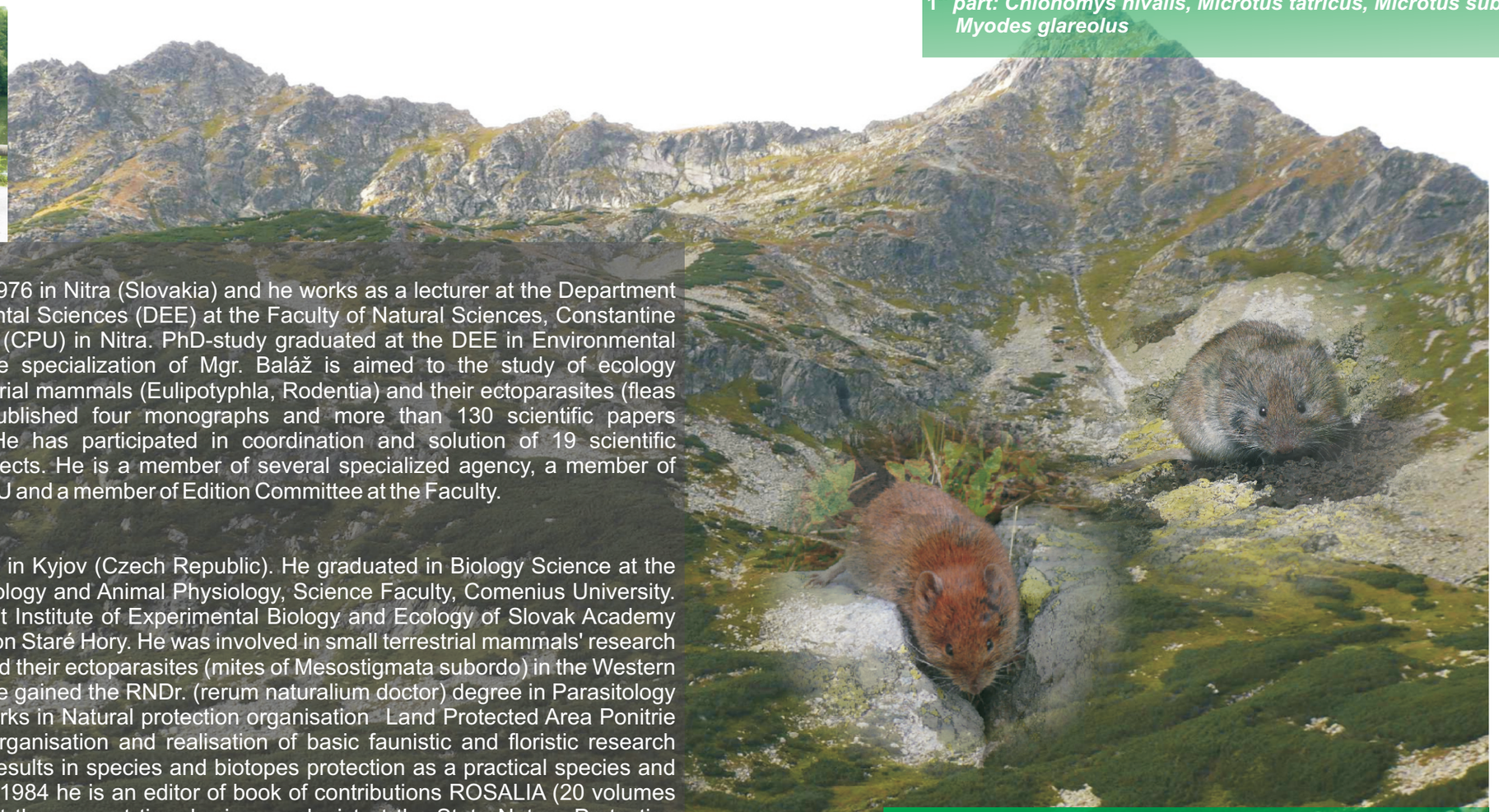
FACULTY OF NATURAL SCIENCES

CONSTANTINE THE PHILOSOPHER UNIVERSITY IN NITRA

DISTRIBUTION AND BIOLOGY OF MURIDAE FAMILY (RODENTIA) IN SLOVAKIA.

1st *part: Chionomys nivalis, Microtus tatricus, Microtus subterraneus, Myodes glareolus*



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CONSTANTINE THE PHILOSOPHER UNIVERSITY IN NITRA

DISTRIBUTION AND BIOLOGY OF MURIDAE FAMILY (RODENTIA) IN SLOVAKIA. 1ST PART: *CHIONOMYS NIVALIS, MICROTUS TATRICUS, MICROTUS SUBTERRANEUS, MYODES GLAREOLUS*

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CONTENT

FOREWORD

This work contains up to date knowledge about the biology, ecology and occurrence of 4 species from the Muridae family and Arvicolinae subfamily (*Chionomys nivalis, Microtus tatricus, Microtus subterraneus, Myodes glarelus*).

Results of this study are based on processing vast amounts of data (the largest amount to date from the Slovakian / Western Carpathians and Panonian Plain) of the following species (172 *Chionomys nivalis,* 148 *Microtus tatricus*, 3369 *Microtus subterraneus* and 18714 *Myodes glareolus*) from many locations covering most Slovakian territories.

The amount of processed data is producing more precise knowledge about reproduction (the beginning and the end of reproduction cycles during a year, the numbers of embryos in pregnant female's wombs) and about body measurements and weight (Degree of variance of physical characteristics, differences in body measurements between sexes and age groups). For evaluation statistical methods were used (variance analysis ANOVA, Fisher´s F-test, Student´s t-test).

This paper summarises the results of secular research into small terrestrial mammals undertaken from 1974 to 2009 by researchers from the Institute of Experimental Biology and Ecology at the Slovak Academy of Science in Staré Hory and from the author's own research (Land Protected Area Ponitrie office and the department of Ecology and Environmental science FNS, UKF in Nitra).

The Slovak nomenclature from LUPTÁK (2003) was accepted when using Slovakian names for species.

We would like to express our gratitude to our friends, RNDr. Andrej Stollmann and prof. RNDr. Alexander Dudich, CSc., for enabling access to the majority of data that we needed about the Muridae family.

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INTRODUCTION

Voles (*Microtus*) represent the youngest group of rodents. They have been documented since the lower Pliocene and since the lower Pleistocene their diversity became very high. *Microtus* species have a wide variety of environmental preferences, which enables their distribution worldwide, but mainly in the northern hemisphere. Voles can be found in steppe, forest, mountain or wetland ecosystems, but most of the species prefer open grass areas like meadows or pastures (MITCHELL-JONES et al. 1999, NOWAK 1999).

Voles (*Microtus*) are small terrestrial mammals, which are a reliable model species to research populations of wild animals. Observing and population structure recognition of small terrestrial mammals are important due to a monitoring of changes in nature. The richness of knowledge about this group of animals is determined by their widespread distribution, high number of individuals and mainly due to their high rate of reproduction. They are playing important role as reservoires lot of parasitic and (viral) microbial diseases infections. Individual species and theirs communities are sensitive to some changes along vertical gradient, which means that due to a rising sea level the habitat types are changing and it enables survival of species with diverse ecological niches. Though, each species prefers specific environment, which comprehensively secures their survival and reproduction at their habitat.

Among the individual species we can find the bank vole (*Myodes glareolus*), which has a vast distribution range and isn't endangered. It can be found in almost all forest and non-forest habitats in scrub or grass biotopes. Similar biotopes are populated by pine voles (*Microtus subterraneous*). Our relict endemites such as snow voles (*Chionomys nivalis*) and tatra voles (*Microtus tatricus*) are species living (or mostly) above the forest boundary and belonging to mountainous or high mountainous vole species.

Systematically we classify the species of *Microtus, Chionomysl* and *Myodes* genus into the *Muridae* family and subfamily *Arvicolinae*.

The aim of this work is to research chosen biological and ecological characteristics of our 4 autochthonous species of small terrestrial mammals (*Chionomys nivalis, Microtus tatricus, Microtus subterraneus, Myodes glareolus*). By processing large amount of data from different parts of Slovakia we should gain a fuller picture about their distribution in Slovakia

The main aims are as follows:

- To gain data on the distribution of vole species in Slovakia
- To evaluate the data about reproductive behaviour and potential of vole species in Slovakia
- Statistically analyse the biometry of somatic characteristics of the species observed

Ecosozological status of vole species (*Chionomys*, *Microtus* sp.)

Chionomys nivalis and *Microtus tatricus* belong to species of national importance (according to a declaration of MŽP SR č. 24/2003 Z. z., which forces the Law No. 543/2002 Z.z. o ochrane prírody a krajiny (about the nature and landscape protection) according to § 5 – in sound of Law No. 525/2003 Z.z., Law No. 205/2004 Z.z., Law No. 364/2004 Z.z., Law No. 587/2004 Z.z., Law No. 15/2005 Z.z., Law No. 479/2005 Z.z.). The species of national importance are regarded as original protected animal species.

Mountainous species (*Chionomys nivalis, Microtus tatricus*) are on the red list of Slovak mammals (ŽIAK & URBAN 2001) listed as vulnerable species (VU).

These species are also listed in the Bern convention „The Convention on the Conservation of European Wildlife and Natural Habitats“, while *Chionomys nivalis mirhanreini* Schaefer, 1935 is listed in Bern3 - Protected Fauna Species (Appendix III contains species that are in need of protection but may be hunted or otherwise exploited in exceptional instances) and *Microtus tatricus* in Bern2 - Strictly Protected Fauna Species (Appendix II).

Distribution, occurrence and characteristics of voles (*Chionomys*, *Microtus* sp.)

The voles of *Microtus* family Schrank, 1798 are ecologically very diverse herbivorous small mammals, which occurred in many Holarctic habitats. Out of total 81 species, 10 is endemic in Europe, 8 in Eurasia, 6 in Asia and 1 species is endemic in Holarctic ecozone. The *Chionomys* genus Miller, 1896 was separated from the Microtus and it is represented by 3 species, and there is only one species *Chionomys nivalis* living in Slovakia.

Subgenus *Microtus* consists of two lines formed by two groups – arvalis group (common voles) and socialis (social voles). Monophyly of the Palearctic pitymyid voles, *Terricola* subgenus, was supported and this subgenus was split into two monophyletic groups of species. Based on knowledge of molecular phylogenetics and evolution (JAAROLA et al. 2004) we group in our *Microtus* species into 4 subgenuses: *Microtus* (*Microtus arvalis*), *Terricola* (terrestrial voles, *Microtus subterraneus, Microtus tatricus*), *Agricola* (*Microtus agrestis*), *Pallasiinus* (*Microtus oeconomus*). Pitymyid forms of voles were separated to two forms, Nearctic (*Pitymys*) and Palearctic (*Terricola*).

Chionomys is represented by only three species settling in mountainous regions of Europe, Asia Minor and parts of western Asia (NADACHOWSKI 1991). The snow vole *Chionomys nivalis (*Martins, 1842) is thought to be a glacial relict (AMORI 1999) and belongs to a group of relatively big voles (above 70 g). In general it appears high in mountains above the forest boundary (1000 – 4700 metres above sea level) and is discontinuously spread from south-west Europe to Iran (KRAPP 1982). Its distribution in Europe includes the altomontan mountains or woodless rocky habitats (landscapes) of south-east France, Spain (Pyrenees), Alps, the Carpathians, Balkan Mountains, Caucasus, Turkey, Israeli, Lebanon, Syria and Iran (MITCHELL-JONES et al. 1999, CORBET 1978). Lowland populations are also recorded in southern Europe: Spain, Mediterranean France, Italy, and Balkan Peninsula. The snow vole does not inhabit only high mountains, but also lowlands in the Mediterranean region, its vertical distribution ranges from 30 m a. s. l. in Croatia (KRYŠTUFEK & KOVACIC 1989) up to more than 4000 m a. s. l. in the

Alps (ZIMMERMANN 1953, NAPPI 2002). The highest recorded 4700 m a. s. l. in the Western Alps (SAINT GIRONS 1973).

Due to fragmentised mountain habitats and polymorphism of species, many forms have been described, e.g. KRATOCHVÍL (1981) distinguished 21 species. For theTatra region the Snow Tatra vole – *Chionomys nivalis mirhanreini* (Schäfer, 1935) was described. The distribution of the snow vole in Slovakia is found mostly in alpine zone of the highest mountains, about 1400 – 2000 metres above sea level. It is a rare representative species of our high mountainous fauna. Therefore it can be seen not only above the forest boundary in grassy meadows where enough rocks and boulders can be found, (but does occur in lower forest belts too depending on succession stand of vegetation). According to surveys, the snow voles are migrating lower to the dwarf-pine zone, where it can find food under the long term snow cover. Its diet consists of plants and dried plant remains (mainly grasses) which are stored through the winter in their nests under boulders. Their reproduction period lasts from approximately April to August. The snow vole gestation lasts about 20 to 22 days (KAHMANN & HALBGEWACHS 1962). During this period, the female has youngs only twice and their number in one litter is small, in average 3 embryos (KRATOCHVÍL 1981). After 13 days, the cubs open their eyes and they become independent after 4-5 weeks. Carnally, they become adult and capable of reproduction in the second year after hibernation. Some females born at the beginning of summer are able to have a litter by the end of the season; males are sexually active only during the next summer (FRANK 1954). The adult female home territory generally does not overlap. Until the beginning of winter, the young use a part of their mother's home territory but sometimes move around. The home territory of an adult male can overlap one or more adult female home territories (BOCCHINI & NIEDER 1994b). Females rarely survive after the end of their second summer, but BOCCHINI & NIEDER (1994b) have recaptured a 20 month-old female. Males do not live longer than 24 months. Snow voles occupy a stable microhabitat and show little variations in population density, life expectancy of adults, low fertility and delayed sexual maturity because they are more k-strategists than the other voles, namely the *Microtus* species (NIEDER & BOCCHINI 1993. The territorial activity is fixed to rocky areas within alpine meadows. It lives in small colonies and it is active both during the day and nocturnally. During the day it can be observed warming up on heated boulders. (FERIANCOVÁ-MASÁROVÁ & HANÁK 1965). All of the studies about vole´s habitats show that snow voles live in rocky environments (screes, moraines, quarries, river canyons), in open habitats (ZIMMERMANN 1953, SAINT GIRONS 1973, KRYŠTUFEK & KOVACIC 1989, BOCCHINI & NIEDER 1994b) and also close to small rivers (SAINT GIRONS 1973). The snow vole is very rare in mountain forests (KRYŠTUFEK & KOVACIC 1989). MARTÍNKOVÁ et al. (2003) studied the habitat selection of small mammals in the landscape of subalpine zones in the Western Tatra Mountains and found out that *Chionomys nivalis* populates the areas covered by rocks, height of shrubs and trees. The probability of inhabitation by *Chionomys nivalis* increases with higher values of area covered by rocks, and lower values of shrubs and trees. The snow vole is one of the most appropriate species that can be used as a bio monitor for environmental assessment in mountain areas (METCHEVA et al. 2008). KOCIAN & KOCIANOVÁ (2002), KOCIANOVÁ & KOCIAN (2002) describes the history of *Chionomys nivalis* research in Carpathians. The first published data about snow voles from the Carpathians are recorded by MOJSISOVIC (1897), who mentions snow voles from the Eastern Carpathians (palin terrain by Stanislava, nowadays called Ivano-Frankovska) under the name *Arvicola nivalis.* However, this

classification is regarded as incorrect in nowadays. The oldest documented snow vole from this region is in the Lviv State Natural History Museum, recorded from 1907 (Čornogorie, hora Pozyzevska). This exemplar was given to the museum from Huppenthal. The first vole captured in the Western Carpathians was held by A. Kocyan. He does not mention snow voles concretely in his published works (1867, 1887/1888), but he describes a few rodents, which he couldn´t identify but he put them into the Arvicola genus. In his unpublished documentary materials – in preparatory journals and diaries, there are a few details about rodents recorded under the name *Arvicola*, respectively "mysz alpines", which preferably could be *Chionomys nivalis.* His individuals from the museum in Poprad were found and reclassified by HANZÁK (HANZÁK & ROSICKÝ 1949) who confirmed that they belonged to the snow vole species.

Another relict endemic species, recorded at first only in the Tatra region, but later also in other mountainous regions, is the tatra vole (*Microtus tatricus*). *Microtus tatricus* is a Carpathian endemic species found in Slovakia, Poland, the Ukraine and Romania. Two subspecies were recorded: *Microtus tatricus tatricus* occupying the western Tatra area in Slovakia and Poland and *Microtus tatricus zykovi* spread into the Ukraine and Romania. It is an indigenous mammal species of the Carpathians (MITCHEL-JONES et al. 1999). It occurs in the western and eastern Carpathians, 630 – 2350 m a.s.l. and populations are found in spruce forests and Tatra meadows (MOŠANSKÝ 1994), in south Poland, but also in western Ukraine and northern Romania (ZAGORODNYUK & ZIMA 1992).

In Slovakia, *Microtus tatricus* was recorded for the very first time during the early Holocene in Veľká Fatra (DUDICH et al. 1981). The type locality of the tatra vole is the Poprad region, Veľká Studená Dolina, Vysoké Tatry. The lowest known altitude *Microtus tatricus* has been recorded is at about 600–650 metres above sea level in cold inverse valleys of Veľká Fatra (DUDICH et al. 1981, KLEINERT 1983) and the highest known altitude ever recorded for this species is 2343 metres above sea level, in the saddleback of the Váhy Pass in the High Tatras (KRATOCHVÍL 1952). A histogram showing the altitudinal distribution of this species is bimodal with a maximum number of localities at 1650 m a.s.l. (MARTÍNKOVÁ & DUDICH 2003). The habitat preferences of *Microtus tatricus* are in mountain spruce forests. Its territory is dispersed into many semi-isolated bio centres. It occurs only higher up in mountains along the high altitude forest boundary and also above in alpine meadows and Tatra glacial valleys. In western Tatra region it prefers wet and colder habitats with thicker layers of organic matter (humus) and rich undergrowth. It settles in nearby vegetation overgrown rock debris from alpine meadows to mountain inverse valleys by which it descends to lower altitudes. Its lifestyle is spent in a vast underground corridor system under rich vegetation and in snow tunnels. The habitat utilized by *Microtus tatricus* has a lower proportion of rocks and almost no dwarf pine (MARTÍNKOVÁ et al. 2003). *Microtus tatricus* inhabits open habitats statistically between rocky areas and *Pinus mugo* stands. The species avoid *Pinus mugo* (and any habitats with closed shrub or tree canopy). *Microtus tatricus* is restricted in the subalpine zone to humid meadows, with tall (herb) vegetation, presence of ferns, and with individual large boulders, or to overgrowing slope (PELIKÁN 1955, HAITLINGER 1981, FLOUSEK et al. 1985, JURDÍKOVÁ et al. 2000). The preferred habitat is partially overgrown talus debris with well developed soil that is capable of retaining moisture but that does not support the development of *Pinus mugo*. The outcome is a wet meadow with ferns and scattered rocks at the surface (JURDÍKOVÁ et al. 1993). The reproduction

period of *Microtus tatricus* species has been observed from April to September, were gravid females were found. It breeds just once or twice a year due to the rough mountainous environment. Mating mostly happens before the first snow occurs. Gravid females usually bear 3 youngs. These young become sexually mature after the winter period. The life expectancy of this species is between 14 and 18 months due to the influence of the high mountainous climate and environment. Their range is restricted to small areas of a few square metres and is dispersed. That´s why it is strongly connected to the vast system of tunnels under the rich vegetation. As found with other vole species, it does not hibernate and it moves through its snow tunnels in winter time (FERIANCOVÁ-MASÁROVÁ & HANÁK 1965).

After Dudich´s opinion (DUDICH, 2005) the tatra vole represents a mammals strategy bound on the primarily woodless mountain habitats. The major part of carpathian metapopulations is living in open habitats from altomontan up to alpine vegetation belts. As species with lovest reproductory fitness (KRATOCHVÍL 1969) is full able only in suchlike conditions keeping one´s end up independent populations in community of 5 cohabiting (for very poor sources compeeting) microtine rodents in interspecific competition. In West Carpathians there are two types of tatra vole populations living below (600-1200 m a.s.l.) the primeval (or secondary) upper mountain tree limite. In broad lived mountain forest belt (beech and beech-fire woods) there are some restricted and limited in number but probably independent island population in restricted areas of limestone cliffs with relic Scotch Pine stands (*Erico-Pinion Br-Bl., Seslerio-Asterion Hadač, ev. Pinetum dealpinum*) in forest typology RANDUŠKA et al. (1986) spreading in Malá Fatra Mts., Veľká Fatra Mts., Chočské vrchy Mts., Muránska planina Plateau e.g. DAROLA, DUDICH & ŠTOLLMANN (1985, MARTÍNKOVÁ & DUDICH (2003). The tatra vole living in such extreem habitats with shallow and rapidly drying up soil layer and very restricted food resouces can long term live under competitive coexistece with bank vole and pine vole populations which seems to be all round in beech stages more succesfull. These four known restricted relic island populations of tatra vole might as well extreemingly endangered by natural and/or antropic impacts.

Another - below upper tree limit living and from immigration depending temporary tatra vole populations occours irregularily in lower vegetation tiers with native or secondary occurrence of spruce (*Picea abies* plantations). Populations of tatra vole living there In habitats of initial phases of the secondary forest succession (primeaval or reforested clear cutted mixed or spruce forests). In these woodless on resources rich habitats the tatra vole hold themselves temprarily succesfull against population pressure of 5-7 confamiliar muroid rodent competitors. Short after closing the upgrowing tree canopy such local populations disappears. These short-dated populations might having several times higher average population density as stable high located populations have above upper tree limit. Both little vole species (*Microtus subterraneus, Microtus atricus*) can be classifyed as oppotunists of the natural forest succession. The large scale forest cut and reforestation technology of the last two ceturies enable of this animal succesfull survive in conditions of ´closed´ coniferous forest belt.

The European pine vole (*Microtus subterraneus*) lives in Europe and Asia Minor (West Antolia) and is represented by two karyotypes. In Europe it occurs from the Atlantic ocean coast in France through central Europe to the Ukraine. It can be also found in the east at the River Don and there are also isolated populations in Estonia and near St. Petersburg in Russia. It is absent around the

Mediterranean Sea and its islands (MITCHELL-JONES et al. 1999). *Microtus subterraneus* was described also in Belgium at a type locality (ÇOLAK et al. 1998). The European pine vole is widely spread across the whole of Slovakia, but discontinuously. The reason is its ecological preference of wet biotopes with rich soil, especially river banks, forest edges, scrub meadows and more rarely it populates in forests and meadows. It is most commonly found in areas with alder trees ranging from lowlands to altitudes of 1700 metres above sea level. Males range, on average from 15-20 metres away from around their nests. Females occupy an even smaller area. The European pine vole gives the smallest litter of all our small terrestrial mammals, only 2.5 (youngs) on average. Although, the female can breed 3-times a year, the species has been never undergoing regular cycling (and population overcrowding), perhaps - due to the low number of youngs youngs in each litter and the population density of the species generally low. For example in wet floodplain forests only 1 individual per 1 hectare on average was recorded. The young voles become independent after 4-6 weeks and their life expectancy is about 12 to 14 months, which is the lowest average age among all vole species.

The European pine vole usually lives in colonies and, out of all our voles, it is the most settled species because of its ecological niche and strong connection to its environment, which is proven by its spatial activity. Its sensitivity to changes in environmental conditions are also demonstrated by the fact that it is the only vole species that can die of shock after being captured. It lives in underground holes grouped into colonies and its movement above the ground happens on desire paths (FERIANCOVÁ-MASÁROVÁ & HANÁK 1965).

Distribution, occurrence and characteristics of *Myodes glareolus*

Clethrionomys Tilesius, 1850 is represented by 7 species. Out of three species of *Clethrionomys* (resp. *Myodes*) genus occupying Palearctic Europe and Asia only one of them lives in Slovakia, the bank vole – *Clethrionomys, Myodes glareolus* (Schreber, 1780). There are many geographical races of bank vole in the Palearctic zone and only one nominotypical geographical race also found in France, Belgium, Netherlands, Denmark, Germany, Poland or Czech Rep., that also lives in Slovakia. The bank vole belonging to 28 geographical races is spread all over Europe. Of these the closest race to Slovakia is (called) ssp. *istericus*, ranging from Russia trough Romania to Hungary and also the lattneri race, living in Austria. Their distribution ranges from the western part of the Palearctic zoological zone – from Great Britain to the Baikal sea (SOUTHERN 1964). The boundaries of its territory reach the polar circle in the north, or even beyond (RACZYŃSKI 1983). In the northern and eastern part of its territory the bank vole occupies spruce or pine-spruce forests, but also shaded forest glades (PUCEK 1983). Bank voles occupy a big part of the British Isles. In Ireland it occurs only in isolated populations at the southern part of the island, where it was introduced. The western boundaries of its range are located at the Atlantic coast of France and at northern Spain. Around the central part of continental Europe it is spread more or less continuously (RACZYŃSKI 1983). There it prefers mainly deciduous woodlands or mixed forests (PUCEK 1983). The southern boundaries are in Mediterranean Europe. On the Pyrenees peninsula it occurs only in the Pyrenees mountains and Cantabria. It has a discontinuous range at the Apennine peninsula and occupies mainly mountainous forests. In the Balkans, the southern territory is spread around Macedonia and northern Greece (RACZYŃSKI 1983). In the southern

area, where the summer temperatures are high, it prefers shaded, wet forest biotopes (PUCEK 1983). It also occupies the south and part of the east coast of the Black Sea. The eastern boundary of bank vole occurrence isn´t as definitive as it is at the western. The occurrence isn´t homogenic, because of human activities affecting their environment (urbanisation, deforestation etc.) and it also doesn´t inhabit in tundra or steppe (RACZYŃSKI 1983).

The bank vole dominates by the number of individuals among forest rodents (HANZÁK & ROSICKÝ 1949). Its occurrence is restricted to the dwarf-pine zone in higher altitudes (KOCIAN et al. 1985), and respectively on places covered by dwarf-pine vegetation (JURDÍKOVÁ et al. 1998). Occurrence at certain localities also depends on food available, e.g. on the amount of tree seeds (NAUMOV 1948, POPOV 1960). Its range though, isn´t homogenic, because it is endangered by fragmentation of habitats (RAJSKA-JURGIEL 1992). Inside of its territory, the bank vole lives in various types of forests (MAZURKIEWICZ & RAJSKA-JURGIEL 1975). The important factor is forest undergrowth, richly developed plant and scrub level (BOCCHINI & NIEDER 1994a). Biotopes like this meet the food requirements of bank voles and provide protection from predators (MAZURKIEWICZ 1986). It is very unique to find bank vole also in biotopes without woods e.g. on arable land (SAINT GIRONS & BEAUCOURNU 1970). In winter, the bank vole can be found in buildings or human settlements near forests (KOSHKINA 1957). Dead wood is also a very important requirement of the bank voles´ environment, because it provides a lot of materials for nest building (RÖDL 1974). For bank voles, very dense forest without undergrowth is unsuitable, because it needs a certain level of shading to survive (WRANGEL 1940).

The Bank vole is considered as species with mixed foraging strategy (granivorous-florivorous (HANSSON 1983). Their (food) composition depends on geographical location and biotopes location and varies with consequent climate and vegetation conditions. GEBCZYŃSKA (1983) states that bank voles are polyphagous species changing its food diet according to currently occupied habitat and available food tender (offer).

The bank vole becomes independent in 25-26 days (KUBÍK 1965). By this age it weighs about 11 grams. These individuals are sexually inactive. Some of them become mature when they weigh about 15-16g. ZEJDA (1971) found out that the earliest bank vole female´s reach maturity is after 4-6 weeks and these are mainly females from a spring litter. The females become sexually mature after 1 – 1,5 months, males after 2 months (BUJALSKA 1985). The pregnancy lasts 22 days in average (BUJALSKA & GRUM 1989). The females are pregnant 3-4 times a year and having usualy with 2-7 youngs per litter (KOWALSKI 1964). TKADLEC et al. (1999) consider rodents as animals with triangular type of reproduction, which means, that the second birth is bigger than the first one. ZEJDA (1971) observed that individuals from summer broods become mature faster and in lower numbers than spring born individuals. The maturity of the autumn born individuals in the same year is even rarer. Also the females previously pregnant, occupy bigger areas than females giving birth for the very first time (BUJALSKA 1985). Young females suspend their reproductive activity until they establish their territory. This is a result of the territorial behaviour of sexually mature and active females. It is a condition of getting sexually mature to gain their own territory and if a high population density occurs, individuals are either forced to migrate or reaching sexual maturity is suspended (GLIWICZ 1990). The same is considered for males in the event of a high population density (GIPPS 1985), but in the case of males it is mainly due to social hierarchy rather than territoriality (VIITALA & HOFFMEYER 1985). ZEJDA (1966)

found out, that weight is a more important factor than for sexual maturity than age. He states that sexually active individuals are on average 5 g heavier than those inactive who usually don´t weigh more than 21 g (GLIWICZ 1983). During the process of getting sexually mature and active, two different variants were described in a bank vole's population (GRUM & BUJALSKA 1994). Passive strategy: where the young individuals await their opportunity near their parents territory until it becomes available, which means until the active individual die. Active strategy: where the young males look for available space they could occupy and get sexually mature.

MATERIAL AND METHODS

The capture period of small terrestrial mammals (*Chionomys nivalis, Microtus tatricus, Microtus subterraneus, Myodes glareolus*) was held since 29.1. 1975 until 10.9.2009 (Experimental Biology and Ecology, Slovak Academy of Science in Staré Hory, Land Protected Area Ponitrie office, The State Nature Protection Institute and the department of Ecology and Environmental Science FNS, UKF in Nitra) The voles were capturing by line method in to folding traps (50 capturing points, in 10-metres distances). The traps were controlled in 24 hours intervals.

The evaluated material of small terrestrial mammals (for biometric analysis) consists of 164 individuals of *Chionomys nivalis*, 3352 individuals of *Microtus subterraneus*, 139 specimens of *Microtus tatricus*, 18566 specimens of *Myodes glareolus* (Table 1).

Table 1: Review of vole´s material (*Chionomys nivalis*, *Microtus* sp.) and *Myodes glareolus*

Species, number of individuals, time period	Sex	Age group				together
		matures	immatures	juveniles	Undefined	
Chionomys nivalis	males	39	18	5	-	62
164 ex. (10.8.1977 -	females	64	30	8	-	102
10.9.2009)	undefined	-	-	-	-	-
Microtus subterraneus	males	903	475	52	59	1489
3352 ex. (5.6.1975 -	females	880	429	52	52	1413
6.10.2008)	undefined	-	20	12	418	450
Microtus tatricus	males	34	19	4	-	57
139 ex. (3.5.1977 -	females	57	25	-	-	82
10.9.2009)	undefined	-	-	-	-	-
Myodes glareolus	males	4151	3828	281	337	8597
18566 ex. (29.1.1975 -	females	3587	3542	308	311	7748
10.9.2009)	undefined	13	89	34	2085	2221

Following biometric indications were observed and surveyed (body weight – H, in grams; body length – LC; tail length – LCd v mm; length of their hind foot – LTp; length of external ears – LA, all measures are in mm).

The sex of captured individuals was determined (males – M, females – F) and were sectionalised into three categories (juveniles – young individuals, who didn´t achieve the size of adult individuals and have juvenile fur colour; immatures – sexually immature individuals who already have achieved the size of adults; matures – sexually mature individuals). Among the adult individuals sexual maturity was examined. Among gravid females, the average size of their embryos and number of embryos in both womb edges and the length of testes among males were examined.

The ratio of adult and subadult individuals was evaluated on a basis of χ^2 test frequency. In dependence of χ^2 value level of importance, the differences can be proved or highly proved. If the number of individuals is less than 200, the Yates correction is applied (PELIKÁN 1984a). From the difference between proved and expected number of individuals 0.5. $\chi^2 = \frac{[(M-F)-1]^2}{n}$ (M – males, F – females, n – number of individuals) is count out. To realise zero difference between proved and expected values, the standard deviation has to be calculated

$s = \sqrt{p.q.n}$ (p = 0.5 = q, n – number of individuals).

We have examined the length of reproduction period during the year (on a basis of female gravidity data) and the potential size of litter (on a basis of number of embryos in both edges of womb). The fertility of females was evaluated according to Elmen-davis equation (EMLEN & DAVIS 1948). Emlen – Davis equation ($F = \% \cdot \frac{T}{V}$) is a method to estimate reproduction potential of mammals (F = gravidity frequency, % = the percentage of visible gravid females from the total number of females, T = number of observation days, V = number of gravidity days).

We have also evaluate the influence of condition changes on biometry of somatic characteristics and reproduction potential in 6 altitudinal geographic levels: L – lowland (till 200 m a. s. l.), H – hillock (200 - 400 m a. s. l.), SM – submontane (400 - 600 m a. s. l.), M – montane (600 - 800 m a. s. l.), O – supramontane, altimontane (800 - 1200 m a. s. l.), Sa – subalpine (above 1200 m a. s. l.).

Biometric data were processed by descriptive statistics, and we were mainly interested in these characteristics: median, modus, the value range of concrete signs (minimal and maximal value of sign) and the size of the statistical series (N) Then we examined the differences of medians of examined characteristics from the point of chosen criteria (sex, geographical and hypsographical changes). Testing the hypothesis and proving statistical relevance of obtained results and differences between each characteristic, the variance ANOVA analysis has been applied.

DISTRIBUTION OF SPECIES OF THE MURIDAE FAMILY IN SLOVAKIA

In the following section the sites of occurrence of *Myodes glareolus* (SCHREBER, 1780), *Microtus subterraneus* (de Sélys-Longchamps, 1836), *Microtus tatricus* (Kratochvíl, 1952), *Chionomys nivalis* (Martins, 1842), resp. *Chionomys nivalis mirhanreini* (Schäfer, 1935) are presented. The list consists of code number of the basic map unit from the Fauna Databank of Slovakia (FDS) and it is structured as follows: **1.** – Code of basic map unit FDS. **2.** – site name – as it was named according to the collector or as it was quoted in literature. **3.** – site coordinates in coordinate system of the World Geodetic System 84 (WGS 84), **4.** – municipality cadastre, where the site is located (mentioned in brackets). In case of the locality wasn´t named, the name of the cadastre isn´t mentioned in brackets. **5.** – site belonging to the district. **6.** – name of the orographic unit (KROUPOVÁ 1980). **7.** – altitude (if specified), **8.** – date of collecting (if specified). **9.** – name of the collector (**coll.:**), surname or organisation names listed. If the record ends up with this item it can be considered as original one, never published before **10.** – literary source (**lit.:**)**,** in which the data from record were published. It also contains authors´ names and year of publication. All records are split by hyphen. To correct interpretation of shortcuts used in this chapter: **VN** – Water reservoir, **NP** – National park, **PR** – Nature reserve, **NPR** – National Nature reserve, **PP** – Natural memorial, **CHA** – Protected area, **SAV** – Slovak Academy of Sciences.

In the following section we bring (Table 2) the summary of records with observed vole species in unique map units of FDS and orographic units in which the species were observed.

Table 2: Occurrence of monitored species of Arvicolinae rodents in mapping squares of Fauna Databank of Slovakia (FDS) and orographic units

	Number of individuals	Records in squares of FDS	Records in orographic units	Number of sites	Hypsographic range (m a.s.l.)
Ch. nivalis	172	9	4	18	824 – 1745
M. subterraneus	3369	167	70	379	99 – 1670
M. tatricus	148	20	9	41	636 – 1729
M. glareolus	18714	230	78	693	100 - 1695

Distribution and occurrence of voles (*Chionomys*, *Microtus* sp.)

Snow Vole – *Chionomys nivalis*

Snow vole, as a petricol species of small mammals is in Slovakia presented in the highest altitudes of subalpine vegetation zone, above the timberline. Captured individuals are from 18 localities of supramontane and subalpine zone (824 to 1745 m.a.s.l.), in four orographic units.

The overview of localities with Snow vole occurrence – *Chionomys nivalis* (MARTINS, 1842), resp. *Chionomys nivalis* ssp. *mirhanreini* (SCHÄFER, 1935):

6783: Bobrovecká dolina (E 19°39'20.1960; N 49°13'6.0960), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1494 m a.s.l., 8.1977, lit.: ŠTOLLMANN & DUDICH (1985b). - Kozaliská (E 19°38'26.3760; N 49°14'7.0080), Zuberec, Tvrdošín, Západné Tatry, 1030 m a.s.l., 5.1978, lit.: ŠTOLLMANN & DUDICH (1985b). - **6784:** Brestová (E 19°40'21.8280; N 49°13'21.9360), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1670 m a.s.l., 10.1993, coll.: AMBROS M. - **6785:** Tichá dolina (E 19°56'19.1760; N 49°12'59.3280), Štrbské Pleso, Poprad, Západné Tatry, 1182 m a.s.l., 5.1982, coll.: AMBROS M., KOVÁČIK J., STALLMANN A. - **6787:** Dolina Bielych plies (E 20°13'6.1320; N 49°13'26.2200), Tatranská Lomnica, Poprad, Vysoké Tatry, 1695 m a.s.l., 9.2009, lit.: AMBROS et al. (2009b). - Kolové pleso – glacial lake (E 20°11'23.1720; N 49°13'10.6680), Tatranská Javorina, Poprad, Vysoké Tatry, 1574 m a.s.l., 10.2009, lit.: AMBROS et al. (2009b). - Zadné Meďodoly, above timberline (E 20°12'48.0600; N 49°14'1.6080), Tatranská Lomnica, Poprad, Belianske Tatry, 1745 m a.s.l., 8.1987, coll.: STOLLMANN A. - **6884:** Žiarska dolina, Malé Závraty (E 19°43'45.9480; N 49°11'13.9560), Smrečany, Liptovský Mikuláš, Západné Tatry, 1553 m a.s.l., 7.2005, coll.: DUDICH A., GUBÁNYI A., STOLLMANN A. - **6885:** Tichá dolina, debris field (E 19°55'10.5600; N 49°10'3.0000), Štrbské Pleso, Poprad, Západné Tatry, 1009 m a.s.l., 5.1982, lit.: ŠTOLLMANN & DUDICH (1985b). - **7082:** Veľká Oružná dolina (E 19°27'42.1920; N 48°56'55.5360), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 824 m a.s.l. - 1729 m a.s.l., 9.1980, 5.1981, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990) - **7083:** Jasná, Pod Derešami (E 19°33'58.1760; N 48°57'34.0200), Demänovská Dolina, Liptovský Mikuláš, Nízke Tatry, 1237 m a.s.l., 10.1984, 11.1984,lit.: DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - Kosodrevina (E 19°35'50.4240; N 48°55'57.0360), Horná Lehota, Brezno, Nízke Tatry, 1510 m a.s.l., 9.1982, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - Kotliská (E 19°31'34.1400; N 48°56'23.7840), Dolná Lehota, Brezno, Nízke Tatry, 1670 m a.s.l., 9.1982, 9.1983, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - **7186:** Kráľova skala, dwarf pine (E 20°9'25.9920; N 48°52'21.6840), Telgárt, Brezno, Nízke Tatry, 1664 m a.s.l., 9.2004, coll.: GUBÁNYI.

Tatra Vole – *Microtus tatricus*

Tatra vole in Slovakia occurs at higher altitudes from montane to subalpine zones (636 to 1729 m a.s.l.). *Microtus tatricus* comes from 41 sites in 9 orographic units.

The overview of localities with Tatra vole - *Microtus tatricus* (KRATOCHVÍL, 1952) occurrence:

6481: Furandova dolina (E 19°17'26.2320; N 49°30'13.3920), Mútne, Námestovo, Podbeskydská brázda, 943 m a.s.l., 5.1980, lit.: DUDICH (1991). - Mútne, gamekeeper's house (E 19°16'21.7560; N 49°29'18.0960), Mútne, Námestovo, Podbeskydská brázda, 825 m a.s.l., 8.1978, coll.: DUDICH A., STOLLMANN A. - **6783:** Pribisko (E 19°38'45.7800; N 49°13'27.2640), Zuberec, Tvrdošín, Západné Tatry, 1417 m a.s.l., 5.1977, lit.: ŠTOLLMANN & DUDICH (1985b). - Sivý vrch (E 19°38'43.0800; N 49°12'29.4840), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1555 m a.s.l., 5.1993, lit.: AMBROS et al. (1995). - Sivý vrch, avalanche trough (E 19°38'58.8480; N 49°12'35.5680), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1475 m a.s.l., 8.1993, lit.: AMBROS et al. (1995). - Bobrovecká dolina (E

19°39'20.1960; N 49°13'6.0960), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1494 m a.s.l., 8.1977, lit.: ŠTOLLMANN & DUDICH (1985b). - Kozaliská (E 19°38'26.3760; N 49°14'7.0080), Zuberec, Tvrdošín, Západné Tatry, 1030 m a.s.l., 8.1977, lit.: ŠTOLLMANN & DUDICH (1985b). - **6784:** pod Brestovou (E 19°40'21.8280; N 49°13'21.9360), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1670 m a.s.l., 10.1993, lit.: AMBROS et al. (1995). - **6785:** Tichá dolina (E 19°56'19.1760; N 49°12'59.3280), Štrbské Pleso, Poprad, Západné Tatry, 1182 m a.s.l., 4.1982, 5.1982, lit.: ŠTOLLMANN & DUDICH (1985b). - **6787:** Zadné Meďodoly (E 20°11'42.1080; N 49°13'59.7000), Tatranská Lomnica, Poprad, Belianske Tatry, 1397 m a.s.l., 6.1987, 8.1987, coll.: MIHÁLIKOVÁ A., STOLLMANN A. - Zadné Meďodoly, 500 m nad Vrátami (E 20°11'12.5520; N 49°14'6.9720), Tatranská Javorina, Poprad, Belianske Tatry, 1353 m a.s.l., coll.: STOLLMANN A. - Zadné Meďodoly, Bránka (E 20°9'56.4120; N 49°14'19.4280), Tatranská Javorina, Poprad, Vysoké Tatry, 1191 m a.s.l., 7.2009, coll.: AMBROS M., BALÁŽ I. - Zadné Meďodoly, Burdel cottage (E 20°11'10.5720; N 49°14'1.1400), Tatranská Javorina, Poprad, Belianske Tatry, 1399 m a.s.l., 10.2009, coll.: BALÁŽ I., TULIS F., SLOBODNÍK S. - Dolina Bielych plies (E 20°13'6.1320; N 49°13'26.2200), Tatranská Lomnica, Poprad, Vysoké Tatry, 1695 m a.s.l., 9.2009, coll.: AMBROS M., BALÁŽ I. - **6883:** Mních, NPR (E 19°38'17.1240; N 49°10'33.6360), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1303 m a.s.l., 7.2006, coll.: AMBROS M. - **6884:** Žiarska dolina, Malé Závraty (E 19°43'45.9480; N 49°11'13.9560), Smrečany, Liptovský Mikuláš, Západné Tatry, 1553 m a.s.l., 7.2005, coll.: GUBÁNYI A., DUDICH A., STOLLMANN A. - **6980:** Čierňavy (E 19°9'36.9360; N 49°1'51.7800), Ľubochňa, Ružomberok, Veľká Fatra, 644 m a.s.l., 4.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Lipová dolina (E 19°8'32.8560; N 49°1'30.5760), Ľubochňa, Ružomberok, Veľká Fatra, 665 m a.s.l., 4.1980, 8.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - **7080:** pod Borišovom (E 19°6'25.1280; N 48°56'27.2760), Belá pri Necpaloch, Martin, Veľká Fatra, 1246 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). – under Čierny Kameň (E 19°8'22.6320; N 48°56'36.2400), Ľubochňa, Ružomberok, Veľká Fatra, 945 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Široký úplaz (E 19°5'36.0960; N 48°57'20.3400), Belá pri Necpaloch, Martin, Veľká Fatra, 788 m a.s.l., 10.1989, lit.: KADLEČÍK et al. (1995). - Čierny Kameň, PR (E 19°8'42.2880; N 48°56'11.5080), Ľubochňa, Ružomberok, Veľká Fatra, 1391 m a.s.l., 8.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - **7081:** Patočiny (E 19°17'27.4200; N 48°54'42.2640), Liptovská Lužná, Ružomberok, Nízke Tatry, 838 m a.s.l., 5.1979, coll.: MIHÁLIKOVÁ A., STOLLMANN A. - **7082:** Veľká Oružná dolina 1 (E 19°25'20.8200; N 48°58'6.2040), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 824 m a.s.l., 5.1981, lit.: AMBROS (1990b), DUDICH (1990b), DUDICH (1990a), ŠTOLLMANN & DUDICH (1990). - Veľká Oružná dolina 2 (E 19°28'10.2720; N 48°57'18.7200), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 1254 m a.s.l., 5.1981, lit.: AMBROS (1990b), DUDICH (1990b), DUDICH (1990a), ŠTOLLMANN & DUDICH (1990). - Veľká Oružná dolina 3 (E 19°28'48.7920; N 48°57'7.3800), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 1459 m a.s.l., 5.1981, lit.: AMBROS (1990b), DUDICH (1990b), DUDICH (1990a), ŠTOLLMANN & DUDICH (1990). - Veľká Oružná dolina 4 (E 19°29'10.5720; N 48°56'41.0640), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 1729 m a.s.l., 5.1981, lit.: AMBROS (1990b), DUDICH (1990b), DUDICH (1990a), ŠTOLLMANN & DUDICH (1990). -

Veľká Oružná dolina 5 (E 19°27'42.1920; N 48°56'55.5360), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 1265 m a.s.l., 9.1980, lit.: AMBROS (1990b), DUDICH (1990b), DUDICH (1990a), ŠTOLLMANN & DUDICH (1990). - **7083:** Jasná, Pod Derešami (E 19°33'58.1760; N 48°57'34.0200), Demänovská Dolina, Liptovský Mikuláš, Nízke Tatry, 1237 m a.s.l., 10.1984, 11.1984, lit.: ŠTOLLMANN & DUDICH (1990). - Kosodrevina (E 19°35'50.4240; N 48°55'57.0360), Horná Lehota, Brezno, Nízke Tatry, 1510 m a.s.l., 9.1982, lit.: AMBROS (1990b), DUDICH (1990b), DUDICH (1990a), ŠTOLLMANN & DUDICH (1990). - Kotliská (E 19°31'34.1400; N 48°56'23.7840), Dolná Lehota, Brezno, Nízke Tatry, 1670 m a.s.l., 9.1982, lit.: AMBROS (1990b), DUDICH (1990b), DUDICH (1990a), ŠTOLLMANN & DUDICH (1990). - **7086:** Čierny Váh (E 20°6' 29.6640; N 48°57'50.8320), Vikartovce, Poprad, Nízke Tatry, 899 m a.s.l., 5.1984, coll.: KUVIKOVÁ A. - **7179:** Rakytovská dolina (E 18°58'34.5000; N 48°53'32.0640), Blatnica, Martin, Veľká Fatra, 719 m a.s.l., 10.1992, lit.: ŠTOLLMANN et al. (1994). - Pročná (E 18°58'39.8640; N 48°53'52.7640), Blatnica, Martin, Veľká Fatra, 715 m a.s.l., 5.1992, coll.: LOVÁS. - **7180:** Prašnica (E 19°0'26.9640; N 48°48'46.7640), Dolný Harmanec, Banská Bystrica, Veľká Fatra, 844 m a.s.l., 9.1980, coll.: DUDICH A. - Biely potok - Stream (E 19°8 '5.3680; N 48°51'59.5800), Staré Hory, Banská Bystrica, Veľká Fatra, 636 m a.s.l., 8.1989, coll.: DUDICH A. - **7181:** Chladná dolina (E 19°10'57.3960; N 48°51'6.6600), Motyčky, Banská Bystrica, Starohorské vrchy, 740 m a.s.l., 8.1989, coll.: DUDICH A., MÉSZAROS F. - **7186:** Havrania, headwater (E 20°8'51.1800; N 48°52'27.8760), Šumiac, Brezno, Nízke Tatry, 1603 m a.s.l., 9.2004, coll.: STOLLMANN A. - **7279:** Pramene (E 18°57'52.8480; N 48°46'25.6440), Horný Turček, Turčianske Teplice, Kremnické vrchy, 825 m a.s.l., 5.1981, lit.: DUDICH et al. (1982). - Mokrá dolina (E 18°59'27.2760; N 48°46'22.4400), Horný Turček, Turčianske Teplice, Kremnické vrchy, 917 m a.s.l., 7.1979, lit.: DUDICH et al. (1982). - **7285:** Za Nihovo (E 19°57'28.1160; N 48°47'36.8520), Závadka nad Hronom, Brezno, Veporské vrchy, 828 m a.s.l., 4.1983, lit.: AMBROS (1986c), DUDICH (1986b), DAROLA, DUDICH & ŠTOLLMANN (1985), KOVÁČIK (1986).

The European Pine Vole – *Microtus subterraneus*

Tatra European Pine vole occurs from lowlands to subalpine zones (99 to 1670 m a.s.l.). *Microtus subterraneus* comes from 3369 sites and was recorded in 70 orographic units.

The overview of sites with the European pine vole *Microtus subterraneus* (DE SÉLYS-LONGCHAMPS, 1836) occurrence:

6481: Furandova dolina (E 19º17'26.2320; N 49º30'13.3920), Mútne, Námestovo, Podbeskydská brázda, 943 m a.s.l., 5.1980, lit.: DUDICH (1991). - Pilsko (E 19º17'45.8520; N 49º31'19.3080), Mútne, Námestovo, Oravské Beskydy, 1068 m a.s.l., 9.1978, lit.: DUDICH (1991). - Zlatá dolina (E 19º15'46.8720; N 49º30'48.8880), Mútne, Námestovo, Oravské Beskydy, 900 m a.s.l., 9.1978, coll.: DUDICH A., STOLLMANN A. - near Geschwantners (E 19º17'34.7640; N 49º28'12.4320), Mútne, Námestovo, Podbeskydská brázda, 782 m a.s.l., 4.1980, lit.: DUDICH (1991). - **6582:** Námestovo (E 19º27'34.2360; N 49º24'23.0040), Námestovo, Námestovo, Podbeskydská vrchovina, 668 m a.s.l., 4.1980, coll.: KOVÁČIK J. - Skalka (E 19º27'41.2200; N 49º23'59.7840), Námestovo, Námestovo, Oravská kotlina, 608 m a.s.l., 4.1977, coll.: DUDICH A., STOLLMANN A. - **6588:** Huty,

Holica (E 20º25'47.5320; N 49º24'39.6720), Lesnica, Stará Ľubovňa, Pieniny, 468 m a.s.l., 4.1988, lit.: AMBROS et al. (1993), DUDICH et al. (1993). - **6593:** Becherov (E 21º16'49.1520; N 49º26'50.5680), Becherov, Bardejov, Ondavská vrchovina, 665 m a.s.l., 9.1979, lit.: AMBROS & STANKO (1989). - **6596:** Vyšný Komárnik (E 21º41'55.3920; N 49º24'26.1000), Vyšný Komárnik, Svidník, Laborecká vrchovina, 481 m a.s.l., 3.1979, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a). - **6678:** Klináre (E 18º45'35.5680; N 49º20'14.7840), Nesluša, Kysucké Nové Mesto, Javorníky, 550 m a.s.l., 11.1983, lit.: DUDICH et al. (1995). - **6679:** Klubinská dolina (E 18º54'54.1800; N 49º22'6.9240), Klubina, Čadca, Kysucké Beskydy, 521 m a.s.l., 10.1977, lit.: DUDICH et al. (1978a), DUDICH et al. (1978b), DUDICH et al. (1991), DUDICH et al. (1995), OBUCH et al. (1977). - Veľká Buková (E 18º58'6.5280; N 49º23'34.8000), Stará Bystrica, Čadca, Kysucké Beskydy, 869 m a.s.l., 7.1977, lit.: DUDICH et al. (1978b), DUDICH et al. (1978a), DUDICH et al. (1991), OBUCH et al. (1977). - Ráztocká dolina (E 18º57'40.9680; N 49º23'15.7200), Stará Bystrica, Čadca, Kysucké Beskydy, 722 m a.s.l., 10.1977, lit.: DUDICH et al. (1978b), DUDICH et al. (1991), DUDICH et al. (1995). - **6680:** Flajšová (E 19º9'29.4120; N 49º20'53.7720), Oravská Lesná, Námestovo, Kysucká vrchovina, 898 m a.s.l., 10.1982, coll.: STOLLMANN A. - **6681:** Feráčova dolina (E 19º16'18.0120; N 49º18'4.5720), Hruštín, Námestovo, Oravská Magura, 855 m a.s.l., 5.1983, coll.: STOLLMANN A., AMBROS M., KOVÁČIK J. - Lomná dolina (E 19º16'51.2040; N 49º20'25.5480), Hruštín, Námestovo, Podbeskydská vrchovina, 762 m a.s.l., 5.1983, coll.: AMBROS M., KOVÁČIK J. - Parač (E 19º14'5.4600; N 49º20'27.4200), Oravská Lesná, Námestovo, Oravská Magura, 918 m a.s.l., 6.1981, coll.: AMBROS M., KOVÁČIK J., STOLLMANN A. - **6682:** stream-side overgrowths Vavrečka river (E 19º27'28.7640; N 49º23'41.9640), Námestovo, Námestovo, Oravská kotlina, 609 m a.s.l., 6.1980, coll.: KOVÁČIK J. - **6688:** Huty (E 20º25'17.4720; N 49º23'19.4280), Červený Kláštor, Kežmarok, Spišská Magura, 472 m a.s.l., 10.1986, lit.: AMBROS et al. (1993), DUDICH et al. (1993). - **6689:** Kamienka (E 20º36'6.0120; N 49º19'52.7880), Kamienka, Stará Ľubovňa, Spišsko-šarišské medzihorie, 645 m a.s.l., 11.1976, 3.1978, 8.1978, lit.: AMBROS (1983a), ŠTOLLMANN et al. (1982). - **6693:** Stebnícka Huta (E 21º15'2.7000; N 49º23'45.5280), Stebnícka Huta, Bardejov, Busov, 427 m a.s.l., 9.1979, lit.: AMBROS & STANKO (1989). - **6696:** Komárnická dolina, Sováreň (E 21º44'6.0720; N 49º22'32.5560), Príkra, Svidník, Laborecká vrchovina, 405 m a.s.l., 3.1979, 9.1979, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a). - **6775:** pod Javorníkom (E 18º17'42.3240; N 49º17'58.5960), Horná Mariková, Považská Bystrica, Javorníky, 763 m a.s.l., 4.1983, lit.: AMBROS (1985b), DUDICH (1985c), DUDICH et al. (1995), ŠTOLLMANN et al. (1985). - Lazy pod Makytou (E 18º12'50.2920; N 49º13'34.2840), Lazy pod Makytou, Púchov, Javorníky, 396 m a.s.l., 6.1983, lit.: AMBROS (1985b), DUDICH (1985c), DUDICH et al. (1995), ŠTOLLMANN et al. (1985). - **6777:** Hlboké nad Váhom (E 18º35'30.5880; N 49º12'3.7440), Hlboké nad Váhom, Bytča, Strážovské vrchy, 391 m a.s.l., 6.1990, coll.: STOLLMANN A. - Kríže (E 18º31'18.1560; N 49º17'53.4480), Kolárovice, Bytča, Javorníky, 486 m a.s.l., 5.1983, lit.: AMBROS (1985b), DUDICH (1985c), DUDICH et al. (1995), ŠTOLLMANN et al. (1985). - Váh river Valley (E 18º31'26.4720; N 49º12'14.5080), Predmier, Bytča, Považské podolie, 304 m a.s.l., 5.1983, lit.: AMBROS (1985b), DUDICH (1985c), DUDICH et al. (1995), ŠTOLLMANN et al. (1985). - **6778:** Považský Chlmec (E 18º43'37.5240; N 49º14'6.6480), Považský Chlmec, Žilina, Žilinská kotlina, 402 m a.s.l., 5.1984, lit.: AMBROS et al. (1986b), DUDICH et al. (1986), DUDICH (1986a). - **6779:** Kremienka cottage (E 18º52'33.8520; N 49º17'58.6320), Povina, Kysucké Nové Mesto, Kysucká vrchovina, 535 m a.s.l.,

11.1983, coll.: STOLLMANN A. - **6780:** Štefanová (E 19º3'49.2480; N 49º13'42.4920), Terchová, Žilina, Malá Fatra, 639 m a.s.l., 6.1993, coll.: GUBÁNYI A., MÉSZAROS F., STOLLMANN A. - Vyhnaná dolina, Stohový potok - Stream (E 19º4'8.8680; N 49º13'38.2800), Terchová, Žilina, Malá Fatra, 669 m a.s.l., 6.1996, coll.: DUDICH A. - **6783:** Bobrovecká dolina (E 19º39'20.1960; N 49º13'6.0960), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1494 m a.s.l., 8.1977, lit.: ŠTOLLMANN & DUDICH (1985b). - Sivý vrch (E 19º38'43.0800; N 49º12'29.4840), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1555 m a.s.l., 5.1993, 10.1993, lit.: AMBROS et al. (1995). - Sivý vrch, avalanche trough (E 19º38'58.8480; N 49º12'35.5680), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1475 m a.s.l., 8.1993, lit.: AMBROS et al. (1995). - Kozaliská (E 19º38'26.3760; N 49º14'7.0080), Zuberec, Tvrdošín, Západné Tatry, 1030 m a.s.l., 8.1977, lit.: ŠTOLLMANN & DUDICH (1985b). - Pribisko (E 19º38'45.7800; N 49º13'27.2640), Zuberec, Tvrdošín, Západné Tatry, 1417 m a.s.l., 5.1977, lit.: ŠTOLLMANN & DUDICH (1985b). - **6785:** Tichá dolina (E 19º56'19.1760; N 49º12'59.3280), Štrbské Pleso, Poprad, Západné Tatry, 1182 m a.s.l., 4.1982, lit.: ŠTOLLMANN & DUDICH (1985b). - **6787:** Zadné Meďodoly (E 20º11'42.1080; N 49º13'59.7000), Tatranská Lomnica, Poprad, Belianske Tatry, 1397 m a.s.l., 6.1987, coll.: LOVÁS J., MIHÁLIKOVÁ A., STOLLMANN A., DUDICH A. - Zadné Meďodoly, 500 m nad Vrátami (E 20º11'12.5520; N 49º14'6.9720), Tatranská Javorina, Poprad, Belianske Tatry, 1353 m a.s.l., 8.1987, coll.: DUDICH A., STOLLMANN A. - **6792:** Suchovlčia dolina (E 21º6'19.6560; N 49º13'47.2440), Livov, Bardejov, Čergov, 702 m a.s.l., 4.1982, lit.: AMBROS (1984c). - Večný potok – Stream (E 21º0'44.6040; N 49º16'15.7440), Lukov, Bardejov, Čergov, 731 m a.s.l., 11.1981, 4.1982, lit.: AMBROS (1984c). - Vlčí potok – Stream (E 21º5'4.0920; N 49º14'2.1120), Livov, Bardejov, Čergov, 606 m a.s.l., 4.1982, lit.: AMBROS (1984c). – **6793:** Hertnická dolina (E 21º12'41.1120; N 49º12'9.5040), Hertník, Bardejov, Čergov, 591 m a.s.l., 8.1980, lit.: AMBROS (1984c). - **6797:** Jarčiská, PR (E 21º50'3.1200; N 49º14'15.9000), Roškovce, Medzilaborce, Laborecká vrchovina, 397 m a.s.l., 7.2002, coll.: THOMKA. - **6798:** Palota (E 22º0'40.4640; N 49º16'23.7000), Palota, Medzilaborce, Laborecká vrchovina, 495 m a.s.l., 10.1978, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a). - Palotské jedliny, PR (E 22º0'57.2400; N 49º16'25.5720), Palota, Medzilaborce, Laborecká vrchovina, 510 m a.s.l., 10.1978, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a). - **6876:** orchard (E 18º21'38.1960; N 49º8'49.3800), Nimnica, Púchov, Javorníky, 308 m a.s.l., 2.1984, 3.1984, lit.: KOVÁČIK (2006). - Sheepfarm (E 18º20'47.6520; N 49º9'13.3560), Nimnica, Púchov, Javorníky, 406 m a.s.l., 8.1983, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). – Forest near the stream (E 18º26'5.3160; N 49º6'11.3760), Považská Bystrica, Považská Bystrica, Považské podolie, 331 m a.s.l., 10.2001, lit.: KOVÁČIK (2006). - Sihoť (E 18º27'31.9680; N 49º7'22.0800), Považská Bystrica, Považská Bystrica, Považské podolie, 288 m a.s.l., 3.1978, lit.: KOVÁČIK (2006). - **6877:** Manínska úžina (E 18º30'10.2960; N 49º8'26.2320), Považská Teplá, Považská Bystrica, Strážovské vrchy, 362 m a.s.l., 5.1984, lit.: KOVÁČIK (2006). – Váh river Valley (E 18º30'9.2880; N 49º11'20.3640), Mikšová, Bytča, Považské podolie, 298 m a.s.l., 5.1983, lit.: DUDICH (1985c), AMBROS (1985b), ŠTOLLMANN et al. (1985). - Hradná (E 18º35'21.6960; N 49º8'58.6680), Súľov - Hradná, Bytča, Strážovské vrchy, 458 m a.s.l., 10.1989, coll.: STOLLMANN A. - **6880:** Ľubochňa (E 19º9'26.6760; N 49º6'54.0000), Ľubochňa, Ružomberok, Veľká Fatra, 473 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Ľubochnianska dolina (E 19º7'54.8040; N 49º6'23.9760), Ľubochňa, Ružomberok, Veľká Fatra, 644 m

a.s.l., 4.1980, lit.: AMBROS (1983c), DUDICH (1983a), MURAI et al. (1983), KOVÁČIK (1983a), ŠTOLLMANN & DUDICH (1983). - pod Vysokým (E 19º8'23.3160; N 49º6'30.8880), Ľubochňa, Ružomberok, Veľká Fatra, 471 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), MURAI et al. (1983), KOVÁČIK (1983a), ŠTOLLMANN & DUDICH (1983). - **6883**: Kvačianska dolina (E 19º32'26.8440; N 49º11'8.0160), Kvačany, Liptovský Mikuláš, Chočské vrchy, 722 m a.s.l., 7.1995, coll.: AMBROS M. **- 6884:** Jamnická dolina (E 19º47'11.0400; N 49º9'21.0960), Pribylina, Liptovský Mikuláš, Západné Tatry, 990 m a.s.l., 11.1981, lit.: ŠTOLLMANN & DUDICH (1985b). - **6885:** Krivánka cottage (E 19º55'25.2840; N 49º9'20.0880), Štrbské Pleso, Poprad, Západné Tatry, 978 m a.s.l., 5.1982, lit.: ŠTOLLMANN & DUDICH (1985b). - **6893:** Hertník (E 21º11'10.5720; N 49º11'39.2640), Hertník, Bardejov, Čergov, 723 m a.s.l., 8.1980, lit.: AMBROS (1984c). - **6899:** Udava (E 22º12'49.8240; N 49º10'30.7200), Osadné, Snina, Bukovské vrchy, 549 m a.s.l., 7.1978, lit.: DUDICH & ŠTOLLMANN (1987a). - **6901:** Stužica canyon (E 22º32'0.4920; N 49º4'46.8120), Nová Sedlica, Snina, Bukovské vrchy, 767 m a.s.l., 10.1978, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a), FENĎA & MAŠÁN (2003). - **6973:** Ľuborčianska dolina, valley end (E 17º59'23.6040; N 49º0'49.7160), Horná Súča, Trenčín, Biele Karpaty, 517 m a.s.l., 9.1980, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - **6974:** Ľuborčianska dolina, middle part (E 18º2'19.1760; N 49º0'11.4120), Ľuborča, Trenčín, Biele Karpaty, 376 m a.s.l., 9.1980, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - Ľuborčianska dolina, valley end (E 18º0'55.0080; N 49º0'28.6200), Horná Súča, Trenčín, Biele Karpaty, 418 m a.s.l., 4.1981, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - Vršatec, PR (E 18º9'38.1240; N 49º4'24.0600), Vršatské Podhradie, Ilava, Biele Karpaty, 826 m a.s.l., 11.1987, coll.: AMBROS M., KOVÁČIK J. - **6975:** bralo Červený Kameň (E 18º10'57.5400; N 49º5'41.2800), Červený Kameň, Ilava, Biele Karpaty, 622 m a.s.l., 11.1986, coll.: AMBROS M. - **6976:** Dobusek Valley (E 18º28'54.8040; N 48º59'59.5320), Pružina, Považská Bystrica, Strážovské vrchy, 491 m a.s.l., 7.1983, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - **6977:** Závada (E 18º31'10.4520; N 49º3'35.3520), Domaniža, Považská Bystrica, Strážovské vrchy, 405 m a.s.l., 7.1983, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - **6978:** Kunerad (E 18º43'9.0120; N 49º5'32.4960), Kunerad, Žilina, Malá Fatra, 538 m a.s.l., 4.1984, 7.1984, lit.: AMBROS et al. (1986b), DUDICH (1986a), DUDICH et al. (1986). - Kunerádska dolina, Krížna (E 18º44'23.5320; N 49º5'2.0400), Kunerad, Žilina, Malá Fatra, 596 m a.s.l., 7.1984, lit.: AMBROS et al. (1986b), DUDICH (1986a), DUDICH et al. (1986). - **6980:** Čierňavy (E 19º9'36.9360; N 49º1'51.7800), Ľubochňa, Ružomberok, Veľká Fatra, 644 m a.s.l., 4.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Čierňavy (E 19º9'36.9360; N 49º1'51.7800), Ľubochňa, Ružomberok, Veľká Fatra, 644 m a.s.l., 8.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Lipová dolina (E 19º8'32.8560; N 49º1'30.5760), Ľubochňa, Ružomberok, Veľká Fatra, 665 m a.s.l., 4.1980, 8.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - **6981:** Hučiaky (E 19º19'40.2960; N 49º1'18.3360), Liptovská Štiavnica, Ružomberok, Nízke Tatry, 647 m a.s.l., 6.1978, coll.: DUDICH A., STOLLMANN A. - Kračkov (E 19º10'6.3480; N 49º5'15.2520), Ľubochňa, Ružomberok, Veľ□ Fatra, 611 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - **6982:** Ivachnovský luh (E 19º23'6.0720; N 49º5'37.0320), Ivachnová, Ružomberok, Liptovská kotlina, 498 m a.s.l., 7.1977,

11.1977, coll.: DUDICH A., STOLLMANN A. - **6985:** Biely Váh, Zámčisko (E 19º53'58.3440; N 49º2'45.3840), Východná, Liptovský Mikuláš, Kozie chrbty, 743 m a.s.l., 8.1986, coll.: KUVIKOVÁ A. - Čierna dolina (E 19º53'17.0160; N 49º2'22.3440), Východná, Liptovský Mikuláš, Kozie chrbty, 755 m a.s.l., 11.1981, 4.1982, 5.1984, coll.: AMBROS M., DUDICH A., KOVÁČIK J., MÉSZAROS F., 6.2001, coll.: BALÁŽ I. - Východná, near the Research Station of SAV (E 19º54'48.8160; N 49º2'53.5920), Východná, Liptovský Mikuláš, Kozie chrbty, 760 m a.s.l., 6.2001, coll.: BALÁŽ I. - **6989:** Levočský potok – stream, Peklisko (E 20º36'50.4000; N 49º4'52.8240), Levočská dolina, Kežmarok, Levočské vrchy, 710 m a.s.l., 6.1975, lit.: AMBROS et al. (1993), DUDICH et al. (1993). - **7072:** Predpoloma-Močariny (E 17º49'0.9480; N 48º55'3.1800), Nová Bošáca, Nové Mesto nad Váhom, Biele Karpaty, 397 m a.s.l., 7.1985, coll.: AMBROS M. - **7075:** Dolná Poruba (E 18º17'44.4840; N 48º54'39.2040), Dolná Poruba, Trenčín, Strážovské vrchy, 425 m a.s.l., 8.1984, coll.: KUVIKOVÁ A., STOLLMANN A. - **7076:** Pružina (E 18º27'46.3320; N 48º57'50.1480), Pružina, Považská Bystrica, Strážovské vrchy, 898 m a.s.l., 4.1984, lit.: AMBROS et al. (1986b), DUDICH (1986a), DUDICH et al. (1986). - **7078:** Moškovské rybníky – Fishponds (E 18º49'29.9280; N 48º56'42.2520), Moškovec, Turčianske Teplice, Turčianska kotlina, 456 m a.s.l., 5.1992, lit.: DUDICH (1994). - **7080:** Havranovo (E 19º4'57.5040; N 48º57'53.8920), Belá pri Necpaloch, Martin, Veľká Fatra, 688 m a.s.l., 10.1989, 5.1990, lit.: DUDICH (1994), KADLEČÍK et al. (1995). - Borišov (E 19º4'39.7920; N 48º57'59.7960), Belá pri Necpaloch, Martin, Veľká Fatra, 667 m a.s.l., 6.1989, lit.: KADLEČÍK et al. (1995). - pod Borišovom (E 19º6'25.1280; N 48º56'27.2760), Belá pri Necpaloch, Martin, Veľká Fatra, 1246 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). – below Čierny Kameň (E 19º8'22.6320; N 48º56'36.2400), Ľubochňa, Ružomberok, Veľká Fatra, 945 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Čierny Kameň, PR (E 19º8'42.2880; N 48º56'11.5080), Ľubochňa, Ružomberok, Veľká Fatra, 1391 m a.s.l., 8.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Široký úplaz (E 19º5'36.0960; N 48º57'20.3400), Belá pri Necpaloch, Martin, Veľká Fatra, 788 m a.s.l., 10.1989, lit.: KADLEČÍK et al. (1995). – Cottage below Čierny Kameň (E 19º8'27.9960; N 48º56'34.0440), Ľubochňa, Ružomberok, Veľká Fatra, 1012 m a.s.l., 8.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Zelený potok – Stream (E 19º8'11.9400; N 48º54'19.7640), Liptovské Revúce, Ružomberok, Veľká Fatra, 770 m a.s.l., 9.1977, 5.1979, coll.: MIHÁLIK A. - **7081:** Patočiny (E 19º17'27.4200; N 48º54'42.2640), Liptovská Lužná, Ružomberok, Nízke Tatry, 838 m a.s.l., 5.1979, coll.: STOLLMANN A. - Smrekovica, Vyšná Matejková (E 19º12'52.4520; N 48º59'46.5720), Ružomberok, Ružomberok, Veľká Fatra, 1194 m a.s.l., 8.1979, coll.: DUDICH A., KOVÁČIK J., STOLLMANN A. - **7082:** Magurka (E 19º26'11.2920; N 48º56'29.0400), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 1095 m a.s.l., 5.1980, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b). - Ďurková (E 19º24'57.4560; N 48º57'8.4600), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 889 m a.s.l., 9.1979, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b). - Oružná dolina (E 19º27'42.1920; N 48º56'55.5360), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 1265 m a.s.l., 9.1980, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - pod Salatínom (E 19º22'43.9320; N 48º59'47.3280), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 875 m a.s.l., 5.1980, coll.: AMBROS M., KOVÁČIK J. - **7083:** Jasná, Pod Derešami (E

19º33'58.1760; N 48º57'34.0200), Demänovská Dolina, Liptovský Mikuláš, Nízke Tatry, 1237 m a.s.l., 10.1984, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). – Dwarf pine (E 19º35'50.4240; N 48º55'57.0360), Horná Lehota, Brezno, Nízke Tatry, 1510 m a.s.l., 9.1982, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - Kotliská (E 19º31'34.1400; N 48º56'23.7840), Dolná Lehota, Brezno, Nízke Tatry, 1670 m a.s.l., 9.1982, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - Tále (E 19º36'0.5040; N 48º55'3.7200), Horná Lehota, Brezno, Nízke Tatry, 1011 m a.s.l., 4.1983, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - Vajskovská dolina (E 19º32'56.9040; N 48º53'59.9640), Dolná Lehota, Brezno, Nízke Tatry, 881 m a.s.l., 4.1983, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - **7084:** Kumštova dolina (E 19º41'59.3880; N 48º54'31.5000), Jarabá, Brezno, Nízke Tatry, 1076 m a.s.l., 9.1983, coll.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - **7086:** Čierny Váh River (E 20º6'29.6640; N 48º57'50.8320), Vikartovce, Poprad, Nízke Tatry, 899 m a.s.l., 5.1984, coll.: KUVIKOVÁ A. - Veľký Brunov Valley (E 20º8'16.7280; N 48º55'16.5720), Liptovská Teplička, Poprad, Nízke Tatry, 1059 m a.s.l., 9.1983, coll.: DUDICH A., KUVIKOVÁ A., STOLLMANN A. - **7088:** Klauzy (E 20º25'6.8520; N 48º54'40.6800), Smižany, Spišská Nová Ves, Slovenský raj, 635 m a.s.l., 4.1986, coll.: DUDICH A., STOLLMANN A. - **7094:** Brestová dolina (E 21º29'15.7920; N 48º55'31.4040), Zámutov, Vranov nad Topľou, Slanské vrchy, 586 m a.s.l., 11.1980, coll.: AMBROS M., KOVÁČIK J., STOLLMANN A. - Dubník (E 21º27'51.5520; N 48º54'43.7760), Červenica, Prešov, Slanské vrchy, 690 m a.s.l., 6.1980, lit.: DUDICH (1988c), DUDICH (1989c). - Malá Delňa stream (E 21º25'1.4160; N 48º58'46.8480), Zlatá Baňa, Prešov, Slanské vrchy, 748 m a.s.l., 6.1980, lit.: DUDICH (1988c). - below Šimonka (E 21º28'24.9240; N 48º55'51.0600), Zámutov, Vranov nad Topľou, Slanské vrchy, 733 m a.s.l., 6.1980, lit.: DUDICH (1988c). - Zlatá Baňa (E 21º25'35.1840; N 48º57'20.0520), Zlatá Baňa, Prešov, Slanské vrchy, 645 m a.s.l., 6.1980, lit.: DUDICH (1988c). - **7098:** Hypkanina (E 22º8'48.0120; N 48º55'36.4800), Valaškovce - North, Humenné, Vihorlatské vrchy, 563 m a.s.l., 4.1977, 6.1977, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Kamenica nad Cirochou (E 22º2'31.7400; N 48º55'21.9720), Valaškovce - North, Humenné, Beskydské predhorie, 342 m a.s.l., 9.1977, 3.1978, 8.1978, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Kotlík (E 22º9'43.7040; N 48º55'1.9200), Valaškovce - North, Humenné, Vihorlatské vrchy, 832 m a.s.l., 11.1976, 4.1977, 6.1977, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Modra nad Cirochou (E 22º3'16.6680; N 48º55'41.9160), Modra nad Cirochou, Humenné, Beskydské predhorie, 282 m a.s.l., 3.1978, coll.: DUDICH A., STOLLMANN A. - Postalka (E 22º9'22.5720; N 48º55'44.2200), Valaškovce - North, Humenné, Vihorlatské vrchy, 742 m a.s.l., 4.1977, 6.1977, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Valaškovce (E 22º6'18.9360; N 48º55'18.9120), Valaškovce - North, Humenné, Vihorlatské vrchy, 637 m a.s.l., 4.1977, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - **7172:** Nová Bošáca (E 17º48'20.0520; N 48º53'57.6960), Nová Bošáca, Nové Mesto nad Váhom, Biele Karpaty, 440 m a.s.l., 4.2010, coll.: BALÁŽ I. - **7177:** Ostrá dolina (E 18º39'0.4680; N 48º48'55.6920), Brezany, Prievidza, Hornonitrianska kotlina, 292 m a.s.l., 8.1984, coll.: DUDICH A., STOLLMANN A. - **7178:** Malá Čausa (E 18º42'40.4280; N 48º49'9.8040), Malá Čausa, Prievidza, Žiar, 629 m a.s.l., 8.1984, coll.: KUVIKOVÁ A., STOLLMANN A. - Vyšehradné (E 18º41'58.0200; N 48º52'32.9520), Solka,

Prievidza, Žiar, 810 m a.s.l., 10.1988, lit.: DUDICH (1994). - **7179:** Čierna voda (E 18º56'1.8240; N 48º50'7.8360), Čremošné, Turčianske Teplice, Kremnické vrchy, 680 m a.s.l., 8.1979, lit.: DUDICH (1994). - Žarnovická dolina (E 18º56'3.8040; N 48º50'46.7160), Mošovce, Turčianske Teplice, Veľká Fatra, 635 m a.s.l., 8.1980, lit.: DUDICH (1994). - Žarnovická dolina (E 18º54'22.2840; N 48º50'48.9480), Čremošné, Turčianske Teplice, Veľká Fatra, 653 m a.s.l., 7.1992, lit.: ŠTOLLMANN et al. (1994). - Kamenná dolina (E 18º55'25.3560; N 48º50'6.1440), Dolná Štubňa, Turčianske Teplice, Veľká Fatra, 649 m a.s.l., 8.1979, lit.: DUDICH (1994). - Rakytovská dolina (E 18º58'34.5000; N 48º53'32.0640), Blatnica, Martin, Veľká Fatra, 719 m a.s.l., 9.1992, 10.1992, lit.: ŠTOLLMANN et al. (1994). - **7180:** Bystrická dolina (E 19º3'24.4080; N 48º49'11.6400), Dolný Harmanec, Banská Bystrica, Veľká Fatra, 536 m a.s.l., 8.1979, coll.: DUDICH A., KOVÁČIK J. - Čierna (E 19º1'37.4520; N 48º48'33.6600), Dolný Harmanec, Banská Bystrica, Veľká Fatra, 715 m a.s.l., 9.1980, lit.: AMBROS et al. (2001). - Horná Turecká (E 19º4'26.8680; N 48º51'12.8520), Turecká, Banská Bystrica, Veľká Fatra, 679 m a.s.l., 9.1980, lit.: AMBROS et al. (2001). - Malá Krížna (E 19º3'13.2840; N 48º51'51.6960), Dolný Harmanec, Banská Bystrica, Veľká Fatra, 1299 m a.s.l., 5.1979, 8.1989, lit.: AMBROS et al. (2001). - Richtárová dolina (E 19º7'51.5640; N 48º49'45.1920), Staré Hory, Banská Bystrica, Starohorské vrchy, 553 m a.s.l., 7.1977, 10.1977, 12.1977, 11.1978, 8.1982, 3.1983, lit.: AMBROS et al. (2001). - Staré Hory (E 19º6'53.2440; N 48º50'14.3520), Staré Hory, Banská Bystrica, Starohorské vrchy, 495 m a.s.l., 5.1976, 10.1979, lit.: AMBROS et al. (2001). - Haliar (E 19º7'31.8720; N 48º50'20.1480), Staré Hory, Banská Bystrica, Starohorské vrchy, 520 m a.s.l., 7.1983, lit.: AMBROS et al. (2001). - Ribô (E 19º7'27.0120; N 48º52'9.0480), Staré Hory, Banská Bystrica, Veľká Fatra, 711 m a.s.l., 5.1990, lit.: AMBROS et al. (2001). - **7181:** Buly (E 19º13'10.7760; N 48º51'50.0040), Donovaly, Banská Bystrica, Starohorské vrchy, 996 m a.s.l., 7.1985, 6.1986, 8.1989, 5.1990, lit.: AMBROS et al. (2001). - Hiadlovské sedlo (E 19º17'7.8720; N 48º52'16.2840), Liptovská Osada, Ružomberok, Starohorské vrchy, 873 m a.s.l., 8.1978, lit.: AMBROS et al. (2001). - kúpele (E 19º17'20.9040; N 48º53'28.1040), Liptovská Lužná, Ružomberok, Nízke Tatry, 868 m a.s.l., 11.1979, coll.: KOVÁČIK J. - Chladná dolina (E 19º10'57.3960; N 48º51'6.6600), Motyčky, Banská Bystrica, Starohorské vrchy, 740 m a.s.l., 8.1989, lit.: AMBROS et al. (2001). - Môcovská dolina (E 19º12'12.2400; N 48º51'40.2120), Motyčky, Banská Bystrica, Starohorské vrchy, 854 m a.s.l., 7.1985, lit.: AMBROS et al. (2001). - Veľká a Malá Šindliarka (E 19º15'34.7760; N 48º52'17.0040), Donovaly, Banská Bystrica, Starohorské vrchy, 847 m a.s.l., 6.1978, lit.: AMBROS et al. (2001). - **7182:** Ráztocká hoľa (E 19º22'6.0600; N 48º52'44.1480), Pohronský Bukovec, Banská Bystrica, Nízke Tatry, 1324 m a.s.l., 9.1981, coll.: KUPCOVÁ A. - Veporná dolina (E 19º28'18.6600; N 48º48'24.5160), Predajná, Brezno, Horehronské podolie, 451 m a.s.l., 5.1982, coll.: STOLLMANN A. - Verbeštekova poľana (E 19º25'7.6800; N 48º52'20.6400), Jasenie, Brezno, Nízke Tatry, 1216 m a.s.l., 9.1981, coll.: KUPCOVÁ A. - **7185:** Malá Zelená dolina (E 19º49'59.5560; N 48º48'40.5360), Bacúch, Brezno, Veporské vrchy, 864 m a.s.l., 10.1980, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986). - Petrikova dolina, lower part (E 19º50'33.7560; N 48º49'46.3080), Polomka, Brezno, Veporské vrchy, 692 m a.s.l., 4.1981, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986). – Rácov Valley, Confluence with Hron river (E 19º59'44.1960; N 48º51'10.0080), Pohorelá, Brezno, Horehronské podolie, 658 m a.s.l., 10.2006, lit.: UHRÍN et al. (2009). - Roveň, Hlboký potok – Stream (E 19º55'53.7600; N 48º51'29.9160), Heľpa, Brezno, Horehronské podolie, 637 m a.s.l., 4.1983, coll.: KOVÁČIK J. - **7186:** Červená Skala, dolina Strateník (E 20º9'32.0400; N 48º49'15.6720), Šumiac,

Brezno, Muránska planina, 841 m a.s.l., 4.1983, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986). - Červená Skala, near Railway Station (E 20º7'50.8800; N 48º49'20.3880), Šumiac, Brezno, Muránska planina, 797 m a.s.l., 9.2004, lit.: UHRÍN et al. (2009). - Červená Skala, Župkova dolina (E 20º8'36.4200; N 48º48'24.8400), Šumiac, Brezno, Muránska planina, 839 m a.s.l., 4.1983, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986). - Havrania dolina (E 20º8'56.7960; N 48º52'0.6240), Šumiac, Brezno, Nízke Tatry, 1313 m a.s.l., 9.2004, coll.: AMBROS M. - Havrania, Head of Stream (E 20º8'51.1800; N 48º52'27.8760), Šumiac, Brezno, Nízke Tatry, 1603 m a.s.l., 9.2004, coll.: STOLLMANN A. - Hnilec, Head, 1400 m a.s.l. (E 20º9'0.1800; N 48º53'15.9000), Šumiac, Brezno, Nízke Tatry, 1660 m a.s.l., 8.1982, coll.: STOLLMANN A. - Vrchovisko near Pohorelská Maša, PR (E 20º1'19.2360; N 48º51'2.0520), Pohorelá, Brezno, Horehronské podolie, 680 m a.s.l., 10.2006, lit.: UHRÍN et al. (2009). - Havraník Valley (E 20º4'35.6520; N 48º49'29.4240), Vaľkovňa, Brezno, Horehronské podolie, 741 m a.s.l., 4.1984, lit.: AMBROS et al. (1986b), DUDICH et al. (1986), DUDICH (1986a). - **7187:** Hnilec Valley, (E 20º13'32.4480; N 48º53'23.6760), Telgárt, Brezno, Slovenský raj, 946 m a.s.l., 8.1982, coll.: AMBROS M., KOVÁČIK J. - Pusté Pole (E 20º14'14.4240; N 48º53'0.9960), Telgárt, Brezno, Slovenský raj, 913 m a.s.l., 8.1982, coll.: STOLLMANN A. - **7188:** Biele Vody (E 20º24'7.3800; N 48º51'46.1880), Mlynky, Spišská Nová Ves, Volovské vrchy, 810 m a.s.l., 10.1984, coll.: DUDICH A., KUVIKOVÁ A. - Havrania dolina (E 20º26'4.7400; N 48º52'19.9560), Mlynky, Spišská Nová Ves, Volovské vrchy, 847 m a.s.l., 10.1984, coll.: DUDICH A., AMBROS M. - Stratená dolina (E 20º20'18.8160; N 48º52'16.5000), Stratená, Rožňava, Slovenský raj, 817 m a.s.l., 10.1984, coll.: MÉSZAROS F. - Veľký Zaif (E 20º21'37.4400; N 48º52'54.3360), Stratená, Rožňava, Slovenský raj, 855 m a.s.l., 5.1984, coll.: DUDICH A. - **7198:** Jovsiansky potok – Stream (E 22º6'39.8160; N 48º51'3.2400), Valaškovce - South, Humenné, Vihorlatské vrchy, 296 m a.s.l., 6.1977, 9.1977, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Kusín (E 22º3'40.1400; N 48º49'9.3360), Kusín, Michalovce, Východoslovenská pahorkatina, 138 m a.s.l., 9.1977, lit.: AMBROS (1983a), ŠTOLLMANN et al. (1982). - Rika (E 22º3'15.0840; N 48º53'35.8440), Valaškovce - North, Humenné, Vihorlatské vrchy, 369 m a.s.l., 3.1978, 10.1978, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Suchý potok – Stream (E 22º1'12.7920; N 48º53'37.3920), Valaškovce - Middle, Humenné, Beskydské predhorie, 312 m a.s.l., 11.1976, 4.1977, 9.1977,3.1978,10.1979, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - **7274:** Panská Javorina (E 18º2'45.3120; N 48º43'57.9000), Zlatníky, Bánovce nad Bebravou, Považský Inovec, 498 m a.s.l., 10.1983, lit.: AMBROS (1986a), AMBROS et al. (1986), DUDICH (1986). - **7276:** Omastiná (E 18º23'4.8480; N 48º46'21.4320), Omastiná, Bánovce nad Bebravou, Strážovské vrchy, 324 m a.s.l., 5.1985, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - **7277:** Koš, Laskársky potok Stream 2 (E 18º33'53.9640; N 48º44'4.0200), Nováky, Prievidza, Hornonitrianska kotlina, 252 m a.s.l., 8.2008, lit.: BALÁŽ et al. (2009b). - **7279:** Mokrá dolina (E 18º59'27.2760; N 48º46'22.4400), Horný Turček, Turčianske Teplice, Kremnické vrchy, 917 m a.s.l., 7.1979, lit.: DUDICH (1994). - Krahulská dolina (E 18º56'45.6360; N 48º44'44.8800), Krahule, Žiar nad Hronom, Kremnické vrchy, 784 m a.s.l., 11.1980, lit.: DUDICH (1994). - Kremnické Bane (E 18º54'9.3960; N 48º44'9.2400), Kremnické Bane, Žiar nad Hronom, Kremnické vrchy, 791 m a.s.l., 9.1989, lit.: DUDICH (1994). - Pramene (E 18º57'52.8480; N 48º46'25.6440), Horný Turček, Turčianske Teplice, Kremnické vrchy, 825 m a.s.l., 5.1981, lit.: DUDICH (1994). - Horný Turček (E 18º56'11.1480; N 48º45'17.1360),

Horný Turček, Turčianske Teplice, Kremnické vrchy, 730 m a.s.l., 9.1989, lit.: DUDICH (1994). - **7280:** Cenovo (E 19º3'44.5680; N 48º47'21.8760), Harmanec, Banská Bystrica, Starohorské vrchy, 505 m a.s.l., 8.1981, coll.: DUDICH A., KOVÁČIK J. - Harmančok, under Košiar (E 19º5'18.8160; N 48º46'53.3280), Uľanka, Banská Bystrica, Starohorské vrchy, 532 m a.s.l., 9.1980, coll.: DUDICH A. - **7281:** Slovenská Lupča (E 19º16'5.5200; N 48º46'4.5120), Slovenská Ľupča, Banská Bystrica, Zvolenská kotlina, 436 m a.s.l., 11.1984, lit.: DUDICH et al. (1994). - Šálková, Veľké Plavno (E 19º15'57.8520; N 48º44'21.9480), Poniky, Banská Bystrica, Zvolenská kotlina, 404 m a.s.l., 11.1984, lit.: DUDICH et al. (1994). - **7285:** Čertova dolina, Gálička Stream (E 19º52'1.3080; N 48º44'34.7280), Tisovec, Rimavská Sobota, Veporské vrchy, 808 m a.s.l., 5.2003, coll.: HAPL E., AMBROS M. - Malá Stožka (E 19º55'41.1600; N 48º46'33.9600), Muráň, Revúca, Muránska planina, 1099 m a.s.l., 4.1983, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986). - Dielik (E 19º59'28.8960; N 48º42'27.4320), Muráň, Revúca, Stolické vrchy, 490 m a.s.l., 5.2003, coll.: STOLLMANN A., GUBÁNYI A. - Za Nihovo (E 19º57'28.1160; N 48º47'36.8520), Závadka nad Hronom, Brezno, Veporské vrchy, 828 m a.s.l., 4.1983, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986). - Za Nihovo, Brest (E 19º58'48.7560; N 48º47'37.8240), Heľpa, Brezno, Veporské vrchy, 1007 m a.s.l., 5.2003, lit.: UHRÍN et al. (2009). - **7286:** Hrdzavá dolina (E 20º0'32.6520; N 48º44'51.7920), Muráň, Revúca, Muránska planina, 593 m a.s.l., 6.1982, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986). - Karafová (E 20º9'24.4440; N 48º46'8.1120), Muránska Zdychava, Revúca, Stolické vrchy, 733 m a.s.l., 7.1981, 7.1986,lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986), UHRÍN et al. (2009). - **7288:** Gemerská Poloma (E 20º28'28.2000; N 48º42'43.5960), Gemerská Poloma, Rožňava, Revúcka vrchovina, 330 m a.s.l., 9.1984, coll.: STOLLMANN A. - Krátka dolina (E 20º29'7.2600; N 48º46'50.6280), Gemerská Poloma, Rožňava, Volovské vrchy, 546 m a.s.l., 5.1984, lit.: STANKO et al. (1992), STANKO & DUDICH (1992). - Podsúľová (E 20º28'38.0280; N 48º46'35.9040), Gemerská Poloma, Rožňava, Volovské vrchy, 459 m a.s.l., 5.1984, lit.: STANKO et al. (1992), STANKO & DUDICH (1992). - Rožňavská dolina, Doboška (E 20º35'50.7840; N 48º42'57.5280), Rožňava, Rožňava, Volovské vrchy, 589 m a.s.l., 11.1983, lit.: STANKO et al. (1992), STANKO & DUDICH (1992). - **7291:** Vyšný Medzev, Humel (E 20º53'33.5040; N 48º43'36.3000), Medzev, Košice - surroundings, Volovské vrchy, 393 m a.s.l., 6.1983, lit.: STANKO et al. (1992), STANKO & DUDICH (1992). - **7295:** Bačkovská dolina (E 21º34'2.3880; N 48º46'19.7760), Bačkov, Trebišov, Slanské vrchy, 411 m a.s.l., 10.1981, lit.: DUDICH (1988c). - **7373:** Hrádocká dolina (E 17º57'22.2840; N 48º41'13.8840), Hrádok, Nové Mesto nad Váhom, Považský Inovec, 286 m a.s.l., 6.1983, lit.: AMBROS (1986a), AMBROS et al. (1986), DUDICH (1986). - Moravany (E 17º53'1.2480; N 48º36'24.4080), Moravany nad Váhom, Piešťany, Považský Inovec, 195 m a.s.l., 7.1985, coll.: AMBROS M. - **7377:** Bystričianska dolina (E 18º34'53.1120; N 48º37'19.5600), Bystričany, Prievidza, Vtáčnik, 628 m a.s.l., 5.1979, 7.1979,10.1979, 8.1984, lit.: AMBROS et al. (1991), DUDICH et al. (1980). - Pokutský potok Stream, spring area (E 18º39'4.6440; N 48º36'56.1960), Kľak, Žarnovica, Vtáčnik, 969 m a.s.l., 5.1985, 12.1985, lit.: AMBROS et al. (1991). - Vtáčnik, PR (E 18º37'57.0720; N 48º37'31.2600), Kamenec pod Vtáčnikom, Prievidza, Vtáčnik, 1289 m a.s.l., 6.1990, 9.1991, 10.1991, 8.1992, 9.1992, lit.: AMBROS et al. (1991), AMBROS et al. (1995). - **7378:** Kľakovská dolina (E 18º41'23.3520; N 48º38'53.1240), Nová Lehota pri Handlovej, Prievidza, Vtáčnik, 612 m a.s.l., 3.1980, lit.: AMBROS et al. (1991). - **7379:** Ihráčska dolina, Biely potok - Stream (E 18º57'58.0320; N 48º37'11.3520), Kľačany pri Trnavej Hore, Žiar nad

Hronom, Kremnické vrchy, 432 m a.s.l., 8.1989, coll.: DUDICH A. - Slaský potok (E 18º50'23.6400; N 48º40'50.2680), Kopernica, Žiar nad Hronom, Kremnické vrchy, 477 m a.s.l., 5.1988, coll.: DUDICH A. - **7380:** Badínsky prales (E 19º2'40.8840; N 48º41'34.4040), Badín, Banská Bystrica, Kremnické vrchy, 745 m a.s.l., 5.1977, 8.1977, 9.1977, 12.1977, 4.1978, coll.: DUDICH A., AMBROS M., STOLLMANN A., MIHÁLIK A. – stationary plot Kováčová (E 19º4'46.9200; N 48º37'6.4560), Hájniky, Zvolen, Kremnické vrchy, 348 m a.s.l., 11.1986, 12.1986, 4.1987, 6.1987, 8.1987, 9.1987, 1.1988, 4.1988, 6.1988, 3.1989, 4.1989, coll.: DUDICH A., STOLLMANN A., MIHÁLIKOVÁ A., ZACH P. - Mláčik (E 19º1'55.9560; N 48º39'20.8800), Hájniky, Zvolen, Kremnické vrchy, 805 m a.s.l., 8.1988, 4.1989, coll.: STOLLMANN A., VALACH I., DUDICH A. - Vlkanová (E 19º8'14.0640; N 48º41'17.2680), Radvaň, Banská Bystrica, Zvolenská kotlina, 372 m a.s.l., 11.1984, lit.: DUDICH et al. (1994). - **7381:** Veľká lúka (E 19º9'54.0360; N 48º36'58.2120), Rybáre, Zvolen, Zvolenská kotlina, 371 m a.s.l., 11.1984, lit.: DUDICH et al. (1994). - **7382:** pod Dudášom (E 19º26'8.6640; N 48º39'15.6600), Očová, Zvolen, Poľana, 777 m a.s.l., 7.1978, 9.1978, lit.: AMBROS (1985a), DUDICH (1985b), ŠTOLLMANN & DUDICH (1985a). - Kyslinky (E 19º24'44.2800; N 48º39'18.5400), Hrochoť, Banská Bystrica, Poľana, 757 m a.s.l., 7.1978, 5.1979, lit.: AMBROS (1985a), DUDICH (1985b), ŠTOLLMANN & DUDICH (1985a). - Predná Poľana (E 19º28'38.1360; N 48º37'40.5480), Hriňová, Detva, Poľana, 1100 m a.s.l., 5.1987, 7.1987, 10.1987, 1.1988, 5.1989, 6.1989, lit.: AMBROS (1985a), DUDICH (1985b), ŠTOLLMANN & DUDICH (1985a). - **7383:** Hrončokový grúň, PR (E 19º30'3.8880; N 48º40'57.6480), Valaská, Brezno, Poľana, 1041 m a.s.l., 5.1992, coll.: JANIČINA, STAŠIOV S. - Poľana (E 19º32'12.7680; N 48º37'6.8880), Hriňová, Detva, Veporské vrchy, 644 m a.s.l., 4.1980, coll.: AMBROS M., DUDICH A., KOVÁČIK J. - **7384:** Dobročský prales (E 19º40'48.1440; N 48º40'59.6640), Čierny Balog, Brezno, Veporské vrchy, 893 m a.s.l., 6.1981, 4.1990, coll.: AMBROS M., DUDICH A. , STOLLMANN A. - Grapa (E 19º41'39.1200; N 48º36'3.1680), Látky, Detva, Veporské vrchy, 792 m a.s.l., 7.2004, coll.: AMBROS M., DUDICH A., STOLLMANN A. - **7386:** border of swamp (E 20º9'36.9360; N 48º39'52.3080), Mokrá Lúka, Revúca, Revúcka vrchovina, 283 m a.s.l., 8.1982, coll.: KOVÁČIK J. - **7387:** Hladomorná dolina (E 20º12'52.5240; N 48º41'33.9720), Chyžné, Revúca, Stolické vrchy, 421 m a.s.l., 3.1982, 9.1982, coll.: AMBROS M., DUDICH A., KOVÁČIK J., STOLLMANN A. - Hrádok (E 20º17'42.9720; N 48º39'35.6040), Jelšava, Revúca, Revúcka vrchovina, 665 m a.s.l., 8.1980, coll.: AMBROS M., KOVÁČIK J. - Lubeník, bottom land of Muránka Stream (E 20º12'3.6360; N 48º38'51.5400), Jelšava, Revúca, Revúcka vrchovina, 257 m a.s.l., 8.1982, coll.: AMBROS M. - Nandraž (E 20º12'36.0720; N 48º36'55.8000), Nandraž, Revúca, Slovenský kras, 293 m a.s.l., 3.1982, coll.: AMBROS M. - Turčok Stream (E 20º9'59.5440; N 48º37'13.3320), Nandraž, Revúca, Revúcka vrchovina, 292 m a.s.l., 9.1982, coll.: DUDICH A. - **7388:** Plešivská planina (E 20º24'53.6760; N 48º36'24.6240), Plešivec, Rožňava, Slovenský kras, 630 m a.s.l., 3.1982, 9.1982, lit.: DUDICH et al. (1987). - **7389:** Brzotín (E 20º30'2.9520; N 48º37'37.2720), Brzotín, Rožňava, Rožňavská kotlina, 257 m a.s.l., 9.1984, coll.: DUDICH A., STOLLMANN A. - **7390:** Čremošná dolina (E 20º45'25.8840; N 48º37'47.4960), Bôrka, Rožňava, Slovenský kras, 559 m a.s.l., 6.1992, coll.: STOLLMANN A., LOVÁS J., UHRÍN M., JANIČINA - Horný vrch (E 20º40'17.0040; N 48º36'11.3760), Jablonov nad Turňou, Rožňava, Slovenský kras, 567 m a.s.l., 10.1992, coll.: LOVÁS J., STOLLMANN A. - Lúčka pri Hrhove (E 20º43'39.6480; N 48º38'15.4680), Lúčka pri Hrhove, Rožňava, Slovenský kras, 562 m a.s.l., 3.1992, coll.: STOLLMANN A. - Čierna Moldava Valley (E 20º46'18.8040; N 48º40'48.1440), Hačava, Košice – surroundings, Volovské vrchy, 517 m a.s.l., 6.1983, lit.: STANKO

et al. (1992), STANKO & DUDICH (1992). - Zádielsky kaňon, cottage of CHKO (E 20º48'58.1760; N 48º38'16.4400), Bôrka, Rožňava, Slovenský kras, 465 m a.s.l., 8.1991, coll.: STOLLMANN A., DUDICH A. - **7391:** Zádielsky canyon (E 20º49'59.8080; N 48º37'14.8080), Háj, Košice - surroundings, Slovenský kras, 335 m a.s.l., 7.1991, coll.: DUDICH A., STOLLMANN A. - **7392:** Hatiny (E 21º0'2.5200; N 48º38'55.6440), Debraď, Košice - surroundings, Košická kotlina, 231 m a.s.l., 4.1982, coll.: AMBROS M., KOVÁČIK J. - **7394:** Terebla under PR Marocká hoľa, Malý Milič (E 21º29'1.4640; N 48º36'10.1160), Nový Salaš, Košice - surroundings, Slanské vrchy, 391 m a.s.l., 5.1981, 7.1982, coll.: AMBROS M., KOVÁČIK J., STOLLMANN A. - **7398:** pheasantry (E 22º2'12.5880; N 48º37'50.3040), Pavlovce nad Uhom, Michalovce, Východoslovenská rovina, 101 m a.s.l., 4.1979, lit.: DUDICH & ŠTOLLMANN (1986), KOVÁČIK (1983b). - **7475:** Čierne blatá (E 18º17'38.8320; N 48º30'34.2360), Krnča, Topoľčany, Tribeč, 480 m a.s.l., 3.1981, lit.: AMBROS (1990a), DUDICH (1987a). - Solčianska dolina (E 18º14'20.0040; N 48º30'16.7760), Solčany, Topoľčany, Tribeč, 328 m a.s.l., 3.1981, 6.1986, lit.: AMBROS (1990a), DUDICH (1987a), DUDICH & AMBROS (1986). - **7476:** Úkropová (E 18º15'32.4000; N 48º30'29.6280), Práznovce, Topoľčany, Tribeč, 324 m a.s.l., 7.1986, 10.1986, 4.1987, lit.: AMBROS (1990a), DUDICH & AMBROS (1990), DUDICH & AMBROS (1986). - Drahožická dolina (E 18º27'29.3040; N 48º33'32.0040), Veľké Uherce, Partizánske, Tribeč, 337 m a.s.l., 8.1987, 7.1989, lit.: AMBROS et al. (1990a), DUDICH et al. (1990). - Hradiský potok – Stream (E 18º20'14.3880; N 48º30'41.1120), Janova Ves, Partizánske, Tribeč, 336 m a.s.l., 10.1982, lit.: AMBROS (1990a), DUDICH (1987a), Dudich & Ambros (1990). - Veľká Chmelina Valley (E 18º23'39.7680; N 48º31'38.4240), Klíž, Partizánske, Tribeč, 296 m a.s.l., 10.1982, lit.: AMBROS (1990a), DUDICH (1987a), DUDICH & AMBROS (1990). - **7477:** Hlboká dolina (E 18º31'8.0400; N 48º31'42.6720), Malá Lehota, Žarnovica, Tribeč, 437 m a.s.l., 8.1984, lit.: AMBROS et al. (1984a), AMBROS et al. (1985), DUDICH et al. (1984). - Javorinka (E 18º37'7.3920; N 48º35'13.4160), Kľak, Žarnovica, Vtáčnik, 748 m a.s.l., 11.1984, lit.: AMBROS et al. (1991). - Vicianska dolina (E 18º37'44.2560; N 48º34'41.8080), Kľak, Žarnovica, Vtáčnik, 614 m a.s.l., 11.1987, lit.: AMBROS et al. (1991). - **7478:** Pokútská dolina (E 18º40'29.1360; N 48º35'3.8040), Ostrý Grúň, Žarnovica, Vtáčnik, 578 m a.s.l., 3.1982, lit.: AMBROS et al. (1991). - Revištské Podzámčie (E 18º43'20.2800; N 48º31'18.9480), Revištské Podzámčie, Žarnovica, Vtáčnik, 301 m a.s.l., 3.1982, coll.: KOVÁČIK J., STOLLMANN A. – alluvial deposits of Hron (E 18º48'57.3120; N 48º34'20.3160), Lovča, Žiar nad Hronom, Žiarska kotlina, 242 m a.s.l., 7.1986, coll.: KRIŠTÍN A., KUVIKOVÁ A. - **7479:** Horné Opatovce (E 18º51'6.1920; N 48º33'31.7520), Horné Opatovce, Žiar nad Hronom, Žiarska kotlina – intramontane basin, 290 m a.s.l., 11.1985, 10.1986, coll.: DUDICH A., STOLLMANN A., KUVIKOVÁ A. - Trnavá hora (E 18º57'30.0240; N 48º35'42.1440), Trnavá Hora, Žiar nad Hronom, Kremnické vrchy – Mts., 367 m a.s.l., 6.1986, coll.: DUDICH A. - **7480:** Boky, PR (E 19º2'25.8360; N 48º34'23.5560), Budča, Zvolen, Kremnické vrchy, 335 m a.s.l., 1.1983, coll.: DUDICH A. - Burzovo (E 19º8'17.5200; N 48º31'58.8360), Môťová, Zvolen, Javorie, 452 m a.s.l., 11.1983, lit.: DUDICH & ŠTOLLMANN (1994). - Jasenica - Stream (E 19º0'18.6840; N 48º32'27.2400), Kozelník, Banská Štiavnica, Štiavnické vrchy - Hills, 310 m a.s.l., 1.1983, lit.: ŠTOLLMANN et al. (1988a). - Pustý hrad (E 19º6'30.9240; N 48º33'19.6560), Zvolen, Zvolen, Javorie, 558 m a.s.l., 8.1985, lit.: DUDICH & ŠTOLLMANN (1994). - Stráže (E 19º5'50.9640; N 48º34'28.7040), Zvolen, Zvolen, Javorie, 308 m a.s.l., 12.1985, lit.: DUDICH & ŠTOLLMANN (1994). - Veľký Sielenec (E 19º2'11.2920; N 48º34'28.7760), Budča, Zvolen, Kremnické vrchy, 338 m a.s.l., 5.1986, coll.: DUDICH A. - **7481:** Môťová (E 19º10'14.3040; N

48º34'24.0960), Zvolen, Zvolen, Zvolenská kotlina, 297 m a.s.l., 10.1993, lit.: DUDICH & ŠTOLLMANN (1994), DUDICH et al. (1994). - Ľubica (E 19º13'53.9040; N 48º33'13.7520), Zvolenská Slatina, Zvolen, Javorie, 335 m a.s.l., 9.2004, coll.: VALACH I. - **7482:** Slatina (E 19º25'33.4560; N 48º31'52.8600), Kriváň, Detva, Zvolenská kotlina, 384 m a.s.l., 9.2004, coll.: VALACH I. - **7483:** Dolná Bzová (E 19º30'4.1760; N 48º30'54.5400), Podkriváň, Detva, Veporské vrchy, 391 m a.s.l., 6.1988, coll.: DUDICH A. - Ipeľ under Barrier of Water reservoir (E 19º39'49.0320; N 48º31'22.8000), Málinec, Poltár, Stolické vrchy, 304 m a.s.l., 10.2003, coll.: STOLLMANN A. - **7485:** Hámor (E 19º54'20.5920; N 48º30'46.6920), Rimavská Lehota, Rimavská Sobota, Revúcka vrchovina, 267 m a.s.l., 7.1981, lit.: AMBROS et al. (1985b). – under Kamenica (E 19º51'52.1280; N 48º32'14.3160), Rimavica, Rimavská Sobota, Stolické vrchy, 289 m a.s.l., 10.2003, coll.: STOLLMANN A. - Svarínska dolina (E 19º54'33.3000; N 48º31'41.5560), Rimavská Baňa, Rimavská Sobota, Stolické vrchy, 351 m a.s.l., 10.1987, coll.: DUDICH A., STOLLMANN A., Mészaros F., 7.1981, lit.: AMBROS et al. (1985b). - **7486:** Water reservoir (E 20º9'9.6840; N 48º32'8.3040), Brusník nad Turcom, Revúca, Revúcka vrchovina, 238 m a.s.l., 11.1991, lit.: UHRÍN et al. (2002). - **7488:** Hrdzavá dolina, Prielom Muránky (E 20º20'26.4840; N 48º30'4.3920), Meliata, Rožňava, Rimavská kotlina, 218 m a.s.l., 7.1986, coll.: KUVIKOVÁ A. - Pašková (E 20º23'13.3080; N 48º35'8.0160), Pašková, Rožňava, Revúcka vrchovina, 242 m a.s.l., 9.1984, coll.: DUDICH A. - Plešivská planina, Veľký vrch (E 20º24'31.9320; N 48º35'34.6560), Plešivec, Rožňava, Slovenský kras, 566 m a.s.l., 8.1983, lit.: DUDICH et al. (1987). - Silická Brezová (E 20º28'1.7400; N 48º32'21.9120), Plešivec, Rožňava, Slovenský kras, 492 m a.s.l., 9.1984, coll.: STOLLMANN A. - **7489:** pod Fabiankou (E 20º33'16.9200; N 48º33'42.2640), Silica, Rožňava, Slovenský kras, 563 m a.s.l., 6.1991, coll.: STOLLMANN A. - Silická Jablonica (E 20º36'46.4400; N 48º33'36.0360), Silická Jablonica, Rožňava, Slovenský kras, 244 m a.s.l., 9.1983, 6.1991, coll.: DUDICH A., AMBROS M. - **7497:** Oborín (E 21º53'13.3440; N 48º32'6.2880), Oborín, Michalovce, Východoslovenská rovina, 99 m a.s.l., 4.1979, lit.: KOVÁČIK (1983b). - **7498:** Ortov (E 22º5'33.1440; N 48º35'13.8480), Pavlovce nad Uhom, Michalovce, Východoslovenská rovina, 107 m a.s.l., 6.1979, lit.: DUDICH & ŠTOLLMANN (1986), KOVÁČIK (1983b). - **7569:** Mokrá dolina (E 17º19'33.4200; N 48º29'18.6000), Plavecký Mikuláš, Malacky, Malé Karpaty, 462 m a.s.l., 11.1981, lit.: DUDICH et al. (1989), DUDICH (1989a). - **7575:** Medical Institution (E 18º10'3.5400; N 48º25'22.1520), Horné Lefantovce, Nitra, Tribeč, 238 m a.s.l., 12.1982, lit.: AMBROS et al. (1985), AMBROS et al. (1990a), DUDICH et al. (1984), DUDICH et al. (1993). - Žlaby (E 18º18'3.4560; N 48º29'20.3280), Zlatno, Zlaté Moravce, Tribeč, 507 m a.s.l., 6.1984, lit.: AMBROS et al. (1984a), AMBROS et al. (1985), Dudich et al. (1984), DUDICH et al. (1993). - **7577:** Hubačov štál (E 18º35'32.4600; N 48º29'13.8480), Malá Lehota, Žarnovica, Pohronský Inovec, 666 m a.s.l., 5.2002, coll.: DUDICH A., STOLLMANN A. - časť Stará Huta, Stream (E 18º35'4.1640; N 48º25'24.0240), Nová Baňa, Žarnovica, Pohronský Inovec, 420 m a.s.l., 3.1983, lit.: DUDICH et al. (1985a). - Osná dolina (E 18º30'46.7640; N 48º26'55.6800), Jedľové Kostoľany, Zlaté Moravce, Pohronský Inovec, 401 m a.s.l., 6.1982, lit.: DUDICH et al. (1985a), DUDICH et al. (1993). - Žitavica (E 18º31'43.5360; N 48º29'8.8440), Jedľové Kostoľany, Zlaté Moravce, Tribeč, 470 m a.s.l., 10.1980, lit.: AMBROS et al. (1990a), DUDICH et al. (1985a), DUDICH et al. (1990), DUDICH et al. (1993). - **7578:** Mokráň (E 18º40'33.6720; N 48º27'11.9880), Rudno nad Hronom, Žarnovica, Vtáčnik, 438 m a.s.l., 11.1984, lit.: AMBROS et al. (1991), DUDICH et al. (1985a). - Richnavská dolina (E 18º44'15.1080; N 48º26'45.6360), Voznica, Žarnovica, Štiavnické vrchy, 297 m a.s.l., 3.1982,

6.1984, lit.: ŠTOLLMANN et al. (1988a). - Rudnianska dolina, Filipka (E 18º42'51.4440; N 48º24'50.6880), Rudno nad Hronom, Žarnovica, Štiavnické vrchy, 315 m a.s.l., 3.1983, lit.: ŠTOLLMANN et al. (1988a). - **7579:** Petrovo (E 18º52'2.7480; N 48º24'38.5920), Banská Štiavnica, Banská Štiavnica, Štiavnické vrchy, 816 m a.s.l., 2.1985, lit.: ŠTOLLMANN et al. (1988a). - **7580:** Bystrá dolina (E 19º2'31.8480; N 48º28'38.4960), Dobrá Niva, Zvolen, Štiavnické vrchy, 437 m a.s.l., 8.1978, 11.1983, lit.: ŠTOLLMANN et al. (1988a). - **7583:** Mýtna, Water reservoir (E 19º31'6.4920; N 48º28'53.4720), Mýtna, Lučenec, Revúcka vrchovina, 289 m a.s.l., 7.2004, coll.: AMBROS M. - **7585:** Selčiansky potok – Stream (E 19º52'21.0720; N 48º28'8.5080), Selce in Gemer, Poltár, Revúcka vrchovina, 275 m a.s.l., 3.1983, lit.: DUDICH A. & ŠTOLLMANN (1987b). - **7586:** Peseta (E 20º6'12.1680; N 48º24'52.9920), Nižný Blh, Rimavská Sobota, Rimavská kotlina, 206 m a.s.l., 3.1983, coll.: AMBROS M., KOVÁČIK J., 11.1982, lit.: UHRÍN et al. (2002). - Teplý vrch, deerfield (E 20º7'51.0240; N 48º28'3.6480), Vyšný Blh, Rimavská Sobota, Revúcka vrchovina, 364 m a.s.l., 6.1984, coll.: DUDICH A. - **7588:** Čertová dolina (E 20º28'23.3040; N 48º29'0.4920), Kečovo, Rožňava, Slovenský kras, 463 m a.s.l., 10.1984, coll.: DUDICH A., MÉSZAROS F. - surroundings of Domica cave (E 20º28'11.4600; N 48º28'37.8840), Kečovo, Rožňava, Slovenský kras, 339 m a.s.l., 4.2005, AMBROS et al. (2008), vývržky *S.aluco*. - Meadows and Pastures in surroundings of Domica cave (E 20º27'45.0360; N 48º28'36.3000), Kečovo, Rožňava, Slovenský kras, 349 m a.s.l., 10.2004, lit.: AMBROS et al. (2008). - **7596:** Somotor (E 21º48'10.4400; N 48º24'23.4720), Somotor, Trebišov, Východoslovenská rovina, 138 m a.s.l., 11.1980, lit.: KOVÁČIK (1983b). - **7597:** Eröš, Pheasentry (E 21º57'4.0320; N 48º26'13.6680), Kráľovský Chlmec, Trebišov. - Východoslovenská rovina, 107 m a.s.l., 6.1979, lit.: KOVÁČIK (1983b). - **7598:** Latorický luh, PR (E 22º6'17.1000; N 48º27'48.2760), Boťany, Trebišov, Východoslovenská rovina, 100 m a.s.l., 6.1980, lit.: DUDICH & ŠTOLLMANN (1986), KOVÁČIK (1983b). - Leles (E 22º2'9.7080; N 48º29'30.1200), Leles, Trebišov, Východoslovenská rovina, 99 m a.s.l., 6.1979, lit.: KOVÁČIK (1983b). - **7673:** Bábsky les - forest, PR (E 17º53'57.9480; N 48º18'24.5880), Veľký Báb, Nitra, Nitrianska pahorkatina, 168 m a.s.l., 9.2008, coll.: GAJDOŠ P. - swamp (E 17º58'36.4080; N 48º18'12.7800), Veľké Zálužie, Nitra, Nitrianska pahorkatina, 201 m a.s.l., 7.1986, lit.: DUDICH et al. (1993). - **7674:** Krvavé Šenky (E 18º0'20.5560; N 48º20'4.4520), Zbehy, Nitra, Nitrianska pahorkatina, 194 m a.s.l., 4.2001, 7.2001, lit.: BALÁŽ (2002). - **7675:** Water reservoir (E 18º12'43.9920; N 48º21'17.1360), Kolíňany, Nitra, Žitavská pahorkatina, 179 m a.s.l., 9.2004, 10.2005, lit.: BALÁŽ et al. (2005). - **7676:** Čierne Klačany (E 18º26'40.7760; N 48º22'32.8800), Čierne Klačany, Zlaté Moravce, Pohronský Inovec, 249 m a.s.l., 7.1983, lit.: DUDICH et al. (1985a), DUDICH et al. (1993). - **7678:** Obecný potok - Stream, Grunty (E 18º42'0.5040; N 48º23'0.3840), Pukanec, Levice, Štiavnické vrchy, 447 m a.s.l., 3.1983, lit.: ŠTOLLMANN et al. (1988a). - Jabloňovce (E 18º47'46.5720; N 48º20'17.1600), Horné Jabloňovce, Levice, Štiavnické vrchy, 317 m a.s.l., 3.1984, lit.: ŠTOLLMANN et al. (1988a). - **7679:** Holík (E 18º51'27.3600; N 48º23'14.5680), Počúvadlo, Banská Štiavnica, Štiavnické vrchy, 752 m a.s.l., 4.1984, lit.: ŠTOLLMANN et al. (1988a). - **7680:** Mäsiarsky briežok (E 19º5'46.3920; N 48º23'50.7120), Krupina, Krupina, Krupinská planina, 538 m a.s.l., 10.1976, 5.1978, lit.: ŠTOLLMANN et al. (1982), ŠTOLLMANN et al. (1988a). - **7683:** Ľadovo, Water reservoir (E 19º37'19.9560; N 48º20'1.8600), Lučenec, Lučenec, Lučenská kotlina, 209 m a.s.l., 11.2002, coll.: AMBROS M., DUDICH A., STOLLMANN A., GUBÁNYI A. - Ľuboreč, Water reservoir (E 19º31'6.6000; N 48º18'3.2760), Ľuboreč, Lučenec, Ipeľská kotlina, 238 m a.s.l., 11.2002, coll.: AMBROS M., DUDICH A.,

STOLLMANN A., GUBÁNYI A. - **7686:** Kurinec (E 20º0'40.0320; N 48º20'51.1800), Rimavská Sobota, Rimavská Sobota, Rimavská kotlina, 208 m a.s.l., 3.1984, coll.: DUDICH A. - **7768:** Vinohrady (E 17º7'56.8560; N 48º12'36.9720), Rača, Bratislava III, Podunajská rovina, 293 m a.s.l., 6.1986, coll.: DUDICH A., STOLLMANN A. - **7774:** Dvorčiansky les – forest (E 18º7'9.6600; N 48º15'40.6800), Dolné Krškany I, Nitra, Nitrianska pahorkatina, 143 m a.s.l., 7.1982, lit.: DUDICH et al. (1993). - **7775:** Golianovo, Water reservoir (E 18º12'6.5520; N 48º15'40.7160), Golianovo, Nitra, Žitavská pahorkatina, 149 m a.s.l., 5.2002, lit.: BALÁŽ et al. (2005). - Vráble, Water reservoir (E 18º17'30.3360; N 48º15'41.1840), Vráble, Nitra, Žitavská pahorkatina, 148 m a.s.l., 6.1984, lit.: DUDICH et al. (1993). - **7776:** Mochovce (E 18º26'39.3720; N 48º16'32.6280), Mochovce, Levice, Hronská pahorkatina, 307 m a.s.l., 7.1983, lit.: ŠTOLLMANN et al. (1997). – Water reservoir (E 18º23'32.8560; N 48º16'51.9240), Nevidzany, Zlaté Moravce, Hronská pahorkatina, 174 m a.s.l., 1.1983, lit.: DUDICH et al. (1993). - Patianska cerina (E 18º23'36.3480; N 48º12'56.4480), Dolný Ďur, Levice, Hronská pahorkatina, 201 m a.s.l., 1.1983, lit.: ŠTOLLMANN et al. (1997). - **7778:** Horšianska dolina (E 18º41'10.6080; N 48º14'5.1360), Horša, Levice, Ipeľská pahorkatina, 173 m a.s.l., 2.1984, coll.: DUDICH A. - **7779:** Veperec - Stream (E 18º50'50.8560; N 48º16'32.4120), Ladzany, Krupina, Štiavnické vrchy, 381 m a.s.l., 10.1983, lit.: ŠTOLLMANN et al. (1988a). - **7780:** Beluja, Alluvial deposits of Litavice (E 19º4'19.5600; N 48º12'17.2080), Čelovce, Veľký Krtíš, Krupinská planina, 439 m a.s.l., 9.1977, lit.: ŠTOLLMANN & DUDICH (1988b). - Beluja, Drieňovský mlyn (E 19º3'51.7680; N 48º12'49.6440), Čelovce, Veľký Krtíš, Krupinská planina, 231 m a.s.l., 3.1977, lit.: ŠTOLLMANN & DUDICH (1988b). - **7781:** Krehora (E 19º13'7.5000; N 48º12'52.4520), Čebovce, Veľký Krtíš, Krupinská planina, 546 m a.s.l., 11.1986, lit.: ŠTOLLMANN & DUDICH (1988b). - Plachtická dolina (E 19º15'50.0400; N 48º16'18.9120), Dolný Dačov Lom, Veľký Krtíš, Krupinská planina, 308 m a.s.l., 7.1987, lit.: ŠTOLLMANN & DUDICH (1988b). - **7783:** Dálovský močiar, PR (E 19º36'15.0480; N 48º14'48.9840), Veľká nad Ipľom, Lučenec, Lučenská kotlina, 169 m a.s.l., 4.2002, coll.: AMBROS M., BALÁŽ A. - **7784:** Volavčia kolónia, PR (E 19º41'50.4960; N 48º17'15.0720), Trebeľovce, Lučenec, Lučenská kotlina, 179 m a.s.l., 4.2002, coll.: AMBROS M., STOLLMANN A. - **7868:** Líšťiny, vineyard (E 17º3'58.7520; N 48º9'56.8440), Karlova Ves, Bratislava IV, Malé Karpaty, 212 m a.s.l., 3.1984, coll.: KOVÁČIK J. - Železná studnička (E 17º5'13.3800; N 48º11'19.1400), Vinohrady, Bratislava III, Malé Karpaty, 381 m a.s.l., 3.1984, coll.: STOLLMANN A. - **7875:** Žitavský luh, PR (E 18º17'46.7160; N 48º10'42.3840), Veľká Maňa, Nové Zámky, Hronská pahorkatina, 152 m a.s.l., 11.2003, coll.: BALÁŽ I., JANČOVÁ A. - **7880:** Plášťovce, Jalšo pusta (E 19º0'59.4720; N 48º10'11.8560), Plášťovce, Levice, Krupinská planina, 169 m a.s.l., 9.1977, lit.: ŠTOLLMANN & DUDICH (1988b). - **7971:** Orechová Potôň (E 17º32'3.3360; N 48º1'3.1080), Orechová Potôň, Dunajská Streda, Podunajská rovina, 118 m a.s.l., 9.1981, coll.: KOVÁČIK J. - **7976:** Mariacsalád (E 18º22'9.4440; N 48º4'34.1760), Veľké Lovce, Nové Zámky, Hronská pahorkatina, 211 m a.s.l., 1.1984, lit.: AMBROS (1988a), ŠTOLLMANN et al. (1997). - **8072:** peatbog (E 17º42'42.5880; N 47º55'59.5200), Dolný Štál, Dunajská Streda, Podunajská rovina, 112 m a.s.l., 2.1992, coll.: JANIČINA - **8074:** Dlhé močariny (E 18º2'53.2680; N 47º55'57.1080), Kolárovo, Komárno, Podunajská rovina, 109 m a.s.l., 6.2002, coll.: AMBROS M. – Nitra distributary (E 18º6'26.1360; N 47º54'43.4520), Nesvady, Komárno, Podunajská rovina, 109 m a.s.l., 6.2002, coll.: AMBROS M. - Veľká dolina, Nitra abandoned meander (E 18º6'10.5480; N 47º57'57.3480), Nové Zámky, Nové Zámky, Podunajská rovina, 110 m a.s.l., 8.2002, coll.: STOLLMANN A., BALÁŽ I. - **8076:** Paríž Stream behind Strekov (E

18º24'24.4080; N 47º54'35.4960), Strekov, Nové Zámky, Hronská pahorkatina, 129 m a.s.l., 5.2002, lit.: AMBROS et al. (2006). – Water reservoir (E 18º24'48.8880; N 47º55'21.0720), Rúbaň, Nové Zámky, Hronská pahorkatina, 136 m a.s.l., 5.2002, coll.: AMBROS M. - **8078:** Pástovce (E 18º44'37.8240; N 47º58'13.1520), Pastovce, Levice, Ipeľská pahorkatina, 161 m a.s.l., 8.1976, 2.1979, coll.: STOLLMANN A. - **8172:** Doboš fének (E 17º44'54.0600; N 47º52'55.5960), Veľký Meder, Dunajská Streda, Podunajská rovina, 109 m a.s.l., 2.1992, coll.: STOLLMANN A., LOVÁS J. - **8173:** Dropie, CHA, Water reservoir surroundings (E 17º55'26.6160; N 47º52'22.6560), Čalovec, Komárno, Podunajská rovina, 108 m a.s.l., 5.2001, lit.: BALÁŽ & AMBROS (2005). - Dropie, CHA, Dudváh abandoned meander, periodically inundated (E 17º55'7.1760; N 47º52'22.1160), Zemianska Olča, Komárno, Podunajská rovina, 108 m a.s.l., 5.2001, lit.: BALÁŽ & AMBROS (2005). - Zsemlekes, Water reservoir (E 17º49'56.2440; N 47º50'30.0840), Bodza, Komárno, Podunajská rovina, 109 m a.s.l., 8.2002, coll.: AMBROS M., STOLLMANN A., BALÁŽ I. - **8174:** Kingyes, poplar forest (E 18º2'51.9360; N 47º52'36.5880), Vrbová nad Váhom, Komárno, Podunajská rovina, 109 m a.s.l., 2.1981, coll.: KOVÁČIK J. - **8176:** Parížsky močiar - swamp, NPR (E 18º25'38.7840; N 47º53'41.1720), Strekov, Nové Zámky, Hronská pahorkatina, 129 m a.s.l., 7.2000, 7.2001, 9.2001, lit.: AMBROS et al. (2005). - Parížsky močiar - swamp, NPR (E 18º27'12.5280; N 47º52'40.9440), Nová Vieska, Nové Zámky, Hronská pahorkatina, 129 m a.s.l., 4.1997, 5.2001, 6.2001, 8.2001, lit.: AMBROS et al. (1999), AMBROS et al. (2005). - **8177:** Kamenín (E 18º38'49.8120; N 47º53'52.9440), Kamenín, Nové Zámky, Hronská pahorkatina, 120 m a.s.l., 6.1986, lit.: AMBROS (1988a). - Paríž Stream (E 18º31'55.0920; N 47º52'0.5520), Šarkan, Nové Zámky, Hronská pahorkatina, 128 m a.s.l., 10.2001, lit.: AMBROS et al. (2005). - Parížsky močiar - swamp, NPR, 020517 (E 18º30'13.0320; N 47º52'0.8760), Gbeľce, Nové Zámky, Hronská pahorkatina, 129 m a.s.l., 5.2002, lit.: AMBROS et al. (2005). - **8178:** Bajtava (E 18º45'21.5640; N 47º51'14.6880), Bajtava, Nové Zámky, Burda, 241 m a.s.l., 2.1978, coll.: DZUREJ, DUDICH A. - Kováčovské kopce - North (E 18º45'51.3360; N 47º51'0.0360), Leľa, Nové Zámky, Burda, 260 m a.s.l., 11.1978, 8.1979, coll.: AMBROS M., STOLLMANN A. - **8275:** Serke, swamp (E 18º17'10.6080; N 47º45'31.3920), Marcelová, Komárno, Podunajská rovina, 111 m a.s.l., 5.2005, coll.: AMBROS M. - **8276:** Močianský majer (E 18º22'26.2560; N 47º46'18.9120), Radvaň nad Dunajom, Komárno, Hronská pahorkatina, 119 m a.s.l., 5.2006, coll.: DUDICH A.

Distribution and occurrence of *Myodes glareolus*

The bank vole was observed in 230 squares of the FDS, in 78 orographic units, in altitudes ranging from 100 – 1695 metres above sea level. This species was recorded in 693 localities. It was observed in willow-poplar lowland floodplain forests, oak-elm-ash lowland floodplain forest up to the altitudes of 1695 metres above sea level representing the dwarf-pine forest zone.

The overview of sites with bank vole - *Myodes glareolus* (Schreber, 1780) occurrence:

6481: Furandova dolina (E 19°17'26.2320; N 49°30'13.3920), Mútne, Námestovo, Podbeskydská brázda, 943 m a.s.l., 5.1980, lit.: DUDICH (1991). - Pilsko (E 19°17'45.8520; N 49°31'19.3080), Mútne, Námestovo, Oravské Beskydy, 1068 m

a.s.l., 9.1978, lit.: DUDICH (1991). - Zlatá dolina (E 19°15'46.8720; N 49°30'48.8880), Mútne, Námestovo, Oravské Beskydy, 900 m a.s.l., 9.1978, coll.: DUDICH A., STOLLMANN A. - **6577:** Klokočov, Grúnik (E 18°31'21.9000; N 49°26'55.7880), Korňa, Čadca, Turzovská vrchovina, 863 m a.s.l., 5.1988, lit.: AMBROS (1995), DUDICH et al. (1995), DUDICH (1995a). - Klin (E 18°34'35.7600; N 49°27'54.5760), Klokočov, Čadca, Turzovská vrchovina, 602 m a.s.l., 5.1988, lit.: AMBROS (1995), DUDICH et al. (1995), DUDICH (1995a). - **6581:** near Geschwantner (E19°17'34.7640; N 49°28'12.4320), Mútne, Námestovo, Podbeskydská brázda, 782 m a.s.l., 4.1980, lit.: DUDICH (1991). - **6582:** Beňadovské rašelinisko – Peatbog (E 19°20'13.4160; N 49°25'54.1560), Beňadovo, Námestovo, Podbeskydská vrchovina, 735 m a.s.l., 4.1980, coll.: DUDICH A. - Klínske rašelinisko – Peatbog (E 19°29'48.4440; N 49°25'40.7640), Klin, Námestovo, Oravská kotlina, 617 m a.s.l., 4.1980, coll.: DUDICH A., STOLLMANN A. - Námestovo (E 19°27'34.2360; N 49°24'23.0040), Námestovo, Námestovo, Podbeskydská vrchovina, 668 m a.s.l., 6.1980, coll.: KOVÁČIK J. - Skalka (E 19°27'41.2200; N 49°23'59.7840), Námestovo, Námestovo, Oravská kotlina, 608 m a.s.l., 4.1977, coll.: DUDICH A., STOLLMANN A. - **6583:** Medvedia hora (E 19°39'3.9240; N 49°24'18.3600), Trstená, Tvrdošín, Oravská kotlina, 631 m a.s.l., 9.1980, coll.: AMBROS M. - Za Jelešnou (E 19°38'8.1240; N 49°24'18.1800), Trstená, Tvrdošín, Oravská kotlina, 627 m a.s.l., 6.1979, coll.: DUDICH A., KOVÁČIK J., STOLLMANN A. - **6584:** Sosnina (E 19°46'29.6400; N 49°24'25.4520), Suchá Hora, Tvrdošín, Oravská kotlina, 720 m a.s.l., 4.1978, coll.: DUDICH A., STOLLMANN A. - **6588:** Červený Kláštor (E 20°24'55.8360; N 49°24'7.8840), Červený Kláštor, Kežmarok, Pieniny, 449 m a.s.l., 4.1975, lit.: AMBROS & STANKO (1993), DUDICH (1993). - Huty, Holica (E 20°25'47.5320; N 49°24'39.6720), Lesnica, Stará Ľubovňa, Pieniny, 468 m a.s.l., 4.1988, lit.: AMBROS & STANKO (1993), DUDICH (1993). - **6593:** Becherov (E 21°16'49.1520; N 49°26'50.5680), Becherov, Bardejov, Ondavská vrchovina, 665 m a.s.l., 9.1979, lit.: AMBROS & STANKO (1989). - **6596:** Vyšný Komárnik (E 21°41'55.3920; N 49°24'26.1000), Vyšný Komárnik, Svidník, Laborecká vrchovina, 481 m a.s.l., 3.1979, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a). - **6678:** Klináre (E 18°45'35.5680; N 49°20'14.7840), Nesluša, Kysucké Nové Mesto, Javorníky, 550 m a.s.l., 11.1983, lit.: DUDICH et al. (1995). - **6679:** Klubinská dolina (E 18°54'54.1800; N 49°22'6.9240), Klubina, Čadca, Kysucké Beskydy, 521 m a.s.l., 10.1977, lit.: DUDICH & ŠTOLLMANN 1978b, DUDICH et al. (1995), OBUCH (1977). - Ráztoka, Veľká Buková (E 18°58'6.5280; N 49°23'34.8000), Stará Bystrica, Čadca, Kysucké Beskydy, 869 m a.s.l., 7.1977, lit.: DUDICH & ŠTOLLMANN 1978b, DUDICH et al. (1995), OBUCH (1977). - Kotliny (E 18°56'59.7120; N 49°23'31.2000), Klubina, Čadca, Kysucké Beskydy, 774 m a.s.l., 10.1977, lit.: DUDICH & ŠTOLLMANN 1978b. - Ráztocká dolina (E 18°57'40.9680; N 49°23'15.7200), Stará Bystrica, Čadca, Kysucké Beskydy, 722 m a.s.l., 10.1977, lit.: DUDICH (1991), DUDICH et al. (1995), DUDICH & ŠTOLLMANN 1978b. - **6680:** Flajšová (E 19°9'29.4120; N 49°20'53.7720), Oravská Lesná, Námestovo, Kysucká vrchovina, 898 m a.s.l., 10.1982, coll.: STOLLMANN A. - Flajšová, gamekeeper's house (E 19°9'45.0000; N 49°19'56.6400), Oravská Lesná, Námestovo, Kysucká vrchovina, 870 m a.s.l., 10.1982, coll.: KOVÁČIK J., STOLLMANN A. - **6681:** Flajšová 2 (E 19°10'15.0600; N 49°19'50.8800), Oravská Lesná, Námestovo, Oravská Magura, 893 m a.s.l., 10.1982, coll.: KOVÁČIK J. - Flajšová 3 (E 19°10'52.7880; N 49°19'41.8080), Oravská Lesná, Námestovo, Oravská Magura, 931 m a.s.l., 10.1982, coll.: STOLLMANN A. - Flajšová, spring area (E 19°11'37.7520; N 49°19'27.4440), Oravská Lesná, Námestovo, Oravská Magura, 1066 m a.s.l., 10.1982, coll.: KOVÁČIK J. - Feráčova dolina (E

19°16'18.0120; N 49°18'4.5720), Hruštín, Námestovo, Oravská Magura, 855 m a.s.l., 5.1983, coll.: STOLLMANN A., AMBROS M., KOVÁČIK J. - Lomná dolina (E 19°16'51.2040; N 49°20'25.5480), Hruštín, Námestovo, Podbeskydská vrchovina, 762 m a.s.l., 5.1983, coll.: AMBROS M., STOLLMANN A. - Parač (E 19°14'5.4600; N 49°20'27.4200), Oravská Lesná, Námestovo, Oravská Magura, 918 m a.s.l., 6.1981, coll.: AMBROS M., KOVÁČIK J., STOLLMANN A. - **6682:** rieka Orava, riparian vegetation of Vavrečka river (E 19°27'28.7640; N 49°23'41.9640), Námestovo, Námestovo, Oravská kotlina, 609 m a.s.l., 6.1980, coll.: DUDICH A., KOVÁČIK J., STOLLMANN A - **6683:** Nové Ústie (E 19°35'3.1200; N 49°22'28.7040), Ústie nad Priehradou, Tvrdošín, Oravská vrchovina, 677 m a.s.l., 6.1980, coll.: KOVÁČIK J. - **6684:** Suchá Hora, Station (E 19°47'14.2440; N 49°23'6.8280), Suchá Hora, Tvrdošín, Oravská kotlina, 768 m a.s.l., 4.1978, coll.: DUDICH A. - **6687:** Lysá nad Dunajcom (E 20°19'38.7480; N 49°23'51.5400), Lysá nad Dunajcom, Kežmarok, Spišská Magura, 513 m a.s.l., 7.1975, lit.: AMBROS & STANKO (1993), DUDICH (1993). - **6688:** Huty (E 20°25'17.4720; N 49°23'19.4280), Červený Kláštor, Kežmarok, Spišská Magura, 472 m a.s.l., 10.1986, lit.: AMBROS & STANKO (1993), DUDICH (1993). - Spa (E 20°25'24.2400; N 49°22'57.5040), Lechnica, Kežmarok, Spišská Magura, 508 m a.s.l., 5.1988, lit.: AMBROS & STANKO (1993), DUDICH (1993). - Haligovce (E 20°26'29.3640; N 49°21'27.9720), Haligovce, Stará Ľubovňa, Spišská Magura, 606 m a.s.l., 4.1988, lit.: AMBROS & STANKO (1993), DUDICH (1993). - **6689:** Hniezdene (E 20°37'11.2080; N 49°18'29.4120), Hniezdne, Stará Ľubovňa, Spišská Magura, 586 m a.s.l., 4.1975, lit.: AMBROS & STANKO (1993), DUDICH (1993). - Kamienka (E 20°36'6.0120; N 49°19'52.7880), Kamienka, Stará Ľubovňa, Spišsko-šarišské medzihorie, 645 m a.s.l., 11.1976, lit.: AMBROS (1983a), ŠTOLLMANN et al. (1982). - Veľký Lipník (E 20°29'56.6880; N 49°22'12.5040), Veľký Lipník, Stará Ľubovňa, Spišská Magura, 638 m a.s.l., .1975, coll.: STOLLMANN A. - **6690:** Podsádek, Ľubovniansky zámok – Castle (E 20°42'1.0440; N 49°18'41.0400), Stará Ľubovňa, Stará Ľubovňa, Spišsko-šarišské medzihorie, 610 m a.s.l., 2.1975, coll.: RANDÍK, SLOSARČÍK, STOLLMANN A. - **6692:** Lenartov (E 21°0'46.5840; N 49°18'41.6160), Lenartov, Bardejov, Ondavská vrchovina, 516 m a.s.l., 1.1975, coll.: DUDICH A., PECIAR B., STOLLMANN A. - **6693:** Sheepfarm (E 21°18'58.5720; N 49°18'5.8680), Bardejovská Nová Ves, Bardejov, Ondavská vrchovina, 260 m a.s.l., 8.1980, lit.: AMBROS (1984c). - Hutisko (E 21°15'16.9920; N 49°23'54.4560), Stebník, Bardejov, Busov, 460 m a.s.l., 9.1979, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a). - Stebnícka Huta (E 21°15'2.7000; N 49°23'45.5280), Stebnícka Huta, Bardejov, Busov, 427 m a.s.l., 9.1979, lit.: AMBROS & STANKO (1989). - **6696:** Sováreň (E 21°44'6.0720; N 49°22'32.5560), Príkra, Svidník, Laborecká vrchovina, 405 m a.s.l., 3.1979, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a). - **6775:** under Javorník (E 18°17'42.3240; N 49°17'58.5960), Horná Mariková, Považská Bystrica, Javorníky, 763 m a.s.l., 4.1983, lit.: AMBROS (1985b), DUDICH (1985c), DUDICH et al. (1995), ŠTOLLMANN et al. (1985). - Lazy pod Makytou (E 18°12'50.2920; N 49°13'34.2840), Lazy pod Makytou, Púchov, Javorníky, 396 m a.s.l., 6.1983, lit.: AMBROS (1985b), DUDICH (1985c), DUDICH et al. (1995), ŠTOLLMANN et al. (1985). - **6777:** Hlboké (E 18°35'30.5880; N 49°12'3.7440), Hlboké nad Váhom, Bytča, Strážovské vrchy, 391 m a.s.l., 6.1990, coll.: STOLLMANN A. – near Railway Station (E 18°36'7.2720; N 49°14'24.7560), Kotešová, Bytča, Považské podolie, 312 m a.s.l., 2.1983, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - Petrovice (E 18°31'5.3760; N 49°16'23.0520), Kolárovice, Bytča, Javorníky, 407 m a.s.l., 2.1983, lit.: AMBROS (1985b), DUDICH (1985c), DUDICH et al. (1995), ŠTOLLMANN et al. (1985). - Kríže (E 18°31'18.1560; N 49°17'53.4480), Kolárovice,

Bytča, Javorníky, 486 m a.s.l., 5.1983, lit.: AMBROS (1985b), DUDICH (1985c), DUDICH et al. (1995), ŠTOLLMANN et al. (1985). – Váh Valley (E 18°31'26.4720; N 49°12'14.5080), Predmier, Bytča, Považské podolie, 304 m a.s.l., 5.1983, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - **6778:** Považský Chlmec (E 18°43'37.5240; N 49°14'6.6480), Považský Chlmec, Žilina, Žilinská kotlina, 402 m a.s.l., 5.1984, lit.: DUDICH et al. (1986), AMBROS (1986b), DUDICH (1986a). - **6779:** Fishponds (E 18°53'8.0160; N 49°12'25.3440), Krasňany, Žilina, Žilinská kotlina, 377 m a.s.l., 2.1983, lit.: AMBROS (1986b), DUDICH (1986a), DUDICH et al. (1986). - Tatarov, Kremienka cottage (E 18°52'33.8520; N 49°17'58.6320), Povina, Kysucké Nové Mesto, Kysucká vrchovina, 535 m a.s.l., 11.1983, coll.: KOVÁČIK J., STOLLMANN A. - **6780:** Štefanová (E 19°3'49.2480; N 49°13'42.4920), Terchová, Žilina, Malá Fatra, 639 m a.s.l., 6.1993, coll.: DUDICH A., GUBÁNYI A., MÉSZAROS F., STOLLMANN A. - Vyhnaná dolina, Stohový potok – Stream (E 19°4'8.8680; N 49°13'38.2800), Terchová, Žilina, Malá Fatra, 669 m a.s.l., 6.1996, coll.: DUDICH A., STAŠIOV S. - **6783:** Bobrovecká dolina (E 19°39'20.1960; N 49°13'6.0960), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1494 m a.s.l., 8.1977, coll.: STOLLMANN A. - Sivý vrch (E 19°38'43.0800; N 49°12'29.4840), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1555 m a.s.l., 10.1993, lit.: AMBROS et al. (1995). - Sivý vrch - avalanche trough (E 19°38'58.8480; N 49°12'35.5680), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1475 m a.s.l., 8.1993, coll.: AMBROS M. - Kozaliská (E 19°38'26.3760; N 49°14'7.0080), Zuberec, Tvrdošín, Západné Tatry, 1030 m a.s.l., 5.1978, lit.: ŠTOLLMANN & DUDICH (1985b). - Pribisko (E 19°38'45.7800; N 49°13'27.2640), Zuberec, Tvrdošín, Západné Tatry, 1417 m a.s.l., 5.1977, lit.: ŠTOLLMANN & DUDICH (1985b). - Brestová – glacial hollow (E 19°40'21.8280; N 49°13'21.9360), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1670 m a.s.l., 10.1993, coll.: AMBROS M. - **6785:** Tichá dolina (E 19°56'19.1760; N 49°12'59.3280), Štrbské Pleso, Poprad, Západné Tatry, 1182 m a.s.l., 4.1982, lit.: ŠTOLLMANN & DUDICH (1985b) - **6787:** Dolina Bielych plies (E 20°13'6.1320; N 49°13'26.2200), Tatranská Lomnica, Poprad, Vysoké Tatry, 1695 m a.s.l., 9.2009, lit.: AMBROS et al. (2009). - Kolové pleso – Tarn (E 20°11'23.1720; N 49°13'10.6680), Tatranská Javorina, Poprad, Vysoké Tatry, 1574 m a.s.l., 10.2009, coll.: BALÁŽ I., TULIS F., SLOBODNÍK V. - Zadné Meďodoly (E 20°11'42.1080; N 49°13'59.7000), Tatranská Lomnica, Poprad, Belianske Tatry, 1397 m a.s.l., 6.1987, coll.: DUDICH A., MIHÁLIKOVÁ A., STOLLMANN A. - Zadné Meďodoly, 500 m above Bránka (E 20°11'12.5520; N 49°14'6.9720), Tatranská Javorina, Poprad, Belianske Tatry, 1353 m a.s.l., 8.1987, coll.: STOLLMANN A. - Zadné Meďodoly, Bránka (E 20°9'56.4120; N 49°14'19.4280), Tatranská Javorina, Poprad, Vysoké Tatry, 1191 m a.s.l., 7.2009, coll.: AMBROS M., BALÁŽ I. - Zadné Meďodoly, Burdel cottage (E 20°11'10.5720; N 49°14'1.1400), Tatranská Javorina, Poprad, Belianske Tatry, 1399 m a.s.l., 10.2009, coll.: BALÁŽ I., TULIS F., SLOBODNÍK V. - Zadné Meďodoly, nad hranicou lesa (E 20°12'48.0600; N 49°14'1.6080), Tatranská Lomnica, Poprad, Belianske Tatry, 1745 m a.s.l., 8.1987, coll.: STOLLMANN A. - **6788:** Šarpanec (E 20°22'7.4280; N 49°12'46.0080), Tatranská Lomnica, Poprad, Popradská kotlina, 713 m a.s.l., 5.1988, coll.: DUDICH A., STOLLMANN A. - **6790:** Stará Ľubovňa (E 20°41'48.9120; N 49°17'44.1600), Stará Ľubovňa, Stará Ľubovňa, Spišsko-šarišské medzihorie, 540 m a.s.l., 1975, coll.: STOLLMANN A. - **6791:** Minčol (E 20°59'11.4000; N 49°13'50.0880), Kyjov, Stará Ľubovňa, Čergov, 970 m a.s.l., 1975, coll.: STOLLMANN A. - Orlov (E 20°51'53.2440; N 49°17'26.9160), Orlov, Stará Ľubovňa, Čergov, 536 m a.s.l., 7.1975, lit.: AMBROS & STANKO (1993), DUDICH (1993). - **6792:** Suchovlčia dolina (E 21°6'19.6560; N 49°13'47.2440), Livov, Bardejov, Čergov, 702 m a.s.l., 4.1982, lit.:

AMBROS (1984c), DUDICH (1984). - Večný potok – Stream (E 21°0'44.6040; N 49°16'15.7440), Lukov, Bardejov, Čergov, 731 m a.s.l., 11.1981, lit.: AMBROS (1984c), DUDICH (1984). - Vlčí potok – Stream (E 21°5'4.0920; N 49°14'2.1120), Livov, Bardejov, Čergov, 606 m a.s.l., 4.1982, lit.: AMBROS (1984c), DUDICH (1984). - **6793:** Hertnická dolina (E 21°12'41.1120; N 49°12'9.5040), Hertník, Bardejov, Čergov, 591 m a.s.l., 8.1980, lit.: AMBROS (1984c), DUDICH (1984). - **6797:** Jarčiská, PR (E 21°50'3.1200; N 49°14'15.9000), Roškovce, Medzilaborce, Laborecká vrchovina, 397 m a.s.l., 7.2002, coll.: THOMKA - **6798:** Palota (E 22°0'40.4640; N 49°16'23.7000), Palota, Medzilaborce, Laborecká vrchovina, 495 m a.s.l., 10.1978, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a). - Palotské jedliny (E 22°0'57.2400; N 49°16'25.5720), Palota, Medzilaborce, Laborecká vrchovina, 510 m a.s.l., 10.1978, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a). - **6876:** Nimnica (E 18°21'30.5280; N 49°8'28.4280), Nimnica, Púchov, Javorníky, 307 m a.s.l., 2.1984, coll.: KOVÁČIK J. - Nimnica, Stream (E 18°21'31.5000; N 49°8'54.9960), Nimnica, Púchov, Javorníky, 296 m a.s.l., 2.1984, coll.: KOVÁČIK J. - Nimnica, Sheepfarm (E 18°20'47.6520; N 49°9'13.3560), Nimnica, Púchov, Javorníky, 406 m a.s.l., 8.1983, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - Nosice (E 18°21'41.1120; N 49°7'33.6360), Nosice, Púchov, Javorníky, 367 m a.s.l., 10.1983, coll.: KOVÁČIK J. - Považská Bystrica (E 18°25'13.9800; N 49°6'49.7520), Považská Bystrica, Považská Bystrica, Považské podolie, 295 m a.s.l., 8.1983, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - Sihoť (E 18°27'31.9680; N 49°7'22.0800), Považská Bystrica, Považská Bystrica, Považské podolie, 288 m a.s.l., 3., 4.1978, coll.: DUDICH A., STOLLMANN A. - **6877:** Manínska úžina (E 18°30'10.2960; N 49°8'26.2320), Považská Teplá, Považská Bystrica, Strážovské vrchy, 362 m a.s.l., 5.1984, coll.: KOVÁČIK J. - Váh Valley (E 18°30'9.2880; N 49°11'20.3640), Mikšová, Bytča, Považské podolie, 298 m a.s.l., 5.1983, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - Hradná (E 18°35'21.6960; N 49°8'58.6680), Súľov - Hradná, Bytča, Strážovské vrchy, 458 m a.s.l., 10.1989, coll.: STOLLMANN A., VALACH I. - Súľov, four-mill (E 18°36'47.3040; N 49°7'57.8640), Súľov - Hradná, Bytča, Strážovské vrchy, 641 m a.s.l., 10.1989, coll.: STOLLMANN A. - **6878:** Brezany (E 18°40'18.8760; N 49°11'21.6240), Brezany near Žilina, Žilina, Žilinská kotlina, 381 m a.s.l., 10.1984, lit.: AMBROS (1986b), DUDICH (1986a), DUDICH et al. (1986). - **6880:** Ľubochňa (E 19°9'26.6760; N 49°6'54.0000), Ľubochňa, Ružomberok, Veľká Fatra, 473 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Ľubochnianska dolina (E 19°7'54.8040; N 49°6'23.9760), Ľubochňa, Ružomberok, Veľká Fatra, 644 m a.s.l., 4.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). – pod Vysokým (E 19°8'23.3160; N 49°6'30.8880), Ľubochňa, Ružomberok, Veľká Fatra, 471 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - **6883:** Mních, NPR (E 19°38'17.1240; N 49°10'33.6360), Bobrovec, Liptovský Mikuláš, Západné Tatry, 1303 m a.s.l., 2006, coll.: AMBROS M. - **6884:** Jamnická dolina (E 19°47'11.0400; N 49°9'21.0960), Pribylina, Liptovský Mikuláš, Západné Tatry, 990 m a.s.l., 11.1981, lit.: ŠTOLLMANN & DUDICH (1985b). - Pribylina (E 19°47'38.9760; N 49°7'58.0440), Pribylina, Liptovský Mikuláš, Západné Tatry, 883 m a.s.l., 8.1986, lit.: DUDICH & PAVLÍKOVÁ (2000). - Račková dolina (E 19°48'32.5080; N 49°10'11.3160), Pribylina, Liptovský Mikuláš, Západné Tatry, 1229 m a.s.l., 4.1982, lit.: DUDICH & PAVLÍKOVÁ (2000). - Švihrová (E 19°45'47.5200; N 49°6'16.9920), Jamník, Liptovský Mikuláš, Liptovská kotlina, 807

m a.s.l., 8.1992, lit.: DUDICH & PAVLÍKOVÁ (2000). - Žiarska dolina, Malé Závraty (E 19°43'45.9480; N 49°11'13.9560), Smrečany, Liptovský Mikuláš, Západné Tatry, 1553 m a.s.l., 7.2005, coll.: GUBÁNYI A., DUDICH A., STOLLMANN A. - **6885:** Machy, PR (E 19°53'48.6600; N 49°7'34.1040), Liptovská Kokava, Liptovský Mikuláš, Liptovská kotlina, 933 m a.s.l., 8.1992, lit.: DUDICH & PAVLÍKOVÁ (2000). - Krivánka cottage (E 19°55'25.2840; N 49°9'20.0880), Štrbské Pleso, Poprad, Západné Tatry, 978 m a.s.l., 5.1982, lit.: ŠTOLLMANN & DUDICH (1985b). - Tichá dolina, debris field (E 19°55'10.5600; N 49°10'3.0000), Štrbské Pleso, Poprad, Západné Tatry, 1009 m a.s.l., 5.1982, lit.: ŠTOLLMANN & DUDICH (1985b). - **6895:** Baranov (E 21°39'36.0720; N 49°8'49.3800), Breznica, Stropkov, Ondavská vrchovina, 198 m a.s.l., 8.1993, coll.: STAŠIOV S. - **6899:** Osadné (E 22°12'49.8240; N 49°10'30.7200), Osadné, Snina, Bukovské vrchy, 549 m a.s.l., 7.1978, lit.: DUDICH & ŠTOLLMANN (1987a). - **6901:** Stužice canyon (E 22°32'0.4920; N 49°4'46.8120), Nová Sedlica, Snina, Bukovské vrchy, 767 m a.s.l., 10.1978, lit.: AMBROS & STANKO (1989), DUDICH & ŠTOLLMANN (1987a), FENĎA & MAŠÁN (2003). - **6973:** Ľuborčianska dolina, end (E 17°59'23.6040; N 49°0'49.7160), Horná Súča, Trenčín, Biele Karpaty, 517 m a.s.l., 9.1980, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - **6974:** Ľuborčianska dolina, middle (E 18°2'19.1760; N 49°0'11.4120), Ľuborča, Trenčín, Biele Karpaty, 376 m a.s.l., 9.1980, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - Ľuborčianska dolina, upper segment (E 18°0'55.0080; N 49°0'28.6200), Horná Súča, Trenčín, Biele Karpaty, 418 m a.s.l., 4.1981, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - Vršatec, PR (E 18°9'38.1240; N 49°4'24.0600), Vršatské Podhradie, Ilava, Biele Karpaty, 826 m a.s.l., 11.1987, coll.: AMBROS M., KOVÁČIK J., MÁJSKY J. - **6975:** Bralo Červený Kameň (E 18°10'57.5400; N 49°5'41.2800), Červený Kameň, Ilava, Biele Karpaty, 622 m a.s.l., 11.1986, coll.: AMBROS M. - **6976:** Dobusek Valley (E 18°28'54.8040; N 48°59'59.5320), Pružina, Považská Bystrica, Strážovské vrchy, 491 m a.s.l., 7.1983, lit.: AMBROS (1985), DUDICH (1985), ŠTOLLMANN et al. (1985). - **6977:** Zemianská Závada (E 18°31'10.4520; N 49°3'35.3520), Domaniža, Považská Bystrica, Strážovské vrchy, 405 m a.s.l., 7.1983, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - **6978:** Kunerad (E 18°43'9.0120; N 49°5'32.4960), Kunerad, Žilina, Malá Fatra, 538 m a.s.l., 4.1984, lit.: AMBROS (1986b), DUDICH (1986a), DUDICH et al. (1986). - Kunerádska dolina, Krížna (E 18°44'23.5320; N 49°5'2.0400), Kunerad, Žilina, Malá Fatra, 596 m a.s.l., 7.1984, lit.: AMBROS (1986b), DUDICH (1986a), DUDICH et al. (1986). - **6980:** Blatná dolina (E 19°9'14.9760; N 49°0'21.7800), Ľubochňa, Ružomberok, Veľká Fatra, 706 m a.s.l., 4.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Čierňavy (E 19°9'36.9360; N 49°1'51.7800), Ľubochňa, Ružomberok, Veľká Fatra, 644 m a.s.l., 4.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Lipová dolina (E 19°8'32.8560; N 49°1'30.5760), Ľubochňa, Ružomberok, Veľká Fatra, 665 m a.s.l., 4.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - **6981:** Hučiaky (E 19°19'40.2960; N 49°1'18.3360), Liptovská Štiavnica, Ružomberok, Nízke Tatry, 647 m a.s.l., 6.1978, coll.: DUDICH A. - Kračkov (E 19°10'6.3480; N 49°5'15.2520), Ľubochňa, Ružomberok, Veľká Fatra, 611 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - **6982:** Ivachnovský luh (E 19°23'6.0720; N 49°5'37.0320), Ivachnová, Ružomberok, Liptovská kotlina, 498 m a.s.l., 11.1977, coll.: DUDICH A., STOLLMANN A. - **6983:** Pavčina Lehota (E 19°34'8.5440; N 49°2'20.1840), Bodice, Liptovský Mikuláš, Liptovská kotlina, 684

m a.s.l., 10.1984, lit.: DUDICH & PAVLÍKOVÁ (2000). - **6984:** Dovalovec Stream (E 19°47'2.2920; N 49°3'22.1760), Dovalovo, Liptovský Mikuláš, Liptovská kotlina, 692 m a.s.l., 8.1992, lit.: DUDICH & PAVLÍKOVÁ (2000). - Vavrišovo, Žiarce (E 19°47'12.2280; N 49°4'46.1640), Vavrišovo, Liptovský Mikuláš, Liptovská kotlina, 728 m a.s.l., 8.1992, lit.: DUDICH & PAVLÍKOVÁ (2000). - **6985:** Biely Váh, Zámčisko (E 19°53'58.3440; N 49°2'45.3840), Východná, Liptovský Mikuláš, Kozie chrbty, 743 m a.s.l., 8.1986, coll.: KUVIKOVÁ A. - Čierna dolina (E 19°53'17.0160; N 49°2'22.3440), Východná, Liptovský Mikuláš, Kozie chrbty, 755 m a.s.l., 11.1981, coll.: DUDICH A., MÉSZAROS F., 4.1982, coll.: KOVÁČIK J., 5.1984, coll.: DUDICH A., 6.1990, coll.: STOLLMANN A., VALACH I., 2002, coll.: BALÁŽ I. - Hybe (E 19°50'25.2600; N 49°3'11.7000), Hybe, Liptovský Mikuláš, Liptovská kotlina, 703 m a.s.l., 4.1982, lit.: DUDICH & PAVLÍKOVÁ (2000). - Východná, forest edge near the Research Station SAV (E 19°54'48.8160; N 49°2'53.5920), Východná, Liptovský Mikuláš, Kozie chrbty, 760 m a.s.l., .2002, coll.: BALÁŽ I. - **6987:** Veľký Slavkov (E 20°16'55.9920; N 49°5'37.2840), Veľký Slavkov, Poprad, Popradská kotlina, 682 m a.s.l., 9.1983, coll.: STOLLMANN A., KUVIKOVÁ A. - **6989:** Levočský potok - Stream, Peklisko (E 20°36'50.4000; N 49°4'52.8240), Levočská Dolina, Kežmarok, Levočské vrchy, 710 m a.s.l., 6.1975, lit.: AMBROS & STANKO (1993), DUDICH (1993). - **7072:** Predpoloma, Močariny (E 17°49'0.9480; N 48°55'3.1800), Nová Bošáca, Nové Mesto nad Váhom, Biele Karpaty, 397 m a.s.l., 7.1985, coll.: AMBROS M. - **7074:** alluvial deposits of Váh (E 18°8'46.6440; N 48°58'35.5440), Borčice, Ilava, Považské podolie, 229 m a.s.l., 9.1980, lit.: AMBROS (1985b), DUDICH (1985c), ŠTOLLMANN et al. (1985). - Opatová, forest (E 18°6'20.0880; N 48°54'44.4600), Opatová, Trenčín, Strážovské vrchy, 266 m a.s.l., 7.1993, coll.: AMBROS M., MÁJSKY J. - Opatová, bottom land of Váh (E 18°4'54.3360; N 48°55'10.4160), Opatová, Trenčín, Považské podolie, 217 m a.s.l., 7.1993, coll.: AMBROS M., MÁJSKY J. - **7075:** Poruba (E 18°17'44.4840; N 48°54'39.2040), Dolná Poruba, Trenčín, Strážovské vrchy, 425 m a.s.l., 8.1984, coll.: DUDICH A., KUVIKOVÁ A., STOLLMANN A. - **7076:** Zliechov (E 18°27'46.3320; N 48°57'50.1480), Pružina, Považská Bystrica, Strážovské vrchy, 898 m a.s.l., 7.1976, lit.: AMBROS (1986b), DUDICH (1986a), DUDICH et al. (1986) - **7078:** Moškovské rybníky - Fishponds (E 18°49'29.9280; N 48°56'42.2520), Moškovec, Turčianske Teplice, Turčianska kotlina, 456 m a.s.l., 5.1992, lit.: DUDICH (1994). - **7079:** Kláštorské lúky, PR (E 18°52'19.5240; N 48°57'36.2520), Kláštor pod Znievom, Martin, Turčianska kotlina, 437 m a.s.l., 7.1982, 5.1992, lit.: AMBROS et al. (1983a), DUDICH (1994). - Slovany (E 18°50'3.2640; N 48°58'1.2360), Slovany, Martin, Turčianska kotlina, 462 m a.s.l., 7.1982, lit.: AMBROS et al. (1983a), DUDICH (1994). - **7080:** Belá, Havranovo (E 19°4'57.5040; N 48°57'53.8920), Belá pri Necpaloch, Martin, Veľká Fatra, 688 m a.s.l., 5.1990, lit.: DUDICH (1994), KADLEČÍK et al. (1995). - Borišov (E 19°4'39.7920; N 48°57'59.7960), Belá pri Necpaloch, Martin, Veľká Fatra, 667 m a.s.l., 6.1989, lit.: KADLEČÍK et al. (1995). - under Borišov (E 19°6'25.1280; N 48°56'27.2760), Belá pri Necpaloch, Martin, Veľká Fatra, 1246 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). – cottage under Čierny Kameň (E 19°8'19.9680; N 48°56'36.5640), Ľubochňa, Ružomberok, Veľká Fatra, 958 m a.s.l., 8.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - under Čierny Kameň (E 19°8'22.6320; N 48°56'36.2400), Ľubochňa, Ružomberok, Veľká Fatra, 945 m a.s.l., 10.1980, lit.: AMBROS (1983c), DUDICH (1983a), KOVÁČIK (1983a), MURAI et al. (1983), ŠTOLLMANN & DUDICH (1983). - Havranovo, Široký úplaz (E 19°5'36.0960; N 48°57'20.3400), Belá pri Necpaloch, Martin, Veľká Fatra, 788 m a.s.l., 10.1989, lit.:

KADLEČÍK et al. (1995). - **7080:** Zelený potok – Stream (E 19°8'11.9400; N 48°54'19.7640), Liptovské Revúce, Ružomberok, Veľká Fatra, 770 m a.s.l., 5.1979, coll.: MIHÁLIK A. - **7081:** Patočiny (E 19°17'27.4200; N 48°54'42.2640), Liptovská Lužná, Ružomberok, Nízke Tatry, 838 m a.s.l., 5.1979, coll.: STOLLMANN A. - Smrekovica (E 19°13'49.7280; N 48°58'57.3600), Liptovská Osada, Ružomberok, Veľká Fatra, 1500 m a.s.l., 11.1979, coll.: KOVÁČIK J. - Vyšná Matejková (E 19°12'52.4520; N 48°59'46.5720), Ružomberok, Ružomberok, Veľká Fatra, 1194 m a.s.l., 8.1979, coll.: DUDICH A., KOVÁČIK J., STOLLMANN A. - **7082:** Magurka (E 19°26'11.2920; N 48°56'29.0400), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 1095 m a.s.l., 5.1980, coll.: AMBROS M., KOVÁČIK J., AMBROS M., STOLLMANN A. – above Tajch (E 19°25'2.9280; N 48°57'57.3120), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 824 m a.s.l., 9.1980, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - Oružná dolina (E 19°27'42.1920; N 48°56'55.5360), Partizánska Ľupča, Liptovský Mikuláš, Nízke Tatry, 1459 m a.s.l., 5.1981, 9.1980, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - **7083:** Jasná, Pod Derešami (E 19°33'58.1760; N 48°57'34.0200), Demänovská Dolina, Liptovský Mikuláš, Nízke Tatry, 1237 m a.s.l., 10.1984, lit.: AMBROS (1990b), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - Kosodrevina (E 19°35'50.4240; N 48°55'57.0360), Horná Lehota, Brezno, Nízke Tatry, 1510 m a.s.l., 9.1982, lit.: AMBROS (1990b), ŠTOLLMANN & DUDICH (1990). - Kotliská (E 19°31'34.1400; N 48°56'23.7840), Dolná Lehota, Brezno, Nízke Tatry, 1670 m a.s.l., 9.1982, lit.: AMBROS (1990b), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - Tále (E 19°36'0.5040; N 48°55'3.7200), Horná Lehota, Brezno, Nízke Tatry, 1011 m a.s.l., 4.1983, 7.1989, lit.: AMBROS (1990b), DUDICH (1990b)ŠTOLLMANN & DUDICH (1990). - Tri domky (E 19°34'46.2720; N 48°58'16.2480), Demänovská Dolina, Liptovský Mikuláš, Nízke Tatry, 1112 m a.s.l., 11.1984, coll.: MÉSZAROS F. - Vajskovská dolina (E 19°32'56.9040; N 48°53'59.9640), Dolná Lehota, Brezno, Nízke Tatry, 881 m a.s.l., 4.1983, lit.: AMBROS (1990b), DUDICH (1990a), DUDICH (1990b), ŠTOLLMANN & DUDICH (1990). - Vrbické pleso – Tarn (E 19°34'35.3280; N 48°58'12.0720), Demänovská Dolina, Liptovský Mikuláš, Nízke Tatry, 1126 m a.s.l., 8.1988, coll.: STOLLMANN A., MIHÁLIKOVÁ A. - **7084:** Kumštova dolina (E 19°41'59.3880; N 48°54'31.5000), Jarabá, Brezno, Nízke Tatry, 1076 m a.s.l., 9.1983, coll.: AMBROS M., DUDICH A., STOLLMANN A. - **7086:** Čierny Váh (E 20°6'29.6640; N 48°57'50.8320), Vikartovce, Poprad, Nízke Tatry, 899 m a.s.l., 5.1984, coll.: KUVIKOVÁ A. - Veľký Brunov Valley (E 20°8'16.7280; N 48°55'16.5720), Liptovská Teplička, Poprad, Nízke Tatry, 1059 m a.s.l., 9.1983, coll.: DUDICH A., KUVIKOVÁ A., STOLLMANN A. - **7088:** Čingov, Železné vráta (E 20°29'19.1040; N 48°56'34.6920), Spišské Tomašovce, Spišská Nová Ves, Hornádska kotlina, 488 m a.s.l., 6.1985, coll.: STOLLMANN A. - Hrabušické rašelinisko – Peatbog (E 20°25'18.7680; N 48°57'46.6560), Hrabušice, Spišská Nová Ves, Hornádska kotlina, 539 m a.s.l., 5.1981, coll.: AMBROS M., KOVÁČIK J., STOLLMANN A. - Klauzy (E 20°25'6.8520; N 48°54'40.6800), Smižany, Spišská Nová Ves, Slovenský raj, 635 m a.s.l., 4.1986, coll.: DUDICH A., KUVIKOVÁ A., STOLLMANN A. - Lesnica po PR Kocúrová (E 20°27'23.8320; N 48°55'15.9600), Smižany, Spišská Nová Ves, Slovenský raj, 576 m a.s.l., 6.1985, coll.: STOLLMANN A. - Lesnica pod Turníkom (E 20°26'13.6320; N 48°54'28.6920), Smižany, Spišská Nová Ves, Slovenský raj, 755 m a.s.l., 6.1985, coll.: STOLLMANN A. - Lesnica, mouth of Valley (E 20°28'21.4320; N 48°56'19.9680), Smižany, Spišská Nová Ves, Slovenský raj, 488 m a.s.l., 6.1985, coll.: DUDICH A., STOLLMANN A. - **7090:** Baldovské rašelinisko – Peatbog (E 20°42'16.3440; N 48°59'30.0840), Baldovce, Levoča, Hornádska kotlina, 438 m a.s.l., 5.1981, coll.: AMBROS M., KOVÁČIK J.,

STOLLMANN A. - **7094:** Brestová dolina (E 21°29'15.7920; N 48°55'31.4040), Zámutov, Vranov nad Topľou, Slanské vrchy, 586 m a.s.l., 6.1980, 11.1980, coll.: AMBROS M., KOVÁČIK J., STOLLMANN A. - Malá Delňa Stream (E 21°25'1.4160; N 48°58'46.8480), Zlatá Baňa, Prešov, Slanské vrchy, 748 m a.s.l., 6.1980, lit.: DUDICH (1989c). – under Šimonka (E 21°28'24.9240; N 48°55'51.0600), Zámutov, Vranov nad Topľou, Slanské vrchy, 733 m a.s.l., 11.1980, lit.: DUDICH (1988c). - Zlatá Baňa (E 21°25'35.1840; N 48°57'20.0520), Zlatá Baňa, Prešov, Slanské vrchy, 645 m a.s.l., 6.1980, lit.: DUDICH (1988c). - **7097:** under Veľká (E 21°58'11.8560; N 48°56'28.7160), Lackovce, Humenné, Ondavská vrchovina, 168 m a.s.l., 11.2001, 4.2002, coll.: THOMKA. - **7098:** Hypkanina (E 22°8'48.0120; N 48°55'36.4800), Valaškovce - North, Humenné, Vihorlatské vrchy, 563 m a.s.l., 11.1976, 4.1977, 6.1977, 9.1977, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Kamenica (E 22°2'31.7400; N 48°55'21.9720), Valaškovce - North, Humenné, Beskydské predhorie, 342 m a.s.l., 9.1977, 3.1978, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Kotlík (E 22°9'43.7040; N 48°55'1.9200), Valaškovce - North, Humenné, Vihorlatské vrchy, 832 m a.s.l., 11.1976, 4.1977, 6.1977, 9.1977, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Modra (E 22°3'16.6680; N 48°55'41.9160), Modra nad Cirochou, Humenné, Beskydské predhorie, 282 m a.s.l., 3.1978, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Postalka (E 22°9'22.5720; N 48°55'44.2200), Valaškovce - North, Humenné, Vihorlatské vrchy, 742 m a.s.l., 11.1976, 4.1977, 6.1977, 9.1977, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Valaškovce (E 22°6'18.9360; N 48°55'18.9120), Valaškovce - Sever, Humenné, Vihorlatské vrchy, 637 m a.s.l., 4.1977, 9.1977, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - **7172:** Nová Bošaca, fruit grove (E 17°47'43.8000; N 48°52'43.7880), Nová Bošáca, Nové Mesto nad Váhom, Biele Karpaty, 301 m a.s.l., 4.2010, coll.: BALÁŽ I. - **7173:** Beckova brána, Sigôtka (E 17°55'4.0080; N 48°48'56.3760), Ivanovce, Trenčín, Považské podolie, 190 m a.s.l., 7.1985, coll.: AMBROS M., MÁJSKY J. - **7175:** Tomanová dolina, forest (E 18°19'44.5440; N 48°50'18.9240), Trebichava, Bánovce nad Bebravou, Strážovské vrchy, 473 m a.s.l., 6.2002, coll.: AMBROS M. - **7176:** Čierna Lehota (E 18°21'4.6440; N 48°52'24.1680), Čierna Lehota, Bánovce nad Bebravou, Strážovské vrchy, 471 m a.s.l., 7.2001, coll.: AMBROS M., BALÁŽ I., BOĎOVÁ M., MÁJSKY J. under Tisovník (E 18°26'0.3120; N 48°48'35.2800), Rudnianska Lehota, Prievidza, Strážovské vrchy, 498 m a.s.l., 7.2008, lit.: BALÁŽ et al. (2009a). - Radiša Stream under Tisovník (E 18°23'46.6080; N 48°50'51.3960), Závada pod Čiernym vrchom, Bánovce nad Bebravou, Strážovské vrchy, 663 m a.s.l., 7.2009, lit.: BALÁŽ et al. (2009a). - **7177:** Ostrá dolina (E 18°39'0.4680; N 48°48'55.6920), Brezany, Prievidza, Hornonitrianska kotlina, 292 m a.s.l., 8.1984, coll.: KUVIKOVÁ A. - **7178:** Diviacky háj, PR (E 18°49'40.8000; N 48°51'32.3280), Diviaky, Turčianske Teplice, Turčianska kotlina, 510 m a.s.l., 7.1982, lit.: AMBROS et al. (1983a), DUDICH (1994). - Malá Čausa (E 18°42'40.4280; N 48°49'9.8040), Malá Čausa, Prievidza, Žiar, 629 m a.s.l., 8.1984, coll.: KUVIKOVÁ A., STOLLMANN A. - Vyšehradné (E 18°41'58.0200; N 48°52'32.9520), Solka, Prievidza, Žiar, 810 m a.s.l., 10.1988, lit.: DUDICH (1994). - **7179:** Žarnovická dolina (E 18°56'3.8040; N 48°50'46.7160), Mošovce, Turčianske Teplice, Veľká Fatra, 635 m a.s.l., 8.1980, lit.: DUDICH (1994). - Kamenná dolina (E 18°55'25.3560; N 48°50'6.1440), Dolná Štubňa, Turčianske Teplice, Veľká Fatra, 649 m a.s.l., 8.1979, lit.: DUDICH (1994). - Rakytovská dolina (E 18°58'34.5000; N 48°53'32.0640), Blatnica, Martin, Veľká Fatra, 719 m a.s.l., 10.1992, 5.1992, lit.: ŠTOLLMANN et al. (1994). - Žarnovická dolina (E 18°54'22.2840; N 48°50'48.9480),

Čremošné, Turčianske Teplice, Veľká Fatra, 653 m a.s.l., 7.1992, lit.: ŠTOLLMANN et al. (1994). - **7180:** Bystrická dolina (E 19°3'24.4080; N 48°49'11.6400), Dolný Harmanec, Banská Bystrica, Veľká Fatra, 536 m a.s.l., 8.1979, coll.: DUDICH A., KOVÁČIK J., MIHÁLIKOVÁ A. - Čierna (E 19°1'37.4520; N 48°48'33.6600), Dolný Harmanec, Banská Bystrica, Veľká Fatra, 715 m a.s.l., 9.1980, coll.: DUDICH A. - Harmanec, Railway Station (E 19°3'33.3360; N 48°48'18.3960), Dolný Harmanec, Banská Bystrica, Starohorské vrchy, 560 m a.s.l., 9.1981, lit.: AMBROS et al. (2001). - Horná Turecká (E 19°4'26.8680; N 48°51'12.8520), Turecká, Banská Bystrica, Veľká Fatra, 679 m a.s.l., 9.1980, lit.: AMBROS et al. (2001). - Malá Krížna (E 19°3'13.2840; N 48°51'51.6960), Dolný Harmanec, Banská Bystrica, Veľká Fatra, 1299 m a.s.l., 3.1977, lit.: AMBROS et al. (2001). - Prašnica, Chytrô (E 19°8'45.0240; N 48°52'32.6640), Staré Hory, Banská Bystrica, Veľká Fatra, 792 m a.s.l., 8.1989, lit.: AMBROS et al. (2001). - Prostredná dolina (E 19°6'8.6760; N 48°50'6.3600), Staré Hory, Banská Bystrica, Starohorské vrchy, 523 m a.s.l., 3.1977, lit.: AMBROS et al. (2001). - Richtárová dolina (E 19°7'51.5640; N 48°49'45.1920), Staré Hory, Banská Bystrica, Starohorské vrchy, 553 m a.s.l., 10.1977, lit.: AMBROS et al. (2001). - Richtárová dolina (E 19°7'51.5640; N 48°49'45.1920), Staré Hory, Banská Bystrica, Starohorské vrchy, 553 m a.s.l., 7.1976, 7.1977, 8.1977, 12.1977, 8.1978, 11.1978, 7.1981, 8.1982, 3.1983, 7.1985, lit.: AMBROS et al. (2001). - Staré Hory (E 19°6'53.2440; N 48°50'14.3520), Staré Hory, Banská Bystrica, Starohorské vrchy, 495 m a.s.l., 5.1976, 5.1977, 1.1984, 8.1990, lit.: AMBROS et al. (2001). - Biely potok – Stream (E 19°8'25.3680; N 48°51'59.5800), Staré Hory, Banská Bystrica, Veľká Fatra, 636 m a.s.l., 8.1989, lit.: AMBROS et al. (2001). - Haliar (E 19°7'31.8720; N 48°50'20.1480), Staré Hory, Banská Bystrica, Starohorské vrchy, 520 m a.s.l., 3.1975, 7.1983, lit.: AMBROS et al. (2001). - Ondrášová dolina (E 19°5'27.6720; N 48°48'21.0600), Staré Hory, Banská Bystrica, Starohorské vrchy, 480 m a.s.l., 8.1989, lit.: AMBROS et al. (2001). - Ribô (E 19°7'27.0120; N 48°52'9.0480), Staré Hory, Banská Bystrica, Veľká Fatra, 711 m a.s.l., 5.1990, lit.: AMBROS et al. (2001). - Zelená dolina (E 19°6'37.5120; N 48°49'26.1840), Staré Hory, Banská Bystrica, Starohorské vrchy, 540 m a.s.l., 3.1977, lit.: AMBROS et al. (2001). - **7181:** Buly (E 19°13'10.7760; N 48°51'50.0040), Donovaly, Banská Bystrica, Starohorské vrchy, 996 m a.s.l., 7.1985, 8.1989, lit.: AMBROS et al. (2001). - Hiadlovské sedlo (E 19°17'7.8720; N 48°52'16.2840), Liptovská Osada, Ružomberok, Starohorské vrchy, 873 m a.s.l., 8.1978, coll.: MIHÁLIKOVÁ A. - Spa (E 19°17'20.9040; N 48°53'28.1040), Liptovská Lužná, Ružomberok, Nízke Tatry, 868 m a.s.l., 11.1979, coll.: KOVÁČIK J. - Prašivá (E 19°17'58.6680; N 48°52'28.2000), Liptovská Osada, Ružomberok, Nízke Tatry, 1097 m a.s.l., 7.1976, coll.: STOLLMANN A. - Chladná dolina (E 19°10'57.3960; N 48°51'6.6600), Motyčky, Banská Bystrica, Starohorské vrchy, 740 m a.s.l., 8.1989, coll.: DUDICH A., MÉSZAROS F. - Môcovská dolina (E 19°12'12.2400; N 48°51'40.2120), Motyčky, Banská Bystrica, Starohorské vrchy, 854 m a.s.l., 7.1985, coll.: KUVIKOVÁ A. - Veľká a Malá Šindliarka (E 19°15'34.7760; N 48°52'17.0040), Donovaly, Banská Bystrica, Starohorské vrchy, 847 m a.s.l., 6.1978, lit.: AMBROS et al. (2001). – **7182:** Lopej (E 19°29'27.7440; N 48°48'58.2480), Podbrezová, Brezno, Horehronské podolie, 461 m a.s.l., 12.1979, coll.: KOVÁČIK J., STOLLMANN A. - Veporná dolina (E 19°28'18.6600; N 48°48'24.5160), Predajná, Brezno, Horehronské podolie, 451 m a.s.l., 5.1982, coll.: AMBROS M., KOVÁČIK J., MIHÁLIKOVÁ A. - **7183:** Spády (E 19°34'29.1360; N 48°48'52.7400), Valaská, Brezno, Horehronské podolie, 483 m a.s.l., 10.1986, coll.: STOLLMANN A., ZACH P. - **7184:** Bacúšska jelšina, PR (E 19°48'22.6080; N 48°50'29.6160), Bacúch, Brezno, Horehronské podolie, 558 m a.s.l., 10.1980, lit.:

AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986) - **7185:** Malá Zelená dolina (E 19°49'59.5560; N 48°48'40.5360), Bacúch, Brezno, Veporské vrchy, 864 m a.s.l., 10.1980, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986) - Petrikova dolina, lower segment (E 19°50'33.7560; N 48°49'46.3080), Polomka, Brezno, Veporské vrchy, 692 m a.s.l., 4.1981, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986). - Polomka, 1 km East from the village (E 19°52'22.8360; N 48°50'59.2800), Polomka, Brezno, Horehronské podolie, 589 m a.s.l., 9.2004, lit.: UHRÍN et al. (2009). – Rácov Valley, confluence with Hron river, (E 19°59'44.1960; N 48°51'10.0080), Pohorelá, Brezno, Horehronské podolie, 658 m a.s.l., .2006, lit.: UHRÍN et al. (2009). - Roveň, Hlboký potok – Stream (E 19°55'53.7600; N 48°51'29.9160), Heľpa, Brezno, Horehronské podolie, 637 m a.s.l., 4.1983, coll.: KOVÁČIK J., STOLLMANN A - **7186:** Strateník Valley (E 20°9'32.0400; N 48°49'15.6720), Šumiac, Brezno, Muránska planina, 841 m a.s.l., 4.1983, lit.: AMBROS (1986c), KOVÁČIK (1986), DUDICH (1986b). - Červená Skala, near Railway Station (E 20°7'50.8800; N 48°49'20.3880), Šumiac, Brezno, Muránska planina, 797 m a.s.l., 9.2004, lit.: UHRÍN et al. (2009). - Červená Skala, Župkova dolina (E 20°8'36.4200; N 48°48'24.8400), Šumiac, Brezno, Muránska planina, 839 m a.s.l., 4.1983, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986), Havrania skala (E 20°8'55.7520; N 48°51'46.2600), Šumiac, Brezno, Nízke Tatry, 1197 m a.s.l., 9.2004, coll.: AMBROS M., DUDICH A., STOLLMANN A. - Havrania dolina, cottage (E 20°8'34.0440; N 48°51'39.8880), Šumiac, Brezno, Nízke Tatry, 1254 m a.s.l., 9.2004, coll.: AMBROS M., DUDICH A., STOLLMANN A. - Havrania dolina, potok 1 – Stream (E 20°8'56.7960; N 48°52'0.6240), Šumiac, Brezno, Nízke Tatry, 1313 m a.s.l., 9.2004, coll.: AMBROS M., DUDICH A., STOLLMANN A. - Havrania dolina, Head of Stream (E 20°8'51.1800; N 48°52'27.8760), Šumiac, Brezno, Nízke Tatry, 1603 m a.s.l., 9.2004, coll.: AMBROS M., DUDICH A., STOLLMANN A. - Hnilec, Head, 1400 m a.s.l. (E 20°9'0.1800; N 48°53'15.9000), Šumiac, Brezno, Nízke Tatry, 1660 m a.s.l., 8.1982, coll.: STOLLMANN A. - Kráľova skala, Dwarf pine (E 20°9'25.9920; N 48°52'21.6840), Telgárt, Brezno, Nízke Tatry, 1664 m a.s.l., 9.2004, coll.: GUBÁNYI A. - Kráľova skala, front saddleback (E 20°8'0.8520; N 48°51'50.7240), Šumiac, Brezno, Nízke Tatry, 1449 m a.s.l., 9.2004, coll.: STOLLMANN A. - under Dudlavá skala (E 20°5'35.1240; N 48°50'19.8240), Šumiac, Brezno, Horehronské podolie, 864 m a.s.l., 9.2004, lit.: UHRÍN et al. (2009). – high bog near Pohorelská Maša, PR (E 20°1'19.2360; N 48°51'2.0520), Pohorelá, Brezno, Horehronské podolie, 680 m a.s.l., 9.2004, 2006, lit.: UHRÍN et al. (2009). - Havraník Valley (E 20°4'35.6520; N 48°49'29.4240), Vaľkovňa, Brezno, Horehronské podolie, 741 m a.s.l., 4.1984, lit.: AMBROS (1986b), DUDICH et al. (1986), DUDICH (1986a). - **7187:** Hnilec, Valley (E 20°13'32.4480; N 48°53'23.6760), Telgárt, Brezno, Slovenský raj, 946 m a.s.l., 8.1982, coll.: AMBROS M., KOVÁČIK J. - Pusté Pole (E 20°14'14.4240; N 48°53'0.9960), Telgárt, Brezno, Slovenský raj, 913 m a.s.l., 8.1982, coll.: STOLLMANN A. - **7188:** Biele Vody (E 20°24'7.3800; N 48°51'46.1880), Mlynky, Spišská Nová Ves, Volovské vrchy, 810 m a.s.l., 10.1984, coll.: DUDICH A., KUVIKOVÁ A. - Havrania dolina (E 20°26'4.7400; N 48°52'19.9560), Mlynky, Spišská Nová Ves, Volovské vrchy, 847 m a.s.l., 5.1984, 10.1984, coll.: AMBROS M., DUDICH A., KUVIKOVÁ A. - Stratená dolina (E 20°20'18.8160; N 48°52'16.5000), Stratená, Rožňava, Slovenský raj, 817 m a.s.l., 5.1984, 10.1984, coll.: DUDICH A., MÉSZAROS F., STOLLMANN A. - Veľký Zaif (E 20°21'37.4400; N 48°52'54.3360), Stratená, Rožňava, Slovenský raj, 855 m a.s.l., 5.1984, coll.: AMBROS M., DUDICH A. - **7197:** Chlmecká skalka PR (E 21°56'30.6600; N 48°52'14.4840), Chlmec, Humenné, Vihorlatské vrchy, 443 m a.s.l., 11.2001, coll.: THOMKA - **7198:** Jovsiansky potok – Stream (E 22°6'39.8160; N 48°51'3.2400), Valaškovce -

South, Humenné, Vihorlatské vrchy, 296 m a.s.l., 4.1977, 6.1977, 9.1977, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Kusín (E 22°3'40.1400; N 48°49'9.3360), Kusín, Michalovce, Východoslovenská pahorkatina, 138 m a.s.l., 9.1977, lit.: AMBROS (1983a), ŠTOLLMANN et al. (1982). - Kyjov, NPR (E 22°1'40.4760; N 48°51'46.9800), Valaškovce - Middle, Humenné, Vihorlatské vrchy, 574 m a.s.l., 10.2003, coll.: THOMKA - Rika (E 22°3'15.0840; N 48°53'35.8440), Valaškovce - North, Humenné, Vihorlatské vrchy, 369 m a.s.l., 11.1976, 3.1978, 10.1978, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - Suchý potok – Stream (E 22°1'12.7920; N 48°53'37.3920), Valaškovce - Middle, Humenné, Beskydské predhorie, 312 m a.s.l., 11.1976, 4.1977, 9.1977, 3.1978, 10.1979, lit.: AMBROS (1983a), DUDICH (1983c), ŠTOLLMANN et al. (1982). - **7269:** Vieska (E 17°16'8.2200; N 48°46'7.2480), Vieska, Skalica, Chvojnická pahorkatina, 224 m a.s.l., 12.1986, lit.: DUDICH (1983b) - **7274:** Panská Javorina (E 18°2'45.3120; N 48°43'57.9000), Zlatníky, Bánovce nad Bebravou, Považský Inovec, 498 m a.s.l., 10.1983, lit.: AMBROS (1986a), AMBROS et al. (1986), DUDICH (1986). - **7276:** Hradištnica, beginning (E 18°23'17.6640; N 48°43'18.6600), Dolné Vestenice, Prievidza, Nitrianska pahorkatina, 320 m a.s.l., 7.2005, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Behúlová, quadrate 1 (E 18°24'50.8320; N 48°46'14.1240), Uhrovské Podhradie, Bánovce nad Bebravou, Strážovské vrchy, 547 m a.s.l., .2007, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Dolné Vestenice, Milotina (E 18°23'29.5440; N 48°42'38.4120), Dolné Vestenice, Prievidza, Nitrianska pahorkatina, 283 m a.s.l., .2007, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Rokoš, Hradištnica, Valley (E 18°24'56.5200; N 48°44'19.2480), Dolné Vestenice, Prievidza, Strážovské vrchy, 612 m a.s.l., .2007, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Uhrovec castle (E 18°23'29.0040; N 48°45'14.8680), Uhrovské Podhradie, Bánovce nad Bebravou, Strážovské vrchy, 540 m a.s.l., .2008, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Jankov vŕšok, quadrate 2 (E 18°21'42.1200; N 48°43'3.4320), Látkovce, Bánovce nad Bebravou, Nitrianska pahorkatina, 343 m a.s.l., 4.2009, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Ješkova Ves, cottages (E 18°28'42.4920; N 48°46'53.7960), Ješkova Ves nad Nitricou, Prievidza, Strážovské vrchy, 402 m a.s.l., 4.2009, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Látkovce (E 18°21'31.6080; N 48°43'4.6560), Látkovce, Bánovce nad Bebravou, Nitrianska pahorkatina, 336 m a.s.l., 4.2009, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Rokoš, avalanche trough (E 18°25'43.8960; N 48°45'56.1240), Uhrovské Podhradie, Bánovce nad Bebravou, Strážovské vrchy, 675 m a.s.l., .2008, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Nitrianske Rudno (E 18°27'8.8920; N 48°47'9.2760), Nitrianske Rudno, Prievidza, Strážovské vrchy, 443 m a.s.l., .2008, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Nitrianske Sučany 2 (E 18°27'30.3120; N 48°44'29.9040), Nitrianske Sučany, Prievidza, Strážovské vrchy, 369 m a.s.l., 4.2009, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Omastiná (E 18°23'4.8480; N 48°46'21.4320), Omastiná, Bánovce nad Bebravou, Strážovské vrchy, 324 m a.s.l., 5.1985, coll.: KOVÁČIK J., STOLLM,ANN A., BALÁŽ et al. (2009a). – Cowhouse behind the village (E 18°24'0.9360; N 48°46'54.5520), Omastiná, Bánovce nad Bebravou, Strážovské vrchy, 381 m a.s.l., .2007, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). – under the village (E 18°23'4.2360; N 48°46'22.9440), Omastiná, Bánovce nad Bebravou, Strážovské vrchy, 329 m a.s.l., 10.2008, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Omastiná, Water Station (E 18°23'55.0320; N 48°47'17.5920), Omastiná, Bánovce nad Bebravou, Strážovské vrchy, 430 m a.s.l., 2007, 10.2008, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). – pasture under Končitý vrch (E 18°28'1.9560; N 48°45'26.4240), Diviaky nad Nitricou, Prievidza, Strážovské

vrchy, 547 m a.s.l., 11.2008, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Podhradský potok – Stream (E 18°24'4.6800; N 48°45'45.6120), Uhrovské Podhradie, Bánovce nad Bebravou, Strážovské vrchy, 416 m a.s.l., 2007, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Podhradský potok - Stream, lateral Valley (E 18°23'43.0800; N 48°45'54.1440), Uhrovské Podhradie, Bánovce nad Bebravou, Strážovské vrchy, 396 m a.s.l., .2007, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Podhradský potok - Stream, swamp above the sheepfarm (E 18°23'11.2920; N 48°45'44.1720), Uhrovské Podhradie, Bánovce nad Bebravou, Strážovské vrchy, 338 m a.s.l., 7.2007, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Striebornica, mouth of the valley (E 18°20'46.6440; N 48°45'3.8520), Uhrovec, Bánovce nad Bebravou, Nitrianska pahorkatina, 273 m a.s.l., 10.2008, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Striebornica, end (E 18°21'50.7600; N 48°45'10.5480), Uhrovec, Bánovce nad Bebravou, Strážovské vrchy, 305 m a.s.l., 10.2008, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - Zengova cottage (E 18°25'24.7080; N 48°45'40.1760), Uhrovské Podhradie, Bánovce nad Bebravou, Strážovské vrchy, 578 m a.s.l., 6.2002, lit.: AMBROS et al. (2009), BALÁŽ et al. (2009a). - **7277:** Water reservoir D, E (E 18°34'9.1560; N 48°44'24.1440), Koš, Prievidza, Hornonitrianska kotlina, 251 m a.s.l., 2008, lit.: BALÁŽ et al. (2009b). – Water reservoir F (E 18°33'38.4480; N 48°43'55.7040), Nováky, Prievidza, Hornonitrianska kotlina, 250 m a.s.l., 2008, lit.: BALÁŽ et al. (2009b). – Drainage canal (E 18°34'37.1280; N 48°43'53.5800), Koš, Prievidza, Hornonitrianska kotlina, 269 m a.s.l., .2008, lit.: BALÁŽ et al. (2009b). - Ťakov 1 – Stream (E 18°34'6.7080; N 48°43'57.7920), Nováky, Prievidza, Hornonitrianska kotlina, 259 m a.s.l., 8.2008, lit.: BALÁŽ et al. (2009b). - Ťakov 2 – Stream (E 18°33'53.9640; N 48°44'4.0200), Nováky, Prievidza, Hornonitrianska kotlina, 252 m a.s.l., 8.2008, lit.: BALÁŽ et al. (2009b). – orchard 1 (E 18°33'59.7240; N 48°43'56.0640), Nováky, Prievidza, Hornonitrianska kotlina, 257 m a.s.l., .2008, lit.: BALÁŽ et al. (2009b). - Metrbos 1 – Stream (E 18°34'2.3520; N 48°44'20.6160), Koš, Prievidza, Hornonitrianska kotlina, 250 m a.s.l., 11.2008, lit.: BALÁŽ et al. (2009b). - Metrbos 2 – Stream (E 18°33'45.6480; N 48°44'27.2040), Koš, Prievidza, Hornonitrianska kotlina, 248 m a.s.l., 12.2008, lit.: BALÁŽ et al. (2009b). - Nitra river - Handlovka (E 18°33'49.5360; N 48°44'35.4840), Koš, Prievidza, Hornonitrianska kotlina, 246 m a.s.l., .2008, lit.: BALÁŽ et al. (2009b). – Stack of Straw, dunghills (E 18°34'30.6480; N 48°44'10.3200), Koš, Prievidza, Hornonitrianska kotlina, 262 m a.s.l., 12.2008, lit.: BALÁŽ et al. (2009b). - Metrbos 3 – Stream (E 18°34'52.9320; N 48°44'4.9920), Koš, Prievidza, Hornonitrianska kotlina, 269 m a.s.l., 12.2008, lit.: BALÁŽ et al. (2009b). - **7279:** Horný Turček, Mokrá dolina (E 18°59'27.2760; N 48°46'22.4400), Horný Turček, Turčianske Teplice, Kremnické vrchy, 917 m a.s.l., 7.1979, lit.: DUDICH (1994). - Krahulská dolina (E 18°56'45.6360; N 48°44'44.8800), Krahule, Žiar nad Hronom, Kremnické vrchy, 784 m a.s.l., 11.1980, lit.: DUDICH (1994). - Skalka (E 18°53'52.6920; N 48°43'3.2880), Kremnica, Žiar nad Hronom, Kremnické vrchy, 747 m a.s.l., 9.1989, coll.: DUDICH A. - Kremnické Bane (E 18°54'9.3960; N 48°44'9.2400), Kremnické Bane, Žiar nad Hronom, Kremnické vrchy, 791 m a.s.l., 9.1989, lit.: DUDICH (1994). - Pramene (E 18°57'52.8480; N 48°46'25.6440), Horný Turček, Turčianske Teplice, Kremnické vrchy, 825 m a.s.l., 5.1981, lit.: DUDICH (1994). - Sklené (E 18°50'21.8760; N 48°47'31.9560), Sklené, Turčianske Teplice, Turčianska kotlina, 549 m a.s.l., 7.1976, 9.1976, lit.: DUDICH (1994). - Rovná hora (E 18°50'47.2560; N 48°47'58.5960), Sklené, Turčianske Teplice, Turčianska kotlina, 567 m a.s.l., 9.1989, lit.: BOĎOVÁ & DUDICH (2000), DUDICH (1994). - Turček (E 18°56'11.1480; N 48°45'17.1360), Horný Turček, Turčianske Teplice,

Kremnické vrchy, 730 m a.s.l., 9.1989, lit.: DUDICH (1994). - **7280:** Cenovo (E 19°3'44.5680; N 48°47'21.8760), Harmanec, Banská Bystrica, Starohorské vrchy, 505 m a.s.l., 9.1980, 8.1981, lit.: AMBROS et al. (2001). - Harmančok, Pod Košiarom (E 19°5'18.8160; N 48°46'53.3280), Uľanka, Banská Bystrica, Starohorské vrchy, 532 m a.s.l., 9.1980, lit.: AMBROS et al. (2001). – above the Railway and Factory (E 19°4'49.6200; N 48°47'48.3720), Harmanec, Banská Bystrica, Starohorské vrchy, 540 m a.s.l., 9.1981, lit.: AMBROS et al. (2001). - Papermill (E 19°5'16.0440; N 48°47'32.3160), Harmanec, Banská Bystrica, Starohorské vrchy, 426 m a.s.l., 9.1981, lit.: AMBROS et al. (2001). - **7281:** Horná Mičiná (E 19°12'9.1440; N 48°42'5.5080), Horná Mičiná, Banská Bystrica, Zvolenská kotlina, 523 m a.s.l., 3.1975, coll.: DUDICH A., STOLLMANN A. - Rudlovský potok – Stream (E 19°10'22.9080; N 48°44'58.2720), Sasová, Banská Bystrica, Zvolenská kotlina, 462 m a.s.l., 4.1977, lit.: DUDICH et al. (1994). - Slovenská Lupča (E 19°16'5.5200; N 48°46'4.5120), Slovenská Ľupča, Banská Bystrica, Zvolenská kotlina, 436 m a.s.l., 11.1984, lit.: DUDICH et al. (1994). - Drekyňa (E 19°17'12.1560; N 48°45'11.8440), Slovenská Ľupča, Banská Bystrica, Zvolenská kotlina, 391 m a.s.l., 11.1984, lit.: DUDICH et al. (1994). - Šalková (E 19°13'30.1800; N 48°44'25.1880), Šalková, Banská Bystrica, Zvolenská kotlina, 359 m a.s.l., 10.1981, 4.1982, lit.: DUDICH et al. (1994). - Veľké Plavno (E 19°15'57.8520; N 48°44'21.9480), Poniky, Banská Bystrica, Zvolenská kotlina, 404 m a.s.l., 11.1984, lit.: DUDICH et al. (1994). – **7283:** Havranie skaly (E 19°34'20.2440; N 48°47'37.3560), Hronec, Brezno, Veporské vrchy, 619 m a.s.l., 10.1986, coll.: DUDICH A. - **7285:** Čertova dolina, Gálička Stream (E 19°52'1.3080; N 48°44'34.7280), Tisovec, Rimavská Sobota, Veporské vrchy, 808 m a.s.l., 5.2003, coll.: AMBROS M., HAPL E. - Klátna (E 19°56'26.1600; N 48°47'58.2720), Závadka nad Hronom, Brezno, Veporské vrchy, 766 m a.s.l., 5.2003, lit.: UHRÍN et al. (2009). - Malá Stožka (E 19°55'41.1600; N 48°46'33.9600), Muráň, Revúca, Muránska planina, 1099 m a.s.l., 4.1983, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986) - Muráň, Dielik (E 19°59'28.8960; N 48°42'27.4320), Muráň, Revúca, Stolické vrchy, 490 m a.s.l., 5.2003, lit.: UHRÍN et al. (2009). - Za Nihovo (E 19°57'28.1160; N 48°47'36.8520), Závadka nad Hronom, Brezno, Veporské vrchy, 828 m a.s.l., 4.1983, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986) - Za Nihovo, Teplá dolina (E 19°57'5.5800; N 48°47'23.4960), Závadka nad Hronom, Brezno, Muránska planina, 827 m a.s.l., 5.2003, lit.: UHRÍN et al. (2009). - Zbojská (E 19°50'42.6480; N 48°45'3.9240), Pohronská Polhora, Brezno, Veporské vrchy, 772 m a.s.l., 10.1996, lit.: UHRÍN et al. (2009). – **7286:** Hrdzavá dolina (E 20°0'32.6520; N 48°44'51.7920), Muráň, Revúca, Muránska planina, 593 m a.s.l., 6.1982, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986) - Karafová (E 20°9'24.4440; N 48°46'8.1120), Muránska Zdychava, Revúca, Stolické vrchy, 733 m a.s.l., 7.1981, 5.1982, 7.1986, lit.: KOVÁČIK (1986), AMBROS (1986c), DUDICH (1986b), UHRÍN et al. (2009). - Muránska Lehota, Fishponds (E 20°2'40.6320; N 48°43'46.8120), Muránska Lehota, Revúca, Stolické vrchy, 377 m a.s.l., 10.1991, lit.: UHRÍN et al. (2009). - **7287:** Valley below Stolica (E 20°11'25.0080; N 48°46'37.0920), Muránska Zdychava, Revúca, Stolické vrchy, 989 m a.s.l., 10.1981, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986) - **7288:** Gemerská Poloma (E 20°28'28.2000; N 48°42'43.5960), Gemerská Poloma, Rožňava, Revúcka vrchovina, 330 m a.s.l., 9.1984, lit.: UHRÍN et al. (2009). - Henckovce (E 20°25'57.7560; N 48°42'43.7040), Henckovce, Rožňava, Revúcka vrchovina, 347 m a.s.l., 9.1984, coll.: DUDICH A., KUVIKOVÁ A. - Krátka dolina (E 20°29'7.2600; N 48°46'50.6280), Gemerská Poloma, Rožňava, Volovské vrchy, 546 m a.s.l., 5.1984, lit.: STANKO et al. (1992), STANKO & DUDICH (1992). - Podsúľová (E

20°28'38.0280; N 48°46'35.9040), Gemerská Poloma, Rožňava, Volovské vrchy, 459 m a.s.l., 5.1984, lit.: STANKO et al. (1992), STANKO & DUDICH (1992). - **7289:** Rožňavská dolina, Doboška (E 20°35'50.7840; N 48°42'57.5280), Rožňava, Rožňava, Volovské vrchy, 589 m a.s.l., 11.1983, lit.: STANKO et al. (1992), STANKO & DUDICH (1992). - **7291:** Humel (E 20°53'33.5040; N 48°43'36.3000), Medzev, Košice – surroundings, Volovské vrchy, 393 m a.s.l., 6.1983, lit.: STANKO et al. (1992), STANKO & DUDICH (1992). - **7295:** Bačkovská dolina (E 21°34'2.3880; N 48°46'19.7760), Bačkov, Trebišov, Slanské vrchy, 411 m a.s.l., 10.1981, lit.: DUDICH (1988c). - **7373:** Hrádocká dolina (E 17°57'22.2840; N 48°41'13.8840), Hrádok, Nové Mesto nad Váhom, Považský Inovec, 286 m a.s.l., 6.1983, lit.: AMBROS (1986a), AMBROS et al. (1986), DUDICH (1986) - Hrádocká dolina, lateral Valley (E 17°58'17.4720; N 48°41'24.7200), Hrádok, Nové Mesto nad Váhom, Považský Inovec, 346 m a.s.l., 6.1983, lit.: AMBROS (1986a), AMBROS et al. (1986), DUDICH (1986) - Hrádocká dolina, end (E 17°57'23.1480; N 48°40'54.0480), Hrádok, Nové Mesto nad Váhom, Považský Inovec, 322 m a.s.l., 6.1983, lit.: AMBROS (1986a), AMBROS et al. (1986), DUDICH (1986) - Moravany (E 17°53'1.2480; N 48°36'24.4080), Moravany nad Váhom, Piešťany, Považský Inovec, 195 m a.s.l., 7.1985, coll.: AMBROS M. - **7375:** Chynoranský luh (E 18°15'49.6440; N 48°37'12.3240), Nadlice, Partizánske, Nitrianska pahorkatina, 180 m a.s.l., 8.1981, lit.: AMBROS (1986a), AMBROS et al. (1986), DUDICH (1986c) - **7376:** Chalmová (E 18°28'17.3280; N 48°39'44.1720), Chalmová, Prievidza, Hornonitrianska kotlina, 229 m a.s.l., 7.1979, lit.: DUDICH et al. (1980). - **7377:** Bystričianska dolina (E 18°34'53.1120; N 48°37'19.5600), Bystričany, Prievidza, Vtáčnik, 628 - 752 m a.s.l., 5.1979, 7.1979, 10.1979, 4.1989, lit.: AMBROS (1991), DUDICH et al. (1980). - Bystričianska dolina, Tri kostolíky (E 18°35'36.7440; N 48°37'6.7080), Bystričany, Prievidza, Vtáčnik, lit.: AMBROS (1991). - Makovište, PR (E 18°36'15.9480; N 48°38'43.6200), Kamenec pod Vtáčnikom, Prievidza, Vtáčnik, 629 m a.s.l., 2.1988, lit.: AMBROS (1991). - Pokutský potok – Stream, headwater (E 18°39'4.6440; N 48°36'56.1960), Kľak, Žarnovica, Vtáčnik, 969 m a.s.l., 12.1985, lit.: AMBROS (1991). - Pokutský potok - Stream, headwater (E 18°39'4.6440; N 48°36'56.1960), Kľak, Žarnovica, Vtáčnik, 969 m a.s.l., 5.1985, lit.: AMBROS (1991). - Vtáčnik, PR, quadrate 1 (E 18°37'57.0720; N 48°37'31.2600), Kamenec pod Vtáčnikom, Prievidza, Vtáčnik, 1289 m a.s.l., 8.1985, 5.1990, 6.1990, 10.1990, 9.1991, 8.1992, 8.1991, lit.: AMBROS (1991), AMBROS et al. (1995). - Vtáčnik, PR , quadrate 2 (E 18°38'12.9840; N 48°37'39.8640), Kamenec pod Vtáčnikom, Prievidza, Vtáčnik, 1230 m a.s.l., 10.1990, lit.: AMBROS et al. (1995). - Vtáčnik, PR, northern hillslope (E 18°37'39.6480; N 48°37'38.1720), Kamenec pod Vtáčnikom, Prievidza, Vtáčnik, 1225 m a.s.l., 6.1991, 8.1991, 9.1991, 10.1991, 7.1991, 6.1992, 7.1992, 8.1992, 9.1992, lit.: AMBROS et al. (1995). - **7378:** Kľakovská dolina (E 18°41'23.3520; N 48°38'53.1240), Nová Lehota pri Handlovej, Prievidza, Vtáčnik, 612 m a.s.l., 3.1980, lit.: AMBROS (1991). - Kosorínska dolina (E 18°48'39.2040; N 48°40'48.1080), Kosorín, Žiar nad Hronom, Kremnické vrchy, 545 m a.s.l., 5.1988, coll.: DUDICH A. - **7379:** Ihráčska dolina, Biely potok – Stream (E 18°57'58.0320; N 48°37'11.3520), Kľačany near Trnavá Hora, Žiar nad Hronom, Kremnické vrchy, 432 m a.s.l., 8.1989, coll.: DUDICH A. - Ihráčska Píla (E 18°57'16.8120; N 48°38'5.6040), Jastrabá, Žiar nad Hronom, Kremnické vrchy, 380 m a.s.l., 5.1988, coll.: DUDICH A. - Jastrabá, Railway Station (E 18°55'24.4920; N 48°38'38.4720), Jastrabá, Žiar nad Hronom, Kremnické vrchy, 502 m a.s.l., 8.1989, coll.: DUDICH A. - Kopernická dolina (E 18°51'15.3720; N 48°39'11.7720), Lutila, Žiar nad Hronom, Kremnické vrchy, 395 m a.s.l., 5.1988, coll.: DUDICH A. - Slaský potok (E 18°50'23.6400; N 48°40'50.2680), Kopernica, Žiar nad Hronom,

Kremnické vrchy, 477 m a.s.l., 5.1988, coll.: DUDICH A. - Stará Kremnička (E 18°53'34.2600; N 48°36'13.8240), Stará Kremnička, Žiar nad Hronom, Kremnické vrchy, 332 m a.s.l., 5.1988, coll.: DUDICH A. - **7380:** Badín (E 19°7'20.1720; N 48°40'4.4760), Badín, Banská Bystrica, Zvolenská kotlina, 392 m a.s.l., 3.1977, lit.: DUDICH et al. (1994). - Badín, Bushes in agrocenosis (E 19°7'20.4960; N 48°40'5.9880), Badín, Banská Bystrica, Zvolenská kotlina, 394 m a.s.l., 6.1982, lit.: DUDICH et al. (1994). - Badínsky prales (E 19°2'40.8840; N 48°41'34.4040), Badín, Banská Bystrica, Kremnické vrchy, 745 m a.s.l., 12.1977, coll.: DUDICH A., MIHÁLIKOVÁ A. - Badínsky prales (E 19°2'40.8840; N 48°41'34.4040), Badín, Banská Bystrica, Kremnické vrchy, 745 m a.s.l., 5.1977, 8.1977, 9.1977, 4.1978, 9.1978, coll.: DUDICH A., MIHÁLIKOVÁ A., STOLLMANN A. – quadrate near Kováčová (E 19°4'46.9200; N 48°37'6.4560), Hájniky, Zvolen, Kremnické vrchy, 348 m a.s.l., 4.1978, 9.1986, 6.1986, 11.1986, 12.1986, 4.1987, 6.1987, 8.1987, 9.1987, 1.1988, 2.1988, 4.1988, 7.1988, 3.1989, 9.1989, 10.1989, 2.1990, 3.1992, 5.1993, coll.: DUDICH A., STOLLMANN A., MIHÁLIKOVÁ A., ZACH P. - Rybník (E 19°5'35.1240; N 48°36'43.1640), Kováčová, Zvolen, Kremnické vrchy, 318 m a.s.l., coll.: DUDICH A. - Kováčovská dolina (E 19°4'8.0760; N 48°38'19.9680), Hájniky, Zvolen, Kremnické vrchy, 529 m a.s.l., 7.1986, coll.: KUVIKOVÁ A., LOVÁS MIHÁLIKOVÁ A. - Ležiak, Borová hora (E 19°9'6.6960; N 48°36'14.5800), Rybáre, Zvolen, Zvolenská kotlina, 331 m a.s.l., 8.1986, coll.: DUDICH A. - Mláčik (E 19°1'55.9560; N 48°39'20.8800), Hájniky, Zvolen, Kremnické vrchy, 805 m a.s.l., 8.1988, 4.1989, coll.: DUDICH A., STOLLMANN A. VALACH I. - Ovsemno (E 19°9'47.7000; N 48°38'9.3840), Veľká Lúka, Zvolen, Zvolenská kotlina, 310 m a.s.l., 1.1990, lit.: DUDICH et al. (1994). - Sliač (E 19°9'46.1160; N 48°36'22.1760), Rybáre, Zvolen, Zvolenská kotlina, 411 m a.s.l., 4.1990, 1.1994, lit.: DUDICH et al. (1994). - Vlkanová (E 19°8'14.0640; N 48°41'17.2680), Radvaň, Banská Bystrica, Zvolenská kotlina, 372 m a.s.l., 3.1977, 11.1984, 7.1984, coll.: DUDICH A., KUVIKOVÁ A. - **7381:** Dolná Mičiná, Lukavica (E 19°13'15.9960; N 48°40'47.5680), Dolná Mičiná, Banská Bystrica, Zvolenská kotlina, 393 m a.s.l., 11.1984, lit.: DUDICH et al. (1994). - Lukové (E 19°11'23.3160; N 48°36'16.7760), Rybáre, Zvolen, Zvolenská kotlina, 370 m a.s.l., 5.1986, lit.: DUDICH et al. (1994). - Mičinské travertíny (E 19°13'25.1040; N 48°39'58.7880), Dolná Mičiná, Banská Bystrica, Zvolenská kotlina, 408 m a.s.l., 6.1982, lit.: DUDICH et al. (1994). - Veľká lúka (E 19°9'54.0360; N 48°36'58.2120), Rybáre, Zvolen, Zvolenská kotlina, 371 m a.s.l., 11.1984, 9.1989, lit.: DUDICH et al. (1994). - **7382:** under Dudáš (E 19°26'8.6640; N 48°39'15.6600), Očová, Zvolen, Poľana, 777 m a.s.l., 7.1978, lit.: AMBROS (1985a), DUDICH (1985b), ŠTOLLMANN & DUDICH (1985a). - Kyslinky (E 19°24'44.2800; N 48°39'18.5400), Hrochoť, Banská Bystrica, Poľana, 757 m a.s.l., 5.1979, lit.: AMBROS (1985a), DUDICH (1985b), ŠTOLLMANN & DUDICH (1985a). - Poľana, cottage (E 19°27'46.4040; N 48°37'32.4120), Hriňová, Detva, Poľana, 1281 m a.s.l., 4.1980, coll.: KOVÁČIK J. - Predná Poľana (E 19°28'38.1360; N 48°37'40.5480), Hriňová, Detva, Poľana, 1100 m a.s.l., 7.1987, 10.1987, 1.1988, 5.1989, 6.1989, 9.1988, lit.: AMBROS (1985a), DUDICH (1985b), ŠTOLLMANN & DUDICH (1985a). - **7383:** Hriňová, Srnčí potok – Stream (E 19°34'19.9560; N 48°36'14.4360), Hriňová, Detva, Veporské vrchy, 594 m a.s.l., 4.1992, coll.: DUDICH A., STAŠIOV S. - Hrončokový grúň, PR (E 19°30'3.8880; N 48°40'57.6480), Valaská, Brezno, Poľana, 1041 m a.s.l., 5.1992, coll.: JANIČINA, STAŠIOV - Medveďovo (E 19°37'49.6560; N 48°39'37.9440), Sihla, Brezno, Veporské vrchy, 878 m a.s.l., 6.1981, coll.: DUDICH A. - Močidlá (E 19°36'41.9400; N 48°38'57.8760), Sihla, Brezno, Veporské vrchy, 940 m a.s.l., 6.1981, coll.: AMBROS M., KOVÁČIK J. - Poľana (E 19°32'12.7680; N 48°37'6.8880), Hriňová, Detva, Veporské vrchy, 644

m a.s.l., 4.1980, coll.: AMBROS M., DUDICH A., KOVÁČIK J., STOLLMANN A. - **7384:** Brôtovo (E 19°40'49.4400; N 48°41'25.5480), Čierny Balog, Brezno, Veporské vrchy, 719 m a.s.l., 4.1990, coll.: STOLLMANN A., VALACH I. - Dobročský prales (E 19°40'48.1440; N 48°40'59.6640), Čierny Balog, Brezno, Veporské vrchy, 893 m a.s.l., 6.1981, 4.1990, coll.: AMBROS M., DUDICH A., KOVÁČIK J., STOLLMANN A., VALACH I. - Chata Lopata (E 19°41'3.7680; N 48°41'48.1560), Čierny Balog, Brezno, Veporské vrchy, 674 m a.s.l., 6.1981, coll.: KOVÁČIK J. - Ipeľ, Grapa (E 19°41'39.1200; N 48°36'3.1680), Látky, Detva, Veporské vrchy, 792 m a.s.l., 7.2004, coll.: AMBROS M., DUDICH A., STOLLMANN A. - **7386:** Mokrá lúka pri Revúcej (E 20°8'52.6920; N 48°40'9.8040), Mokrá Lúka, Revúca, Revúcka vrchovina, 288 m a.s.l., 10.1991, coll.: UHRÍN M., JANIČINA - Podhora, edge of swamp (E 20°9'36.9360; N 48°39'52.3080), Mokrá Lúka, Revúca, Revúcka vrchovina, 283 m a.s.l., 8.1982, coll.: KOVÁČIK J. - Viničky (E 20°5'7.1880; N 48°41'23.1360), Revúca, Revúca, Stolické vrchy, 367 m a.s.l., 10.1991, coll.: UHRÍN M., JANIČINA - **7387:** Hladomorná dolina (E 20°12'52.5240; N 48°41'33.9720), Chyžné, Revúca, Stolické vrchy, 421 m a.s.l., 9.1982, coll.: AMBROS M., KOVÁČIK J. - Hrádok (E 20°17'42.9720; N 48°39'35.6040), Jelšava, Revúca, Revúcka vrchovina, 665 m a.s.l., 8.1980, coll.: AMBROS M., KOVÁČIK J., STOLLMANN A. - alluvium of Muráň river (E 20°13'17.4720; N 48°38'21.0840), Jelšava, Revúca, Revúcka vrchovina, 259 m a.s.l., 9.1982, coll.: STOLLMANN A. - Lubeník, Muránka lower stream (E 20°12'3.6360; N 48°38'51.5400), Jelšava, Revúca, Revúcka vrchovina, 257 m a.s.l., 8.1982, coll.: AMBROS M. - Nandraž (E 20°12'36.0720; N 48°36'55.8000), Nandraž, Revúca, Slovenský kras, 293 m a.s.l., 3.1982, coll.: AMBROS M., DUDICH A. - Podhora, niva Muránky (E 20°10'18.0120; N 48°39'32.6520), Mokrá Lúka, Revúca, Revúcka vrchovina, 316 m a.s.l., 7.1981, lit.: AMBROS (1986c), DUDICH (1986b), KOVÁČIK (1986). - **7388:** Plešivecká planina (E 20°24'53.6760; N 48°36'24.6240), Plešivec, Rožňava, Slovenský kras, 630 m a.s.l., 9.1981, 3.1982, lit.: DUDICH et al. (1987). - **7389:** Brzotín (E 20°30'2.9520; N 48°37'37.2720), Brzotín, Rožňava, Rožňavská kotlina, 257 m a.s.l., 9.1984, coll.: DUDICH A., KUVIKOVÁ A., STOLLMANN A. - Drnava (E 20°39'38.7720; N 48°38'57.9480), Drnava, Rožňava, Slovenský kras, 424 m a.s.l., 3.1992, coll.: DUDICH A., STOLLMANN A. – tree nursery "Červená" (E 20°39'31.7160; N 48°37'0.8760), Drnava, Rožňava, Slovenský kras, 691 m a.s.l., 9.1991, coll.: STOLLMANN A., UHRÍN M. - **7390:** Bôrka, Vápenná dolina (E 20°45'25.8480; N 48°38'49.3800), Bôrka, Rožňava, Slovenský kras, 660 m a.s.l., 3.1992, coll.: JANIČINA, LOVÁS, STOLLMANN A. - Bôrka, Čremošná dolina (E 20°45'25.8840; N 48°37'47.4960), Bôrka, Rožňava, Slovenský kras, 559 m a.s.l., 6.1992, coll.: STOLLMANN A., UHRÍN M., JANIČINA - Petrov laz (E 20°48'16.4520; N 48°36'42.0480), Hrhov, Rožňava, Slovenský kras, 296 m a.s.l., 10.1992, coll.: JANIČINA, LOVÁS. - Horný vrch (E 20°40'17.0040; N 48°36'11.3760), Jablonov nad Turňou, Rožňava, Slovenský kras, 567 m a.s.l., 10.1992, coll.: STOLLMANN A. - Lúčka (E 20°43'39.6480; N 48°38'15.4680), Lúčka pri Hrhove, Rožňava, Slovenský kras, 562 m a.s.l., 3.1992, coll.: STOLLMANN A. - dolina Čierna Moldava (E 20°46'18.8040; N 48°40'48.1440), Hačava, Košice - surroundings, Volovské vrchy, 517 m a.s.l., 6.1983, lit.: STANKO et al. (1992), STANKO & DUDICH (1992). - Zádielsky canyon, cottage of CHKO (E 20°48'58.1760; N 48°38'16.4400), Bôrka, Rožňava, Slovenský kras, 465 m a.s.l., 8.1991, coll.: STOLLMANN A. - **7391:** Zádielský kaňon (E 20°49'59.8080; N 48°37'14.8080), Háj, Košice - surroundings, Slovenský kras, 335 m a.s.l., 7.1991, 8.1991, coll.: DUDICH A., STOLLMANN A. - **7392:** Hatiny (E 21°0'2.5200; N 48°38'55.6440), Debraď, Košice - surroundings, Košická kotlina, 231 m a.s.l., 4.1982, coll.: KOVÁČIK J., STOLLMANN A. - **7394:** Terebla pod PR Marocká hoľa, Malý Milič (E 21°29'1.4640; N 48°36'10.1160),

Nový Salaš, Košice - surroundings, Slanské vrchy, 391 m a.s.l., 5.1981, coll.: AMBROS M., KOVÁČIK J., STOLLMANN A. - **7398:** Pavlovce nad Uhom, pheasantry (E 22°2'12.5880; N 48°37'50.3040), Pavlovce nad Uhom, Michalovce, Východoslovenská rovina, 101 m a.s.l., 4.1979, lit.: DUDICH & ŠTOLLMANN (1986), KOVÁČIK (1983b). - **7470:** Buková, forest (E 17°21'56.0160; N 48°31'57.5760), Buková, Trnava, Malé Karpaty, 289 m a.s.l., 7.1987, lit.: AMBROS (1989), DUDICH et al. (1989), DUDICH (1989a). - Rozbehy (E 17°23'17.2680; N 48°34'24.8160), Rozbehy, Senica, Malé Karpaty, 430 m a.s.l., 7.1988, lit.: AMBROS (1989), DUDICH et al. (1989). - **7475:** Čierne blatá (E 18°17'38.8320; N 48°30'34.2360), Krnča, Topoľčany, Tribeč, 480 m a.s.l., 3.1981, lit.: AMBROS (1990a), DUDICH (1987a). - Čierne blatá, end of Valley (E 18°18'10.3320; N 48°30'30.4200), Krnča, Topoľčany, Tribeč, 423 m a.s.l., 3.1981, lit.: AMBROS (1990a), DUDICH (1987a). - Solčianska dolina (E 18°14'20.0040; N 48°30'16.7760), Solčany, Topoľčany, Tribeč, 328 m a.s.l., 3.1981, 8.1981, 6.1986, lit.: AMBROS (1990a), DUDICH (1987a), DUDICH & AMBROS (1986). - Úkropová (E 18°15'32.4000; N 48°30'29.6280), Práznovce, Topoľčany, Tribeč, 324 m a.s.l., 4.1986, 7.1986, 8.1986, 10.1986, 12.1986, 3.1987, 4.1987, lit.: AMBROS (1990a), DUDICH & AMBROS (1986), DUDICH & AMBROS (1990). - **7476:** Drahožická dolina (E 18°27'29.3040; N 48°33'32.0040), Veľké Uherce, Partizánske, Tribeč, 337 m a.s.l., 9.1986, 8.1987, 2.1989, 3.1989, 7.1989, lit.: AMBROS (1990a), DUDICH & AMBROS (1990), DUDICH & AMBROS (1986). - Hradiský potok (E 18°20'14.3880; N 48°30'41.1120), Janova Ves, Partizánske, Tribeč, 336 m a.s.l., 10.1982, lit.: AMBROS (1990a), DUDICH (1987a), DUDICH & AMBROS (1990). - Veľká Chmelina Valley (E 18°23'39.7680; N 48°31'38.4240), Klíž, Partizánske, Tribeč, 296 m a.s.l., 10.1982, lit.: AMBROS (1990a), DUDICH (1987a), DUDICH & AMBROS (1990). - **7477:** Brložné (E 18°34'55.4520; N 48°35'42.2520), Osľany, Prievidza, Vtáčnik, 970 m a.s.l., 10.1985, lit.: AMBROS (1991). – under Brložné (E 18°34'54.1560; N 48°35'35.3040), Osľany, Prievidza, Vtáčnik, 850 m a.s.l., 1.1985, 2.1985, lit.: AMBROS (1991). - Debnárov štál, below Jazvinska cave (E 18°32'41.0280; N 48°30'35.2800), Malá Lehota, Žarnovica, Tribeč, 531 m a.s.l., 5.2002, coll.: BALÁŽ I. - Hlboká dolina (E 18°31'8.0400; N 48°31'42.6720), Malá Lehota, Žarnovica, Tribeč, 437 m a.s.l., 4.1984, 8.1984, 11.1984, lit.: AMBROS (1984a), AMBROS et al. (1985), DUDICH & AMBROS (1984). - Javorinka (E 18°37'7.3920; N 48°35'13.4160), Kľak, Žarnovica, Vtáčnik, 748 m a.s.l., lit.: AMBROS (1991). - Lomská dolina (E 18°34'8.2920; N 48°34'42.9600), Horná Ves, Prievidza, Vtáčnik, 567 m a.s.l., 4.1988, lit.: AMBROS (1991). - Piliansky potok – Stream (E 18°34'22.2600; N 48°31'52.5360), Veľké Pole, Žarnovica, Tribeč, 419 m a.s.l., 7.1994, coll.: AMBROS M. - Piliansky Stream near Majsniar (E 18°34'59.0880; N 48°31'22.2600), Píla near Žarnovici, Žarnovica, Tribeč, 457 m a.s.l., 5.1995, 6.1995, coll.: AMBROS M. - Vicianska dolina (E 18°37'44.2560; N 48°34'41.8080), Kľak, Žarnovica, Vtáčnik, 614 m a.s.l., 11.1987, lit.: AMBROS (1991). - **7478:** Bralce (E 18°48'25.6680; N 48°31'57.2520), Hliník nad Hronom, Žiar nad Hronom, Štiavnické vrchy, 393 m a.s.l., 7.1985, lit.: AMBROS (1988b), DUDICH (1988a), ŠTOLLMANN & DUDICH 1988a - Pokútská dolina (E 18°40'29.1360; N 48°35'3.8040), Ostrý Grúň, Žarnovica, Vtáčnik, 578 m a.s.l., 3.1982, lit.: AMBROS (1991). - Revištské Podzámčie (E 18°43'20.2800; N 48°31'18.9480), Revištské Podzámčie, Žarnovica, Vtáčnik, 301 m a.s.l., 3.1982, coll.: AMBROS M., DUDICH A., KOVÁČIK J., STOLLMANN A. – Hron alluvial deposits (E 18°48'57.3120; N 48°34'20.3160), Lovča, Žiar nad Hronom, Žiarska kotlina, 242 m a.s.l., 7.1986, coll.: KRIŠTÍN A., KUVIKOVÁ A., LOVÁS, ŽILINEC - **7479:** Horné Opatovce (Žiar n.Hr.) (E 18°51'6.1920; N 48°33'31.7520), Horné Opatovce, Žiar nad Hronom, Žiarska kotlina, 290 m a.s.l., 11.1985, 6.1986, 10.1986, coll.: STOLLMANN A., MIHÁLIKOVÁ A.

- Šášovské podhradie (E 18°54'8.7480; N 48°34'39.0720), Šášovské Podhradie, Žiar nad Hronom, Štiavnické vrchy, 386 m a.s.l., 6.1986, lit.: AMBROS (1988b), DUDICH (1988a), - Trnavá hora (E 18°57'30.0240; N 48°35'42.1440), Trnavá Hora, Žiar nad Hronom, Kremnické vrchy, 367 m a.s.l., 6.1986, coll.: DUDICH A. - **7480:** Baková jama (E 19°9'32.1480; N 48°35'44.0520), Zvolen, Zvolen, Zvolenská kotlina, 424 m a.s.l., 12.1993, lit.: DUDICH et al. (1994). - Bienska dolina (E 19°5'17.3400; N 48°35'30.1200), Kováčová, Zvolen, Kremnické vrchy, 317 m a.s.l., 11.1986, coll.: DUDICH A. - Boky, PR (E 19°2'25.8360; N 48°34'23.5560), Budča, Zvolen, Kremnické vrchy, 335 m a.s.l., 1.1983, coll.: DUDICH A. - Burzovo (E 19°8'17.5200; N 48°31'58.8360), Môťová, Zvolen, Javorie, 452 m a.s.l., 11.1983, lit.: DUDICH & ŠTOLLMANN (1994). - Jasenica, Stream, Budča (E 19°0'18.6840; N 48°32'27.2400), Kozelník, Banská Štiavnica, Štiavnické vrchy, 310 m a.s.l., 1.1983, lit.: AMBROS (1988b), DUDICH (1988a), ŠTOLLMANN & DUDICH (1988a). - Kráľová (E 19°9'41.7960; N 48°32'8.1600), Môťová, Zvolen, Javorie, 465 m a.s.l., 7.1993, lit.: DUDICH & ŠTOLLMANN (1994). - Malá Stráž (E 19°5'24.6840; N 48°34'34.6440), Budča, Zvolen, Javorie, 370 m a.s.l., 9.1986, lit.: DUDICH & ŠTOLLMANN (1994). - Pustý hrad Castle (E 19°6'30.9240; N 48°33'19.6560), Zvolen, Zvolen, Javorie, 558 m a.s.l., 8.1985, lit.: DUDICH & ŠTOLLMANN (1994). - Stráže (E 19°5'50.9640; N 48°34'28.7040), Zvolen, Zvolen, Javorie, 308 m a.s.l., 12.1985, 6.1986, lit.: DUDICH & ŠTOLLMANN (1994). - Tepličky (E 19°6'35.4960; N 48°34'41.9880), Zvolen, Zvolen, Zvolenská kotlina, 292 m a.s.l., 12.1985, lit.: DUDICH et al. (1994). - Veľká Stráž, lower part hill (E 19°5'49.4880; N 48°34'27.0840), Zvolen, Zvolen, Javorie, 311 m a.s.l., 12.1985, lit.: DUDICH & ŠTOLLMANN (1994). - Veľký Sielenec (E 19°2'11.2920; N 48°34'28.7760), Budča, Zvolen, Kremnické vrchy, 338 m a.s.l., 5.1986, coll.: DUDICH A. - Zvolen (E 19°6'44.7480; N 48°34'42.7080), Zvolen, Zvolen, Zvolenská kotlina, 291 m a.s.l., 5.1986, lit.: DUDICH et al. (1994). - **7481:** Lieskovec (E 19°11'26.1960; N 48°34'55.8840), Lieskovec, Zvolen, Zvolenská kotlina, 327 m a.s.l., 9.1986, 12.1986, lit.: DUDICH et al. (1994). - Môťová (E 19°10'14.3040; N 48°34'24.0960), Zvolen, Zvolen, Zvolenská kotlina, 297 m a.s.l., 10.1993, lit.: DUDICH & ŠTOLLMANN (1994), DUDICH et al. (1994). - Zvolenská Slatina, Ľubica (E 19°13'53.9040; N 48°33'13.7520), Zvolenská Slatina, Zvolen, Javorie, 335 m a.s.l., 9.2004, coll.: DUDICH A., VALACH I. - **7482:** Kriváň, Slatina (E 19°25'33.4560; N 48°31'52.8600), Kriváň, Detva, Zvolenská kotlina, 384 m a.s.l., 9.2004, coll.: DUDICH A., VALACH I. - Vígľaš, Pstruša (E 19°20'42.4320; N 48°32'36.1680), Stožok, Detva, Zvolenská kotlina, 350 m a.s.l., 9.2004, coll.: DUDICH A., VALACH I. - **7483:** Dolná Bzová (E 19°30'4.1760; N 48°30'54.5400), Podkriváň, Detva, Veporské vrchy, 391 m a.s.l., 6.1988, coll.: DUDICH A. - Málinec, Confluent of Ipeľ river below the Water reservoir (E 19°39'34.0920; N 48°31'12.7200), Málinec, Poltár, Stolické vrchy, 344 m a.s.l., 10.2003, coll.: AMBROS M. - **7484:** Habánovo, PR (E 19°40'3.1800; N 48°35'29.5800), Látky, Detva, Veporské vrchy, 1009 m a.s.l., 7.2004, coll.: AMBROS M., DUDICH A., STOLLMANN A. - Ipeľ, Vlčovo 1 (E 19°43'24.7440; N 48°35'0.8880), Ipeľský potok, Stream, Poltár, Stolické vrchy, 555 m a.s.l., 7.2004, coll.: AMBROS M., DUDICH A., STOLLMANN A. - Málinec, Water reservoir (E 19°40'8.5440; N 48°32'34.3680), Málinec, Poltár, Stolické vrchy, 363 m a.s.l., 7.2004, coll.: AMBROS M., DUDICH A., STOLLMANN A. - **7485:** Hámor (E 19°54'20.5920; N 48°30'46.6920), Rimavská Lehota, Rimavská Sobota, Revúcka vrchovina, 267 m a.s.l., 7.1981, lit.: AMBROS et al. (1985b). - pod Kamenicou (E 19°51'52.1280; N 48°32'14.3160), Rimavica, Rimavská Sobota, Stolické vrchy, 289 m a.s.l., 10.2003, coll.: AMBROS M., BALÁŽ I., STOLLMANN A. - Svarínska dolina (E 19°54'33.3000; N 48°31'41.5560), Rimavská Baňa, Rimavská Sobota, Stolické

vrchy, 351 m a.s.l., 7.1981, 10.1987, lit.: AMBROS et al. (1985b). - **7486:** Ratková (E 20°5'29.3640; N 48°35'41.6040), Ratková, Revúca, Revúcka vrchovina, 330 m a.s.l., 11.1991, 2.1992, lit.: UHRÍN et al. (2002). - Rybník (E 20°7'32.4120; N 48°32'45.6000), Rybník nad Turcom, Revúca, Revúcka vrchovina, 246 m a.s.l., 11.1991, lit.: UHRÍN et al. (2002). - **7488:** Ardovská jaskyňa, okolie (E 20°25'14.4840; N 48°31'16.1400), Ardovo, Rožňava, Slovenský kras, 317 m a.s.l., 7.2004, coll.: STOLLMANN A. - Hrdzavá dolina, Prielom Muránky (E 20°20'26.4840; N 48°30'4.3920), Meliata, Rožňava, Rimavská kotlina, 218 m a.s.l., 7.1986, coll.: KUVIKOVÁ A. - planina Koniar (E 20°23'12.6240; N 48°32'43.9440), Plešivec, Rožňava, Slovenský kras, 393 m a.s.l., 6.1981, 7.1981, 8.1983, 9.1983, lit.: DUDICH et al. (1987). - Silická Brezová (E 20°28'1.7400; N 48°32'21.9120), Plešivec, Rožňava, Slovenský kras, 492 m a.s.l., 9.1984, coll.: STOLLMANN A. - **7489:** Fabianka, pod Fabiankou (E 20°33'16.9200; N 48°33'42.2640), Silica, Rožňava, Slovenský kras, 563 m a.s.l., 6.1991, coll.: DUDICH A., STOLLMANN A., UHRÍN M. - Ľadnica (E 20°30'12.8880; N 48°32'57.9120), Silická Brezová, Rožňava, Slovenský kras, 501 m a.s.l., 8.1991, coll.: MIHÁLIKOVÁ A., UHRÍN M., JANIČINA - Silická Jablonica (E 20°36'46.4400; N 48°33'36.0360), Silická Jablonica, Rožňava, Slovenský kras, 244 m a.s.l., 8.1983, 9.1983, 6.1991, coll.: AMBROS M., DUDICH A., STOLLMANN A. - Vápenná dolina, sv.Anna (E 20°36'51.4800; N 48°35'40.3800), Hrušov nad Turňou, Rožňava, Slovenský kras, 302 m a.s.l., 10.1991, coll.: JANIČINA, STOLLMANN A. - **7490:** Hrhovské jazerá (E 20°45'5.8320; N 48°35'25.0440), Hrhov, Rožňava, Slovenský kras, 198 m a.s.l., 4.1982, coll.: AMBROS M., STOLLMANN A. - **7495:** Veľaty (E 21°39'38.0880; N 48°30'2.7720), Veľaty, Trebišov, Zemplínske vrchy, 245 m a.s.l., 7.1985, coll.: DUDICH & ŠTOLLMANN (1986). - **7497:** Bešiansky polder (E 21°56'25.8360; N 48°31'15.2760), Beša nad Latoricou, Michalovce, Východoslovenská rovina, 99 m a.s.l., 10.1979, coll.: KOVÁČIK J., VYLEŤAL M. - **7498:** Ortov (E 22°5'33.1440; N 48°35'13.8480), Pavlovce nad Uhom, Michalovce, Východoslovenská rovina, 107 m a.s.l., 6.1979, lit.: DUDICH & ŠTOLLMANN (1986), KOVÁČIK (1983b). - Veľké Kapušany (E 22°4'47.9280; N 48°33'32.4000), Veľké Kapušany, Michalovce, Východoslovenská rovina, 109 m a.s.l., 6.1979, lit.: KOVÁČIK (1983b). - **7569:** Mokrá dolina (E 17°19'33.4200; N 48°29'18.6000), Plavecký Mikuláš, Malacky, Malé Karpaty, 462 m a.s.l., 11.1981, lit.: AMBROS (1984b), AMBROS (1989), DUDICH et al. (1989), DUDICH (1989a). - **7575:** Jelenec, Remitáž (E 18°12'11.5920; N 48°24'9.1800), Jelenec, Nitra, Žitavská pahorkatina, 229 m a.s.l., 5.1990, lit.: DUDICH et al. (1993). - Žlaby (E 18°18'3.4560; N 48°29'20.3280), Zlatno, Zlaté Moravce, Tribeč, 507 m a.s.l., 6.1984, lit.: AMBROS (1984a), AMBROS et al. (1985), DUDICH & AMBROS (1984) - **7576:** Hlboká dolina, Hríbová (E 18°27'47.6640; N 48°28'16.4640), Hostie I, Zlaté Moravce, Tribeč, 333 m a.s.l., 6.1988, lit.: AMBROS (1990a), DUDICH et al. (1993). - **7577:** Hubačov štál (E 18°35'32.4600; N 48°29'13.8480), Malá Lehota, Žarnovica, Pohronský Inovec, 666 m a.s.l., 5.2002, coll.:BALÁŽ I. – cottage below Vojšín (E 18°35'23.0280; N 48°27'19.3680), Nová Baňa, Žarnovica, Pohronský Inovec, 698 m a.s.l., 10.1984, lit.: DUDICH (1985a). - Andezitové kamenné more Block sea (E 18°34'30.9360; N 48°29'32.9640), Malá Lehota, Žarnovica, Tribeč, 538 m a.s.l., 4.2010, coll.: BALÁŽ I. - Stará Huta, Stream (E 18°35'4.1640; N 48°25'24.0240), Nová Baňa, Žarnovica, Pohronský Inovec, 420 m a.s.l., 3.1983, lit.: DUDICH (1985a). - Obycká Huta (E 18°31'39.7200; N 48°25'58.6200), Obyce, Zlaté Moravce, Pohronský Inovec, 631 m a.s.l., 10.1980, lit.: DUDICH (1985a), DUDICH et al. (1993). - Osná dolina (E 18°30'46.7640; N 48°26'55.6800), Jedľové Kostoľany, Zlaté Moravce, Pohronský Inovec, 401 m a.s.l., 10.1980, 6.1982, lit.: DUDICH (1985a), DUDICH et al. (1993). - Žitava (E 18°31'37.3080; N 48°29'11.9400),

Jedľové Kostoľany, Zlaté Moravce, Tribeč, 459 m a.s.l., 3.1983, lit.: DUDICH (1985a), DUDICH, ŠTOLLMANN & AMBROS (1993) - Záhradska dolina (E 18°30'14.6160; N 48°26'2.2560), Obyce, Zlaté Moravce, Pohronský Inovec, 453 m a.s.l., 6.1994, coll.: AMBROS M. - Žiare (E 18°31'36.9480; N 48°29'12.1920), Jedľové Kostoľany, Zlaté Moravce, Tribeč, 459 m a.s.l., 6.1987, lit.: AMBROS (1990a), DUDICH & AMBROS (1990), DUDICH (1993) - Žitavica (E 18°31'43.5360; N 48°29'8.8440), Jedľové Kostoľany, Zlaté Moravce, Tribeč, 470 m a.s.l., 10.1980, lit.: AMBROS (1990a), DUDICH (1985a), DUDICH & AMBROS (1990), DUDICH et al. (1993) - **7578:** Mokráň (E 18°40'33.6720; N 48°27'11.9880), Rudno nad Hronom, Žarnovica, Vtáčnik, 438 m a.s.l., 3.1982, 11.1984, 3.1986, lit.: AMBROS (1991). - Richnavská dolina (E 18°44'15.1080; N 48°26'45.6360), Voznica, Žarnovica, Štiavnické vrchy, 297 m a.s.l., 3.1982, lit.: AMBROS (1988b), Dudich (1988a), ŠTOLLMANN & DUDICH 1988a - Rudnianska dolina, Filipka (E 18°42'51.4440; N 48°24'50.6880), Rudno nad Hronom, Žarnovica, Štiavnické vrchy, 315 m a.s.l., 3.1983, lit.: AMBROS (1988b), DUDICH (1988a), ŠTOLLMANN & DUDICH 1988a - Žarnovica (E 18°42'8.9640; N 48°28'25.1400), Žarnovica, Žarnovica, Žiarska kotlina, 223 m a.s.l., 3.1982, coll.: DUDICH A. - **7579:** Petrovo (E 18°52'2.7480; N 48°24'38.5920), Banská Štiavnica, Banská Štiavnica, Štiavnické vrchy, 816 m a.s.l., 2.1985, lit.: AMBROS (1988b), DUDICH (1988a), ŠTOLLMANN & DUDICH (1988a). - Počúvadlo (E 18°51'21.1320; N 48°24'15.9840), Banská Štiavnica, Banská Štiavnica, Štiavnické vrchy, 685 m a.s.l., 7.1985, lit.: AMBROS (1988b), DUDICH (1988a), ŠTOLLMANN & DUDICH (1988a). - **7580:** Bystrá dolina (E 19°2'31.8480; N 48°28'38.4960), Dobrá Niva, Zvolen, Štiavnické vrchy, 437 m a.s.l., 8.197811.1983, lit.: AMBROS (1988b), DUDICH (1988a), DUDICH A., MIHÁLIKOVÁ A. - **7583:** Ružiná Water reservoir (E 19°32'40.2720; N 48°26'34.3680), Ružiná, Lučenec, Revúcka vrchovina, 251 m a.s.l., 11.2002, coll.: AMBROS M., STOLLMANN A., DUDICH A. - Mýtna, Water reservoir (E 19°31'6.4920; N 48°28'53.4720), Mýtna, Lučenec, Revúcka vrchovina, 289 m a.s.l., 7.2004, coll.: DUDICH A., STOLLMANN A. - **7584:** Zelené, Water reservoir (E 19°46'58.2240; N 48°26'1.7880), Poltár, Poltár, Lučenská kotlina, 224 m a.s.l., 10.2003, coll.: AMBROS M., BALÁŽ I., STOLLMANN A. - Uhorské, Water reservoir (E 19°45'45.5040; N 48°28'0.6960), Uhorské, Poltár, Revúcka vrchovina, 261 m a.s.l., 10.2003, coll.: AMBROS M., STOLLMANN A. - **7585:** Selčiansky potok - Stream (E 19°52'21.0720; N 48°28'8.5080), Selce in Gemer, Poltár, Revúcka vrchovina, 275 m a.s.l., 3.1983, lit.: DUDICH & ŠTOLLMANN (1987b). - **7586:** Budikovany (E 20°4'57.6840; N 48°29'24.8640), Drienčany, Rimavská Sobota, Rimavská kotlina, 249 m a.s.l., 11.1991, coll.: JANIČINA, LOVÁS. - Peseta (E 20°6'12.1680; N 48°24'52.9920), Nižný Blh, Rimavská Sobota, Rimavská kotlina, 206 m a.s.l., 11.1982, coll.: AMBROS M., DUDICH A., KOVÁČIK J., STOLLMANN A. - Peseta (E 20°6'12.1680; N 48°24'52.9920), Nižný Blh, Rimavská Sobota, Rimavská kotlina, 206 m a.s.l., 3.1983, lit.: UHRÍN et al. (2002). - Teplý vrch, deerfield (E 20°7'51.0240; N 48°28'3.6480), Vyšný Blh, Rimavská Sobota, Revúcka vrchovina, 364 m a.s.l., 11.1982, 6.1984, lit.: UHRÍN et al. (2002). - **7588:** Čertová dolina (E 20°28'23.3040; N 48°29'0.4920), Kečovo, Rožňava, Slovenský kras, 463 m a.s.l., 10.1984, coll.: DUDICH A., MÉSZAROS F. - Domica, road to Kečovo (E 20°28'34.4280; N 48°28'47.6760), Kečovo, Rožňava, Slovenský kras, 390 m a.s.l., 5.2004, lit.: AMBROS et al. (2008). - Domica, Čertova diera (E 20°27'34.8840; N 48°28'56.0640), Dlhá Ves, Rožňava, Slovenský kras, 357 m a.s.l., 6.1981, coll.: AMBROS M., STOLLMANN A. - Domica, meadows and pastures 1 (E 20°27'45.0360; N 48°28'36.3000), Kečovo, Rožňava, Slovenský kras, 349 m a.s.l., 10.2004, lit.: AMBROS et al. (2008). - Domica, above the cave (E 20°28'12.4320; N

48°28'50.6280), Kečovo, Rožňava, Slovenský kras, 428 m a.s.l., 5.2004, lit.: AMBROS et al. (2008). - Smradľavé jazero Lake (E 20°27'31.4640; N 48°28'44.5080), Kečovo, Rožňava, Slovenský kras, 349 m a.s.l., 8.1991, coll.: STOLLMANN A., UHRÍN M. – sink-hole near Domica cave (E 20°28'32.0520; N 48°28'39.1440), Kečovo, Rožňava, Slovenský kras, 351 m a.s.l., 10.2004, lit.: AMBROS et al. (2008). - Domica, cave surroundings (E 20°28'12.2880; N 48°28'16.6080), Kečovo, Rožňava, Bodvianska pahorkatina, 357 m a.s.l., 7.2004, lit.: AMBROS et al. (2008). - **7596:** Malá Tŕňa (E 21°41'49.3440; N 48°27'41.9400), Malá Tŕňa, Trebišov, Zemplínske vrchy, 229 m a.s.l., 11.1982, lit.: DUDICH & ŠTOLLMANN (1986). - Somotor (E 21°48'10.4400; N 48°24'23.4720), Somotor, Trebišov, Východoslovenská rovina, 138 m a.s.l., 11.1980, lit.: KOVÁČIK (1983b). - **7597:** Erös, pheasantry (E 21°57'4.0320; N 48°26'13.6680), Kráľovský Chlmec, Trebišov, Východoslovenská rovina, 107 m a.s.l., 6.1979, lit.: KOVÁČIK (1983b). - **7598:** Latorický luh, PR (E 22°6'17.1000; N 48°27'48.2760), Boťany, Trebišov, Východoslovenská rovina, 100 m a.s.l., 6.1980, lit.: DUDICH & ŠTOLLMANN (1986), KOVÁČIK (1983b). - Leles (E 22°2'9.7080; N 48°29'30.1200), Leles, Trebišov, Východoslovenská rovina, 99 m a.s.l., 6.1980, lit.: KOVÁČIK (1983b). - **7673:** Bábsky les Forest, PR (E 17°53'57.9480; N 48°18'24.5880), Veľký Báb, Nitra, Nitrianska pahorkatina, 168 m a.s.l., 3.1990,. 2008, lit.: DUDICH et al. (1993). - **7674:** Krvavé Šenky (E 18°0'20.5560; N 48°20'4.4520), Zbehy, Nitra, Nitrianska pahorkatina, 194 m a.s.l., 4.2001, 7.2001, 8.2001, 9.2001, 11.2001, 3.2002, 2002, 2007, lit.: BALÁŽ (2002), JANČOVÁ & BALÁŽ (2004). - Ecotone agrocenosis – nonforest vegetation (E 18°0'17.1000; N 48°19'42.6360), Lužianky, Nitra, Nitrianska pahorkatina, 194 m a.s.l., .2002, lit.: BALÁŽ (2002), JANČOVÁ & BALÁŽ (2004). - Zobor, meadow in forest above NPR (E 18°5'58.3800; N 48°20'52.3320), Drážovce, Nitra, Tribeč, 396 m a.s.l., 4.1984, lit.: AMBROS (1990a), AMBROS et al. (1985), DUDICH & AMBROS (1984), DUDICH et al. (1993) - Zoborská lesostep, NPR (E 18°5'37.0320; N 48°20'48.3720), Drážovce, Nitra, Tribeč, 308 m a.s.l., 4.1984, lit.: AMBROS (1990a), AMBROS et al. (1985), DUDICH & AMBROS (1984), DUDICH et al. (1993). 10.2001, coll.: AMBROS M. - **7675:** Kolíňany, Water reservoir (E 18°12'43.9920; N 48°21'17.1360), Kolíňany, Nitra, Žitavská pahorkatina, 179 m a.s.l., 9.2004,10.2005, 11.2005, 2007, lit.: BALÁŽ et al. (2005), AMBROS et al. (2006), JANČOVÁ & BALÁŽ (2004). - forest above the village (E 18°10'13.7280; N 48°21'40.8960), Dolné Štitáre, Nitra, Tribeč, 365 m a.s.l., 9.2004, 2004, 10.2005, 11.2005, 2005, 2006, 2007, lit.: BALÁŽ et al. (2005), AMBROS et al. (2006), JANČOVÁ & BALÁŽ (2004) - Heathland (E 18°10'27.5880; N 48°22'5.2320), Žirany, Nitra, Tribeč, 349 m a.s.l., 9.2005, 11.2005, 2006, lit.: BALÁŽ et al. (2005), AMBROS et al. (2006), JANČOVÁ & BALÁŽ (2004) - **7676:** Čierne Klačany (E 18°26'40.7760; N 48°22'32.8800), Prílepy, Zlaté Moravce, Pohronský Inovec, 249 m a.s.l., 7.1983, lit.: DUDICH (1985a), DUDICH et al. (1993). - Nemčiňany (E 18°27'25.0200; N 48°18'44.6400), Nemčiňany, Zlaté Moravce, Hronská pahorkatina, 222 m a.s.l., 12.1984, lit.: DUDICH et al. (1993), ŠTOLLMANN et al. (1997). - **7677:** Kozárovce (E 18°31'37.6680; N 48°18'27.1080), Kozárovce, Levice, Štiavnické vrchy, 209 m a.s.l., 12.1984, lit.: AMBROS (1988b), Dudich (1988a), ŠTOLLMANN et al. (1997). - Krivín (E 18°33'1.9440; N 48°19'26.0040), Rybník, Levice, Štiavnické vrchy, 192 m a.s.l., 7.1990, coll.: AMBROS M. - Orovnica (E 18°35'55.8600; N 48°23'27.7440), Orovnica, Žarnovica, Štiavnické vrchy, 254 m a.s.l., 4.1989, coll.: DUDICH A. - **7678:** Grunty (E 18°42'0.5040; N 48°23'0.3840), Pukanec, Levice, Štiavnické vrchy, 447 m a.s.l., 3.1983, lit.: AMBROS (1988b), Dudich (1988a), ŠTOLLMANN & DUDICH (1988a) - Jabloňovce (E 18°47'46.5720; N 48°20'17.1600), Horné Jabloňovce, Levice, Štiavnické vrchy, 317 m a.s.l., 3.1984, lit.: AMBROS (1988b),

Dudich (1988a), ŠTOLLMANN & DUDICH (1988a) - **7679:** Holík (E 18°51'27.3600; N 48°23'14.5680), Počúvadlo, Banská Štiavnica, Štiavnické vrchy, 752 m a.s.l., 4.1984, 7.1985, lit.: AMBROS (1988b), Dudich (1988a), ŠTOLLMANN & DUDICH (1988a) - **7680:** Mäsiarsky briežok (E 19°5'46.3920; N 48°23'50.7120), Krupina, Krupina, Krupinská planina, 538 m a.s.l., 4.1976, 10.1976, 5.1978, 6.1978, 12.1978, lit.: ŠTOLLMANN & DUDICH (1982), ŠTOLLMANN & DUDICH (1988a) - **7681:** Lešť (E 19°18'36.6120; N 48°23'8.0880), Lešť I, Zvolen, Krupinská planina, 598 m a.s.l., 7.1994, coll.: STAŠIOV S. - **7683:** Halier, Water reservoir (E 19°38'7.2600; N 48°23'20.1480), Točnica, Lučenec, Revúcka vrchovina, 219 m a.s.l., 11.2002, coll.: STOLLMANN A. - Ľadovo, water reservoir (E 19°37'19.9560; N 48°20'1.8600), Lučenec, Lučenec, Lučenská kotlina, 209 m a.s.l., 11.2002, coll.: AMBROS M., DUDICH A., STOLLMANN A., GUBÁNYI A. - Ľuboreč, Water reservoir (E 19°31'6.6000; N 48°18'3.2760), Ľuboreč, Lučenec, Ipeľská kotlina, 238 m a.s.l., 11.2002, coll.: AMBROS M., DUDICH A., STOLLMANN A., GUBÁNYI A. - Tomášovce, Water reservoir (E 19°36'52.6680; N 48°22'52.0320), Tomášovce, Lučenec, Lučenská kotlina, 205 m a.s.l., 11.2002, coll.: AMBROS M. - **7684:** berehový porast Ipľa (E 19°46'28.6320; N 48°19'31.9440), Nitra nad Ipľom, Lučenec, Lučenská kotlina, 185 m a.s.l., 11.2001, coll.: AMBROS M., UHRÍN M. - **7686:** Bátka (E 20°9'47.0520; N 48°21'54.2520), Bátka, Rimavská Sobota, Rimavská kotlina, 187 m a.s.l., 11.1991, coll.: STOLLMANN A., UHRÍN M. - Kurinec (E 20°0'40.0320; N 48°20'51.1800), Rimavská Sobota, Rimavská Sobota, Rimavská kotlina, 208 m a.s.l., 3.1984, coll.: DUDICH A. 11.2001, lit.: UHRÍN et al. (2002). - **7687:** Water reservoir (E 20°16'8.9760; N 48°19'43.1400), Chanava, Rimavská Sobota, Rimavská kotlina, 180 m a.s.l., 10.1991, coll.: STOLLMANN A., UHRÍN M. – Water reservoir (E 20°12'16.8840; N 48°19'57.1440), Cakov, Rimavská Sobota, Rimavská kotlina, 177 m a.s.l., 11.1991, coll.: STOLLMANN A., LOVÁS - **7696:** Tarbucka, PR Tajba (E 21°46'35.9760; N 48°23'4.1280), Streda nad Bodrogom, Trebišov, Východoslovenská rovina, 99 m a.s.l., 11.1980, lit.: DUDICH & ŠTOLLMANN (1986). - **7768:** Biely Kríž (E 17°8'30.1200; N 48°14'57.3000), Borinka I, Malacky, Malé Karpaty, 499 m a.s.l., 4.1986, coll.: DUDICH A., STOLLMANN A., UHRÍN M., KUVIKOVÁ A., ZACH P. - Hrabina (E 17°5'20.1120; N 48°13'20.0640), Záhorská Bystrica I, Bratislava IV, Malé Karpaty, 307 m a.s.l., 6.1986, coll.: KUVIKOVÁ A. - Pekná cesta (E 17°6'20.5920; N 48°13'14.7720), Vinohrady, Bratislava III, Malé Karpaty, 337 m a.s.l., 6.1986, coll.: LOVÁS - Vinohrady (E 17°7'56.8560; N 48°12'36.9720), Rača, Bratislava III, Podunajská rovina, 293 m a.s.l., 6.1986, coll.: DUDICH A., STOLLMANN A. - **7769:** Šur, NPR, northern part (E 17°13'49.3320; N 48°14'41.4240), Svätý Jur, Pezinok, Podunajská rovina, 129 m a.s.l., 12.2003, coll.: AMBROS M., BALÁŽ I., STOLLMANN A. - Šur, NPR, east part (E 17°14'57.3000; N 48°14'36.0240), Svätý Jur, Pezinok, Podunajská rovina, 129 m a.s.l., 3.2004, coll.: AMBROS M., BALÁŽ I., STOLLMANN A. - **7771:** Pusté Uľany (E 17°34'25.7520; N 48°13'4.8000), Pusté Úľany, Galanta, Podunajská rovina, 119 m a.s.l., 3.2004, coll.: AMBROS M., BALÁŽ I., STOLLMANN A. - **7774:** Dvorčiansky les – Forest (E 18°7'9.6600; N 48°15'40.6800), Dolné Krškany I, Nitra, Nitrianska pahorkatina, 143 m a.s.l., 7.1982, lit.: DUDICH et al. (1993)., 9.2004, 2004, 10.2005, 11.2005, 2005, 2006, lit.: AMBROS et al. (2006), JANČOVÁ et al. (2007), 2007, 2008, 7.2009, coll.: AMBROS M., BALÁŽ I., BRIDIŠOVÁ Z., JANČOVÁ A. - **7775:** Golianovo, Water reservoir (E 18°12'6.5520; N 48°15'40.7160), Golianovo, Nitra, Žitavská pahorkatina, 149 m a.s.l., 2.2002, 2003, 2004, 2005, lit.: BALÁŽ & AMBROS (2005), BALÁŽ (2006), JANČOVÁ et al. (2007). – vineyard (E 18°18'8.3880; N 48°16'38.3160), Nová Ves nad Žitavou, Nitra, Žitavská pahorkatina, 188 m a.s.l., .2008, coll.: BALÁŽ I., JANČOVÁ A. - Vráble, Water reservoir (E 18°17'30.3360; N 48°15'41.1840), Vráble,

Nitra, Žitavská pahorkatina, 148 m a.s.l., .2008, coll.: BALÁŽ I., JANČOVÁ A. - Žitava (E 18°18'50.1120; N 48°16'11.2440), Horný Ohaj, Nitra, Žitavská pahorkatina, 149 m a.s.l., 9.2008, coll.: BALÁŽ I. - **7776:** Čifáre (E 18°25'6.9240; N 48°14'11.6880), Čifáre, Nitra, Hronská pahorkatina, 187 m a.s.l., 7.1983, lit.: DUDICH et al. (1993). - Mochovce (E 18°26'39.3720; N 48°16'32.6280), Mochovce, Levice, Hronská pahorkatina, 307 m a.s.l., 7.1983, lit.: ŠTOLLMANN et al. (1997). – Water reservoir (E 18°23'32.8560; N 48°16'51.9240), Nevidzany, Zlaté Moravce, Hronská pahorkatina, 174 m a.s.l., 1.1983, lit.: DUDICH et al. (1993). - Patianska cerina (E 18°23'36.3480; N 48°12'56.4480), Dolný Ďur, Levice, Hronská pahorkatina, 201 m a.s.l., 1.1983, lit.: ŠTOLLMANN et al. (1997). - **7777:** Podlužany (E 18°36'59.2920; N 48°15'13.3560), Podlužany, Levice, Ipeľská pahorkatina, 180 m a.s.l., 11.1984, coll.: DUDICH A. - **7778:** Horšianska dolina (E 18°41'10.6080; N 48°14'5.1360), Horša, Levice, Ipeľská pahorkatina, 173 m a.s.l., 11.1984, 2.1984, 3.1986, coll.: DUDICH A. - **7779:** Veperec Stream (E 18°50'50.8560; N 48°16'32.4120), Ladzany, Krupina, Štiavnické vrchy, 381 m a.s.l., 10.1983, lit.: ŠTOLLMANN & DUDICH 1988a - **7780:** Beluja (E 19°4'16.7160; N 48°12'15.9480), Čelovce, Veľký Krtíš, Krupinská planina, 446 m a.s.l., 8.1976, 9.1977, 12.1977, lit.: ŠTOLLMANN & DUDICH (1988b). - Drieňovský mlyn (E 19°3'51.7680; N 48°12'49.6440), Čelovce, Veľký Krtíš, Krupinská planina, 231 m a.s.l., 3.1977, lit.: ŠTOLLMANN & DUDICH (1988b). - Stráž (E 19°4'24.3120; N 48°12'35.1000), Čelovce, Veľký Krtíš, Krupinská planina, 450 m a.s.l., 9.1977, lit.: ŠTOLLMANN & DUDICH (1988b). - Drienovo (E 19°3'45.6840; N 48°13'52.9680), Drienovo, Krupina, Krupinská planina, 372 m a.s.l., 4.1976, lit.: ŠTOLLMANN & DUDICH (1988b). - Kozí Vrbovok (E 19°4'30.6840; N 48°16'44.6160), Horný Badín, Krupina, Krupinská planina, 309 m a.s.l., 3.1976, coll.: STOLLMANN A., DAROLA J. - Litava, Tábor Stream (E 19°6'25.8480; N 48°13'59.2680), Čabradský Vrbovok, Krupina, Krupinská planina, 286 m a.s.l., 8.1976, lit.: ŠTOLLMANN & DUDICH (1988b). – **7781:** Krehora (E 19°13'7.5000; N 48°12'52.4520), Čebovce, Veľký Krtíš, Krupinská planina, 546 m a.s.l., 11.1986, lit.: ŠTOLLMANN & DUDICH (1988b). - Plachtická dolina (E 19°15'50.0400; N 48°16'18.9120), Dolný Dačov Lom, Veľký Krtíš, Krupinská planina, 308 m a.s.l., 7.1987, lit.: ŠTOLLMANN & DUDICH (1988b). - Riečky (E 19°18'43.3800; N 48°16'57.9360), Modrý Kameň, Veľký Krtíš, Krupinská planina, 443 m a.s.l., 10.1983, lit.: ŠTOLLMANN & DUDICH (1988b). - **7783:** Dálovský močiar, PR (E 19°36'15.0480; N 48°14'48.9840), Veľká nad Ipľom, Lučenec, Lučenská kotlina, 169 m a.s.l., 11.2002, coll.: AMBROS M., BALÁŽ I. - Rároš (E 19°32'21.6240; N 48°12'41.4000), Muľa, Veľký Krtíš, Ipeľská kotlina, 166 m a.s.l., 11.2002, coll.: AMBROS M., DUDICH A., STOLLMANN A., GUBÁNYI A. - **7784:** Veľká lúka (E 19°40'35.1120; N 48°17'25.8720), Mikušovce, Lučenec, Lučenská kotlina, 172 m a.s.l., 4.2002, coll.: BALÁŽ I. - Volavčia kolónia, PR (E 19°41'50.4960; N 48°17'15.0720), Trebeľovce, Lučenec, Lučenská kotlina, 179 m a.s.l., 4.2002, coll.: AMBROS M., BALÁŽ I., STOLLMANN A. - **7785:** Gortva (E 19°56'44.7720; N 48°14'5.1720), Hajnáčka, Rimavská Sobota, Cerová vrchovina, 218 m a.s.l., 11.2001, coll.: UHRÍN M. - **7786:** Mačací potok Stream (E 20°4'24.3120; N 48°14'40.6680), Hostice, Rimavská Sobota, Cerová vrchovina, 190 m a.s.l., 11.2001, coll.: UHRÍN M. - Hostice, Water reservoir (E 20°5'9.8520; N 48°14'44.4120), Hostice, Rimavská Sobota, Cerová vrchovina, 187 m a.s.l., 10.1991, coll.: DUDICH A. - **7868:** Líštiny, Fruit grove (E 17°3'10.6920; N 48°10'0.3360), Karlova Ves, Bratislava IV, Malé Karpaty, 205 m a.s.l., 3.1984, coll.: KOVÁČIK J. - Železná studnička (E 17°5'13.3800; N 48°11'19.1400), Vinohrady, Bratislava III, Malé Karpaty, 381 m a.s.l., 3.1984, coll.: KOVÁČIK J., STOLLMANN A. - **7873:** Kolárovský kanál, Pump (E 17°53'3.6240; N 48°6'20.8440),

Šaľa, Šaľa, Podunajská rovina, 114 m a.s.l., .2006, coll.: AMBROS M., BALÁŽ I., DUDICH A. - **7877:** Jur nad Hronom (E 18°36'53.0280; N 48°7'44.7960), Júr nad Hronom, Levice, Hronská pahorkatina, 145 m a.s.l., 12.1984, coll.: DUDICH A. - Levické rybníky – Fishponds (E 18°36'37.1520; N 48°11'36.7440), Levice, Levice, Ipeľská pahorkatina, 163 m a.s.l., 12.1984, coll.: DUDICH A. - **7878:** Čankov (E 18°43'2.6760; N 48°10'40.9800), Čankov, Levice, Ipeľská pahorkatina, 219 m a.s.l., 11.1984, coll.: DUDICH A. - **7880:** Jalšo pusta (E 19°0'59.4720; N 48°10'11.8560), Plášťovce, Levice, Krupinská planina, 169 m a.s.l., 9.1977, lit.: ŠTOLLMANN & DUDICH (1988b). - Brezová stráň, NPR (E 19°0'38.9160; N 48°10'17.1840), Plášťovce, Levice, Krupinská planina, 211 m a.s.l., 7.2006, coll.: AMBROS M. - **7882:** Kiarovský močiar - Swamp, PR (E 19°25'56.1720; N 48°6'27.0360), Kiarov, Veľký Krtíš, Ipeľská kotlina, 145 m a.s.l., 10.1983, lit.: AMBROS (1988c), DUDICH (1988b), ŠTOLLMANN & DUDICH (1988b), 4.2002, coll.: AMBROS M., STOLLMANN A. - **7885:** Dubno, Water reservoir (E 19°59'43.7640; N 48°11'4.5960), Petrovce, Rimavská Sobota, Cerová vrchovina, 277 m a.s.l., 10.1991,11.2001, coll.: AMBROS M., DUDICH A., STOLLMANN A. - **7969:** Šamorín (E 17°17'49.4520; N 48°1'5.4120), Šamorín, Dunajská Streda, Podunajská rovina, 126 m a.s.l., 3.1984, coll.: DUDICH A., STOLLMANN A. - **7971:** Hanské pasienky (E 17°34'34.7160; N 48°2'43.5840), Dolná Potôň, Dunajská Streda, Podunajská rovina, 116 m a.s.l., 9.2005, coll.: DUDICH A., BRIDIŠOVÁ Z. - **7974:** Gug (E 18°5'36.0600; N 48°0'1.0080), Zemné, Nové Zámky, Podunajská rovina, 109 m a.s.l., 6.2004, coll.: STOLLMANN A. - Alexandrovo (E 18°1'45.8760; N 48°2'23.1720), Palárikovo, Nové Zámky, Podunajská rovina, 109 m a.s.l., 5.2005, coll.: STOLLMANN A. - **7976:** Mariacsalád (E 18°22'9.4440; N 48°4'34.1760), Veľké Lovce, Nové Zámky, Hronská pahorkatina, 211 m a.s.l., 1.1984, lit.: AMBROS (1988a), ŠTOLLMANN et al. (1997). - **7977:** Nagypuszta (E 18°35'38.6880; N 48°2'38.6160), Želiezovce, Levice, Hronská pahorkatina, 146 m a.s.l., 3.1990, coll.: DUDICH A. - **7978:** Kompa Stream (E 18°42'52.8480; N 48°3'56.0520), Trhyňa, Levice, Ipeľská pahorkatina, 145 m a.s.l., 8.1989, coll.: DUDICH A. - Hron (E 18°40'14.2680; N 48°2'44.0520), Želiezovce, Levice, Hronská pahorkatina, 136 m a.s.l., 8.1989, coll.: DUDICH A. - **7980:** Ipeľ (E 19°1'45.6960; N 48°4'17.4720), Ipeľské Predmostie, Veľký Krtíš, Ipeľská kotlina, 132 m a.s.l., 2008, coll.: BALÁŽ I. - **8072:** Hroboňovo, Peatbog (E 17°42'42.5880; N 47°55'59.5200), Dolný Štál, Dunajská Streda, Podunajská rovina, 112 m a.s.l., 2.1992, coll.: JANIČINA, STOLLMANN A., LOVÁS - Doboš fének 2 (E 17°44'18.3480; N 47°54'15.2280), Tône, Dunajská Streda, Podunajská rovina, 109 m a.s.l., 4.2003, coll.: AMBROS M., BALÁŽ I. - **8074:** Behátsky kanál – canal (E 18°3'48.8880; N 47°55'44.4360), Nesvady, Komárno, Podunajská rovina, 110 m a.s.l., 6.2002, coll.: AMBROS M. - Dlhé močariny (E 18°2'53.2680; N 47°55'57.1080), Kolárovo, Komárno, Podunajská rovina, 109 m a.s.l., 6.2002, coll.: AMBROS M., BALÁŽ I. - Nitra distributary (E 18°6'26.1360; N 47°54'43.4520), Nesvady, Komárno, Podunajská rovina, 109 m a.s.l., 6.2002, coll.: BALÁŽ I. - Veľká dolina, Nitra abandoned meander (E 18°6'10.5480; N 47°57'57.3480), Nové Zámky, Nové Zámky, Podunajská rovina, 110 m a.s.l., 8.2002, coll.: AMBROS M., STOLLMANN A., BALÁŽ I. - **8075:** Príbetský kanál – canal (E 18°12'30.2400; N 47°55'56.3520), Bajč, Komárno, Podunajská rovina, 118 m a.s.l., 10.2003, coll.: AMBROS M., BRIDIŠOVÁ Z. - **8076:** Water reservoir (E 18°22'43.0320; N 47°57'25.9560), Dubník, Nové Zámky, Hronská pahorkatina, 139 m a.s.l., 4.2002, coll.: AMBROS M. – Water reservoir (E 18°25'10.9560; N 47°59'46.0680), Jasová, Nové Zámky, Hronská pahorkatina, 156 m a.s.l., 4.2002, coll.: AMBROS M. - Parížsky močiar - Swamp, behind Strekov (E 18°24'24.4080; N 47°54'35.4960), Strekov, Nové Zámky, Hronská pahorkatina,

129 m a.s.l., 5.2002, coll.: AMBROS M. – Water reservoir (E 18°24'48.8880; N 47°55'21.0720), Rúbaň, Nové Zámky, Hronská pahorkatina, 136 m a.s.l., 5.2002, coll.: AMBROS M. - **8078:** Pastovce (E 18°44'37.8240; N 47°58'13.1520), Pastovce, Levice, Ipeľská pahorkatina, 161 m a.s.l., 4.1976, 8.1976, 12.1976, 2.1979, 3.1980, lit.: AMBROS (1988a). - Sikenička (E 18°41'15.1080; N 47°56'43.5120), Sikenička, Nové Zámky, Ipeľská pahorkatina, 119 m a.s.l., 2.1979, coll.: DUDICH A., STOLLMANN A. - **8171:** Dedinský ostrov (E 17°33'49.0320; N 47°50'59.9280), Gabčíkovo, Dunajská Streda, Podunajská rovina, 114 m a.s.l., 2.1992, coll.: JANIČINA, LOVÁS - prístav (E 17°34'32.1600; N 47°53'30.5520), Gabčíkovo, Dunajská Streda, Podunajská rovina, 114 m a.s.l., 3.1984, 2.1992, coll.: JANIČINA, STOLLMANN A. - Riečina (E 17°34'43.3560; N 47°49'34.6440), Sap, Dunajská Streda, Podunajská rovina, 113 m a.s.l., 3.2003, coll.: AMBROS M., STOLLMANN A. - **8172:** Čiližský potok (E 17°43'0.6960; N 47°50'21.4080), Čiližská Radvaň, Dunajská Streda, Podunajská rovina, 109 m a.s.l., 2.1982, coll.: AMBROS M., KOVÁČIK J., STOLLMANN A. - Swamp (E 17°43'22.1520; N 47°50'14.6040), Čiližská Radvaň, Dunajská Streda, Podunajská rovina, 109 m a.s.l., 2.1982, coll.: AMBROS M., KOVÁČIK J., - Medveďov (E 17°40'16.5720; N 47°48'2.5560), Medveďov, Dunajská Streda, Podunajská rovina, 111 m a.s.l., 2.1992, coll.: STOLLMANN A., JANIČINA - Doboš fének (E 17°44'54.0600; N 47°52'55.5960), Veľký Meder, Dunajská Streda, Podunajská rovina, 109 m a.s.l., 2.1992, coll.: STOLLMANN A., LOVÁS 9.2005, coll.: AMBROS M., DUDICH A., STOLLMANN A. - **8173:** Dropie, CHA (E 17°56'1.6440; N 47°51'54.0360), Čalovec, Komárno, Podunajská rovina, 108 m a.s.l., 5.2001, lit.: BALÁŽ et al. (2005). - Dudváh abandoned meander (E 17°55'7.1760; N 47°52'22.1160), Zemianska Olča, Komárno, Podunajská rovina, 108 m a.s.l., 5.2001, 6.2001, lit.: BALÁŽ et al. (2005). - Dudváh, near CHA Dropie (E 17°55'0.7680; N 47°52'39.0720), Zemianska Olča, Komárno, Podunajská rovina, 108 m a.s.l., 6.2002, lit.: BALÁŽ et al. (2005). - Dudváh distributary (E 17°54'55.0440; N 47°51'58.3200), Zemianska Olča, Komárno, Podunajská rovina, 108 m a.s.l., 2002, lit.: BALÁŽ et al. (2005). - Zsemlekes, Water reservoir (E 17°49'56.2440; N 47°50'30.0840), Bodza, Komárno, Podunajská rovina, 109 m a.s.l., 8.2002, coll.: AMBROS M., STOLLMANN A. - **8174:** Gamota (E 18°7'16.1040; N 47°50'47.1840), Martovce, Komárno, Podunajská rovina, 109 m a.s.l., 3.2000, coll.: AMBROS M., STOLLMANN A. - Gémeš (E 18°6'3.0240; N 47°51'13.9680), Martovce, Komárno, Podunajská rovina, 109 m a.s.l., 3.2000, coll.: DUDICH A., BOĎOVÁ M. - Kingyes, okraj močiara (E 18°3'17.5680; N 47°52'32.5560), Vrbová nad Váhom, Komárno, Podunajská rovina, 109 m a.s.l., 2.1981, coll.: DUDICH A., STOLLMANN A. - Kingyes, Poplar Forest (E 18°2'51.9360; N 47°52'36.5880), Vrbová nad Váhom, Komárno, Podunajská rovina, 109 m a.s.l., 2.1981, coll.: AMBROS M., KOVÁČIK J., STOLLMANN A. - Lohot, PR (E 18°0'37.3680; N 47°51'29.0880), Kameničná, Komárno, Podunajská rovina, 109 m a.s.l., 9.2002, 10.2002, lit.: AMBROS et al. (2003). - Malý Vék, Aluvium Žitavy NPR (E 18°9'33.2640; N 47°51'53.2080), Hurbanovo, Komárno, Podunajská rovina, 110 m a.s.l., .2005, lit.: BRIDIŠOVÁ et al. (2006). - Veľký Vék, Aluvium Žitavy NPR (E 18°8'33.7200; N 47°51'45.9000), Hurbanovo, Komárno, Podunajská rovina, 109 m a.s.l., 2005, lit.: BRIDIŠOVÁ et al. (2006). - Stará Nitra River (E 18°7'12.0720; N 47°51'28.6920), Martovce, Komárno, Podunajská rovina, 110 m a.s.l., 6.2005, lit.: BRIDIŠOVÁ et al. (2006). - Rozsas (E 18°6'45.5400; N 47°50'27.1680), Komárno, Komárno, Podunajská rovina, 109 m a.s.l., 3.2000, lit.: DUDICH A., BOĎOVÁ M. - Tibátsky kanál – canal, South-East from Čalovec (E 18°0'19.4760; N 47°48'34.8120), Čalovec, Komárno, Podunajská rovina, 108 m a.s.l., 9.2002, lit.: AMBROS M., BALÁŽ I. - **8175:** Fialkový potok – Stream (E 18°12'9.3240; N 47°48'23.4000), Chotín,

Komárno, Podunajská rovina, 109 m a.s.l., 2005, coll.: AMBROS M. - Mudroňovo (E 18°19'7.8600; N 47°49'33.8520), Mudroňovo, Komárno, Hronská pahorkatina, 189 m a.s.l., 8.1983, coll.: STOLLMANN A. - **8176:** Búč, Water reservoir (E 18°26'18.6720; N 47°48'54.0720), Bátorove Kosihy, Komárno, Hronská pahorkatina, 119 m a.s.l., 2006, lit.: AMBROS & BALÁŽ (2002). - Chrbát PR (E 18°21'24.5880; N 47°51'12.0240), Bátorove Kosihy, Komárno, Hronská pahorkatina, 243 m a.s.l., 12.1982, coll.: AMBROS M., STOLLMANN A. - Parížsky močiar Swamp NPR (E 18°25'38.7840; N 47°53'41.1720), Strekov, Nové Zámky, Hronská pahorkatina, 129 m a.s.l., 3.1981, lit.: DUDICH & ŠTOLLMANN (1988), 4.1997, 7.2000, 1.2001, 3.2001, 4.2001, 5.2001, 6.2001, 7.2001, 8.2001, 9.2001, 10.2001, lit.: AMBROS et al. (1999), AMBROS et al. (2005), AMBROS & BALÁŽ (2002). - **8177:** Kamenín (E 18°38'49.8120; N 47°53'52.9440), Bíňa, Nové Zámky, Hronská pahorkatina, 120 m a.s.l., 4.1979, 8.1979, 6.1986, lit.: AMBROS (1988a). – Paríž Stream, Korytnisko (E 18°35'20.8320; N 47°51'50.8680), Ľubá, Nové Zámky, Hronská pahorkatina, 117 m a.s.l., 2.2004, lit.: AMBROS et al. (2005), AMBROS & BALÁŽ (2002). - Paríž Stream (E 18°31'55.0920; N 47°52'0.5520), Šarkan, Nové Zámky, Hronská pahorkatina, 128 m a.s.l., 10.2001, 11.2001, lit.: AMBROS et al. (2005), AMBROS & BALÁŽ (2002). - **8177:** Parížsky močiar Swamp, NPR (E 18°30'40.5000; N 47°51'26.7120), Gbelce, Nové Zámky, Hronská pahorkatina, 129 m a.s.l., 3.1998, 9.2000, 1.2002, 5.2002, lit.: AMBROS et al. (1999), AMBROS et al. (2005), AMBROS & BALÁŽ (2002). - Parížsky močiar Swamp, NPR, (E 18°30'25.8120; N 47°51'53.0280), Maďarský Svodín, Nové Zámky, Hronská pahorkatina, 130 m a.s.l., 4.1999, 12.2004, lit.: AMBROS et al. (1999), AMBROS et al. (2005), AMBROS & BALÁŽ (2002). – Water reservoir (E 18°30'12.2400; N 47°52'51.1320), Maďarský Svodín, Nové Zámky, Hronská pahorkatina, 148 m a.s.l., 2.2002, lit.: AMBROS & BALÁŽ (2002). - Vršok (E 18°38'37.4280; N 47°49'33.9600), Kamenný Most, Nové Zámky, Hronská pahorkatina, 252 m a.s.l., 12.2004, coll.: AMBROS M., DUDICH A., BRIDIŠOVÁ Z. - **8178:** Bajtava (E 18°45'21.5640; N 47°51'14.6880), Bajtava, Nové Zámky, Burda, 241 m a.s.l., 7.1977, 1.1978, 2.1978, lit.: AMBROS (1988a), ŠTOLLMANN & DUDICH (1988b). - Kováčovské kopce - North (E 18°45'51.3360; N 47°51'0.0360), Leľa, Nové Zámky, Burda, 260 m a.s.l., 11.1978, 3.1979, 8.1979, lit.: AMBROS (1988a). – Cottage above Lela (E 18°46'15.3840; N 47°51'17.1720), Leľa, Nové Zámky, Ipeľská pahorkatina, 180 m a.s.l., 2.1978, coll.: STOLLMANN A. - Chľaba (E 18°46'49.4760; N 47°49'54.7680), Kamenica nad Hronom, Nové Zámky, Burda, 388 m a.s.l., 2.1977, 1.1978, 2.1978, lit.: AMBROS (1988a). - Kamenica nad Hronom (E 18°43'37.2000; N 47°49'52.6440), Kamenica nad Hronom, Nové Zámky, Ipeľská pahorkatina, 129 m a.s.l., 7.1977, lit.: AMBROS (1988a). - Burda (E 18°46'25.3920; N 47°49'40.7640), Kamenica nad Hronom, Nové Zámky, Burda, 179 m a.s.l., 3.1980, lit.: AMBROS (1988a). - **8272:** Hamské tŕstie (E 17°44'53.3400; N 47°46'13.3680), Čičov, Komárno, Podunajská rovina, 109 m a.s.l., 4.2003, coll.: BALÁŽ I. - **8273:** Veľké Kosihy (E 17°51'35.7120; N 47°46'20.6400), Veľké Kosihy, Komárno, Podunajská rovina, 109 m a.s.l., 4.1992, coll.: STOLLMANN A. - **8274:** Apáli (E 18°7'33.9600; N 47°47'28.5720), Komárno, Komárno, Podunajská rovina, 109 m a.s.l., 2.1981, coll.: AMBROS M., DUDICH A., KOVÁČIK J., STOLLMANN A. - Čerhát (E 18°1'3.7200; N 47°47'41.8200), Nová Stráž, Komárno, Podunajská rovina, 108 m a.s.l., 10.2002, coll.: AMBROS M., BALÁŽ I. - **8275:** Serke Swamp (E 18°17'43.2240; N 47°45'59.4000), Marcelová, Komárno, Podunajská rovina, 110 m a.s.l., 9.1990, coll.: MIHÁLIK A. - Patince, cottagey settlement (E 18°18'37.8360; N 47°44'59.3520), Patince, Komárno, Podunajská rovina, 109 m a.s.l., 6.2003, coll.: AMBROS M. - Veľký Harčáž, Ižský kanál – canal (E 18°11'43.9440; N

47°45'16.0920), Iža, Komárno, Podunajská rovina, 110 m a.s.l., 10.2003, coll.: BALÁŽ I., JANČOVÁ A. - Virt, alluvium of Žitava river (E 18°19'25.2480; N 47°44'43.2600), Patince, Komárno, Hronská pahorkatina, 110 m a.s.l., 10.1982, coll.: STOLLMANN A. - **8276:** Bystrička (E 18°21'40.5360; N 47°45'46.1160), Radvaň nad Dunajom, Komárno, Hronská pahorkatina, 109 m a.s.l., 2006, coll.: AMBROS M., DUDICH A. - Močianský majer – Grange (E 18°22'26.2560; N 47°46'18.9120), Radvaň nad Dunajom, Komárno, Hronská pahorkatina, 119 m a.s.l., .2006, coll.: DUDICH A., BRIDIŠOVÁ Z. - **8277:** Čapáš, Mužliansky Stream (E 18°36'56.7720; N 47°46'58.5120), Mužla, Nové Zámky, Hronská pahorkatina, 119 m a.s.l., 11.2003, coll.: AMBROS M., DUDICH A., STOLLMANN A. - Čenkovský les – Forest (E 18°31'31.5120; N 47°46'5.2680), Mužla, Nové Zámky, Hronská pahorkatina, 110 m a.s.l., 8.1989, 11.1989, coll.: DUDICH A. - Veľké jazero – Lake (E 18°32'57.8760; N 47°47'39.6600), Mužla, Nové Zámky, Hronská pahorkatina, 118 m a.s.l., 3.1998, lit.: AMBROS et al. (1999). - Mužlianska sihoť (E 18°35'4.7040; N 47°46'11.9640), Mužla, Nové Zámky, Hronská pahorkatina, 109 m a.s.l., 11.1989, coll.: DUDICH A. - Pereš, Krížny kanál – canal (E 18°31'19.1640; N 47°47'53.0880), Búč, Komárno, Hronská pahorkatina, 117 m a.s.l., 4.1998, lit.: AMBROS et al. (1999). - Pereš, Obidský kanál – canal (E 18°29'57.5520; N 47°47'57.0120), Búč, Komárno, Hronská pahorkatina, 115 m a.s.l., 4.1998, lit.: AMBROS et al. (1999).

SNOW VOLE (*CHIONOMYS NIVALIS*)

The sex ratio is an important structural and dynamic characteristic of vole populations. It is gently influenced by the processes inside of populations, therefore it belongs to the most important signs when analysing population. The ratio of sexes among the subadult population of *Chionomys nivalis* equals in August, unequals in September when the females prevail. The sex ratio among adult population is unequal, when females significantly prevail over the males. According to χ^2-test with Yates correction the female dominance during a year has been proven only in May (Table 3).

Table 3: Sex ratio between males and females of *Chionomys nivalis* (testing by χ^2 with Yates correction, s –standard deviation)

Month	Immatures – 25 ex.			matures – 71 ex.		
	males	females	χ^2 (s)	males	females	χ^2 (s)
May	-	-	-	7	23	7.5 (2.74)
July	-	1	-	3	5	0.13 (1.41)
August	5	2	0.57 (1.32)	3	3	0
September	4	11	2.4 (1.94)	8	16	2.04 (2.45)
October	-	1	-	-	1	-
November	-	1	-	1	1	0
together	9	16	1.44 (2.5)	22	49	9.52 (4.21)

Body measurements and weight of Snow Vole

The biggest variability according to the standard deviation is at the weight factor (adult individuals together and female adults), respectively the body length (in the rest of the cases). The smallest variability is at the hind foot values (in all measured and observed groups of *Chionomys nivalis*, Table 4). The tail represents 42.3% of the adult´s body length in average and 43.6% of the immature individuals' body length. Proportionality, the ratio between body length and tail length is not changing during their life. In subadult but also in adult population, all the observed somatic characteristics reach higher values among males in comparison to females. Statistically, highly significant difference was calculated only for the length of the hind foot among adult individuals. The differences of other somatic characteristics between males and females aren´t so significant (Table 5).

JANEAU & AULAGNIER (1997) state, that the parameters of *Chionomys nivalis* are increasing from west to east of Alps due to geographical latitude and altitude. They record the range of body length from 90 to 140 mm (maximum in High Tatras 143 mm), tail length from 47 – 75 mm (minimum in High Tatras, maximum in Pyrenees), the length of hind foot from 18 – 22 mm (maximum 22,4 mm in Tatras), ear length from 17 – 18 mm, weight from 40 – 62 g. (KRATOCHVÍL 1956, NIETHAMMER 1964, KRYŠTUFEK 1990). FERIANCOVÁ-MASÁROVÁ & HANÁK (1965) presents following records of snow vole´s somatic signs: H – 39-67 g, LC – 110-143 mm, LCd – 43-68 mm, LTp – 19-23 mm, LA – 15-19 mm and the tail represents 39.5 which is 52.4% of their body length.

Table 4: Somatic characteristics of *Chionomys nivalis*

Group	Somatic characteristics	N	Mean ± SD	Range
Matures	Weight (g)	63	49.06 ± 8.58	33 – 65
	Body length (mm)	62	123.47 ± 8.49	102 – 141
	Tail length (mm)	61	53.6 ± 4.69	42 – 64
	Hind foot length (mm)	63	20.41 ± 0.65	19 – 22
	Ear length (mm)	41	16.74 ± 1.47	14 – 19
Mature males	Weight (g)	19	50.16 ± 9.44	33 – 64
	Body length (mm)	19	124.58 ± 10.23	105 – 141
	Tail length (mm)	18	54.36 ± 5.18	46 – 63
	Hind foot length (mm)	19	20.74 ± 0.63	19 – 22
	Ear length (mm)	10	16.75 ± 1.36	15 – 19
Mature females	Weight (g)	44	48.59 ± 8.25	35 – 65
	Body length (mm)	43	122.97 ± 7.69	102 – 137
	Tail length (mm)	43	53.28 ± 4.5	42 – 64
	Hind foot length (mm)	44	20.27 ± 0.61	19 – 22
	Ear length (mm)	31	16.74 ±1.53	14 – 19
Immatures	Weight (g)	24	30.41 ± 5.67	19 – 39
	Body length (mm)	23	107.61 ± 6.63	93.5 – 120
	Tail length (mm)	23	44.06 ± 5.04	31 – 51
	Hind foot length (mm)	23	19.93 ± 0.69	18.5 – 21
	Ear length (mm)	11	15.45 ± 1.57	13.5 – 18
Immature males	Weight (g)	9	31.88 ± 4.88	23 – 39
	Body length (mm)	9	109.05 ± 6.88	100 – 120
	Tail length (mm)	9	46.11 ± 3.33	41 – 50
	Hind foot length (mm)	9	20 ± 0.83	18.5 – 21
	Ear length (mm)	3	16.5 ± 1.8	14.5 – 18
Immature females	Weight (g)	15	29.53 ± 6.08	19 – 38
	Body length (mm)	14	106.68 ± 6.54	93.5 – 116
	Tail length (mm)	14	42.75 ± 5.6	31 – 51
	Hind foot length (mm)	14	19.89 ± 0.63	18.5 – 21
	Ear length (mm)	8	15.06 ± 1.39	13.5 – 18

Key: N – number of individuals, SD – standard deviation

Table 5: Testing the equality of medians of somatic characteristics of *Chionomys nivalis* according to sex and age structure

Age category	Somatic characteristics	Mean values		P Anova
		males	females	
Matures	Weight (g)	50.16	48.59	0.51
	Body length (mm)	124.58	122.97	0.49
	Tail length (mm)	54.36	53.28	0.42
	Hind foot length (mm)	20.74	20.27	0.008**
	Ear length (mm)	16.75	16.74	0.99
Immatures	Weight (g)	31.89	29.53	0.336
	Body length (mm)	109.06	106.68	0.414
	Tail length (mm)	46.1	42.75	0.121
	Hind foot length (mm)	20	19.89	0.73
	Ear length (mm)	16.5	15.06	0.19

Key: ** - $P < 0.01$

Reproduction and reproduction potential of Snow Vole

It is problematic to assess reproduction and reproduction potential of snow, because we have data about gravid females only from May. Eighteen out of thirty adult females were gravid which represents 60% of the population. The number of embryos in gravid female´s wombs varied from 1 to 4, with most frequent number (modus) 3 embryos. In total the average number of embryos was 2.78 (Table 6). We found lower average number of embryos (1.33) in right edge of womb than in the left edge (1.44). The difference is not significant.

Table 6: Reproduction activity and potential of *Chionomys nivalis* during the year (1977–2005)

Month	NCF	NPF	%	Number of embryos in uterus				ANE	ME
				1	2	3	4		
May	30	18	60	1	4	11	2	2.78	3

Key: NCF – number of caught females, NPF – number of pregnant females, ANE – average number of embryos, ME – modus of embryos

The gravid females appear from the beginning of June to September ranging in altitudes from 1600 to 1900 metres above sea level (KAHMANN & HALBGEWACHS 1962), from the beginning of June to the end of August at altitudes from 1800 to 2600 metres above sea level (JANEAU & AULAGNIER 1997). The females from the hibernated cohort produce usually 2 litters (KRATOCHVÍL 1981). MARTIROSYAN (1964) recorded 3 litters in Armenia. KAHMANN & HALBGEWACHS (1962) state, that some females can even produce 4 litters in year. The number of embryos in Alps varies from 2 to 4. In Pyrenees it is 6 and one female in Armenia had 9 embryos. (JANEAU & AULAGNIER 1997). NIEDERER (2008) mentioned the number of young from 1 to 4, but the most common number of embryos was 2 or 3. According to Feriancová-Masárová and Hanák (FERIANCOVÁ-MASÁROVÁ & HANÁK 1965) the snow voles bring young two or three times a year: in June, July and August. Single female usually produces 5 to 6 youngs. These data from Feriancová-Masárová and Hanák doesn´t correlate with our findings, because the maximum number of embryos out of 30 examined gravid females reached the value of 4.

TATRA VOLE (*MICROTUS TATRICUS*)

The sex ratio between the males and females in subadult category is almost ideally equal throughout the year, with proven female prevalence in October. In total, according to χ^2–test the sex ratio is equal (Table 7). In adult part of the tatra vole population was the sex ratio unequal with prevailing females, especially in August (when the females prevail significantly). According to the χ^2–test we set up a high value, which proves inequality of sex ratio. The female´s prevalence was recorded also in April, May and September. Only in October the male dominance was observed (Table 7).

Table 7: Sex ratio between males and females of *Microtus tatricus* (testing by χ^2 with Yates correction, s –standard deviation)

Month	Immature (42 individuals)			Matures (87 individuals)		
	males	females	χ^2 (s)	males	females	χ^2 (s)
April	-	-	-	2	4	0.17 (1.22)
May	1	1	0	15	25	2.03 (3.16)
June	-	-	-	1	1	0
July	-	-	-	3	3	0
August	9	9	0	4	15	5.26 (2.18)
September	3	3	0	3	6	0.44 (1.5)
October	3	9	2.08 (1.73)	3	1	0.25 (1)
November	2	2	0	-	1	-
together	18	24	0.59 (3.24)	31	56	6.62 (4.66)

Body measurements and weight of Tatra Vole

The statistical results of somatic characteristic´s variability for the adult and subadult age group of *Microtus tatricus* shows that the dispersion values of all characteristics are bigger among the adult individuals and within them of the males. The body length values show the biggest variability and the hind foot values show the lowest variability (Table 8). Tail of subadult individuals present 38.1% of their body length and 38.8% of adult´s body length, which means that this ratio doesn´t evolve in time significantly.

FERIANCOVÁ-MASÁROVÁ & HANÁK (1965) present following measures of somatic characteristics: LC – 90-121 mm, LCd – 31-46 mm, LTp – 16.5-8.5 mm, LA – 10-13 mm.

Bigger values of all somatic characteristics are more common for males within both examined age categories. Statistically bigger values are common in body weight, body length and tail length for males in comparison to the statistical values obtained for females. The immature males have only the ear size significantly bigger (value) then immature females (Table 9).

The Tatra vole occurs at three hypsographic zones, in mountainous, oreal and subalpine zone. We gained relevant amount of information about their biometric somatic characteristics from all zones and that is why we were able to realise more detailed analysis. We have found out the average weight and body length of tatra vole in different altitudes (Fig. 1, 2).

Table 8: Somatic characteristics of *Microtus tatricus*

Group	Somatic characteristics	N	Mean ± SD	Range
Matures	Weight (g)	83	25.04 ± 3.56	18 – 36
	Body length (mm)	83	105.26 ± 4.986	83 – 115
	Tail length (mm)	81	40.21 ± 3.644	31 – 47
	Hind foot length (mm)	84	17.01 ± 0.647	15 – 18
	Ear length (mm)	51	10.9 ± 1.744	12 – 14.5
Mature males	Weight (g)	30	25.65 ± 3.24	20 – 31
	Body length (mm)	30	107.067 ± 4.6	97 – 115
	Tail length (mm)	29	41.55 ± 3.46	35.5 – 47
	Hind foot length (mm)	30	17.13 ± 0.718	16 – 18
	Ear length (mm)	22	11.27 ± 1.17	9.5 – 14.5
Mature females	Weight (g)	53	24.7 ± 3.71	18 – 36
	Body length (mm)	53	104.23 ± 4.94	83 – 113
	Tail length (mm)	52	39.46 ± 3.55	31 – 45
	Hind foot length (mm)	54	16.94 ± 0.599	15 – 18
	Ear length (mm)	29	10.96 ± 1.22	8.5 – 14
Immature	Weight (g)	38	18.68 ± 2.95	10 – 23.5
	Body length (mm)	34	97.34 ± 5.37	82 – 106
	Tail length (mm)	34	37.07 ± 4.13	25 – 43
	Hind foot length (mm)	39	17.7 ± 0.67	15.5 – 19
	Ala auris length (mm)	18	10.73 ± 1.2	8 – 12
Immature males	Weight (g)	16	18.68 ± 2.77	10 – 21
	Body length (mm)	15	97.1 ± 5.82	82 – 106
	Tail length (mm)	15	37.03 ± 3.98	29 – 43
	Hind foot length (mm)	16	17.15 ± 0.7	15.5 – 18
	Ear length (mm)	9	11.4 ± 0.406	11 – 12
Immature females	Weight (g)	22	18.68 ± 3.14	11.5 – 23.5
	Body length (mm)	19	97.53 ± 5.15	83 – 105
	Tail length (mm)	19	37.1 ± 4.36	25 – 43
	Hind foot length (mm)	23	17.02 ± 0,66	16 – 19
	Ear length (mm)	9	10.06 ± 1.38	8 – 12

Key: N – number of individuals, SD – standard deviation.

Table 9: Differences in somatic characteristics between sexes in matures and immatures of *Microtus tatricus*

Age category	Somatic characteristics	Mean values		P Anova
		males	females	
Matures	Weight (g)	25.65	24.7	0.243*
	Body length (mm)	107.067	104.235	0.012*
	Tail length (mm)	41.55	39.46	0.012*
	Hind foot length (mm)	17.13	16.93	0.18
	Ear length (mm)	11.27	10.96	0.37
Immatures	Weight (g)	18.68	18.68	0.995
	Body length (mm)	97.1	97.53	0.82
	Tail length (mm)	37.03	37.105	0.96
	Hind foot length (mm)	17.16	17.02	0.547
	Ear length (mm)	11.4	10.06	0.013*

Key: * - P < 0,05

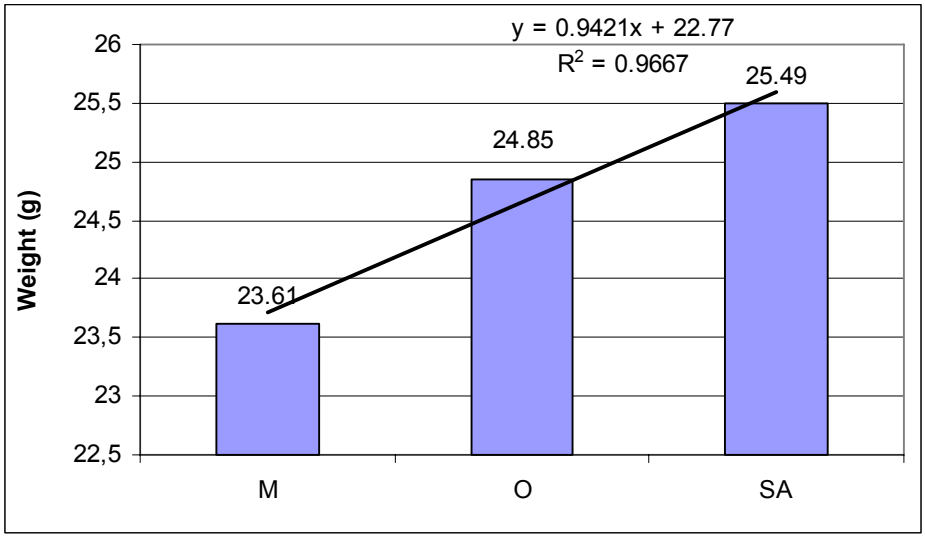

Fig. 1: Mean weights of mature *Microtus tatricus* from different altitudes – hypsographic levels of Slovakia (M – mountainous, O – high mountainous, SA – subalpine)

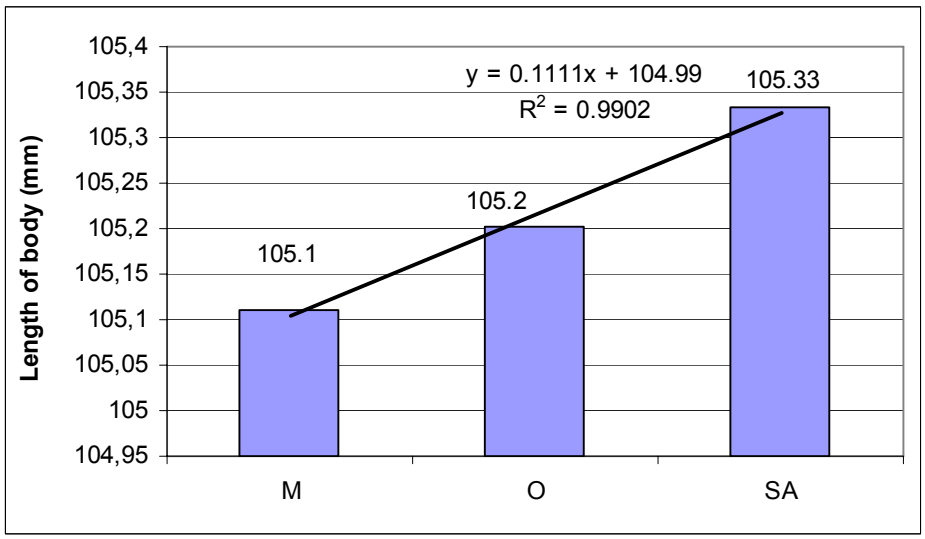

Fig. 2: Mean body lengths of mature *Microtus tatricus* from different altitudes – hypsographic levels of Slovakia (M – mountainous, O – high mountainous, SA – subalpine)

Positive correlation of weight growth and body length due to the sea level can be explained by Bergman´s rule. The Bergmann's rule is an ecogeographic rule that correlates latitude with body mass in animals. Broadly it asserts that within a species the body mass increases with latitude and colder climate and other environmental conditions to extreme values and the bigger weight and body length provides advantage for animal´s survival, because it rationalises theirs energy consumption.

The average values of tail length and hind feet are decreasing with altitude (Fig. 3, 4, 5). This negative correlation can be explained by Allen´s rule. Shorter limbs or appendages in colder climates provides better energy management for endothermic animals than in warmer climate (where animals are using bigger appendages to cool down their body)

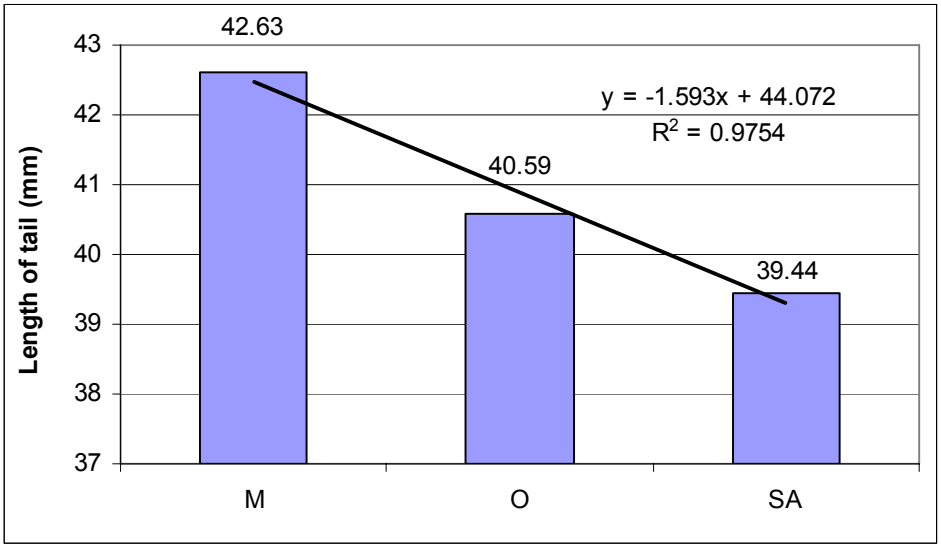

Fig. 3: Mean tail lengths of mature *Microtus tatricus* from different altitudes – hypsographic levels of Slovakia (M – mountainous, O – high mountainous, SA – subalpine)

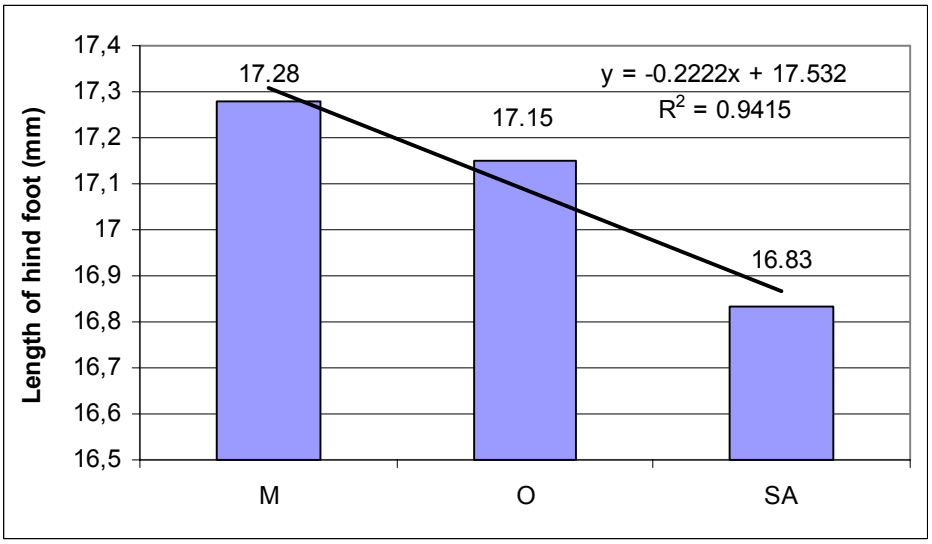

Fig. 4: Mean hind foot lengths of mature *Microtus tatricus* from different altitudes – hypsographic levels of Slovakia (M – mountainous, O – high mountainous, SA – subalpine)

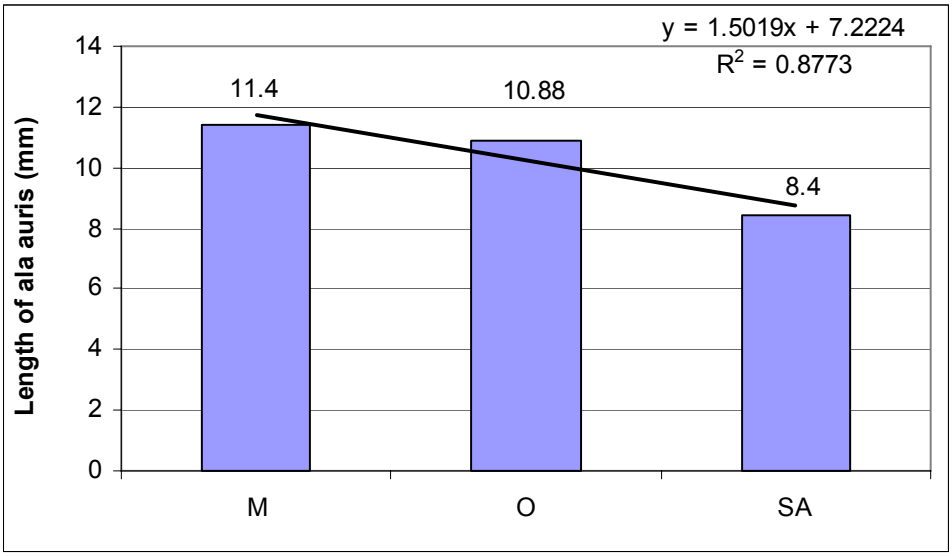

Fig. 5: Mean ear lengths of mature *Microtus tatricus* from different altitudes – hypsographic levels of Slovakia (M – mountainous, O – high mountainous, SA – subalpine)

Reproduction and reproduction potential of Tatra Vole

The tatra vole reproduction starts approximately on 24th of April, because the 12 mm embryos were recorded on 5th of May. According to our findings, the reproduction activity ends up around the 23rd of September, because the 5 mm embryos were observed 8th of September. The reproduction season of *Microtus tatricus* lasts 141 days. The number of embryos varies from 1 to 3, with average value 2.46 (Table 10). In the right edge of wombs we found lower number of embryos (1.042) than in the left edge (1.42). The female´s gravidity lasts from 21 to 23 days, in average 22 days. The frequency of gravidity (according to Emlen-David equation) is 3.2. The average number of young per one female during one season is 7.87.

KRATOCHVÍL (1952) found that female of *Microtus tatricus* breeds 2 to 3 youngs, but only 3 or 4 times a year and their reproduction activity comes after winter.

Table 10: Reproduction activity and potential of *Microtus tatricus*

Month	NCF	NPF	%	Number of embryos in uterus			ANE	ME
				1	2	3		
May	25	13	52	-	2	11	2.85	3
June	1	1	100	-	1	-	2	-
July	3	1	33.3	-	1	-	2	-
August	13	6	46.2	2	2	2	2	-
September	6	3	50	-	3	-	2	2
together	48	24	50	2	9	13	2.46	3

Key: NCF – number of caught females, NPF – number of pregnant females, ANE – average number of embryos, ME – modus of embryos

The reproduction activity of *Microtus tatricus* is typical by two peaks curve. In June (all captured females were gravid) and in September (50% gravid females), and the biggest decrease was recorded in July (33.3% gravid females, Fig. 6).

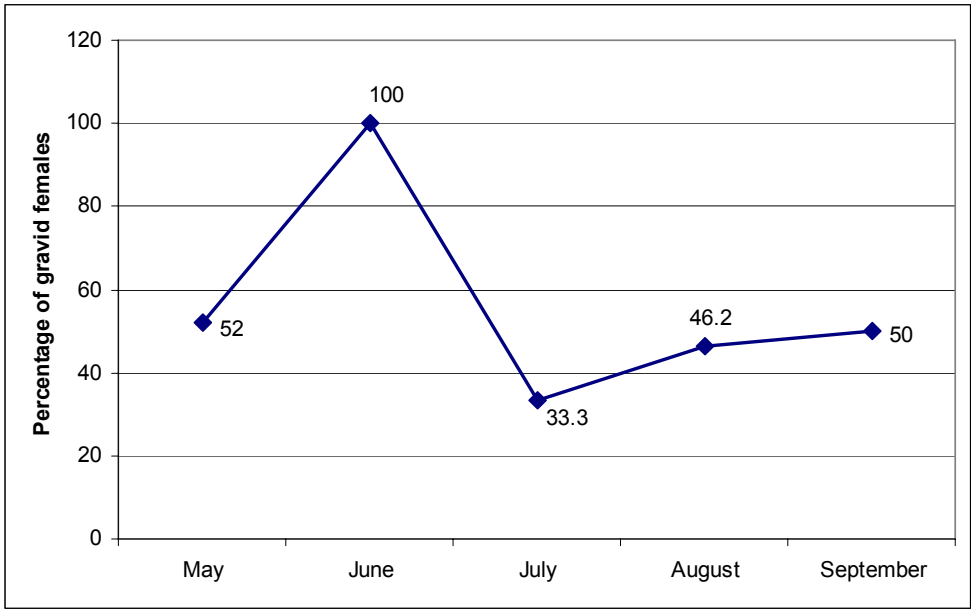

Fig. 6: Process of *Microtus tatricus* reproduction activity couched in percentage ratio of pregnant females from total number of caught females in certain months

The evaluation of reproduction potential in relation to hypsographic level indicates certain change. As we had data only from oreal and subalpine zone, we evaluated the average number of embryos in wombs of gravid *Microtus tatricus* from these two levels. We found, that in oreal zone, the average number of embryos is 2.8 and in subalpine only 2.2, which indicates the decrease with increasing altitude and the changes along the vertical gradient are proposed.

THE EUROPEAN PINE VOLE (*MICROTUS SUBTERRANEUS*)

The sex ratio between males and females within the subadult age group is almost equal throughout the year with an exception in April where we have recorded unequal sex ratio. In total according to χ^2–test calculations, there is equal sex ratio with gentle prevalence of males (Table 11). The sex ratio within the adult population is also equal with gentle predominance of males. During the year, we found out unequal sex ratio only in March and November (prevalence of males) and in June (prevalence of females). Not evidential prevalence of females was found in May and July (Table 11).

Table 11: Sex ratio between males and females of *Microtus subterraneus* (testing by χ^2 with Yates correction, s –standard deviation)

Month	immatures – 904 individuals			matures– 1783 individuals		
	males	females	χ^2 (s)	males	females	χ^2 (s)
January	7	5	0.08 (1.73)	3	1	0.25 (1)
February	1	2	0.33 (0.87)	3	1	0.25 (1)
March	3	7	0.9 (1.58)	66	40	5.89 (5.15)
April	5	23	10.32 (2.65)	186	150	3.86 (9.17)
May	35	26	1.05 (3.91)	129	150	1.58 (8.35)
June	52	50	0.009 (5.05)	105	152	8.59 (8.02)
July	82	68	1.13 (6.12)	104	107	0.04 (7.26)
August	63	54	0.56 (5.41)	94	99	0.08 (6.95)
September	99	88	0.53 (6.84)	118	116	0.017 (7.65)
October	75	74	0.0067 (6.1)	77	59	2.13 (5.83)
November	47	29	3.8 (4.36)	15	4	5.26 (2.18)
December	6	3	0.44 (1.5)	3	1	0.25 (1)
together	475	429	2.34 (15.03)	903	880	0.29 (21.11)

Body measurements and weight of The European Pine Vole

According to values of standard deviation the body weight shows biggest variability in both age categories and both sexes. The lowest variability was evidenced for the hind foot length (amid all observed groups of *Microtus subterraneus*, Table 12). The ear length shows very low variability and the tail length and body weight shows approximately equal variability (same values of standard deviation). The tail presents 32.61% of sub adult's body length and 31.89% of the adult´s body length.

ÇOLAK et al. (1998) made a research of *Microtus subterraneus* in European part of Turkey and they presented following values of somatic characteristics: body length 89-107 mm (96.42 mm), tail length 28-35 mm (30.28 mm), hind foot length 16-17 mm (16.85 mm), ear length 10-11 mm (10.71 mm) and body weight 18-22 g (20.28 g).

PELIKÁN (1973) presents the average body weight of sexually mature males between April and September in south Moravia (200 – 400 m n. m.) is 21.16 g and of females 19.4 g – the average body weight of all mature individuals was 20.25 g, immature 14.06 g. From the mountainous population of High Tatras was the average body weight of mature individuals set to 19.86g, for immature to 15.3 g. The differences between these two populations were significant.

Data from south-west Slovakia about the biometrical somatic characteristics were published by SOVIŠ (1965). Adult individuals: Body weight 14.5-22 g (18.3 g), body length 82-100 mm (94 mm), tail length 26-39.5 mm (34.9 mm), hind foot length 14-15.5 mm (14.9 mm), ear length 8.5-10 mm (9.1 mm). Sub adult individuals: body weight 12-14.5 g (13.6 g), body length 70-86 mm (80 mm), tail length 25-30 mm (27.8 mm), hind foot length 13-14.5 mm (13.8 mm), ear length 8.5-9 mm (9 mm).

KRATOCHVÍL (1952) presents following somatic characteristics of *Microtus subterraneus* from Czech Republic and Slovakia: body length 82-105 mm, tail length 24-32 mm, hind foot length 14-15.5 mm. MOŠANSKÝ (1957) presents these data for Slovak populations: body length 85-101 mm, tail length 30.6-34.3 mm, hind foot length 14.3-15.3 mm, ear length 8-10.7, weight 15.5-22 g. DUDICH (1964) recorded following values of somatic signs of *Microtus subterraneus* from Slovakia: body length 82-102 mm, tail length 27.5-34 mm, hind foot length 15-15.5 mm, ear length 8-10.5, body weight 16-23 g.

For central Europe following somatic characteristics of *Microtus subterraneus* are presented by GAFFREY (1961): body length 85-105 mm, tail length 20-39 mm, hind foot length 14-17 mm, ear length 8-10, weight 15-23 g.

Table 12: Somatic characteristics of *Microtus subterraneus*

Group	Somatic characteristics	N	Mean ± SD	Range
Matures	Weight (g)	1719	18.66 ± 2.57	14-29.5
	Body length (mm)	1580	95.56 ± 4.57	79-108
	Tail length (mm)	1575	30.48 ± 2.69	23-38
	Hind foot length (mm)	1611	14.83 ± 0.43	14-16
	Ear length (mm)	401	9.23 ± 0.62	7.5-11
Mature males	Weight (g)	882	18.31 ± 2.22	14-28.5
	Body length (mm)	798	95.77 ± 4.51	79-108
	Tail length (mm)	791	30.07 ± 2.74	23-38
	Hind foot length (mm)	816	14.85 ± 0.45	14-16
	Ear length (mm)	202	9.22 ± 0.63	7.5-11
Mature females	Weight (g)	837	19.03 ± 2.85	14-29.5
	Body length (mm)	782	95.34 ± 4.62	79-108
	Tail length (mm)	784	30.9 ± 2.58	23-38
	Hind foot length (mm)	795	14.81 ± 0.42	14-16
	Ear length (mm)	199	9.24 ± 0.61	8-11
Immatures	Weight (g)	890	15.15 ± 1.99	10-21
	Body length (mm)	621	89.67 ± 5.53	68-102
	Tail length (mm)	618	29.25 ± 2.62	22-39
	Hind foot length (mm)	652	14.67 ± 0.54	13-16
	Ear length (mm)	127	9.17 ± 0.61	7-10.5
Immature males	Weight (g)	459	15.31 ± 1.95	10-21
	Body length (mm)	307	89.82 ± 5.65	68-102
	Tail length (mm)	303	29.18 ± 2.49	22-36
	Hind foot length (mm)	326	14.71 ± 0.54	13-16
	Ear length (mm)	58	9.22 ± 0.59	8-10.5
Immature females	Weight (g)	414	14.98 ± 2.02	10-20.5
	Body length (mm)	313	89.54 ± 5.42	70-102
	Tail length (mm)	314	29.27 ± 2.69	22-39
	Hind foot length (mm)	320	14.63 ± 0.54	13-16
	Ear length (mm)	69	9.15 ± 0.62	7-10.5

Key: N – number of individuals, SD – standard deviation.

Within the adult age group the females reach bigger weight values even after selection of gravid and non-gravid females. The weight ratio between gravid and non-gravid adult females is statistically significant. The body weight growth is 7.02% (Fig. 7).

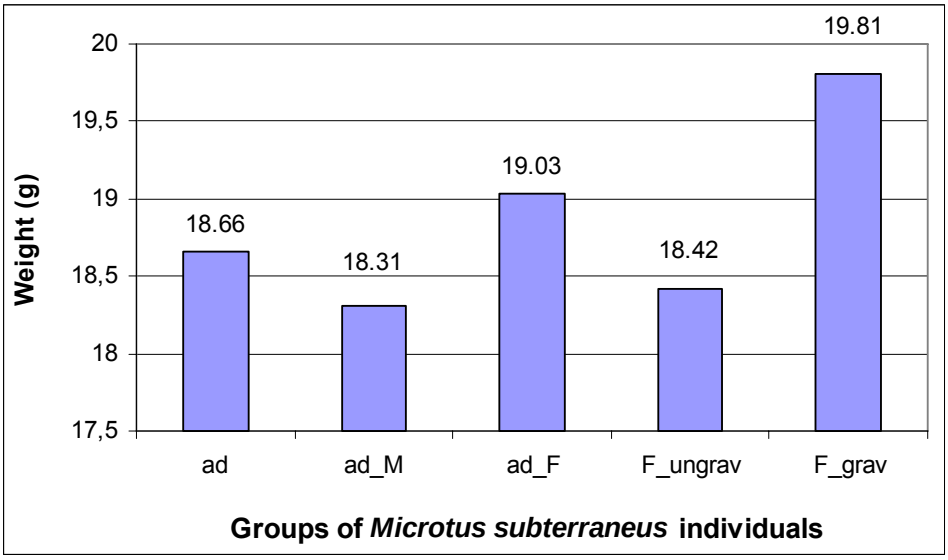

Fig. 7: Average weights of different groups of adult *Microtus subterraneus* (ad - matures in total, ad_M - mature males, ad_F - mature females, F_grav - pregnant females, F_not grav - other mature females non-gravid)

All the somatic characteristics inside of the subadult age group reach bigger values for males with an exception of tail length. Statistically significant difference between the sexes is recorded only for the tail length. In subadult population, females have higher values of all observed somatic characteristics except the tail length. Among the adult population female´s characteristics are also bigger in all parameters except the body length and hind foot length. Females have statistically highly significant bigger values of the body weight and the tail length (Table 13).

Table 13: Differences in somatic characteristics between sexes in matures and immatures of *Microtus subterraneus*

Age category	Somatic characteristics	Mean values		P Anova
		males	females	
Matures	Weight (g)	18.31	19.03	$6.71.10^{-9}$**
	Body length (mm)	95.77	95.35	0.067
	Tail length (mm)	30.07	30.9	$7.3.\ 10^{-10}$**
	Hind foot length (mm)	14.85	14.81	0.707
	Ear length (mm)	9.21	9.24	0.647
Immatures	Weight (g)	15.31	14.99	0.018*
	Body length (mm)	89.82	89.54	0.534
	Tail length (mm)	29.18	29.28	0.649
	Hind foot length (mm)	14.71	14.62	0.056
	Ear length (mm)	9.22	9.15	0.53

Key: * - $P < 0.05$, ** - $P < 0.01$

By observing the influence of environment conditions on the biometry of somatic characteristics we found positive correlation to the rising altitude. The average values of all somatic characteristics and the body weight are rising with increasing altitude from premontane to subalpine life zone. (Fig. 8 – 12). In case of weight, the increase of mean value from the lowland to the subalpine zone was 7.8%. With rising altitude also the average body length increased (3.47%), the average tail length (4.89%), hind foot length (1.54%) and the ear length (7.23%). The lowest change was recorded for the hind foot length and the biggest change was for the weight. With rising altitude the average temperatures are decreasing, which can result into the increasing body weight as an adaptation to colder climate (for better termoisolation) We have also expected the size of limbs, tails or ears to get smaller with rising altitude, but we have found positive correlation with rising sea level.

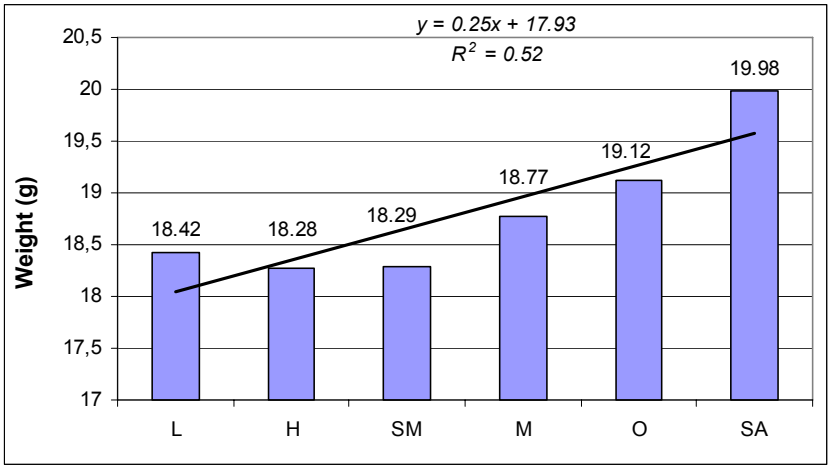

Fig. 8: Body mass changes of *Microtus subterraneus* in different hypsographic zones (L-lowland, H – hilly, SM – sub mountainous, M – mountainous, O – high mountainous, Sa – subalpine)

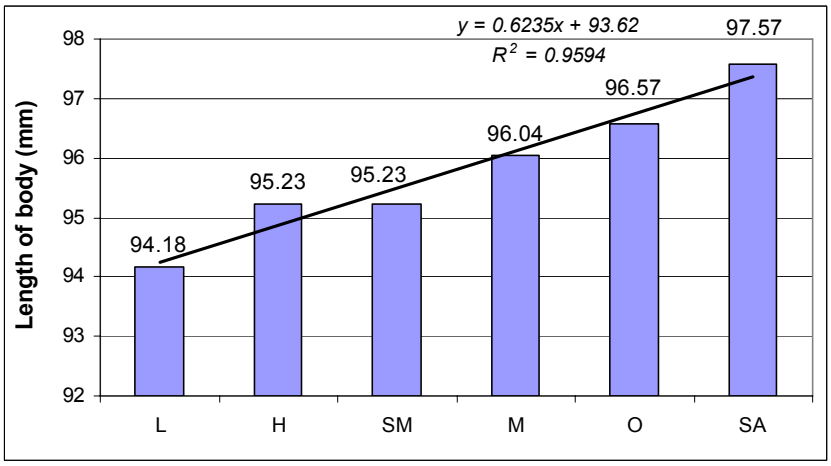

Fig. 9: Body length changes of *Microtus subterraneus* in different hypsographic zones (L-lowland, H – hilly, SM – sub mountainous, M – mountainous, O – high mountainous, Sa – subalpine)

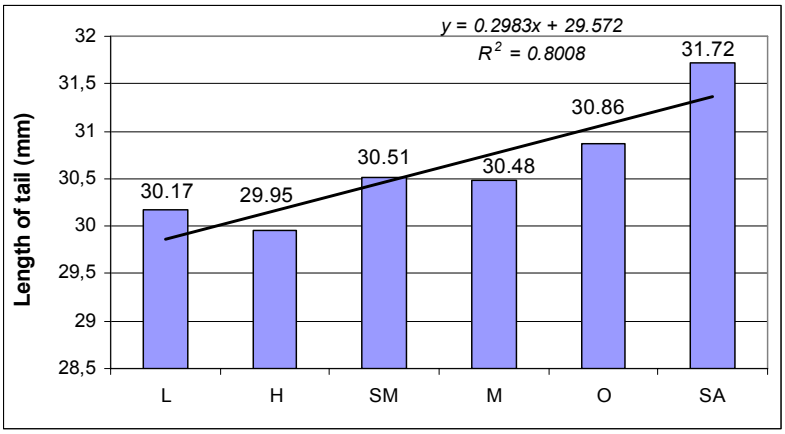

Fig. 10: Tail length changes of *Microtus subterraneus* in different hypsographic zones (L- lowland, H – hilly, SM – sub mountainous, M – mountainous, O – high mountainous, Sa – subalpine)

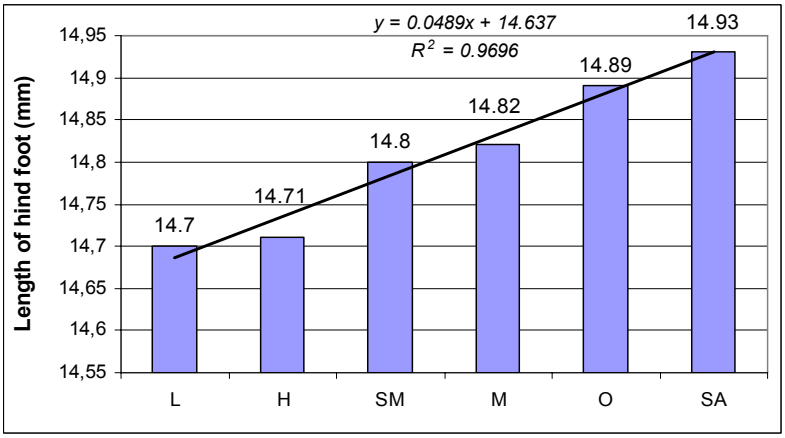

Fig. 11: Length of hind foot changes of *Microtus subterraneus* in different hypsographic zones (L- lowland, H – hilly, SM – sub mountainous, M – mountainous, O – high mountainous, Sa – subalpine)

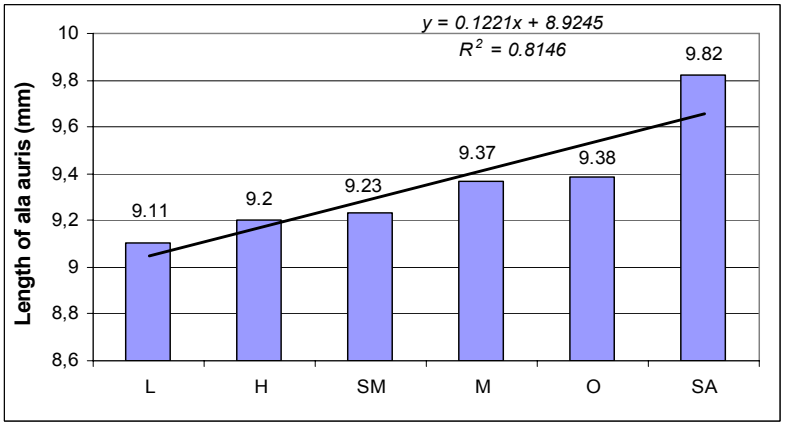

Fig. 12: Ear length changes of *Microtus subterraneus* in different hypsographic zones (L- lowland, H – hilly, SM – sub mountainous, M – mountainous, O – high mountainous, Sa – subalpine)

Reproduction and reproduction potential of The European Pine Vole

The rodent´s males' sexual activity is visible by testical descending from abdominal into scrotal position, while their overall size is increasing meanwhile. The testes size dynamically changes during the reproduction period. The European pine vole´s testes reach the biggest size from April to September and their size decreases slowly in time (Fig. 13).

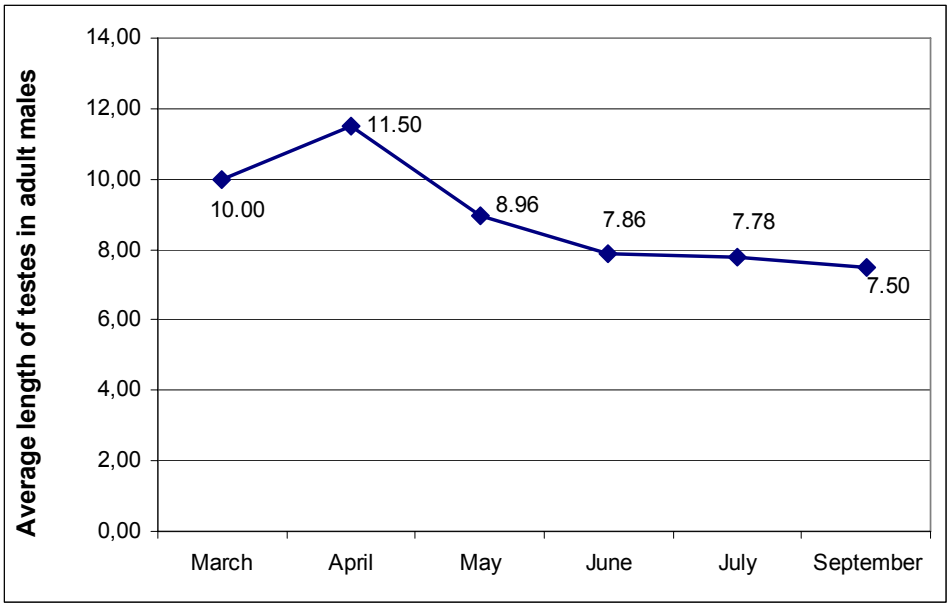

Fig. 13: Testes length dynamics of *Microtus subterraneus* mature males during reproduction season

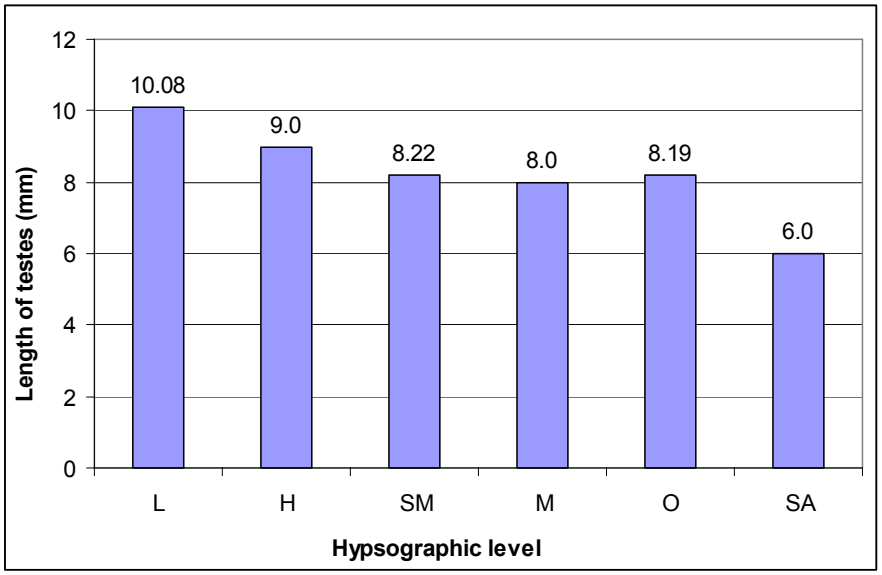

Fig. 14: Testes length of *Microtus subterraneus* mature males in different hypsographic zones during June

When measuring the influence of altitude on teste´s size test during the reproduction period of *Microtus subterraneus*, only individuals captured in June were accepted. The negative correlation was recorded as a result of our measurements. The decrease from lowland zone to subalpine zone is 59.57%, towards the oreal zone the decrease is 18.75% (Fig. 14).

The reproduction of the European pine vole starts approximately on 5th of March, because 2 mm embryos were found on the 9th of March. According to our findings the reproduction activity ends up around the 20th of November as we found 6 mm embryos at 11th of November. The reproduction season of *Microtus subterraneus* lasts 235 days. The number of embryos varies from 1 to 5 with 2.35 average (Table 14). In the right edge of womb higher average number of embryos (1.32) was recorded than in the left edge (1.03, Fig. 15). Female is gravid for 21 days. The gravidity frequency is 4.85 according to the Emlen-David equation. At each of the average litter (2.35) the number of young for one female in one season is 11.4.

The reproduction season in lowland landscape lasts since 15th of February to the end of September. According to PELIKÁN (1973) the duration of the mountainous population reproduction isn´t known precisely. The changes of percentage ratio of sexually active individuals of lowlands and mountainous populations during the reproduction season are similar. The average litter of lowland populations counts 2.76 embryos, which is significantly higher than 2.25 of young in average of one litter recorded at the mountain population. Evaluated material of gravid females from lowlands and mountains shows evident growth of litter between April (2.58) and July (2.67) and decrease to minimum in September (2.27).

Females with average weight provide the biggest litter in average. The potential fertility of females from lowlands and mountains doesn´t indicate any differences. Since April to September in average 15.5 young is common for one female in lowland and 14.6 in mountains. These differences aren´t verified. NOVIKOV & PETROV (1953) estimated that one female gives 3 to 4 litters during one season and WASILEWSKI (1960) estimated 9 litters. BUCHALCZYK (1961) evidenced maximum of 10 litters per year in laboratory (in average only 4.8).

Table 14: Reproduction activity and potential of *Microtus subterraneus*

Month	NCF	NPF	%	Number of embryos in uterus					ANE	ME
				1	2	3	4	5		
March	40	12	30	1	5	6			2.42	3
April	150	50	33,3		23	23	2		2.56	2-3
May	150	84	56	1	36	45	1	1	2.58	3
June	152	66	43,4	6	28	28	4		2.45	2-3
July	107	43	40,2	4	30	8			2.09	2
August	99	62	62,6	8	43	11			2.05	2
September	116	54	46,6	5	37	9	1	2	2.22	2
October	59	8	13,6	1	4	3			2.25	2
November	4	1	25		1				2	2
together	877	380	43.3	26	207	133	8	3	2.35	2

Key: NCF – number of caught females, NPF – number of pregnant females, ANE – average number of embryos, ME – modus of embryos

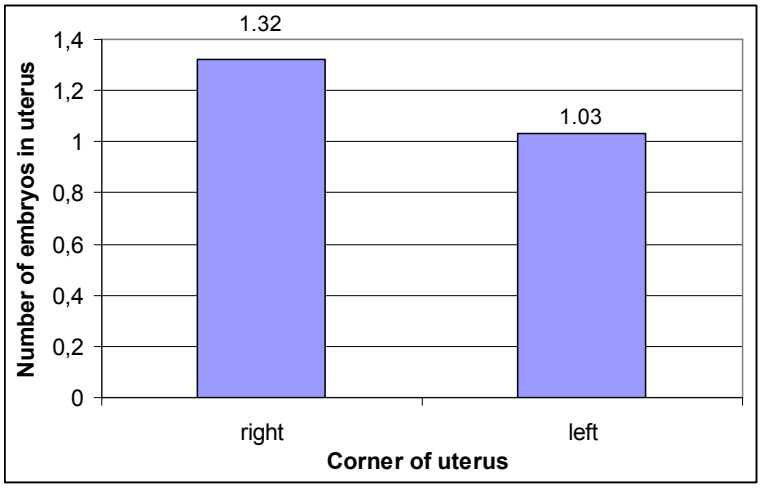

Fig. 15: Number of embryos in both corners of uterus of *Microtus subterraneus*

During the *Microtus subterraneus* reproduction season, which is usually from March to November, the percentage ratio of gravid females out of all captured females is changing. The reproduction peaks were observed, one in May (56%) and August (62.6%), and the minimum in July (40.2%) and October (13.6%) of captured gravid females (Fig. 16).

We also examined the average number of embryos of gravid females of *Microtus subterraneus* with the rising altitude and negative correlation was recorded. In individual hypsographic zones, the decrease of average number of embryos with rising altitudes is typical (Fig. 17). The ANOVA-test of number of embryos in lowland and subalpine zone showed statistically relevant difference (P = 0.006).

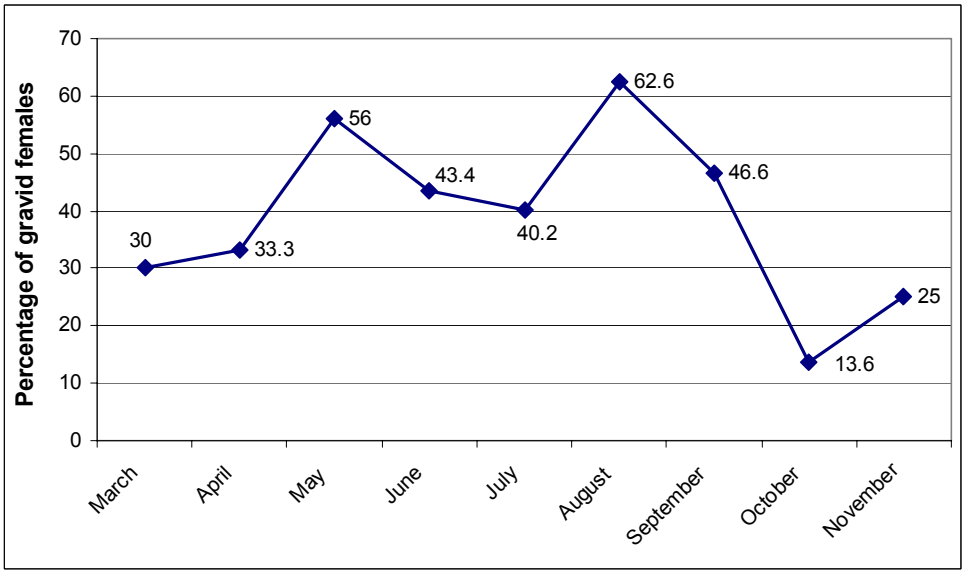

Fig. 16: Percentage ratio of *Microtus subterraneus* pregnant females from total number of caught females in certain months during reproduction season

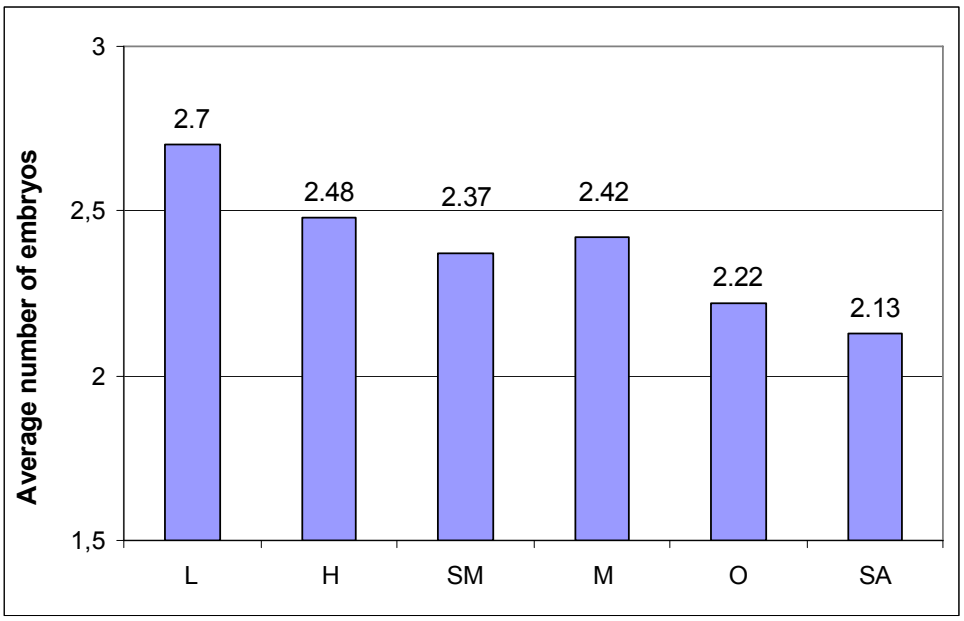

Fig. 17: Average number of embryos in uterus of *Microtus subterraneus* pregnant females in different hypsographic zones (L – lowland, H – hilly, SM – submountainous, M – mountainous, O – high mountainous, Sa – subalpine)

We found out, that the length of rodent´s reproduction season is decreasing from 9 months in lowlands to sub mountainous zone and it lasts only 5 months in subalpine zone (Fig. 18).

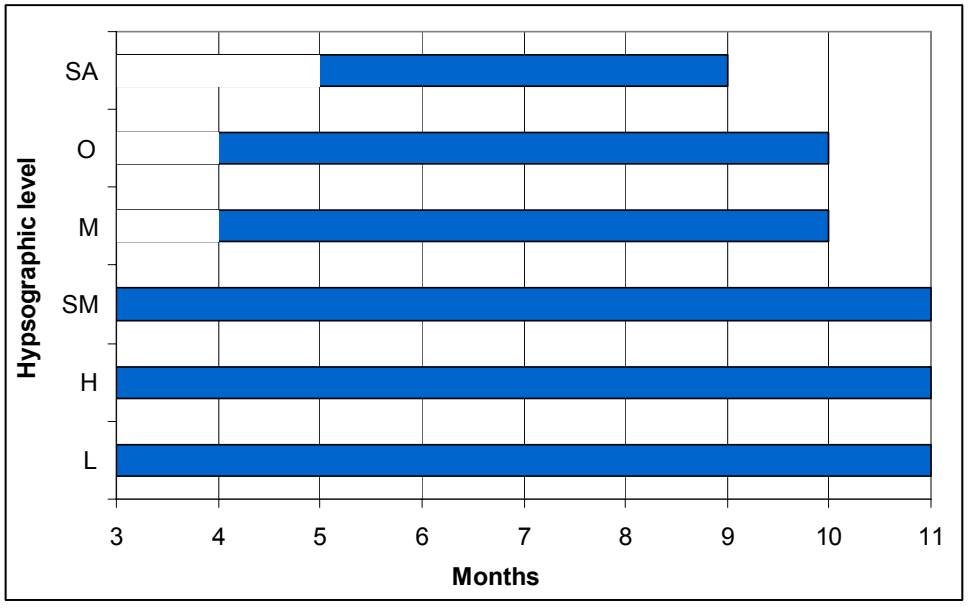

Fig. 18: Duration of reproduction season following the pregnancy of *Microtus subterraneus* in hypsographic zones

BANK VOLE (*MYODES GLAREOLUS*)

The sex ratio in both age categories of bank vole is represented by more males present in the population. It is most probably linked to a bigger activity of males and mainly during the beginning of reproduction season, when males are trying to find females. Evidenced and proven prevalence of males is in March and April. Also females take care of their descendants. Among the adult population, females predominate the population in autumn and winter (September, October, November, and December). The reason of it is that the females are relieved from their motherhood and are more focused to gain nutrition. The females also dominate from January to April and also in July among the subadult population. The sex ratio in adult age group of *Myodes glareolus* is unequal (55.04), males prevail significantly (Table 15).

The population sex ratio is very often unstable and depends on the reproduction and population density (PELIKÁN 1984b). Females of bank vole are strongly territorial, especially during the reproduction season (BUJALSKA 1970).

Territoriality means mainly active protection of food resources (IMS 1987), or of nests (WOLFF 1993). During the year, the sex ratio within the population is changing too. The females dominate in autumn while there are more males in spring and summer (BOCCHINI & NIEDER 1994a). ZEJDA (1971) found out that also the type of biotope affects the population. At dryer biotopes the males prevail. BUJALSKA (1985) confirms that males are more active during the reproduction season than females. Gravid females are able to repel other individuals from their territory using olfactory marks (ŽIAK & KOCIAN 1996) and mainly by hind leg scratching and defecation (VIITALA & HOFFMEYER 1985). KRUCZEK (1986) observed higher female´s aggression towards the other sexually active females under the influence of males' presence.

Table 15: Sex ratio between males and females of *Myodes glareolus* during year 1975 - 2006 (testing by χ^2 with Yates correction, s –standard deviation)

Month	Immatures – 6668 individuals			Matures – 8327 individuals		
	males	females	χ^2 (s)	males	females	χ^2 (s)
January	107	135	3.2 (7.78)	58	49	0.59 (5.17)
February	69	94	3.53 (6.38)	191	171	1.1 (9.51)
March	36	79	16.1 (15.34)	567	357	47.7 (15.19)
April	19	48	11.7 (4.09)	829	546	58.2 (18.54)
May	148	113	4.7 (8.08)	460	384	6.8 (14.53)
June	413	370	2.4 (13.99)	520	453	4.6 (15.59)
July	274	315	2.9 (12.13)	439	370	5.9 (14.22)
August	398	369	1.1 (13.85)	327	324	0.01 (12.76)
September	505	424	7.1 (15.24)	389	404	0.3 (14.08)
October	674	551	12.4 (17.5)	394	396	0.005 (14.05)
November	590	587	0.008 (17.15)	246	260	0.4 (11.25)
December	183	167	0.7 (9.35)	82	111	4.06 (6.95)
Together	3416	3252	4.03 (40.8)	4502	3825	55.04 (45.63)

Body measurements and weight of Bank Vole

The statistical results of *Myodes glareolus* adults and subadults' variability of their somatic characteristics shows that adults have bigger average values of all somatic characteristics. Body length shows the biggest variability, the hind foot

shows the lowest variability. High values of standard deviation were recorded for the tail length and body weight. The weight values show bigger variability among the adult individuals. Among the subadult it is the tail length (Table 16).

Table 16: Somatic characteristics of *Myodes glareolus*

Group	Somatic characteristics	N	Mean ± SD	Range
Matures	Weight (g)	4705	22.96 ± 3.93	17-40.5
	Body length (mm)	2021	98.96 ± 6.18	83-116
	Tail length (mm)	1142	45.00 ± 4.01	30-56
	Hind foot length (mm)	635	17.71± 0.667	16-19
	Ear length (mm)	38	12.59 ± 0.978	10-14
Mature males	Weight (g)	2595	22.64 ± 3.32	17-40.5
	Body length (mm)	1085	98.69 ± 5.95	74,5-116
	Tail length (mm)	603	44.5 ± 3.8	31,5-56
	Hind foot length (mm)	324	17.74 ± 0.68	16-19
	Ear length (mm)	22	12.66 ± 1.09	10-14
Mature females	Weight (g)	2095	23.35 ± 4.54	17-40
	Body length (mm)	934	99.28 ± 6.44	78,5-117
	Tail length (mm)	537	45.56 ± 4.17	30-56
	Hind foot length (mm)	309	17.67 ± 0.65	16-19
	Ear length (mm)	16	12.5 ± 0.82	11-14
Immatures	Weight (g)	3016	16.69 ± 1.75	12-19.5
	Body length (mm)	612	88.54 ± 5.25	60-102
	Tail length (mm)	341	41.92 ± 3.24	33-51.5
	Hind foot length (mm)	184	17.53 ± 0.65	16-19
	Ear length (mm)	32	12.13 ± 0.907	10-14
Immature males	Weight (g)	1500	16.86 ± 1.74	12-19.5
	Body length (mm)	339	88.87 ± 5.35	60-102
	Tail length (mm)	187	41.89 ± 3.22	33-50
	Hind foot length (mm)	104	17.67 ± 0.63	16-19
	Ear length (mm)	22	12.23 ± 0.87	10-14
Immature females	Weight (g)	1465	16.51 ± 1.75	12-19.5
	Body length (mm)	273	88.14 ± 5.09	72-102
	Tail length (mm)	154	41.95 ± 3.28	34-51.5
	Hind foot length (mm)	80	17.36 ± 0.64	16-19
	Ear length (mm)	10	11.9 ± 0.99	10-13

Key: N – number of individuals, SD – standard deviation.

The body size, concretely body length and weight are not stable characteristics but very variable. They depend on geographical locality, on population but also on the faze of cycle in which the population is. Also dependency of body size to sexual activity was proven. According to the Anova test, the differences between the observed characteristics of males and females of both age categories were evaluated. For adult individuals, we found females have bigger values of somatic characteristics than males. Significant differences were proven valid in case of body weight, body length and tail length. Within subadult category, males show bigger values of somatic characteristics with an exception of tail length. Statistically significant differences were proven for weight and hind foot length (Table 17).

Table 17: Differences in somatic characteristics between sexes in matures and immatures of *Myodes glareolus*

Age group	Somatic characteristics	P ANOVA	Mean values	
			males	females
Matures	Weight (g)	$7.97.10^{-10}$**	22.64	23.35
	Body length (mm)	0,034*	98.69	99.28
	Tail length (mm)	$7.92.10^{-6}$**	44.5	45.56
	Hind foot length (mm)	0,183	17.74	17.67
	Ear length (mm)	0.627	12.66	12.5
Immatures	Weight (g)	$7.01.10^{-8}$**	16.86	16.5
	Body length (mm)	0.085	88.87	88.14
	Tail length (mm)	0.856	41.89	41.95
	Hind foot length (mm)	0.0016**	17.67	17.36
	Ear length (mm)	0.352	12.23	11.9

Key: * - P < 0.05, ** - P < 0.01

Among the adult part of *Myodes glareolus* population, we have set up the average value of body weight for adult individuals together, but also separately. The adult females were specified gravid and not gravid individuals. For females, we found a growth of body weight during the gravidity about 15.07% (Fig. 19).

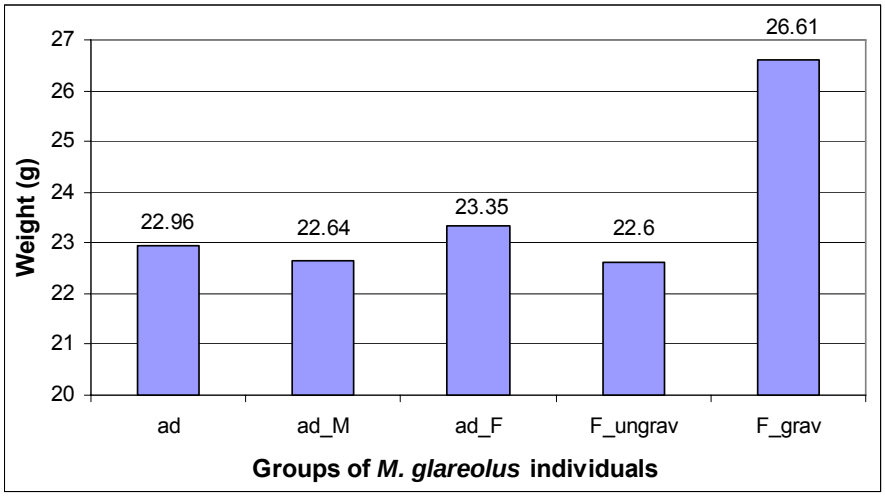

Fig. 19: Average weights of different groups of mature *Myodes glareolus* (ad - mature individuals in total, ad_M - mature males, ad_F - mature females, F_grav - pregnant females, F_not grav - other adult females non-gravid)

According to our findings we can state that the average values of body weight and body length are growing with rising altitude (Fig. 20, 21), but only in case of weight the difference between the lowland and subalpine zone is significant (P Anova = $5.39.10^{-5}$). The values of tail length and hind foot length have the opposite tendency. They are decreasing with rising altitude (Fig. 22, 23). This decrease is statistically not evident yet.

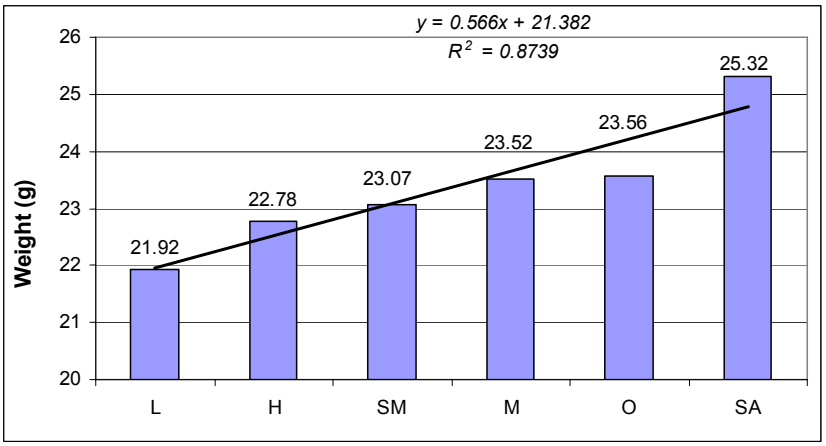

Fig. 20: Body mass changes of *Myodes glareolus* in different hypsographic zones (L-lowland, H – hilly, SM – submountainous, M – mountainous, O – high mountainous, Sa – subalpine)

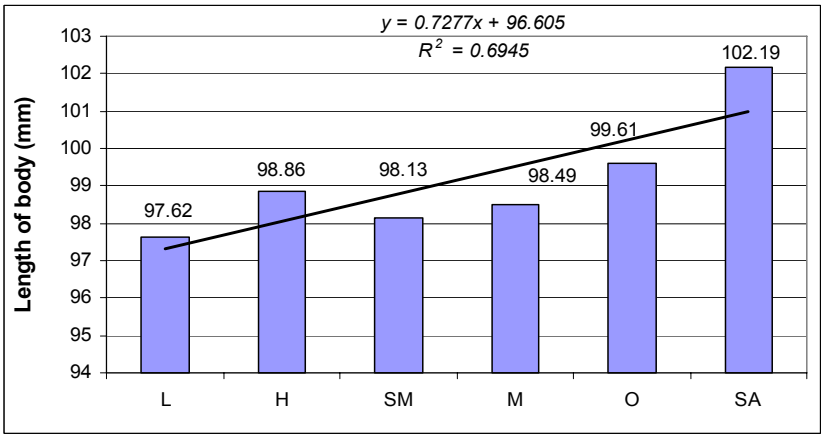

Fig. 21: Length of body changes of *Myodes glareolus* in different hypsographic zones (L-lowland, H – hilly, SM – submountainous, M – mountainous, O – high mountainous, Sa – subalpine)

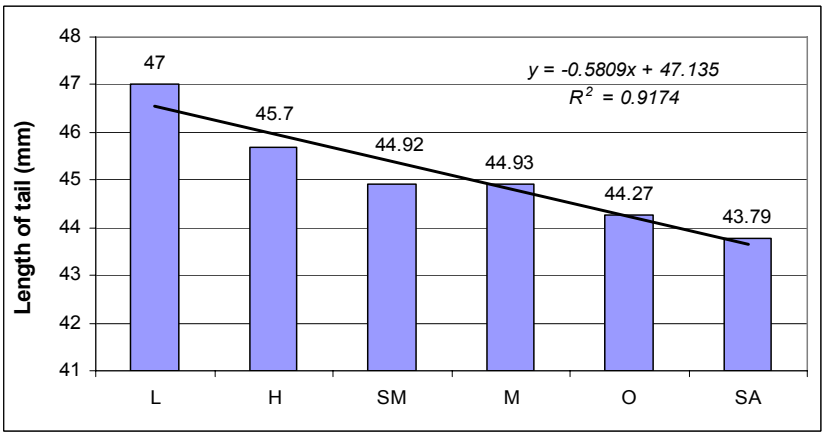

Fig. 22: Length of tail changes of *Myodes glareolus* in different hypsographic zones (L – lowland, H – hilly, SM – submountainous, M – mountainous, O – high mountainous, Sa – subalpine)

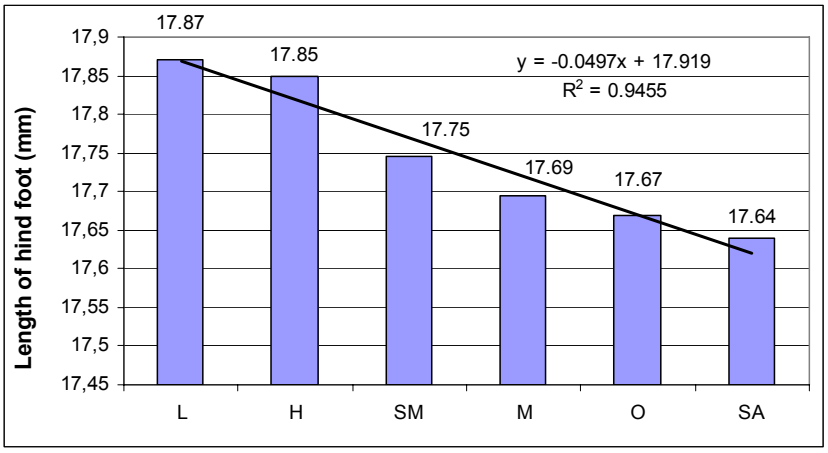

Fig. 23: Hind foot length changes of *Myodes glareolus* in different hypsographic zones (L – lowland, H – hilly, SM – submountainous, M – mountainous, O – high mountainous, Sa – subalpine)

It is known that individuals inhabiting higher altitudes (colder regions) in general have bigger bodies than individuals from lower altitudes (Bergman´s rule). ASHTON et al. (2000) have been debated the validity of Bergmann's rule in mammals. They examined the relationship between size and latitude as well as size and temperature within various species of mammals. They also tested the idea that smaller mammals follow Bergmann's rule more strongly than larger mammals, as expected if heat conservation is the cause of the rule. The percentage of species showing a positive correlation between size and latitude was significantly >50% (78 of 110 species). Similarly, the percentage of species showing a negative correlation between size and temperature was significantly >50% (48 of 64). They did not find support for the hypothesis that smaller mammals conform more strongly to Bergmann's rule than larger mammals. Thus, they found broad support for Bergmann's rule as a general trend for mammals, but the analyses do not support heat conservation as the explanation. MEIRI et al. (2004) examined patterns of correlation between skull length and geographical latitude in 44 species of carnivores in order to test the validity of Bergmann's rule in the Carnivora. Results were then compared to those of other studies. Significant positive correlation between skull length and latitude was found in 50% of carnivore species, while significant negative correlation was found in only 11% of species. These results indicate that the occurrence of Bergmann's rule in the Carnivora is less frequent than earlier published data suggest. The validity of Bergmann's rule in Soricidae did not support MEZHZHERIN (1964), found that *Sorex* from colder regions were smaller than those from warmer ones, and OCHOCINSKA & TAYLOR (2003) reported that in three of five species of *Sorex* examined in the Palearctic region, condylobasal length of the skull (CBL, a reliable indicator of body size) was negatively correlated with latitude, and the same trend, although not statistically significant, was also found in the fourth species. YOM-TOV & YOM-TOV (2005) found out that body size of *Sorex cinereus* decreases with increasing latitude, thus contradicting Bergmann's rule, and this trend was explained by food shortage during the cold northern winter. BALÁŽ & AMBROS (2006) declare the body size decrease of *Sorex araneus* and *Sorex minutus* with altitude increasing.

Reproduction and reproduction potential of Bank Vole

During year, the length of *Myodes glareolus* testes is changing due to sexual hormones and reproduction instincts. The testes size can be put in relation to the intensity of reproduction activity. Male´s testes size grows from March to June to 11.5 mm and then it is getting down to 3.5 mm in December (Fig. 24).

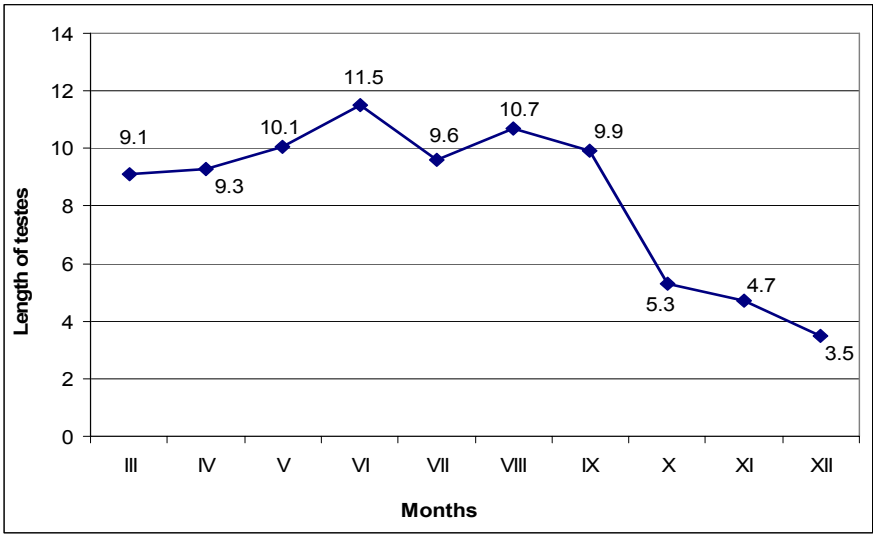

Fig. 24: Testes length dynamics of *Myodes glareolus* mature males during reproduction season

We were looking for the altitude influence on the *Myodes glareolus´s* testes size during the reproduction period. To test this dependency, only males captured in June were accepted. The representative sample was obtained from 5 hypsographic zones and negative correlation due to rising altitude was observed. The decrease from mountainous to oreal zone is 15.7% (Fig. 25).

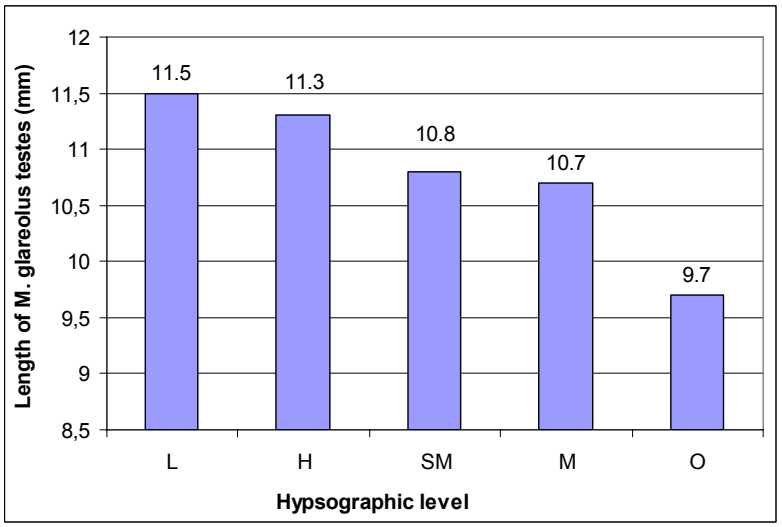

Fig. 25: Testes length of *Myodes glareolus* mature males in different hypsographic zones during June

Table 18: Reproduction activity of *Myodes glareolus* during reproduction season

Month	NCF	NPF	%	Number of embryos in uterus										ANE	ME
				1	2	3	4	5	6	7	8	9	13		
March	372	21	5.6	-	-	2	3	6	3	-	-	-	-	4.7	5
April	546	133	24.4	1	4	21	41	34	21	9	2	-	-	4.6	5
May	375	119	31.7	1	-	12	32	46	17	8	3	-	-	4.8	5
June	411	130	31.6	-	1	8	34	37	28	10	5	2	1	5.2	5
July	305	90	29.5	-	4	11	31	22	19	2	-	-	1	4.6	5
August	289	100	34.6	-	3	20	40	25	10	1	-	-	-	4.2	4
Sept.	344	110	32	1	4	10	42	37	17	-	1	-	-	4.5	4
Oct.	348	31	8.9	1	2	5	6	8	8	1	-	-	-	4.5	4
Nov.	202	28	13.9	-	-	3	10	8	6	1	-	-	-	4.7	4
Dec.	87	4	4.6	2	-	2	-	-	-	-	-	-	-	2.0	3
Togeth.	3279	766	23.4	6	18	94	239	223	129	32	11	2	2	4.7	4

Key: NCF – number of caught females, NPF – number of pregnant females, ANE – average number of embryos, ME – modus of embryos

We evaluated the reproduction of 766 gravid females of *Myodes glareolus* from 206 localities and from 120 mapping squares of FDS. The reproduction starts at the end of February and ends up in December. Percentage ratio of gravid females out of all captured females varies from 4.6% (in December) to 34.6% (in August), while average percentage ratio of gravid females during one year is 23.4% (Table 18, Fig. 26).

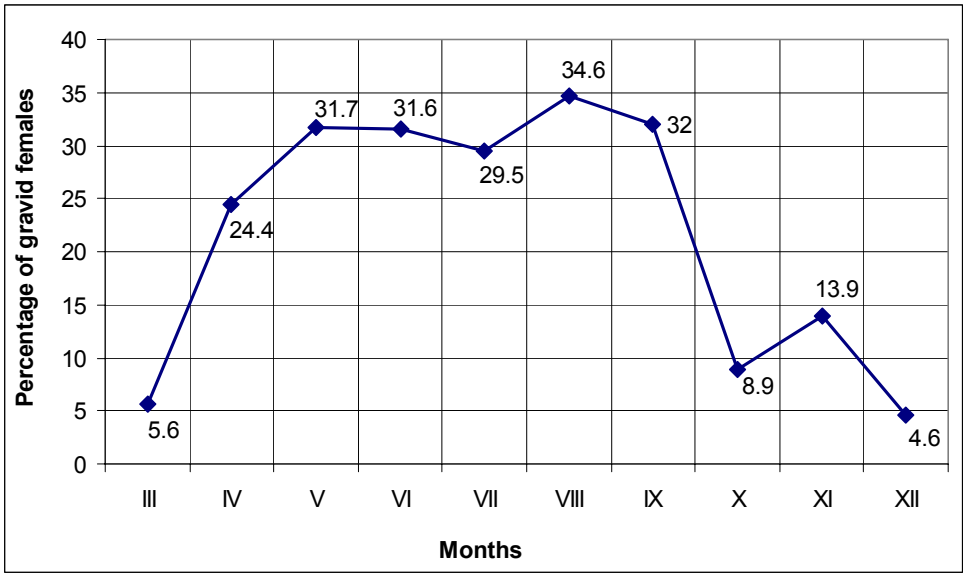

Fig. 26: Percentage of pregnant females *Myodes glareolus* during reproduction season

21 gravid females out of 372 females were captured in March, which indicates that the reproduction most probably started already in February. The first gravid females were discovered already in the first decade of March. According to the prectentual ratio of gravid females we can state that the reproduction activity is most intense in August (34.6%) and is slowly decreasing down to 4.6% until December. This is caused mainly by previous year born individuals, spring or early summer born individuals (February to June) involved in the reproduction process. We assume that size of litter is lower at the beginning and at the end of the reproduction season than in its peak. In May, we recorded 31.7% gravid females out of all captured females, which represent the second largest number of gravid individuals during the year. It is caused by fast sexual maturity process, which is more remarkable for females. The females of *Myodes glareolus* get sexually mature at the age of 1 to 1.5 month and males at the age of 2 month (BUCHALCZYK 1970). The presence of higher number of generations in one reproduction season is considered as the main reason of rapid population growth, which is typical for many species of *Muridae* family.

The number of embryos in *Myodes glareolus* wombs varies from 1 to 13 with average value of 4.7, modus is 4. The highest average (5.2) as well as maximum (13) value of numbers of embryos in wombs was recorded in May (Fig. 27). In May the second cohort is getting born, which matches with findings of Tkadlec et al. (TKADLEC et al. 1999), state that the second litter is bigger than first.

In the right womb edge from 0 to 7 embryos were recorded (2.39 in average) and in the left edge from 0 to 9 embryos (2.27 in average, Fig. 28). No significant difference between the numbers of embryos between the womb edges was proven when testing the equality using ANOVA-test (P = 0.077).

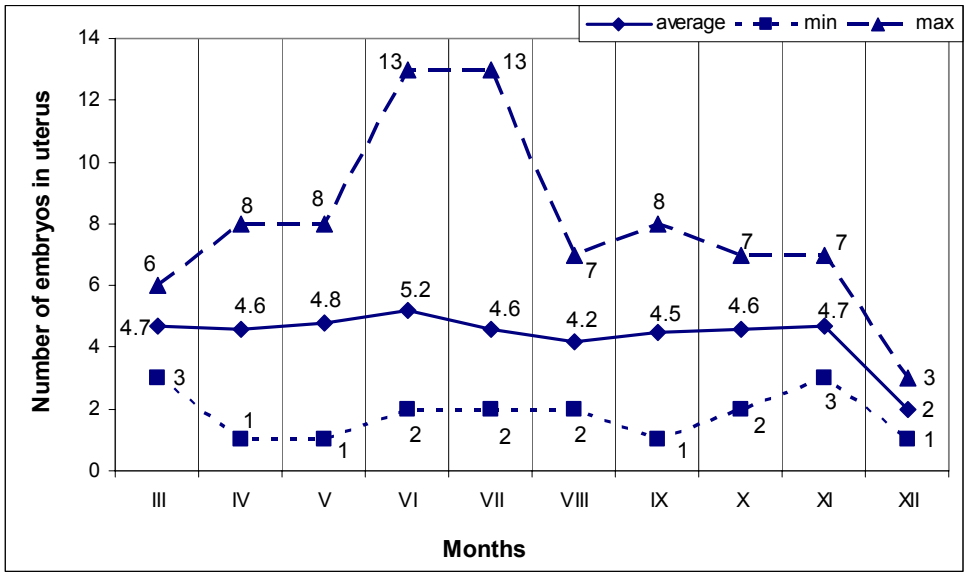

Fig. 27: Number of embryos in uterus of *Myodes glareolus* during reproduction season (minimum, maximum and average of embryos)

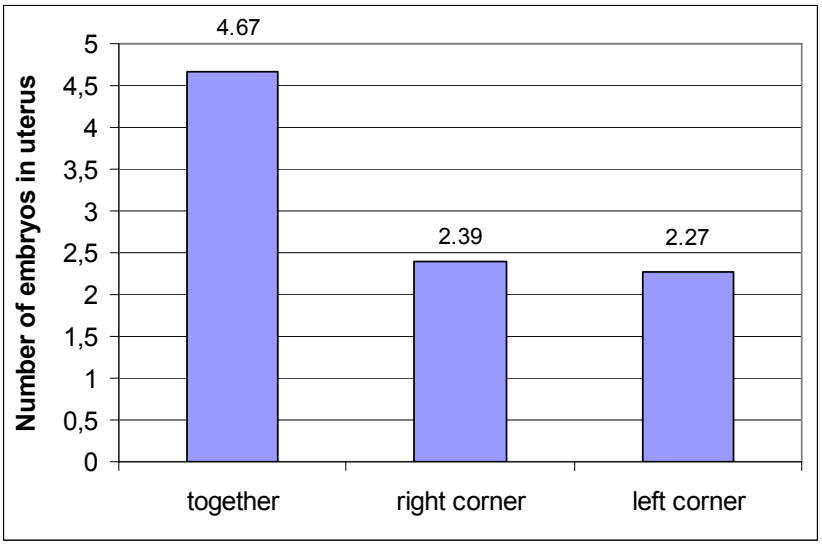

Fig. 28: Number of embryos in uterus *Myodes glareolus*: total number and number in right and left corner

Duration of reproduction season during a year (on the base of gravid female's data) and potential litter size (on the base of number of embryos at both womb sides) was examined from the reproduction. According to our records the reproduction period lasts for 10 months. We examined big representative sample of bank voles. Gravid females were observed also in winter time, where 87 females were captured in December, out of which 4.6% were gravid (this represents 4 females). Winter gravidity is presented also by ZEJDA (1962), NEWSON (1963), HANSSON (1983). Gravid females were recorded from March to December, so the duration of reproduction period was set to 284 days. Frequency of gravidity is F = 3.32, which means that observed females of bank vole species are gravid 3.32 times a year. The average number of young they have in one season is 15.6.

We examined the relation between weight, resp. body length and the number of embryos in gravid female´s wombs by regressive statistics. We found positive relation between values of somatic characteristics (weight and body length) and the number of embryos in gravid female´s wombs.

The number of embryos in gravid female´s wombs of *Myodes glareolus* changes in relation to altitude. Firstly – decent growth from 4.5 starts from the lowland zone to 4.8 in foldland (hillock) and submontane zone and then slow decrease of embryos down to 4.1 in subalpine zone (Fig. 29).

Because we´ve gathered enough material from all six Slovak hypsographic zones, we were able to evaluate the duration of reproduction season of bank vole´s gravid females (beginning and end) for each zone. We found that with rising altitude also the reproduction duration shortens from 10 months (lowland and foldland (hillock) to five months in subalpine zone (Fig. 30).

BUJALSKA (1985) observed reproduction season of bank vole in Central Europe from the beginning of April till the end of September and can either get shorter or longer. This can be caused by more factors. ZEJDA (1962) also states the beginning of reproduction starts in February. PUCEK (1983) presents the reproduction period of *Myodes glareolus* from April to the end of September.

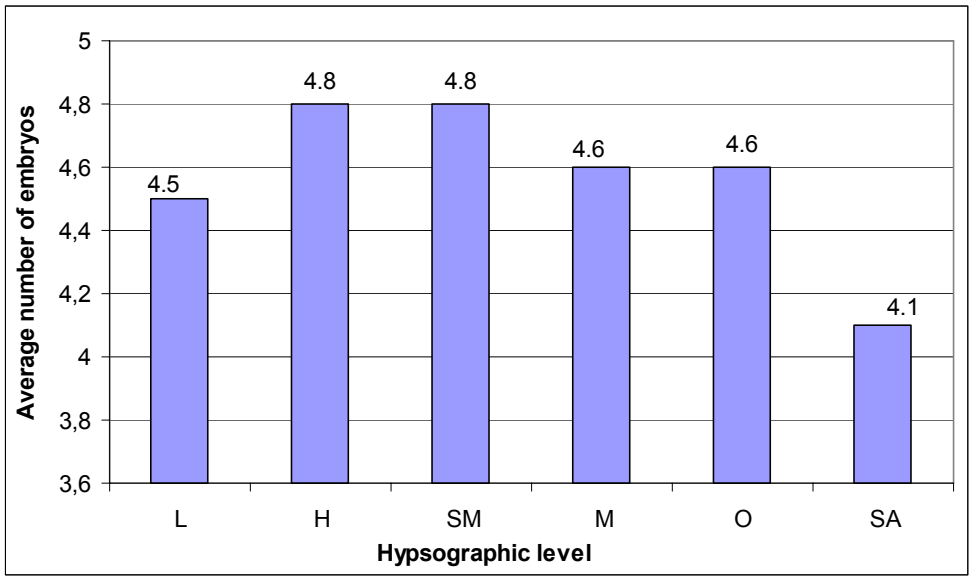

Fig. 29: Average number of embryos in uterus of *Myodes glareolus* in hypsographic zones (L- lowland, H – hilly, SM – submountainous, M – mountainous, O – high mountainous, Sa – subalpine)

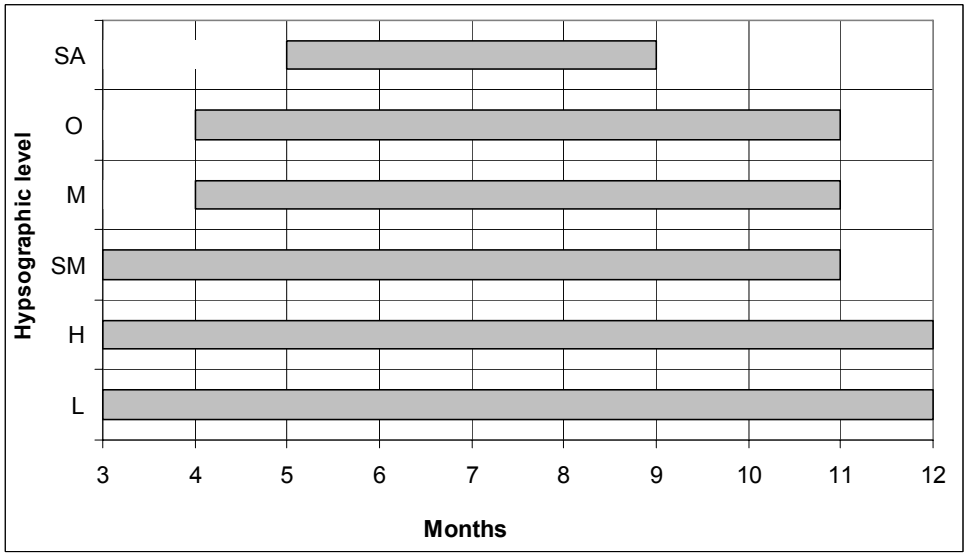

Fig. 30: Duration of reproduction season following the pregnancy of *Myodes glareolus* in hypsographic zones

ZEJDA (1966) recorded the highest reproduction intensity in May. In Slovakia ZEJDA (1962, 1966, 1968, 1971), KRIŠTOFÍK (1994) observed reproduction activity and litter size of bank vole in Slovakia. Majority of sources sets the gravidity duration of bank vole in range from 18 to 21 days with 3 to 4 litters per year and number of young from 2 to 8. Reproduction season starts in early spring after hibernation. First litters come already in February and their number in one year

reach 4-5. These attributes make remarkable fluctuation of population density and during the year also gradation changes. Yearly fluctuations consist of high multiplicity in late autumn followed by decrease in winter and in spring and stable values are common for summer. Hibernated individuals pay an important role during the reproduction. We can mark these individuals as cohort K0. They are important when setting up a new generation at the beginning of each year (KARLSSON 1986). KRIŠTOFÍK (1994) presents the reproduction period duration from 7 to 7.5 months (in average 7.2 months), with beginning in March and finishing in second half of October. ZEJDA (1966) shows the difference in the duration of reproduction cycles at different habitat types. In wet, vegetation rich biotopes the reproduction period lasts from 4 to 5 months, while at drier and grassy biotopes it is a month longer. Ending up the reproduction activity is influenced by the population density. When the population density is high, the reproduction period is shorter (ZEJDA 1971). TURČEK (1954) found in Poľana that the early stop of reproduction in June is linked to the lack of food resources and high population densities.

But ZEJDA (1966) and MÁJSKY (1985) found that in case of high number of hibernated individuals (mother generation), the population density will grow rapidly due to the early reproduction activity of the whole population as well as due to the new early spring born individuals already involved in this activity. This usually results into the early stop of reproduction activity already in the first half of summer. This indicates that the inner population processes (mainly population density) are the main factors influencing the duration of reproduction season. MÁJSKY (1985) found that shortening the reproduction period due to the growing population density is common also for *Apodemus flavicollis*. TURČEK (1954) points out a fact that stopping the reproduction activity means stopping the process of young generation development, which may have a bad influence on the forthcoming population.

Similarly as other rodents, also bank voles show a connection between the size of their litter and their body length and body weight. ZEJDA (1971) presents that smaller females (until 22 g) had smaller litters than bigger females (more than 30 g). Of course we can consider the fact that bigger females were older, so they had bigger individuals in their litters. The influence of age on litter is not remarkable under natural conditions. ZEJDA (1966) found that a period when the female is gravid is also responsible for the litter size. Only the litter given by the oldest females was little bit smaller. Among the subalpine population occupying altitudes above 1000 metres above sea level, 4.09 was the size of litter according to number of embryos. The litter size at these altitudes is most probably much lower than of those in lowlands because the reproduction period is much shorter. Size growth from south to north wasn´t proven.

Any reproduction activity during winter is very rare in Slovakia, but not unusual. It normally happens if there is enough food and higher temperatures (ZEJDA 1962).

Different number of embryos at both womb edges is observed during the reproduction period of bank vole. ZEJDA (1966) presents the litter size equals to 4.902 ± 0.065. These values were presented for lowlands and hillocks in Slovakia and Czech Republic. At the beginning of their reproduction period smaller number of females having embryos at the left edge of their wombs was captured, but the difference is minimal. Bigger difference was observed in June. 41 gravid females had 3 left edge embryos, while only 34 females had right edge embryos. Similar values were also published by KARLSSON (1986). According to these authors, the

average litter size ranges in interval from 4 to 4.6 embryos. BERGSTEDT (1965) analysed a population from altitudes 1600 metres above sea level and found that the average litter size varies from 4.40 to 5.15 embryos in relation to reproduction season. KRIŠTOFÍK (1994) presents the litter size of bank voles from south-west Slovakia is 4.64 ± 0.13 and the most common number of embryos during gravidity is from 4 – 6.

SUMMARY

This work sums up the results of small terrestrial mammal´s research since 1975 till 2009 and updates our knowledge about the distribution, population habitus and reproduction behaviour of species: bank vole - *Myodes glareolus* (Schreber, 1780), the european pine vole - *Microtus subterraneus* (de Sélys-Longchamps, 1836), tatra vole - *Microtus tatricus* (Kratochvíl, 1952), snow vole - *Chionomys nivalis mirhanreini* (Schäfer, 1935).

The *Myodes glareolus* species has the biggest area occurrence out of 4 observed species of *Muridae* family, subfamily *Arvicolinae*. The bank vole occupies various types of forest ecosystems, fragmentised habitats with forest´s mosaics and flooded wetlands. An important factor of their occurrence is the forest undergrowth, richly developed undergrowth level (plants) and shrub level or the presence of young trees, where *Myodes glareolus* can find places to settle down, build their burrows, hide or reproduce. We found *Microtus subterraneus* at various places in Slovakia, but its multiplicity and presence in our catches was very low. Carpathian endemites *Microtus tatricus* and *Chionomys nivalis* both have a very small range. *Microtus tatricus* was recorded at mountainous vegetation level. *Chionomys nivalis* species has the lowest spatial range in Slovakia. It is strongly related to the highest located areas of Slovakia. This species occupies rocky biotopes, respectively dwarf pine bushes.

Body weight respectively body length, both show the biggest variability out of all observed somatic characteristics of *Chionomys nivalis.* The values of hind foot length shows the lowest variability. Tail usually represents 42.3% of adult´s body length. The ratio between body length and tail length does not change during vole´s lifetime. At both adult and subadult population all somatic characteristics reach higher values in male part of the population in comparison to females. Statistically highly proven difference was recorded only for the adult´s hind foot length. Differences of other somatic characteristics between males and females among both adult and subadult population are not statistically significant.

Microtus tatricus males show bigger dispersion values of all characteristics in comparison to females. Body length values show the biggest variability recorded among observed individuals, the lowest variability is for the hind foot length. Adult´s tail length represents 38.8% of their body length. Bigger values of somatic characteristics are common for males of both age categories. Statistically proven higher values of weight, body length and tail length are known for adult males compare to adult females. The tatra vole occurs in three hypsographic zones: mountainous, oreal and subalpine. We found growth of average body weight and body length with rising altitude. This positive correlation can be explained by Bergman´s rule. The average values of tail length and hind foot length are getting smaller with rising altitude. This negative correlation can be explained by Allen´s rule.

From all evaluated somatic characteristics of *Microtus subterraneus* the body length shows the biggest variability and the hind foot length the lowest. Very low variability was also recorded in case of ear length, the values of weight and tail length have approximately equal variability. The tail represents 31.89% of adult´s body length. Females show bigger weight values in adult age group than males.

Differences between weight of gravid and not gravid adult females are statistically significant. The weight growth represents 7.2%. Among the adult part of *Microtus subterraneus* population higher values of all somatic characteristics were recorded for females with an exception of body length and hind foot length. The differences are statistically highly significant in case of female´s weight and tail length. The average values of al somatic characteristics and of body weight are growing with rising altitude. The lowest change we recorded was in case of hind foot length, the biggest change in case of body weight.

The average values of all somatic characteristics of *Myodes glareolus* are bigger at adult individuals. The body length shows biggest variability, the hind foot length the smallest. High values of standard deviation were recorded for weight and tail length. By adults, bigger variability of weight is present, by subadults it is the tail length. With an exception of hind foot and ear length, bigger values of all somatic characteristics were recorded for females. Significant differences were proven for weight, tail length and body length. We found female´s body weight increase during their gravidity period about 15.07%. According to our findings we can state that the average values of weight and body length are growing with rising altitude, but the difference between the lowland and subalpine zone is significant only in case of body weight. Opposite tendency was observed in case of tail length and hind foot, which are both getting smaller with rising altitude. This decrease is not proven statistically.

To evaluate reproduction and reproduction potential of snow vole is a very problematic task, as we have data about gravid females only from May. 18 females (60%) were gravid out of 30 adult females during May. The number of embryos in gravid female´s wombs varied from 1 to 4. The average number of embryos counts 2.78. At the right edge of womb lower average number of embryos (1.33) was found compare to left edge (1.44), but the difference is not significant.

Reproduction of tatra vole starts in the last decade of April. According to our findings the reproduction activity ends up in the third decade of September. Reproduction season of *Microtus tatricus* lasts about 141 days. The number of embryos varies from 1 to 3 (2.46 in average). At the right womb´s edge lower average number of embryos (1.042) was found than in left edge. Female´s gravidity lasts from 21 to 23 days (22 in average). Frequency of gravidity is 3.2. Number of young per one female during each season is 7.78 with average litter 2.46. Evaluation of reproduction potential in relation to hypsographic zones indicates certain change. As we had data about gravid females only from oreal and subalpine zone we evaluated the average number of embryos in gravid *Microtus tatricus* female´s wombs only from these two zones. We found that in oreal zone is the average number of embryos 2.8 and in subalpine zone it is less, 2.2, which indicates a decrease with rising altitude and changes along the vertical gradient are proposed.

European pine vole´s testes are of bigger size in April and towards September theirs size are getting slowly smaller. Their reproduction season starts in the first decade of March. According to our findings the reproduction activity ends up in the third decade of November. The whole reproduction season of *Microtus subterraneus* lasts for 235 days. The number of embryos varies from 1 to 5, with

an average value of 2.35. At the right womb´s edge higher average number of embryos was observed (1.32) than at the left edge (1.03). Female´s gravidity lasts for 21 days. Gravidity frequency is 4.85. The average litter is 2.35 and number of young per one female in one season is 11.4. During the reproduction season, which lasts from March to November, the percentage ratio of gravid females out of all captured adult females is changing. The decrease of average number of embryos was observed. By testing the equality of number of embryos at lowland zone and subalpine zone, statistically significant difference was proven.

Testes size of *Myodes glareolus* males is increasing from March to June to 11.5 mm and then slowly decreases down to 3.5mm in December. For the test of rising altitude influence on testes size only individuals captured in June were accepted. We found negative correlation with rising altitude, while the decrease from lowland zone to oreal zone counts 15.7%. Reproduction season of *Myodes glareolus* starts by the end of February and ends by the end of December. The percentage ratio of gravid females in whole year counts 23.4%. The reproduction starts most probably already in February and we found the first gravid females already in the first decade of March. Number of embryos in *Myodes glareolus* wombs varies from 1 to 13, but the average value is 4.7. Highest average (5.2) as well as maximum number of embryos in womb was recorded in May. At the right womb edge from 0 to 7 embryos was observed (2.39 in average), at the left end from 0 to 9 (average 2.27). By using Anova-test we didn´t prove any significant difference in number of embryos between the two edges. We recorded 10 months duration of reproduction period; gravid females were observed also in winter time. We recorded gravid females from March to December, so the duration of reproduction period was set up on 284 days. Gravidity frequency F = 3.32 and the average number of young per one female is 15.6. The number of embryos in female´s wombs is changing due to changing altitude. Firstly a slow increase (4.5) from lowland to (4.8) in submountainious zone was observed. We found that the reproduction period of bank vole is decreasing from 10 months in lowlands to 5 months in subalpine zone.

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Baláž, I., Ambros, M.: Distribution and biology of Muridae family (Rodentia) in Slovakia. 1st part: *Chionomys nivalis, Microtus tatricus, Microtus subterraneus, Myodes glareolus*

Práca sumarizuje výsledky výskumu drobných zemných cicavcov získané v rokoch 1975 - 2009 a kompletizuje doterajšie poznatky o rozšírení, habituse populácií a rozmnožovaní druhov hrdziak lesný - *Myodes glareolus* (SCHREBER, 1780), hrabošík podzemný - *Microtus subterraneus* (DE SÉLYS-LONGCHAMPS, 1836), hrabošík tatranský - *Microtus tatricus* (KRATOCHVÍL, 1952), hraboš snežný - *Chionomys nivalis mirhanreini* (SCHÄFER, 1935).

Rozšírenie druhov na Slovensku

Druh *Myodes glareolus* má zo 4 sledovaných druhov čeľade Muridae, podčeľade Arvicolinae najväčšie plošné rozšírenie na Slovensku (výskyt potvrdený v 230 štvorcoch DFS a v 78 orografických celkoch). V rámci svojho areálu obýva hrdziak lesný rozličné typy lesov, fragmentované habitaty s mozaikou lesných porastov a zaplavované územia s charakterom mokrade. Dôležitým faktorom je lesný podrast, bohato rozvinutá bylinná etáž a etáž krovín, či mladých stromov, kde nachádza *Myodes glareolus* miesta na úkryt, ale aj reprodukciu. Za dôležitú súčasť v prostredí, ktoré obýva hrdziak lesný, by nemal chýbať odumretý drevný materiál, ktorý tvorí podstatnú časť pri tvorbe úkrytov a skladov. Druh *Microtus subterraneus* sme zistili v 167 kvadrátoch DFS a v 70 orografických celkoch. Karpatské endemity, *Microtus tatricus, Chionomys nivalis* majú veľmi úzke rozšírenie. Výskyt *Microtus tatricus* sme zaznamenali v 20 štvorcoch DFS a v 9 orografických celkoch Slovenska. Najmenšie plošné rozšírenie na Slovensku má druh *Chionomys nivalis* (výskyt zistený v 9 kvadrátoch DFS a 4 orografických celkoch Slovenska).

Pomer pohlaví (*sex ratio*) sledovaných druhov

Chionomys nivalis
Pomer pohlaví je významnou štruktúrnou a dynamickou charakteristikou populácie. Je citlivo ovplyvňovaný vnútro populačnými procesmi, preto patrí k najdôležitejším ukazovateľom pri rozboroch populácie. Pomer pohlaví v subadultnej časti populácie *Chionomys nivalis* je vyrovnaný, napriek tomu majú prevahu samice. U dospelých jedincov je celkovo nevyrovnaný pomer pohlaví, signifikantne prevládajú samice nad samcami (podľa χ^2-testu).

Microtus tatricus
Pomer pohlaví medzi samcami a samicami v subadultnej vekovej kategórii *Microtus tarricus* je v priebehu celého roka takmer ideálne vyrovnaný, s miernou prevahou samíc v októbri. Celkovo je podľa χ^2–testu vyrovnaný pomer pohlaví. V dospelej časti populácie je pomer pohlaví nevyrovnaný, s výraznou prevahou samíc, najmä v auguste. Celkovo sme χ^2–testom stanovili vysokú hodnotu, čo svedčí o nevyrovnanom pomere pohlaví. Prevahu samíc sme zaznamenali aj v apríli, máji a septembri. Iba v októbri sme zistili prevahu samcov.

Microtus subterraneus
V subadultnej vekovej kategórii je pomer pohlaví medzi samcami a samicami Microtus *subterraneus* v priebehu takmer celého roka vyrovnaný, s výnimkou dvoch mesiacov (apríl a november), kedy sme zaznamenali preukazne nevyrovnaný *sex ratio*. Celkovo je podľa χ^2–testu vyrovnaný pomer pohlaví, s prevahou samcov. V dospelej časti populácie je pomer pohlaví vyrovnaný, s miernou prevahou samcov. Počas roka sme nevyrovnaný pomer pohlaví zistili v mesiacoch marec, november (prevaha samcov), jún (prevaha samíc). Nepreukaznú prevahu samíc sme zistili ešte v mesiacoch máj a júl.

Myodes glareolus
V oboch vekových kategóriách je pomer pohlaví *Myodes glareolus* naklonený v prospech samcov. Pravdepodobne to súvisí s väčšou aktivitou samcov a hlavne vyhľadávanie samíc na začiatku reprodukčnej sezóny. Naopak samice sa starajú o potomstvo. Sledovaním pomeru pohlaví u adultnej skupiny pozorujeme prevahu samíc predovšetkým na jeseň a v zime (september, október, november, december). Príčinu prevahy samíc v tomto období môžeme hľadať hlavne v tom, že samice sú odbremenené od starostlivosti o mláďaťa a sústredia sa najmä na vyhľadávanie potravy. U subadultnej skupiny je prevaha samíc zaznamenaná v januári až v apríli a tiež v júli. V dospelej vekovej kategóriii *Myodes glareolus* je pomer pohlaví nevyrovnaný (55,04), výrazne naklonený v prospech samcov.

Hodnotenie biometrie somatických znakov

Chionomys nivalis
Zo sledovaných somatických znakov *Chionomys nivalis* sa najväčšou variabilitou vyznačuje hmotnosť, prípadne dĺžka tela, najmenšiu variabilitu vykazujú hodnoty dĺžky zadnej labky. Chvost predstavuje priemerne 42,3% dĺžky tela u nedospelých jedincov a 43,6% u dospelých jedincov, t.j. pomer medzi dĺžkou tela a chvosta sa počas života nemení. V subadultnej aj adultnej časti populácie dosahujú všetky sledované somatické znaky vyššie hodnoty u samcov, v porovnaní so samicami. Štatisticky vysoko preukazný rozdiel sme zaznamenali iba v dĺžke zadnej labky u dospelých jedincov, rozdiely v ostatných somatických znakoch, medzi samcami a samicami v dospelej a nedospelej časti populácie, nie sú štatisticky signifikantné.

Microtus tatricus
Výsledkom štatistického spracovania variability somatických znakov adultnej a subadultnej vekovej kategórie *Microtus tatricus* je zistenie, že hodnoty rozptylov všetkých znakov sú väčšie u dospelých jedincov a v rámci adultných jedincov u samcov. Najväčšou variabilitou u sledovaných jedincov sa vyznačujú hodnoty dĺžky tela a najmenšiu variabilitu vykazujú hodnoty dĺžky zadného chodidla. Chvost tvorí 38,1% dĺžky tela u nedospelých a 38,8% u dospelých jedincov, t.j. vekom sa tento pomer podstatne nemení. Vyššie hodnoty somatických znakov dosahujú samce v oboch skúmaných vekových kategóriách. Štatisticky preukazne vyššie hodnoty dosahujú dospelé samce pri hmotnosti, dĺžke tela a dĺžke chvosta, v porovnaní s rozmermi zistenými u dospelých samíc. U nedospelých samcov dosahuje signifikantne vyššiu hodnotu iba dĺžka ušnice, v porovnaní so samicami subadultnej vekovej kategórie. Hrabošík tatranský sa vyskytuje v rozsahu troch hypsografických pásiem, v montánnom, oreálnom a subalpínskom. Získali sme dostatočné množstvo údajov o biometrii somatických znakov *Microtus tatricus* zo

všetkých pásiem, preto sme mohli uskutočniť podrobnejšie analýzy. Zistili sme nárast hodnôt priemernej hmotnosti a dĺžky tela s rastom hypsografických pásiem. Pozitívnu koreláciu rastu hmotnosti a dĺžky tela s nadmorskou výškou môžeme vysvetliť Bergmannovým pravidlom. S rastom nadmorskej výšky klesajú teploty a menia sa ďalšie environmentálne parametre k extrémnym hodnotám, pričom vyššia hmotnosť a dĺžka tela zvýhodňujú prežívanie živočíchov a ich racionálne energetické výdaje. Vyššie hodnoty hmotnosti súvisia s ukladaním izolačnej tukovej vrstvy ako ochrany pred nízkymi teplotami. Priemerné hodnoty dĺžky chvosta a zadného chodidla s rastom nadmorskej výšky klesajú. Negatívnu korelácia hodnôt dĺžky zadného chodidla, chvosta a ušnice s rastom nadmorskej výšky možno vysvetliť Allanovým pravidlom. Kratšie koncové časti tela v chladnejších oblastiach zabezpečujú nižšie tepelné straty (racionálne energetické hospodárenie).

Microtus subterraneus

Z hodnotených somatických znakov *Microtus subterraneus* sa najväčšou variabilitou vyznačuje dĺžka tela, najmenšiu variabilitu vykazujú hodnoty dĺžky zadnej labky. Veľmi nízku variabilitu vykazujú hodnoty dĺžky ušnice. Hodnoty hmotnosti a dĺžky chvosta dosahujú približne rovnakú variabilitu (rovnaké hodnoty smerodajnej odchýlky). Chvost predstavuje 32,61% dĺžky tela u nedospelých jedincov a 31,89% u dospelých jedincov. V dospelej vekovej kategórii dosahujú samice vyššie hodnoty hmotnosti. Dokonca aj po vyselektovaní gravidných a negravidných dospelých samíc, obe skupiny dosahovali vyššie priemerné hodnoty hmotnosti. Rozdiely v hmotnosti medzi gravidnými a negravidnými dospelými samicami sú štatisticky signifikantné, pričom nárast hmotnosti je 7,2%. V subadultnej vekovej kategórii dosahujú všetky somatické znaky vyššie hodnoty u samcov, s výnimkou dĺžky chvosta. Štatisticky významný rozdiel medzi pohlaviami je iba pri dĺžke chvosta. V adultnej časti populácie dosahujú všetky sledované somatické znaky vyššie hodnoty u samíc, s výnimkou dĺžky tela a zadného chodidla. Rozdiely v prospech samíc sú štatisticky vysoko významné pri hmotnosti a dĺžke chvosta. Sledovaním vplyvu zmien podmienok prostredia na biometriu somatických znakov sme zistili pozitívnu koreláciu s nadmorskou výškou. Priemerné hodnoty všetkých somatických znakov a hmotnosti s rastom nadmorskej výšky (od nížinného po subalpínsky vegetačný výškový stupeň) rastú. V prípade hmotnosti nastal nárast priemernej hodnoty od nížinného do subalpínskeho stupňa o 7,8%. S rastom nadmorskej výšky vzrástla priemerná hodnota dĺžky tela o 3,47%, priemerná hodnota dĺžky chvosta o 4,89%, hodnota dĺžky zadného chodidla o 1,54%, hodnota dĺžky ušnice o 7,23%. Najmenšiu zmenu sme zaznamenali pri dĺžke zadného chodidla a najväčšia zmena bola zistená pri hmotnosti. S rastom nadmorskej výšky klesajú priemerné teploty, čo môže mať za následok nárast hmotnosti ako adaptácia na chladnejšie prostredie (lepšie termoizolácia). S rastom nadmorskej výšky by bol očakávaný pokles hodnôt dĺžky koncových častí tela, ako je dĺžka chvosta a ušníc. Tieto hodnoty však majú naopak pozitívnu koreláciu s nadmorskou výškou.

Myodes glareolus

Výsledkom štatistického spracovania variability somatických znakov adultnej a subadultnej vekovej kategórie *Myodes glareolus* je zistenie, že priemerné hodnoty všetkých somatických znakov sú väčšie u dospelých jedincov. Najväčšou variabilitou sa vyznačuje dĺžka tela, najmenšiu variabilitu vykazujú hodnoty zadného chodidla. Vysoké hodnoty smerodajnej odchýlky sme zaznamenali pri

hmotnosti a dĺžke chvosta, pričom väčšiu variabilitu u dospelých jedincov vykazujú hodnoty hmotnosti, u nedospelých jedincov hodnoty dĺžky chvosta. Veľkosť tela, konkrétne dĺžka tela a hmotnosť, nie sú stálymi znakmi, ale sú značne variabilné. Závisia od geografickej polohy, od populácie, ale aj od fázy cyklu, v ktorom sa populácia momentálne nachádza. Takisto bola dokázaná aj závislosť veľkosti tela od pohlavnej aktivity jedincov. Pomocou Anova-testu sme testovali rozdiely sledovaných znakov medzi samcami a samicami oboch vekových kategórií. V rámci adultných jedincov vyššie hodnoty somatických znakov sme zaznamenali u samíc, s výnimkou dĺžky zadného chodidla a dĺžky ušnice, ktoré dosahujú vyššie hodnoty u samcov. Signifikantné rozdiely sme potvrdili pri hmotnosti, dĺžke chvosta (vysoko preukazné) a dĺžke tela. Vo vekovej kategórii subadultov, vyššie hodnoty somatických znakov majú samce, s výnimkou dĺžky chvosta. Štatisticky vysoko preukazné rozdiely boli zistené pri hmotnosti a dĺžke zadného chodidla. V rámci adultnej časti populácie *Myodes glareolus* sme stanovili priemernú hodnotu telesnej hmotnosti pre dospelé jedince spolu, osobitne pre dospelé samce a dospelé samice. Dospelé samice sme špecifikovali na gravidné a negravidné jedince. Zistili sme nárast hmotnosti u samíc počas gravidity o 15,07%. Na základe našich zistení môžeme konštatovať, že priemerné hodnoty hmotnosti a dĺžky tela rastú s rastúcou nadmorskou výškou, ale iba v prípade hmotnosti je rozdiel medzi nížinným a subalpínskym stupňom signifikantný (P Anova = $5.39.10^{-5}$). Opačný priebeh majú hodnoty dĺžky chvosta a zadného chodidla, nakoľko s rastúcou nadmorskou výškou klesajú. Tento pokles je však štatisticky nepreukazný. Je známe, že jedince obývajúce vyššie polohy (chladnejšie oblasti) dosahujú väčšie rozmery tela ako jedince z nižších polôh - Bergmannovo pravidlo.

Reprodukčná aktivita a potenciál

Chionomys nivalis

Zhodnotiť reprodukciu a reprodukčný potenciál hraboša snežného je veľmi problematické, nakoľko máme k dispozícii iba údaje o gravidných samiciach odchytených v priebehu mája. Z celkového počtu 30 dospelých samíc bolo 18 samíc gravidných (60%) v priebehu mája. Počet embryí v materniciach gravidných samíc sa pohyboval od 1 do 4, s najčastejším počtom (modusom) 3 embryá. Celkovo bol priemerný počet embryí 2,78. V pravom rohu maternice sme zistili nižší priemerný počet embryí (1,33) ako v ľavom rohu (1,44), rozdiel však nie je signifikantný.

Microtus tatricus

Reprodukcia hraboša tatranského začína v poslednej dekáde apríla. Podľa našich zistení, reprodukčná aktivita končí v tretej dekáde septembra. Reprodukčná sezóna *Microtus tatricus* trvá 141 dní. Počet embryí sa pohybuje od 1 do 3, s priemernou hodnotou 2,46. V pravom rohu maternice sme zistili nižší priemerný počet embryí (1,042) ako v ľavom rohu (1,42). Gravidita samice trvá 21 až 23 dní, priemerne 22 dní. Frekvencia gravidity (podľa Emlen-Davidovho vzorca) je 3,2. Pri priemernom vrhu 2,46 je počet mláďat na jednu samicu počas sezóny 7,87. Reprodukčná aktivita u druhu *Microtus tatricus* sa vyznačuje dvojvrcholovou krivkou, v júni (všetky odchytené samice boli gravidné) a v septembri (50% gravidných samíc), najväčší pokles sme zaznamenali v júli (33,3% gravidných samíc). Hodnotenie reprodukčného potenciálu vo vzťahu k hypsografickým stupňom naznačuje určitú zmenu. Nakoľko sme mali údaje o gravidných

samiciach iba z oreálneho a subalpínskeho stupňa, hodnotili sme priemerný počet embryí v materniciach gravidných *Microtus tatricus* z týchto dvoch stupňov. Zistili sme, že v oreálnom stupni je priemerný počet embryí 2,8 a v subalpínskom iba 2,2, čo naznačuje pokles s rastom nadmorskej výšky, pravdepodobne nastávajú zmeny pozdĺž vertikálneho gradientu.

Microtus subterraneus

U samcov hlodavcov sa pohlavná aktivita prejavuje zostupom semenníkov z abdominálnej do skrotálnej polohy, pričom sa súčasne zväčšuje ich celková veľkosť. Počas rozmnožovacieho obdobia sa veľkosť testes dynamicky mení. U hrabošíka podzemného dosahujú semenníky najväčšie rozmery v apríli a do septembra sa ich veľkosť pozvoľna zmenšuje. Reprodukcia hrabošíka podzemného začína v prvej dekáde marca. Podľa našich zistení, reprodukčná aktivita končí v tretej dekáde novembra. Reprodukčná sezóna *Microtus subterraneus* trvá 235 dní. Počet embryí sa pohybuje od 1 do 5, s priemernou hodnotou 2,35. V pravom rohu maternice sme zistili vyšší priemerný počet embryí (1,32) ako v ľavom rohu (1,03). Gravidita samíc trvá 21 dní. Frekvencia gravidity (podľa Emlen-Davidovho vzorca) je 4,85. Pri priemernom vrhu 2,35 je počet mláďat na jednu samicu počas sezóny 11,4. Počas reprodukčnej sezóny, ktorá u *Microtus subterraneus* prebieha od marca do novembra, sa percentuálne zastúpenie gravidných samíc z celkového počtu odchytených dospelých samíc mení. Zaznamenali sme dva reprodukčné vrcholy v máji (56%) a auguste (62,6%), v júli (40,2%) a v októbri (13,6%) bol najnižší počet zistených gravidných samíc. Zisťovali sme zmenu priemerného počtu embryí u gravidných samíc *Microtus subterraneus* s rastom nadmorskej výšky, pričom sme zaznamenali negatívnu koreláciu. V jednotlivých hypsografických pásmach, s rastom nadmorskej výšky nastáva pokles priemerného počtu embryí. Testovaním rovnosti (Anova-test) počtu zárodkov v nížinnom a subalpínskom stupni sme zistili štatisticky preukazný rozdiel (P = 0,006).

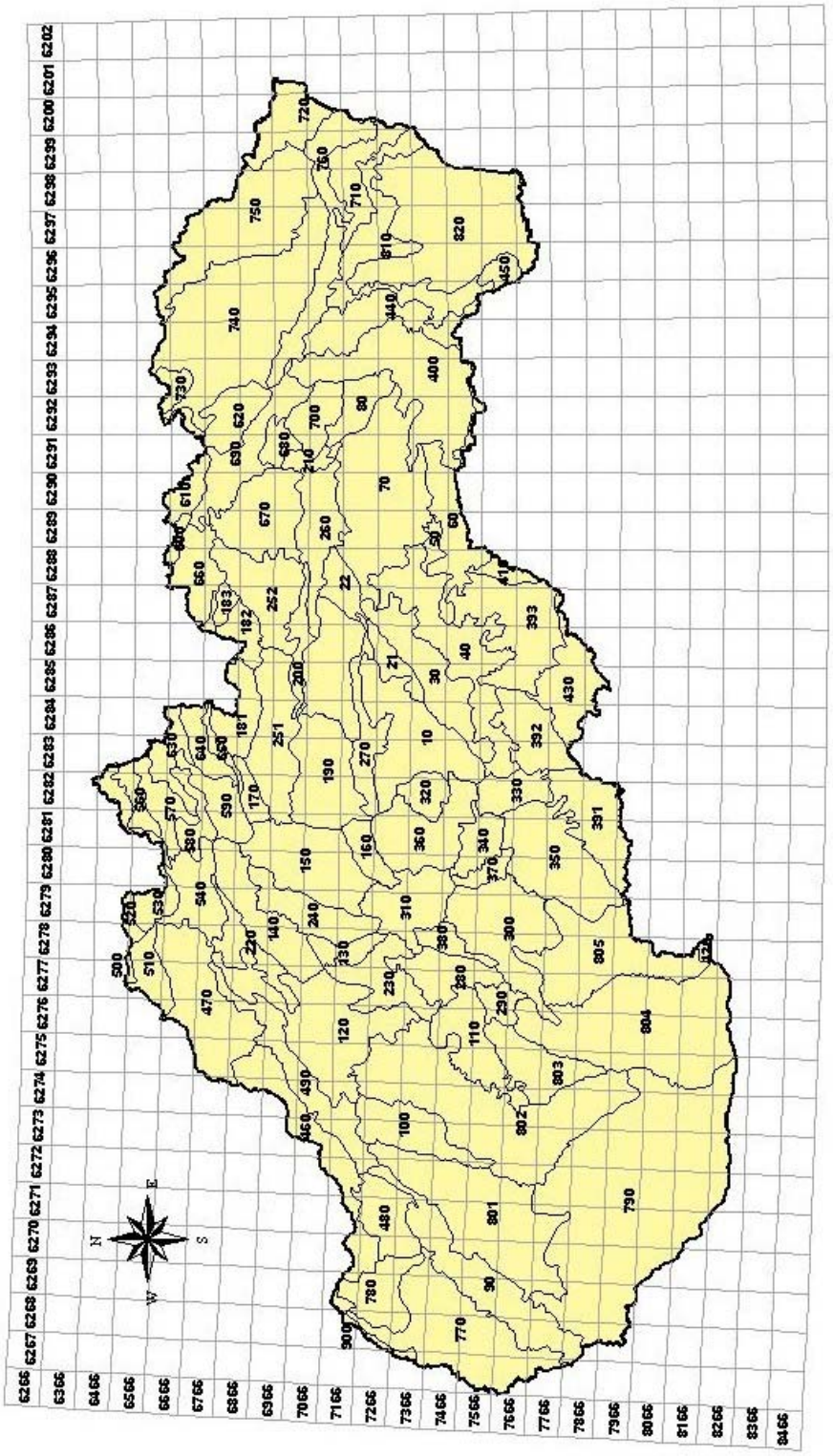
Myodes glareolus

Počas roka sa vplyvom pohlavných hormónov a reprodukčného pudu mení dĺžka semenníkov *Myodes glareolus*. Veľkosť semenníkov môžeme dať do súvisu s intenzitou reprodukčnej aktivity. Veľkosť testes samcov sa od marca do júna zväčšuje na 11,5 mm a potom sa pozvoľna veľkosť zmenšuje až na hodnotu 3,5 mm v decembri. Zisťovali sme vplyv nadmorskej výšky na veľkosť semenníkov *Myodes glareolus* počas reprodukčného obdobia. K testovaniu tejto závislosti sme akceptovali iba samce odchytené v júni. Reprezentatívnu vzorku sme získali z 5 hypsografických stupňov a zistili sme negatívnu koreláciu s rastom nadmorskej výšky, pričom pokles od nížinného k oreálnemu stupňu predstavuje 15,7%. Reprodukciu *Myodes glareolus* sme vyhodnocovali na základe 766 gravidných samíc, ktoré sme získali z 206 lokalít a zo 120 mapovacích štvorcov Databanky fauny Slovenska. Rozmnožovanie začína koncom februára a končí v decembri. Percentuálne zastúpenie gravidných samíc z celkového počtu odchytených samíc sa pohybuje od 4,6% (v decembri) do 34,6% (v auguste), pričom priemerný percentuálny podiel gravidných samíc za celý rok predstavuje 23,4%. V marci bolo odchytených 372 samíc, z toho gravidných bolo 21, z čoho možno usudzovať, že rozmnožovanie pravdepodobne začalo už vo februári, prvé gravidné samice sme objavili v prvej dekáde marca. Podľa percentuálneho zastúpenia gravidných samíc možno usúdiť, že reprodukčná aktivita prebieha najintenzívnejšie v auguste (34,6%) a postupne do decembra klesá na 4,6%. Je to spôsobené hlavne tým, že

do reprodukcie sa plne zapojili jedince narodené v minulom vegetačnom období a aj jedince narodené v jarných mesiacoch a v skorých letných termínoch (február – jún). Môžeme teda predpokladať, že veľkosť vrhu je na začiatku a na konci vegetačného obdobia menšia ako v strede vegetačného obdobia. My sme zaznamenali v máji 31,7% gravidných samíc z celkového počtu odchytených samíc, čo predstavuje druhý najvyšší počet gravidných jedincov v priebehu roka. Súvisí to s veľmi rýchlym pohlavným dospievaním, ktoré je výraznejšie u samíc. Počet zárodkov v maternici *Myodes glareolus* je od 1 do 13, priemerná hodnota počtu zárodkov je 4,7 a modus počtu embryí je 4. Najvyššia priemerná (5,2) ako aj maximálna (13) hodnota počtu zárodkov v maternici bola zaznamenaná v máji. V pravom rohu maternice sme zistili od 0 do 7 embryí (priemer 2,39), v ľavom rohu od 0 do 9 zárodkov (priemer 2,27). Testovaním rovnosti pomocou Anova-testu sme nepotvrdili signifikantný rozdiel v počte embryí medzi rohmi maternice (P Anova = 0,077). V rámci reprodukcie sme zisťovali dĺžku obdobia rozmnožovania počas roka (na základe údajov o gravidite samíc) a potenciálnu veľkosť vrhu (na základe počtu embryí v oboch rohoch maternice). Zaznamenali sme dĺžku reprodukčnej periódy až 10 mesiacov, nakoľko sme mali k dispozícii veľkú reprezentatívnu vzorku odchytených samíc hrdziaka lesného. Gravidné samice sme pozorovali aj v zimnom období, kedy bolo v decembri odchytených 87 samíc, z ktorých 4,6% bolo gravidných (čo predstavuje 4 samice). Gravidné samice sme zaznamenali od marca do decembra, t.j. dĺžku rozmnožovacieho obdobia sme stanovili na 284 dní. Frekvencia gravidity F = 3,32, čo znamená, že sledované samice hrdziaka lesného sú počas jedného roka až 3,32 krát gravidné. Priemerný počet mláďat na dospelú samicu počas sezóny je 15,6. Regresnou štatistikou sme zisťovali závislosť medzi hmotnosťou, resp. dĺžkou tela a počtom embryí v maternici gravidných samíc *Myodes glareolus*. Zistili sme pozitívnu závislosť medzi hodnotami somatických znakov (hmotnosti a dĺžky tela) a počtom zárodkov v materniciach gravidných samíc. Počet embryí v maternici gravidných samíc *Myodes glareolus* sa mení v závislosti od nadmorskej výšky. Najskôr nastáva mierny nárast zo 4,5 v nížinnom stupni na 4,8 v kolinnom a submontánnom stupni a potom pozvoľný pokles počtu embryí až na 4,1 v subalpínskom stupni. V dôsledku dostatočného materiálu gravidných samíc *Myodes glareolus* zo všetkých 6 hypsografických stupňov Slovenska sme mohli vyhodnotiť trvanie reprodukčného obdobia (začiatku a konca reprodukčnej sezóny) v jednotlivých hypsografických stupňoch. Zistili sme, že s rastom nadmorskej výšky sa dĺžka rozmnožovacieho obdobia hrdziaka lesného skracuje z 10 mesiacov v nížinnom a kolinnom stupni na 5 mesiacov v subalpínskom stupni.

APPENDIX

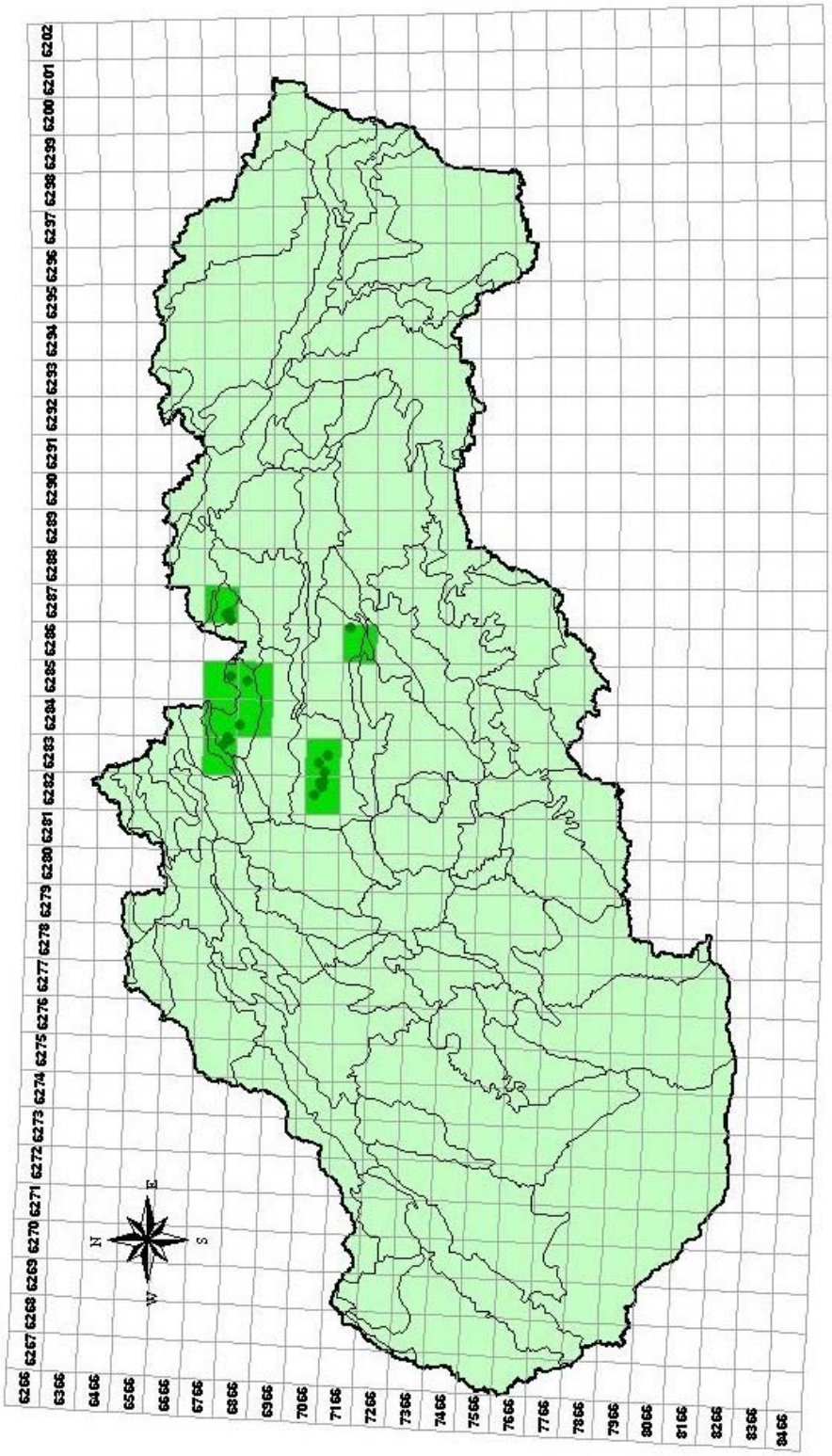
Appendix 1: Orographic units of Slovakia
Appendix 2: Distribution of *Chionomys nivalis* in Slovakia (in squares of Fauna Databank of Slovakia)
Appendix 3: Distribution of *Microtus tatricus* in Slovakia (in squares of Fauna Databank of Slovakia)
Appendix 4: Distribution of *Microtus subterraneus* in Slovakia (in squares of Fauna Databank of Slovakia)
Appendix 5: Distribution of *Myodes glareolus* in Slovakia (in squares of Fauna Databank of Slovakia)



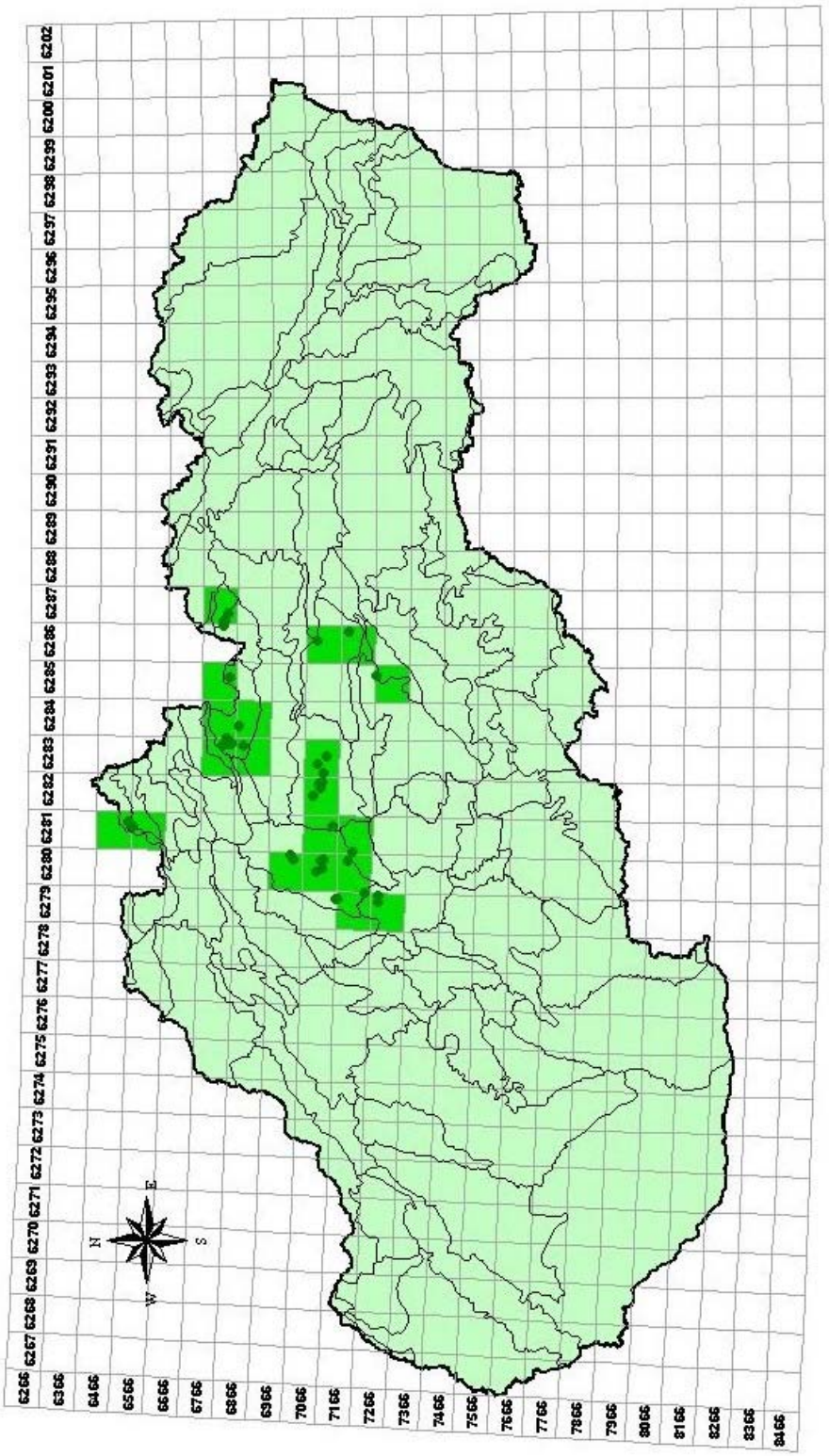
Appendix 1: Orographic units of Slovakia

Legend to the map of orographic units of Slovakia

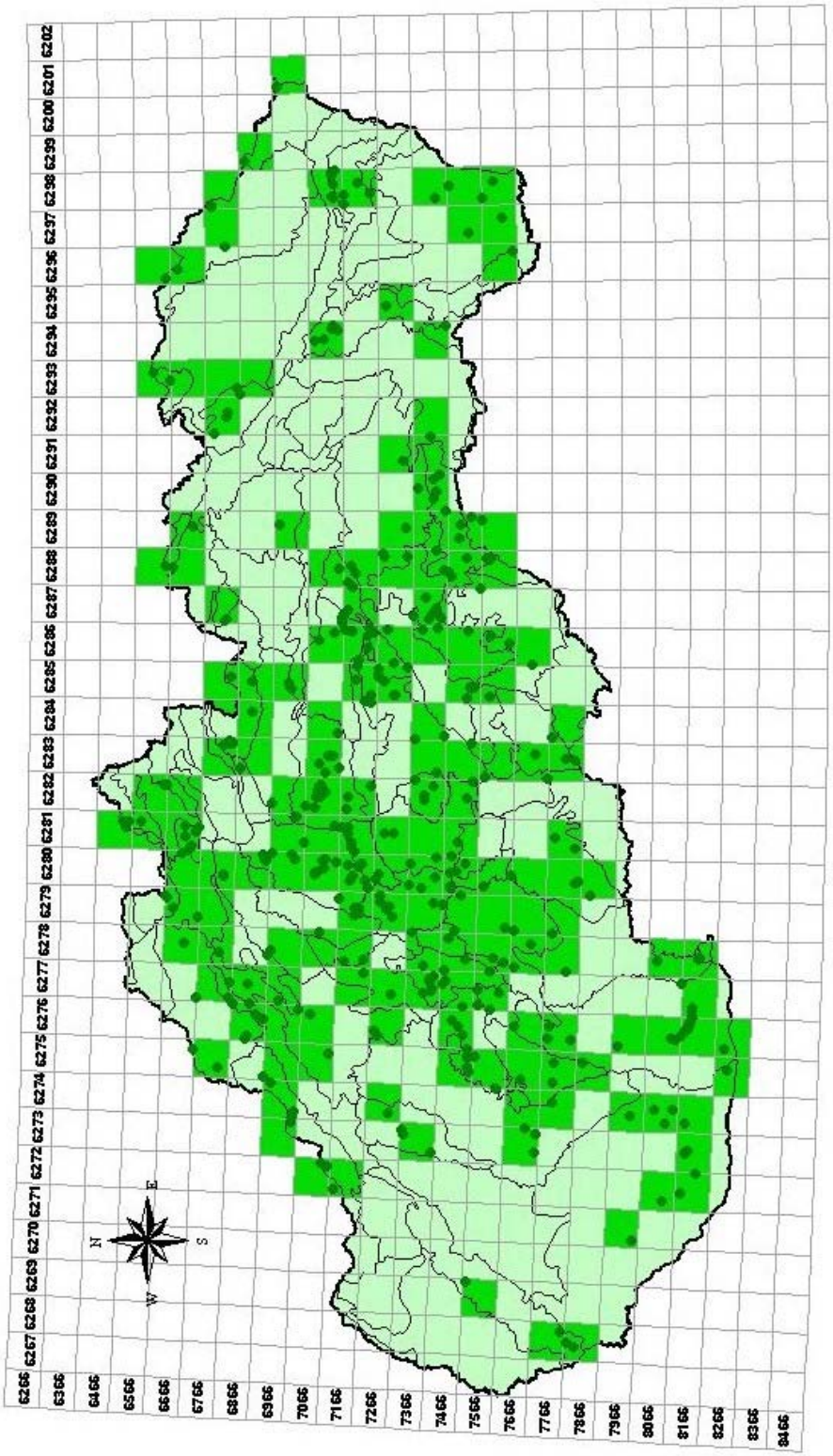
Code	Name	Code	Name	Code	Name
10	Veporské vrchy Mts.	280	Vtáčnik Mts.	570	Podbeskydská vrchovina Highlands
21	Muránska planina Mts.	290	Pohronský Inovec Mts.	580	Oravská Magura Mts.
22	Slovenský raj Mts.	300	Štiavnické vrchy Mts.	590	Oravská vrchovina Highlands
30	Stolické vrchy Mts.	310	Kremnické vrchy Mts.	600	Pieniny Mts.
40	Revúcka vrchovina Highlands	320	Poľana Mts.	610	Ľubovnianska vrchovina Highlands
50	Rožňavská kotlina Basin	330	Ostrôžky Mts.	620	Čergov Mts.
60	Slovenský kras Mts.	340	Javorie Mts.	630	Oravská kotlina Basin
70	Volovské vrchy Hills	350	Krupinská planina Plateau	640	Skorušinské vrchy Hills
80	Čierna hora Mts.	360	Zvolenská kotlina Basin	650	Podtatranská brázda Furrow
90	Malé Karpaty Mts.	370	Pliešovská kotlina Basin	660	Spišská Magura Mts.
100	Považský Inovec Mts.	380	Žiarska kotlina Basin	670	Levočské vrchy Hills
110	Tribeč Mts.	391	Ipeľská kotlina Basin	680	Bachureň Mts.
120	Strážovské vrchy Mts.	392	Lučenská kotlina Basin	690	Spišsko-šarišské medzihorie Basin
130	Žiar Mts.	393	Rimavská kotlina Basin	700	Šarišská vrchovina Highlands
140	Malá Fatra Mts.	400	Košická kotlina Basin	710	Vihorlatské vrchy Hills
150	Veľká Fatra Mts.	410	Bodvianska pahorkatina Hills	720	Bukovské vrchy Hills
160	Starohorské vrchy Hills	420	Burda Mts.	730	Busov Mts.
170	Chočské vrchy Hills	430	Cerová vrchovina Highlands	740	Ondavská vrchovina Highlands
181	Západné Tatry Mts.	440	Slanské vrchy Mts.	750	Laborecká vrchovina Highlands
182	Vysoké Tatry Mts.	450	Zemplínske vrchy Hills.	760	Beskydské predhorie Piedmont
183	Belianske Tatry Mts.	460	Biele Karpaty Mts.	770	Borská nížina Lowland
190	Nízke Tatry Mts.	470	Javorníky Mts.	780	Chvojnická pahorkatina Hills
200	Kozie chrbty Highland	480	Myjavská pahorkatina Hills	790	Podunajská rovina Flat
210	Branisko Hill	490	Považské Podolie Mts.	801	Trnavská pahorkatina Hills
220	Žilinská kotlina Basin	500	Moravsko-sliezske Beskydy Mts.	802	Nitrianska pahorkatina Hills
230	Hornonitrianska kotlina Basin	510	Turzovská vrchovina Highlands	803	Žitavská pahorkatina Hills
240	Turčianska kotlina Basin	520	Jablunkovské medzihorie Highlands	804	Hronská pahorkatina Hills
251	Liptovská kotlina Basin	530	Kysucké Beskydy Highlands	805	Ipeľská pahorkatina Hills
252	Popradská kotlina Basin	540	Kysucká vrchovina Highlands	810	Východoslovenská pahorkatina Hills
260	Hornádska kotlina Basin	550	Oravské Beskydy Mts.	820	Východoslovenská rovina Flat
270	Horehronské Podolie Basin	560	Podbeskydská brázda Furrow	900	Dolnomoravský úval Lowland



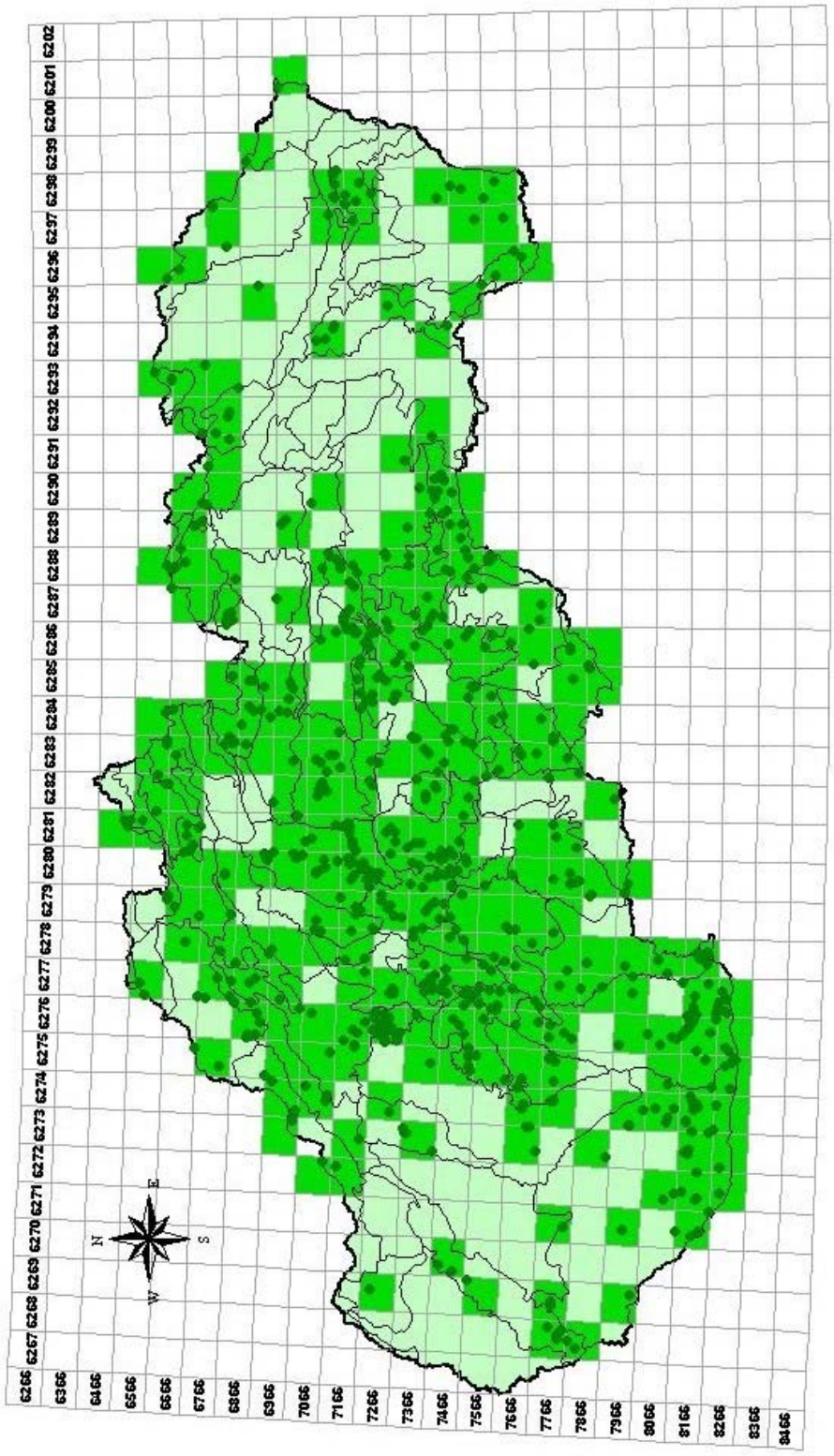
Appendix 2: Distribution of *Chionomys nivalis* in Slovakia (in squares of Fauna Databank of Slovakia)



Appendix 3: Distribution of *Microtus tatricus* in Slovakia (in squares of Fauna Databank of Slovakia)



Appendix 4: Distribution of *Microtus subterraneus* in Slovakia (in squares of Fauna Databank of Slovakia)



Appendix 5: Distribution of *Myodes glareolus* in Slovakia (in squares of Fauna Databank of Slovakia)

Authors: Mgr. Ivan Baláž, PhD., RNDr. Michal Ambros, PhD.
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