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Article

To the memory of my friend Stoitse Andreev (1937 – 2018)
Bulgarian carcinologist and caver

Checklist of Isopoda Oniscidea (Crustacea) of Bulgaria

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Abstract
A checklist of Isopoda Oniscidea (Crustacea) from Bulgaria (16 families, 33 genera, 81 sp.) is provided, together with an analysis of the cave species and of the inhabitants in the neighbouring territories.

Key words: Isopoda Oniscidea, Bulgaria, Checklist.

Introduction

The research on Isopoda Oniscidea in Bulgaria

First data on the terrestrial Isopoda from Bulgaria we find in the article of Hristovich (1892) where two species are mentioned (*Oniscus murarius* = *O. asellus* and *Porcellium scaber*). None of these are included in the modern list of Oniscidea from Bulgaria. Chichkoff (1912) mentions one more species among the inhabitants of the Bulgarian littoral of Black Sea.

The specialized study of this suborder in Bulgaria started with K. Verhoeff, who published several articles on it (Verhoeff, 1926, 1929, 1936), arriving to a number of 27 species and describing five new genera and 15 new species (now valid). Méhely (1929) added *Hyloniscus rilensis* from Rila. The material has been sent to these authors by Dr Ivan Buresch, collected by him and by his team mostly from caves. Some myrmecophilous isopods, together with ants, have been collected by N. Atanassov, Important contributions were made also by Strouhal (1939) and Frankenberger (1940, 1941), based mostly on isopods collected by K. Absolon in 1924, J. Táborský in 1933, 1934, and 1935 and V. Nabélek in 1938.

Next article is by Messner (1967) on Isopoda collected by him in 1963 and identified by A. Vandel.

After many visits in Bulgarian caves several Bulgarian biospeleologists (P. Beron, V. Beshkov, Hr. Deltshev, A. Popov, S. Andreev, and later also B. Petrov and P. Stoev) accumulated large collections of Isopoda. These have been identified first by Vandel (1965, 1967), and from 1970 to 2002 by the very active explorer of Balkan Isopoda and Amphipoda Stoitse Andreev (1937 – 2018). Vandel described several new species that are still valid and the new genera *Beroniscus* and *Bulgaronethes*. This prominent specialist published also important papers on the Oniscidea of Greece, describing many new taxa from material, partly collected by P. Beron. The interesting isopod fauna of this country has been studied also by H. Schmalfuss, who published checklists from Greece and also from Crete. He crowned his efforts by the monographic catalogue of the world Oniscidea (2003) and by a bibliography on this suborder (Schmalfuss & Wolf-

Schwenninger, 2002). Herein we follow the taxonomy of this catalogue. A recent checklist of the Greek Isopoda Oniscidea was prepared by Alexiou & Sfenthourakis (2013).

The Romanian specialist I. Tabacaru described (together with S. Andreev) the species *Trichoniscus raitchevi* and revised some taxa (Tabacaru, 1993), creating the new genera *Rhodopioniscus* and *Vandeloniscellus*. Tabacaru & Giurginca (2013) outlined the cave Oniscidea in Romania and Giurginca & Ćurčić (2003) – the Oniscidea of Northern Dobrudja.

The Bulgarian Oniscidea fauna includes so far eight endemic genera (*Acyphoniscus, Balkanoniscus, Bureschia, Bulgaronethes, Rhodopioniscus, Tricyphoniscus, Vandeloniscellus, Myrmiciocellio*) and 36 endemic species. There are also semi-endemic taxa like genus *Beroniscus* and the species *Trichoniscus bononiensis* and *T. rhodopiense*. The endemics are mostly dwellers in Bulgarian caves. Oniscidea have been recorded from 185 caves (Beron, 2015). Periodically among other cave animals Oniscidea have been reviewed by Buresch (1924, 1929), Guéorguiev & Beron (1962), Beron & Guéorguiev (1967), and Beron (1972, 1978, 1994, 2005, 2007, 2015). These authors published many new localities of Isopoda collected by them, identified first by K. Verhoeff, then by Adem Buturović, A. Vandel and St. Andreev.

Meanwhile Isopods have been described from neighbouring territories (Northern Dobrudja, East Serbia, North Macedonia, N. Greece, and the island of Thassos (N. Aegean Sea). Some of the taxa have not yet been found in Bulgaria, but their occurrence in this country can not be excluded.

How many species of Isopoda Oniscidea are present in Bulgaria? Strouhal (1932) gives – 32 sp. Frankenberger (1941) – 40 spp., Messner (1967) – 50 spp., Andreev (1983) - 42 spp. in caves, Deltshev, Andreev et al. (1993) – 93 spp. (all, including aquatic isopods), Andreev (2002) – 104 spp., Golemansky et al. (2005) – 137 sp. (all, incl. aquatic isopods), Sfenthourakis & Hornung (2018) – 67 spp. I have found published information on 81 spp. of Isopoda Oniscidea in Bulgaria.

Among the taxa already known in Bulgaria the richest is Trichoniscidae (32 spp., 23 of them troglobites). We could expected more species to be found outside caves, especially of genera like *Armadillidium* (59 spp. in Greece, 8 in Bulgaria). In Bulgaria 16 of the 20 Balkanic families of Oniscidea have been recorded. We could expect also the occurrence of the families Scleropactidae (*Kithironiscus* in Kithira Island at southern Greece and at the Romanian Dobrudja), Mesoniscidae (*Mesoniscus* in Serbia), Tendosphaeridae (*Thrakosphaera* in Western Thrace), as well as several other genera.

The caves in this paper are indicated with the signs and numbers accepted in our catalogues (Guéorguiev & Beron, 1962; Beron & Guéorguiev, 1967) and summarized by Beron (2015).

List of Isopoda Oniscidea from Bulgaria

Class **Crustacea**
Order **Isopoda**
Suborder **Oniscidea**

Tylida

Family **Tylidae**
Genus ***Tylos*** Audouin, 1826

Tylos latreillei Audouin, 1826 – Euxinograd nr. Varna – Verhoeff (1929: 139). Nomen dubium (Schmalfuss, 2003). Has to be clarified whether it is *T. ponticus* Grebnicki, 1874 or some other species.

Diplocheta

Family **Ligiidae**
Genus ***Ligia*** Fabricius, 1798

Ligia italica Fabricius, 1798 – Kaliakra, Taukliman, Balchik, Varna, Pomorie, Ravda, Sozopol, Ahtopol, Sv. Ivan Island – Andreev (1972: 178). Halophile.

Genus ***Ligidium*** Brandt, 1833

Ligidium germanicum Verhoeff, 1901 (= *Ligidium herzegowinense* Verhoeff, 1901, *Ligidium germanicum h.*) - Andaka (Gb 1) – Verhoeff (1926: 156), Polichki II (Gb 4) – Strouhal (1939: 194); Strandja, Musalla - Frankengerger (1941: 1); Zelenich (Sl 10) - Vandel (1965: 245); Mecha dupka (Sl 11), Zmijskiyat ostrov – Vandel (1967: 334); Bachkovski manastir, Vitosha, Karlovo, Slavyanka, Kostenets – Andreev (1972: 178), Georgievata peshtera (Bs 10), Peshterata s dvata vhoda (Bs 13), Bazat (Bs 19), Golyamata Vapa (Bs 12) - Beron (1994: 15 - S. Andreev det.); Leleshka dupka 1 (Ya 12), Sarpiyskata peshtera (Bs 7) – Andreev (2002: 56), Kresnensko hanche – Andreev (2001: 45); Goleshovo, Vitosha, Kostenets, Bachkovski manastir – Andreev (2002: 56); Kremenskata peshtera (Sm 22), Dupkata (Sm 60) – Beron et al. (2011: 592 – S. Andreev det.).

Synocheta

Family **Styloniscidae**
Genus ***Cordioniscus*** Graeve, 1914

Cordioniscus bulgaricus Andreev, 1986 - Boychovata peshtera (Bl 4) – Andreev (1986: 67). Troglobite. Bulgarian endemic.

Cordioniscus schmalfussi Andreev, 2002 - Zmiin burun (Pv 21), Shepran dupka (Pv 34) – Andreev (2002: 57). Troglobite. Bulgarian endemic.

Family **Trichoniscidae**
Genus ***Acyphoniscus*** Frankengerger, 1941 (endemic genus for Bulgaria)

Acyphoniscus nabeleki Frankengerger, 1941- Sozopol - Frankengerger (1941: 3). Bulgarian endemic.

Genus ***Alpioniscus*** Racovitza, 1908

Alpioniscus [=*Illyrionethes*] sp. - Starshelitsa (Bl 11) – Andreev (2002: 59). Troglobite (most probably Bulgarian endemic).

Genus ***Balkanoniscus*** Verhoeff, 1926 (endemic genus for Bulgaria)

Balkanoniscus corniculatus (Verhoeff, 1926) - Haydushkata dupka (Lv 2) – Verhoeff (1926: 148 – as *Trichoniscus* (*Balkanoniscus*) *c.*); Rushovata peshtera (Lv 20), Djebin Trap (Lv 21) (Guéorguiev & Beron, 1962: 297- A. Vandel det.); Yamata (Sf 15) – Vandel (1965: 250 – sub "Pešterata s Vodspad"); Razrushenata peshtera (Vr) – Andreev (1972: 179); Shipochinata (Vr 87), Planinets (Lv 94), Partizanskata peshtera (Lv 111) – Andreev (2002: 60). Troglobite. Bulgarian endemic (Stara planina).

Balkanoniscus minimus Vandel, 1967 - Parnitsite (Lv 44) – Vandel (1967: 335); Danchova dupka (Lv 91) – Andreev (2002: 60). Troglobite. Bulgarian endemic (Stara planina).

Genus ***Beroniscus*** Vandel, 1967

Beroniscus capreolus Vandel, 1967 - Parnitsite (Lv 44) – Vandel (1967: 337); Andreev (2002: 66). Troglobite. Bulgarian endemic (Stara planina).

Genus ***Bulgaronethes*** Vandel, 1967 (endemic genus for Bulgaria)

Bulgaronethes haplophthalmoides Vandel, 1967 - Novata peshtera (Pz 4) – Vandel (1967: 335); Suhata dupka (Pz 2) – Andreev (2002: 59). Troglobite. Bulgarian endemic (Rhodopes).

Genus ***Bureschia*** Verhoeff, 1926 **(**endemic genus for Bulgaria)

Bureschia bulgarica Verhoeff, 1926 - Vodnata peshtera (Sf 52) – Verhoeff

(1926: 143); Temnata dupka (Sf 30) – Buresch (1929: 1433); Belyar (Vr 53) – Andreev (1972: 178). Troglobite. Bulgarian endemic (Stara planina).

Genus ***Cyphoniscellus*** Verhoeff, 1900

Cyphoniscellus [***Bulgaroniscus***] ***gueorguievi*** (Vandel, 1965) - Desni Suhi pech (Vd 13), Vodni pech (Vd 15), Vreloto (Mt 3) – Vandel (1965: 261); Dupkata v Glamata (Vd 51), Levi suhi pech (Vd 14), Srednyata (Mt) - Andreev (1972: 181); Zhivkova dupka (Mt 10), Ayduchkata dupka (Mt 15), Mitsina dupka (Mt 23), Neprivetlivata (Vd 4), Yame 2 (Vd 28), Tatarska dupka (Vd 40), Parnak (Vd 52) - Beron (1994: 16 – S. Andreev det.), Falkovskata peshtera (Vd 46), Mecha dupka (Mt 25) – Andreev (2002: 66 – *Bulgaroniscus g*.). Troglobite. Bulgarian endemic (NW Bulgaria).

Genus ***Haplophthalmus*** Schöbl, 1860

Haplophthalmus danicus Budde-Lund, 1885 – Strandja – Frankenberger (1941: 3); Lyubovnata (Lv 53) – Andreev (1972: 181); Kresnensko hanche – Andreev (2001: 45); Bezimenna (Bs 23), Bezimenna v Bazat (Bs 14); Andaka (Gb 1) – Andreev (2002: 67).

Haplophthalmus intermedius Frankenberger, 1941 - Sozopol – Frankengerger (1941: 1), Alepu – Andreev (1972: 181). Bulgarian endemic.

Haplophthalmus sp. - Futyovskata peshtera (Lv 36) – Vandel (1965: 261).

Genus ***Hyloniscus*** Verfoeff, 1928

Hyloniscus crassicornis Verhoeff, 1926 - Devetashkata peshtera (Lv 37), Kayalashkata peshtera (Pn 1) – Verhoeff (1926: 155); Art. gallery in Urvich nr. Sofia – Vandel (1967: 335). Troglophile. Balkan endemic (Bosnia and Herzegovina, Serbia, Montenegro, Bulgaria).

Hyloniscus flammula Vandel, 1965 - Vrkan (Vd 1), Magura (Vd 2) – Vandel (1965: 250); Elenova dupka, or Djamiite (Vd 17), Studena (Vd 18) - Andreev (1972: 179); Magura 2 (Vd 37), Varnitsata (Vd 55) - Beron (1994: 15 – S. Andreev det.). Troglobite. Bulgarian endemic.

Hyloniscus pugionum Verhoeff, 1926 - Andaka (Gb 1), Nirits (Sl 7) – Verhoeff (1926: 154). Troglophile. Bulgarian endemic (Stara planina).

Hyloniscus rilensis Méhely, 1929 – Rila – Méhely (1929). Bulgarian endemic (Rila).

Hyloniscus riparius (C.L. Koch, 1838) - Yavor peshtera, Rhodopes – Méhely (1929: 47); Polichki II (Gb 4), Ivanovata peshtera (?), Gorna Rudina (?) – Strouhal (1939: 195); Razhishka yama (Sf 55), Bankovitsa (Lv 5) - Guéorguiev & Beron (1962: 298 – Ad. Buturović det.); Svinskata dupka (Sf 33), Ledenika (Vr 17), Futyovskata peshtera (Lv 36), Kumanitsa (Lv 41), Lyaskovskata peshtera (Tn 1) - Vandel (1965: 246); Urvich, Bov, Gornata dupka (Sf 60), Levitsa vreloto (Mt 2), Parnicite (Lv 44), Niric (Sl 7), Novata peshtera (Pz 4), Tabachka, Vodna, Mokrata peshtera (Rz 2) – Vandel (1967: 334); Kalugerova dupka (Tn 2), Elidere, Persenk (Rhodopes), Vitosha, Varna - Andreev (1972: 179); Emenskata peshtera (Tn 13), Devetashkata peshtera (Lv 37) - Beron (1994: 15 - S. Andreev det.); Sedlarkata (Pn 4), Orlova chuka (Rs 1), Filipovskata peshtera (Pk 4), Boevskata peshtera (Sm 6) – Andreev (2002: 59).

Hyloniscus stankovici Pljakić, 1972 - Dupkata v Dedin dol (Sf 78) - Beron (1978: 200; 1994: 15 - S. Andreev det.). Troglophile. Balkan endemic (Serbia, Bulgaria).

Hyloniscus taborskyi Frankenberger, 1940 - Kostenets (Frankenberger, 1940: 76); Vitosha – Messner (1967: 22). Bulgarian endemic.

Hyloniscus sp. - Golema Podlistsa (Tn 3) – Verhoeff (1936: 22); Bacho Kiro (Gb 2), Tsarkvishte (Sf 19) - Guéorguiev & Beron (1962: 298); Koryanska dupka (Bl 38), Orlova chuka (Rs 1), Banyan (Bl 20), Dupkata (Kr) – Andreev (2002: 59); Manailovata peshtera (Bl 1), Mecha dupka (Sm 3), Hera (Sm 62) – Beron et al. (2011: 593).

Genus ***Monocyphoniscus*** Strouhal, 1939

Monocyphoniscus babadagensis (Radu, 1965) – Maslen nos (Strandja), Longoza (Varna), Balchik – Andreev (1972: 182). Balkan endemic (Bulgaria and Northern Dobrudja).

Monocyphoniscus bulgaricus Strouhal, 1939 - Dupkata (Sm 3) – Strouhal (1939: 198); Tilki Ini (Kr 1) - Vandel (1965: 264); Hassarskata peshtera (Kr 3) - Andreev (1972: 181); Golyamata Vapa (Bs 2) - Beron (1994: 16 - S. Andreev det.); Zandana (Hs 1), Bozkite (Ya 1), Kaleto (Bs 4), Vitosha (Art. gallery), Lessovo – Andreev (2002: 67); Dupkata (Sm 60) – Beron et al. (2011: 593 – S. Andreev det.). Troglophile (?). Bulgaria, Greece (incl. Crete), Turkey.

Genus ***Rhodopioniscus*** Tabacaru, 1993 (so far endemic genus for Bulgaria)

Rhodopioniscus beroni (Vandel, 1965)(= *Balkanoniscus beroni* Vandel, 1965) - Topchika (Pv 4), Yamata (Pv 8) – Vandel (1965: 251); Ahmetyova dupka (Pv 16), Shepran dupka (Pv 34), Zmiin burun (Pv 19), Hralupa (Pv 10) – Andreev (2002: 59). Remarks. Genus *Rhodopioniscus* was erected by Tabacaru (1993: 62) to include only *B. beroni*, which is quite distinct from the other members of *Balkanoniscus* Verhoeff. Troglobite. Bulgarian endemic (Rhodopes).

Genus ***Trichoniscus*** Brandt, 1833

Trichoniscus anophthalmus Vandel, 1965 - Studenata dupka (Vr 3), Ezeroto (Vr4) – Vandel (1965: 257); Mishin Kamik (Mt 1) – Vandel (1967: 336); Toshova dupka (Matnitza)(Vr 42) - Andreev (1972: 180); Vreloto (Mt 3), Ayduchkata dupka (Mt 15), Tatarska dupka (Vd 40), Parasinskata propast (Mt 31) - Beron (1994: 15 - S. Andreev det.); Razrushenata peshtera (Vr) – Andreev (2002: 60). Troglobite. Bulgarian endemic (Stara planina).

Trichoniscus beroni Andreev, 1985 - Bratanovskata peshtera (Bs 18) – Andreev (1985: 49). Troglobite. Bulgarian endemic (Strandja).

Trichoniscus bononiensis Vandel, 1965 - Tsankinoto vrelo (Vd 3), Gornata propast (Vd 4), Haydushkata propast (Vd 5), Bashovishki pech (= Vodni pech) (Vd 9), Tamni pech (Vd 10), Golemi pech (Vd 11) – Vandel (1965: 258–260); Varkan (Vd 1), Yame 3 (Vd 29), Mecha dupka (Vd 20), Redaka (Vd 19), Rushkovitsa (Vd 58), Suhi pech (Vd 8) – Andreev (1972: 180), Pech (Mt 8), Yame 2 (Vd 28), Parnak (Vd 52), Yankulova dupka (Vd 56) - Beron (1994: 16 - S. Andreev det.); Falkovskata peshtera (Vd 46) – Andreev (2002: 60). Troglobite. Balkan endemic (NW Bulgaria, Serbia).

Trichoniscus bulgaricus Andreev, 1970 - Yulen Ere II (Pv 17) – Andreev (1970: 1135). Troglobite. Bulgarian endemic (Stara planina).

Trichoniscus bureschi Verhoeff, 1926 - Vodnata peshtera (Sf 52) – Verhoeff (1926: 151 – as *Trichoniscus* (*Spiloniscus*) *b*.); Haydushkata dupka (Pn 2) – Verhoeff (1936: 22); Zidanka (Sf 29), Temnata dupka (Sf 30), Svinskata dupka (Sf 33), Golemata Vrazha dupka (Sf 35), Samuilitsa (Vr 8), Bankovitsa (Lv 5), Zadanenka (Lv 10), "Cave near the Waterfall", Bezimenna 22 (Lv 47), Kumanitsa (Lv 41), Razklonenata peshtera (Sm 11) - Vandel (1965: 254 - 256); Tsankaliva dupka (Pv 12), Ledenika (Vr 17), Cherdjenitsa (Lv 50), Dyado Draganovata peshtera (Lv 51), Ponora (Vr 22), Dupkata v Glamata (Vd 51) – Andreev (1972: 180); Shokyovets (Mt 13), Falkovskata peshtera (Vd 46) (Beron, 1994: 15 - S. Andreev det.); Shipochinata (Vr 87), Chelovecha dupka (Vr 77) – Andreev (2002: 61). Troglophile. Bulgarian endemic (NW Bulgaria).

Trichoniscus garevi Andreev, 2000 - Sinyoto ezero (Lv 103), Alchashkata peshtera (Lv 104), Popskata peshtera (Lv 31), Tanyova peshtera (Lv 105), Voditsata (Lv 106) – Andreev (2000: 40); Skoka (Lv 116), Gornik (Lv 98) – Andreev (2002: 61). Troglobite. Bulgarian endemic (Stara planina).

Trichoniscus petrovi Andreev, 2002 - Byaloto Kamene (Sm 41), Pirkovskata peshtera (Pv 23) – Andreev (2002: 61); Shepran dupka (Pv 34) – Beron et al. (2011: 593). Troglobite. Bulgarian endemic (Rhodopes).

Trichoniscus provisorius Racovitza, 1908 - Kresnensko hanche – Andreev (2001: 45); Haydushkata peshtera (Pn 2) - Vandel (1965: 253); Orlova Chuka (Rs 1) – Andreev (2002: 63) (sub *Trichoniscus pusillus pusillus* Brandt, 1833). As S. Sfenthourakis signaled in litt., according to Schmalfuss (2003*) T. pusillus pusillus* is spread north of the Alps and in Bulgaria should be living *T. provisorius* Racovitza, 1908.

Trichoniscus pusillus pusillus Brandt, 1833 - Kresnensko hanche – Andreev (2001: 45); Haydushkata peshtera (Pn 2) - Vandel (1965: 253); Orlova Chuka (Rs 1) – Andreev (2002: 63).

Trichoniscus raitchevi Andreev et Tabacaru, 1972 - Imamova dupka (Sm 13) – Andreev & Tabacaru (1972: 387). Troglophile (or recent troglobite ?). Bulgarian endemic (Rhodopes).

Trichoniscus rhodopiense Vandel, 1965 - Peshterata (Kr 2) – Vandel (1965: 258); Nadarskata peshtera (Sm 15), Boevskata peshtera (Sm 16) – Andreev (1972: 180); Samara (Kr 4) - Beron (1994: 15); Zlatnata yama (Kremenskata peshtera) (Kr 14), Karagug (Kr 2), Zmiyn borun (Pv 19), Kraypatnata (Sm 40), Samara (Kr 4), Ogledalnata peshtera (Ayna Ini) (Kr 12), Byaloto Kamene (Sm 41), Hassarskata peshtera (Kr 3), Rupata (Kr 16), Nadarskata peshtera (Sm 15), Nameless cave near Svetulka (Kr) – Andreev (2002: 64). Troglobite. Balkan endemic (Bulgaria – Rhodopes, Greece - Thasos).

Trichoniscus semigranulatus Buturović, 1954 - Mecha dupka (Kl 6) – Andreev (2000: 45). Troglophile. Balkan endemic (SW Bulgaria, Rep. N. Macedonia – cave Bislim, Pchinja Village, Distr. Kumanovo).

Trichoniscus stoevi Andreev, 2002 - Stoletovskata peshtera (Sz 1) – Andreev (2002: 64). Troglobite. Bulgarian endemic (Central Stara planina).

Trichoniscus tenebrarum Verhoeff, 1926 - Golema Podlistsa (Tn 3) – Verhoeff (1926: 150 – as *Trichoniscus* (*Spiloniscus*) *t.*); Andaka (Gb 1), Devetashkata peshtera (Lv 37) - Beron (1994: 16 - S. Andreev det.); Gornik (Lv 98) – Andreev (2002: 66). Troglobite. Bulgarian endemic (Stara planina).

Trichoniscus tranteevi Andreev, 2000 (pro *T. anophthalmus intermedius* Vandel, 1967, praeoccup.) - Tamnata peshtera (Rs 3) – Vandel (1967: 336). Troglobite. Bulgarian endemic (NE Bulgaria).

Trichoniscus valkanovi Andreev, 1985 - The species has been described from the cave Sarpiyskata peshtera (Bs 7), called erroneously by us "Kiretchnicata" (Beron, 1972: 292). The name "Kirechnicata" belongs to another cave in the same area (Bs 8); Georgieva peshtera (Bs 10) – Andreev (1985: 46). Troglobite. Bulgarian endemic (Strandja).

Trichoniscus sp. – Golema Podlistsa (Tn 3) – Verhoeff (1936: 22); Zandana (Hs 1), Vodnata peshtera, Kraypatnata peshtera (Sm 11), Novata peshtera (Pz 4), Prilepova dupka (Kr 13), Uhlovitsa (Sm 31), Nahodka 13 (Shn 12), Mechkina dupka (Kr 20), Naredenite kamani (Kr 23), Varkan (Vd 1), Lessovo - Andreev (2002: 66); Salievata peshtera (Bl 2), Stapalkata (Bl 29), Tsankaliva dupka (Pv 12), Leshtaka (Pv 30), Prikazna (Pv 32), Ushatovi dupki (Pz 6), Cheleveshnitza (Sm 6), Kaunitsa (Sm 12), Vodnata peshtera (Sm 50) – Beron et al. (2011: 593 – S. Andreev det.).

Genus ***Tricyphoniscus*** Verhoeff, 1936 (endemic genus for Bulgaria)

Tricyphoniscus bureschi Verhoeff, 1936 - Haydushka dupka (Lv 2) – Verhoeff (1936: 20); Vodnata pesht (Sf 47) - Vandel (1965: 164); Bezimenna 22 (Lv 47) – Vandel (1967: 337); Cherdjenitsa (Lv 50) – Andreev (1972: 181); Kozarnika (Sf 56), Bankovets (Sf 61) - Beron (1994: 16 - S. Andreev det.); Ovnarkata (Lv 9),

Ledenika (Vr 17) – Andreev (2002: 67 – 68); Alchashkata peshtera (Lv 104), P. Beron et B. Garev leg. (St. Andreev det.). Troglobite. Bulgarian endemic (Stara planina).

Genus ***Vandeloniscellus*** Tabacaru, 1993 (endemic genus for Bulgaria)

Vandeloniscellus bulgaricus (Vandel, 1967)(= *Cyphoniscellus b*.) - Toshova dupka (= Matnitsa) (Vr 42) – Vandel (1967: 337), Andreev (2002: 67). Troglobite. Bulgarian endemic (NE Bulgaria).

Genus ***Budelundiella*** Silvestri, 1897

Budelundiella cataractae Verhoeff, 1930 – Stoilovo (Strandja) – Andreev (1987: 85).

Crinocheta

Family **Agnaridae**
Genus ***Protracheoniscus*** Verhoeff, 1917

Protracheoniscus major (Dollfus, 1903) – Sofia – Vandel (1967: 338, sub "*P. asiaticus* Uljanin, 1875", see Schmalfuss, 2003).

Protracheoniscus ubliensis (Verhoeff, 1901) - Ledenika (Vr 17) - Vandel (1965: 265).

Family **Armadillidae**
Genus ***Armadillo*** Latreille, 1802

Armadillo officinalis Duméril, 1816 - Euxinograd nr. Varna – Verhoeff (1929: 133); Plovdiv, Kaliakra – Messner (1967: 25); Ropotamo, Ahtopol, Balchik - Andreev (1972: 186).

Family **Armadillidiidae**
Genus ***Armadillidium*** Brandt, 1833

Armadillidium bulgaricum Frankengerger, 1941- Sozopol - Frankengerger (1941: 9). Bulgarian endemic.

Armadillidium elysii Verhoeff, 1936 - Dolnata maaza (Sl 1), "Cave near Dryanovski monastir" – Verhoeff (1936: 6); Bachkovski manastir (Rhodopes) – Messner (1967: 25); Peshterata s dvata vhoda (Bs 13), Kaleto (Bs 16) - Beron (1994: 17- S. Andreev det.). Bulgarian endemic (Stara planina, Rhodopes, Strandja).

Armadillidium euxinum Verhoeff, 1929 – Varna – Verhoeff (1929: 131). Bulgarian endemic.

Armadillidium pallasii Brandt, 1833 – Gara Pirin – Frankenberger (1941: 8 – sub *A. pallasi frontirostre* Budde-Lund, 1885, living on the Adriatic coast).

"Armadillidium klugii Brandt, 1833" – Sedmovratitsa (Sf 36), Futyovskata peshtera (Lv 36) – Vandel (1967: 340). According to Schmalfuss (2003), "The records from Bulgaria (Vandel, 1967) seem to refer to a different species".

Armadillidium rhodopinum Verhoeff, 1936 – Radilovo (Rhodopes) - Verhoeff (1936: 2). Bulgarian endemic (Rhodopes).

Armadillidium versicolor Stein, 1859 (syn. *quinqueseriatum* Verhoeff, 1901) - Devetashkata peshtera (Lv 37) – Verhoeff (1929: 132), Polichki II (Gb 4) - Strouhal (1939: 205); Trân – Vandel (1967: 340); Sadovets (Distr. Pleven) – Andreev (1972: 185); Snezhanka (Pz 5) – Beron et al. (2011: 593 – *Armadillidium versicolor* Stein, 1859).

Armadillidium vulgare (Latreille, 1804) – Temnata dupka (Sf 8), Euxinograd, Varna, Ahtopol – Verhoeff (1929: 133); Dolnata Maaza (Sl 1) – Verhoeff (1936: 22); Strandja – Frankenberger (1941: 9); Sofia, Vitosha, Plovdiv, Stara Zagora, Sandanski – Messner (1967: 25); Bankovitsa (Lv 5), Rebrovo, Vitosha, Borovets, Krupnik, Sozopol – Vandel (1967: 340); Devetaki (Distr. Lovech), Sozopol, Vratsa, Varna - Andreev (1972: 186); Kaleto (Bs 16), Bratanovskata peshtera (Bs 18) - Beron (1994: 17 - S. Andreev det.); Kresnensko hanche – Andreev (2001: 45); Golyamata Vapa (Bs 12), Marina dupka (Sf 20), Lessovo – Andreev (2002: 70).

Armadillidium sp. - Saeva dupka (Lv 18) – Atanasov & Stefanov (1951: 261).

Family **Cylisticidae**
Genus ***Cylisticus*** Schnitzler, 1853

Cylisticus convexus (de Geer, 1778) - Andaka (Gb 1), Devetashkata peshtera (Lv 37), Peshterata (Pz 3), Bacho Kiro (Gb 2) – Verhoeff (1929: 133); Bacho Kiro (Gb 2), Urushka maara (Lv 35) – Verhoeff (1936: 21); Polichki I (Gb 3), Polichki II (Gb 4), Kayalashkata peshtera (Pn 1) – Strouhal (1939: 204); Sozopol, Varna, Strandja – Frankenberger (1941: 8), Mechata dupka (Vr 20) - Guéorguiev & Beron (1962: 298 – A. Vandel det.); Bankovitsa (Lv 5), Ovnarkata (Lv 9), Vodopada (Lv 34), Uske (Kl 1) – Vandel (1965: 265); Plovdiv, Iskar Reservoire – Messner (1967: 23); Dupkata v Glamata (Vd 51), Bezimenna 22 (Lv 47) - Andreev (1972: 185); Parasinskata propast (Mt 31), Bezimenna (Lv 82), Musinskata peshtera (Tn 12), Sarpiyskata peshtera (Bs 7), Georgieva peshtera (Bs 10), Golyamata Vapa (Bs 12), Kaleto (Bs 16), Bratanovskata peshtera (Bs 18), Bazat (Bs 19), Bezimenna (Bs 23) - Beron (1994: 17 - S. Andreev det.); Kresnensko hanche – Andreev (2001: 45); Lessovo, Petrich, Krushevets (Distr. Burgas), Filipovtsi (Distr. Pernik), Shkorpilovtsi (Distr. Varna), Kresna, Senovo (Distr. Gabrovo), Kachul (Distr. Burgas), Sozopol, Balchik - Andreev (2002: 68); Manailovata peshtera (Bl 1), Stapalkata (Bl 29), Kaleto (Sm 63) – Beron et al. (2011: 592 – S. Andreev det.). Troglophile.

Family **Detonidae**
Genus ***Armadilloniscus*** Uljanin, 1875

Armadilloniscus bulgaricus Frankengerger, 1941- Sozopol - Frankengerger (1941: 5). Bulgarian endemic.

Family **Halophilosciidae**
Genus ***Halophiloscia*** Verhoeff, 1908

Halophiloscia couchii (Kinahan, 1858) – Varna, Obrochishte (Distr. Dobrich) – Andreev (1972: 185). Halophilous.

Family **Oniscidae**
Genus ***Oniscus*** Linnaeus, 1758

Oniscus asellus Linnaeus, 1758 (syn. *O. murarius* Cuvier, 1792) - Bulgaria - Hristovich (1892). The distribution of this species is (according to Schmalfuss, 2003: 184) “Northern and western Europe east to Finland, Poland, Ukraine, not in the Mediterranean area”. So the species (and entire family Oniscidae) may or may not live in Bulgaria.

Family **Philosciidae**
Genus ***Chaetophiloscia*** Verhoeff, 1908

Chaetophiloscia cellaria (Dollfus, 1884) – Between Bachkovski manastir and Assenovgrad – Messner (1967: 22).

Chaetophiloscia elongata (Dollfus, 1884) - Sozopol - Frankengerger (1941: 3).

Chaetophiloscia hastata Verhoeff, 1929 – Euxinograd nr. Varna – Verhoeff (1929: 133); Chirpan Bunar (Pv 2), Tilki Ini (Kr 1) - Vandel (1965: 264); Plovdiv, Kuklen, Stara Zagora - Messner (1967: 23); Varna, Nesebar, Ognyanovo (Distr. Pazardjik) – Andreev (1972: 185); Zmiyarnika (Kodja Kaya) (Kr 8), Lessovo – Andreev (2002: 68).

Family **Platyarthridae**
Genus ***Platyarthrus*** Brandt, 1833

Platyarthrus atanassovi Verhoeff, 1936 – Dermantsi (Distr. Lovech) – Verhoeff (1936: 10); Shtarkovo (Distr. Pazardjik), Pesnopoi (Distr. Plovdiv), Primorsko, Varna, Vratsa, Voden (Distr. Razgrad), Sadovets (Distr. Pleven), Chiren (Distr. Vratsa), Assenovgrad, Balchik, Krapets (Distr. Dobrich) – Andreev (1972: 182). Myrmecophilous, with the ants *Messor rufitarsus, Lasius niger, L. flavus, L. alienus, Ponera coarctata, Camponotus vagus* (Hym., Formicidae). Bulgaria, Romania and European Turkey.

Platyarthrus coronatus Radu, 1959 – Varna, Balgarevo, Balchik, Krapets, Shabla (Distr. Dobrich), Nesebar - Andreev (1972: 183). Myrmecophilous, with *Plagiolepis vindobonensis, Tetramorium caespitum, Lasius alienus, Messor rufitarsis* (Hym., Formicidae). "Possibly identical with *P. lindbergi* from Greece (Schmalfuss, 2003)". Romania, Bulgaria.

Platyarthrus hoffmannseggi Brandt, 1833 – Narechenski bani, Bachkovski manastir (Rhodopes), Alepu, Sozopol, Ognyanovo (Distr. Pazardjik), Yasenkovo (Distr. Shumen), Vodna (Distr. Vidin) - Andreev (1972: 183); Kresnensko hanche – Andreev (2001: 45); Maarata (Kr 30), Lessovo – Andreev (2002: 68). Myrmecophile, with *Messor rufitarsis, Tetramorium caespitum* (Hym., Formicidae).

Platyarthrus schoeblii Budde-Lund, 1885 (syn. *P messorum* Verhoeff, 1936) - Skakavitsa - Verhoeff (1936 – sub "*P. messorum*"); Slaviyanka (Alibotush), Obrochishte (Distr. Dobrich), Varna, Sozopol, Primorsko – Andreev (1972: 182). Myrmecophilous, with *Pheidole pallidula arenarum* var. *orientalis* (Hym. Formicidae).

Family **Porcellionidae**
Genus ***Porcellio*** Latreille, 1804

Porcellio dilatatus Brandt, 1833 - Mechata dupka (Bl 30) – Beron et al. (2011: 592).

Porcellio laevis Latreille, 1804 – Kayalashkata peshtera (Pn 1) - Strouhal (1939: 201); Sozopol – Frankenberger (1941: 8); Kazanlâk - Messner (1967: 24); Zmijskijat ostrov – Vandel (1967: 339).

Porcellio lamellatus Budde-Lund, 1885 – Euxinograd nr. Varna – Verhoeff (1929: 129 – sub "*Haloporcellio ferdinandi*").

Porcellio scaber Latreille, 1802 – Hristovich (1892); Sofia – Vandel (1967: 339), Messner (1967: 24). Synanthrop.

Genus ***Porcellionides*** Miers, 1877

Porcellionides myrmecophilus (Stein, 1859) – Gara Pirin, Strumeshnitsa Valley – Frankenberger (1941: 7).

Porcellionides pruinosus (Brandt, 1833)(= *Metoponorhus p*.) – Lukovit – Verhoeff (1936: 22); Kuklen, Bachkovski manastir (Distr. Plovdiv), Stara Zagora – Messner (1967: 23); Srem (Distr. Yambol, art. gallery), Sozopol, Balchik – Andreev (2002: 70). Synanthrop.

Family **Stenoniscidae**
Genus ***Stenoniscus*** Aubert et Dollfus, 1890

Stenoniscus pleonalis pleonalis Aubert et Dollfus, 1890 – Kornyata near Sozopol – Andreev (1987: 87). Halobiont.

Family **Trachelipodidae**
Genus ***Porcellium*** Dahl, 1916

Porcellium balkanicum Verhoeff, 1936 - Ledenika (Vr 17) – Verhoeff (1936: 11); Draganchovitsa (Lv 27) - Strouhal (1939: 204); Bekir-Salahovata dupka (Bl 2) - Vandel (1965: 267). Troglophile. Bulgarian endemic (Stara planina and Pirin).

Porcellium frontacutum Schmalfuss, 1996 - Samara (Kr 4), Aina Ini (Kr 12), Mechkina dupka (Kr 20) – Beron (2004: 825); Banyan (Bl 20), Ribnovskata peshtera (Bl 31), Mecha dupka (Sm 3), Vodnata peshtera (Sm 50) – Beron et al. (2011: 592). Troglophile. Balkan endemic (Bulgarian and Greek Rhodopes).

Porcellium recurvatum Verhoeff, 1901 – Vitosha, 1360 m – Verhoeff (1936: 14 – sub "*Porcellium witoschicum* Verh."); Sveti Konstantin nr. Peshtera (Rhodopes) – Vandel (1967: 359 – sub "*Porcellium rhodopinum* Vandel"); Boyana – Andreev (2002: 70). Syn. by Schmalfuss (2003).

Genus ***Trachelipus*** Budde-Lund, 1908

Trachelipus myrmicidarum (Verhoeff, 1936) – Zemen, Skakavitsa - Verhoeff (1936: 10); Sandanski – Vandel (1967: 359), Messner (1967: 23); Belassitsa Hut, Kresna, Sandanski – Andreev (2002: 70). Myrmecophilous, with *Messor structor rufitarsis*, *M. barbarus varrialei* (Hym., Formicidae). Bulgarian endemic.

Trachelipus nodulosus (C.L. Koch, 1838) (= *balticus* Verhoeff, 1907) - Medenik (Vr 18), Dragalevtsi (Vitosha) - Verhoeff (1926: 145); Borovets, 1460 m, Kolibata (Sf 12), Han Maara (Pv 1), General Toshevo - Vandel (1967: 338).

Trachelipus rathkei Brandt, 1833 – Sofia, Vitosha, Kuklen, Bachkovski manastir, Shipka, Kazanlak, Lakatnik, Shtarkelovo gnezdo, Sandanski – Messner (1967: 23); Katsa peshtera (Rz 4) – Vandel (1967: 338); Vitosha, Bachkovska manastir, Malo Konare (Distr. Plovdiv), Tsrancha, Ognyanovo (Distr. Pazardjik), Uzana, Shipchenski prohod (Stara planina), Peshketo (Vr 68) – Andreev (1972: 184-185); Peshterata s dvata vhoda (Bs 13), Kaleto (Bs 16), Tsakalat (Bs 21), Mecha dupka (Bs 24) – Beron (1994: 17 - S. Andreev det.); Deli Burun (Shn 11), Salievata peshtera (Bl 2), Mussinskata peshtera (Tn 12) – Andreev (2002: 69).

Trachelipus squamuliger (Verhoeff, 1907)(= *Trachelipus absoloni* (Strouhal, 1939)) - Haydushka dupka (Lv 2) – Verhoeff (1926: 145); Sozopol – Frankenberger (1941: 8 – sub "*Tracheoniscus bulgaricus* Verh."); Strouhal (1939: 201); Razhishka yama (Sf 55) - Guéorguiev & Beron, (1962: 299 – A. Vandel det., sub "*Trachelipus absoloni*"); Haydushkata peshtera (Pn 2) - Vandel (1967: 267 – sub "*Trachelipus absoloni*"); Skoka (Bl 32) – Beron et al. (2011: 594 – S. Andreev det.). Troglophile. According to Schmalfuss (2003), the species *T. bulgaricus* Verhoeff, 1926 with its two subspecies is synonymous also of *T. squamuliger*. Below the localities of these possible subspecies are provided.

[*Trachelipus bulgaricus bulgaricus* Verhoeff, 1926] (*Tracheoniscus bulgaricus*) - Haydushka dupka (Lv 2) – Verhoeff (1926: 145); Saeva dupka (Lv 18) – Verhoeff (1936: 11); Draganchovitsa (Lv 27) - Strouhal (1939: 199); "Cave without name near Karlukovo" – Vandel (1965: 266); Yarkovets (Sf 77), Bankovica (Lv 5), Temnata dupka (Lv 16), Cerovo – Vandel (1967: 339); Haydushka dupka (Pn 2), Devetashkata peshtera (Lv 37) - Beron (1994: 17, Andreev, 2002: 69). Troglophile (or trogloxene ?).

[*Trachelipus bulgaricus bureschi* Verhoeff,1926] - Nirits (Sl 7) – Verhoeff (1926: 145); Dolnata Maaza (Sl 1), "Cave near Krushuna" – Verhoeff (1936: 11 as *Tracheoniscus bulgaricus bureschi*); Saeva dupka (Lv 18) – Strouhal (1939: 199); Malkata Humba (Sl 13) - Vandel (1965: 266). Troglophile.

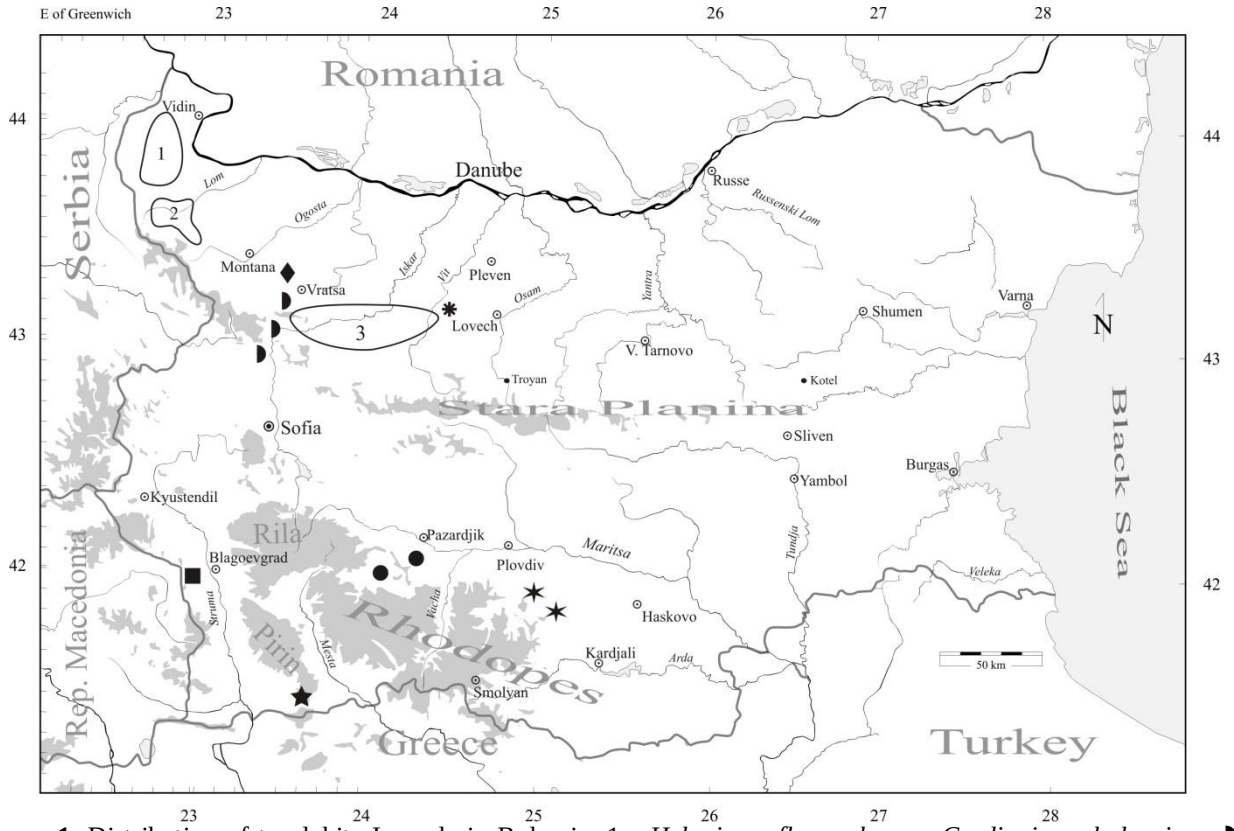

Figure 1. Distribution of troglobite Isopoda in Bulgaria. 1 - *Hyloniscus flammula*, ■ - *Cordioniscus bulgaricus*, ◗ - *Bureschia bulgarica*, ✶ - *Cordioniscus schmalfussi*, 2 - *Cyphoniscellus (Bulgaroniscus) gueorguievi*, ★ - *Alpioniscus* sp., ♦ - *Vandeloniscellus bulgaricus*, ● - *Bulgaronethes haplophthalmoides*, 3 - *Tricyphoniscus bureschi*, ❋ - *Beroniscus capreolus.*

Figure 2. Distribution of troglobite Isopoda in Bulgaria. 1 – *Balkanoniscus corniculatus*, ■ - *Balkanoniscus minimus*, 2 – *Rhodopioniscus beroni.*

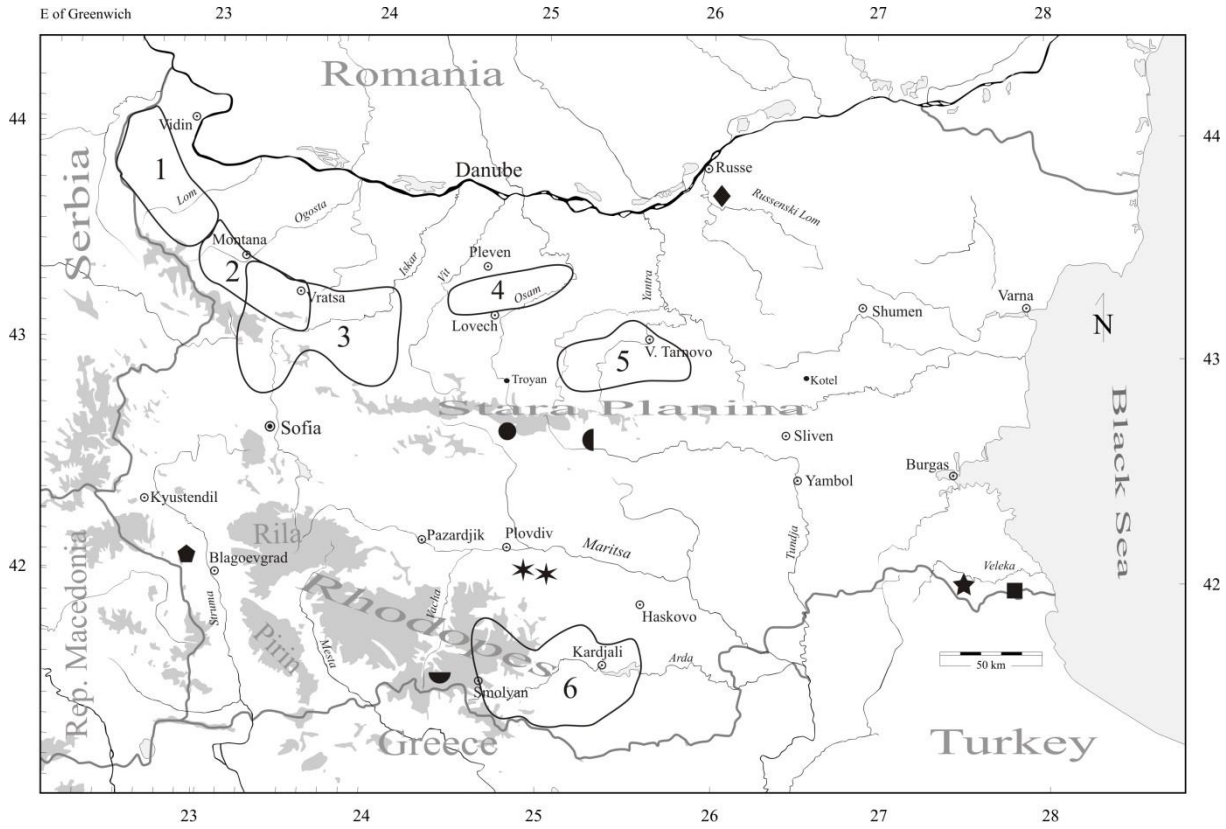

Figure 3. Distribution of troglobitic Isopoda of genus *Trichoniscus* in Bulgaria. 1 - *Trichoniscus bononiensis,* ⬟ - *T. semigranulatus,* 2 - *T. anophthalmus,* ● – *T. stoevi,* 3 - *T. bureschi,* ✶ - *T. petrovi,* 4 - *T. garevi,* ◡ - *T. raitchevi,* 5 - *T. tenebrarum,* 6 - *T. rhodopiense,* ● - *T. bulgaricus,* ★ - *T. beroni,* ♦ - *T. tranteevi,* ■ - *T. valkanovi.*

Oniscidea incertae sedis

Genus ***Myrmekiocellio*** Verhoeff, 1936 (endemic genus for Bulgaria, but according to Schmalfuss, 2003, with doubtful status)

[***Myrmekiocellio squamatus*** Verhoeff, 1936 – Skakavitsa - Verhoeff (1936: 18, with the ants *Tetramorium caespitum*). Bulgarian endemic]. According to Sfenthourakis (in litt.), the description is based on a juvenile of *Porcellium recurvatum* and is not valid.

Isopoda Oniscidea in Bulgarian caves

A substantial part of the list of Balkan Oniscidea consists of cave dwellers, with many troglobitic species and endemic genera. If we consider only the inhabitants of Bulgaria and the neighbouring Serbia, Rep. N. Macedonia, Greece, Eastern Thrace and Northern Dobrudja, we find the following:

Bulgaria (Beron, 2015, with corrections) – Oniscidea are known from 185 caves. They belong to 9 families (Ligiidae, Styloniscidae, mostly Trichoniscidae, Trachelipodidae, Chaetophilosciidae, Platyarthridae, Porcellionidae, Cylisticidae, Armadillidiidae), 24 genera and 49 species. The 26 troglobitic species belong to Trichoniscidae (24 – *Hyloniscus, Trichoniscus, Alpioniscus, Balkanoniscus, Rhodopioniscus, Bureschia, Bulgaronethes, Cyphoniscellus, Vandeloniscellus, Beroniscus*) and Styloniscidae (2 *Cordioniscus*). See also Verhoeff (1926, 1929, 1936), Vandel (1965, 1967), Tabacaru (1993), and Andreev (1970, 1972, 1983, 1985, 1986, 1987, 2000, 2002 and others).

Greece (Alexiou & Sfenthourakis, 2013; Beron, 2016) – the cave Oniscidea of Greece (Dodekanese excluded) belong to 11 families and 25 genera (Beron 2016). *Buddelundiella sporadica* belongs to Trichoniscidae and not to a separate family (Schmalfuss, 2003). The 34 troglobitic species belong to Styloniscidae (9 *Cordioniscus*), Trichoniscidae (18 - *Alistratia, Alpioniscus, Buddelundiella. Graeconiscus, Libanonethes, Trichoniscus*), Scleropactidae (*Kithironiscus*), Armadillidiidae (*Platanosphaera* (= *Troglarmadillidium*), *Schizidium*). Unlike Bulgaria, members of *Cordioniscus, Alpioniscus* and *Schizidium*

prevail here. See also Andreev (1984, 1985, 1986, 1997, 2001, 2004, 2013), Schmalfuss (1979, 1995 and many others), Sfenthourakis (1996), Vandel (1955, 1958, 1959, 1964, 1968).

Serbia (Buturović, 1960; Pljakić, 1977; Ćurčić, 2014) - In Serbia (Kosovo included) Oniscidea have been analysed by Pljakić (1970, 1972, 1977) with descriptions of the new taxa *Hyloniscus stankovici, H. kossovensis, Microtitanethes licodrensis* (n.g., n.sp.), and 10 new *Trichoniscus*. Buturović (1960) added *Hyloniscus kopaonicensis*. The list of the cave Oniscidea in Ćurčić, Juberthie & Decu in Ćurčić (2014) contains 13 sp. (all Trichoniscidae, 12 described by Pljakić in 1970 and 1977). One genus (*Microtitanethes*) and all *Trichoniscus* are endemic to Serbia. *Macedoniscus* is a synonyme of *Alpioniscus* (see Schmalfuss, 2003). The cave Oniscidea of Serbia clearly remain understudied.

Rep. N. Macedonia (Komnenov, 2010; Sket et al., in Ćurčić, 2014) – The list of cave Isopoda terrestria of Komnenov (2010) contains 11 identified to species, including 10 troglobites and *Trichoniscus semigranulatus* (troglophile, known also from Bulgaria). *Alpioniscus vejdovskii* is known also from Greece. The other nine (including five *Alpioniscus*) are endemic troglobites and include the endemic genera *Macedonethes* and *Mladenoniscus*. *Vardaroniscus* is a synonyme of *Cyphoniscellus* (see Schmalfuss, 2003). The list of Sket et al. in Ćurčić (2014) contains only seven species (without *Mladenoniscus belavodae, Alpioniscus macedonicus, Macedonethes skopjensis*, and *M. stankoi*) (see also Buturović, 1954, 1955a, 1955b, I. Karaman, 2003, Karaman & Horvatović, 2008; M. Karaman, 1961, 1966).

Northern Dobrudja (Romania)(Giurginca & Curčić, 2003; Tabacaru & Giurginca, 2013) – Among the 41 species of Isopoda terrestrial recorded from Northern (Romanian) Dobrudja there are 17 species recorded from caves and drills, including such interesting taxa like *Kithironiscus* and *Caucasonethes*. These and some other amazing troglobites like *Trachelipus troglobius, Armadillidium tabacarui* and others were described among the unique inhabitants of the "lost world" of the cave of Movile (see also Tabacaru, 1993; Tabacaru & Boghean, 1989).

Eastern Thrace (European Turkey) (Verhoeff, 1941) - from the cave Barut hane near Yarim Burgaz have been recorded *Haplophthalmus stygivagus, Trichoniscus provisorius*, and *Kosswigius bilselii*. Among the Oniscidea of European Turkey the genus *Kosswigius* Verhoeff, 1941 is notable as it is found only in this area and on Lesvos Island (N. Aegean Sea, Greece).

In the monograph of Guéorguiev (1977) and in some of his earlier papers the origin of the troglobitic terrestrial isopods of the Balkans has been addressed. Many genera have been considered as having a Paleoaegeidian and Nordaegeidean origin, the genera *Balkanoniscus, Beroniscus* and *Bureschia* were considered as of Mesoaegeidian and *Cordioniscus* was ranged among the most ancient Gondwanian relicts in the cave fauna of the Balkans.

Meanwhile many new data have been published. The analysis of Guéorguiev has been updated and completed in the monographs on Bulgaria by Beron (1915) and on Greece by Beron (2016). A remarqable finding was the many new species of *Cordioniscus* in the caves of Bulgaria and Greece.

The fauna of Oniscidea of the neibouring territories

In Northern (Romanian) Dobrudja 41 sp. of Oniscidea have been recorded (Giurginca and Ćurčić 2003) in 10 families. The conclusion of these authors is that "..we may emphasize two main features of the Oniscidea from Dobrudja: a high degree of endemicity resulting from the existence of an Euxinic glacial subrefugium and also the preponderance of the Mediterranean, Balkan-Central European, East-European and Holarctic species". A remarkable finding in Dobrudja was a member of the genus *Kithironiscus*, which "..marks an isolated northern point in the typically Gondwanian spreading of the Scleropactidae family". The Oniscidea in Bulgarian Dobrudja are much less well known and some of the interesting genera like *Kithironiscus* or *Caucasonethes* could be expected also from Bulgaria.

The Greek fauna of Oniscidea has been analysed by Schmalfuss (1979), Sfenthourakis (2013) and Alexiou and Sfenthourakis (2013), after many papers of Strouhal, Vandel, Schmalfuss, Andreev and others. I myself spent many years collecting Isopoda in Greek caves.

The checklist of Alexiou and Sfenthourakis (2013) contains data on 238 species of 47 genera and 19 families. Again, many species and some peculiar findings (*Kithironiscus*) are from caves. The presence of the mainly South American family Scleropactidae is remarkable. Seven genera are Greek (and Balkanic) endemics: *Acteoniscus* Vandel, *Alistratia* Andreev, *Paxodillium* Schmalfuss, *Trichodillidium* Schmalfuss, *Xeroporcellio* Strouhal, *Thrakosphaera* Schmalfuss, and *Rodoniscus* Arcangeli, as well as 161 species. Best represented are the families Armadillidiidae (88 sp.), Trichoniscidae (38), Porcellionidae (26), and Trachelipodidae (20). Remarkable are the 13 species of *Cordioniscus* Graeve (Styloniscidae), a genus

distributed in the countries of Gondwanian origin, and in Mediterranean (Vandel, 1968, Guéorguiev, 1977). The cause of this distribution is unclear (Schmalfuss & Erhard, 1998). All of them are troglobitic and endemic to Greece. Many of them are living in Southern Greece, Crete or the Dodecanese, whose fauna is very different from that of Bulgaria.

Regarding the Oniscidea of northern Greece, immediately bordering Bulgaria (the territory East of Struma, or Strymon River and the islands Thassos and Samotraki), according to the checklist of Alexiou and Sfenthourakis (2013) from this area are known at least 40 species. Some (mainly cave species) are endemic: *Cordioniscus graevei* (cave of Alistrati), *C. vandeli* (caves near Zygos), *Alistratia beroni* (cave of Alistrati, endemic genus), *Alpioniscus thracicus* (cave of Maronia), *Porcellium collicola* (Greek Makedonia, Thrace), *Thracosphaera schawalleri* (Thrace, endemic genus), *Armadillidium jerrentrupi* (Nestos), *A. pangaionum* (Pangaion), *A. peraccae* (Thassos island), *A. petralonense* (from Thessaloniki to Petralona), *A. phalacronum* (Phalacron, Rhodopes), *A. tuberculatum* (Kavala). Particularly interesting is the endemic genus *Thrakosphaera* (Tendosphaeridae) and the species of *Alpioniscus*, which could be expected also from Bulgaria. Other species are widespread, littoral or halophilic, or riparian (*Ligia, Ligidium, Tylos, Stenoniscus*).

Some species are also present in Bulgaria (*Monocyphoniscus bulgaricus, Trachelipus squamuliger, Trichoniscus rhodopiensis* and some widespread or myrmecophilous species).

On the map in the paper of Sfenthourakis & Hornung (2018) we see that 132 species are known from continental Greece, 24 from Rep. N. Macedonia, 67 from Bulgaria, 49 from European Turkey, 25 from Albania, 45 from Montenegro, 44 from Serbia (Kosovo included), 65 from Bosnia and Herzegovina, 140 from continental Croatia, and 67 from Slovenia.

The fauna of Rep. North Macedonia contains endemic genera like *Macedonethes* Buturović. It has been studied mostly by Buturović (1954, 1955a, 1955b), who described *Vardaroniscus* (= *Cyphoniscellus*) *tetraceratus, Macedoniscus* (= *Alpioniscus*) *vardarensis, Alpioniscus slatinensis, A. karamani*, and others. Karaman (1961) recorded other Oniscidea from North Macedonia. He recorded (Karaman, 1966) also "*Tendosphaera verrucosa*" near Skopje, but Schmalfuss rations that this is certainly a species of *Tendosphaera*, but can neither be the *verrucosa* nor *graeca*"[these are the only known species of *Tendosphaera*]. The family is not yet known from Bulgaria, but most probably occurs there. I. Karaman & M. Horvatović (2008) described the new (endemic) genus and species *Mladenoniscus belavodae* from the cave Bela Voda near Demir Kapija.

Oniscidea of Serbia have been explored by Buturović (1960), who described in 1970 – 1977 several more species (including some near the border with Bulgaria) – *Hyloniscus stankovici, H. kossovensis, Macedoniscus* (now *Alpioniscus*) *metohicus, Microtitanethes licodrensis, Trichoniscus bogovinae, T. serbicus, T. buturovici, T. naissensis, T. serboorientalis, T. bononiensis timocensis, T. bononiensis sotirovi, T. pancici, T. licodrensis*. Pljakić (1970) also reported some Oniscidea (Ligiidae, Mesoniscidae,Trichoniscidae).

Regarding Eastern (Turkish) Thrace Verhoeff (1941) published several species from the cave Barut hane near Yarim Burgaz and some others from other Thracian places.

Isopoda Oniscidea expected from Bulgaria

On the Balkan Peninsula (the Alpine part of Slovenia and the Dodecanese excepted) 20 families of Isopoda Oniscidea are known, in ca.80 genera. The Slovenian genera like *Moserius* and *Calconiscellus* are rather part of the Italian or Apine fauna. Almost half of the genera belong to the family Trichoniscidae, 32 genera are endemic for the Peninsula (including the islands). Most of the endemics are troglobites.

The following three families, known from the Balkans, but not yet found in Bulgaria.

Mesoniscidae – *Mesoniscus graniger* (Friv.) is known from Serbia and Romania.

Scleropactidae – the (relict?) genus *Kithironiscus* Schmallfuss, 1995 of this mostly Neotropical family is known from Kithira Island (S. Greece) and from Northern Dobrudja.

Tendosphaeridae – the genus *Thrakosphaera* Schmallfuss, 1998 is endemic for Thrace (the Greek province Thraki, not far from the Bulgarian border).

Several genera of other families (*Leptotrichus* Budde-Lund and others) could also be found in Bulgaria, as well as new species, mostly from caves. Several more species of *Armadillidium* Brandt and *Alpioniscus* Racovitza are also to be expected from Bulgaria.

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