

Terrestrial cave invertebrates of the Vrachanska Planina Mountains

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Abstract: The modern biospeleological research in Bulgaria started in 1921 in the Ledenika Cave. From 65 caves of “Vrachanski Balkan” Nature Park and its surroundings have been recorded a total of 218 species of terrestrial invertebrates, including 32 species of troglobionts, most of them endemic to Vrachanska Planina Mts. (including the caves near Lakatnik): Isopoda Oniscoidea – 4, Chilopoda – 1, Diplopoda – 5, Opiliones – 2, Pseudoscorpiones – 3, Araneae – 3, Collembola – 2, Diplura – 2, Coleoptera, Carabidae – 7, Coleoptera, Leiodidae – 3. Troglobites are known from 51 caves, the richest being the caves near Lakatnik (Temnata dupka – 10, Zidanka – 7, Razhishkata dupka – 5, Svinskata dupka – 6, Kozarskata peshtera – 5), near Vratsa (Ledenika – 11, Barkite 8 – 5, Belyar – 6), Toshova dupka near Glavatsi – 6 and others.

Key words: Vrachanska Planina Mts., cave fauna, terrestrial invertebrates, Bulgaria.

Introduction

Vrachanska Planina Mts. (most of it included in the “Vrachanski Balkan” Nature Park) is among the richest areas of cave fauna. From the Ledenika Cave and the caves near Gara Lakatnik village started the modern biospeleological research in Bulgaria. Subject of the present paper is the fauna of the Park, and the surrounding areas (caves near Lilyache, Chiren, Gabare, Drashan, Cherkaski, Dolna Beshovitsa and further to Kunino and Karlukovo) are also rich in fauna and should be taken into attention to understand the distribution of the cave animals of Vrachanski Balkan. The rich fauna of the caves near Lakatnik is also connected with the fauna of caves more to the south (near Bov, Tserovo, Iskrets, Breze, Zimevitsa, etc.).

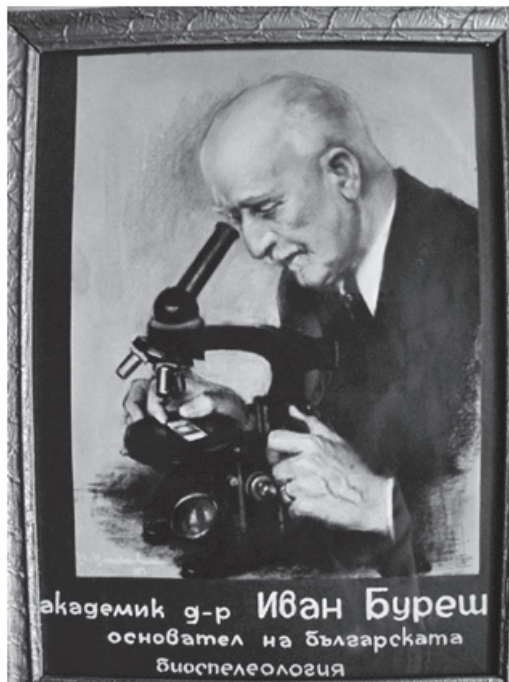
The region under study (the Park “Vrachanski Balkan” and its nearest places) includes Vratsa (SW of the town), Mezdra and the villages Lakatnik, Druzhevo, Milanovo, Zgorigrad, Glavaci, Dolno and Gorno Ozirovo, Lyutadzhik, Pavolche, Cherepish, Moravitsa, Gorna and Dolna Bela Rechka, Opletnya, Chelopek, Bistrets, Eliseyna.

Outline of the history of biospeleological studies on Bulgarian cave animals

The curiosity of Bulgarian zoologists for studying cave animals was aroused by a geologist. In 1922 V. Arnaudov indicated to Dr Iv. Buresch the existence of strange yellowish insects in the cave Ledenika near Vratsa. The experienced Director of the Royal Museum of Natural History in Sofia immediately realized how important was this observation. Together with his fellow entomologists from the Museum Dr Buresch undertook series of visits in the caves near Vratsa and in Iskâr Gorge. In several years (1923 -1926) tens of troglobites

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of different groups have been discovered and described. Prominent foreign specialists visited Bulgaria or identified the material collected (to mention K. Verhoeff, Ed. Knirsch, Ed. Handschin, V. Redikorzev, A. Wagner, L. Fage, C.Fr. Roewer). Their publications increased notably the knowledge on groups like Isopoda, Myriapoda, Pseudoscorpiones, Opiliones, Collembola, Coleoptera and others in Bulgaria. Many visits of Dr Buresch and his associates in caves rose the number of organisms known from them by 1927 to 44, among which were some remarkable troglobites. A general list of this fauna was presented by Dr Buresch in September 1927 to the International Zoological Congress in Budapest (published in 1929). Meanwhile, Dr Buresch published two important papers on the cave fauna of Bulgaria (in 1924 and 1926). Nenko Radev started publishing a Catalogue of Bulgarian caves, of which also two parts were published (in 1926 and 1928). On 18 March 1929 the Bulgarian Speleological Society was founded. New visits to caves followed and a series of new publications contributed to the study of spiders (P. Drensky, 1931), Diptera (L. Czerny, 1930), Thysanura (F. Silvestri, 1931, 1942), Coleoptera (Iv. Buresch, 1925, R. Jeannel, 1924 – 1930, K. Mandl, 1942), Pseudoscorpions (J. Hadzi, 1940), Oligochaeta (L. Černosvitov, 1937, 1939), Nycteribiidae (Z. Karaman, 1939), Crustacea (W. Klie, 1936), Isopoda (H. Strouhal, 1939), Gastropoda (H. Wagner, 1934), Isopoda, Diplopoda, Chilopoda (Verhoeff, up to 1937) and others. A third general paper on Bulgarian Biospeleology was published by Dr Buresch in 1936. Most of the material originated from the caves of Vrachanska Planina Mts and Lakatnik.



After the World War II again Dr Buresch organized two “caving brigades” within Bulgarian Academy of Sciences. They studied some caves in Northwest Bulgaria and collected many new cave animals, arranged in the collection “Fauna cavernicola bulgarica” in the Institute of Zoology in Sofia. Part of this material was identified by J. Kratochvil (Opiliones, 1951, 1958a, 1958b), A. Angelov (Gastropoda, 1959, 1960), C. Attems (Myriapoda, 1951, 1959), Iv. Buresch & V. Gueorguiev (*Stenasellus*, 1962), C. Fr. Roewer (Opiliones, 1951), Z. Karaman (Coleoptera, 1958), E. Pretner (Coleoptera, 1958), F. Miller (Araneae, 1958), J. Lang (Diplopoda, 1958), and others.

These papers concern, together with the older material of Dr Buresch and his associates, some new animals (like *Paralola buresi* and *Tranteeva paradoxa*) collected in the 50-es by Petar Tranteev and the group of young Biospeleologists formed around him (V. Guéorguiev, P. Beron, V. Beshkov, T. Michev, M. Kwartirnikov, A. Popov, St. Andreev, Hr. Delchev).

After the resurrection of the organized caving in Bulgaria since 1958 the Caving Commission at Bulgarian Tourist’s Union formed many caving clubs and a much more intensive research in caves took place everywhere in the country, even abroad. Considerable new collections have been accumulated and studied by the new generation of Bulgarian and some foreign specialists: Protozoa (D. Tashev, V. Golemansky, since 1961), Hirudinea (A. Angelov), Mollusca (A. Angelov, A. Riedel, esp. Zonitidae, since 1955), Isopoda (A. Vandel, St. Andreev, since 1970), Chilopoda (J.-M. Demange, J. Gulička, Z. Matic and V. Golemansky), Diplopoda (K. Strasser, from 1960 to 1975), Opiliones (V. Šilhavy, V. Starega), Araneae (Hr. Delchev, since 1967), Orthoptera (A. Popov), Collembola (Rusek, M.M. da Gama), Diplura (Rusek), Homoptera Aphidodea (D. Tashev), Coleoptera (V. Guéorguiev, from 1959 to 1992; Z. Karaman, L. Genest, L. Zerche), Trichoptera (K. Kumanski), Diptera and Siphonaptera parasites of bats (W. Skuratowicz, K. Hůrka), Diptera (V. Beshovski). Have been started more specialized studies on the nervous system and ecology of *Pheggomisetes* and other cave beetles (M. Kwartirnikov).

Some visits or publications by foreign cave biologists also contributed to better understanding of this fauna (H. Coiffait, J.-M. Thibaud, D. Dancau, L. Botosaneanu, V. Decu, A. Riedel, L. Genest). Most data on the cave fauna of Bulgaria, however, were collected after 1960 by Bulgarian scientists. The latest bibliography of Bulgarian cave fauna (Beron, 1994) contains 409 titles of which 230 are due entirely or partly to Bulgarians.

The numerous data obtained have been generalized by Guéorguiev & Beron (1962), than by Beron & Guéorguiev (1967), Beron (1973, 1994) and finally by Beron (2015), where a complete list of 866 animal species from 813 Bulgarian caves was made. Some other general outlines of Bulgarian cave fauna are due to Guéorguiev (1966, etc.) and Beron (2005, 2006, 2007). But since the beginning of the 90 – ties considerable “new wave” of Biospeleologists marked another leap forward in the knowledge on the cave and underground fauna of Bulgaria. Several younger researchers (P. Stoev, B. Petrov, S. Beshkov, T. Ivanova, I. Pandurski, D. Georgiev) carried further the efforts of the older workers. Meanwhile, part of the explorers of Bulgarian cave animals died (P. Tranteev in 1979, Iv. Buresch in 1980, V. Guéorguiev in 1994), or retired (V. Beshkov in 1995, St. Andreev in 2003, Hr. Deltshv and P. Beron in 2010). The newer specialists work mostly in the National Museum of Nature History, Bulgarian Academy of Sciences. Already some groups are in study by them (Myriapoda P. Stoev, Pseudoscorpiones – B. Petrov, Copepoda – Iv. Pandurski, Coleoptera – B. Gueorguiev, R. Bekchiev, Lepidoptera – St. Beshkov).

Karstic Region of Stara Planina (the Predbalkan and the chain of Stara Planina) is subdivided into 19 districts. The karst of this Region covers 4980 km², or 19.2 % of its total area (Popov, 1970b). This Region is the richest on caves in Bulgaria. There are 19 of the 53 Bulgarian pot holes, deeper than 100 m, and 46 of the 62 Bulgarian caves, longer than 1000 m. In all parts of the Regions there are big caves and pot holes.

One classic karst area and among the richest in Bulgaria is at the Vratsa District. In its thick limestone from Jurassic and Cretaceous have been discovered more than 500 caves and pot holes. On the higher parts of Vrachanska Planina have been explored the pot holes Barkite 14 (- 356 m denivelation, 2600 m long), Belyar (- 282 m deniv., 2560 m long), Barkite 18 (- 178 m), Pukoya near Pavolche Village (- 178 m), Yavorets (- 147 m) and Panchovi Gramadi (- 104 m) near Zverino and Haydushkata near Bistrets (- 108 m). The water caves near Chiren (Ponora, 3172 m long; Mladenovata propast, 1732 m long) are among the favourites to the cavers. Other caves over 500 m long are Toshova dupka near Stoyanovo (1302 m), Mizhishnitsa (885 m), Sokolskata dupka near Lyutadjik (815 m), Gardyuva dupka near Zgorigrad (510 m). The longest of the 130 small caves near Cherepish is Studenata dupka (623 m).

The caves near Lakatnik – the “cradle” of the cavers from Sofia – also belong to the Vratsa Region. Here we find Temnata dupka (4500 m), Kozarskata peshtera (709 m), Razhishkata dupka (316 m) and Svinskata dupka (300 m).

List of terrestrial invertebrates, known from the caves of described area

Protozoa

According to Golemansky (1983) among the protozoans, hitherto found in the Bulgarian caves, there are two groups deserving more special attention. They are the epibiontic infusorians living on the stygobites from the genera *Niphargus*, *Protelsonia*, *Sphaeromides*, etc. and the Gregarinida, parasites in the intestine of the Myriapoda and troglobite insects. All these groups are incompletely known in Bulgaria and elsewhere.

Ciliata

Peritricha

Family Vorticellidae

***Vorticella* sp.**

Temnata dupka (Sf 30) – Tashev & Golemanski (1961: 8). Epibionte.

Suctoria

Family Acinesidae

***Tokophrya* sp.**

Temnata dupka (Sf 30) – Tashev & Golemanski (1961: 8). Epibionte.

Sporozoa

Gregarinida

Family Stylocephalidae

***Lepismatophila plusiocampae* Tashev et Golemansky, 1973**

Endoparasite in *Plusiocampa bureschi*.

Family Stenophoridae

***Stenophora typhloiuli* Golemansky et Taschev, 1973**

Endoparasite in *Typhloiulus bureschi*.

***Stenophora beroni* Golemansky, 1973**

Endoparasite in *Balkanopetalum armatum*.

***Stenophora bulgarosomae* Golemansky, 1973**

Endoparasite in *Bulgarosoma bureschi*.

Nemathelminthes

Nematoda

Dorylaimida

Family Neodiplogasteridae

***Fictor fictor* (Bastian, 1965)**

Svinskata dupka (Sf 33) - (New data, I. Iliev det.).

Family Cephalobidae

***Cephalobius persegnis* Bastian, 1965**

Svinskata dupka (Sf 33) - (New data, I. Iliev det.).

***Eucephalobius mucronatus* (Kozłowska et Wasilewska, 1963)**

Svinskata dupka (Sf 33) - (New data, I. Iliev det.).

***Acrobeloides* sp.**

Svinskata dupka (Sf 33) - (New data, I. Iliev det.).

***Chiloplacus* sp.**

Svinskata dupka (Sf 33) - (New data, I. Iliev det.).

Family Hoplolaimidae

***Helicotylenchus vulgaris* Yuen, 1964**

Svinskata dupka (Sf 33) - (New data, I. Iliev det.).

Family Plectidae

***Plectus* sp.**

Svinskata dupka (Sf 33) - (New data, I. Iliev det.).

Annelida

Oligochaeta

Opisthophora

Family Lumbricidae

***Allolobophora biserialis* Černosvitov, 1937**

Ledenika (Vr 17), Medenik (Vr 18) – Černosvitov (1937: 85). Troglonexene.

***Octolasion lacteum* Oerley, 1881**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962). Troglophile.

***Dendrobaena rubida* (Savigny, 1826)**

(= *D. subrubicunda*, *Bimastus tenius* - sensu Guéorguiev & Beron, 1962)

Široki valog (Sf 58) - Beron & Guéorguiev (1967) Troglonexene.

Mollusca

Most of the molluscs, regularly found in Bulgarian caves, are gastropods belonging

to the families Zonitidae and Hydrobiidae (Riedel, 1975; Angelov, 2000). The predominant terrestrial species in the Bulgarian caves is the troglophile *Oxychilus glaber striarius*.

Gastropoda

Stylommatophora

Family Zonitidae

***Oxychilus (Morlina) glaber striarius* (Westerlund, 1881)**

Studenata dupka (Vr 3) – Beron (1972). Troglophile.

***Oxychilus (Morlina) glaber* Rossmassler, 1835**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962). Troglophile.

***Oxychilus (Riedelius) depressus* (Sterki, 1889)**

Ledenishka yama (Vr 35) – Beron (1972). Troglaxene or troglophile.

***Vitrea diaphana* (Studer, 1820)**

Ledenika (Vr 17) – Beron & Guéorguiev (1967) – Beron (1972). Troglaxene.

***Daudebardia* sp.**

Ledenika (Vr 17) - Guéorguiev & Beron (1962).

Family Limacidae

***Lytopenelte (Liolytopenelte) bureschi* (H. Wagner, 1934)**

(= *Agriolimax b.*)

Medenik (Vr 18) – Wagner (1934: 55). Troglaxene.

Family Milacidae

***Milax (M.) kusceri* H. Wagner, 1931**

Temnata dupka (Sf 30) – Urbanski & Wiktor (1967: 86). Troglaxene.

Arthropoda

Crustacea

Isopoda

Andreev (1983) reviewed the distribution of the cave Oniscoidea in Bulgaria. Details on this distribution contain also the papers of Andreev (2000, 2002), Guéorguiev (1977), Beron (1978) and Beron et al. (2011). Isopoda Oniscoidea are known from 185 Bulgarian caves. From 24 genera and 49 species (including 26 troglobites) listed further, 7 genera (*Balkanoniscus*, *Rhodopioniscus*, *Bureschia*, *Bulgaronethes*, *Bulgaroniscus*, *Vandeloniscellus*, *Tricyphoniscus*, all belonging to Trichoniscidae) and 31 species are Bulgarian endemics. Zoogeographically and from the point of view of cave evolution the Isopoda terrestria are among the most important and interesting groups in Bulgarian cave fauna. From 13 families of Isopoda Oniscoidea, known in Bulgaria, only Buddelundiellidae, Tylidae and Stenoniscidae do not contain cave species. With 32 species (including 23 of the 25 troglobites), Trichoniscidae is the family by far the most important among Bulgarian cave Isopoda. The only other troglobites (*Cordioniscus bulgaricus* and *C. schmalzfussi*) belong to the family Stytoniscidae, but they are not known in Vratza area.

Oniscidea

Family Trichoniscidae

***Hyloniscus riparius* (C.L. Koch, 1838)**

Razhishka yama (Sf 55) - Guéorguiev & Beron (1962); Svinskata dupka (Sf 33),

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Ledenika (Vr 17) - Beron & Guéorguiev (1967). Troglaxene.

***Trichoniscus anophthalmus* Vandel, 1965**

Studenata dupka (Vr 3), Ezeroto (Vr 4) – Vandel (1965: 257); Toshova dupka (Vr 42) – Beron (1972). **Troglobite.**

***Trichoniscus bureschi* Verhoeff, 1926**

Zidanka (Sf 29), Temnata dupka (Sf 30), Svinskata dupka (Sf 33), Golemata Vrazha dupka (Sf 35) – Beron & Guéorguiev (1967). Troglophile.

***Bureschia bulgarica* Verhoeff, 1926**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962); Belyar (Vr 53) – Andreev (1972: 178). **Troglobite.**

***Vandeloniscellus bulgaricus* (Vandel, 1967)**

(= *Cyphoniscellus b.*)

Toshova dupka (= Matnitsa) (Vr 42) – Vandel (1967: 337). Troglobite.

***Tricyphoniscus bureschi* Verhoeff, 1936**

Ledenika (Vr 17) – Andreev (2002: 67 - 68). Troglobite.

Family Trachelipidae

***Trachelipus balticus* (Verhoeff, 1907)**

Medenik (Vr 18) - Guéorguiev & Beron (1962). Troglaxene.

***Trachelipus squamuliger* (Verhoeff, 1907) (= *Trachelipus absoloni* (Strouhal, 1939)**

Razhishka yama (Sf 55) - Guéorguiev & Beron (1962). Troglophile.

***Protracheoniscus ubliensis* (Verhoeff, 1901)**

Ledenika (Vr 17) - Beron & Guéorguiev (1967). Troglaxene.

Family Porcellionidae

***Porcellium balkanicum* Verhoeff, 1936**

Ledenika (Vr 17) – Verhoeff (1936: 11). Troglophile.

Arachnida

Among the 15 recent orders of Arachnida 10 are known in Bulgaria. Nine (all except Solifugi) have been found in caves. The scorpions do not live in the deeper part of the Bulgarian caves.

Scorpiones

Family Euscorpiidae

***Euscorpius (E.) deltshevi* Fet, Graham, Webber et Blagoev, 2014**

Tchernija izvor (Vr 91) – Fet et al. (2014: 89 – 90).

***Euscorpius* sp.**

Temnata dupka (Sf 30) – Buresch, Tranteev & Aleksandrov (1949: 9); Razhishkata peshtera (Sf 32) - Guéorguiev & Beron (1962)(all sub “*carpathicus* (Linnaeus, 1767”).

Troglaxenes. According to the recent data of V. Fet, *Euscorpius carpathicus* lives only in Romania. The published records of this species in Bulgaria should be referred to other species of *Euscorpius*.

Opiliones

The first cave opilions in Bulgaria have been collected by Dr. Buresch and his team (including from Vrachanska Planina) and published by Roewer (1926). The monograph

of Starega (1976) assessed the number of Bulgarian harvestmens at 44 species (40 + *Platybunus bucephalus* + *Cyphophthalmus* [*Tranteeva*] *paradoxus* + 2 species of genus *Siro*) and two subspecies. Up to now 22 species (2 out of 3 *Cyphophthalmi*, one of *Laniatores*, 9 of 17 *Dyspnoi* and 10 of 24 *Eupnoi*) have been recorded from caves. The material collected in Bulgarian caves and published after the monograph of Starega (1976) by Jubertthie (1991), Beron & Mitov (1996) and Mitov (2003) does not change our ideas about the cave representatives of the group. Meanwhile, several papers of Mitov completed the number of Bulgarian Opilions to 63 species. This number includes 5 troglobites: *Tranteeva paradoxa*, *Siro beschkovi*, *Paralola buresi*, *Paranemastoma beroni* and *Paranemastoma bureschi*. The most widespread troglophile in the Bulgarian caves is *Paranemastoma radewi* (sensu Starega, 1976), known from 66 caves. All five troglobite harvestmen are endemic to the actual Bulgarian territory, but *Paranemastoma bureschi* will certainly be found in the caves of the “Western confines” (part of Western Stara Planina, now in Serbia) and *P. beroni* – in the Greek part (Orvilos) of Slavyanka Mt. *Paranemastoma radewi* is known also from Bosnia (Hadži, 1973), and from Northern Greece. The information obtained in the years after 1972, has been published by Beron & Mitov (1996), by Mitov (2004, 2011) and by Beron & Mitov (2011).

Laniatores

Family Phalangodidae

***Paralola buresi* Kratochvil, 1951**

Temnata dupka (Sf 30) – Kratochvil (1958: 382); Zidankata (Sf 29), Svinskata dupka (Sf 33), Kozarskata peshtera (Sf 34) - Beron & Guéorguiev (1967). Troglobite.

Palpatores

Family Troglulidae

***Trogulus tricarinatus* (Linnaeus, 1758)**

Zmeyova dupka III (Vr 33) - Beron & Guéorguiev (1967); Golemata yama (Vr 23) – Starega (1976: 299). Troglaxene.

Family Nemastomatidae

***Pyza bosnica* (Roewer, 1919)**

(= *Nemastoma bosnicum orientale* Kratochvil, 1958)

Zmeyova dupka III (Vr 33) - Beron & Guéorguiev (1967). Troglaxene.

***Paranemastoma* (*P.*) *radewi* (Roewer, 1926)**

(= *Nemastoma radewi* Roewer = *N. (Dromedostoma) paspalevi* Kratochvil = *N. (D.) markovi* Kratochvil = *N. (D.) atanasovi balcanica* Kratochvil – see Starega, 1976)

Radyova propast (Sf 59), Reznyovete (Vr 16), Golemata Mecha dupka (Vr 19), Zmeyova dupka (Vr 25), Garvanets (Vr 31) - Beron & Guéorguiev (1967); cave near Chavkite, Malata Yama (Vr 24), Toshova dupka (Kalna Matnitsa) (Vr 42), Bezimenna (Vr 76) – Starega (1976: 300); Peshtereto (Sf 27), Temnata dupka (Sf 30), Propast 8 (Vr 50) – Beron & Mitov (1996: 18-19). Troglophile.

***Paranemastoma* (*Buresiolla*) *bureschi* (Roewer, 1926)**

Temnata dupka (Sf 30), Ledenika (Vr 17), Medenik (Vr 18) – Roewer (1926: 301), Zidanka (Sf 29) - Guéorguiev & Beron (1962); Yavoretskata peshtera (Sf 25), Sokolskata dupka (Vr 52) – Beron (1994); Ledenishka yama (Vr 35), Malkata Mecha dupka (Vr 27), Haydushka dupka (Vr 83) – Beron & Mitov (1996: 20); Belyar (Vr 53) – Mitov (2011: 303). Troglobite.

Family Phalangiidae***Leiobunum rumelicum* Šilhavý, 1965**

Reznyovete (Vr 16), Ledenika (Vr 17) – Beron (1994). Regular troglaxene.

***Lacinius horridus* (Panzer, 1794)**

(= *L. gallipoliensis* Roewer, 1923 = *L. dentiger* sensu Beron et Guéorguiev, 1967 - det. incorr.)

Medenik (Vr 18) - Guéorguiev & Beron (1962). Troglaxene.

***Phalangium opilio* Linnaeus, 1758**

Medenik (Vr 18) - Guéorguiev & Beron (1962). Troglaxene.

***Zachaeus crista* (Brullé, 1832)**

Medenik (Vr 18) - Guéorguiev & Beron (1962); Golemata yama (Vr 23) – Beron (1994). Troglaxene.

***Egaenus convexus* (C.L. Koch, 1835)**

Golemata yama (Vr 23) - Beron & Guéorguiev (1967). Troglaxene.

Pseudoscorpiones

From ten families and 59 species of Pseudoscorpions in Bulgaria two families (Chthoniidae and Neobisiidae) and 16 species are known to inhabit caves (including 7 troglobites). This number is by no means definitive and will certainly increase after the identification of the extensive material collected by us.

Family Chthoniidae***Chthonius* (*Chthonius*) sp.****Family Neobisiidae*****Neobisium* (*Heoblothrus*) *beroni* Beier, 1963**

Svinskata dupka (Sf 33) – Beier (1963: 133); Kozarskata peshtera (Sf 34), P. Beron leg. et det.; B. Petrov leg. et det. Troglobite.

***Balkanoroncus hadzii* Harvey, 1990**

(= *Roncus bureschi* Hadzi, 1940)

Razhishka peshtera (Sf 32) – Hadzi (1940: 34); Harvey (1990: 331). Troglobite.

***Roncus lubricus* L. Koch, 1873**

Yavoretskata peshtera (Sf 25) - Guéorguiev & Beron (1962). Troglophile.

***Roncus mahnerti* Ćurčić et Beron, 1981**

Vodnata dupka (Vr 74) – Ćurčić & Beron (1981: 70). Troglobite.

Araneae

Recently Deltshv, Lazarov & Petrov (2003), Deltshv & Petrov (2008) and Deltshv et al. (2011) actualized the number of the cave spiders in Bulgaria to 99 (about 10% of the total number of spider species of the country. However, the overall picture did not change too much and the number of the troglobitic spiders remained feeble. From the caves of Vrachanski Balkan and Lakatnik have been recorded 21 sp. of spiders, incl. three (conditional) troglobites: *Protoleptoneta bulgarica*, *Centromerus bulgarianus* and *Porrhomma convexum*.

Araneomorpha**Family Pholcidae*****Hoplopholcus forskali* (Thorell, 1871)**

“Propastta near Cherepish” – Drensky (1931: 12), Vodna dupka (Vr 70) – Beron (1994). Regular troglonexene.

***Pholcus opilionoides* (Schrank, 1781)**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962). Regular troglonexene.

***Pholcus phalangioides* (Fuessli, 1775)**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962). Troglonexene.

Family Nesticidae

***Nesticus cellulanus* (Clerck, 1757)**

Studenata dupka (Vr 3) - Guéorguiev & Beron (1962), Propastta (Vr 80), Zdraveshka dupka (Sf 72) – Beron (1994). Troglophile.

***Nesticus* sp.**

Temnata dupka (Sf 30) – Buresch, Tranteev & Aleksandrov (1949: 9).

Family Araneidae

***Araneus diadematus* Clerck, 1757**

Ledenika (Vr 17) – Delchev (1982: 101). Troglonexene.

Family Leptonetidae

***Protoleptoneta bulgarica* Deltchev, 1972**

Grebenyo (Mt 18), Dupna mogila (Vr 34) – Deltshv (1972: 282) – Beron (1994). Troglobite.

Family Tetragnathidae

***Meta menardi* (Latreille, 1804)**

Vratnik (Vr 65), Yarkovets (Sf 77), Temnata dupka (Sf 84), Ledenika (Vr 17). Troglophile.

***Metellina merianae* (Scopoli, 1763)**

Vratnik (Vr 65), Radyova propast (Sf 59) – Beron (1994); Mechata dupka (Sf 24). Troglophile.

Family Linyphiidae

***Antrohyphantes sofiianus* (Drensky, 1931)**

(syn. *Lepthyphantes* s., syn. *L. tranteevi* Miller, 1958)

Suhata yama (Sf 44), Radyova propast (Sf 59), Zdraveshka dupka (Sf 72) – Beron (1994); Temnata dupka (Sf 84), Svinskata dupka (Sf 33) – Deltchev, Lazarov & Petrov (2003: 14). Troglophile.

***Centromerus bulgarianus* (Drensky, 1931)**

(= *Troglhyphantes balcanica* Drensky, 1931)

Razhishka peshtera (Sf 32) – Drensky (1931: 26); Zidanka (Sf 29) – Beron (1994);

New: Barkite 8 (Vr 49) – 1 ♂, 1 ♀., 31.10.2004, P. Beron leg.(Hr. Delchev det.). Troglobite.

***Centromerus lakatnikensis* (Drensky, 1931)**

Razhishka peshtera (Sf 32) – Drensky (1931: 25). Troglophile.

***Lepthyphantes leprosus* (Ohlert, 1865)**

Temnata dupka (Sf 30), Yavoretskata peshtera (Sf 25), Razhishkata peshtera (Sf 32) – Drensky (1931: 14); Prinčovitsa (Vr 72), Serapinovata peshtera (Vr 5), Ledenika (Vr 17), Toshina (Toshova) dupka (Vr 42). Regular troglonexene.

***Lepthyphantes centromeroides* Kulczynski, 1914**

(= *Troglohyphantes bureschi* Drensky, 1931)

Ledenika (Vr 17) – Drensky (1931: 21). Troglophile.

***Microneta viaria* (Blackwall, 1841)**

Razhishka peshtera (Sf 32) – Drensky (1931: 33). Troglonexene.

***Porrhomma convexum* (Westring, 1861)**

(= *Porrhomma rosenhaueri* L. Koch = *P. errans* (Blackwall) sensu Drensky, 1931 = *P. profundum* Dahl sensu Guéorguiev et Beron, 1962)

Garvanets (Vr 31), Toshova dupka (Vr 42) – Beron (1994). Troglobite.

***Porrhomma* sp.**

Temnata dupka (Sf 30) – Buresch, Tranteev & Aleksandrov (1949: 9).

***Ceratinopsis romana* (Cambridge, 1872)**

Ledenika (Vr 17) – Delchev (1982: 102). Troglonexene.

***Thyreosthenius parasiticus* (Westring, 1851)**

Haydushkata dupka (Sf 69) – Delchev (1982: 102). Troglonexene.

Family Agelenidae

***Inermocoelotes jurinitschi* (Drensky, 1915)**

Haydushkata dupka (Vr 73) – Deltchev (1973b: 41). Troglonexene.

***Tegenaria domestica* (Clerck, 1757)**

(= *Amaurobius erberi* sensu Drensky, 1931)

Temnata dupka (Sf 30), Razhishka peshtera (Sf 32), Studenata dupka (Vr 3) – Drensky (1931: 12); Serapionovata peshtera (Vr 5), Princhovitsa (Vr 72), Sveti Kirik (Vr 75) – Beron (1994). Regular troglonexene.

***Tegenaria silvestris* L. Koch, 1872**

Vratnik (Vr 65) – Beron (1994). Regular troglonexene.

Family Gnaphosidae

***Echemus rhenanus* Bertkau, 1883**

Razhishka peshtera (Sf 32) – Drensky (1931: 36). Troglonexene.

Acaromorpha

Terrestrial mites of Bulgarian caves are not yet well known, especially the free-living forms. There is a provisional ecological subdivision (Beron, 1978: 207) in 4 categories: obligate parasites in all stages (Sarcoptidae, Myobiidae, Psorergatidae, Listrophoroidea, Spinturnicidae, etc. These mites are listed here only for completeness, they are not real cave animals); parasites having some parasitical or commensal stages and some free-living stages (Trombiculidae, Trombidiidae s.l., Ixodidae, Argasidae, some Acaridida and Mesostigmata; such species are listed here); saprophages (Oribatida, some Tyroglyphoides, etc.); predators (most of the free-living Prostigmata - Rhagidiidae, Labidostomidae and others). Many mites live in the guano. In the list below the obligatory parasites are enumerated only for the record, without mentioning the caves in which they live.

Acariformes

Prostigmata

Family Myobiidae

Parasites of Chiroptera, not part of the cave fauna (after Beron, 1973, 1974, 2007).

Pteracarus pipistrellius (Radford, 1938), *P. submedianus* Dusbábek, 1963, *P. minutus*

(Radford, 1940)

Acanthopthirus emarginatus (Dusbábek, 1963), *A. myoti* (Dusbábek, 1963), *A. mystacinalis* (Radford, 1935), *A. pantopus* (Poppe et Trouessart, 1895), *A. etheldredae* Perkins, 1925, *A. klapaleki* (Dusbábek, 1963), *A. bohemicus* Dusbábek, 1963

Neomyobia rollinati (Poppe, 1908), *N. chiropteralis* (Michael, 1884), *N. slovenica* Dusbábek, 1968

Family Trombiculidae

Parasites of Chiroptera; the adults are found on the floor of caves.

***Oudemansidium komareki* (Daniel et Dusbábek, 1959)**

(= *Leptotrombidium* k.)

Razhishka dupka (Sf 32), ex *Pipistrellus pipistrellus* and *Plecotus austriacus* - Kolebinova & Beron (1965: 72).

***Pentagonaspis (Dusbabekia) trajani* (Dusbábek, 1964)**

(= *Neotrombicula trajani*)

Temnata dupka (Sf 30), Razhishkata peshtera (Sf 32), ex *Pipistrellus pipistrellus* and *Plecotus austriacus* - Dusbábek (1964), Kolebinova et Beron (1965: 74).

***Leptotrombidium rassicum* (Oudemans, 1902)**

Razhishka dupka (Sf 32), Temnata dupka (Sf 30) – Dusbábek, 1964: 16.

***Leptotrombidium myoticulum* (Feider, 1968)**

(= *Eltonella (Marcandrea) myoti*)

Razhishka dupka (Sf 32) - Kolebinova & Beron (1965: 78).

***Riedlinia (R.) europaea* Kolebinova et Beron, 1965**

Dupna mogila (Vr 34), ex *Rhinolophus hipposideros* (Kolebinova & Beron, 1965: 77).

***Willmannium bulgaricum* (Dusbábek, 1964)**

Razhishka dupka (Sf 32), ex *Pipistrellus pipistrellus* – Dusbábek (1964); Kolebinova & Beron (1965: 72).

Acaridida

Family Rosensteiniidae

***Chiroptoglyphus bulgaricus* (Dusbábek, 1964)**

Temnata dupka (Sf 30), Razhishkata dupka (Sf 32) - Dusbábek (1964a: 226). Parasite of Chiroptera.

Family Chirodiscidae

Parasites of Chiroptera, not part of the cave fauna (after Beron, 1974, 2007).

Labidocarpus rollinati Trouessart, 1895

Olavidocarpus belsorum belsorum (van Eyndhoven, 1940)

Alavidocarpus megalonyx megalonyx (Trouessart, 1895), *A. calcaratus* Lawrence, 1952, *A. intercalatus* Fain, 1971, *A. minor* (Rollinat et Trouessart, 1897)

Family Sarcoptidae

Parasites of Chiroptera, not part of the cave fauna (after Beron, 1970, 1973, 1974, 2007).

Nycteridocoptes poppei (Oudemans, 1897), *N. eyndhoveni* Fain, 1959, *N. miniopteri* Fain, 1959

Notoedres (N.) plecoti Fain, 1959, *N. (N.) chiropteralis* (Trouessart, 1896)

CAVE INVERTEBRATES

Parasitiformes

Mesostigmata

Gamasina

Family Parasitidae

***Pergamasus* sp.**

Propastta (Vr 27) - Guéorguiev & Beron (1962).

Family Macronyssidae

Parasites of Chiroptera (after Beron, 1968, 2007).

Ichoronyssus scutatus (Kolenati, 1856)

Macronyssus cyclaspis (Oudemans, 1906), *M. ellipticus* (Kolenati, 1856), *M. flavus* (Kolenati, 1856), *M. granulosus* (Kolenati, 1856), *M. uncinatus* (Canestrini, 1885) (= *M. rhinolophi* (Oudemans))

Steatonyssus spinosus Willmann, 1936, *S. periblepharus* Kolenati, 1858

Family Spinturnicidae

Parasites of Chiroptera (after Beron & Kolebinova, 1964; Beron, 1968, 1973, 2007).

Eyndhovenia euryalis (Canestrini, 1884)

Paraperiglischrus rhinolophinus (C.L. Koch, 1841)

Spinturnix mystacina (Kolenati, 1857), *S. myoti* (Kolenati, 1856), *S. emarginata* (Kolenati, 1856), *Spinturnix psi* (Kolenati, 1856), *Spinturnix plecotina* (C.L. Koch, 1839)

Ixodida

Parasites of Chiroptera.

Family Argasidae

***Argas vespertilionis* (Latreille, 1802)**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962); Razhishkata peshtera (Sf 32) - Beron & Guéorguiev (1967). Parasite..

Family Ixodidae

***Ixodes (Eschatocephalus) vespertilionis* C.L. Koch, 1844** – free living males found also in caves.

Temnata dupka (Sf 30), Razhishkata peshtera (Sf 32) - Beron & Guéorguiev (1967). Parasite.

***Ixodes (Pomerantzevella) simplex simplex* Neumann, 1906**

(= *I. pospelovae* Emtschuk, 1955)

Razhishkata peshtera (Sf 32) - Beron & Guéorguiev (1967). Parasite (mainly on *Miniopterus schreibersi*).

Myriapoda

Chilopoda

We know now 44 species of this group, living in Bulgarian caves (out of 105 species of Chilopoda in Bulgaria). The progress is evident when we compare this figure to the 6 species listed in our first Essai (Guéorguiev & Beron, 1962). The ecological categories of Chilopoda are only provisory, as we know very little on the biology of these animals. Among the 6 - 7 “troglobite“ species (all belonging to order Lithobiomorpha, fam. Lithobiidae) two

are of special interest. *Lithobius lakatnicensis*, longtime considered “endemic“ for the caves near Lakatnik, in fact proved to be a species with a distribution amazingly large for a troglobite. Being the only troglobitic *Lithobius* in West Bulgaria and in the Rhodopes, it is “replaced” in Central Stara Planina and in Southeast Bulgaria by other species.

Lithobiomorpha

Family Lithobiidae

***Eupolybothrus transsylvanicus* (Latzel, 1882)**

Zidanka (Sf 29) – Beron (1994); Studenata dupka (Vr 3) – Stoev (2001: 49). Troglophile or regular troglaxene.

***Lithobius (L.) agilis* C.L. Koch, 1862**

Reznyovete (Vr 16) – Stoev (2002: 24). Troglophile.

***Lithobius (L.) lakatnicensis* Verhoeff, 1926**

(syn. *L. gueorguievi* Demange, 1961)

Temnata dupka (Sf 30) – Verhoeff (1926b: 295); Svinskata dupka (Sf 33) – Demange (1961: 179), Zidanka (Sf 29) – Negrea (1965: 96); Grebenyo (Mt 18), Toshova dupka (Vr 42) – Stoev & Ribarov (1995: 93). Troglobite.

***Lithobius (L.) schuleri* Verhoeff, 1925**

(= *L. borisi rylaicus* Verhoeff, 1928, fide Stoev, 2002 = *L. erythrocephalus* et *L. erythrocephalus borisi* sensu Beron, 1994)

Serapionovata peshtera (Vr 5) – Stoev & Ribarov (1995: 92); Stoev (2002: 38). Troglaxene.

***Lithobius (L.) viriatus* Sselivanoff, 1878**

Reznyovete (Vr 16) – Stoev (2001: 43). Regular troglaxene.

***Lithobius (Sigibius) micropodus* (Matic, 1980)**

(= *microps*, nec Meinert, 1868)

Cherniya Izvor (Vr 91) – Stoev (2001: 44). Troglophile.

***Harpolithobius anodus anodus* (Latzel, 1880)**

Temnata dupka (Sf 8), Zhabokreshka yama (Vr 71), Reznyovete (Vr 16) – Stoev (2001: 45-46). Troglophile or regular troglaxene.

Geophilomorpha

Family Linotaeniidae

***Strigamia crassipes* (C.L. Koch, 1835)**

Ledenika (Vr 17) – Matic (1967: 235). Troglaxene.

Family Dignathodontidae

***Henia illyrica* (Meinert, 1870)**

Temnata dupka (Sf 30) – Stoev (2001: 32). Troglaxene.

Scolopendromorpha

Family Cryptopidae

***Cryptops anomalans* Newport, 1844**

Medenik (Vr 18) – Stoev (2001: 33). Troglaxene.

Diplopoda

Thanks mostly to the works of Verhoeff, Strasser, Gulička and Stoev now we know the essential on Bulgarian cave Diplopoda. From 113 species of Diplopoda known in Bulgaria

(Strasser, 1973, 1975, etc.), 60 species have been found in caves.

Very important groups of Bulgarian cave Diplopoda are the order Chordeumatida (Ascospermophora) and the Typhloiulini (*Typhloiulus* and *Serboiulus*). The particularities of their distribution have been analysed in details by Strasser (1969, 1973) and Beron (1978). We should note that among the many *Trachysphaera* from Bulgarian caves only *T. lakatnicensis* is to be considered troglobite.

Glomerida

Family Glomeridae

***Glomeris pustulata* Latreille, 1804**

(*Glomeris pustulata diminuta* Attems = *Glomeris vodnatensis* Verhoeff, 1926, syn., see Mauriès, Golovatch & Stoev, 1997, Zoosystema, Paris, 19: 260).

Temnata dupka (Sf 30), Sedmovratitsa (Sf 36) - Beron & Guéorguiev (1967). Troglaxene.

Family Doderiidae

***Trachysphaera costata* (Waga, 1857)**

Gornata dupka (Sf 60) - Beron & Guéorguiev (1967). Troglophile.

***Trachysphaera lakatnicensis* Tabacaru, 1979**

Svinskata dupka (Sf 33), Zidanka (Sf 29) - Guéorguiev & Beron (1962); Sedmovratitsa (Sf 36) - Beron & Guéorguiev (1967); Svardelo (Sf 26), Kozarskata peshtera (Sf 34) - Beron (1972). Troglobite.

***Trachysphaera* sp.**

Toshova dupka (Vr 42), Chetvartitata dupka (Vr 89) - Stoev (2004: 146).

Polydesmida

Family Polydesmidae

***Polydesmus renschi* Schubart, 1934**

Ledenika (Vr 17) - Beron & Guéorguiev (1967). Troglaxene.

***Polydesmus tridens* Attems, 1951**

"Cave Gornata Rudina near Vratsa"(?) - Attems (1959: 337). Troglophile ?

***Brachydesmus* sp.**

Serapionovata peshtera (Vr 5) - Beron & Guéorguiev (1967).

Family Trichopolydesmidae (Bacillidesmidae)

***Bacillidesmus bulgaricus bulgaricus* Strasser, 1962**

Mladenovata peshtera (Vr 30) - Beron & Guéorguiev (1967). Troglobite.

Family Paradoxosomatidae

***Strongylosoma stigmatosum* (Eichwald, 1830) subsp. *balcanicum* Schubart, 1934**

(= *Str. pallipes balcanicum* Schubart, 1934).

Ledenika (Vr 17) - Beron & Guéorguiev (1967); Malkata peshtera (Vr 92) - Stoev (2004: 149). Troglaxene.

Chordeumatida

Family Anthroleucosomatidae

***Bulgarosoma bureschi* Verhoeff, 1926**

Ledenika (Vr 17) - Verhoeff (1926b: 295); Malkata Mecha dupka (Vr 27) - Botosaneanu,

Decu & Rusu (1964: 420); Nevestina propast (Vr 7), Kitova kukla (Sf 38), Reznyovete (Vr 16) - Beron & Guéorguiev (1967); Belyar (Vr 53) – Beron (1972). Troglobite.

Callipodida

Family Schizopetalidae

***Balkanopetalum armatum* Verhoeff, 1926**

Studenata dupka (Vr 3) – Verhoeff (1926c: 61); Serapionovata peshtera (Vr 5) Beron & Guéorguiev (1967); Shishmanovets (Vr 64) – Beron (1972); Peshtereto (Sf 27) - Troglophile.

Julida

Family Julidae

***Typhloiulus (Typhloiulus) bureschi* Verhoeff, 1926**

(incl. var. *obscurus* Strasser, 1966)

Temnata dupka (Sf 30) – Verhoeff (1926a: 76); Svinskata dupka (Sf 33), Razhishka yama (Sf 55), Zidanka (Sf 29) - Guéorguiev & Beron (1962); Sipo (Vr 29) - Beron & Guéorguiev (1967); Toshova dupka (Vr 42) – Beron (1972: 299, K. Strasser det.); Razhishkata peshtera (Sf 32) – Stoev (2004: 150). Troglobite.

***Typhloiulus (Inversotyphlus) longipes* Strasser, 1973**

Belyar (Vr 53) – Strasser (1973: 434). Troglobite.

***Typhloiulus* sp.**

Labirinta (Vr 93) – Stoev (2004: 150).

***Balkanophoenix borisi* Verhoeff, 1937**

Razhishka peshtera (Sf 32) – Verhoeff (1937: 113). Troglaxene (?).

Insecta s. lato

In the modern classifications some researchers follow the system in which Protura and Collembola form the class Ellipura, the Diplura are a separate class and all other former insects form the class Insecta with infraclasses Thysanura and Pterygota.

Collembola

Among the 165 species of Collembola in Bulgaria (Thibaud, 1995), 53 have been found in caves, and many of them only there. After Massoud & Thibaud (1977)*, it is useless to apply the notion of “troglaxene“ for characterising a spring-tail, taking into account that all Collembola are able to reproduce both in caves and outside them.

*Essai de classification des Collemboles “cavernicoles“ européens. Proc. 6th Intern. Congr. Spel., Acad. Praha, V, p.141-157. If we accept this view point, Collembola will appear as the only group of cave animals having no troglaxenes.

Family Hypogastruridae

***Bonetogastrura cavicola* (Börner, 1901)**

(= *Hypogastrura* c.)

Ledenika (Vr 17), Medenik (Vr 18) - Guéorguiev & Beron (1962), Chavkite (Sf 41) – Thibaud (1995: 22). Hemiedaphic-troglophile.

***Ceratophysella armata* (Nicolet, 1841)**

Chavkite (Sf 41), Kalnata dupka (Vr 40), Toshova dupka (Vr 42) – Beron (1972); Reznyovete (Vr 16) – Beron (1994). Troglophile-guanophile.

Family Onychiuridae***Deuteraphorura ghidinii* (Denis, 1938)**

Temnata dupka (Sf 30) - Beron & Guéorguiev (1967); Mecha dupka (Sf 70) - Beron (1972). Troglophile.

***Allonychiurus sensitivus* (Handschin, 1928)**

Ledenika (Vr 17) - Guéorguiev & Beron (1962). Troglobite.

***Onychiuroides bureschi* (Handschin, 1928)**

Ledenika (Vr 17) - Guéorguiev & Beron (1962). Troglophile.

***Onychiuroides postumicus* (Bonet, 1931)**

Svinskata dupka (Sf 33) - Guéorguiev & Beron (1962), Troglophile.

***Onychiuroides subgranulosus* (Gama, 1964)**

Lednitsata (Vr 47) - Beron (1972). Troglophile.

Family Isotomidae***Heteromurus nitidus* (Templeton, 1835)**

(= *H. n. margaritaria* Wankel, 1860)

Kozarskata peshtera (Sf 24), Zidanka (Sf 29) - Guéorguiev & Beron (1962); Temnata dupka (Sf 30) - Beron & Guéorguiev (1967); Ledenika (Vr 17), Zmeyova dupka (Vr 25) - Thibaud (1995: 24). Troglophile.

***Heteromurus nitidus quadriocellatus* Ksenemann, 1935**

Yavoretskata peshtera (Sf 25) - Beron (1994). Troglophile.

***Orchesella vilosa* (Geoffroy, 1764) (var. *devergens* Handschin)**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962). Troglophile.

***Pseudosinella duodecimocellata* Handschin, 1928**

Temnata dupka (Sf 30), Ledenika (Vr 17) - Handschin (1928: 24); Lednitsata (Vr 47) - Beron (1972); Yavoretskata peshtera (Sf 25) - Beron (1994); Razhishka peshtera (Sf 32) - Thibaud (1995: 25). Troglobite.

***Pseudosinella wahlgreni* Börner, 1907**

Propastta (Vr 27) - Guéorguiev & Beron (1962). Troglophile.

Family Tomoceridae***Tomocerus vulgaris* (Tullberg, 1891)**

Razhishka yama (Sf 55) - Beron & Guéorguiev (1967). Troglophile.

Diplura

The members of Campodeidae (Diplura) are numerous in Bulgarian caves. Part of the material collected was recently published by C. Bareth and B. Condé. It is to note that the troglobite *Plusiocampa bulgarica* is found in the caves of Stara Planina and the Rhodopes - considerable disjunction for a troglobite. The Japygidae are rare in Bulgarian caves.

Family Campodeidae***Campodea (Dicampa) frenata* Silvestri, 1931**

Yavoretskata peshtera (Pz 1) - Guéorguiev & Beron (1962). Troglophile (?).

***Plusiocampa (Stygiocampa) bulgarica* Silvestri, 1931**

Yavoretskata peshtera (Sf 25) - Silvestri (1931: 107). Troglobite.

***Plusiocampa (Stygiocampa) bureschi* Silvestri, 1931**

(= *Plusiocampa rauseri* Rusek, 1965)

Temnata dupka (Sf 30), Razhishkata peshtera (Sf 32) - Silvestri (1931: 103);

Kozarskata peshtera (Sf 34), Svinskata dupka (Sf 33), Prohodnata vrazha dupka (Sf), Zidankata (Sf 29), Pyasachnata dupka (Sf 49), Sedmovratitsa (Sf 36), Propastta (Sf) – Bareth & Condé (2002: 10 -12).

Locus typicus of *Plusiocampa rauseri*: Razhishkata peshtera (Sf 32) - Beron & Guéorguiev (1967). Troglobite.

Insecta

Thysanura

Microcoryphia

Family Machilidae

***Trigoniophthalmus banaticus* Verhoeff, 1910**

Ledenika (Vr 17) - Guéorguiev & Beron (1962). Troglaxene.

Pterygota

Heteroptera

Family Nabidae

***Himacerus myrmecoides* Costa, 1834**

Pyasachnata dupka (Sf 49) - Guéorguiev & Beron (1962). Occasional troglaxene.

Coleoptera

From the 12 families of beetles recorded so far from Bulgarian caves only three contain troglobites (about one third of all Bulgarian troglobites). The most typical are Carabidae (43 sp., 23 troglobitic species). Among them are the genera *Pheggomisetes*, *Rambousekiella* and *Paralovricia* (endemic to Bulgaria) and *Duvalius* (17 cave inhabiting endemic species). Another important group of cavernicolous species are the Leiodidae (Cholevidae), with 29 species in Bulgarian caves, including at least 26 troglobites. This group contains many endemic genera: *Beskovia*, *Beronia*, *Netolitzkya*, *Hexaurus*, *Beroniella*, *Radevia* (=Vratzaniola), *Genestiellina*, *Bureschiana*, *Rhodopiola*, *Bulgariella* (=Tranteeviella), *Gueorguieviella*, *Balkanobius*. Important part of the cave fauna are also the troglaphiles and the guanobites (*Trechus*, *Laemostenus*, *Catops*, *Choleva*, *Nargus*, *Quedius*, *Atheta*, etc.).

Family Carabidae

***Trechus quadristriatus* (Schrank, 1781)**

Princhovitsa (Vr 72) – Beron (1994). Troglaxene - muscicole.

***Duvalius (Paraduvalius) beroni* Guéorguiev, 1971**

Toshova dupka (Vr 42) - Guéorguiev (1971: 161). Troglobite.

***Duvalius (Paraduvalius) papasoffi* Mandl, 1942**

Temnata dupka (Sf 30) – Mandl (1942: 253); Zidanka (Sf 29), Pyasachnata dupka (Sf 59) - Beron & Guéorguiev (1967). Troglobite.

***Duvalius (Paraduvalius) zivkovi* Knirsch, 1925**

Ledenika (Vr 17) – Knirsch (1925: 88); Malkata Mecha dupka (Vr 27) - Beron & Guéorguiev (1967); Barkite 8 (25 godini Akademik) (Mt 49) – Dupré (2000: 166); Malkata Nevestina propast (Vr 43) - Beron & Guéorguiev (1967), sub “*Duvalius (Paraduvalius) zivkovi deltshevi* Guéorguiev, 1965”, cf. Guéorguiev, 2004c: 96). Troglobite.

Duvalius (Paraduvalius) sp.

Zidanka (Sf 29), Pyasachnata dupka (Sf 49) - Guéorguiev & Beron (1962).

***Pheggomisetes buresi buresi* Knirsch, 1923**

Ledenika (Vr 17) – Knirsch (1923: 5); Ledenishka yama (Vr 35), Reznyovete (Vr 16), Malkata Mecha dupka (Vr 27), Golemata Mecha dupka (Vr 19), Nevestina propast (Vr 7), Pesopin Kamak (Vr 36), Zmeyova dupka (Vr 25), Malata yama (Vr 23), Radyova propast (Sf 59), Chavkite (Sf 41) – Guéorguiev (1964: 269-270); Zmeyova dupka II (Vr 32), Kalnata dupka (Vr 40), Malkata Nevestina propast (Vr 43) - Beron & Guéorguiev (1967); Barkite 8 (25 godini Akademik) (Mt 49) – Dupré (2000: 166). **New:** Mizhishnitsa Cave (Vr 97), 01.05.2010; Duglaska (Vr 98), 02.05.2010, P. Beron leg., B. Guéorguiev det. Troglobite.

***Pheggomisetes buresi medenikensis* Knirsch, 1924**

Medenik (Vr 18) – Knirsch (1924: 63). Troglobite.

***Pheggomisetes globiceps georgievi* Z. Karaman, 1958**

Yamata (Sf 40) - Z. Karaman (1958: 224). Troglobite.

***Pheggomisetes globiceps lakatnicensis* Jeannel, 1928**

Temnata dupka (Sf 30) – Jeannel (1928: 224); Zidanka (Sf 29), Svinskata dupka (Sf 33), Radyova propast (Sf 59), Kolkina dupka (Sf 28), Golemata Mecha dupka (Vr 19) - Beron & Guéorguiev (1967). Troglobite.

***Pheggomisetes globiceps stoicevi* Guéorguiev, 1964**

Nevestina propast (Vr 7) - Beron & Guéorguiev (1967). Troglobite.

***Pheggomisetes globiceps mladenovi* Guéorguiev, 1964**

Malkata Mecha dupka (Vr 27) - Guéorguiev (1964: 274); Barkite 8 (25 godini Akademik) (Mt 49) – Dupré (2000: 166). Troglobite.

***Pheggomisetes radevi radevi* Knirsch, 1924**

Ledenika (Vr 17) - Knirsch (1924: 166). Troglobite.

***Pheggomisetes radevi ilcevi* Knirsch, 1924**

Medenik (Vr 18) – Knirsch (1924: 63). Troglobite.

***Pheggomisetes radevi tranteevi* Guéorguiev, 1964**

Suhata yama (Sf 44) - Guéorguiev (1964: 273). Troglobite.

***Rambousekiella ledenikensis* Knirsch, 1925**

Ledenika (Vr 17) - Knirsch (1925: 87); Grebenyo (Mt 18) – Beron (1972). Troglobite.

***Procrustes coriaceus kindermanni* Walt, 1838**

Razhishka yama (Sf 55) - Guéorguiev & Beron (1962). Troglaxene.

Family Dytiscidae

***Rhantus (Rhantus) latitans* Sharp, 1882**

Mladenovata peshtera (Vr 30) - Beron & Guéorguiev (1967). Troglaxene.

Family Staphylinidae

***Conosoma testaceum* Fabricius, 1775**

Golemata dupka (Vr 42) – Beron (1994). Troglaxene.

***Atheta (Atheta) macroptera* Bernhauer, 1913**

Princhovitsa (Vr 72) – Beron (1994). Troglophile-guanobite.

***Atheta (Atheta) macroptera dinarica* Jeannel et Jarrige, 1949**

Zidanka (Sf 29) - Guéorguiev & Beron (1962). Guanobite.

***Atheta (Xenota) spelaea* (Erichson, 1839)**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962). Troglophile.

***Atheta (Megista) graminicola* Gravenhorst, 1805**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962). Troglaxene.

Subfamily Pselaphinae

***Bryaxis (Erychobythus) beroni* Z. Karaman, 1969**

Garvanets (Vr 31) – Z. Karaman (1969: 60); Toshova dupka (Vr 42) – Beron (1972). Regular troglaxene.

Family Endomychidae

***Mycetaea hirta* Marsham, 1802**

Toshova dupka (Vr 42) – Beron (1972). Troglophile.

Family Cryptophagidae

***Micrambe translatus* (Grouvelle, 1916)**

Temnata dupka (Sf 30), Razhishka peshtera (Sf 32) – Beron (1972). Troglophile (?).

***Cryptophagus scutellatus* Newmann, 1834**

Temnata dupka (Sf 30), Razhishka peshtera (Sf 32) – Beron (1972). Troglaxene (lucifuge).

Family Leiodidae (Cholevidae)

Cholevinae

Cholevini

***Catops coracinus* (Kellner, 1846)**

Golemata yama (Vr 23) – Beron (1972). Troglaxene.

***Catops picipes* (Fabricius, 1792)**

Ledenika (Vr 17) – Beron (1972). Troglaxene (?).

***Choleva (Ch.) agilis* (Illiger, 1789)**

Studenata dupka (Vr 3), Ezeroto (Vr 4) - Guéorguiev & Beron (1962); Bulina dupka (Vr 38) – Beron (1972); Kalnata dupka (Vr 40). Subtroglophile.

Leptodirini

***Beskovia bulgarica* Guéorguiev, 1960**

Studenata dupka (Vr 3) - Guéorguiev (1960: 723); Serapionovata peshtera (Vr 5) – Giachino & Guéorguiev (1996: 253). Troglobite.

***Beskovia beroni* Giachino et Guéorguiev, 2008**

Kozarskata peshtera (Sf 34) - Giachino & Guéorguiev (2008: 86). Troglobite.

***Radevia hanusi* Knirsch, 1925 (= *Vratzaniola pandurskii* Dupré, 2000)**

Ledenika (Vr 17) (Knirsch, 1925a: 63); Bezimenna (Vr 86), Zmeyova dupka III (Vr 33), Zmeyova dupka I (Vr 25), Golyamata Mecha dupka (Vr 19), Radyova propast (Sf 59) – Giachino & Guéorguiev (1996: 253); Barkite 8 (25 godini Akademik) (Mt 49), Barkite No 9 (Vr 84) – Dupré (2000: 166, sub “*Vratzaniola pandurskii* Dupré, 2000”). Troglobite.

Hymenoptera

Parasitica

Family Ichneumonidae

***Diphyus quadripunctorius* (Müller, 1776)**

(= *Amblyteles bipunctatus* Rudow, 1888)

Razhishka peshtera (Sf 32) - Guéorguiev & Beron (1962). Regular troglonexene.

***Amblyteles* sp.**

Reznyovete (Vr 16) – Botosaneanu, Decu & Rusu (1964: 420).

The species “*Amblyteles connata*, *A. multifasciata*, *A. subfasciata*“, mentioned by Buresch (1934), remain doubtful.

Siphonaptera

Family Ischnopsyllidae

Ischnopsyllus (Ischnopsyllus) octactenus (Kolenati, 1857)

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962); Razhishka dupka (Suhata peshtera) (Sf 32) – Hürka (1970: 11). Parasite.

Nycteridopsylla (Nycteridopsylla) eusarca Dampf, 1908

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962). Parasite.

Nycteridopsylla (N.) ancyluris johanae Hürka, 1970

Razhishka dupka (Sf 32) - Hürka (1970: 21). Parasite.

Nycteridopsylla (Aneptesopsylla) trigona balcanica Hürka, 1965

Temnata dupka (Sf 30), Razhishka peshtera (Sf 32) – Hürka (1965: 498). Parasite.

Diptera

So far 17 families of Diptera have been recorded from Bulgarian caves (altogether 60 species plus 8 Pupiparae). This group does not contain troglobites, but many representatives of the families Limnobiidae, Mycetophilidae, Dolichopodidae, Phoridae, Heleomyidae, Sphaeroceridae and Drosophilidae form important component of the parietal and guano fauna. The main source of our knowledge on these families in Bulgaria are the papers of Czerny (1930), Burghel-Balacesco (1966), Beshovski (1972) and Langourov (2001, 2011). Some information on flies, identified by other specialists, contain also the papers of Guéorguiev & Beron (1962), Hazelton (1970), Beron (1994) and others. Special group (Pupiparae) consists of the families Nycteribiidae and Streblidae (parasites of bats). They have been studied by Hürka (1958, 1962), Skuratowicz (1970), Novosad et al. (1987).

Nematocera

Family Limoniidae

Limonia nubeculosa (Meigen, 1804)

Reznyovete (Vr 16), Ledenika (Vr 17), Golemata Mecha dupka (Vr 19), Malkata Mecha dupka (Vr 27) - Beron & Guéorguiev (1967). Subtroglophile.

Family Mycetophilidae

Speolepta leptogaster (Winnertz, 1863)

Mladenovata peshtera (Vr 30) - Beron & Guéorguiev (1967). Troglophile.

Mycetophila ornata (Stephens, 1832)

Golemata Mecha dupka (Vr 19) - Beron & Guéorguiev (1967). Troglonexene.

Tarnania fenestralis (Meigen, 1818)

Reznyovete (Vr 16), Ledenika (Vr 17), Golemata Mecha dupka (Vr 19), Malkata Mecha dupka (Vr 27) - Beron & Guéorguiev (1967). Subtroglophile.

Tarnania dziedzickii (Edwards, 1924)

Malkata Mecha dupka (Vr 27) - Beron & Guéorguiev (1967). Subtroglophile.

Exechiopsis (E.) intersecta (Meigen, 1818)

Ledenika (Vr 17) - Beron & Guéorguiev (1967). Subtroglophile.

Exechiopsis (E.) furcata (Lundström, 1911)

Reznyovete (Vr 16) - Beron & Guéorguiev (1967). Subtroglophile.

Exechiopsis (E.) vizzavonensis (Edwards, 1928)

Reznyovete (Vr 16) - Beron & Guéorguiev (1967). Subtroglophile.

Exechiopsis (E.) indecisa (Walkenaer, 1856)

Reznyovete (Vr 16), Malkata Mecha dupka (Vr 27) - Beron & Guéorguiev (1967). Subtroglophile.

Brachycera

Family Stratiomyidae

Actina nitens (Latreille, 1809)

Ledenika (Vr 17) - Beron (1972). Troglaxene.

Family Dolichopodidae

Liancalus virens (Scopoli, 1763)

Temnata dupka (Sf 30), Razhishka peshtera (Sf 32), Peshterata (Sf 10) - Guéorguiev & Beron (1962). Subtroglophile.

Family Phoridae

Triphleba antricola (Schmitz, 1918)

Chavkite (Sf 41), Temnata dupka (Sf 3) - Langourov (2001: 34). Troglaphile.

Triphleba aptina (Schiner, 1853)

Ledenika (Vr 17) - Langourov (2001: 35). Troglaphile.

Megaselia fusca Wood, 1909

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962). Troglaphile-guanophile.

Family Heleomyzidae

Eccoptomera emarginata Loew, 1862

Yavoretskata peshtera (Sf 25), Ledenika (Vr 17), Medenik (Vr 18) - Guéorguiev & Beron (1962); Reznyovete (Vr 16), Golemata Mecha dupka (Vr 19), Malkata Mecha dupka (Vr 27) - Beron & Guéorguiev (1967). Subtroglophile.

Eccoptomera pallescens (Meigen, 1830)

Reznyovete (Vr 16) - Beron & Guéorguiev (1967). Subtroglophile.

Acantholeria cineraria (Loew, 1862)

Zmeyova dupka (Vr 25) - Beron (1972). Troglaxene.

Scoliocentra (Leriola) brachypterna (Loew, 1873)

Temnata dupka (Sf 30) - Beron (1972). Troglaxene.

Heleomyza serrata (Linnaeus, 1758)

(= *Helomyza s.* = *Leria s.*)

Yavoretskata peshtera (Sf 25), Ledenika (Vr 17) - Guéorguiev & Beron (1962); Reznyovete (Vr 16) - Beron & Guéorguiev (1967). Subtroglophile. One of the most typical members of the parietal association. The larvae live in the guano.

Heleomyza captiosa (Gorodkov, 1962)

Yavoretskata peshtera (Sf 25) - Beron (1972). Subtroglophile.

Heteromyza atricornis Meigen, 1830

(= *Helomyza a.* = *Theleida a.*)

Temnata dupka (Sf 30), Medenik (Vr 18) - Guéorguiev & Beron (1962); Ponora (Vr 22)

- Beron & Guéorguiev (1967); Sini Vir (Sf 84) – Beron (1994). Troglophile-guanophile.

***Heteromyza comixta* Collin, 1901**

(= *Thelesta c.*)

Ledenika (Vr 17) - Beron & Guéorguiev (1967). Troglaxene.

Family Sphaeroceridae

***Copromyza (Fungobia) nitida* (Meigen, 1830)**

(= *Cypselia n.*)

Golemata Vrazha dupka (Sf 35) - Beron & Guéorguiev (1967). Troglaxene.

***Copromyza (Crumomyia) nigra* (Meigen, 1830)**

(= *Cypselia n.* = *Sphaerocera n.*)

Golemata Vrazha dupka (Sf 35) - Beron & Guéorguiev (1967). Troglaxene.

***Leptocera* sp.**

Zidanka (Sf 29) - Guéorguiev & Beron (1962).

***Terrilimosina racovitzai* (Bezzi, 1911)**

Razhishkata peshtera (Sf 32) – Beron (1972). Troglaxene.

Family Drosophilidae

***Phortica variegata* (Fallén, 1823)**

Studentata dupka (Vr 3) – Beron (1972). Troglaxene.

***Drosophila (Sophophora) melanogaster* Meigen, 1830**

(= *D. fasciata* Meigen, 1830)

Temnata dupka (Sf 30), Chavkite (Sf 41) – Beron (1994). Troglaxene.

Family Nycteribiidae

***Nycteribia (N.) schmidli schmidli* Schinner, 1853**

Razhishka dupka (Sf 32) – Hürka (1962: 161).

***Nycteribia (Acrocholidia) vexata vexata* Westwood, 1835**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962).

***Phthiridium biarticulatum* (Hermann, 1804)**

(= *Stylidia biarticulata*)

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962); Razhishka dupka (Sf 32) – Hürka (1962: 162).

***Penicillidia (Penicillidia) dufouri* (Westwood, 1835)**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962); Razhishka peshtera (Sf 32) – Hürka (1962: 161).

***Penicillidia (Neopenicillidia) conspicus* Speiser, 1904**

Razhishka peshtera (Sf 32) – Hürka (1962: 161).

Trichoptera

The order Trichoptera contains in Bulgaria at least 258 species, only 16 of them being recorded from caves and nine from the area under study. As in most European caves three genera (*Stenophylax*, *Micropterna* and *Mesophylax*) contain the bulk of the regular visitors. They are considered usually as regular troglaxenes.

Family Limnephilidae

***Stenophylax meridionalis* Malicky, 1980**

(= *S. speluncarum* = *S. vibex speluncarum* et *S. vibex vibex* sensu auct. bulg.)

Yavoretskata peshtera (Sf 25), Lednika (Vr 17) – Buresch (1936a: 148);

Reznyovete (Vr 16), Golemata Mecha dupka (Vr 19), Mladenovata peshtera (Vr 30), Garvanets (Vr 31), Zmeyova dupka III (Vr 33) – Botoșaneanu (1965: 58); Srutenata peshtera (Sf 63) - Beron & Guéorguiev (1967); Kitova Kukla (Sf 38) – Kumanski (1971: 210). Regular troglaxene.

***Stenophylax mitis* McLachlan, 1875**

Reznyovete (Vr 16) – Botoșaneanu (1965: 58); Kitova Kukla (Sf 38) – Kumanski (1971: 210). Regular troglaxene.

***Stenophylax permistus* McLachlan, 1895**

Medenik (Vr 18) – Buresch (1936a: 149); Reznyovete (Vr 16), Ledenika (Vr 17), Malkata Mecha dupka (Vr 27), Mladenovata peshtera (Vr 30), Garvanets (Vr 31) – Botoșaneanu (1965: 58). Regular troglaxene..

***Micropterna nycterobia* McLachlan, 1875**

Yavoretskata peshtera (Sf 25), Govedarnika (Sf 64), Srutenata peshtera (Sf 63), Reznyovete (Vr 16), Ledenika (Vr 17), Mladenovata peshtera (Vr 30), Garvanets (Vr 31) - Beron & Guéorguiev (1967); Svardelo (Sf 26), Drankalna dupka (Mt 17). Regular troglaxene.

***Micropterna sequax* McLachlan, 1875**

Ledenika (Vr 17), Garvanets (Vr 31) - Beron & Guéorguiev (1967). Regular troglaxene.

***Micropterna testacea* (Scopoli, 1763)**

Yavoretskata peshtera (Sf 25) - Guéorguiev & Beron (1962). Troglaxene.

***Mesophylax impunctatus aduncus* Navas, 1923**

(sub *M. aspersus* Rambour, 1842)

Mladenovata peshtera (Vr 30) - Beron & Guéorguiev (1967); Dupkata (Vr 46) – Kumanski (1968: 111) – Beron (1972); Malicky (1998: 132). Regular troglaxene.

***Limnephilus lunatus* (Curtis, 1834)**

Mladenovata peshtera (Vr 30) - Beron & Guéorguiev (1967). Troglaxene.

***Grammotaulius nitidus* (Müller, 1764)**

Ledenika (Vr 17) - Beron & Guéorguiev (1967). Troglaxene.

Lepidoptera

The butterflies and moths in Bulgarian caves have been collected intensively during the last years and analysed in the paper of Beshkov & Petrov (1996) in which the recent changes in the nomenclature have been introduced. Altogether 28 species have been recorded, most of them troglaxenic, even chance visitors. Typical element of the parietal fauna are *Triphosa sabaudiata*, *T. dubitata* and *Scoliopteryx libatrix*. They, and also *Monopis rusticella* and *Alucita cymmatodaclyla*, could be considered subtroglophiles, and some others (*Hypena rostralis*) – regular troglaxenes. The moths most attached to underground environment belong to the families Tineidae, Yponomeutidae, Alucitidae, Geometridae and Noctuidae.

From the area under study are recorded 13 sp. of Lepidoptera.

Family Tineidae

***Tinea* sp.**

Razhishka peshtera (Sf 32) - Guéorguiev & Beron (1962).

Family Yponomeutidae

***Ypsolophus wolfschlaegeri* (Rebel, 1941)**

(= *Cerostoma w.*, in Beron, 1994)

Razhishkata peshtera (Sf 32) – Rebel (1941: 2). Troglaxene.

***Digitivalva granitella* (Treitschke, 1833)**

(= *Acrolepia g.*, in Beron, 1994)

Razhishka peshtera (Sf 32) - Guéorguiev & Beron (1962); Temnata dupka (Sf 30) – Skalski (1971: 215). Regular troglaxene.

***Digitivalva pulicariae* (Klimesch, 1956)**

(= *Acrolepia p.*, in Beron, 1994)

Temnata dupka (Sf 30), Kozarskata peshtera (Sf 34) – Skalski (1971: 216). Troglaxene.

Family Alucitidae (Orneodidae)

***Alucita huebneri* Wallengren, 1859**

Temnata dupka (Sf 30) - Guéorguiev & Beron (1962). Troglaxene.

Family Nymphalidae

***Inachis io* (Linnaeus, 1758)**

Svinskata dupka (Sf 33) – Beshkov & Petrov (1996: 436-437). Troglaxene.

***Triphosa dubitata* (Linnaeus, 1758)**

Ledenika (Vr 17) – Buresch & Tuleshkov (1936: 214); Razhishka peshtera (Sf 32) - Guéorguiev & Beron (1962); Temnata dupka (Sf 30) – Slivov (1968: 177). Subtroglaphile.

***Triphosa sabaudiata* (Duponchel, 1830)**

Temnata dupka (Sf 30) – Buresch (1926: 32); Razhishka peshtera (Sf 32) – Buresch & Tuleshkov (1936: 214); Svinskata dupka (Sf 33) – Beshkov & Petrov (1996: 438). Subtroglaphile.

Family Noctuidae

***Hypena rostralis* (Linnaeus, 1758)**

Svinskata dupka (Sf 33) – Beshkov & Petrov (1996: 440-441). Regular troglaxene.

***Scoliopteryx libatrix* (Linnaeus, 1758)**

Temnata dupka (Sf 30) – Slivov (1968: 172); Barkite 8 (25 Godini Akademik) (Mt 49) – Dupré (2000: 166). Subtroglaphile.

***Autophila dilucida* (Hübner, 1785)**

Temnata dupka (Sf 30) – Buresch & Tuleshkov (1935: 158). Troglaxene.

***Autophila limbata* Staudinger, 1870**

Temnata dupka (Sf 30), Razhishka dupka (Sf 32) – Skalski (1971: 216). Troglaxene.

Family Plutellidae

***Cerostoma wolfschlaegeri* Rebel, 1941**

Razhishka peshtera (Sf 32) – Rebel (1941: 2). Troglaxene.

Origin and Zoogeography of Bulgarian cave fauna, especially what concerns the terrestrial invertebrates of the analyzed area.

The intensive research on the cave and underground living animals in Bulgaria since 1922 accumulated rather complete information on the composition and distribution of most of the groups of underground living animals. Time has come to formulate hypotheses about the origine and the zoogeography of this fauna. Such hypotheses are due mainly to V. Guéorguiev, who analysed the terrestrial troglobites known from Bulgarian caves. His series

of papers (1966 - 1977) was crowned by his monograph on the origine, the formation and the zoogeography of the terrestrial troglobites of Balkan Peninsula (1977). This remarkable book was followed by his speleozoogeographical subdivision of Bulgaria (Guéorguiev, 1992, in Bulgarian). Other attempts to analyze the distribution of the terrestrial cave fauna in Bulgaria find place in the papers of Beron (1976, 1978) and in some articles on different groups of cave animals Deltchev (1978, 1983), Riedel (1975).

In his monograph Guéorguiev (1977) subdivided Balkan Peninsula into four provinces (Dinaric, Egean, of Stara Planina and Rhodopean). Bulgarian territory falls into two of these provinces: the Province of Stara Planina (with two zones – Western and Eastern) and Rhodopean Province (also with two zones – Western and Eastern).

Beron (1976) subdivided the Province of Stara Planina into seven regions, some of them only provisional: Reg. of Eastern Serbia, Reg. of Ogosta, Reg. of Iskar, Reg. of Ossam, Reg. of Russe, Reg. of Kamchiya and Reg. of Dobrudja.

In his monograph Guéorguiev (1977) delimited also some special regions within his zones and subzones. In Bulgaria these regions (indicated on map) are:

In Western Stara Planina:

Vrachanska Planina (the richest region in troglobites in the eastern part of Balkan Peninsula) – up to 1977 there were 29 terrestrial troglobites in this region, including 17 indicators: “*Cyphoniscellus*” [now *Vandeloniscellus*] *bulgaricus*, *Bulgarosoma bureschi*, *Typhloiulus longipes*, *Centromerus bulgarianus*, *Neobisium beroni*, “*Microcreagris bureschi*” [now *Balkanoroncus hadzii*], *Allonychiurus sensitivus*, *Plusiocampa rauseri* [now synonym of *P. bureschi* and no more indicator], *Pheggomisetes radevi*, *Ph. r. ilcevi*, *Ph. r. tranteevi*, *Ph. globiceps mladenovi*, *Duvalius beroni*, “*D. deltschevi*” [now syn. of *Duvalius zivkovi*], *D. papasoffi*, *D. zivkovi*, *Radevia hanusi*.

Ponor Planina – 12 troglobites, incl. three indicators: *Eupolybothrus andreevi*, *Pheggomisetes globiceps globiceps*, *Ph. g. cerovenssis*.

As we can see, meanwhile several changes occurred in the taxonomy of these troglobites. Several other species have been added over the 38 years since the edition of the book of Guéorguiev. We have added them as “**new**”.

As the monograph of Guéorguiev (1977) concerns data only on terrestrial animals, it seems appropriate to say something on the origin of the remarkable stygobites in Bulgaria (and partly in East Serbia, as it include parts of Stara Planina). Analysis has been made by Pandourski & Breskovski (1995) and I will recall here some of their conclusions. They treat the Isopoda of the families Cirolanidae (marin relics) and Stenasellidae.

It seems that the Albian sea was the last to cover the karstic regions of Western and Central Stara Planina. After its retreat during the entire Upper Cretaceous Western Stara Planina has been emerged land. “Exactly in this time is appropriate to attribute the onquest of the karstic continental freshwater in the emerged massifs by the ancestors of *Sphaeromides bureschi*, *S. polateni*, *Protelsonia lakatnicensis* and *P. bureschi*” (we may add here also of *Sphaeromides serbica*, see also Pljalic, 1969). The observations of Pandourski & Breskovski (1995) confirm the “regression model” of Boutin & Coineau, 1990, providing for two fases of penetration of marin forms into the karstic waters of the rocki shore, followed by a sea regression and adaptation of the animals with marin ancestors to life in fresh karstic water.

Endemics in the cave fauna in the area under study.

Terrestrial Mollusca – the most important groups of Gastropoda living in Bulgarian caves belong to the families Zonitidae and Hydrobiidae. The land snails of the family Zonitidae are relatively well known, thanks to the efforts of Prof. Riedel. From ca. 33 sp. found in Bulgaria one third (11 sp.) live in caves. Four of them can be considered endemic. Two slugs seem also endemic: *Litopelte bureschi* (H. Wagner) and *Milax kusceri* H. Wagner. Among the six species of Gastropoda known in the area in study there are no endemic species.

Isopoda Oniscidea - From 24 genera and 49 species (including 26 troglobites) of cave woodlice in Bulgaria, 7 genera (*Balkanoniscus*, *Rhodopioniscus*, *Bureschia*, *Bulgaronethes*, *Bulgaroniscus*, *Vandeloniscellus*, *Tricyphoniscus*, all belonging to Trichoniscidae) and 31 species are endemic for Bulgaria. Zoogeographically and from the point of view of cave evolution the Isopoda terrestria are among the most important and interesting groups in Bulgarian cave fauna. With 32 species in caves (including 24 of all 26 troglobites), Trichoniscidae is the family by far the most important among Bulgarian cave Isopoda. The only other troglobites (*Cordioniscus bulgaricus* Andreev and *C. schmallfussi* Andreev) belongs to the family Styloniscidae and are not known from the area under study. From the 32 species of Trichoniscidae 26 are endemic for Bulgaria.

From Vrachanski Balkan are known 10 species of cave dwelling Isopoda Oniscidea, including four troglobites, all of them from the family Trichoniscidae: *Bureschia bulgarica* Verhoeff, *Tricyphoniscus bureschi* Verhoeff, *Trichoniscus anophthalmus* Vandel and *Vandeloniscellus bulgaricus* (Vandel). All four are Bulgarian endemics, *Vandeloniscellus bulgaricus* and *Bureschia bulgarica* are endemic for the described area, both of them representing endemic genera.

Pseudoscorpiones – Many of the Pseudoscorpions collected in the studied area are not yet identified, there are three endemic species in the caves of Lakatnik – *Neobisium* (*Heoblothrus*) *beroni* Beier and *Balkanoroncus hadzii* Harvey and *Roncus mahnerti* Ćurčić et Beron from Vodnata dupka near Botunya. *Roncus parablothroides* Hadži is Balkanic endemic.

Opiliones – Almost half of the 22 species of harvestmen known to live in Bulgarian caves are known from the studied area. Two species of these 10 are troglobites: *Paralola buresi* Kratochvil, endemic for four caves at Lakatnik Railway Station (remarkable endemic genus and the only cave representative of suborder Laniatores in Bulgaria) and *Paranemastoma* (*Buresiola*) *bureschi* (Roewer) – practically endemic for the studied area (living also in the caves of Odorovsko pole in the Western Confines in Serbia).

Araneae – In the caves of the studied area have been recorded 22 sp. of spiders (out of 99 species of cave spiders in Bulgaria). Only three of them are classified as troglobites in the modern sense: *Protoleptoneta bulgarica* Deltchev, *Centromerus bulgarianus* (Drensky) and *Porrhomma convexum* (Westring). Non of the is endemic for the described area, *Protoleptoneta bulgarica* has been found also in East Serbia.

Diplopoda – From the caves of the studied area are known 17 sp. of Diplopoda, including six troglobites, five of them endemics for this area: *Trachysphaera lakatnicensis* Tabacaru, *Brachydesmus radewi* Verhoeff, *Bacillidesmus bulgaricus bulgaricus* Strasser (and subspecies *B. b. dentatus* Strasser), *Bulgarosoma bureschi* Verhoeff, and *Typhloiulus* (*Inversotyphlus*) *longipes* Strasser. *Typhloiulus* (*Typhloiulus*) *bureschi*

Verhoeff is wider distributed, still remaining Bulgarian endemic. Endemic for this area and its closest confines is the troglophile *Balkanopetalum armatum* Verhoeff – the only representative in Stara Planina of the southbulgarian genus *Balkanopetalum* (Callipodida, Schizopetalidae). Another troglophile (endemic genus and species), described from the area under study, is *Balkanophoenix borisi* Verhoeff.

Typical for the caves of Vrachanska Planina (but found also in caves East of Iskar River, which is not a zoogeographical barrier!) is *Bulgarosoma bureschi*. After the revision of this group (Ćurčić & Makarov, 2000) *B. bureschi* remains the only clear representative of the genus.

Chilopoda – So far 10 sp. of Chilopoda are known from the caves of the studied area, one is Bulgarian endemic (*Lithobius lakatnicensis*).

Diplura – The troglobitic Diplurans from the area under study (*Plusiocampa bulgarica* and *P. bureschi*) are Bulgarian endemics.

Collembola – from 13 sp. of Collembola found in the caves of the studied area there are 4 Bulgarian endemics (mostly local).

Fam. Onychiuridae - *Allonychiurus sensitivus*, *Onychiuroides bureschi*, *O. subgranulosus*

Fam. Entomobryidae - *Pseudosinella duodecimocellata*

Coleoptera

Carabidae - Three genera in the cave fauna of Bulgaria are Bulgarian endemics, two in Western Stara Planina: *Rambousekiella* and (practically) *Pheggomisetes* and one in the Western Rhodopes – *Paralovricia*. *Pheggomisetes* was found also in caves in East Serbia (the Western Confines of the former Bulgarian territory)(Pretner, 1970; Ćurčić et al., 2004), but the three Bulgarian species remain almost entirely endemics for the studied area. The genus *Duvalius* includes four (3?) troglobitic species in the studied area, all of them local endemics.

Another important group of cave Coleoptera is the family **Leiodidae** with three troglobitic species in the studied area, of two genera, practically endemic for the area: *Beskovia* and *Radevia* (see Giachino & Guéorguiev, 1996, 2008).

Staphylinidae (Pselaphinae) – only one (trogloxenic) species (*Bryaxis beroni*) seems to be Bulgarian endemic (Western Bulgaria).

Siphonaptera – Only subspecies (so far endemic for Bulgaria) of two species of fleas have been described from cave bats in the studied area: *Nycteridopsylla ancyluris johanae* and *N. trigona balcanica*.

Relics in the cave fauna of Bulgaria.

The problem of the relictiness and the anciennety of the troglobites still stays. For Jeannel (1944, 1960), followed by Vandel (1964) and Guéorguiev (1977), there was no doubt that the paleotroglobites are very ancient and have no relatives among the recent animals living outside the caves. On the contrary, the neotroglobites still have relatives outside the caves and are connected with them by intermediary forms. For Leleup (1965), the main lines of southeuropean troglobites have their origin in an orophilic prepleistocene fauna, very ancient and very rich, living in biotopes on land emerged in remote geological periods. For Vandel (1964) “Terrestrial troglobites are mostly descendents of a tropical

fauna populating Europe and North America in the first half of the Tertiary". We have to keep in mind that the Paleogene (the first part of the Tertiary) takes the time between 67 and 25 millions years!

In the recent time Brignoli (1979) opposed this assertion, taken longtime as axiomatic. The early deceased prominent Italian specialist writes: "... It is not true at all (or, at least, it is not sure) that the troglobites are ancient". And further: "...The term of "relict" (or even of "living fossil"), so often applied to the troglobites, is for me completely meaningless". However, other prominent specialists do support the opinion of the ancient nature of the troglobites. According to Beier (1969), "...the troglobite species show high degree of specialisation and are without doubt to be considered as relicts from the Tertiary".

The present author also thinks that the assertions of Brignoli are exaggerated and that relicts do exist. Which troglobite is ancient and which is more recent is matter of analysis.

In his many papers B. Ćurčić insists that the troglobitic Pseudoscorpions, beetles and Diplopoda of the caves of East Serbia are very old relic, even pre-Tertiary. Our species from Western and Central Stara Planina are very close to them, sometimes even the same subgenera (*Paraduvaius*), so this analysis is equally related to them. For some genera and species, like the members of cave Laniatores (the Bulgarian *Paralola buresi* and the Serbian *Trojanella serbica*) for me there is no doubt that they are Tertiary relicts, despite the opinion of Martens (1972). Some water Isopods of Flabellifera (the two *Sphaeromides* species) are of marine origine and also undoubtedly are relicts (Pandourski & Breskovski, 1995).

Guéorguiev (1977) was firm supporter of the theories of Jeannel and Vandel and his classification of the troglobites according to their origin will be resumed here, completed with some new data.

Descendents of Laurasian phyletic lines

Guéorguiev (1977) considered as Laurasian relicts some spiders of the genus *Nesticus* and some Collembols. Bulgarian *Nesticus* species are also troglaphyles.

Descendents of Mesogeidean (paleomediterranean) phyletic lines

As descendents of phyletic line populating in the Paleocene and early Eocene the land stretching from Cantabric Mountains to Caucasus and called Mesogeida are considered the Isopods of the endemic genera *Balkanoniscus*, *Beroniscus* and *Bureschia* (all in Stara Planina and the Predbalkan). Among the Diplopoda such Mesogeidean relicts would be the Glomerid *Trachysphaera lakatnicensis* Tabacaru.

Mesogeidean origin is presumed also for the troglobitic Opilions *Paralola buresi* Kratochvil and *Paranemastoma (Buresiola) bureschi* (Roewer). The endemic genus *Paralola* Kratochvil (Phalangodidae) and its only species *P. buresi* from the caves near Lakatnik in Western Stara Planina represents in Bulgaria the (mostly tropical) suborder Laniatores. Martens (1972) wrote that the Laniatores "should not be considered any more as Tertiary relicts in the European fauna as they are widespread in the areas remaining outside the Pleistocene glaciation". Nevertheless, *Paralola* is beyond doubt a relict – its age is to be considered further.

What concerns the *Buresiola*, it is no more considered a separate genus, but a subgenus of *Paranemastoma*. The only known species in Bulgaria is also endemic of Western Stara Planina.

According to Guéorguiev (1977), a third of all endemic troglobite genera of Leioididae on the Balkan Peninsula are of Mesogeidean origine (such is *Radevia*).

Paleogeidean (Protoegeidean) relicts

Isopoda – here belongs the Haplophthalminae genus *Tricyphoniscus*, represented in the studied area by the species *Tricyphoniscus bureschi* Verhoeff.

Diplura Campodeidae – may be here belong the troglobitic species of the subgenus *Stygiocampa* (genus *Plusiocampa*), found in Bulgaria in Stara Planina and the Rhodopes.

Nordegeidean relicts

Most terrestrial troglobites of Balkan Peninsula belong to this category, due to the fact that major parts of former Yugoslavia, of Bulgaria and of Greece were situated for long periods during the Tertiary on Northern Egeide.

Many genera of different groups which are listed by Guéorguiev (1977) in the categories of the descendents of Gondwanian phyletic lines, Laurasian phyletic lines, of the descendents of Mesogeidean (paleomediterranean) phyletic lines (*Balkanoniscus*, *Bureschia*, *Buresiolla*, *Paralola*) or the Paleogeidean (Protoegeidean) relicts (*Tricyphoniscus*) are considered by him also as Nordegeidean relicts. The assertion needs clarification. Further, as Nordegeidean relicts are considered also the following genera: Isopoda (*Hyloniscus*), Diplopoda (*Bulgarosoma*, *Typhloiulus*). Such are the species of genus *Balkanoroncus* Curčić, not known to Guéorguiev by 1977. They are two species living in the caves of Stara Planina and the Prebalkan: *Balkanoroncus bureschi* (Hadži) and *B. hadzii* Harvey. From the Carabidae here belong the species of genus *Pheggomisetes* Knirsch, from the Leiodidae – the genera *Beskovia*, *Tranteeviella*, *Balcanobius*.

Southgeidean relicts

In Bulgarian caves most species of genus *Duvalius* belong to subgenera *Biharotrechus* and *Paraduvalius*. According to Jeannel (1928a), the *Paraduvalius* are typical Nordegeidian elements.

Zoogeographical relations of the troglobites and some troglaphiles living in the caves of Vrachanski Balkan and Lakatnik

Some of these animals are related to the inhabitants of the caves in the neighbouring areas of Western Stara Planina and the adjacent part of the Prebalkan. The spider *Protoleptoneta bulgarica* lives also in Mechata dupka near Lepitsa and in other caves outside Vrachanski Balkan. *Bulgarosoma bureschi* is known only from six caves of Vrachanski Balkan. *Balkanoniscus corniculatus* was published also from caves near Tserovo and Kunino. Also from the big water cave of Tserovo is known another member of Trichoniscidae – *Bureschia bulgarica*. From Drashanskata peshtera is known the thin Diplopod *Bacillidesmus bulgaricus dentatus*. Some local subspecies of *Pheggomisetes* are spread from Iskretz and Gintsi to Karlukovo.

Some other remarkable troglobites live very close to the described area – such are *Eupolybothrus andreevi* from Tzerovo, *Cyphophthalmus beshkovi* from Deventsi and *Bulgaridicus tranteevi* in Karlukovo.

There is a sharp limit, separating the cave fauna of Vrachanski Balkan s.l. and the cave fauna NW from Botunya. Two clearly different complexes of troglobites are found in Vrachanski Balkan s.l. (*Bulgarosoma*, *Radevia*, *Beskovia*, *Paralola*, *Bureschia*, *Vandeloniscellus bulgaricus*, *Typhloiulus bureschi*, *Paranemastoma bureschi*) and in the caves of the districts Montana and Vidin (*Hyloniscus flammula*, *Trichoniscus bononiensis*, *Bulgaroniscus gueorguievi*, *Beronia*, *Serboiulus*, *Protoleptoneta beroni*,

Typhloiulus strictus, *T. staregai*, *Onychiuroides beroni*). Troglobites, found in Vrachanski Balkan and in the Rhodopes (the same species!)(*Centromerus bulgarianus*, *Lithobius lakatnicensis*, *Plusiocampa bulgarica*) are not spread to the NW of Vrachanski Balkan, despite of the proximity of the caves (no caveless space, as is the gap between Stara Planina and the Rhodopes).

Interesting feature in the distribution of some troglaphiles is the presence of the Diplopod *Balkanopetalum armatum*, the only representative of the genus in Stara Planina (the other species have been described from Southern Bulgaria). Even more interesting is the lack of cave Orthoptera in Vrachanski Balkan and the caves of Iskar Valley. Cave *Troglophilus* live near the border with Serbia, but their distribution is stopped abruptly in the area of Vrachanski Balkan, despite the availability of many caves there with conditions similar of the conditions in the caves more to the west.

Caves of the described area and lists of their terrestrial invertebrates

(the numbers of the caves follow the system of Guéorguiev & Beron, 1962 and Beron, 1994)

Montana – Mt (= Mg)

Mt 17. Drankalna dupka - pot hole near Dolno Ozirovo Village. Length 78 m. Denivellation: - 89 m. Coordinates: N 43° 15' 01,2" E 23° 21' 34,4". Visit: 14.06.1969 (P. Beron, V. Beshkov).

Araneae: *Porrhomma convexum*

Trichoptera: *Micropterna nycterobia*

Mt 18. Grebenyo - cave-pot hole near Dolno Ozirovo Village. Visit: 16.06.1970 (P. Beron, V. Beshkov).

Araneae: *Protoleoneta bulgarica*

Chilopoda: *Lithobius lakatnicensis*

Coleoptera, Carabidae: *Rambousekiella ledenicensis*

Mt 19. Nikolova yama - pot hole near Dolno Ozirovo Village. Length 107 m, deniv. - 22 m.

Araneae: *Nesticus cellulanus*

Diplopoda: *Typhloiulus bureschi*

Mt 20. Vodnata dupka - cave near Dolno Ozirovo Village.

Lepidoptera: *Scoliopteryx libatrix*

Mt 49. Barkite 8 (25 Godini Akademik) – pot hole near Gorno Ozirovo Village. Alt. 830 m. Length 733 m. Denivellation: - 190 m. Coordinates: N 43° 13' 18,7" E 23° 27' 24,6". Visits: 26.07.1997 (B. Petrov), 31.10.2004 (P. Beron).

Pseudoscorpiones: *Roncus* sp.

Opiliones: *Paranemastoma* sp.

Araneae: *Centromerus bulgarianus*

Coleoptera, Carabidae: *Pheggomisetes globiceps mladenovi*, *Ph. buresi*, *Duvalius zivkovi*

Coleoptera, Leiodidae: *Radevia hanusi*

Lepidoptera: *Scoliopteryx libatrix*

Mt 51. Vartop – cave near Dolna Bela rechka.

Scorpiones: *Euscorpilus deltshevi*

Sofia - Sf

Sf 25. Yavoretskata peshtera - cave near Lakatnik Village. Length 211 m. Visits: 17.02.1962 (A. Grozdanov, P. Beron).

Pseudoscorpiones: *Roncus lubricus*

Opiliones: ***Paranemastoma bureschi***

Araneae: *Lepthyphantes leprosus*, *L. centromeroides*, *Meta menardi*

Collembola: *Pseudosinella duodecimocellata*, *Heteromurus nitidus quadriocellatus*

Diplura: *Campodea frenata*, ***Plusiocampa bulgarica***

Diptera: *Eccoptomera emarginata*, *Heleomyza [Leria] serrata*, *H. captiosa*

Trichoptera: *Micropterna testacea*, *M. nycterobia*, *Stenophylax meridiorientalis*

Sf 26. Svardelo - pot hole near Lakatnik Railway Station. Denivelation: -22 m. Visit: 2.07.1960 (P. Beron).

Opiliones: *Paranemastoma radewi*, ***P. bureschi***

Diplopoda: ***Trachysphaera lakatnicensis***

Trichoptera: *Micropterna nycterobia*

Sf 27. Peshtereto - cave near Lakatnik Railway Station. Length 200 m. Deniv. 7 m. Visit: 19.04.1992 (D. Kozhuharov).

Opiliones: *Paranemastoma radewi*

Diplopoda: *Balkanopetalum armatum*

Sf 29. Zidanka - cave near Lakatnik Railway Station, connected with Sf 30. Length ca. 400 m. Many visits by all Bulgarian Biospeologists.

Isopoda: *Trichoniscus bureschi*

Opiliones: *Paranemastoma radewi*, ***P. bureschi***, ***Paralola buresi***

Araneae: ***Centromerus bulgarianus***

Chilopoda: *Eupolybothrus transsylvanicus*, ***Lithobius lakatnicensis***

Diplopoda: ***Trachysphaera lakatnicensis***, ***Typhloiulus bureschi***

Collembola: *Heteromurus nitidus*

Coleoptera, Carabidae: ***Pheggomisetes globiceps lakatnicensis***, ***Duvalius papasoffi***

Coleoptera, Staphylinidae: *Atheta macroptera dinarica*, *Quedius mesomelinus skoraszewskiji*

Diptera: *Leptocera* sp.

Sf 30. Temnata dupka - cave near Lakatnik Railway Station. Alt. 600 m. Length > 7000 m. Denivelation: +33/ -21 m. Coordinates: N 43° 05' 19,9" E 23° 23' 10,6" * N 43° 05' 22,9" E 23° 23' 28,3". Big river. Bulgaria's richest in cave fauna. Visits: many, by most Bulgarian Biospeologists.

Protozoa: *Tokophria* sp., *Vorticella* sp.

Oligochaeta: *Octolasion lacteum*

Gastropoda: *Oxychilus glaber*

Isopoda, Oniscidea: *Trichoniscus bureschi*, ***Bureschia bulgarica***

Scorpiones: *Euscorpius* sp.

Opiliones: *Paranemastoma radewi*, ***P. bureschi***, ***Paralola buresi***

Araneae: ***Porrhomma convexum***, *Lepthyphantes leprosus*, *Nesticus* sp., *Pholcus opilionides*, *Ph. phalangioides*, *Tegenaria domestica*

Acari: *Spinturnix plecotina*, *Ichoronyssus scutatus*, *Macronyssus cyclaspis*, *Steatonyssus periblepharus*, *Argas vespertilionis*, *Ixodes vespertilionis*, *Leptotrombidium rassicum*, *Chiroptella muscae*, *Pentagonaspis trajani*, *Chiroptoglyphus bulgaricus*

Chilopoda: ***Lithobius lakatnicensis***, *Henia illyrica*

Diplopoda: *Glomeris pustulata*, ***Typhloiulus bureschi***

Collembola: *Deuteraphorura ghidinii*, *Heteromurus nitidus*, ***Pseudosinella duodecimocellata***, *Orchesella villosa* var. *devergens*

Diplura: ***Plusiocampa bureschi***

Coleoptera, Carabidae: ***Pheggomisetes globiceps lakatnicensis***, ***Duvalius papasoffi***

Coleoptera, Staphylinidae: *Atheta graminicola*, *A. spelaea*, *Quedius mesomelinus skoraszewskyi*

Coleoptera, Cryptophagidae: *Micrambe translatus*, *Cryptophagus scutellatus*

Diptera: *Triphleba antricola*, *Scoliocentra brachypterna*, *Drosophila fasciata*, *Heteromyza atricornis*, *Liancalus virens*, *Megaselia fusca*, *Phthiridium [Stylidia] biarticulatum*, *Nycteribia vexata*, *Penicillidia dufouri*

Siphonaptera: *Nycteridopsylla trigona balcanica*, *N. eusarca*, *Ischnopsyllus octactenus*, *Rhinolophopsylla unipunctinata unipunctinata*

Lepidoptera: *Allucita hubneri*, *Digitivalva granitella*, *D. pulicariae*, *Autophila dilucida*, *A. limbata*, *Triphosa sabaudiata*, *T. dubitata*, *Scoliopteryx libatrix*

Sf 32. Razhishka peshtera (dupka) - cave near Lakatnik Railway Station, 140 m above Iskar River. Length 316 m. Denivelation: +22 m. Coordinates: N 43° 05' 24,2" E 23° 23' 10,4". Visits: many, since 1955 (P. Beron, V. Beshkov), 22.02.1995 and others (B. Petrov).
Scorpiones: *Euscorpius* sp.

Pseudoscorpiones: ***Balkanoroncus hadzii***

Araneae: ***Centromerus bulgarianus***, *C. lakatnicensis*, *Echemus rhenanus*, *Lepthyphantes leprosus*, *Microneta viaria*, ***Porrhomma convexum***, *Tegenaria domestica*

Acari: *Chiroptoglyphus bulgarius*, *Leptotrombidium russicum*, *Willmannium bulgarium*, *Oudemansidium komareki*, *Steatonyssus periblepharus*, *Macronyssus cyclaspis*, *M. uncinatus*, *Paraperiglischrus rhinolophinus*, *Spinturnix emarginata*, *S. plecotina*, *Argas vespertilionis*, *Ixodes vespertilionis*, *I. simplex*

Diplopoda: ***Typhloiulus bureschi***, *Balkanophoenix borisi*

Collembola: ***Pseudosinella duodecimocellata***

Diplura: ***Plusiocampa bureschi*** (= *P. rauseri*)

Hymenoptera: *Diphyus quadripunctorius* (sub *Amblyteles bipunctatus*)

Diptera: *Limonia nubeculosa*, *Nycteribia schmidli*, *Phthiridium [Stylidia] biarticulatum*, *Penicillidia conspicua*, *P. dufouri*, *Terrilimosina racovitzai*

Siphonaptera: *Nycteridopsylla trigona balcanica*, *N. ancyluris johanae*, *Ischnopsyllus octactenus*, *Rhinolophopsylla unipunctinata unipunctinata*

Lepidoptera: *Digitivalva granitella*, *Autophila limbata*, *Ypsolophus wolfschlaegeri*, *Tinea* sp., *Triphosa dubitata*, *T. sabaudiata*

Sf 33. Svinskata dupka - cave near Lakatnik Railway Station. Length 362 m, deniv. + 15 m. Coordinates: N 43° 05' 17,02" E 23° 22' 10,64". Visits: many, since 1955 (P. Beron, V. Beshkov), 26.09.1992 (P. Stoev); 27.11.1994, 22.02.1995, 11.12.2002 (B. Petrov).

Nematoda: *Fictor fictor*, *Cephalobius persegnis*, *Eucephalobius mucronatus*, *Acrobeloides* sp., *Chiloplacus* sp., *Helicotylenchus vulgaris*, *Plectus* sp. (I. Iliev det.)

Pseudoscorpiones: ***Neobisium beroni***

Opiliones: ***Paralola buresi***

Araneae: *Antrohyphantes sophianus*, *Meta menardi*

Acari: *Eyndhovenia euryalis*, *Paraperiglischrus rhinolophinus*

Chilopoda: ***Lithobius lakatnicensis***

Diplopoda: ***Trachysphaera lakatnicensis***, ***Typhloiulus bureschi***

Collembola: *Onychiuroides postumicus*

Coleoptera, Carabidae: ***Pheggomisetes globiceps lakatnicensis***

Coleoptera, Staphylinidae: *Quedius mesomelinus*

Lepidoptera: *Inachis io*, *Hypena rostralis*, *Triphosa sabaudiata*

Sf 34. Kozarskata peshtera - cave near Lakatnik Railway Station. Alt. 395 m. Length 834 m. Denivelation: +12 m. Visits: many, since 1956 (P. Beron), 21.03.1993 (P. Stoev), 01.01.2004 (P. Beron & V. Beshkov).

Opiliones: ***Paralola buresi***

Pseudoscorpiones: ***Neobisium beroni***

Diplopoda: ***Trachysphaera lakatnicensis***

Diplura: ***Plusiocampa bureschi***

Coleoptera, Leiodidae: ***Beskovia beroni***

Lepidoptera: *Digitivalva pulicariae*

Sf 35. Golemata Vrazha dupka - cave near Lakatnik Railway Station. Visit: 1.01.1958 (P. Beron).

Isopoda: *Trichoniscus bureschi*

Araneae *Liocranum rupicola*

Diptera: *Cypsela nitida*, *C. nigra*

Sf 36. Sedmovratitsa - cave near Lakatnik Railway Station. Visits: 16.11.1957, 5.11.1961 (P. Beron).

Isopoda: *Armadillidium klugi*

Araneae: *Lepthyphantes leprosus*

Diplopoda: *Glomeris pustulata*, ***Trachysphaera lakatnicensis***

Diplura: ***Plusiocampa bureschi***

Sf 38. Kitova Kukla - cave near Druzhevo Village. Length 124 m, deniv. 5 m. Visit: 7.08.1961 (P. Beron).

Opiliones: ***Paranemastoma bureschi***

Araneae: *Meta menardi*

Diplopoda: ***Bulgarosoma bureschi***

Trichoptera: *Stenophylax mitis*, *S. meridiorientalis*, *Micropterna nycterobia*

Sf 40. Yamata - cave near Lakatnik Railway Station.

Gastropoda: *Oxychilus glaber striarius*

Araneae: ***Porrhomma convexum***, *Walckenaeria capito*

Diplopoda: *Pachyiulus cattarensis*

Coleoptera, Carabidae: ***Pheggomisetes globiceps georgievi***

Sf 41. Chavkite - pot hole above Milanovo Village, area of summit Sokolets. Length 50 m. Denivelation: - 70 m. Visit: 23.11.1958 (P. Beron).

Collembola: *Ceratophysella armata*, *Bonetogastrura cavicola*

Coleoptera, Carabidae: ***Pheggomisetes buresi***

Diptera: *Triphleba antricola*, *Drosophila fasciata*

Sf 44. Suhata yama - cave - pot hole near Druzhevo Village. Denivelation: 20 m. Visits: (P. Beron & V. Beshkov).

Araneae: *Meta menardi*, *Antrohyphantes sofanus*

Coleoptera, Carabidae: ***Pheggomisetes radevi tranteevi***

Sf 49. Pyasachnata dupka - cave near Lakatnik Railway Station.

Diplura: *Plusiocampa bureschi*

Coleoptera, Carabidae: *Duvalius papasoffi*

Sf 55. Razhishka yama - pot hole near Milanovo Village. Denivelation: 22 m.

Diplopoda: *Typhloiulus bureschi*

Collembola: *Tomocerus vulgaris*

Sf 59. Radyova propast - pot hole near Milanovo Village. Denivelation: 52 m. Visit: 3.12.1961 (P. Beron)

Opiliones: *Paranemastoma bureschi*

Araneae: *Centromerus lakatnikensis*, *Antrohyphantes sofianus*, *Metellina merianae*

Coleoptera, Carabidae: *Pheggomisetes buresi*, *Ph. globiceps lakatnicensis*

Coleoptera, Leiodidae: *Radevia hanusi*

Sf 72. Zdraveshka dupka - cave near Druzhevo Village. Length 84 m. Denivelation: -23 m. Visit: 7.08.1961 (P. Beron).

Araneae: *Meta menardi*, *Antrohyphantes sofianus*, *Nesticus cellulanus*

Vratsa - Vr

Vr 3. Studenata dupka (Cherepishkata) - cave near Cherepish Railway Station. Length 634 m. Denivelation: 43 m (-16 +27). Visits: 05.06.1960 (P. Beron, V. Beshkov) and others.

Gastropoda: *Oxychilus glaber striarius*

Isopoda: *Trichoniscus anophthalmus*

Diplopoda: *Balkanopetalum armatum*

Chilopoda: *Eupolybothrus transsylvanicus*

Araneae: *Hoplopholcus forskali*, *Metellina merianae*, *Nesticus cellulanus*, *Tegenaria domestica*, *T. silvestris*

Coleoptera, Leiodidae: *Beskovia bulgarica*, *Choleva agilis*

Diptera: *Phortica variegata*

Vr 4. Ezeroto - cave near Cherepish Railway Station. Visit: 5.06.1960 (V. Beshkov).

Isopoda: *Trichoniscus anophthalmus*

Coleoptera, Leiodidae: *Choleva agilis*

Vr 5. Serapionovata peshtera - cave near Cherepish Railway Station. Length 129 m. Denivelation: ca -32 m. Abundant bat guano. Visits: 06.07.1960 (P. Beron), 31.01.1991, 22.02.1991, 24.02.1991 (P. Stoev); 03.03.1991 (P. Stoev, B. Petrov & R. Pandurska); 07.03.1992 (P. Stoev); 15.04.1993 (P. Stoev, T. Ivanova & B. Barov); 07.11.1993 (P. Stoev); 03.03.1996 (B. Petrov & B. Barov).

Araneae: *Lepthyphantes leprosus*, *Tegenaria domestica*, *Steatoda triangulosa*, *Liocranum rupicola*, *Haplopholcus forskali*

Pseudoscorpiones: *Chernes hahni*

Diplopoda: *Brachydesmus* sp., *Balkanopetalum armatum*

Chilopoda: *Lithobius* aff. *schuleri*

Coleoptera, Staphylinidae: *Quedius mesomelinus skoraszewskyi*, *Atheta macroptera*

Coleoptera, Leiodidae: *Beskovia bulgarica*

Vr 7. Nevestina propast - pot hole near Vratsa. Denivelation: -76 m. Visit: (P. Beron).

Diplopoda: *Bulgarosoma bureschi*

Coleoptera, Carabidae: *Pheggomisetes globiceps stoicevi*

Vr 16. Reznyovete - pot hole near Vratsa. Denivelation: -32 m. Visit: 23.08.1963 (P. Beron).

Opiliones: *Leiobunum rumelicum*, ***Paranemastoma bureschi***, *P. radewi*

Araneae: *Meta menardi*

Chilopoda: *Lithobius agilis*, *L. viriatus*, *Harpolithobius anodus*

Diplopoda: ***Bulgarosoma bureschi***

Collembola: *Ceratophysella armata*

Coleoptera, Carabidae: ***Pheggomisetes buresi***

Coleoptera, Staphylinidae: *Quedius mesomelinus skoraszewskyi*

Trichoptera: *Micropterna nycterobia*, *Stenophylax mitis*, *S. permistus*, *S. mediorientalis*

Diptera: *Limonia nubeculosa*, *Tarnania fenestralis*, *Exechiopsis furcata*, *E. indecisa*, *E. vizzavonensis*, *Eccoptomera emarginata*, *E. pallescens*, *Heleomyza serrata*

Vr 17. Ledenika – show cave near Vratsa. Alt. 830 m. Length 226 m. Coordinates: N 43°12'35,6" E 23°29'34,8". The systematic exploration of the Bulgarian cave fauna began in 1922 with this cave. Recent visits: many (P. Beron), 22.05.1994 (P. Stoev & B. Petrov); 18.03.1995 (P. Stoev, T. Ivanova & B. Guéorguiev).

Oligochaeta: *Allolobophora biserialis*

Gastropoda: *Daudebardia* sp., *Oxychilus glaber striarius*, *Vitrea diaphana*

Isopoda: *Porcellium balkanicum*, *Hyloniscus riparius*, *Protracheoniscus ubliensis*, *Trichoniscus bureschi*, ***Tricyphoniscus bureschi***

Opiliones: ***Paranemastoma bureschi***, *Leiobunum rumelicum*

Araneae: *Coelotes jurinitschi*, *Lepthyphantes leprosus*, *L. sofianus*, ***Porrhomma convexum***, *Araneus diadematus*, *Ceratinopsis romana*, *Nesticus cellulanus*, *Meta menardi*, *Tegenaria silvestris*

Diplopoda: *Polydesmus renschi*, *Strongylosoma stigmatosum*, ***Bulgarosoma bureschi***

Chilopoda: *Strigamia crassipes*

Collembola: *Bonetogastrura cavicola*, *Onychiuroides bureschi*, ***Allonychiurus sensitivus***, ***Pseudosinella duodecimocellata***, *Heteromurus nitidus*

Thysanura: *Trigoniophthalmus banaticus*

Coleoptera, Carabidae: ***Duvalius zivkovi***, ***Pheggomisetes buresi***, ***Ph. radewi***, ***Rambousekiella ledenikensis***

Coleoptera, Leiodiidae: ***Radevia hanusi***, *Catops picipes*

Coleoptera, Staphylinidae: *Quedius mesomelinus skoraszewskyi*

Diptera: *Triphleba aptina*, *Eccoptomera emarginata*, *Heleomyza serrata*, *Limonia nubeculosa*, *Tarnania fenestralis*, *Exechiopsis intersecta*, *Heteromyza comixta*, *Actina nitens*

Trichoptera: *Stenophylax mediorientalis*, *S. permistus*, *Grammotaulius nitidus*, *Micropterna nycterobia*

Lepidoptera: *Triphosa dubitata*

Vr 18. Medenik – pot hole cave and ancient mine 9 km north of Eliseyna Railway Station. Visit: 13.07.1924 (I. Buresch & N. Radev).

Oligochaeta: *Allolobophora biserialis*, *Fridericia* sp., *Henlea subterranea*

Gastropoda: *Agriolimax bureschi*

Isopoda: *Trachelipus balticus*

Opiliones: ***Paranemastoma bureschi***, *Lacinius gallipoliensis*, *Phalangium opilio*, *Zacheus crista*

Chilopoda: *Cryptops anomalans*

Diplopoda: ***Typhloiulus aff. bureschi***

Collembola: *Bonetogastrura cavicola*

Coleoptera, Carabidae: ***Pheggomisetes buresi medenikensis*, *Ph. radevi***

Diptera: *Eccoptomera emarginata*, *Heteromyza atricornis*

Trichoptera: *Stenophylax permistus*

Vr 19. Golemata Mecha dupka - cave near Vratsa. Length 83 m, deniv. – 14 m. Visit: 19.08.1963 (P. Beron).

Opiliones: ***Paranemastoma bureschi***

Coleoptera, Carabidae: ***Pheggomisetes buresi*, *Ph. globiceps lakatnicensis***

Coleoptera, Leiodidae: ***Radevia hanusi***

Diptera: *Limonia nubeculosa*, *Tarnania fenestralis*, *Mycetophila ornata*, *Eccoptomera emarginata*

Trichoptera: *Stenophylax meridionalis*

Vr 23. Golemata yama - cave near Chelopek Village. Denivelation: 51 m.

Opiliones: *Egaenus convexus*, *Trogulus tricarinatus*, *Zacheus crista*

Araneae: ***Porrhomma convexum***

Coleoptera, Carabidae: ***Pheggomisetes sp.***

Coleoptera, Staphylinidae: *Quedius mesomelinus skoraszewskyi*

Coleoptera, Leiodidae: *Catops coracinus*

Vr 24. Malata yama – pot hole near Chelopek Village. Denivelation: 18 m.

Opiliones: *Paranemastoma radevi*

Coleoptera, Carabidae: ***Pheggomisetes sp.***

Vr 25. Zmeyova dupka I - pot hole near Bistrets Village. Length 122 m. Denivelation: - 68 m. Coordinates: N 43° 14' 08,5" E 23° 27'41". Visit: 29.10.1960 (P. Beron).

Opiliones: ***Paranemastoma bureschi***

Araneae: *Meta menardi*

Collembola: *Heteromurus nitidus*

Coleoptera, Carabidae: ***Pheggomisetes buresi***

Coleoptera, Leiodidae: ***Radevia hanusi***

Diptera: *Acantholeria cineraria*

Vr 27. Malkata Mecha dupka - cave near Vratsa. Length ca. 20 m. Visit: 24.10.1968 (P. Beron).

Opiliones: ***Paranemastoma bureschi***

Diplopoda: ***Bulgarosoma bureschi***

Coleoptera, Carabidae: ***Pheggomisetes buresi*, *Ph. globiceps mladenovi*, *Duvalius zivkovi***

Diptera: *Limonia nubeculosa*, *Tarnania fenestralis*, *Exechiopsis indecisa*, *Eccoptomera emarginata*

Trichoptera: *Stenophylax permistus*

Vr 29. Sipo (Sipo 1) - pot hole near Bistrets Village. Denivelation: - 80 m. Visit: (P. Beron).

Araneae: *Antrohyphantes sofianus*

Diplopoda: ***Typhloiulus bureschi***

Vr 31. Garvanets - pot hole near Bistrets Village. Length 43 m. Deniv. – 19 m. Visit: 19.08.1963 (P. Beron).

Opiliones: ***Paranemastoma bureschi***

Araneae: ***Porrhomma convexum***

Coleoptera, Pselaphinae: *Bryaxis beroni*

Trichoptera: *Micropterna sequax*, *M. nycterobia*, *Stenophylax meridionalis*, *S. permistus*

- Vr 32. Zmeyova dupka II** - pot hole near Bistrets Village. Denivelation: 50 m.
 Araneae: *Antrohyphantes sofianus*
 Coleoptera, Carabidae: ***Pheggomisetes buresi***
- Vr 33. Zmeyova dupka III** - pot hole near Bistrets Village. Denivelation: 35 m. Visit: 20.08.1963 (P. Beron).
 Opiliones: *Pyza bosnica*, *Trogulus tricarinatus*
 Coleoptera, Leioididae: ***Radevia hanusi***
 Trichoptera: *Stenophylax meridiorientalis*
- Vr 35. Ledenishka Yama** – cave-pot hole near Ledenika Hut. Denivelation: 38 m. Visit: 20.11.1988 (R. Pandurska).
 Gastropoda: *Oxychilus depressus*
 Opiliones: ***Paranemastoma bureschi***
 Coleoptera, Carabidae: ***Pheggomisetes buresi***
- Vr 36. Pesopin kamak** - cave near Vratsa. Length 910 m, deniv. – 8 + 6 m.
 Coleoptera, Carabidae: ***Pheggomisetes buresi***
- Vr 40. Kalnata dupka** – pot hole near Vratsa. Denivelation: 87 m. Visit: 24.09.1968 (P. Beron).
 Collembola: *Ceratophysella armata*
 Coleoptera, Carabidae: ***Pheggomisetes buresi***
 Coleoptera, Staphylinidae: *Quedius mesomelinus skoraszewskyi*
 Coleoptera, Leioididae: *Choleva agilis*
- Vr 41. Duglaska** – cave near Ledenika Hut, explored length ca. 350 m, small stream. Visit: 2.05.2010 (P. Beron).
 Araneae: under study
 Coleoptera: ***Pheggomisetes buresi***
- Vr 42. Toshova dupka (Kalna Matnitsa)** - cave near Glavatsi Village. Length 1302 m. Denivelation: -63 m. Coordinates: N 43° 14' 33,2" E 25° 02' 09,2". Visits: 17.02.1968 (P. Beron), 12.06.1994 (T. Ivanova); 03.04.1999 (B. Petrov).
 Isopoda Oniscidea: ***Vandeloniscellus bulgaricus*, *Trichoniscus anophthalmus***
 Opiliones: *Paranemastoma radewi*
 Araneae: ***Porrhomma convexum***, *Hoplopholcus forskali*, *Meta menardi*, *Metellina merianae*, *Nesticus cellulanus*
 Pseudoscorpiones: *Chthonius* sp.
 Chilopoda: ***Lithobius lakatnicensis***
 Diplopoda: *Trachysphaera* sp., ***Typhloiulus bureschi***
 Collembola: *Ceratophysella armata*
 Coleoptera, Carabidae: ***Duvalius beroni***
 Coleoptera, Pselaphinae: *Bryaxis beroni*
 Coleoptera, Endomychidae: *Mycetaea hirta*
 Coleoptera, Staphylinidae: *Atheta macroptera*, *Quedius mesomelinus skoraszewskyi*
- Vr 43. Malkata Nevestina propast** – pot hole near Vratsa. Denivelation: 15 m.
 Coleoptera, Carabidae: ***Pheggomisetes buresi*, *Duvalius zivkovi***
- Vr 45. Mecha dupka (Chernata Mecha dupka)** - cave near Lyutadjik Village. Visit: 5.02.1967 (P. Beron).
 Araneae: *Metellina merianae*
- Vr 47. Lednitsata** – pot hole near Vratsa. Denivelation: -52 m.

Collembola: *Onychiuroides subgranulosus*, ***Pseudosinella duodecimocellata***

Vr 52. Sokolskata dupka - cave near Lyutadjik Village. Underground stream. Length 815 m. Denivelation: +44 m. Alt. 800 m. Visit: 5.02.1967 (P. Beron).

Opiliones: ***Paranemastoma bureschi***

Araneae: ***Centromerus bulgarianus***, *Tegenaria silvestris*, *Meta menardi*

Vr 53. Belyar – pot hole - cave near Vratsa. Length 2560 m. Denivelation: -282 m. Visits: 7.10.1968 (P. Beron), 7.11. 1970 (V. Beshkov), 27.07.1997 (B. Petrov).

Isopoda: ***Bureschia bulgarica***

Araneae: ***Centromerus bulgarianus***

Opiliones: ***Paranemastoma bureschi***

Diplopoda: ***Bulgarosoma bureschi***, ***Typhloiulus longipes***

Coleoptera, Carabidae: ***Pheggomisetes* sp.**

Vr 55. Barkite 14 - cave near Vratsa. Alt. 834 m. Length 2600 m. Denivelation: 356 m. Coordinates: N 43° 13' 15" E 23° 27' 29,7". Visit: (P. Beron).

Araneae: *Nesticus cellulanus*, *Antrohyphantes sofianus*

Vr 64. Shishmanovets – cave near Cherepish Railway Station.

Diplopoda: *Balkanopetalum armatum*

Vr 65. Vratnik – cave near Lyutadjik Village.

Araneae: *Meta menardi*, *Metellina merianae*, *Tegenaria silvestris*

Vr 72. Prinčovitsa – cave near Moravitsa Village. Length 227 m. Visit: 19.10.1973 (P. Beron).

Araneae: *Lepthyphantes leprosus*, *Tegenaria domestica*

Coleoptera, Carabidae: *Trechus quadristriatus*

Coleoptera, Staphylinidae: *Atheta macroptera*

Vr 74. Vodna (Vodnata dupka) - cave near Botunya Village. Length 130 m. Visit: 13.06.1971 (P. Beron).

Pseudoscorpiones: ***Roncus mahnerti***

Araneae: ***Porrhomma convexum***

Vr 75. Sveti Kirik - cave near Botunya Village.

Araneae: *Tegenaria domestica*

Vr 83. Haydushka dupka – pot hole near Bistrets Village. Denivelation 108 m. Visit: 26.04.1970 (P. Beron)

Opiliones: ***Paranemastoma bureschi***

Vr 84. Barkite 9 – pot hole near Vratsa.

Coleoptera, Leiodidae: ***Radevia hanusi***

Vr 86. Bezimenna

Coleoptera, Leiodidae: ***Radevia hanusi***

Vr 89. Chetvartitata dupka – cave at the foot of Kobileni steni, Opletnya Village. Alt. 1430 m. Length ca. 50-60 m. Humide, bat guano. Visit: 22.05.1994 (P. Stoev & B. Petrov).

Diplopoda: *Trachysphaera* sp.

Vr 91. Cherniya Izvor – cave near Matnishki Monastery. Underground source. Length 546 m. Denivelation: +35 m. Visit: 03.04.1999 (B. Petrov).

Scorpiones: *Euscorpius deltshevi*

Chilopoda: *Lithobius* cf. *micropodus*

Coleoptera, Staphylinidae: *Quedius* sp., *Atheta* sp.

Vr 92. Malkata peshtera – cave in Vrachanski Balkan Mt. above Zgorigrad Village. Visit:

16.05.1999 (B. Petrov).

Pseudoscorpiones: *Chernes hahnii*

Diplopoda: *Strongylosoma stigmatosum*

Vr 93. Labirinta – cave near Cherepish Railway Station. Visits: 07.03.1992, 07.11.1993 (P. Stoev).

Diplopoda: ***Typhloiulus* sp.**

Vr 97. Mizheshnitsa – cave near Ledenika Hut. Streams, explored length ca. 1800 m, explored denivelation ca. 150 m. Visit: 1.05.2010 (P. Beron).

Collembola: under study

Coleoptera, Carabidae: ***Pheggomisetes buresi***

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Сухоземните пещерни безгръбначни във Врачанска планина

ПЕТЪР БЕРОН

(Резюме)

В настоящия обзор са включени 65 пещери, от които са известни 218 сухоземни безгръбначни, в района на Природния парк «Врачански Балкан», вкл. пещерите при Лакатник. От тях са съобщени 218 вида, от които 32 се смятат за троглобионти (Isopoda Oniscidea – 4, Chilopoda – 1, Diplopoda – 5, Opiliones – 2, Pseudoscorpiones – 3, Araneae – 3, Collembola – 2, Diplura – 2, Coleoptera Carabidae – 7, Col. Leiodidae – 3). Най-богати на троглобионти са пещерите при гара Лакатник (Темната дупка – 10, Зиданка – 7, Ражиската дупка – 6, Свинската дупка – 6, Козарската пещера – 5), при Враца (Леденика – 11, Барките 8 – 5, Беляр – 6), Тошова дупка при Главаци – 6 и др. Троглобионти са познати от 51 пещери в описвания район. Направен е анализ на произхода и зоогеографските особености на сухоземните безгръбначни в описвания район. Литературата върху тези животни възлиза на 120 заглавия.