *Prodicus*, *Paraprodicus* and *Bulgarosoma* as follows: undivided, wide and high coxites joined medially with the telopodites rudiments on their terminal external margin (STRASSER, 1966 p. 346). At our new species, the posterior gonopods coxites are distanced between them on the medial line in the distal half and, also, there is a beginning of disjunction between the membranous paramedian prolongations and the lateral prolongations bearing the telopodites rudiments.

Bulgardicus bucarestensis n. sp.

Types: 1 male, holotype (Speleological Institute "Emile Racovitza") collected by Andrei Giurginca, 24 April 2005, "Stadionul Național Lia Manoliu", under pieces of tree-bark scattered on the soil in a wet and shady clump of trees.

Etymology: "bucarestensis" from Bucharest, capital of Romania.

Body with 30 segments, the last 2 segments anterior to the epiproct legless. Length: approx. 9 mm, width (horizontal diameter): 0.8 mm. Color: marbled grey-brown. Eye patch intensely black, triangular with approx. 12 ocelli arranged on three rows (6, 4, 2 ocelli). Face slightly concave. Labrum with 3 median teeth at anterior margin. Gnatochilarium with a triangular promentum.

Antenna (Fig. 3, A) as in *B. tranteevi* with article 5 three times longer than its maximum width, article 6 longer than article 7.

Body segments with a narrow, depigmented, median line; rounded and moderately developed paranota with three, thin and short setae.

Legpairs 1 and 2 with tarsal combs. Legpairs 3–7 are clearly incrassate. Tarsal papillae absent. Coxae, prefemurs and femurs granulated. Legpair 7 thicker and longer than anterior legpairs; particularly, the praefemur, femur and tarsus are elongated. The type-species of the genus, Strasser mentions the absence of the claw at P. 7, at our

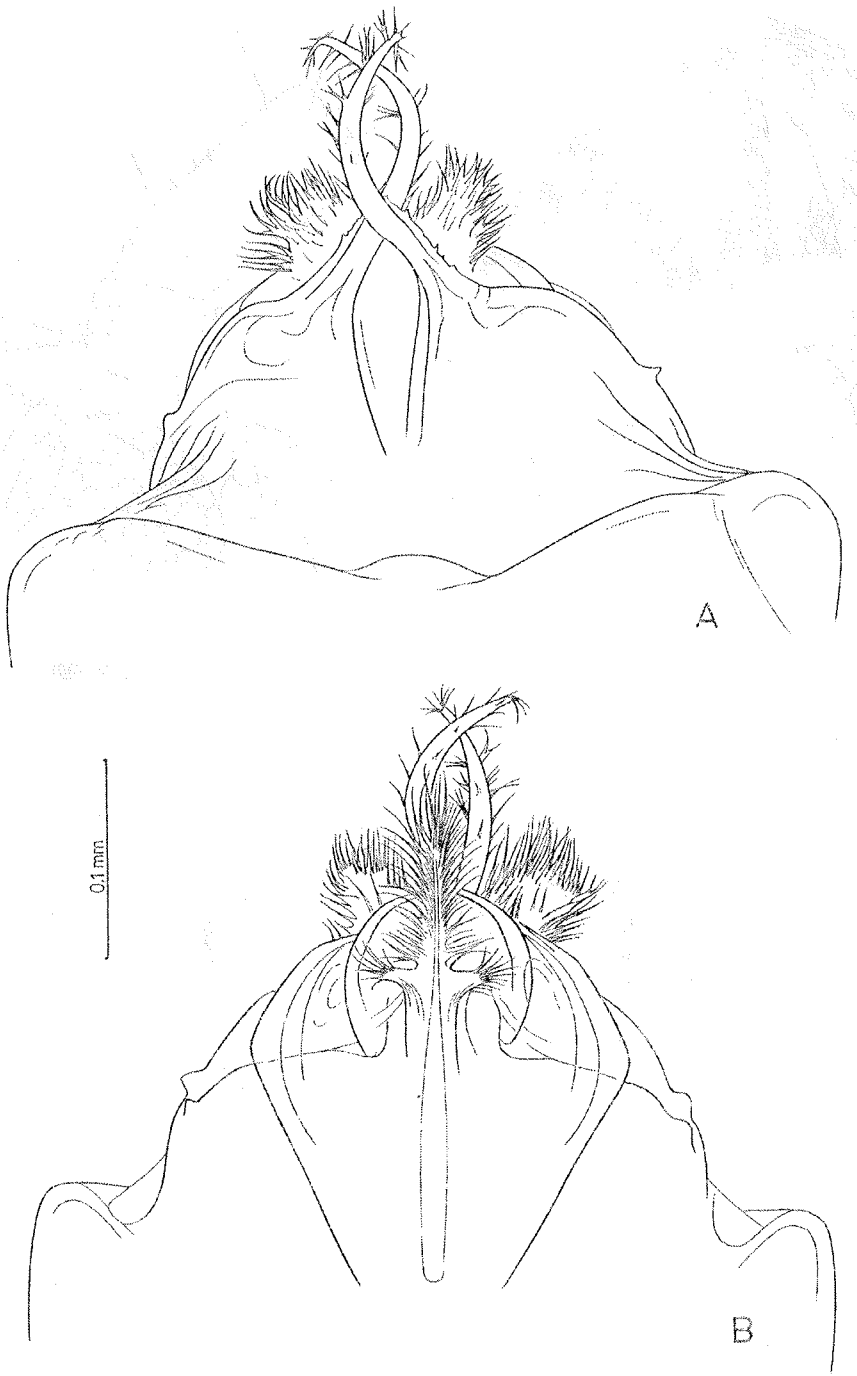

Fig. 1. – *Bulgardicus bucarestensis* n. sp., anterior gonopods; A – oral view; B – caudal view.

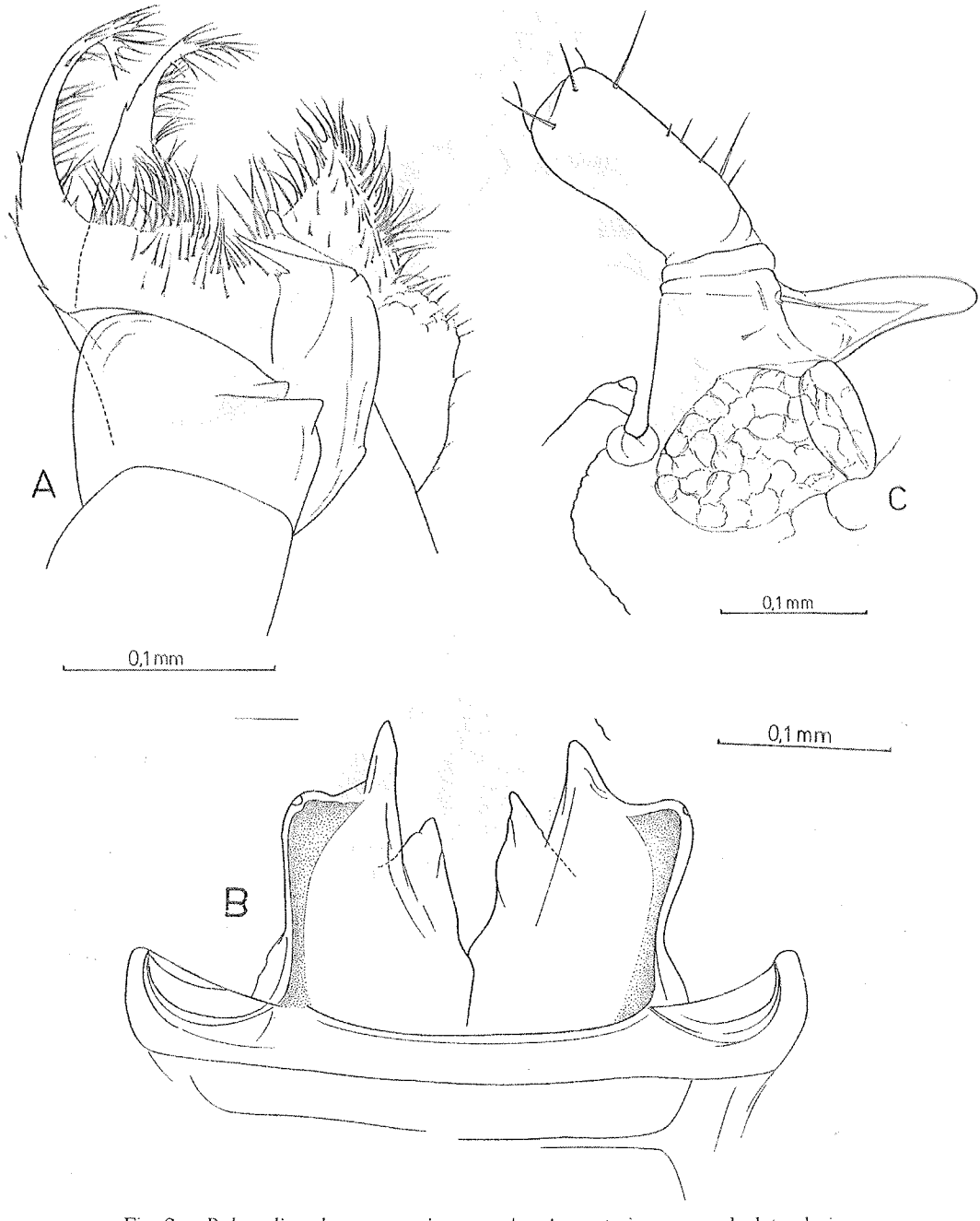

Fig. 2. – *Bulgardicus bucarestensis* n. sp.; A – A – anterior gonopods, lateral view; B – posterior gonopods; C – coxa 11.

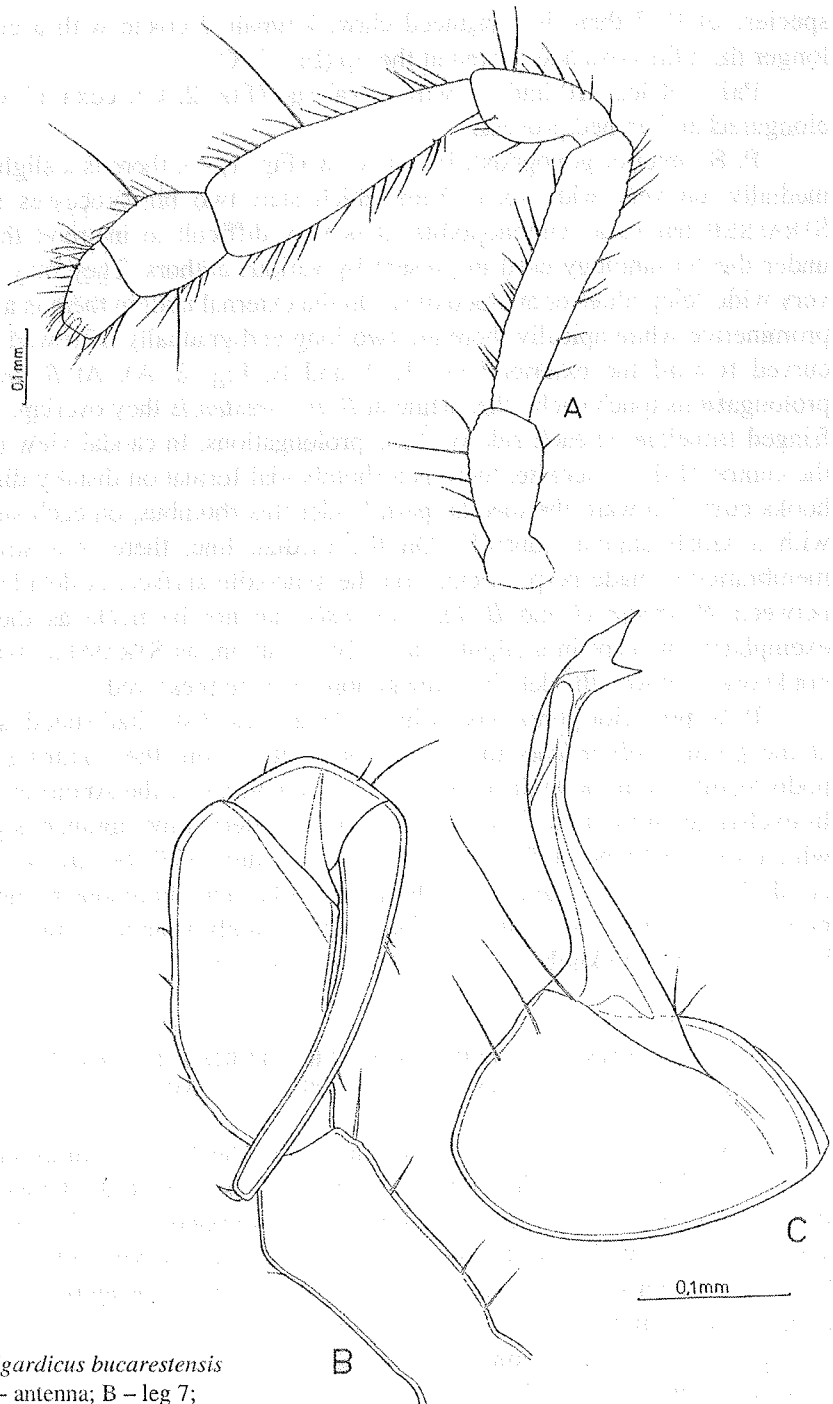

Fig. 3. – *Bulgardicus bucarestensis* n. sp.; A – antenna; B – leg 7; C – process on coxa 7.

species, at P. 7 there is a reduced claw. Legpair 7 coxae with a curved process longer than the coxa and forked at the tip (Fig. 3, C).

Pairs of legs 10 and 11 with coxal sac (Fig. 2, C); coxa 11 with a robust, elongated and arched process.

P. 8 (anterior gonopods): in oral view (Fig. 1, A), there is a slightly prominent medially on very wide socle from which start two big processes forming what STRASSER names a syngonopodite. It is very difficult to interpret these processes under the terminology used in present by various authors. They may represent two very wide telopodites or angiocoxites. On the external margin there is a small angular prominence while apically there are two long and gradually narrowed prolongations curved toward the exterior (Fig. 1, A and B, Fig. 2. A). At *B. tranteevi*, these prolongations touch each other while at *B. bucarestensis* they overlap. There are two fringed lamellae on each side of these prolongations. In caudal view (Fig. 1, B), in the centre of the syncoxite, there is a rhomboidal formation distally differentiated in hooks curved toward the median part. Under this rhombus, on each side, is an edge with a small angular tubercle. On the median line, there is a strongly fringed membraneous blade perpendicular on the syncoxite surface. A detailed comparison between *B. tranteevi* and *B. bucarestensis* can not be made as the *B. tranteevi* exemplary was kept in a slightly corrosive solution, as STRASSER stated, so we do not know how well the details of the gonopods were preserved.

P. 9 (posterior gonopods) (Fig. 2, B), as STRASSER had stated, seems to have at the genus *Bulgardicus* the sternite separated from the coxites so there is no podosternite as in the majority of the representatives of the Anthroleucosomatidae. In exchange, at the new species we found the internal membraneous prolongations which are not found at *B. tranteevi*. At the coxites of *B. bucarestensis*, the coxae are divided into two branches: a shorter, angular, membraneous branch and a wide branch with a sole, long internal lobe and a widely rounded, pigmented, external lobe with a minute knob, a rudiment of the telopodite.

3. ON THE CONTENT AND THE CHARACTERIZATION OF THE FAMILY ANTHROLEUCOSOMATIDAE

From the point of view of its diagnosis, the family Anthroleucosomatidae Verhoeff, 1899 is one of the most difficult families of the order Craspedosomatida. In his ample synthesis "Classification of the Diplopoda", R. L. HOFFMAN (1979) says: "As presented here, the family *Anthroleucosomatidae* will doubtless appear hopelessly heterogenous to European specialists. Yet considering the uncertainly about family limits in this part of the order, and the way that some genera have been placed first in one family, then another, perhaps the best course is to combine everything into one family with a number of subfamilies. If the latter are natural units, they can later be elevated, split, or combined, as seems appropriate with better

knowledge of their structure. Most of the species are very small and the very complex gonopods are obviously difficult to study and interpret." However, HOFFMAN (1979) gives the family Anthroleucosomatidae Verhoeff, 1899 a very wide meaning including the subfamilies: Anthroleucosomatinae Verhoeff, 1899, Origmatogoninae Verhoeff, 1914, Anthogoninae Ribaut, 1913, Vandeleumatinae Mauries, 1970, Haasiinae (new name pro Acherosominae Verhoeff, 1929), Scutogoninae Verhoeff, 1914, Brachychaeteumatinae Verhoeff, 1911, Macrochaeteumatinae Verhoeff, 1914, Chamaesomatinae Verhoeff, 1913. In our paper, we deal with the family Anthroleucosomatidae sensu strictu.

With the description of some new species (TABACARU, 1967), we tried to give a diagnosis of the family Antroleucosomidae and, in the same time, an identification key of the genera and a presentation of the species spreading. However, in 1967, only 6 genera and 17 species were known: *Anthroleucosoma* Verhoeff, 1899 with two species in two subgenera (*Anthroleucosoma* s. str. and *Heteranthroleucosoma* Ceuca, 1964), *Prodicus* Attems, 1899 with 7 species in four subgenera (*Prodicus* s.str., *Hellasdicus* Verhoeff, 1940, *Osmandicus* Strasser, 1960, *Balkandicus* Strasser, 1960), *Bulgarosoma* Verhoeff, 1926 with 5 species, *Paraprodicus* Verhoeff, 1940 with one species, *Bulgardicus* Strasser, 1960 with one species and *Dacosoma* Tabacaru, 1967 with one species. Analyzing the characters of the species included in these genera, we propose the family Antroleucosomidae as follows:

30 segments. Body segments with lateral swellings and three macrochaetae on each side. Thin antennae. Gnathochilarium with promentum. Legs without tarsal papillae; legpairs 1 and 2 with tarsal combs. Without independently penises; vasa deferentia open on the coxae of the second legpair. At the male, legpairs 3–7 usually incrassated and with modifications (with the exception of *Anthroleucosoma banaticum*). At males, legpairs 8 and 9 with coxal sacs, legpair 9 with one or two coxal hooked process. Without accessory gonopodes. Anterior gonopods without a cheirit, with strongly coalesced syncoxite. No cluster of cuticular filaments (Grannenapparat). Usually, the posterior gonopods segment presents a podosternite with a median, un-paired projection or two, paramedian processes (with the exception of *Bulgardicus*). Posterior gonopods telopodites are distally directed stubs formed by more or less articles or un-segmented remnants or they miss completely.

Taking into account this family diagnosis, KARL STRASSER (1970), following the description of *Caucaseuma* Strasser, 1970, slightly modifies it only in this aspect: "At the male, legpair 9 with or without coxal processes".

Today, the number of taxa included in this family is much bigger. Thus, MAURIÈS, GOLOVATCH and STOEV (1997) record 12 genera and consider as dubious the inclusion of *Bulgardicus* Strasser, 1960. They gather the other genera in three groups: the first group contains the genera *Alloiopus* Attems, 1951, *Persedicus* Mauries, 1982, *Ghilarovia* Gulicka, 1972; the second group contains the genera

Anthroleucosoma Verhoeff, 1899, *Heteranthroleucosoma* Ceuca, 1964 and *Dacosoma* Tabacaru, 1968; the third one includes the genera *Anamastigona* Silvestri, 1898, *Bulgarosoma* Varhoeff, 1926, *Caucaseuma* Strasser, 1970, *Adshardicus* Golovatch, 1981 and *Ratcheuma* Golovatch, 1985.

Recently, Serbian authors argued that *Bulgarosoma* sensu STRASSER (1960) and TABACARU (1967) represent a group of genera and namely *Bulgarosoma* Verhoeff, 1926, *Serbosoma* Ćurčić and Makarov, 2000, *Banatosoma* Ćurčić and Makarov, 2000, *Rhodoposoma* Ćurčić and Makarov, *Troglodicus* Gulička, 1967, *Svarogosoma* Makarov, 2003.

From the data available to us, the following species are considered as belonging to the family Anthroleucosomatidae:

Order **Craspedosomatida** Gray, 1843

Chordeumatida Koch, 1847
Ascospermophora Verhoeff, 1900

Suborder **Craspedosomatidea** Gray, 1843

Superfamily ***Anthroleucosomatoidea*** Verhoeff, 1899

Anthroleucosomatoidea Verhoeff, 1899 (new status Shear, 2000)

Family ***Anthroleucosomatidae*** Verhoeff, 1899

Anthroleucosomini Verhoeff, 1899 (recte: – somatini – Jeeekel, 1970)
Anthroleucosominae Verhoeff, 1929
Anthroleucosomidae Verhoeff, 1910
Anthroleucosomatidae Verhoeff, 1899 (nomen correctum Hoffman, 1979)

Anthroleucosoma Verhoeff, 1899

Subgen *Anthroleucosoma* s.str.

A. (A.) banaticum Verhoeff, 1899; Tabacaru, 1967 (redescription) – caves from Banat and Northern Oltenia (Southern Carpathians), Romania. Troglobiont.

Subgen *Heteranthroleucosoma* Ceuca, 1964

A. (H.) spelaeum Ceuca, 1964 – A cave in Northern Oltenia (Southern Carpathians), Romania. Troglobitic.

Dacosoma Tabacaru, 1967

D. motasi Tabacaru, 1967 – Caves in the Southern Carpathians. Troglobitic.

Anamastigona Silvestri, 1898

Anamastigona Silvestri, 1898 (type-species: *Craspedosoma pulchellum* Silvestri, 1894).
Prodicus Attems, 1899 (type-species: *Prodicus napolitanus* Attems, 1899)

Paraprodicus Verhoeff, 1940 (subgenus) (type-species: *Prodicus penni cillatus* Attems, 1902); Strasser, 1960 (as a genus) synonymy Strasser 1970

1. *A. pulchella* (Silvestri, 1894) – Southern France, Southern and Middle Italy.
Syn.: *Craspedosoma pulchellum* Silvestri, 1894
Prodicus attemsi Verhoeff, 1900 – Strasser, 1958; Mauriès, 1960; Synonymy: Mauriès,1984.
Synonymous or subspecies: *Prodicus macchiae* Verhoeff, 1930; *P. attemsi macchiae* Verh. – Strasser, 1958.
2. *A. hispidula* (Silvestri, 1895) – Southern and Middle Italy.
Syn.: *P. napolitanus* Attems, 1899. Synonymy: Strasser & Minelli, 1984
P. hiemalis Verhoeff, 1941 – Synonymy: Strasser & Minelli, 1984
Synonymy or subspecies: *P. hispidulus appeninorum* Verhoeff, 1930,
P. hispidulus ischianus Verhoeff, 1940
P. hispidulus relictus Verhoeff, 1942
P. hispidulus quercuum Verhoeff, 1942
P. hispidulus rotaranus Verhoeff, 1943
P. hispidulus fissus Verhoeff, 1951
P. hispidulus sorattinus Verhoeff, 1951
3. *A. meridionalis* Silvestri, 1898 – Sicily, Italy.
Syn.: *Prodicus (Prodicus) meridionalis* (Silv.) – Strasser, 1970
4. *A. penicillata* (Attems, 1902) – Crete, Greece
Syn.: *Prodicus penicillatus* Attems, 1902
5. *A. penteliconica* (Verhoeff, 1925) – Pentelikon, Attika, Greece.
Syn.: *Prodicus penteliconus* Verhoeff, 1925; Strasser, 1970 (redescription)
6. *A. bilselii* (Verhoeff, 1940) – Istanbul, Turkey; Thrace, Greece; North-Eastern Bulgaria.
Syn.: *Prodicus (Prodicus) bilselii* Verhoeff, 1940.
P. (P.) bilselii Verh. var. *rinoceros* Strasser, 1973
P. bilselii Verh., 1940 – Ceuca, 1975 (redescription); Strasser, 1976.
7. *A. halophila* (Verhoeff, 1940) – Northern shore of the Marmara Sea, Turkey.
Syn.: *Prodicus (Prodicus) halophilus* Verhoeff, 1940
8. *A. aspromontis* (Strasser, 1970) – Calabria, Italy.
Syn.: *Prodicus (Prodicus) aspromontis* Strasser, 1970
9. *A. alba* (Strasser, 1960) – A cave in Lovec District, Bulgaria. Troglobitic.
Syn.: *Prodicus (Balkandicus) albus* Strasser, 1960
10. *A. falcata* (Gulička. 1967) – A cave in the Eastern Balcans, Bulgaria. Troglobitic.
Syn.: *Antrodicus falcatus* Gulička, 1967
Prodicus (Antrodicus) falcatus Gulička, 1967 – Strasser, 1973
11. *A. delcevi* (Strasser, 1973) – Southern Bulgaria. Posibly troglobitic.
Syn.: *Prodicus (Antrodicus) delcevi* Strasser, 1973

12. *A. lepenicae* (Strasser, 1975) – Caves in the Western Rhodopes, Velingrad District, Bulgaria. Troglobitic.
Syn.: *Prodicus (Antrodicus) lepenicae* Strasser, 1975.
13. *A. hauseri* (Strasser, 1974) – Cephalonia, Greece.
Syn.: *Prodicus hauseri* (Strasser, 1974)
14. *A. matsakisi* Mauriés & Karamaouna, 1984 – Naxos, Cyclades, Greece.
15. *A. albanensis* Mauriés, Golovatch & Stoev, 1997 – Tirana District, Albania.
16. *A. mediterranea* Ćurčić, Makarov & Lymberakis, 2001 – Crete, Greece.

Bulgarosoma Verhoeff, 1926

B. bureschi Verhoeff, 1926 – North-Western Bulgaria. Troglobitic.
? B. superficei Strasser, 1975. – Vitosha Mt., Sofia, Bulgaria.

Troglodicus Gulička, 1967

T. tridentifer Gulčka, 1967 – A cave in Western Rhodopes, Bulgaria. Troglobitic.
Syn.: *Troglodicus tridentifer* Gulička, 1967
Bulgarosoma tridentiferum Gulička, 1967 – Strasser, 1973
T. meridionale (Tabacaru, 1967) – A cave in Western Rhodopes, Bulgaria. Troglobitic.
Syn.: *Bulgarosoma meridionale* Tabacaru, 1967

Serbosoma Ćurčić & Makarov, 2000

S. crucis (Strasser, 1960) – Caves in Eastern Serbia. Troglobitic.
Syn.: *Bulgarosoma crucis* Strasser, 1960
S. lazarevensis (Ceuca, 1964) – Caves in Eastern Serbia. Troglobitic.
Syn.: *Bulgarosoma crucis lazarevensis* Ceuca, 1964
Bulgarosoma lazarevensis (Ceuca, 1964) – Ćurčić & Makarov, 1997
S. beljanicae (Ćurčić & Makarov, 1998) – Caves in Eastern Serbia. Troglobitic.
Syn.: *Bulgarosoma belanicae* Ćurčić & Makarov, 1998..
S. zagubicae (Ćurčić & Makarov, 1998) – Caves in Eastern Serbia. Troglobitic.
Syn.: *Bulgarosoma zagubicae* Ćurčić & Makarov, 1998
S. kucajensis (Ćurčić & Makarov, 1998) – Peşteră în East Serbia. Troglobitic.
Syn.: *Bulgarosoma kucajensis* Ćurčić & Makarov, 1998

Banatosoma Ćurčić & Makarov, 2000

B. ocellatum (Tabacaru, 1967) – Caves in Banatului Mts., Romania. Troglobitic.
Syn.: *Bulgarosoma ocellatum* Tabacaru, 1967

Rhodoposoma Ćurčić & Makarov, 2000

R. rhodopinum (Strasser, 1966) – A cave in Western Rhodopes, Plovdiv District, Bulgaria. Probably troglobitic.
Syn.: *Bulgarosoma rhodopinum* Strasser, 1966

Svarogosoma Makarov, 2003

S. bozidarcurcici Makarov, 2003 – A cave in Eastern Serbia. Troglobitic.

Bulgardicus Strasser, 1960

B. tranteevi Strasser, 1960 – A cave in North-Western Bulgaria. Probably troglobitic.

B. bucarestensis n. sp. – Bucharest, Romania.

Stygiosoma Gulička, 1967

S. beroni Gulička, 1967 – A cave in Weastern Rhodopes, Bulgaria, Troglobitic.

Caucaseuma Strasser, 1970

C. lohmanderi Strasser, 1970 – Caves in the Soci region, South-West Caucasus. Probably troglobitic.

Adshardicus Golovatch. 1981

A. *strasseri* Golovatch, 1981 – Batumi, Adjaria, Caucasus.

Ratcheuma Golovatch, 1985

R. excorne Golovatch, 1985 – A cave in the Racha Mountains, West Georgia, Caucasus. Probably troglobitic.

Alloiopus Attems, 1951

A. solitarius Attems, 1951 – near Lahidjan, Iran.

Persedicus Mauriès, 1982

P. martensi Mauriès, 1982 – Elbrus Mts., Mazandaran District, Iran.

Leschius Shear & Leonard, 2004

L. mcallisteri Shear & Leonard, 2004 – near Olympia, Washington, U. S. A.

3.1. REMARKS CONCERNING THE NOMENCLATURE

1. Just like C.A.W. JEEKEL (1970) and J.-P. MAURIÈS (1978), taking into account the priority principle (in present, this principle is applied also to higher taxa), we consider Craspedosomatida Gray, 1843 as the valid name of the order and not Chordeumida C. L. Koch, 1847.

2. The well-known biospeologist and diplopodologist Karl Strasser, collaborator and friend of K.W. VERHOEFF, wrote *Antroleucosoma* and Antroleucosomidae (without "h") and at his indication so did we (TABACARU, 1967). According to the nomenclature code [Art. 33 (i)], we considered this is about a "justified

emendation" of an incorrect original spelling. The name cames from *antron* (Greek), respectively *antrum – i* (Latin) = cave. In our opinion, it represents [Art. 32a (ii)] an inadverdent error (*lapsus calami*) and not an incorrect transliteration or latinization. Even Verhoeff wrote *Antrokoreana* Verh. 1938, *Antrochodus* Verh., 1941 and *Antroremya* Verh., 1942 – so, without "h", also, in the description of the family Antroremyidae he refers to "Antroleucosomiden". Subsequently, S.I. GOLOVATCH (1981, 1985) and W.A. SHEAR (2000) wrote Antroleucosomatidae (without "h"). Unfortunately, in the present this emendation is no longer followed.

3.2. REMARKS CONCERNING THE METHODOLOGY AND THE MORPHOLOGICAL TERMINOLOGY

Although even from 1899, K.W. VERHOEFF (in complete agreement with C. ATTEMS and especially H.-W. BROLEMANN) argued against the opinion endorsed by F. SILVESTRI (1896) according to which the gonopods are not modified legs, in his descriptions he does not number the gonopods in continuation of the legs. In this respect and other characters, there are differences in the interpretations among the diplopodologists who studied the Ascospermophora.

While for some authors (VERHOEFF, RIBAUT, ATTEMS, SCHUBART, STRASSER) the modified legpairs of the seventh segment are named anterior gonopods (vordere Gonopoden) and, respectively, posterior gonopods (hintere Gonopoden), while for others (BROLEMANN, DEMANGE, MAURIÈS) they are P. 8 (gonopods) and P. 9 (paragonopods). It results the legpairs of the segment 8 bear the name P. 8 and P. 9 for the first authors and P. 10 and P. 11 for the last ones. These legpairs are important as both pairs or only one of them have coxal sacs which store the spermatozoids. In our paper, we numbered the gonopods as the eighth and ninth legpairs and the legpairs of the eight segment as pairs 10 and 11.

In their studies regarding the anterior gonopods, BROLEMANN (1932, 1935) and subsequently, MAURIÈS used the terms introduced by RIBAUT: *angiocoxite* (the part of the coxite coming from the transformation of the chitinous coxal cylinder) and *colpocoxite* (the part coming from the transformation of the coxal sack). The analysis of the origin of the different parts from the structure of the anterior gonopods has a particular importance in achieving a phylogenetic classification but we have to admit that such an analysis presents great difficulties and as such it is problematic to use the terms introduced by RIBAUT.

The term "cheirite", introduced by VERHOEFF in describing the anterior gonopods of some Ascospermophora, was accepted by BROLEMANN (1932, p. 218) with the definition: pieces formed by the direct merging of the telopodit with the corresponding trachean pouch. We have to point out that different meanings were given to this term. Furthermore, other terms, like angiocheirite (BROLEMANN, 1932, p. 219), procheirite and pseudocheirite (VERHOEFF, 1926–1932, p. 569) were introduced. We consider there is no

cheirite at the representatives of the family Anthroleucosomatidae; we understand the term cheirite the way SCHUBART (1934, p. 61) saw it as grasping free pincers mobile one toward another ("frei gegeneinnander bewegliche Greifzangen, die aus Verwachsung der Tlpdt. mit den Tracheentasche hervorgegangen sind").

Also, we wish to point out that at any species of the family Anthroleucosomatidae, the P. 8 does not became "peltogonopodes" – term created by BROLEMANN (1935, p. 61) in order to define the transformation into a protective organ contributing to the closure of the gonopodal cavity. Mauriès uses this term also for the P. 7 from *Osellasoma* (Neoatractosomatidae) but at any species included in the Anthroleucosomatidae, the telopodites are not reduced at P. 7.

3.3. THE SYSTEMATIC POSITION OF THE FAMILY ANTHROLEUCOSOMATIDAE

In his classification of the Ascospermophora, K.W. VERHOEFF (1926–1932) specify this is the order of Diplopoda with the most complex and diversity in the structure of the gonopods. He includes the family Anthroleucosomidae together with the family Anthogonide in the Super-family Haplomera characterized by: posterior gonopods reduced to remnants more or less fused with the sternite; P. 3–7 without tarsal papillae; anterior and posterior gonopods without psudoflagellum; anterior gonopods do not form cheirites and are strongly fused, partially forming a syncoxite. In his posthumous classification, C. ATTEMS (1959) keeps the super-family Haplomera but adds here the family Heterolatzeliidae although the representatives of this family have tarsal papillae on P. 3–7.

In the more recent classification proposed by W.A. SHEAR (2000), the family Anthroleucosomidae Verhoeff, 1899 is included, together with the families Haplobainosomatidae Verhoeff, 1909, Origmatogonidae Verhoeff, 1914, Vandeleumatidae Mauriès, 1970 and Haasiidae Hoffman, 1979, in the superfamily Antroleucosomatoidea Verhoeff, 1899 – new statut. So, Shear regards as the superfamily Antroleucosomatoidea what HOFFMAN (1979) considered as the family Anthroleucosomatidae in a wide sense. Shear excludes from the family (as HOFFMAN sees it) the subfamilies Brachychaeteumatinae, Macrochaeteumatinae and Chamaesomatinae, which he considers as families and moves them in the superfamily Brannerioidea Cook, 1896. Probably by mistake, the family Haplobainosomatidae is included by SHEAR both in the superfamily Craspedosomatoidea and the suprafamily Anthroleucosomatidea. On the other hand, it is not evident where SHEAR places the genera included in the subfamilies Anthogoninae Ribaut, 1913 and Scutogoninae Verhoeff, 1914.

3.4. MORPHOLOGICAL CHARACTERS OF THE ANTHROLEUCOSOMATIDAE

Recently, SHEAR and LEONARD (2004) stated on the family Anthroleucosomatidae: "At the present time it is not possible to present a concise diagnosis of this family,

the composition of which will undoubtedly change with further study." For a future revision of this family, we try to present here a concise analysis of the characters.

Analyzing the characters of the species considered as belonging to the family Anthroleucosomatidae, we can easily note the scarcity of common characters and the difficulty in establishing a differential diagnosis of the family. The common characters are found separately and at different other families so a definition of the family may result only by taking into account the ensemble of characters.

All the representatives of the family share the following characters:

1. Gnathochilarium with promentum;
2. P. 8 (anterior gonopods) functioning in sperm transfer;
3. P. 9 (posterior gonopods) with telopodites not inflated or glandular;
4. Legpairs 10 and 11 with coxal glands;
5. Legpairs 1 and 2 with tarsal combs (Borstenkamm);
6. Legpairs 3–7 without tarsal papillae (Tarsalpapillen or tarsale Haftbläschen);
7. Legpair 7 with well developed telopodites;
8. P. 8 (anterior gonopods) with strongly coalesced syncoxites and without cheirite;
9. Anterior gonopods coxites without a cluster of cuticular filaments (faisceau de lanières, Grannenapparat or Grannenbüscheln));
10. P. 9 (posterior gonopods) with strongly reduced telopodites, never with flagellum;
11. Legpairs 10 and 11 with well developed telopodites;
12. Legpair 2 at female with well developed telopodites, not reduced.

The characters 1–4 argue for the inclusion of the family Anthroleucosomatidae in the suborder Craspedosomatidea and only characters 5–12 may diagnose the superfamily or the family.

If we analyze the main characters particular to some representatives, we may enumerate:

1. Number of segments. Most of the species included in the family Anthroleucosomatidae present 30 body segments. There are rare exceptions like *Leschius* with 26 segments, *Ghilarovia* with 28 segments (after SHEAR, 1988) and *Persedicus* with 31 segments. But, as Verhoeff showed a long time ago and more recently MAURIÈS, if the number of body segments is stable at the species level, it has only a secondary importance for the supra-generic classifications.

2. Another exception concerns the pregonopodal legs. Generally, at the representatives of the family Anthroleucosomatidae the legs 3–7 are swollen. There is only one exception, *Anthroleucosoma banaticum*, the first species of the family to be described. If this character represents a difference with a sub-generic value (CEUCA, 1964) or justifies a generic distinction (MAURIÈS, GOLOVATCH, STOEV,

1997) is still a problem as the anterior and posterior gonopods of the two species of the genus have very similar structures.

3. Another character rarely found at the family Anthroleucosomatidae is the presence of a coxal process at P. 7. Coxal process, but with different conformations, were found at two genera, respectively *Alloiopus* with the species *A. solitarius* and *Bulgardicus* with two species *B. tranteevi* and *B. bucarestensis* n. sp.

4. The presence at P. 8 (anterior gonopods) of a pair of flagella is a character which in general has a systematic importance but in this case still needs to be analyzed. In the family Anthroleucosomatidae, such flagella are missing at the vast majority of the species. Well developed flagella on the anterior side were described the species *Anamastigona matsakisi* and flagelloid processes were described on the posterior side at the species of the genera *Anthroleucosoma*, *Ghilarovia* and *Ratcheuma*.

5. At the anterior gonopods, we have to note the great prolongations, considered by some authors telopodites and by others as angiocoxites or even pseudocheirits (MAURIÈS, 1982), may be situated laterally far from the median part of the gonopods or very close, latero-anterior or even completely anterior.

6. Also at the anterior gonopods, a character with a clear systematic value is the presence at the *Bulgarosoma* complex of genera of a probably colpocoxal, median posterior piece anteriorly prolonged with a triangular lobe named "triangulum" by VERHOEFF. In our opinion, this piece distinguishes the *Bulgarosoma* group of genera.

7. Concerning the P. 9 (posterior gonopods), a systematically important character is the presence of a median sternal (or maybe angiosternal) projection at the genera *Dacosoma* and *Anthroleucosoma*. But, while at *Dacosoma* this prjection is narrow and distinct from the membraneous coxal processes, at *Anthroleucosoma*, the median sternal projection is wide and fused with the membraneous coxal processes.

8. Another character found at the posterior gonopods of some representatives of the family (*Caucaseuma, Adsharicus, Ghilarovia, Leschius*) is the presence of some long and narrow filaments.

9. Finally, we note the variation at the family Anthroleucosomatidae of the coxal processes from the legpairs 10 and 11. Most frequently, these coxal processes are found at legpair 11 (*Anthroleucosoma, Dacosoma, Bulgarosoma, Troglodicus, Serbosoma, Banatosoma, Svarogosoma* and some species of *Anamastigona*); some species have 2 coxal processes, a posterior one and a smaller anterior one (*Anamastigona hispidula, A. pulchella, A. bilselii, A. aspromontis*); sometimes there are processess both on coxa 10 and 11 (*Alloiopus solitarius, Anamastigona matsakisi*), rarely was recorded the presence of the coxal process only on P. 10 (*Persedicus*) while at some genera they are completely absent (*Caucaseuma, Ghilarovia, Ratcheuma, Leschius*).

A detailed analysis of the characters from the related species will lead to a new classification of the genera and a new redefinition of the families. It has to be taken into account, first of all, a comparison of the P. 8 structure (anterior

gonopods), as Mauriès argued repeatedly. But, in order to reach a phyletic classification, the characters indicating synapomorphies from the whole reproductive apparatus complex, should be found.

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