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SLOVAKIA

by

Christian JUBERTHIE*, Vasile DECU**, Vladimir KOŠEL***, K. KOVÁČ**** and Marcel UHRIN*****

I - GENERALITIES

The Slovakia, new central Europe state since 1993, is for a large part a mountains country in the Carpathian zone. It covers 49,000 km².

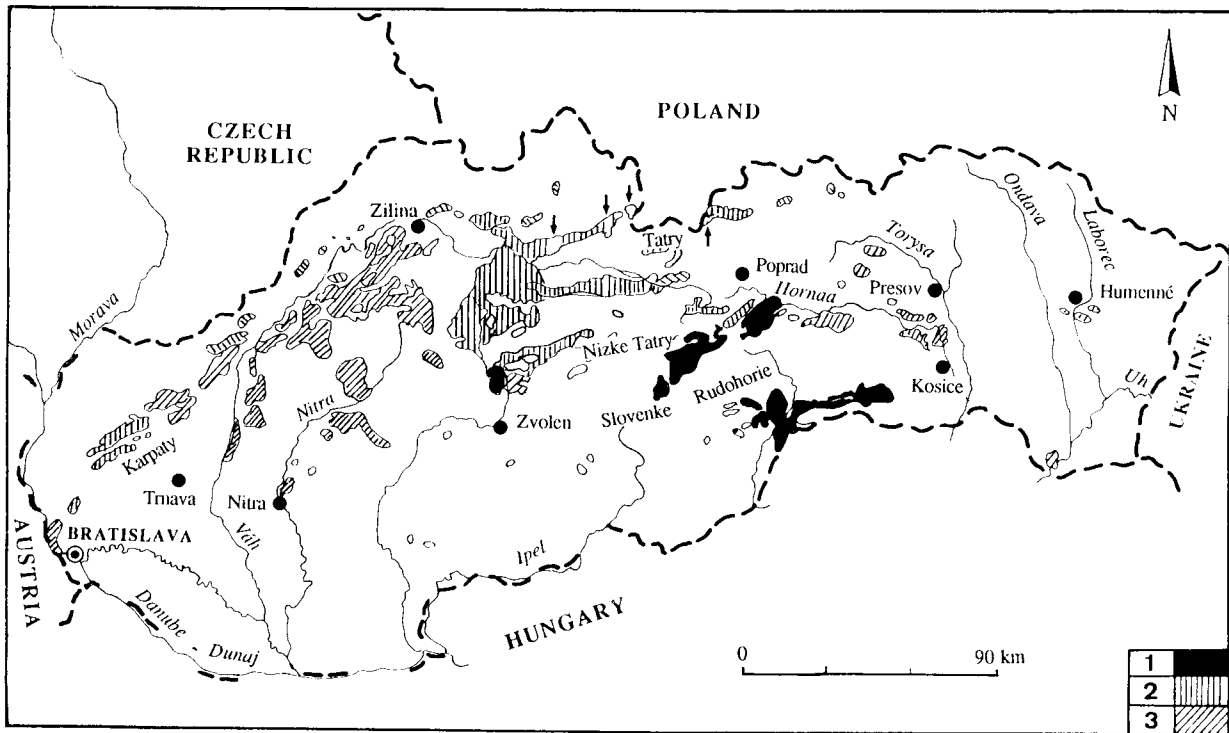


Fig. 1 - Karst areas in Slovakia. 1 = Plateau Karst. 2 = Karst of the monoclinial ridge. 3 = Karst of the horsts and combined structure (After Bystrický *et al.*, 1972, simplified).

II - KARST REGIONS AND CAVES

II. 1 - History

The first written record on cave in Slovakia is in 1299 on Demänovská Ice cave, followed only 250 years later by Georg WEHRNER (1549). Graffiti in the Jasovská Cave, situated at eastern margin of the Slovak Karst to the west of the city of Kosice, are dated to 1452. Descriptions by Pietro RANZANO (1420-1492) were published only in 1558, 1579 and 1600. Detailed investigations and descriptions of the Demänovská Ice Cave were carried out in 1714 to 1724 by J. BUCHHOLZ, and this cave was open to public in 1880-1885. The Jasovská Cave was open in 1846 by ABBOT a local monastery (BREŽINA & VOTOCEK, 1989). The Belianska Cave was open to public on July 1882 (LALKOVIC, 1993a, b, c).

The history of the scientific investigations of the karst regions of Slovakia can be dated from the beginning of the 20th century with the works of SAWICKY (1908, 1909). The Slovakian karst was studied later by VITÁSEK (1930), ROTH (1939), JANÁČEK (1941), SENES (1957), KEMENY (1961), LUKNIS (1962) and a large monograph was published by MAZUR (1963).

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The Low Tatras have been studied by LOUCEK (1956), and, chiefly from the speleological aspect and underground phenomena in Slovakia, by DROPPA (1957, 1966, 1967).

The high mountain karsts were studied in Belianske Tatras (SEKYRA, 1954) and in Western Tatras (MAZÚR, 1962).

Some problems of the karst hydrogeology have been studied by KULLMANN (1964).

II. 2 - Karst

The karst covers more than 2,700 km² in Slovakia. Many of the karst regions extend over some hundreds of km² and the degree of the karst phenomena is relatively intense.

The Western Carpathians are divided into two longitudinal zones: the Outer Carpathians in the north and the Inner Carpathians in the south.

In the Outer Carpathians, the karst is only represented by some bioherm limestones of the Jurassic (Pavloské Hills, Stramberk).

The karst is more extensively developed in the Inner Carpathians. The limestone complex of the Triassic is present in many places where it forms substantial parts of mountains or even whole chains.

In the Cliff Zone which extends between the Outer and Inner Carpathians as a 5-50 km broad belt, the limestones are found in much larger quantity than in Outer zone.

The central karst of Western Carpathians is divided into three different groups as following:

- the plateau karst;
- articulated karst of the fault-folded mosaic structure (karst of the horsts, karst of the monoclinical ridge, karst of the basins);
- karst of the Cliff structure.

Some islands of Alpine karst are dispersed in the Western Carpathians.

Plateau karst.

The plateau karst is the most characteristic type in the Western Carpathians and it covers the largest areas, more than 1000 km². It represents the semi-massive block of the Slovenské Rudohorie. It extends in three regions: Slovensky kras (Slovakian karst), Muránska planina and Slovensky raj. It is limited by the neighbouring non-karst regions. The vegetation cover takes up a considerable area. A common feature was the levelling of the surface by the erosive activity of the rivers in the periods of alternative humid and dry hot sub-tropical climates during the Pannonian (MAZÚR, 1965). At this period, the Slovensky kras could have had the character of a typical cone karst (LUNIS, 1962). A raising up of the levelled karst surface occurred during the Rhodanian tectonic movements, and a vertical underground drainage followed with an intensive karst formation. The canyons in the Slovakian karst attain a relatively important width and depth. The plateaus are raised above the bottom of the canyons by 300-400 m steep rocky escarpments. On the plateau karst various forms of lapiès, karst holes, avens, wally sinks and blind valleys can be seen.

Among the best known caves are the Domica Cave in the Slovensky kras with a development of 5.9 km, the Gombasek Cave, the Jasovská Cave, the Bear Cave, the Dobsina Ice cave, etc.

Articulated karst.

This is bound with mountain horsts, open folds, and grabens-basins of the Tatra-Fatra region in the Western Carpathians. It presents less favourable conditions for the development of the karst phenomena.

Karst of the monoclinical ridge. This is bound with carbonate rocks asymmetrically situated at the so called core mountains in the shape of the monoclinical structure, or rising as independent monoclinical structures without a core. The karst is divided by deep valleys into elongated crests. On the hand there are chasms of the aven type, on the other hand there are extensive underground cave, often with several floors. Sinks and springs are numerous. This type of karst is developed, especially in the northern slopes of Nízke Tatry with the well known Demänovské jaskyne (jaskyne = cave), in a smaller region in the southern part of Nízke Tatry, in the monoclinical ridges of the Tatras with the Belianská Cave, and in the Veľká Fatrá, Malá Fatra, Choc Mountains.

Basin karst; covered karst. Depressed complexes of karst rocks occur most often in the intra-montane basins. In places the karst rises to the surface, but more frequently it is covered with periglacial and glacio-fluvial Neogene and Quaternary formations. The basin karsts are recorded in the following regions: Vazec karst, Hron valley, Zvolen Basin and karst of the Strba upheaval.

Sporadic karst of the Klippen structure. It consists of small karst islands or lenses, as strong residuals of the Cliff zone. It is represented by Jurassic limestones, strongly folded, mostly covered with soil. Allogene rivers often cut the Cliff residual limestones. The best known are the Manín, and in Spis in the Klippen group Pieniny.

Alpine karst.

Karst rising above 1400 m are classified as Alpine karst. The climatic conditions (rainfall up to 1800 mm, average yearly temperature about 0°C or below 0°C, cold water with a high content of CO₂) speed up the solution of limestones. Karst phenomena are well developed (avens, dolines, lapiès). This karst is most

extensive in Belianska Tatry, in the Western Tatras, in the Nízke Tatry and locally in the Veľká and Malá Fatra Mountains.

III - HYPOGEAN FAUNA

III. 1 - History

The studies on cave fauna and flora have been performed by CSIKI (1910, 1912, 1914), BOKOR (1922, 1925), KOMAREK (1926), ROUBAL (1930-1941), and since the second mondial war, by CHAPPUIS (1948), LOZEK (1948a, 1948b, 1950, 1954), GULICKA (1954, 1975, 1977a, 1977b, 1978, 1982, 1985), PACLT (1956, 1957a, 1957b), KORBEL (1955, 1960, 1965), STERBA (1955, 1962, 1964, 1969), STRASKRABA (1956, 1958, 1959, 1962), VACHOLD (1957a, 1957b, 1961), RUSEK (1961), NOSEK (1960 to 1975), PETKOVSKI (1966), GEISLER & HANÁK (1973), KOSEL (1974 to 1997), KOVAC (1992, 1997).

III. 2 - Aquatic hypogean fauna

Aquatic hypogean species has been found in caves, wells, hyporeic habitat and in filtered water from springs. In Slovakia the average temperatures of 83 springs from 200 to 1150 m above the sea level varies from 4-5°C to 12°C (ZATKO, 1973).

Archannelida

Nerillidae

Troglochaetus beranecki Delachaux; Domic Cave; stygobite.

Turbellaria

Dendrocoelidae

Dendrocoelum carpathicum Komarek; springs of Tisa and frequent in oriental Slovakia, Sloboda Cave; known also in Poland; depigmented and anophthalme; stygobite.

Oligochaeta

Ten species were found in seven Slovakian caves (KOSEL, 1983). Eight of these live both in caves and springs [for example, the Tubificidae *Tubifex speciosus zavreli* (Hrabé)]. Another Tubificidae, *Rhyacodrilus carsticus* Kosel, seems to be restricted to underground water and is known from Slovakia and also from France.

Gastropoda

Hydrobiidae

Belgrandiella slovenica Lozek & Brtek; dolina Peklo near Klacno; endemic from western Carpathians with only two recent subspecies [*slovenica* (fig. 2A), *alticola* (fig. 2B)], the two others are fossiles; stygobite.

Bythinella austriaca (Frauenfeld) (fig. 2C), with local form in caves; known also from Romania; stygobite.

Sadleriana pannonica (Frauenfeld) (fig. 2D); springs from Slovakian karst; in Hungarian part of this territory and the Bukk Mt does not enter caves; stygophile.

Hauffenia n. sp. undescribed; Slovakian karst.

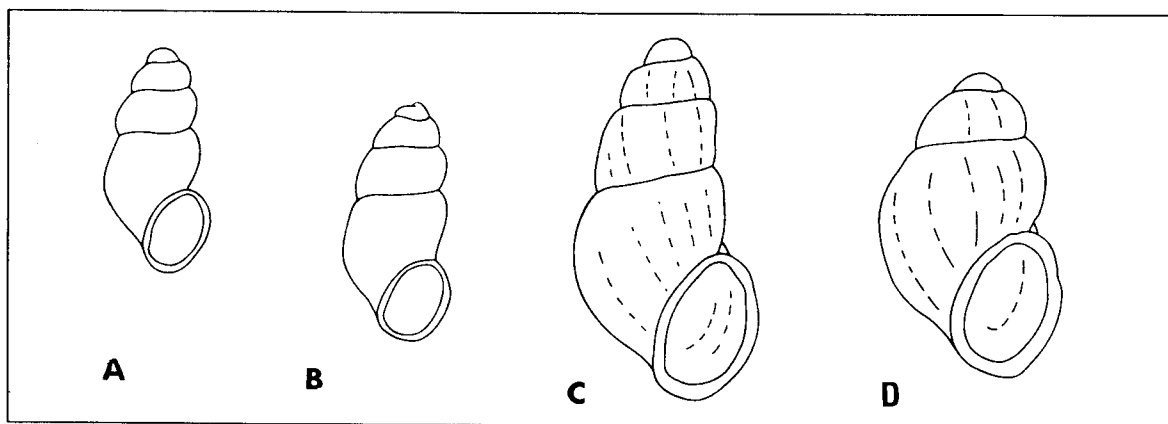


Fig. 2 - Gastropoda Hydrobiidae. A = *Belgrandiella slovenica slovenica* Lozek & Brtek. B = *Belgrandiella slovenica alticola*. C = *Bythinella austriaca* (Frauenfeld). D = *Sadleriana pannonica* (Frauenfeld) (After Gulicka, 1975, redrawn).

Ostracoda

Cyprididae

Cypridopsis subterraneus Wolf; in several springs in middle Slovakia and in water filtered from a spring lower than the Dobsina Ice cave; stygophile?

Cryptocandona dudichi (Klie); Baradla Cave and spring Zázrivá; stygobite.

Cryptocandona phreaticola (Klie); well in Tekovské Luzany; stygobite.

Copepoda

Cyclopoidea, Cyclopidae

Diacyclops languidoides clandestinus (Kiefer); Jasovská Cave; wide range; stygophile.

Diacyclops languidus belgicus Kiefer; Sloboda Cave in Demänovská valley.

Harpacticoidea

Canthocamptidae

Elaphoidella pseudophreatica (Chappuis); Sloboda Cave in Demänovská-Tal and in another caves; also found in northern Italia and Romania (Banat); stygobite.

Maraenobiotus vej dovskyi Mra; present in numerous caves in Slovakia, such as Sloboda Cave, Jasovská Cave, Hacavská Cave.

Parastenocarididae

Parastenocaris pannonicus Török; Laborec river near Michalovce, in the most oriental part of Slovakia; also found in Hungary (Budapest) and Romania (Bucharest); stygobite.

Parastenocaris phreatica Chappuis; wide range in Europe, and in Slovakia and Czech Republic (13 stations); stygobite.

Amphipoda

Niphargidae

Four or five stygobite species have been described from Slovakia.

Niphargus bajuvaricus (= *N. jovanovici bajuvaricus*) Schellenberg; hyporeic water and wells in western part of the Slovakian Carpathians; also in caves, wells and hyporeic water in Austria, Germany and Romania; stygobite.

Niphargus carsicus Straskraba; springs and wells at Zádiel, southern Slovakia; endemic; stygobite (species dubiae).

Niphargus dudichi Hankó; phreatic water in wells in Tekovské Luzany, true endemic in Western Carpathian; southern Slovakia; with a subspecies *N. dudichi rajecensis* Schellenberg; phreatic water in wells at Rajec; endemic; stygobite.

Niphargus inopinatus Schellenberg; phreatic water in wells at Rajec; also found in Hungary; stygobite.

Niphargus rajecensis Schellenberg; phreatic water in wells at Rajec.

Niphargus tatrensis Wrzěsniowski; species with wide variability; springs and caves in the Slovakian karst; found in Austria, Hungary and Poland; stygobite.

Another species, *Niphargus hrabei* S. Karaman and *Niphargus valachicus* Dobreanu & Manolache (fig. 3), inhabit the superficial water in Slovakia and other countries of Central Europe.

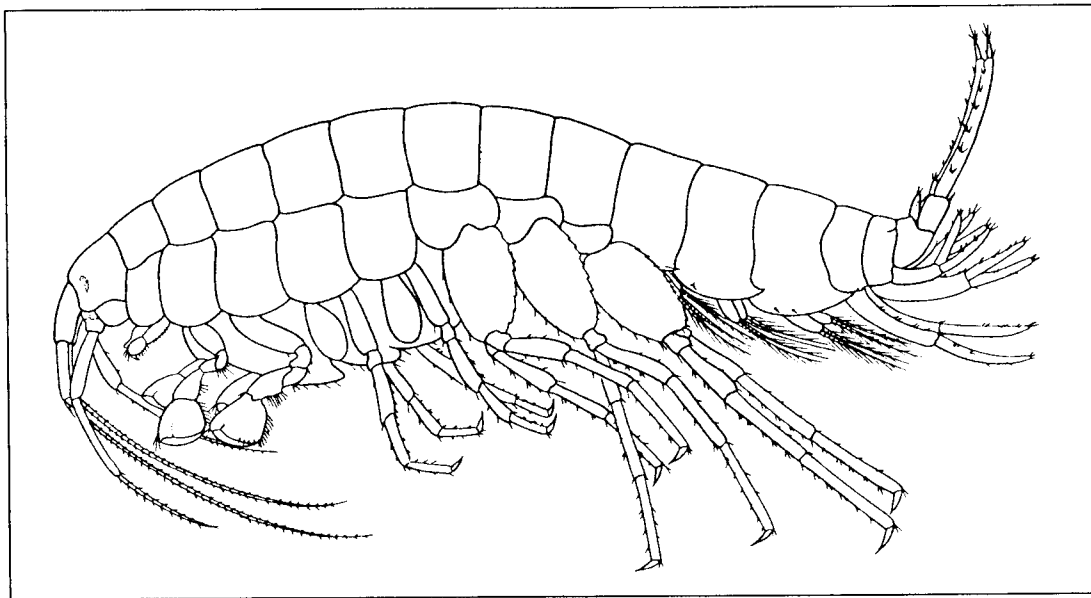


Fig. 3 - Amphipoda Niphargidae. *Niphargus valachicus* Dobr. & Man., 1955; female (After the authors, redrawn).

Crangonyctidae

Crangonyx subterraneus Bate; in a well at Rajec; wide range in groundwater in central and western Europe; stygobite.

Synurella intermedia hrabei Straskraba; Sloboda Cave in Demänovská valley; also found in wells in Romania; endemic of Carpathians; stygobite.

Synurella ambulans Müller (fig. 4); widespread in both epigeal and hypogean waters of central and eastern Europe; with numerous subspecies considered as synonyms; stygophile.

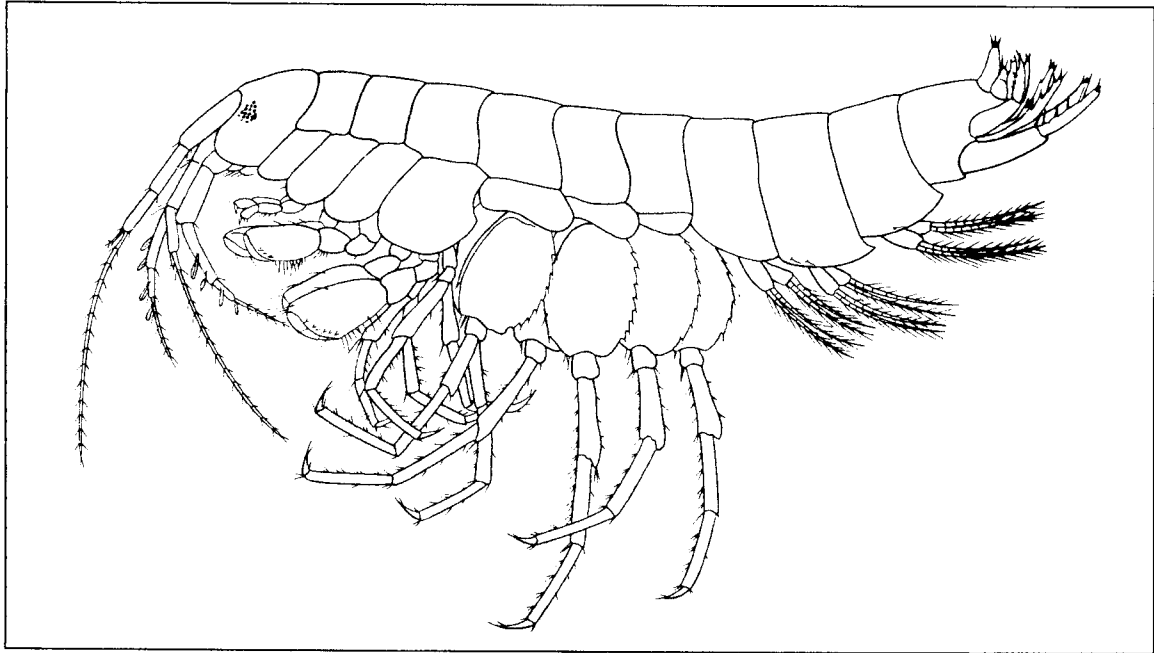


Fig. 4 - Amphipoda Crangonyctidae. *Synurella ambulans* Müller, 1846 (After Carausu *et al.*, 1955, modified).

Isopoda

Asellidae

Proasellus slavus slavus (Rémy); well at Rajec near Zilina and phreatic water near Danube; endemic; stygobite.

Note. The stygobitic fauna in the wells at Rajec consists of four species of amphipods: two *Niphargus*, one *Crangonyx* and one *Proasellus*.

Syncarida

Bathynella natans and *Parabathynella stygia* are recorded from Slovakia (KOŠEL, 1997).

Hydracarina

Limnohalacaridae

Lobohalacarus weberi (Romijn et Viets); caves, phreatic, interstitial, springs; stygobite.

Amphibia

Several troglone species use caves as winter shelters, feeding habitats, or in spring-autumn period (UHRIN & LESINSKY, 1997).

Salamandridae

Salamandra salamandra is the most common; it was recorded from October to end of February in 12 Slovakian caves. The number of wintering animals is usually not more than 10, but in Veterná diera Cave in Slanské Mountains hundreds of salamander were found. They hibernated around 20 m behind the cave entrances.

Bufo

Bufo bufo was found in the entrances of 12 caves during dry summer.

Ranidae

Rana temporaria was recorded wintering in 8 caves and 2 galleries.

III. 3 - Terrestrial hypogean fauna

By contrast to the hypogean aquatic fauna, the terrestrial cave fauna (troglobite) is scarce. However, a very diversified fauna inhabits the wells and soil detritus of the entrance of cave and bottom of shafts. It consists of troglone species characteristic of soil, moss and stones in forests: 36 species of diplopods, 28 species of isopods, 17 species of chilopods and 17 species of harvestmen has been recorded in 40 Slovakian caves (GULICKA, 1985). Few species are considered as true troglonites or troglonophiles.

Isopoda terrestria

Mesoniscidae

Mesoniscus graniger (Frivaldszky); found in entrance zone (chasmatobionte according the DUDICH' terminology used by GULICKA), and in dark zone; estimated as troglonite in Slovakia (GULICKA, 1985).

Pseudoscorpiones

Neobisiidae

Neobisium (Blothrus) slovacum Gulicka; numerous caves in Slovakian Karst (Plesivec and Dolny Vrch Plateaus); absence of eyes, elongated appendages, depigmented ; troglobite.

Araneae

Linyphiidae

Porrhomma profundum Dahl; troglophile in caves of Slovakian karst.

Metidae

Metellina merianae (Scopoli); in the entrances of caves; wide range in Europe; troglophile.

Opliones

Ischyropsalidae

Ischyropsalis manicata C. L. Koch; western Carpathians; troglophile.

Others species seasonally stay in the entrance of caves: *Leiobunum rupestre* (Herbst) and *Gyas annulatus* (Olivier) on the wells; *Nemastoma lugubre* and *Paranemastoma kochi* (Nowicki) under stones, leaves, wood or detritus on the floor.

Palpigradida

Eukoenia spelaea vagvoelgyii (Condé); Ardovská Cave in the Slovak Karst ; troglobite.

Acari terrestria

Parasitidae

Parasitus niveus (Wankel), troglophile.

Rhagidiidae

Foveacheles (Spelaeocheles) troglodyta Zacharda; western Carpathians, Stratsenska cave; troglophile?

Poecilophysis spelaea (Wankel); Slovakian caves, large range in Europe; troglomorphic, troglobite.

Thyrisomidae

Gammazeres cavatica (Kunst); caves in the Slovak Karst; troglophile, or troglobite after LEBRUN, 1967.

Uropodidae

Urobovella advena (Trägårdh), troglobite.

Diplopoda

Polydesmidae

Brachydesmus superus (Latz.); blind and depigmented but widespread in forest and collected only in one cave (Plesivská planina).

Allorhiscosoma sphinx (Verhoeff); endemic species of the Western Carpathians; troglophile.

Collembola

Arrhopalitidae

Arrhopalites aggtelekiensis (Stach); caves of the Slovak Karst; troglobite.

Arrhopalites slovacicus Nosek; Domica Cave; troglobite.

Entomobryidae

Pseudosinella aggtelekiensis (Stach); caves of the Slovak Karst; troglobite.

Pseudosinella pachti (Rusek); Western Carpathians caves; troglobite.

Isotomidae

Folsomia candida (Willem); parthenogenetic species with a large range in European caves and other habitats; troglophile.

Onychiuridae

Onychiurus kratochvili (Nosek); Dobsinská Ice Cave; troglobite.

Onychiurus troglophilus; troglophile.

Protaphorura janosik Weiner; caves in the Western Carpathians; troglobite.

Stenaphorura japygiformis Absolon; Plavecké pohradie Cave; troglophile.

Diplura

Campodeidae

Plusiocampa spelaea Stach; in Slovakian karst; troglobite.

Coleoptera

Carabidae

Revised by JEANNEL (1928) and HURKA (1996). Two genera. Four endemic species and 11 subspecies (8 troglobite and 3 troglophile) of *Duvalius* (subgenus *Duvalidius*) and one wide range troglophile species of *Trechoblemus* inhabit caves of Slovakian Karst. The troglophile species inhabit caves, chams, sinkholes, deeply embeded stones, ravines, seepages, forests mountains, sometimes grasslands and polonina lands.

Duvalius bokori (Csiki); endemic to Slovakian mountains Slovenské Rudohorie, Lower Tatras (Nizké Tatry) and Slovakian Karst; with 3 subspecies geographically isolated, morphologically distinguishable only by means of metrical characters of numerous specimens; single specimen are sometimes difficult to identify:

- *Duvalius bokori bokori* (Csiki); caves in Plesivecká planina (Ludmila Cave), and caves in Murávi plateau and Slovakian Paradis, collected also in chasms and under deeply embeded stones on limestone ; very rare and localized; troglophile;

- *Duvalius bokori gellidus* (Csiki) in the Silická plateau ; in Ladnica Ice cave and other caves, chasms and sinkholes on limestone ; rare; presumably troglobite;

- *Duvalius bokori valyianus* Bokor in caves on limestone of the Muránska plateau, Slovenské Rudohorie, but also in ravines, and under deeply embedded stones with range in the south northernmost part of eastern Slovak karst; troglophile.

An other subspecies inhabits banks of brooks in ravines and seepages.

Duvalius goemoeriensis (Bokor); endemic to Driencanský Karst in South Slovakia (Slizké Caves); only in limestone caves, about 300 m above sea level; troglobite.

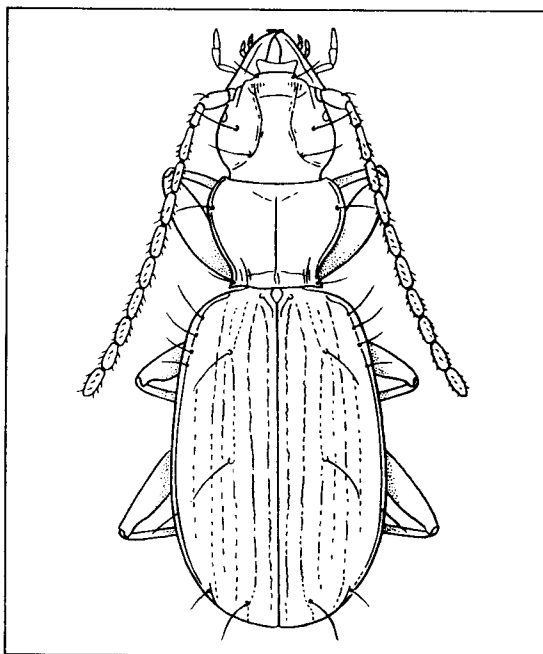


Fig. 5 - Coleoptera Carabidae. *Duvalius microphthalmus* Miller, 1859 (After Jeannel 1928, modified).

Duvalius microphthalmus Miller (fig. 5); endemic of Tatras (Slovakia and Poland), Mutranska planina, pol'ana Mts and Slovenske Rudohorie, which inhabits outside the caves under stones in mountains from about 900 m to 2000 m in the alpine zone, and with two troglobites and one troglophile subspecies:

- *Duvalius microphthalmus spelaeus* (Reitter) in and around the cave-system of the Demänovská-Tal in Lower Tatras (Nizké Tatry); troglobite;

- *Duvalius microphthalmus vorago* Hurka & Mlejnek ; isolated in the cave chasm of Mt Radzim in Revuka vrchovina group of Slovenské Rudohorie; troglobite;

- *Duvalius microphthalmus tatricus* Jeannel in the Tufna Cave in the southern part of the Wakischen karst, and in forest zone or subalpine pastures in Mala and Vel'ká Fatra, Kremnické vrchy, Trbec, Pohronský Inovec and Javorie; troglophile and soil subspecies.

Duvalius hungaricus (Csiki); endemic to the eastern part of Slovenské Rudohorie, Silická plateau, Slovakian Karst, and Aggtelek karst in Hungary, with three subspecies known only in caves and 1 (*D. h. slovavus* Hurka & Pulpan) endogeous-epigeous in forest zone:

- *Duvalius hungaricus brzotinensis* Janak; only from two caves of Plesivska planina, Slovakian Karst; troglobite;

- *Duvalius hungaricus hungaricus* (Csiki); slovak populations from one or two caves and one chasm in Silická planina; known from Aggtelek karst Mts in Hungary; troglobite;

- *Duvalius hungaricus sziliczensis* (Csiki); only known from three caves and their sinkholes in western part of Silická planina; due to their isolation, populations differ both in size and morphological features, as well as in abundance; troglobite.

Duvalius szaboi (Csiki); endemic to central part of Slovenské Rudohorie, with 1 epigeous [*D. s. veporensis* (Hurka *et al.*)] and 1 subspecies troglobite: *Duvalius szaboi szaboi* (Csiki); collected only in limestone cave Certova jaskyna near Banovo, 650 m a. s. l.; very rare.

Duvaliopsis pilosellus (Miller), with two subspecies only distinguishable by inner sac of aedeagus (*Duvaliopsis pilosellus poloninensis* Hurka and *Duvaliopsis pilosellus stobieckii* Csiki), is an epigeous species, rare and localised in forest, polonina grasslands, but collected also under deeply embedded stones, an habitat presumably near to M.S.S.

Trechoblemus micros (Herbst, 1784), wide range in Europe; troglophile species known in the Slovensky kras (Certova diem-Domica, Majkova Cave) and from variety of habitats (meadows, burrows of small mammals, lowlands to mountains, water shores with vegetation).

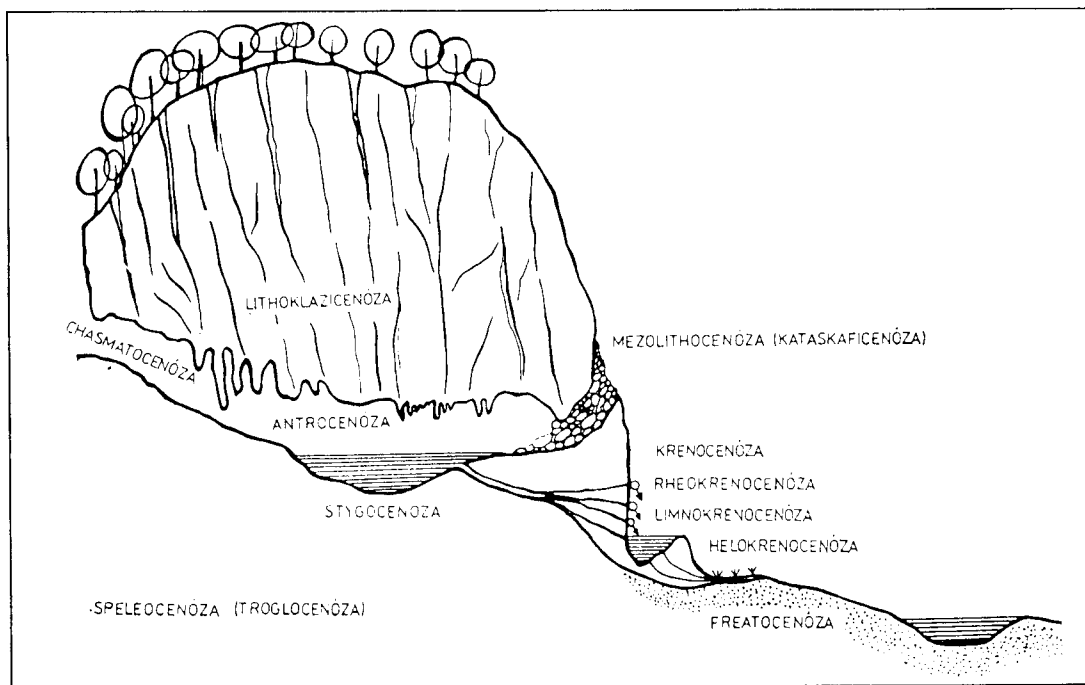


Fig. 6 - Diagram of the principal subterranean biocenosis (After Gulicka, 1978). Based on Dudich' terminology. Synonymie: chasmatocenoza = entrance biocenose.

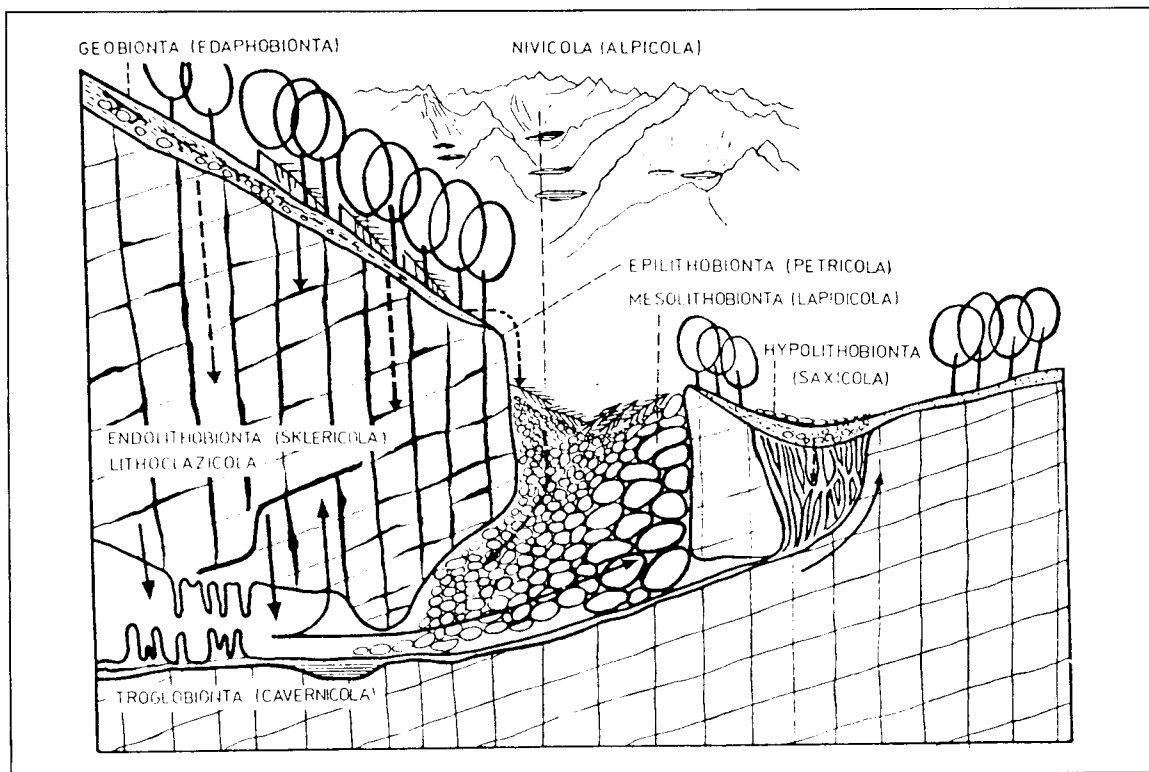


Fig. 7 - Diagram of the origin of the terrestrial troglobiont fauna. Dashing line = ways of penetration of the surface animals into the subterranean and caves environment. Full line = ways of penetration of troglobionts to the entrance, rocky debris, bores and rocky cracks (After Gulicka, 1978). Based on the Dudich's terminology. Note : mark-recapture method has demonstrated that the deep cracks in limestones (lithoclasts habitat) and caves are two parts of the same system inhabited by the same troglomite beetles. So, to day, the "lithoclazicenoza" is limited to the most outer part of the lithoclasts, inhabited by epigeic species, and described by Orghidan and Dumitresco (1964) in Dobrogea (Rumania).

Staphylinidae

Quedius mesomelinus (Marsham) ; troglophile, with large range.

Chiroptera

Bats roost and hibernate in Slovakian caves.

Rhinolophidae

Rhinolophus hipposideros (Bechstein) is a common species widely distributed in Slovakia. Altitudinal range is 100-1 488 m. In winter, it is recorded in 108 natural caves, 54 galleries and old mines. The average number of individuals in a winter roots is 22 ind. The most populated hibernacula were Kostolik cave (650-700 ind. in February 1955) and Netopierov cave (540 ind. in winter 1954/1955). The abundance of this species seems to be stabilized (1980-1995), except for Kostolik and Netopierov caves with a drastic decline at the beginning of 60s, caused probably by banding.

Rhinolophus ferrumequinum (Schreber) was recorded of 43 hibernacula in caves, 16 in old mines and galleries, and one in an abandoned railway tunnel Altitudinal range is 200-500 m a. s. l. The number of individual observed in hibernacula varied from 1 to 271. The abundance seems stable in a long-time period in the Jasovská cave in Slovensky karst.

Rhinolophus euryale Blasius. All hibernacula are natural caves. A high turnover during winter period is very characteristic of this species. The number of bats in a hibernaculum varies from 1 to colonies with a maximum number of 1 632 individuals. The area distribution is strictly delimited, and the Slovak *Rhinolophus euryale* is considered as an example of a quite isolated subpopulation.

Vespertilionidae

Miniopterus schreibersi Kuhl is recorded in around twenty caves, most of localities are within 200-400 m a. s. l. Only two breeding colonies (300 to 4 000 individuals), and one winter colony (1000 ind.) are known in Slovakia.

The other species are: *Myotis bechsteini* Kuhl; *Myotis blythi* Tomes; *Myotis brandti* Eversman; *Myotis dasycneme* Boie; *Myotis daubentoni* Kuhl; *Myotis emarginatus* Geoffroy; *Myotis myotis* (Borkhausen); *Myotis mystacinus* Kuhl; *Eptesicus nilsoni* Keyserling & Blasius; *Eptesicus serotinus* Schreber; *Barbastella barbastellus* Schreber which hibernate in caves from 0°C to 4°C; *Plecotus auritus* Linné; *Plecotus austriacus* Fische; *Pipistrellus pipistrellus* Schreber.

III. 4 - Ecology

GULICKA (1978) published about regional subterranean fauna in Slovakia, about origin of troglobionts and on classification of biocenosis in subterranean media. It was partly summarized in the diagrams fig. 6 and 7.

Cave terrestrial fauna consists mostly of troglophilic and guanobious species. Cave water fauna is territorially not so restricted as terrestrial fauna. Phreatobious and interstitial fauna, contrary to the cave terrestrial fauna, has low degree of endemism and most species has large range in Europe (KOŠEL, 1997).

III. 5 - Regionalisation of the cave and karst fauna

Within the Western Carpathians (Slovakia, Hungary, Poland, Czech Rep.), three main geographic karst supraregions can be recognized. Gemersko-bukkovsko-spisky supraregion has the most characteristic cavernicolous and surface fauna with many relict and endemic taxons. It is divided into eight further parts-regions; the most important is the Slovak-Aggtelek Karst Mts which can be considered to be the evolutionary centrum for the cavernicolous fauna in the frame of the Western Carpathians (KOŠEL, 2000).

BIBLIOGRAPHY

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BELLA, P. and J. HLAVAC - 1993 - Tables of longest and deepest Slovakian caves, state at 31. 12. 1992). <i>Speleoforum</i> , 93. p. 59-60 (In slovak). | BRTEK, J. - 1966 - Dalsie nálezy <i>Bathynella natans</i> Vejd. a <i>Parabathynella stygia</i> Chapp. na Slovensku a niekoľko poznámok k novým poznatkom o rozšírení oboch druhov. <i>Acta Rer. natur. Mus. nat. Slov.</i> , Bratislava, 12, 1, p. 119-121. |
| BELLA, P. and D. JANCOVIC - 1993 - Caves in the Svarinka Valley in the northeastern part of Low Tatra Mts. <i>Slovensky Kras</i> , 31, p. 83-91 (In slovak). | BRTEK, J. - 1994 - The occurrence of Bathynellacea species (Malacostraca) in Slovakia. <i>Zbor. Slov. Múz., Prir. Vedy</i> , 40, p. 195-199. (In slovak). |
| BOKOR, E. - 1922 - Die nordwester ungarischen <i>Duvalites</i> (Col.). <i>Entomol. Blätter</i> , 18, p. 129-137. | BYSTRICKY, J., MAZUR, E. and J. JAKAL - 1972 - Karst in Czechoslovakia, p. 297-325. In: M. Herak and V. T. Springfield (eds.), <i>Karst</i> . Elsevier Publ. Comp., Amsterdam. |
| BOKOR, E. - 1925 - Notizen über einzelne Trechinae. <i>Entomol. Mitteil.</i> , 14, p. 362-368. | CARAUSU, S., DOBREANU, E. and C. MANOLACHE - 1955 - Crustacea. Amphipoda. In: |
| BREZINA, Z. and J. VOTOCEK - 1989 - Show Caves in Czechoslovakia. <i>Proc. Int. Symp. Cave Tourism</i> , Postojna, 1988, p. 24-28. | |

- Fauna R. P. R.*, ed. Acad R. P. R., Vol. 4, fasc. 4, 407 pp.
- CSIKI, E. - 1912 - Coleoptera nova in Hungaria. **Ann. Mus. nat. Hung.**, 10, p. 510.
- CSIKI, E. - 1946 - *Die Käferfauna der Karpaten-Beckens*. Budapest, 798 pp.
- DROPPA, A. - 1957 - *Die Höhlen Demänovské Jaskyne*. Slovakian Acad. Science, Bratislava, 289 pp.
- DROPPA, A. - 1966 - Characteristics of the karst region in the Carpathians. **Probl. Speleol. Res.**, 2, p. 23-30.
- DROPPA, A. - 1967 - Karsterscheinungen im Tale des Flusses Biely Vah. **Geograf. Casopis**, 2, p. 141-153.
- DUCHAC, V. and R. MLEJNEK - 2000 - Records of the Pseudoscorpion *Neobisium (Blothrus) slovacum* (Neobisiidae) in caves and Chasms of the Slovak karst, p. 15-20. In: A. Mock, L. Kovac and M. Fulin (eds.), *Fauna jaskyn. Kosice*.
- DUDICH, E. - 1933 - Klassifikation der Höhlen auf biologischer Grundlage. **Mitt. Höhl. - u. Karstforsch.**, 3, p. 35-43.
- FRANKENBERGER, Z. - 1939 - O jeskynnim Iso-podu *Mesoniscus graniger* Friv. z Domice. **Vestn. Král. ces. spol. nauk. tr. mat. přír.**, p. 1-12.
- GABEL, B., KOSEL, V. and A. KRISTIN - 1978 - *Digitivalva (Inuliphila) pulicariae* (Klimesch, 1956) eine neue troglophile Art der slowakischen Fauna. **Biológia, Bratislava**, 32, 2, p. 157-159.
- GAISLER, J. and V. HANÁK - 1973 - Aperçu des Chauves-souris des grottes slovaques. **Slovensky Kras**, 11, p. 73-84.
- GULICKA, J. - 1954 - O karpatskom endemickomrode *Allorhiscosoma* (Verhoeff) (Diplopoda: Ascospermophora). **Biológia SAV**, 9, 1, p. 65-82.
- GULICKA, J. - 1975 - Fauna slovenských jaskyn. **Slovensky Kras**, 13, p. 37-85.
- GULICKA, J. - 1977a - *Neobisium (Blothrus) slovacum* sp. n. eine neue Art des blinden Höhlen-afterskorpions aus der Slowakei (Pseudoscorpionidae). **Annot. Zool. Bot., S. N. M., Bratislava**, 117.
- GULICKA, J. - 1977b - Kotázke vyskytu pravých troglobiontov v slovenských jaskyniach. **Slovensky Kras**, 15, p. 23-29.
- GULICKA, J. - 1978 - Kotázke pôvodu troglobiontov a klasifikácie jaskyných spoločenskíev. **Slovensky Kras**, 16, p. 69-93.
- GULICKA, J. - 1982 - Biospeológia, p. 159-189. In: J. Jakal, *Praktická Speleológia*.
- GULICKA, J. - 1985 - Pôdna a jaskynná makrofauna krasových pohorí západných Karpá. **Biospeologica slovacica n° 9. Slovensky Kras**, 23, p. 89-129.
- HANÁK, V., GRAISLER, J. and J. FIGALA - 1962 - Results of bat-banding in Czechoslovakia 1948 - 1950. **Acta Univ. Carol. Praha, Biol.**, 1, p. 9-87.
- HRABE, S. - 1942 - O benlické zvirne jezr ve Vysokých Tatrách. **Physiographica slovacica**, 1, p. 124-177.
- HURKA, K. - 1996 - *Carabidae of the Czech and Slovak Republics*. Kabourek, 565 pp.
- HURKA, K., JANÁK, J. and P. MORAVEK - 1989 - Neue erkenntnisse zur Taxonomie, Bionomie und Verbreitung der slowakischen und ungarischen *Duvalius*-Arten (Coleoptera, Carabidae, Trechini). **Acta Univ. Carol. Praha, Biol.**, p. 353-400.
- JANÁČEK, J. - 1941 - Morphological-hydrological observations in the Turna River Basin. **Rozpravy Cesk. Akad.**, Ser. 2, 2, 5, p. 1-17.
- JEANNEL, R. - 1926 - Monographie des Trechinae. **L'Abeille**, 32, p. 221-350 ; 33, p. 1-592 ; 34, p. 59-122 ; 35, p. 1-808.
- KEMENY, A. - 1961 - Geomorphological conditions of the Koniar Plateau. **Geograf. Casopis**, 2, p. 104-139.
- KOMAREK, J. - 1953 - Beispiele der Aufspaltung der Art, insbesondere bei Höhlentieren. **Schweiz. Z. Hydrolog.**, 15, 2, p. 164-274.
- KORBEL, L. - 1955 - *Duvalius bokori* Csiki (Col. Carab.) na Silickej plosine. **Biológia, Bratislava**, 10, p. 3.
- KORBEL, L. - 1960 - Príspevok k poznaniu chrobákov (Coleoptera) juhoslovenského krasu. **Slovensky Kras**, 3, p. 63-73.
- KORBEL, L. - 1965 - K poznaniu bystruskovitých (Coleoptera, Carabidae) Slovenského krasu. **Slovensky Kras**, 5, p. 49-57.
- KOSEL, V. - 1974 - (On fauna in our caves). O zivcisstve našich jaskyn. **Spravodaj Slov. Speleol. spol.**, 2, p. 17-20 (In slovak).
- KOSEL, V. - 1975a - [Faunistic investigation in the chasm of Brázda (Barazdalás) in the Slovakian Karst Mts]. Faunisticky prieskum v priespaci Brázda (Barazdalás) v Slovenskom krase. **Slovensky Kras**, 13, p. 181-185 (In slovak).
- KOSEL, V. - 1975b - [Origine of *Haemopsis sanguisuga* (Hirudinea) in the cave system of Domic-Baradla]. O povode pijavic konych (Hirudinea) v jaskynnem systéme Domic-Baradla]. **Slovensky Kras**, 13, p. 191-193 (In slovak).
- KOSEL, V. - 1976 - (Fauna of the Bear Cave in the Slovak Paradise Mts; the western Carpathian). Fauna Medvedej jaskyne v Slovenskom raji (Západné Karpaty). **Slovensky Kras**, 14, p. 105-113 (In slovak).
- KOSEL, V. - 1977 - (Faunistic investigation in the cave of Javorinka; the Vysoké Tatry Mts). Faunisticky prieskum v jaskyni Javorinka (Vysoké Tatri). **Spravodaj Slov. Speleol. spol.**, 4, p. 20-22 (In slovak).
- KOSEL, V. - 1980 - *Rhyacodrilus carsticus* sp. n.; (Oligochaeta Tubificidae) from the Slovakian Karst. (Biospeologica Slovaca n° 7). **Biológia, Bratislava**, 35, 8, p. 609-612.
- KOSEL, V. - 1982 - Aquatic Oligochaets from caves and karst springs of the Slovakian Karst.

- Stygo News**, 3, 2, p. 5.
- KOŠEL, V. - 1983a - Preliminary report on aquatic oligochaets from springs and caves of Slovakian karst. **Proc. Europ. Region. Conf. Speleol.**, Sofia, 1980, p. 131-133.
- KOŠEL, V. - 1983b - (Recent problems in karst documentation with special reference to karst fauna and flora). Súčasné problémy dokumentácie krasu so zameraním na krasovú faunu a flóru. **Spravodaj Slov. Speleol. spol.**, 14, 2, p. 28-30 (In slovak).
- KOŠEL, V. - 1984 - (Present status of knowledge on fauna caves of the Slovensky raj Mts). Súčasný stav poznania fauny v jaskyniach Slovenského raja. **Spravodaj Slov. Speleol. spol.**, 15, 1, p. 38-40 (In slovak).
- KOŠEL, V. - 1985 - (Classification of cave-like forms from the biological point of view). Klasifikácia jaskynovitých útvarov z biologického hľadiska. **Spravodaj Slov. Speleol. spol.**, 16, 1-2, p. 28-29 (In slovak).
- KOŠEL, V. - 1992 - (Underground biotops in Slovakia). Pozemné biotopy. Biotopy Slovenska. **Ústav krajinej ekol. SAV**, p. 107-108 (In slovak).
- KOŠEL, V. - 1994a - (Fauna of karst waters). Zivocísstvo krasovych vôd, p. 235-240. In: M. Rozložnik and E. Karasova (eds.), *Slovensky kraschránená krajinná oblasť - biosférická rezervácia*. Osteva, Martin.
- KOŠEL, V. - 1994b - (Fauna in caves). Zivocísstvo jakyn, p. 241-245. In: M. Rozložnik and E. Karasova (eds.), *Slovensky kraschránená krajinná oblasť - biosférická rezervácia*. Osteva, Martin.
- KOŠEL, V. - 1997 - Characteristics of underground fauna in Slovakia. **Proc. 12th int. Congr. Speleol.**, Switzerland, 3, p. 310.
- KOŠEL, V. - 1998 - Charakteristika podzemnej fauny slovenska s náhrom na faunistické regióny. **Liptovský Mikuláš**, p. 63-66.
- KOŠEL, V. - 2000 - Regionalisation of the cave and karst fauna of the western Carpathians, p. 67-34. In: Mock, Kovac and Fulin (eds.), *Cave Fauna*. Kosice.
- KOŠEL, V. and M. HORVÁTH - 1995 - Spatial and temporal distribution of family Limoniidae (Insecta, Diptera) in a cave of the Western Carpathians (Slovakia). **Dipterologica bohemoslov**, 7, p. 97-109.
- KOŠEL, V. and M. HORVÁTH - 1996 - Temporal and spatial dynamics of Nematocera (Insecta, Diptera) in a cave of the Western Carpathians (Slovakia). **Acta zool. Univ. Comeniana**, 40, p. 75-114.
- KOŠEL, V. and V. MARTINEK - 1989 - Summer synusie and distribution of the family Heleomyzidae (Insecta, Diptera) in a cave of the Western Carpathians. **Proc. 10th int. Congr. Speleol.**, Budapest, 1, p. 281-283.
- KOŠEL, V. and V. MARTINEK - 1990 - Summer populations of the Heleomyzidae (Diptera) in a cave of the Western Carpathians. **Abstr. 2nd Int. Congr. Dipterology**, Bratislava, p. 120.
- KOŠEL, V. and J. MARTINOSKY - 1994 - Tipulidae (Diptera) from the caves in the Western Carpathians (Slovakia). **Acta zool. Univ. Comeniana**, 38, p. 27-34.
- KOŠEL, V., ZATWARNICKI, A. and M. HORVÁTH - 1997 - The first Ephydriidae (Diptera) from the cave habitat in Slovakia. **Acta zool. Univ. Comeniana**, 41, p. 37-38.
- KOVÁČ, L. - 1992 - Pôdne článkonozce (Arthropoda) Dreveníka. III. Chvostoskoky (Collembola). **Zborník Vsl. Múzea, Kosice, prírodné vedy**, 32-33, p. 131-139.
- KOVÁČ, L. - 1997 - Aktuálny stav vyskumu bezstavovcov jaskyn Slovenského.
- KULLMAN, E. - 1964 - Karstgewässer in der Slowakei und deren hydrogeologische Durchforschung. **Geol. Prace, Zpravy**, 32, p. 9-28.
- LALKOVIC, M. - 1993a - Beitrag zur den Anfängen des Interesses für die Höhlen in der Slowakei. **Slovensky Kras**, 31, p. 61-74 (In slovak; germ. and engl. summaries).
- LALKOVIC, M. - 1993b - 110th Anniversary of opening of the Belianska Cave. **Sinter**, 1, p. 26 (In slovak).
- LALKOVIC, M. - 1993c - Demänovská Ice Cave and its opening in 1952. **Sinter**, 1, p. 27-28 (In Slovak).
- LOUCEK, D. - 1956 - The Alpine karst in Dumbier (Low Tatra). **Rozpravy Cesk. Akad. Nauk**, 3, p. 45.
- LOZEK, V. - 1948a - Makkyse juhoslovenskeho krasu. **Prírod. sborník SAVU**, 3, 2-3, p. 87-116.
- LOZEK, V. - 1948b - Makkyse Muranskeho krasu. **Prírod. sborník SAVU**, 4, p. 119-158.
- LOZEK, V. - 1950 - Malakozoologické vyskumy v Malých Karpatoch. **Prírod. sborník SAVU**, 5, p. 20-57.
- LOZEK, V. - 1954 - Mekkyse vrchu nad jeskyni Domicou a jejich význam pro poznání paleogeografie Jihoslovenského krasu. **Cs. Kras**, 7, p. 65.
- LOZEK, V. and J. BRTEK - 1964 - Neue *Belgrandiella* aus den Westkarpaten. **Arch. Moll.**, 93, 5/6, p. 201-207.
- LUKNIS, M. - 1962 - Geomorfologický prehľad. Vysvetlivky k prehľad. geologickej mape C.S.S.R. 1/200,000. **List Rimavska Soboty**, 1, p. 81-88.
- MAZUR, E. - 1962 - Die Formen des Hochgebirgskarst in den Cervené vrchy (Westliche Tatra). **Geograf. Casopis**, 2, p. 87-104.
- MAZUR, E. - 1963 - *The Zilina Basin and the Adjacent Mountains*. Slovakian Acad. Science, Bratislava, 185 pp.
- NOSEK, J. - 1960-1964 - Apterygota z ceskoslovenských pud. I. - V. **Folia zoologica**, 9, 4, p. 353-387; 10, 2, p. 147-177; 11, 2, p. 161-182; 11, 4, p. 335-354; 13, 1, p. 73-84.

- NOSEK, J. - 1962 - The Collembola from the cave Plavecké Podhradie in Small Carpathians. **Acta Soc. Entomol. Cechosloveniae**, 59, 1, p. 12-17.
- NOSEK, J. - 1975a - A contribution to the knowledge of the collembolan fauna in the Domica Cave (SE Slovakia). **Vestn. Cs. Zool. Spol.**, 39, 3, p. 220-223.
- NOSEK, J. - 1975b - *Arrhopalites slovacicus*, a new species of Collembola from the Domica Cave. **Revue Suisse Zool.**, 82, 3, p. 599-602.
- NOVOTNY, L. - 1993 - Tertiary cave levels and planation surfaces in the Slovak Paradise. **Slovensky Kras**, 31, p. 55-59 (In slovak; engl. abstract).
- ORGHIDAN, T. and M. DUMITRESCO - 1964 - Données préliminaires concernant la faune des espaces lithoclasiques des schistes verts de Dobrogea. **Spelunca, Mém.**, 4, p. 188-196.
- ORSZÁGH, I. and V. KOŠEL - 1995 - Redescription of *Atrichopogon trifasciatus* (Diptera Ceratopogonidae). collected in three caves of Slovakia. **Acta zool. Univ. Comeniana**, 39, p. 39-44.
- ORSZÁGH, I., KOŠEL, V. and Z. ORSZÁGHOVÁ - 1994 - [Contribution to the knowledge of Centipeds (Tracheata, Chilopoda) from caves in Slovakia]. Príspevok k poznaniu stonožiek (Tracheata, Chilopoda) jaskyn Slovenska. **Slovensky Kras**, 32, p. 79-90 (In slovak).
- PACLT, J. - 1956 - Diplura Slovenska a prilahlych oblasti. **Biol. práce**, Bratislava, III, 2, p. 5-25.
- PACLT, J. - 1957a - Collembola z kvaplovej jaskyne, "Dúrna diera" v Strazovských vrchoch. **Ac. Rer. natur. Mus. slov.**, 3, 2, p. 1-6.
- PACLT, J. - 1957b - Über die Collembolen Fauna der slowakischen Höhlen. **Beitr. Entomol.**, 7, 3/4, p. 269-275.
- PETKOVSKI, T. K. - 1966 - Ostracoden aus einigen Quellen der Slowakei. **Acta Musei maced. scient. nat. Skopje**, 10, 4, p. 91-107.
- PIRCOVÁ, E. and Z. VOSTAL - 1967 - Príspevok k poznaniu slimákov Silickej tadnice. **Acta Mus. slov. reg. orient. Kosice**, ser. B, 8, p. 173-176.
- REITTER, E. - 1869 - Eine Exkursion ins Tatra-gebirge im Jahre 1869. **Verh. Natur. Ver. Brünn**, 8, 1, p. 3-25.
- REMY, P. - 1948 - Sur quelques Crustacés cavernicoles d'Europe. **Notes Biospéol.**, 3, p. 35.
- ROTH, Z. - 1939 - Nekolik geomorfologických poznámek o Jihoslov krasu a Silické Lednici. **Rozpravy Cesk Akad.**, Ser. 2, 49, 8, p. 1-24.
- ROUBAL, J. - 1930-1941 - *Katalog Coleopter Slovenska a Podkarpatska*. I - III. Praha, Bratislava.
- RUSEK, J. - 1961 - Eine neue Collembolenart aus den slowakischen Höhlen (Collembola). **Beitr. Entomol.**, 11, 1/2, p. 21-23.
- STRASKRABA, M. - 1956 - *Niphargus foreli carsi-*cus n. subsp. (Crustacea, Amphipoda) aus der Tschechoslowakei. **Vestn. Cs. Zool. Spol.**, 20, 3, p. 279-284.
- STRASKRABA, M. - 1962 - Amphipoden der Tschechoslowakei nach den Sammlungen von Prof. Hrabé. I. **Vestn. Cs. Zool. Spol.**, 26, 2, p. 117-145.
- STERBA, O. - 1955 - Príspevek k poznání korysu nekterych krasovych vod Slovenska. **Spisy Přírod. fak. Mas. univ. v. Brne**, 365, p. 1-6.
- STERBA, O. - 1962 - Copepoda z intersticiálních vod náplavů nekterych slovenskych toku. **Biológia Bratislava**, 17, 12, p. 893-902.
- STERBA, O. - 1964 - Plazivky (Copepoda, Harpacticoida) Moravy a Slovenska. Část I. **Acta Univ. Palackiana Olomucensis**, Fac. rer. nat., 16, p. 203-321.
- STERBA, O. - 1969 - Über die geographische Verbreitung der Harpacticiden (Copepoda, Harpacticoida) in der Tschechoslowakei. **Vestn. Cs. Zool. Spol.**, 33, 2, p. 162-173.
- UHRIN, M. - 1993 - Note to population of bats (Chiroptera) in hibernating places of the Slovak karst. **Zbor. Vychodoslov Múz v Kosiach, Prir. Vedy**, 34, p. 151-162.
- UHRIN, M. and G. LESINSKY - 1997 - Mechanisms of occurrence of Amphibians in an underground spaces in Slovakia: preliminary data evaluation. **Proc. 12th int. Congr. Speleol.**, Neuchâtel, Symp. 9: Biospeology, 3, p. 325-327.
- UHRIN, M., DANKO, S. and J. OBUCH - 1995 - Distributional patterns of bats (Mammalia: Chiroptera) in Slovakia. Part II - *Myotis dasycneme* and *Myotis daubentoni*, p. 33-43. In: *Vyskum o ochrana cicavcov na Slovenska II (Research and conservation of mammals in Slovakia II.)* Banské Bystrica: SAZP, 112 pp.
- UHRIN, M., LEHOTSKÁ, B., BENDA, P., LEHOTSKI, R. and S. MATIS - 1997 - Rozsínie netopierov na Slovensku. Časť 3, *Miniopterus schreibersi*. **Vespertilio**, 2, p. 113-130 (In slovak, english summary).
- UHRIN, M., DANKO, S., OBUCH, J., HORÁČEK, I., PACENOVSKY, S., PJENČÁK, P. and M. FULÍN - 1996 - Distributional patterns of bats (Mammalia: Chiroptera) in Slovakia. Part 1, Horseshoe bats (Rhinolophidae). **Acta Soc. Zool. Bohem.**, 60, p. 247-279.
- VACHOLD, J. - 1957a - Netopiere jaskyn Jasovskozadielsko krasu. **Biológia, Bratislava**, 12, p. 195-202.
- VACHOLD, J. - 1957b - Netopiere jaskyn Tisovskomuránskeho krasu. **Biológia, Bratislava**, 10, p. 735-743.
- VACHOLD, J. - 1961 - K pomerom hibernácie netopierov v jaskyniach Demänovského krasu. **Slovensky Kras**, 3, p. 59-67.
- ZAJONC, I. - 1963 - Príspevok k poznaniu fauny krasovej oblasti Strážovskej hornatiny. **Slovensky Kras**, 4, p. 75-85.

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TOME III

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