Mites (Acari: Mesostigmata) of the family Ascidae of Slovakia

Stanislav Kalúz & Peter Fenďa

Institute of Zoology
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Mites (Acari: Mesostigmata) of the family Ascidae of Slovakia

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Abstract: Altogether 35 species, belonging to the family Ascidae have been reliably recorded from the Slovak territory, four of them *Arctoseius resinae* Karg, 1969, *Cheiroseius (Cheiroseius) bryophilus* Karg, 1969, *Leioseius naglitschi* Karg, 1965 and *Zerconopsis apodius* Karg, 1969 were registered from Slovakia for the first time. The species, occurring in Slovakia, are taxonomically included into the genera; *Arctoseius* Sig Thor, 1930, *Asca* v. Heyden, 1826, *Cheiroseius* Berlese, 1916, *Iphidozercon* Berlese, 1903, *Leioseius* Berlese, 1916, *Platyseius* Berlese, 1916, *Plesioseius* Evans, 1960 and *Zerconopsis* Hull, 1918.

Within all samples, collected from 44 geomorphological units, the mites within the family Ascidae were registered in 374 sampling sites. The sampling sites involved various biocenoses, habitats and microhabitats from lowlands to mountains. Mites were obtained from different substrates (including the nests) and by an individual collation.

History of the taxonomical studies on the family Ascidae presents the information on the development of the knowledge of this mite group both in Europe and Slovakia, and the oppinions on the classification of the family, genera and species.

Vertical distribution of the species is based on the occurrence of the species in hypsographic zones in Slovakia from planar to supramountain zones. The ascide species mainly occur in lower altitudes and the detailed attention is devoted to their occurrence in various ecosystems and biocenoses within lower situated hypsographic zones.

The ecology of Ascidae is presented taking into account their basic ecological requirements e.g. occurring of the species in various types of biocenoses, habitats and microhabitats, their habitat preference, share of the occurrence of separate species within one habitat, the affinity to the nests of various birds and mammals, food requirements and also notes on the phoresy.

Geographic anylyse is based on the recent knowledge of the occurrence of representatives of the family Ascidae from both Slovakia and other areas of the world. The knowledge on the distribution of Ascidae in Slovak territory is presented and a short overview on the chorology includes the species with better known zoogeographic distribution in Europe. A straightforward tables show the ecological and also chorological classifications of the species elaborated.

The identification keys in the paper reflect the external morphological characters of the females. The keys include the genera and species recorded from Slovakia only, and the illustrations of the characters used in the keys, are based on original drawings.

The species diagnoses involve the detailed descriptions of external morphological characters on dorsal and ventral sides of species including some morphological variations of the taxons. Altogether 80 figures present the morphology of Ascidae The synonyms and the basic relevant taxonomical literature are also included. At the same time the information on the species involves the basic measurments of the body and setae, short ecological requirements, geographic and vertical distribution, habitat preference and information on the occurrence of the species in Slovakia.

The occurrence and the distribution of Slovak representatives of the family Ascidae in Slovak territory is presented using the grid mapping system of "The Database of the Fauna of Slovakia" and altogether 18 plates give the information on the occurrence of separate species in Slovakia.

The terminology of external morphological characters and the diagnostical numbering of setae, used in the paper, follow the papers of Evans (1958) and Karg (1993). This terminology has been later widely applied by many other authors. Some important characters are also used from the paper of Bregetova (1977).

During the identification process of mite specimens the keys of Karg (1993) and Bregetova (1977) were mainly used and the characters in these keys were critically compared. The identification keys in the paper were partially compiled from the above mentioned papers of Karg (1993) and Bregetova (1977). However, a new combinations and characters, making the identification process more precise and effective, were included into the identification keys (and to the species diagnoses) resulting from the morphology of Slovak mite material.

Key words: Acari, Ascidae, Mesostigmata, mites, ecology, fauna, Slovakia, taxonomy

Introduction

The aim of this work is to contribute to the knowledge on gamaside mites in Slovakia. Like previous compiled publications on soil mites, this work deals with another group of mesostigmatic mites, the family Ascidae, generally less studied family of the gamaside mites. The contribution to the knowledge is focussed on the faunistics and the ecological requirements of separate species inhabiting various biocenoses and habitats in different hypsogaraphic zones in the territory of Slovakia. Mainly, the detailed analyse of habitats and microhabitats reflects the occurrence of the species of Slovak ascids in various life conditions. At the same time the elucidation of more exact external morphology of Slovak representatives (described in figures) is presented, the practical and an effective identification keys are given. The contribution also regards to the chorological aspects of Ascidae in Slovakia.

Ascidae have been known populating various biocenoses, microhabitats and habitats, but they are generally involved into soil inhabiting mites. Taking into account the body size, they are belonging to rather small mites in comparison to other gamaside families. Some of them use to populate wide spectrum of habitats from drier through mesohygrophilous to the wet ones. Thus, as an edaphic mites, they are considered the species inhabiting humid subsoils, while other species, living mainly in the leaf litter, can belong to epigeic or mesoedaphic representatives. Reflecting the majority of literature facts, the authors classified the representatives of Ascidae mainly as inhabitants of decaying plant material (Karg, 1971, 1993; Bregetova, 1977). During two last centuries the Ascidae have been known mainly from Europe, but more and more new species are described from other areas of the world (Karg, 1994a, 1994b, 1996).

History of the study of Ascidae in Slovakia

Resulting from their scarcity, the mites within the family Ascidae did not belong to well studied groups of mites in the past. The first information on ascide mites from Slovakia (former Tekovská župa district) came from the paper of Willmann (1938), when the author described the species *Cheiroseius viduus* (Willmann, 1938) as *Episeiella heteropoda* Willmann, 1938. Another information on mites from family Ascidae can be found in the paper of Mrciak (1963), when the first finding of the species *Cheiroseius curtipes* (Halbert, 1923) appeared. The species was published from Ondavská vrchovina highlands as *Episeius ovaspini = Seius curtipes*. After nearly twenty yers a new generation of acarologists started to study various families of mesostigmatic mites in Slovak teritory, both parasitic and soil mites. Ambros (1983, 1990) and Ambros et al. (1985) during the study of parasitic mites on small mammals found out ascide mites in Veľká Fatra Mts and in South Slovakia.

Systematic studies of the parasitefauna of small mammals in East Slovakia brought a new information on the representatives of the family Ascidae, occasionally occurring on the hair of captured small mammals or in their burrows. In the papers of Stanko (1987, 1998a, 1998b, 1995) and Stanko et al. (1992) the occurrence of Ascidae was registered from Volovské vrchy Mts., Slovenské rudohorie Mts., Slánske vrchy Mts. and Východné Karpaty Mts.

Further studies, focussing the attention on parasites or inhabintants of birds' nests on trees and shrubs were done by Ambros et al. (1992), Fenďa & Schniererová (2004), Fenďa et al. (1998), Krištofík et al. (2001, 2002, 2005), Krumpál et al. (1998, 2001) and Mašán & Országhová (1995). Mite fauna from birds' nests situated on ground in mainly littoral zones of lakes and ponds has been better known thanking to studies of Fenďa & Schniererová (2005), when very interesting findings of Ascidae in specific conditions appeared and a new ecological requirements of some species were elucidated. Very interesting acarofauna, including the representatives of the family Ascidae, was studied from the winter nests of the commom mole *Talpa europaea* from western part of Malé Karpaty Mts. (Mašán et al., 1994).

The basic ecological studies on soil acarofauna in floodplain forests of South-West Slovakia resulted from an expected changes in hydrological regime of the river Danube after its damming into the by-pass canal. This monitory research taking into accout the study of various groups of fauna in floodplain area, was also focussed on soil mites. The papers, resulted from several years of this research, brought an extensive material of soil mites including some species of Ascidae from willow-poplar forests (Kalúz, 1994a, 1994b, 1995b, 1997b). During the following years a similar research originated in the floodplain of the river Morava, regarding to restoration of river arms and the neighbouring biocenoses in this very interesting and valuable area. While in the floodplain of Danube the attention was focussed on soil mites in forests, the floodplain of the river Morava besides softwood and hardwood forests involves very rich spectrum of various meadow habitats. Such, there was a unique possibility to study and to compare the acarofauna both in forests and meadows (Kalúz, 1999; Kalúz & Čarnogurský, 2000).

Missing data on some ecological requirements of soil mites resulted in the research of the adaptation of soil mites to the irrigation (Kalúz, 1996) and to the mites, populating mainly meadow habitats with different soil moisture (Kalúz, 2003, 2005a). Further fragmentary data were elaborated in papers bringing faunistic records on mesostigmatic mites from Slovakia and Ascidae appeared among a new members of Slovak acarofauna (Fenďa, 1999, 2002; Kalúz, 1993b and Mašán, 2001). In 1998 a new ascide species belonging to the genus *Zerconopsis* was described as *Zerconopsis slovacus* Mašán, 1998 from South-West Slovakia.

Arable soils used to be not very attractive from the aspect of the study of soil acarofauna. Anthropogenously influenced agrocenoses are inhabited by reduced spectrum of soil mites. However, some species from the family Ascidae can populate these artificial habitats and have been regularly found there. Therefore, the knowlwdge, contributing to the faunistics and ecology mainly of the genera *Arctoseius* and *Leioseius* in Slovakia appeared in the papers of Čarnogurský et al. (1994) and Kalúz (1994c, 1994d), including the study of the activity of soil mites in arable soils of South-West Slovakia. The same study was done in East- South Slovakia, when Kováč et al. (1999) studied soil mites in various types of agrocenoses. In both cases the representatives of the family Ascidae were observed in various types of arable soils and some new information on their faunistics and ecology appeared.

Caves create a specific living conditions for many groups of soil arthropods including mites. Unfortunately, fragmentary information on soil mites from Slovak caves is still available. However, the effort of the research in Slovak caves resulted in interesting findings of several ascids (Fenďa & Košel, 2004; Kováč et al., 2002). Moreover, soil mites were studied in the conditions of temperature inversion in the soil of the chasm of Slovenský kras karst (Kalúz, 1993a). Another papers, dealing also with the mites from family Ascidae in carst areas of Slovakia, were presented by Kalúz (1992, 1994e, 1995a, 1998, 2001). The results included the occurrence of mites in the soil of forest-steppe biotopes, xerophilous habitats, pastures, littoral zones and marshlands in the carst area of South Slovakia.

The systematic research of soil mites in differrent orographic units in Slovakia concerned also mountain areas. Such, the information on mites within the family Ascidae from Malá Fatra Mts. were presented in the papers of Kalúz (1997a) and Kalúz & Žuffa (1986). Another contribution to the mountain acarofauna (Kalúz & Žuffová, 1989), brought more information also on representatives of the family Ascidae in various mountain habitats on limestones. North-East Slovakia was less studied from the aspect of soil mite in the past and the results from the study of Bukovské vrchy Mts. (Fenďa & Mašán, 2003) substantially contributed to the knowledge of acarofauna in this part of Slovakia.

Xerophilous forest-steppe habitats with very interesting acarofauna in South-West Slovakia were studied by Kalúz (2005b) and the results updated the information on the faunistics and ecology of Ascidae.

Several papers exist, dealing with the phoresy of mites on various groups of insects. But, the phoresy of Ascidae on arthropods in Slovakia has still been practically unknown. The only paper of Mašán & Országh (1994) brings the first information on the occurrence of ascide mite *Iphidozercon gibbus* Berlese, 1903 phoretic on bitting midge *Culicoides obsoletus* (Diptera) from South-West Slovakia.

One paper of Sidor (1986) brings the information on the occurrence of one representative of Ascidae *Arctoseius butleri* (Hughes, 1948) from untypical place - horse stables in South-Western Slovakia.

Untill recent altogether 36 reliable or doubtful species of the family Ascidae, belonging into eight genera, have been recorded from Slovak territory:

Asca aphidioides (Linnaeus, 1758), *Asca bicornis* (Canestrini & Fanzago, 1887), *Arctoseius butleri* (Hughes, 1948), *Arctoseius semiscissus* (Berlese, 1892), *Arctoseius cetratus* (Sellnick, 1940), *Arctoseius insularis* (Willmann, 1952), *Arctoseius magnanalis* Evans, 1958, *Arctoseius venustulus* (Berlese, 1917), *Arctoseius eremitus* (Berlese, 1918), *Arctoseius brevichelis* Karg, 1969, *Arctoseius pristinus* Karg, 1962, *Arctoseius resinae* Karg, 1969, *Arctoseius minutus* (Halbert, 1915), *Cheiroseius (Posttrematus) unguiculatus* (Berlese, 1887), C*heiroseius (Posttrematus) necorniger* (Oudemans, 1903), *Cheiroseius (Posttrematus) cassiteridium* (Evans & Hyatt, 1960), *Cheiroseius (Posttrematus) curtipes* (Halbert, 1923), *Cheiroseius (Posttrematus)*

salicorniae (Willmann, 1949), *Cheiroseius (Posttrematus) longipes* (Willmann, 1951), *Cheiroseius (Posttrematus) mutilus* (Berlese, 1916), *Cheiroseius (Posttrematus) serratus* (Halbert, 1915), *Cheiroseius (Cheiroseius) viduus* C. L. Koch, 1839, *Cheiroseius (Cheiroseius) borealis* (Berlese, 1904), *Cheiroseius (Cheiroseius) bryophilus* Karg, 1969, *Iphidozercon gibbus* Berlese, 1903, *Leioseius bicolor* (Berlese, 1918), *Leioseius elongatus* Evans, 1958, *Leioseius minusculus* Berlese, 1905, *Leioseius naglitschi* Karg, 1965, *Platyseius subglaber* (Oudemans, 1903), *Plesioseius major* (Halbert, 1923), *Plesioseius italicus* (Berlese, 1905), *Zerconopsis apodius* Karg, 1969, *Zerconopsis remiger* (Kramer, 1876), *Zerconopsis muestairi* (Schweizer, 1949) and *Zerconopsis slovacus* Mašán, 1998.

Missidentification of the mites published mainly in older papers is possible due to unavailable material for the revision of the species (lost or destroyed material). The available material from older research was revised. Missidentifications, caused by older unprecise and uncomplete identification keys, and by a small numbers of mite material for the comparison, were corrected (mainly in the genus *Cheiroseius*). The corrections are stated in the text within the faunistic data of relevant species.

Basic taxonomic publications

No compiled taxonomic works on the family Ascidae exist from the Slovak teritory. However, separate taxonomic papers with the new described species appeared (Willmann, 1938; Mašán, 1998), bringing a new descriptions in the genus *Cheiroseius*. Koch (1839) and Berlese (1910), as ones of the first authors dealing also with Ascidae, had provided more or less comleted descriptions of the species. However, the attention of the authors, devoted to the taxonomy of the family Ascidae in later decades, resulted from the need to elaborate as precise as possible identification keys. This was done mainly in western Europe. Compiled works, dealing with the taxonomy of mesostigmatic mites and also with ascids were elaborated in several countries. These papers, including taxonomy and identification keys of Ascidae appeared mainly in Central Europe. Willmann (1949), Stammer (1961), Bernhard (1963) and Karg (1969, 1971, 1981, 1993) contributed to the systematics, taxonomy and ecology of this mite family in Germany. Schweizer (1961) studied soil mites including Ascidae in Switzerland, while Evans (1958, 1963) elaborated mite material from the collections of the British Museum and revised the material of British Ascidae. Eastern acarological school included mainly the Russian acorologists. Compiled paper on mesostigmatic mites, involving also the taxonomy and identification keys of Aceoseijdae (=Ascidae) elaborated Bregetova (1977) from the former Soviet Union. Another paper appeared in Latvija (Lapinija, 1976) and several other acarologists contributed to the taxonomy of Ascidae, describing a new species from mainly Asian part of the former Soviet Union. Recently a new descriptions of the representatives of the family Ascidae have been presented by Karg (1994a, 1994b, 1996), Petrova & Makarova (1991), Gwiazdowicz (2001, 2003a, 2003b) and Gwiazdowicz & Lakomy (2002). Another authors devoted the attention to the descriptions of the species and also to the revision of this family from the other parts of the world (Halliday, Walter & Lindquist, 1998).

Material and Methods

This chapter provides the basic information on the division of the paper, where the introductory part shows the history and the aspects of study of the family Ascidae in Slovakia. At the same time this part surveys faunistic and compiled taxonomic papers from Europe, reflecting the progress in the knowledge of the mite species and genera within the family Ascidae. The Collection list presents all collection sites ordered alphabetically according to the orographic units and the data of the collection, following the years, months and the days of the collection from older to the newest. The following information is in the chapters dealing with the chorology, zoogeographic origin of the species, vertical and regional distribution of representatives of the family Ascidae in Slovakia. At the same time, the ecological requirements of the species are presented in details, their preference of the habitats and an ecological adaptations within a wide spectrum of inhabited sites from very current to the specfic.

The systematic part includes a synopsis of the family Ascidae in Slovakia. This part presents the list of the species, identification keys to the genera and species of Ascidae from Slovakia, based on external morphological characters of the adult mites (females). Species diagnosis with detailed external morphological characters, geographic distribution, vertical distributiom and ecological requirements are presented in each species, following by original drawings of the species (drawn by S. Kalúz). In unavailable species (or damaged specimens) the figures are taken from the relevant literature. In each species both sides (dorsal and ventral) are described in details. The maps of geographic distribution of each species occurring in Slovakia are presented in Plates.

The collation of the mites was based on field research from various areas of Slovakia. The mites were collected mainly by quantitative methods and by individual collection. The individual collection included specific habitats (under stones, under bark of dead tree trunks, pieces of wood), when the mites were collected by pinset with wetted tips and then preserved in tube with 70% ethylalcohol. The quantitative methods involved various types of heterogenous samples and the sifting of the litter. The extraction was used in consistent subsoils (substrates), soil with or without grass rhisosphere, decaying plant remnants, leaf litter, soils from wet, alluvial and littoral habitats, various types of bird nests (on ground, bush, trees), moss and wooden detritus, mouldering wood. Shifting was used in leaf and needle litter and in some types of nests.

Mites from soil samples and from other suitable substrates were extracted using modified photo-thermoeclectors of the Tullgren type, provided by 60-Watt bulbs, during minimally 72 hours. The extracted material was continuously preserved in 70% ethylacohol. The specimens were mounted into permanent microscopic slides using Liquide de Swanne and identified microscopically.

The information on each species, presented in the paper, includes the species diagnosis with detailed external morphological characteristics, original drawings (or exceptionally taken from literature), basic taxonomic literature, the list of synonyms (if exist), short survey of ecological requirements, geographic and vertical distribution. Then, the data on the occurrence of the species from Slovakia are presented (orographic unit, locality, date of the collection, number of specimens, collector or relevant literature source and/or other supporting information).

Among the material included into paper there are the specimes from the field research and the information from published literature from Slovakia. The mites from the collections (if accessible) were re-identified and revised. The names of incorrectly identified species are given in systematic part (in each relevant species) within the survey of revised data. The information on dubious data is also added.

The maps of the distribution of each species with verified occurrence in Slovakia are pre-

sented in the Plates. This is schematically shown in the grid maps of the "Database of the Fauna of Slovakia." This grid mapping system enables to locate each occurrence of the species into altogether 100 mapping squares, covering the territory of Slovakia. Each grid square is defined by 4-digit numbers, where the two first ones mean the northern latitude and two following digits mean the eastern longitude. Such, each mapping square presents 6' of the northern latitude and 10' of eastern longitude. Each of grid squares with the size 11 x 12 km can be divided into 4 smaller sectors (a - d).

Diagnostic characteristics of the family Ascidae, the genera and species were used from the literature and from own study of the material examined. The majority of taxonomic characters were taken mainly from the papers of EVANS (1958), KARG (1993) and BREGETOVA (1977). Some additional characters were taken from other relevant papers, listed in the References. The basic morphological chaetotaxy is depicted in the Fig. 1 and follows the chaetotaxy used in the paper of KARG (1993). Another more detailed characters are also taken from the paper of BREGETOVA (1997) and depicted in the Figs. 2 - 6, using the original material of mites, collected in Slovakia. Each species is depicted including dorsal and ventral side. The presented lengths of the bodies or setae of the mites are taken from mite material, originally found in Slovakia. The original size of each mite is presented in the figures.

Collection list

Mites from the family Ascidae were collected from 44 geomorphological units of the territory of Slovakia. In the Collection list the geomorphological units are arranged alphabetically reflecting the names of the units and then the dates of collections are stated chronologically within each unit. The same pattern is presented in the systematic part.

Belianske Tatry Mts.

2.8.2004 Dolina siedmich prameňov valey, spruce forest, litter; 956 m a. s. l. [DFS: 6787, leg. S. Kalúz];

Borská nížina lowland

11.6.1986 Plavecké Podhradie village - forest of *Pinus silvestris*, sandy soil, 186 m a. s. l. [DFS: 7569, leg. S. Kalúz]
12.8.1992 Vysoká pri Morave village - *Salici-Populetum*, fluvisoil, soil sample, 141 m a. s. l. [DFS: 7667, leg. S. Kalúz]
6.5.1993 Veľké Leváre village, Borová - sandy dune with *Pinus silvestris*, soil sample, 162 m a. s. l. [DFS: 7467, leg. S. Kalúz]
8.6.1993 Veľké Leváre village, Borová - sandy dune with *Pinus silvestris*, soil sample, 162 m a. s. l. [DFS: 7467, leg. S. Kalúz]
21.7.1993 Veľké Leváre village, Borová - sandy dune with *Pinus silvestris*, soil sample, 162 m a. s. l. [DFS: 7467, leg. S. Kalúz]
27.9.1993 Veľké Leváre village, Borová - sandy dune with *Pinus silvestris*, soil sample, 162 m a. s. l. [DFS: 7467, leg. S. Kalúz]
15.5.1996 Vysoká pri Morave village - *Salici - Populetum*, soil samples; 142 m a. s. l. [DFS: 7667, leg. S. Kalúz];
28.6. 1995 Vysoká pri Morave village - *Salici-Populetum*, fluvisoil, soil sample, 141 m a. s. l. [DFS: 7667, leg. S. Kalúz]
13.7.1995 Devínske jazero village - floodplain meadow, soil, 138 m a. s. l. [DFS: 7767, leg. S. Kalúz]
3.8.1995 Devínske jazero village - floodplain meadow, grass, soil sample, 138 m a. s. l. [DFS: 7767, leg. S. Kalúz]
3.8.1995 Devínske jazero village, Šrek - floodplain meadow, soil samples; 138 m a. s. l. [DFS: 7767, leg. S. Kalúz]
3.8.1995 Vysoká pri Morave village - floodplain meadow, soil samples; 142 m a. s. l. [DFS: 7667, leg. S. Kalúz];
13.8.1995 Devínske jazero village - floodplain meadow, grass, soil sample, 138 m a. s. l. [DFS: 7767, leg. S. Kalúz]
2.11.1995 Moravský Ján village - floodplain meadow, soil samples; 156 m a. s. l. [DFS: 7367, leg. S. Kalúz];
15.5.1996 Vysoká pri Morave village - *Salici - Populetum*, soil samples; 142 m a. s. l. [DFS: 7667, leg. S. Kalúz]
26.7.1996 Devínske jazero village, Šrek - floodplain meadow, soil samples; 138 m a. s. l. [DFS: 7767, leg. S. Kalúz]
26.7.1996 Devínske jazero village - floodplain meadow, soil samples; 137 m a. s. l. [DFS: 7767, leg. S. Kalúz]
26.7.1996 Devínske jazero village, Temreis - floodplain meadow, soil samples; 138 m a. s. l. [DFS: 7767, leg. S. Kalúz]
26.7.1996 Devínske jazero village, Temreis - floodplain meadow, grass rhizos-phere with soil; 138 m a. s. l. [DFS: 7767, leg. S. Kalúz]
28.8.1996 Devínske jazero village - floodplain meadow, soil samples; 137 m a. s. l. [DFS: 7667, leg. S. Kalúz];
28.8.1996 Devínske jazero village - floodplain meadow, grass rhizosphere with soil; 137 m a. s. l. [DFS: 7667, leg. S. Kalúz]
28.8.1996 Devínske jazero village, Temreis - floodplain meadow, soil samples; 138 m a. s. l. [DFS: 7767, leg. S. Kalúz]
24.9.1996 Moravský Ján village - Populetum, soil samples; 156 m a. s. l. [DFS: 7368, leg. S. Kalúz]
24.9.1996 Moravský Ján village - *Salici - Populetum*, soil samples; 156 m a. s. l. [DFS: 7467, leg. S. Kalúz]
27.9.1996 Vysoká pri Morave village - *Salici - Populetum*, soil samples; 142 m a. s. l. [DFS: 7667, leg. S. Kalúz]
14.3.1997 Devínske jazero village - wet floodplain meadow, soil sample, rhizosphere of grass; 137 m a. s. l. [DFS: 7667, leg. S. Kalúz]
14.3.1997 Devínske jazero village, Temreis - floodplain meadow, soil samples; 138 m a. s. l. [DFS: 7767, leg. S. Kalúz]
25.4.1997 Devínske jazero village - floodplain meadow, soil samples; 137 m a. s. l. [DFS: 7667, leg. S. Kalúz]
10.5.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]
10.5.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Anser anser* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

10.5.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Circus aeruginosus* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

10.5.1997 Jakubov village, Stará Šutrovňa gravel pit - alder forest, nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

27.5.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), 3 nests of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

27.5.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Aythya ferina* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

27.5.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Aythya fuligula* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

27.5.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Fulica atra* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

30.5.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Aythya ferina* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

25.6.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), 6 nests of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

25.6.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), 6 nests of *Aythya ferina* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

4.7.1997 Devínske jazero village - floodplain meadow, soil samples; 137 m a. s. l. [DFS: 7667, leg. S. Kalúz];

4.7.1997 Devínske jazero village, Temreis - floodplain meadow, soil samples; 137 m a. s. l. [DFS: 7767, leg. S. Kalúz]

23.7.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), 3 nests of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

20.8.1997 Devínske jazero village, Temreis - floodplain meadow, soil samples; 137 m a. s. l. [DFS: 7767, leg. S. Kalúz]

27.8.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

24.9.1997 Jakubov village, Jakubovské rybníky fishponds - littoral reed stand (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

24.9.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition) on island, leaf litter and sandy soil; 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

27.10.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

13.12.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

13.12.1997 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of C*ircus aeruginosus* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

27.1.1998 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

27.1.1998 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Circus aeruginosus* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

25.3.1998 Jakubov village, Jakubovské rybníky fishponds - littoral reed stand (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

28.5.1998 Jakubov village, Jakubovské rybníky fishponds - littoral reed stand (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

3.6.1998 Malacky town, Štvrtý rybník fishpond - littoral reed stand (Phragmition), nest of *Podiceps cristatus* (Aves); 180 m a. s. l. [DFS: 7568, leg. R. Jureček]

23.6.1998 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Fulica atra* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

4.8.1998 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), 2 nests of *Podiceps cristatus* (Aves); 150 m a. s. l. [DFS: 7567, leg. E. Schniererová]

21.8.1998 Jakubov village, Jakubovské rybníky fishponds - littoral reed stand (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

16.10.1998 Jakubov village, Jakubovské rybníky fishponds - littoral reed stand (Phragmition), nest of *Acrocephalus scirpaceus* (Aves); 150 m a. s. l. [DFS: 7567, leg. E. Schniererová]

6.11.1998 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

3.12.1998 Jakubov village, Jakubovské rybníky fishponds - littoral reed stand (Phragmition), nest of *Acrocephalus scirpaceus* (Aves); 150 m a. s. l. [DFS: 7567, leg. E. Schniererová]

10.2.1999 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), 2 nests of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

15.4.1999 Jakubov village, Jakubovské rybníky fishponds - reed stands (Phragmition), nest of *Anas platyrhynchos* (Aves); 150 m a. s. l. [DFS: 7567, leg. P. Fenďa]

24.5.1999 Závod village, NNR Abrod - wet meadow (*Molinietum coerulae*); 153 m a. s. l. [DFS: 7468, leg. S. Kalúz]

25.5.1999 Jakubov village, Jakubovské rybníky fishponds - littoral reed stand (Phragmition), 2 nests of *Fulica atra* (Aves); 150 m a. s. l. [DFS: 7567, leg. E. Schniererová]
25.5.1999 Jakubov village, Jakubovské rybníky fishponds - littoral reed stand (Phragmition), leafs of *Phragmites australis*; 150 m a. s. l. [DFS: 7567, leg. E. Schniererová]
30.6.1999, Závod village, NNR Abrod - wet meadow (Caricetum goodenowi); 152 m a. s. l.. [DFS: 7468, leg. S. Kalúz]
30.6.1999 Závod village, NNR Abrod - wet meadow (*Molinietum coerulae*); 153 m a. s. l. [DFS: 7468, leg. S. Kalúz]
12.7.1999 Jakubov village, Nová Šutrovňa gravel pit - littoral reed stand (Phragmition), nest of *Acrocephalus arundinaceus* (Aves); 146 m a. s. l. [DFS: 7567, leg. E. Schniererová]
1.8.1999 Jakubov village, Nová Šutrovňa gravel pit - littoral reed stand (Phragmition), nest of *Ixobrychus minutus* (Aves); 146 m a. s. l. [DFS: 7567, leg. E. Schniererová]
1.8.1999 Jakubov village, Nová Šutrovňa gravel pit - littoral reed stand (Phragmition), leafs of *Phragmites australis*; 146 m a. s. l. [DFS: 7567, leg. E. Schniererová]
10.8.1999 Závod village, NNR Abrod - swamp meadow; 153 m a. s. l. [DFS: 7468, leg. S. Kalúz]
9.9.1999 Jakubov village, Nová Šutrovňa gravel pit - littoral reed stand (Phragmition), nest of *Ixobrychus minutus* (Aves); 146 m a. s. l. [DFS: 7567, leg. E. Schniererová]
14.9.1999 Závod village, NNR Abrod - wet meadow (*Molinietum coerulae*); 152 m a. s. l. [DFS: 7468, leg. S. Kalúz]
14.9.1999 Závod, NNR Abrod - wet meadow (*Molinietum coerulae potentiletosum albae*); 152 m a. s. l. [DFS: 7468, leg. S. Kalúz]
29.9.1999 Závod village, NNR Abrod - wet *Molinietum coerulae*; 152 m a. s. l. [DFS: 7468, leg. S. Kalúz]
13.10.1999 Jakubov village, Jakubovské rybníky fishponds - littoral reed stand (Phragmition), leafs of *Phragmites australis*; 150 m a. s. l. [DFS: 7567, leg. E. Schniererová]
3.11.1999 Jakubov village, Jakubovské rybníky fishponds - littoral reed stand (Phragmition), leafs of *Phragmites australis*; 150 m a. s. l. [DFS: 7567, leg. E. Schniererová]
24.5.2000 Závod village, Dúbrava forest - acacia forest (*Robinia pseudoacacia*), moss and sand; 156 m a. s. l. [DFS: 7467, leg. P. Fenďa]
24.5.2000 Závod village - *Piceeto-Quercetum*, sandy soil, litter; 199 m a. s. l. [DFS: 7467, leg. S. Kalúz]
26.9.2002 Studienka village - *Piceetum*, sandy soil, soil detritus; 212 m a. s. l.. [DFS: 7468, leg. S. Kalúz]
26.9.2002 LakĻarská N. Ves village - *Piceetum*, sandy soil, soil detrit, moss; 216 m a. s. l. [DFS: 7469, leg. S. Kalúz]
26.9.2002 Borský MikulášĻ village - *Piceetum*, sandy soil, soil detrit, moss; 218 m a. s. l. [DFS: 7369, leg. S. Kalúz]
27.9.2002 Plavecký Štvrtok village - *Piceeto-Quercetum*, sandy soil, litter; 196 m a. s. l. [DFS: 7668, leg. S. Kalúz]
27.9.2002 Malacky town - *Piceeto-Quercetum*, sandy soil, litter; 184 m a. s. l. [DFS: 7568, leg. S. Kalúz]
12.11.2003 Šaštín-Stráže village, Gazárka - xerothermic meadow, rhizosphere of grass with sand; 175 m a. s. l. [DFS: 7368, leg. P. Fenďa]
12.11.2003 Šaštín-Stráže village, Zváčov mlyn - ruderal meadow, rhizosphere of grass with sand; 180 m a. s. l. [DFS: 7368, leg. P. Fenďa]
13.11.2003 Sekule village, Mláky lake - xerothermic meadow, rhizosphere of grass with sand; 150 m a. s. l. [DFS: 7368, leg. P. Fenďa]
24.9.2005 Borský Jur village - *Piceeto-Quercetum*, sandy soil, litter; 210 m a. s. l. [DFS: 7368, leg. S. Kalúz]

Bukovské vrchy Mts.

19.6.1998 Nová Sedlica village, dolina Zbojského potoka valley - mesophilous pasture, rhizosphere of grass with soil; 441 m a. s. l. [DFS: 6901, leg. P. Fenďa]
19.6.1998 Nová Sedlica village, dolina Zbojského potoka valley - herbaceous vegetation (*Petasites sp.*) along brook; 441 m a. s. l. [DFS: 6901, leg. P. Fenďa]
20.6.1998 Uličˇ village, Pri starej tehelni - bank of gravel pit, moss; 270 m a. s. l. [DFS: 7000, leg. P. Fenďa]
20.6.1998, Nová Sedlica village - mesophilous pasture, rhizosphere of grass with soil; 441 m a. s. l. [DFS: 6901, leg. P. Fenďa]
6.6.1999 Nová Sedlica village, dolina Zakasárenského potoka valley - mesophilous pasture, rhizosphere of grass with soil; 480 m a. s. l. [DFS: 6901, leg. P. Fenďa]
6.6.1999 Nová Sedlica village, dolina Zbojského potoka valley - marshland, wet moss and soil; 470 m a. s. l. [DFS: 6901, leg. P. Fenďa]
7.6.1999 Kolbasov village, Kýčera Mt. - xerothermic meadow, rhizosphere of grass with soil; 340 m a. s. l. [DFS: 7000, leg. P. Fenďa]
7.6.1999 Uličˇ village, Ulička river - gravel banks of the river, rhizosphere of grass with sand; 240 m a. s. l. [DFS: 7000, leg. P. Fenďa]
8.6.1999 Nová Sedlica village, NNR Stužica, Príkry Mt. - fir-beech forest (*Abieti-Fagetum*), leaf litter and raw humus; 825 m a. s. l. [DFS: 6901, leg. P. Fenďa]

9.6.1999 Stakčín village, Ruské settlement - marshland, wet moss and soil; 580 m a. s. l. [DFS: 6800, leg. P. Fenďa]
10.6.1999 Kolbasov village, NNR Bzaná - meadow with solitery trees (*Pyrus sp., Carpinus betulus, Corylus avellana*), leaf litter and soil; 400 m a. s. l. [DFS: 6900, leg. P. Fenďa]
10.6.1999 Kolbasov village, NNR Bzaná - subxerophile meadow, rhizosphere of grass with soil; 400 m a. s. l. [DFS: 6900, leg. P. Fenďa]
10.6.1999 Runina village - bank of brook, rhizosphere of grass with soil; 560 m a. s. l. [DFS: 6900, leg. P. Fenďa]
11.6.1999 Zboj village, Stinská slatina bog - marshland, wet moss; 680 m a. s. l. [DFS: 6901, leg. P. Fenďa]
11.6.1999 Uličské Krivé village, NNR Rožok - beech forest (*Fagion sylvaticae*), leaf litter and soil detritus; 480 m a. s. l. [DFS: 7000, leg. P. Fenďa]
21.9.1999 Nová Sedlica village, Grófske chyžky fishpond - littoral reed stand (Phragmition), wet moss and soil; 620 m a. s. l. [DFS: 6900, leg. P. Fenďa]
21.9.1999 Nová Sedlica village, Riaba skala Mt. - mountain meadow, rhizosphere of grass with soil; 1167 m a. s. l. [DFS: 6800, leg. P. Fenďa]
21.9.1999 Runina village, Žurkovec Mt. - fir-beech forest (*Abieti-Fagetum*), leaf litter and soil detritus; 1188 m a. s. l. [DFS: 6800, leg. P. Fenďa]
22.9.1999 Zboj village, Oblazy - alder forest with *Fraxinus sp*., rhizosphere of herbs with soil; 310 m a. s. l. [DFS: 6900, leg. P. Fenďa]
23.9.1999 Nová Sedlica village, NNR Stužica, Kamenistý potok - fir-beech forest (*Abieti-Fagetum*), old *Fomes fomentarius*; 730 m a. s. l. [DFS: 6901, leg. P. Fenďa]
24.9.1999 Ruský Potok village, pod Poloňom - alluvium of brook, alder forest, soil; 320 m a. s. l. [DFS: 6900, leg. P. Fenďa]
24.9.1999 Ruský Potok village, Kamenistý - mesophilous pasture, rhizosphere of grass with soil; 500 m a. s. l. [DFS: 6900, leg. P. Fenďa]
25.9.1999 Nová Sedlica village, Vrch hrbu Mt. - mesophilous pasture, rhizosphere of grass with soil; 585 m a. s.l. [DFS: 6901, leg. P. Fenďa]
25.9.1999 Nová Sedlica village, Stinská Mt. - fir-beech forest (*Abieti-Fagetum)*, leaf litter and soil detritus; 1030 m a. s. l. [DFS: 6901, leg. P. Fenďa]

Cerová vrchovina highland

1.5.2000 Šiatorská Bukovinka village, railway station - young oak forest (*Quercetum*), rhizosphere of grass with soil; 280 m a. s. l. [DFS: 7884, leg. P. Fenďa]

Hronská pahorkatina wold

25.5.2002 Mochovce village, Dobrica Mt. - xerophile forest-steppe, rhizosphere of grass with soil; 320 m a. s. l. [DFS: 7776, leg. P. Fenďa]
10.4.2003 Chotín village, NNR Chotínske piesky - acacia forest (*Robinia pseudoacacia*), rhizosphere of grass with sand; 116 m a. s. l. [DFS: 8175, leg. E. Kalivodová]

Ipeľská pahorkatina wold

8.12.1981 Žemberovce village - vineyard, pitfall trap; 290 m a. s. l. [DFS: 7778 , leg. S. Kalúz]

Jablunkovské medzihorie wold

28.12.1985 Svrčinovec village - apple tree alley, nest of *Fringilla sp.* (Aves); 450 m a. s. l. [DFS: 6578, leg. D. Cyprich]

Košická kotlina basin

15.8.1989 Haniská village - pine forest, nest of *Turdus pilaris* (Aves); 200 m a. s. l. [DFS: 7393, leg. M. Krumpál]

Kozie chrbty Mts.

9.7.2003 Svit town, Tabličky saddleback - glade in montane spruce forest (*Piceetum abietinum*) with solitery beeches (*Fagus sylvaticus*), rhizosphere of grass and soil; 1,060 m a. s. l. [DFS: 6986, leg. P. Fenďa]
10.7.2003, Vikartovce village, Závozy forest - mesophilous pasture, rhizosphere of grass and soil; 860 m a. s. l. [DFS: 6986, leg. P. Fenďa]

Krupinská planina plateau

25.5.2001 Plášťovce village - Quercetum, xerophile forest-steppe, soil samples; 325 m a. s. l. [DFS: 7879, leg. S. Kalúz]
26.5.2001 Ipeľské Úľany village - *Quercetum*, leaf litter, detritus; 357 m a. s. l. [DFS: 7880, leg. S. Kalúz]
26.5.2001 Medovarce village - *Quercetum*, xerophile forest-steppe, soil samples ; 366 m a. s. l. [DFS: 7780, leg. S. Kalúz]

Kysucké Beskydy Mts.

1.7.1997 Nová Bystrica village, Chmúra bog - transition mire, moss; 700 m a. s. l. [DFS: 6680, leg. P. Fenďa]

Laborecká vrchovina highland

31.10.1998 Palota village, Starý stavenec forest - montane spruce forest (*Vaccinio-Piceetum*), nest of *Aquila pomarina* (Aves) on fir (*Abies alba*); 580 m a. s. l. [DFS: 6798, leg. S. Siryová]

Levočské vrchy Mts.

7.5.2000 Levoča town, Levočská dolina valley - alluvium of brook, growth of *Petasites sp.*, soil; 560 m a. s. l. [DFS: 6989, leg. P. Fenďa]

Liptovská kotlina basin

22.6.2001 Pribilina village, Záhatie - mesophilous pasture, rhizosphere of grass and soil; 820 m a. s. l. [DFS: 6884, leg. P. Fenďa]

Malá Fatra Mts.

24.10.1996 Štefanová village, NNR Rozsutec - *Fagetum*, soil litter, moss; 965 m a. s. l. [DFS: 6780, leg. S. Kalúz].
16.9.1991 Šútovská dolina valley - forest of *Picea abies*, leaf litter and soil detritus; 900 m a. s. l. [DFS: 6880, leg. S. Kalúz]
29.7.1996 Terchová village, Štefanová settlement - spruce forest, nest of *Sylvia sp.* (Aves); 700 m a. s. l. [DFS: 6780, leg. M. Krumpál]
24.10.1996 Štefanová village, NNR Rozsutec - *Fagetum*, leaf litter and soil detritus; 965 m a. s. l. [DFS: 6780, leg. S. Kalúz]

Malé Karpaty Mts.

30.5.2000, Bratislava city, Botanical garden - park, nest of *Sturnus vulgaris* (Aves) from nest box; 135 m a. s. l. [DFS: 7868, leg. K. Sobeková]
23.8. 2000 Bratislava, Devín, NNR Devínska Kobyla - *Querceto-Crataegetum*, forest steppe, rhizosphere of grass, litter; 360 m a. s. l. [DFS: 7868, leg. S. Kalúz].
23.8. 2000, Bratislava, Devín, NNR Devínska Lesostep - *Querceto-Crataegetum*, forest steppe, rhizosphere of grass, litter; 185 m a. s. l. [DFS: 7868, leg. S. Kalúz].
20.4.2001 Bratislava, Devín, valley above village - *Quercetum*, leaf litter, moss; 375 m a. s. l. [DFS: 7867, leg. S. Kalúz];
15.5.2001, Bratislava, Devín, valley above village - *Quercetum*, leaf litter, soil; 380 m a. s. l. [DFS: 7867, leg. S. Kalúz];

26.6.2002 Bratislava, Kamzík - mesohygrophilous *Quercetum*, leaf litter, soil detritus, 350 m a. s. l. [DFS: 7868, leg. S. Kalúz]
2.5.2004 Bratislava city, NNR Devínska Kobyla, Pod Devínskou Kobylou crossroad - xerothermic forest steppe with oak (*Quercus sp.*), leaf litter and soil detritus; 250 m a. s. l. [DFS: 7867, leg. P. Fenďa]
31.7.2004 Višňové village, Višňovská dolina valley, planina Nezo plateau - xerothermic forest steppe, rhizosphere of grass with soil; 380 m a. s. l. [DFS: 7272, leg. P. Fenďa]
14.7.2005 Bratislava, Kamzík - mesohygrophilous *Quercetum*, leaf litter, soil; 360 m a. s. l. [DFS: 7868, leg. S. Kalúz];
21.7.2005 Bratislava, Rača - mesohygrophilous *Quercetum*, leaf litter, soil; 345 m a. s. l. [DFS: 7768, leg. S. Kalúz].

Myjavská pahorkatina wold

13.7.1997 Stará Turá town, Dubník basin - oak-hornbeam forest (*Querco-Carpinetum*), leaf litter and soil detritus; 280 m a. s. l. [DFS: 7272, leg. P. Fenďa]

Nízke Tatry Mts.

22.6.2005 Brusno village, Sopotnická dolina valey - bank of creek with *Alnus incana, Picea abies,* leaf litter, soil; 810 m a. s. l. [DFS: 7182, leg. S. Kalúz];
24.6.2005 Čierny Váh - Ipoltická dolina valey, mountain spruce forest, leaf litter and soil; 790 m a. s. l. [DFS: 7085, leg. S. Kalúz];
23.6.2005 Dolina Čierneho Váhu valey - mountain spruce forest, leaf litter and soil; 766 m a. s. l. [DFS: 6985, leg. S. Kalúz];
25.6.2005 Liptovská Tepličkа village - submountain meadow, grass rhizosphere with soil; 925 m a. s. l. [DFS: 7086, leg. S. Kalúz].

Ondavská vrchovina highland

9.7.2002 Zborov village, Zborovská slatina - transition mire, rhizosphere of grass with soil; 345 m a. s. l. [DFS: 6693, leg. P. Fenďa]

Oravská kotlina basin

10.7.2001 Suchá Hora village, NR Rudné - peat bog, wet moss; 760 m a. s. l. [DFS: 6684, leg. P. Fenďa]
11.7.2001 Bobrov village, Poľanový Kriváň - transition mire, moss and moist soil; 620 m a. s. l. [DFS: 6583, leg. P. Fenďa]
13.7.2001 Trstená town, NR Surdíky - moorgrass bog in pine forest (*Pinus sylvestris*), moss; 620 m a. s. l. [DFS: 6583, leg. P. Fenďa]

Oravská vrchovina highland

21.7.1989 Nižná town, pod Lučivným vrchom - spruce forest, nest of *Turdus merula* (Aves); 670 m a. s. l. [DFS: 6683, leg. A. Trnka]

Oravské Beskydy Mts.

11.7.2001 Mútne village, Hraničný Kriváň - peat - bog, 760 m a. s. l. [DFS: 6482, leg. J. Čarnogurský]

Pieniny Mts.

29.6.1999 Červený Kláštor village, NNR Prielom Dunajca, Sedem mníchov Mt. - river gravel bank (*Epilobio-Myricarietum*), soil; 445 m a. s. l. [DFS: 6588, leg. L. Kováč]

20.5.1981 Most na Ostrove village - agrocenose, white beet , pitfall trap, 136 m a. s. l. [DFS: 7869, leg. S. Kalúz]
11.6.1981 Most na Ostrove village - agrocenose, white beet , pitfall trap, 136 m a. s. l. [DFS: 7869, leg. S. Kalúz]
10.9.1981 Most na Ostrove village - agrocenose, white beet , pitfall trap, 136 m a. s. l. [DFS: 7869, leg. S. Kalúz]
7.7.1982 Vydrany village - agrocenose, *Triticum durum*, soil sample 132 m a. s. l. [DFS: 7971, leg. S. Kalúz]
11.10.1982 Vydrany village - agrocenose, *Triticum durum*, soil sample 132 m a. s. l. [DFS: 7971, leg. S. Kalúz]
14.3.1983 Vydrany village - agrocenose, *Triticum durum,* soil sample, 132 m a. s. l. [DFS: 7971, leg. S. Kalúz]
14.4.1983 Vydrany village - agrocenose, *Triticum durum*, soil sample, 132 m a. s. l. [DFS: 7971, leg. S. Kalúz]
14.6.1983 Vydrany village - agrocenose, *Triticum durum*, soil sample, 132 m a. s. l. [DFS: 7971, leg. S. Kalúz]
16.8.1983 Vydrany village - agrocenose, *Triticum durum*, soil sample, 132 m a. s. l. [DFS: 7971, leg. S. Kalúz]
22.9.1993 Dobrohošť village, Dunajské Kriviny - willow-poplar flood-plain forest (*Salici-Populetum*), soil sample, soil detritus; 122 m a. s. l. [DFS: 8070, leg. S. Kalúz]
13.10.1983 Vydrany village - agrocenose, *Triticum durum*, soil sample, 132 m a. s. l. [DFS: 7971, leg. S. Kalúz]
16.11.1983 Vydrany village - agrocenose, *Triticum durum*, soil sample, 132 m a. s. l. [DFS: 7971, leg. S. Kalúz]
18.4.1984 Vydrany village - agrocenose, *Triticum durum*, soil sample, 132 m a. s. l. [DFS: 7971, leg. S. Kalúz]
14.6.1984 Svätý Jur town, NNR Šúr - fish-pond, littoral reed stand (Phragmition), nest of *Anas platyrhynchos* (Aves) on water level; 131 m a. s. l. [DFS: 7769, leg. D. Cyprich]
11.6.1985 Svätý Jur town, NNR Šúr - wet alder forest (*Alnion glutinosae*), nest of *Chloris chloris* (Aves); 130 m a. s. l. [DFS: 7769, leg. D. Cyprich and M. Krumpál]
11.6.1985 Svätý Jur town, NNR Šúr - wet alder forest (*Alnion glutinosae*), nest of *Turdus merula* (Aves); 130 m a. s. l. [DFS: 7769, leg. D. Cyprich and M. Krumpál]
19.1.1986 Vojka nad Dunajom village - willow-poplar flood-plain forest (*Salici-Populetum*), nest of *Chloris chloris* (Aves); 123 m a. s. l. [DFS: 8070, leg. D. Cyprich and M. Krumpál]
17.4.1986 Svätý Jur town, NNR Šúr - wet alder forest (*Alnion glutinosae*), nest of *Anas platyrhynchos* (Aves); 130 m a. s. l. [DFS: 7769, leg. D. Cyprich and M. Krumpál]
17.4.1989 Gabčíkovo village, Istragov - floodplain forest (*Salici-Populetum*), soil sample, litter; 118 m a. s. l. [DFS: 8171, leg. S. Kalúz]
20.7.1989 Gabčíkovo village, Istragov - floodplain forest (*Salici-Populetum*), soil sample, litter; 118 m a. s. l. [DFS: 8171, leg. S. Kalúz]
20.7.1989 Trstená na Ostrove, Kráľovská lúka - floodplain forest (*Salici-Populetum* with *Leucojum aestivum*), soil sample, litter; 122 m a. s. l. [DFS: 8070, leg. S. Kalúz]
14.10.1991 Bodíky village, Bodícka brána - floodplain forest (*Salici-Populetum*), soil sample, litter; 123 m a. s. l. [DFS: 8070, leg. S. Kalúz]
27.4.1992 Gabčíkovo town, Istragov - floodplain forest (*Salici-Populetum* with *Leucojum aestivum*), soil sample, litter; 118 m a. s. l [DFS: 8171, leg. S. Kalúz]
10.8.1992, Gabčíkovo town, Istragov - floodplain forest (*Salici-Populetum* with *Leucojum aestivum*), soil sample, litter; 118 m a. s. l [DFS: 8171, leg. S. Kalúz]
26.8.1992 Bodíky village, Bodícka brána - floodplain forest (*Salici-Populetum*), soil sample, litter; 123 m a. s. l. [DFS: 8070, leg. S. Kalúz];
2.12.1992 Gabčíkovo town, Istragov - floodplain forest (*Salici-Populetum*), soil detritus, 118 m a. s. l [DFS: 8171, leg. S. Kalúz]
21.4.1994 Bodíky village, Bodícka brána - floodplain forest (*Salici-Populetum*), soil sample, litter; 123 m a. s. l. [DFS: 8070, leg. S. Kalúz]
25.11.1994 Dobrohošť village, Dunajské Kriviny - willow-poplar flood-plain forest (*Salici-Populetum*), nest of *Passer montanus* (Aves) from nest box; 122 m a. s. l. [DFS: 8070, leg. D. Cyprich and M. Krumpál]
25.11.1994 Dobrohošť|village, Dunajské Kriviny - willow-poplar flood-plain forest (*Salici-Populetum*), combined nest of *Passer montanus* and *Martes sp.* (Aves, Mammalia) from nest box; 122 m a. s. l. [DFS: 8070, leg. D. Cyprich and M. Krumpál]
25.11.1994 Dobrohošť village, Dunajské Kriviny - willow-poplar flood-plain forest (*Salici-Populetum*), combined nest of *Parus major* and *Apodemus sp.* (Aves, Mammalia) from nest box; 122 m a. s. l. [DFS: 8070, leg. D. Cyprich and M. Krumpál]
30.11.1994 Bodíky village, Bodícka brána - floodplain forest (*Salici-Populetum*), soil sample, litter; 123 m a. s. l. [DFS: 8170, leg. S. Kalúz]
17.6.1995 Čičov village, Čičovské mŕtve rameno arm - littoral reed stand (Phragmition), nest of *Porzana parva* (Aves); 112 m a. s. l. [DFS: 8272, leg. P. Rác]
18.6.1995 Gabčíkovo village, Malé Vranie forest - littoral reed stand (Phragmition) of Danube river, nest of *Acrocephalus arundinaceus* (Aves); 115 m a. s. l. [DFS: 8171, leg. D. Cyprich]
4.12.1995 Dobrohošť village, Dunajské Kriviny - willow-poplar flood-plain forest (*Salici-Populetum*), nest of *Sturnus vulgaris* (Aves) from nest box; 122 m a. s. l. [DFS: 8070, leg. D. Cyprich and M. Krumpál]
4.12.1995 Dobrohošť village, Dunajské Kriviny - willow-poplar flood-plain forest (*Salici-Populetum*), nest of Sturnus sp. (Aves) from nest box; 122 m a. s. l. [DFS: 8070, leg. D. Cyprich and M. Krumpál]
4.12.1995 Dobrohošť village, Dunajské Kriviny - willow-poplar flood-plain forest (*Salici-Populetum*), nest of *Turdus sp.*

(Aves) from nest box; 122 m a. s. l. [DFS: 8070, leg. D. Cyprich and M. Krumpál]
23.6.1997 Čičov village, Lyon - littoral reed stand (Phragmition), nest of *Acrocephalus arundinaceus* (Aves); 114 m a. s. l. [DFS: 8272, leg. D. Cyprich]
23.6.1997 Čičov village, Lyon - littoral reed stand (Phragmition), 2 nests of *Ixobrychus minutus* (Aves); 114 m a. s. l. [DFS: 8272, leg. D. Cyprich]
4.6.1998 Svätý Jur town, NNR Šúr - fish-pond, littoral reed stand (Phragmition), 2 nests of *Fulica atra* (Aves) on water level; 131 m a. s. l. [DFS: 7769, leg. D. Cyprich]
4.6.1998 Svätý Jur town, NNR Šúr - fish-pond, nest of Passeriformes (Aves) on bush; 131 m a. s. l. [DFS: 7769, leg. D. Cyprich]
10.6.1998 Svätý Jur town, NNR Šúr - fish-pond, littoral reed stand (Phragmition), 4 nests of *Fulica atra* (Aves) on water level; 131 m a. s. l. [DFS: 7769, leg. D. Cyprich]
10.6.1998 Svätý Jur town, NNR Šúr - fish-pond, littoral reed stand (Phragmition), 2 nests of *Cygnus olor* (Aves) on water level; 131 m a. s. l. [DFS: 7769, leg. D. Cyprich]
6.8.1998 Svätý Jur town, NNR Šúr - fish-pond, littoral reed stand (Phragmition), nest of *Cygnus olor* (Aves) on water level; 131 m a. s. l. [DFS: 7769, leg. D. Cyprich]
6.8.1998 Svätý Jur town, NNR Šúr - fish-pond, littoral reed stand (Phragmition), nest of *Fulica atra* (Aves) on water level; 131 m a. s. l. [DFS: 7769, leg. D. Cyprich]
4.3.1999 Svätý Jur town, NNR Šúr - wet alder forest (*Alnion glutinosae*), nest of *Passer montanus* (Aves) from nest box; 130 m a. s. l. [DFS: 7769, leg. K. Sobeková]
16.6.1999 Čičov village, Čičovské mŕtve rameno arm - littoral reed stand (Phragmition), nest of *Acrocephalus arundinaceus* (Aves); 112 m a. s. l. [DFS: 8272, leg. P. Rác]
16.6.1999 Čičov village, Čičovské mŕtve rameno arm - littoral reed stand (Phragmition), nest of *Emberiza schoeniclus* (Aves); 112 m a. s. l. [DFS: 8272, leg. P. Rác]
27.7.1999 Svätý Jur town, NNR Šúr - wet alder forest (Alnion glutinosae), nest of *Passer montanus* (Aves) from nest box; 130 m a. s. l. [DFS: 7769, leg. K. Sobeková]
1.3.2000 Svätý Jur town, NNR Šúr - wet alder forest (*Alnion glutinosae*), nest of *Passer montanus* (Aves) from nest box; 130 m a. s. l. [DFS: 7769, leg. K. Sobeková]
7.3.2001 Svätý Jur town, NNR Šúr - park, nest of *Passer montanus* (Aves) in nest-box; 140 m a. s. l. [DFS: 7769, leg. K. Sobeková]
2.10.2001 Bratislava city, NNR Ostrov Kopáč - xerothermic forest steppe, nest of *Lullula arborea* (Aves); 131 m a. s. l. [DFS: 7968, leg. P. Rác]

Považský Inovec Mts.

9.6.1998 Kálnica village - beech forest, nest of *Aquila heliaca* (Aves); 215 m a. s. l. [DFS: 7273, leg. J. Chavko]

Revúcka vrchovina highland

18.9.1999 Ružiná village, Ružiná reservoir - littoral reed stand (Phragmition), nest of *Acrocephalus arundinaceus* (Aves); 350 m a. s. l. [DFS: 7583, leg. E. Schniererová]

Rimavská kotlina basin

29.5.2004 Rimavská Sobota env. - *Quercetum*, leaf litter, soil; 364 m a. s. l. [DFS: 7685, leg. S. Kalúz]
29.5.2004 Gemerská Panica village - forest-steppe habitat (*Querceto-Crataegetum)*, leaf litter, soil; 410 m a. s. l. [DFS: 7587, leg. S. Kalúz]

Slovenský kras karst

6.5.1987 Silica village - NPR Pod Fabiankou, *Alnetum-glutinosae*; 603 m a. s. l. [DFS: 7489, leg. S. Kalúz]
27.7.1987 Silica village, Jašteričie jazierko lake - bank, pasture, rhizosphere of grass; 607 m a. s. l. [DFS: 7489, leg. S. Kalúz],
27.7.1987 Silica, Silická ľadnica cave - slope of chasm, humus; 590 m a. s. l. [DFS: 7489, leg. S. Kalúz]
27.7.1987 Silica, NNR Pod Fabiankou - marsh habitat with *Stellario-Alnetum-glutinosae, Filipendulo-Caricetum buekii*; 603 m a. s. l. [DFS: 7489, leg. S. Kalúz]
16.9.1987 Silica village, Jašteričie jazierko lake - bank, pasture, grass; 607 m a. s. l. [DFS: 7489, leg. S. Kalúz]
16.9.1987 Silica, NNR Pod Fabiankou - marsh habitat with *Stellario-alnetum-glutinosae, Filipendulo-Caricetum buekii*; 603 m a. s. l. [DFS: 7489, leg. S. Kalúz]
21.10.1987 Silica village, Jašteričie jazierko lake - bank, pasture, grass; 607 m a. s. l. [DFS: 7489, leg. S. Kalúz]

12.9.2003 Krásnohorská Dlhá Lúka village, Krásnohorská jaskyňa cave - cave, pitfall trap; 340 m a. s. l. [DFS: 7389, leg. Ľ. Kováč]
12.9.2003 Krásnohorská Dlhá Lúka village, Krásnohorská jaskyňa cave - cave, guano; 340 m a. s. l. [DFS: 7389, leg. Ľ. Kováč]
12.9.2003 Krásnohorská Dlhá Lúka village, Krásnohorská jaskyňa cave - cave, bait; 340 m a. s. l. [DFS: 7389, leg. Ľ. Kováč]
27.5.2004 Kečovo village, NR Domické škrapy - xerothermic steppe, slope with well prepared limestone rocks, rhizosphere of grass with soil and moss; 410 m a. s. l. [DFS: 7588, leg. P. Fenďa]
28.5.2004 Hrušov village, Jablonovské sedlo saddleback, western slope - xerothermic forest steppe with juniper (*Juniperus communis*) and solitery maple (*Acer sp.*), leaf litter and soil detritus; 560 m a. s. l. [DFS: 7389, leg. P. Fenďa]

Slovenský raj Mts.

14.6.1999 Hrabušice village, Ružová jaskyňa cave - cave, bait; 723 m a. s. l. [DFS: 7088, leg. V. Košel]
1.8.1999 Spišské Tomášovce village, Tomášovská jaskyňa cave - cave, guano and wood detritus; 570 m a. s. l. [DFS: 7088, leg. V. Košel]
22.10.1999 Spišské Tomášovce village, Čertova jaskyňa cave - cave, bait; 620 m a. s. l. [DFS: 7088, leg. V. Košel]
25.10.1999 Hrabušice village, Kláštorná jaskyňa cave - cave, bait; 653 m a. s. l. [DFS: 7088, leg. V. Košel]
25.10.1999 Hrabušice village, Ružová jaskyňa cave - cave, bait; 723 m a. s. l. [DFS: 7088, leg. V. Košel]

Starohorské vrchy Mts.

20.8.1990 Staré Hory village, Richtárová valley - spruce forest, nest of *Sylvia sp.* (Aves); 513 m a. s. l. [DFS: 7180, leg. D. Cyprich & M. Krumpál]

Stolické vrchy Mts.

12.9.2003 Tisovec village, Suché doly - mountain spruce forest, leaf litter, soil; 670 m a. s. l. [DFS: 7385, leg. P. Fenďa]

Štiavnické vrchy Mts.

21.6.2004 Čajkov village - *Quercetum,* leaf litter, trunk detrit; 560 m a. s. l. [DFS: 7677, leg. S. Kalúz]
26.6.2005 Čajkov village - *Quercetum,* leaf litter, trunk detrit; 560 m a. s. l. [DFS: 7677, leg. S. Kalúz]
26.6.2005 Krupina village - mesohygrophilous oak forests (*Quercetum)*, leaf litter, trunk detrit; 510 m a. s. l. [DFS: 7680, leg. S. Kalúz]
26.6.2005 Ladzany village - mesohygrophilous oak forest (*Quercetum)*, leaf litter, trunk detrit; 540 m a. s. l. [DFS: 7779, leg. S. Kalúz]
11.6.1998 Dobrá Niva village - pasture with *Quercetum*, leaf litter, grass rhizosphere; 520 m a. s. l. [DFS: 7478, leg. S. Kalúz]

Trnavská pahorkatina wold

10.7.1981 Pezinok village - agrocenose with *Zea mays*, pitfall trap, 165 m a. s. l. [DFS: 7669, leg. S. Kalúz]
15.7.1986 Viničné village - agrocenose with *Zea mays*, soil sample, 192 m a. s. l. [DFS: 7768, leg. S. Kalúz]
1.9.1986 Viničné village - agrocenose with *Zea mays*, soil sample, 192 m a. s. l. [DFS: 7768, leg. S. Kalúz]
10.8.1998 Trnava town, Trnavské rybníky fishponds - littoral reed stand (Phragmition), nest of *Fulica atra* (Aves); 142 m a. s. l. [DFS: 7671, leg. E. Schniererová]

Turčianska kotlina basin

20.6.2003 Turčianske Teplice town, Háj settlement, nad Somolickým potokom - mountain hay meadow, rhizosphere of grass with soil; 535 m a. s. l. [DFS: 7179, leg. P. Fenďa]

Turzovská vrchovina highland

2.7.1997 Korňa village, Korniansky ropný prameň - mountain hay meadow with solitery limes (*Tilia sp.*), sifting of leaf litter and soil detritus; 550 m a. s. l. [DFS: 6577, leg. P. Fenďa]
2.7.1997 Korňa village, Korniansky ropný prameň - mountain hay meadow, rhizosphere of grass with soil; 550 m a. s. l. [DFS: 6577, leg. P. Fenďa]

Veľká Fatra Mts.

30.5.1985 Smrekovica, NNR Skalná Alpa - *Fageto-Aceretum*, leaf litter and soil detritus; 1220 m a. s. l. [DFS: 7081,leg. S. Kalúz]
3.7.1985 Smrekovica, NNR Skalná Alpa - *Acereto-Piceetum*, leaf litter and soil detritus; 1405 m a. s. l. [DFS: 7081, leg. S. Kalúz]
3.7.1985 Smrekovica, NNR Skalná Alpa - *Fageto-Aceretum*, leaf litter and soil detritus; 1260 m a. s. l. [DFS: 7081, leg. S. Kalúz]
3.7.1985 Smrekovica, NNR Skalná Alpa - *Fageto-Piceetum*, leaf litter and soil detritus; 1270 m a. s. l. [DFS: 708, leg. S. Kalúz]
7.8.1985 Smrekovica, NNR Skalná Alpa - *Acereto-Piceetum*, leaf litter and soil detritus; 1405 m a. s. l. [DFS: 7081, leg. S. Kalúz]
7.8.1985 Smrekovica, NNR Skalná Alpa - *Fageto-Aceretum*, leaf litter and soil detritus; 1260 m a. s. l. [DFS: 7081, leg. S. Kalúz]
7.8.1985 Smrekovica, NNR Skalná Alpa - *Fageto-Piceetum*, leaf litter and soil detritus; 1270 m a. s. l. [DFS: 7081, leg. S. Kalúz]
7.8.1985 Smrekovica, NNR Skalná Alpa - *Fageto-Aceretum*, leaf litter and soil detritus; 1260 m a. s. l. [DFS: 7081, leg. S. Kalúz]
7.8.1985 Smrekovica, NNR Skalná Alpa - *Fageto-Aceretum*, leaf litter and soil detritus; 1220 m a. s. l. [DFS: 7081, leg. S. Kalúz]
4.9.1985 Smrekovica, NNR Skalná Alpa - *Fageto-Aceretum*, leaf litter and soil detritus; 1220 m a. s. l. [DFS: 7081, leg. S. Kalúz]
23.10.1985 Smrekovica, NNR Skalná Alpa - spruce forest with beechs, leaf litter, soil; 1260 m a. s. l. [DFS: 7081, leg. S. Kalúz]

Vihorlatské vrchy Mts.

17.6.2004 Vinné village, NR Viniansky hradný vrch - xerophile forest-steppe, rhizosphere of grass and sand; 260 m a. s. l. [DFS: 7197, leg. P. Fenďa]

Volovské vrchy Mts.

23.10.1999 Poráč village, Poráčska jaskyňa cave - cave, bait; 850 m a. s. l. [DFS: 7190, leg. V. Košel]
26.5.2004 Kováčová village - *Quercetum*, leaf litter, soil; 510 m a. s. l. [DFS: 7390, leg. S. Kalúz]
26.5.2004 Krásnohorské Podhradie village - *Quercetum*, leaf litter, soil; 490 m a. s. l. [DFS: 7389, leg. S. Kalúz]
28.5.2004 Betliar village, park - spruce forest (*Piceetum abietinum)*, leaf litter and soil detritus; 390 m a. s. l. [DFS: 7289, leg. P. Fenďa]

Vtáčnik Mts.

29.6.2004 Ostrý Grúň village, NR Ivanov salaš - mesophile pasture with juniper (*Juniperus communis*), rhizosphere of grass and litter; 910 m a. s. l. [DFS: 7377, leg. P. Fenďa]

Východoslovenská pahorkatina wold

16.6.2004 Úbrež village, Karná forest - oak-hornbeam forest (*Querco-Carpinetum*), leaf litter and soil; 165 m a. s. l. [DFS: 7298, leg. P. Fenďa]
16.6.2004 Jovsa village, NR Jovsianska hrabina - oak-hornbeam forest (*Querco-Carpinetum*), leaf litter and soil detritus; 170 m a. s. l. [DFS: 7198, leg. P. Fenďa]

Východoslovenská rovina lowland

17.6.2003 Leles village - sand dune, rhizosphere of grass and sand; 100 m a. s. l. [DFS: 7598, leg. H. Kalivoda]
17.6.2003 Sirník village - sand dune, rhizosphere of grass and sand; 140 m a. s. l. [DFS: 7496, leg. H. Kalivoda]
17.6.2003 Soľnička village - sand dune, rhizosphere of grass and sand; 110 m a. s. l. [DFS: 7597, leg. H. Kalivoda]
18.6.2003 Veľký Kamenec village, NNR Tarbucka - xerothermic forest steppe, rhizosphere of grass and sand; 140 m a. s. l. [DFS: 7696, leg. H. Kalivoda]
31.5.2004 Malý Horeč village, NR Poniklecová lúčka - xerothermic meadow, rhizosphere of grass with sand; 115 m a. s. l. [DFS: 7597, leg. P. Fenďa]
2.6.2004 Svätuše village - sand dune, rhizosphere of grass with sand; 100 m a. s. l. [DFS: 7597, leg. P. Gajdoš]
2.6.2004 Vojka village - sand dune, rhizosphere of grass with sand; 118 m a. s. l. [DFS: 7597, leg. P. Gajdoš]
2.6.2004 Veľký Kamenec village, Tarbucka Mt., southern slope - xerothermic forest steppe, rhizosphere of grass and sand; 170 m a. s. l. [DFS: 7696, leg. P. Fenďa]

Vysoké Tatry Mts.

3.8. 2004 Stará Lesná village - spruce forest, leaf litter, soil; 935 m a. s. l. [DFS: 6887, leg. S. Kalúz]

Západné Tatry Mts.

10.7.1989 Zuberec village, dolina Studeného potoka valley - spruce forest, nest of *Turdus philomelos* (Aves); 980 m a. s. l. [DFS: 6784, leg. A. Trnka]
16.7.1989 Zuberec village, dolina Studeného potoka valley - spruce forest, nest of T*urdus merula* (Aves); 980 m a. s. l. [DFS: 6784, leg. D. Cyprich and M. Krumpál]

Zemplínske vrchy Mts.

2.6.2004 Ladmovce village, NNR Kašvár - xerothermic forest steppe, rhizosphere of grass and soil; 170 m a. s. l. [DFS: 7596, leg. P. Fenďa]

History of taxonomic classification

The family Ascidae always belonged to the "problematic" families within the mesostigmatic mites. While many gamaside families were well defined many years ago, the taxonomical status of this family, its genera and species has still been discussed among the acarologists. The most known representatives of this family *Asca aphidioides* (Linnaeus, 1758) and *Asca bicornis* (Canestrini & Fanzago, 1887), with other species, described in 19-th century (e.g. *Cheiroseius (Cheiroseius) viduus* C. L. Koch, 1839, *Zerconopsis remiger* (Kramer, 1876)), were species with well defined common morphological characters, distinguishing them from the genera and species, taxonomically belonging to other gamaside famiilies. The family Ascidae was erected by Oudemans (1905) and a newly described species (belonging recently to the family Ascidae) appeared during the following years, mainly in the genera *Arctoseius, Cheiroseius, Leioseius* and *Platyseius*. Contribution to the knowledge of the family Ascidae appeared in the papers of Berlese (1910), Willmann (1938, 1949) and of other authors. But, resulting from wider definition of the family, the taxonomic status of this family was changed several times during the following one hundred years. This was caused by newly described species with problematic taxonomical status and there was a problem to place them into other better defined and more uniform families.

Such, Baker & Wharton (1952) erected and established a new family name Aceosejidae for the representatives included into the former erected family Ascidae. The following research dealing with the family resulted in papers, elaborating some genera and species in more details. Evans (1955) described a new species within the genus *Arctoseius* from Alaska and gave a new and detailed definition of this genus. His following paper (Evans, 1958) brought the revision of the subfamily Aceosejinae from Great Britain and the elucidation of the chaetotaxy of the legs in Gamasina appeared during the next years (Evans, 1963). Practically at the same time Evans & Hyatt (1960) did a revision of the subfamily Platyseiinae. Study on the genus *Arctoseius* (Lindquist, 1961) from Alaska elucidated both some taxonomic and biological aspects in this genus, while the research of forest insects pests (Lindquist, 1971) contributed to the taxonomy of Ascidae, when a new described species enriched the family.

Another taxonomical paper of the authors Lindquist & Evans (1965) substantially contributed to the taxonomy of Gamasina and the taxonomic concept in the family Ascidae with a modified setal nomenclature of the mite body was established.

A new information came from various parts of the world on the taxonomy and the distribution of the species of family Ascidae, when a new species were described from America (De Leon, 1967), Africa and Europe (Hurlbutt, 1963), mainly in the genera *Asca* and *Cheiroseius* (Evans & Hyatt, 1960). Walter, Halliday & Lindquist (1993) revised the genus *Asca* from Australia and described a new species from this region.

Also, the other Australian species of the family Ascidae were revised (Walter, Halliday & Lindquist, 1998). The research in areas, recently practically unknown from the aspect of acarofauna, resulted in more and more facts also on the knowledge of the family Ascidae. Karg (1994a, 1994b, 1996) described a new species within the genera *Asca, Platyseius, Leioseius* and *Cheiroseius* from Galapagos islands and from New Caledonia. Such he confirmes, that the distribution of this family has been much more wider than it was supposed. Moreover, besides strictly taxonomical contribution, the latest mentioned paper brings very interesting taxonomic and ecological information on the species within the *Asca*-groups.

The European papers, dealing with Ascidae, primarily included the knowledge on this group from Central Europe (Schweizer, 1961; Stammer, 1963; Karg, 1969, 1971a, 1981). Another paper on the taxonomy of the wider understood family Aceosejidae (=Ascidae) came from eastern Europe (Lapinija, 1976; Bregetova, 1977) from the countries of the former Soviet

Union. The taxonomic classification of the genera and species within the wider established family Aceosejidae was (and still has been) different and during the last fifty years the authors "moved" these genera and species from family to family (e.g. to Ameroseidae, Phytoseiidae, Rhodacaridae, Antennoseiidae ... and vice versa). A new taxonomical status of the family was needed and the family was taxonomically elaborated by KARG (1965, 1971b, 1993) and newly reerected as the family Ascidae. The new classification is based mainly on morphological characters of gnathosoma and hyphognathum of the genera *Asca, Arctoseius* and *Leioseius*. Another important characters resulting from the ontogeny of the species are on the pygidial parts of the bodies of protonymphs within the genera *Asca, Arctoseius, Cheiroseius, Leioseius* and *Zerconopsis*. This, more clear and uniform classification, recently includes altogether nine genera into the family Ascidae (*Asca, Arctoseius, Cheiroseius, Iphidozercon, Leioseius, Plesioseius, Platyseius, Zercoseius* and *Zerconopsis*) occurring in Europe, eight of them reliably recorded from Slovak territory. This interesting and less known mite family evokes the acarologists to devote the attention to the study of taxonomy, and both a new species (PETROVA & MAKAROVA, 1991; MAŠÁN, 1998; GWIAZDOWICZ, 2003a) and unknown males (GWIAZDOWICZ, 2001, 2003b) are described. This paper is not aimed to solve the taxonomical aspects of the family. But, on our opinion, the family Ascidae has not still been completely elaborated and there is a need of further very intensive studies to establish a reliable taxonomical status of the family, based on phylogeny, onthogeny, morphology and ecology.

Vertical distribution of Ascidae in Slovakia

Hypsographic zones

Vertical zonation in Slovakia reflects very rich territory including areas from lowlands to nival zone in High Tatras. General division involves several hypsographic zones. The overview of the vertical distribution of Ascidae in Slovakia is shown in Tab. 1

Planar zone (up to 200 m a.s.l.)

This zone represents mainly lowlands of south-western and south-eastern parts of Slovakia. The substantial parts of these lowlands are covered by various types of arable soils with d ifferrent agricultural plants. Soft-wood floodplain forest mainly of the types of *Salicetum, Salici--Populetum, Salici-Fraxinetum* are along the rivers Danube, Morava, Ipeľ and Latorica, sometimes combined with wetlands, marshs and floodplain meadows. Another forest types belong to the hard-wood forests occuring there. While very large area of South-West Slovakia on sediments of eolic sandy soils (in Borská nížina lowland) has been covered by pine forests, the oak-hornbeam forests can be mainly found in Podunajská rovina lowland and Východoslovenská nížina lowland.

Mites within the family Ascidae populate various ecosystems and biocenoses in this hypsographic zone. The frequency of the occurrence of species in each ecosystem (biocenose) is shown in details below and the share of the frequency of the species is stated in the brackets.

1. Softwood floodplain forests: Species spectrum there includes altogether 14 representatives of the family Ascidae; *Arctoseius minutus* (5,6 %), *Arctoseius semiscissus* (17,6 %), *Asca aphidioides* (2,9 %), *Cheiroseius borealis* (2,9 %), *Cheiroseius cassiteridium* (2,9 %), *Cheiroseius curtipes* (5,6 %), *Cheiroseius longipes* (5,6 %), *Cheiroseius mutilus* (5,6 %), *Cheiroseius salicorniae* (2,9 %), *Cheiroseius viduus* (11,8 %), *Leioseius bicolor* (23,5 %), *Leioseius minusculus* (5,6 %), *Zerconopsis muestairi* (2,9 %) and *Zerconopsis remiger* (2,9 %).

2. Thermophilous broad-leaved forests: Three species occurred there - *Arctoseius semiscissus* (33 %), *Asca aphidioides* (33 %), *Asca bicornis* (33 %).

3. Parks: This type of anthropogenously formed biocenose loses an original natural features and the species spectrum is poor there. Two species were found - *Leioseius bicolor* (80 %) and *Leioseius minusculus* (20 %).

4. Acidophilous pine forests: This type of forest in SW - Slovakia involves forests on acidophilous eolic sands in Borská nižina lowland and soil mites must be adapted to extreme conditions during the summer (drying), two species were found - *Arctoseius semiscissus* (50 %) and *Asca aphidioides* (50 %).

5. Acacia (*Robinia pseudoacacia*) forests: Despite of unsuitable living conditions for many groups of soil mesofauna in this type of biocenose (poor plant growth, phytoncides in the soil), two species with wide ecological tolerance occurred there - *Asca bicornis* (50 %) and *Leioseius bicolor* (50 %).

6. Floodplain meadows: Relatively big area along the river Morava (less along the river Danube) includes periodically flooded meadows with very rich spectrum of various biocenoses and habitats from wet depressions through mesohygrophilous meadows to small hills with xerophilous vegetation. Richer mite spectrum resulted from this phenomenon and the occurrence of altogether 21 representatives of Ascidae were found out there; *Arctoseius cetratus* (5,6 %), *Arctoseius eremitus* (0,8 %), *Arctoseius minutus* (32, %), *Arctoseius semiscissus* (11,3 %), *Asca aphidioides* (0,8 %), *Asca bicornis* (5,6 %), *Cheiroseius borealis* (2,4 %), *Cheiroseius cassiteridium* (6,4 %), Cheiroseius curtipes (12,9 %), *Cheiroseius longipes* (0,8 %), *Cheiroseius mutilus* (1,6 %), *Cheiroseius necorniger* (1,6 %), *Cheiroseius salicorniae* (0,8 %), *Cheiroseius serratus* (0,8 %), *Cheiroseius viduus* (5,6 %), *Iphidozercon gibbus* (2,4 %), *Leioseius bicolor* (0,8 %), *Leioseius minusculus* (24,2 %), *Plesiosejus italicus* (7,3 %), *Plesiosejus major* (3,2 %) and *Zerconopsis slovacus* (0,8 %).

7. Agrocenoses: Manmade biocenoses created by long term human activities with a poor soil fauna, depending very much on agricultural plants and on the type of natural fertilization. Only resistant species can inhabit the remnants of manure in the soil and among the root system of plants - *Arctoseius cetratus* (90 %), *Asca aphidioides* (5 %), *Leioseius bicolor* (5 %).

8. Mesohygrophilous meadows: Other types of meadows besides floodplain areas occur in Slovak lowlands. Human impact is visible there, however more representatives of family Ascidae can be found there - *Asca aphidioides* (4,8 %), *Asca bicornis* (4,8 %), *Cheiroseius borealis* (4,8 %), *Cheiroseius cassiteridium* (33,3 %), *Cheiroseius curtipes* (4,8 %) and *Leioseius bicolor* (48 %).

9. Xerothermic meadows: Typical mainly for southern parts of Slovak territory, characterized by an extreme conditions and low xerophilous plant growth, sometimes on sandy soils. Due to this two tolerant species as - *Asca bicornis* (66,7 %) and *Leioseius bicolor* (25 %) can inhabit this type of meadow, while the knowledge on ecological requirements of *Leioseius naglitschi* (8,3 %) is still unsufficient.

Colline zone (201-600 m a.s.l.)

This zone involves mainly oak, hornbeam and beech forests, very frequently mixed. Various forest ecosystems and biocenoses from wet to xerophilous can provide wide spectrum of living conditions for many mite species involving the family Ascidae. This zone seems to be suitable for more representatives of soil fauna and altogether 27 species from the family Ascidae can be stated from this zone, both current and scarce - *Arctoseius cetratus* (6,2 %), *Arctoseius eremitus* (3,7 %), *Arctoseius insularis* (1,2 %), *Arctoseius magnanalis* (1,2 %), *Arctoseius minutus* (1,2 %), *Arctoseius pristinus* (1,2 %), *Arctoseius resinae* (1,2 %), *Arctoseius semiscissus* (3,7 %), Ar*ctoseius venustulus* (1,2 %), *Asca aphidioides* (4,9 %), *Asca bicornis* (22,2 %), *Cheiroseius borealis* (4,9 %), *Cheiroseius curtipes* (8,6 %), *Cheiroseius longipes* (1,2 %), *Cheiroseius bryophilus* (1,2 %), *Cheiroseius mutilus* (6,2 %), *Cheiroseius salicorniae* (1,2 %), *Cheiroseius viduus* (2,4 %), *Leioseius bicolor* (8,6 %), *Leioseius elongatus* (1,2 %), *Leioseius minusculus* (1,2 %), *Platyseius subglaber* (1,2 %), *Platyseius sp.* (1,2 %), *Plesiosejus italicus* (1,2 %), *Plesiosejus major* (1,2 %), *Zerconopsis apodius* (1,2 %) and *Zerconopsis remiger* (9,9 %).

Submountain zone (601-900 m a.s.l.)

Mainly beech forests dominate there, however they are sometimes mixed with spruces or fires. Mainly mesohygrophilous mites prefer submountain forests due to sufficient ammount of precipitations and suitable soil moisture. Vertically rich divided terrain with various ecosystems and biocenoses creates very often steep slopes, deep valleys, marshlands and peat-boggs with specific flora and soil fauna involving wide spectrum of current, rare and specific mite species - *Arctoseius brevichelis* (1,7 %), *Arctoseius cetratus* (7,1 %), A*rctoseius magnanalis* (1,7 %), *Arctoseius pristinus* (1,7 %), *Arctoseius semiscissus* (1,7 %), *Arctoseius venustulus* (1,7 %), *Asca aphidioides* (1,7 %), *Asca bicornis* (29,8 %), *Cheiroseius cassiteridium* (1,7 %), *Cheiroseius curtipes* (14 %), *Cheiroseius longipes* (3,5 %), *Cheiroseius mutilus* (1,7 %), *Cheiroseius salicorniae* (1,7 %), *Cheiroseius serratus* (3,5 %), *Cheiroseius unguiculatus* (1,7 %), *Iphidozercon gibbus* (1,7 %), *Leioseius minusculus* (3,5 %), *Platyseius subglaber* (5,3 %), *Platyseius sp.* (5,3 %), *Plesiosejus italicus* (5,3 %) and *Zerconopsis remiger* (3,5 %).

Mountain zone (901-1,200 m a.s.l.)

Predominance of spruce-beech-fir forests is visible there and these forests (monocultures or mixed) are mainly mesohygrophilous. This phenomenon reflects the ammount of precipitation during each year and the soil is rather mildly wet. Shorter vegetational season cannot provide good living conditions for thermophilous mite species. However, more ecologically adapted representatives within the family Ascidae - *Arctoseius brevichelis* (6,3 %), *Arctoseius cetratus* (6,3 %), *Arctoseius eremitus* (6,3 %), *Arctoseius magnanalis* (6,3 %), *Arctoseius pristinus* (6,3 %), *Asca bicornis* (37,5 %), *Cheiroseius borealis* (6,3 %), *Cheiroseius serratus* (6,3 %), *Iphidozercon gibbus* (6,3 %) and *Zerconopsis remiger* (12,6 %) can still be found in this hypsographic zone.

Supramountain zone (1,201-1,550 m a.s.l.)

For this zone the spruce foreste are the most typical, although mixed forests including other

trees, mainly beechs and firs are also present in some areas. Colder climatic conditions with much snow during the winter and higher ammount of precipitation do not allow many mite species to inhabit these types of forests. Only one representative occurred there - *Arctoseius magnanalis*.

Subalpine zone (1,551-1,850 m a.s.l.)

This type of hypsographic zone occurs in northern and central areas of Slovak territory. Subalpine zone depends very much on the timber line, which is sometimes not at the same altitude (resulting from geological, geomorphological and exposition conditions). But the territory above the timber line used to be limited in majority of Slovak mountains. No Ascidae were registered there.

Alpine zone (1,851-2,400 m a.s.l.)

Alpine meadows with various low grasses and sedges are typical for this hypsographic zone, characterized by substantially lower temperature and short vegetational season. No Ascidae were found within this zone.

Nival zone (above 2400 m a.s.l.)

Spots of lichens and low moss occur there, but in Slovakia this zone cannot be fully developed above the permanent snow line. Only the peaks in High Tatras can be included into nival zone. No Ascidae were registered in this hypsographic zone.

Ecology of Ascidae

Basic ecological requirements

Recent knowledge on ecological requirements of the representatives of family Ascidae has been compiled mainly from the literature, where the mites of this family were not preferentially studied. Being rather scarce or rare, these mites used to occurr in samples from field research ocassionally. While representatives of other families of gamaside mites are currently present during the research in many biocenoses and habitats, the ascids generally belong to more specialized mites. A few species can populate wider spectrum of biocenoses and habitats in Slovakia (e.g. *Asca bicornis, Arctoseius semiscissus, Leioseius bicolor*) only. These species regularly occur in forests, meadows, cultivated landscape and in other types of biocenoses. In human influenced landscape the colonization of a new habitats by the species e.g. *Arctoseius cetratus* and *Asca bicornis* is not surprizing, however the presence of organic remnants in the soil is necessary for the life and development of these species. The majority of Ascidae representatives have been considered as detricolous species (Fenďa & Mašán, 2003) and this information comes from both literature and from elaborated material of Acidae from Slovakia. The majority of acarologists, studying gamaside mites, found out, that these mites inhabited most of all decomposed wooden material (Bregetova et al., 1977; Gwiazdowicz & Lakomy, 2002), leaf detritus and decaying plant material (Karg, 1993). The species, preferring wet material can be sometimes found under bark of dead trees (trunks) (Karg, 1993). Some papers from the Slovak territory bring the information on the occurrence of Ascidae on small mammals (Ambros, 1983) or in their winter nests (Mašán et al., 1994). Stanko (1987, 1988a, 1988b, 1995) found

the species *P. subglabe*r and *P. italicus* regularly occurring on captured small mammals in submountain areas of South-East Slovakia. The information on microhabitats of these species is, of course, missing. However, we can suppose, that they could somehow be adapted to the nest material in burrows of small mammals. Even, wide distributed species inhabiting cultivated lowland landscape (*Asca bicornis* or *Arctoseius semiscissus*), require some remnants of decomposed plant material (manure, straw) in the soil.

However, the majority of species belonging to family Ascidae, are really scarce. Despite of their scarcity, there was a possibility of preliminary classification of some of them. Such, according to their occurrence in very wet meadows, peat-boggs and marshlands, the species from the genus *Cheiroseius* (e.g. *Ch. serratus, Ch. unguiculatus*) were classified as edaphic hygrophilous detricoles. The same can be said on more representatives within the genus *Cheiroseius*. Permanently moist places are also populated by the species *Platyseius subglaber, Plesioseius major* and *Plesioseius italicus*. Nevertheless, these species above all prefer the bird nests situated on ground, however situated in the growth of reed bed in wet littoral zones of lakes and ponds (Fenďa & Schniererová, 2004, 2005). Despite of these hygrophilous species another more tolerant ascide mite *Leioseius bicolor* can inhabit drier conditions in the nests of birds, situated on shrubs or plants. Table 2 shows preliminary classification of Ascidae species based on tolerance/sensibility to ecological conditions. However, the knowledge on ecological requirements of the majority of ascids still needs further intensive study.

Slovak territory includes a rich spectrum of various habitats and biocenoses, inhabited by soil mites including the family Ascidae. The information on the occurrence of mites within the family Ascidae from the literature concerned some habitats/microhabitats and substrates from wet to dry. However, more detailed division of habitats, suitable (or preferred by) for ascids in Slovak territory was not known untill recent. From the study of Ascidae in Slovakia a new information appeared on the preference of various habitats. The species composition and the frequency of their occurrence in various types of biocenose and habitats (published and examined material from Slovakia) is stated below.

Preference of biocenoses, habitats and microhabitats

1. Forests

Pine forest on sandy soil: Typical mainly for Borská nížina lowland, the occurrence of two current and tolerant species was visible there - *Arctoseius semiscissus* (16,7%), *Asca aphidioides* (83,3 %).

Pine forest: The same was related to the species spectrum in pine forests on other types of soils, the same species occurred there - *Arctoseius semiscissus* (50 %) and *Asca bicornis* (50 %).

Wilow-poplar floodplain forest (*Salici-Populetum*): Higher numbers of ascide representatives in softwood floodplain forests reflect the terrain specifities (fluvisoils, humidity, depressions, various plants ...) and more species requiring higher soil moisture appeared there - *Arctoseius eremitus* (3,4 %), *Arctoseius insularis* (3,4 %), *Arctoseius minutus* (10,3 %), *Arctoseius semiscissus* (31 %), *Cheiroseius borealis* (3,4 %), *Cheiroseius cassiteridium* (3,4 %), *Cheiroseius curtipes* (6,8 %), *Cheiroseius longipes* (10,3 %), *Cheiroseius mutilus* (3,4 %), *Cheiroseius salicorniae* (3,4 %), *Cheiroseius viduus* (13,8 %), *Leioseius minusculus* (3,4 %) and *Zerconopsis remiger* (3,4 %).

Alnetum: Registered species - *Arctoseius brevichelis* (7,1 %), *Arctoseius cetratus* (7,1 %),

Arctoseius minutus (7,1 %), *Arctoseius pristinus* (7,1 %), *Asca aphidioides* (7,1 %), *Asca bicornis* (7,1 %), *Cheiroseius borealis* (7,1 %), *Cheiroseius curtipes* (21,3 %), *Cheiroseius mutilus* (7,1 %), *Cheiroseius viduus* (7,1 %), *Leioseius minusculus* (14,2 %).

Thermophilous oak forest (*Quercetum*): *Arctoseius magnanalis* (5 %), *Arctoseius resinae* (5 %), *Arctoseius semiscissus* (5 %), *Asca aphidioides* (15 %), *Asca bicornis* (15 %), *Cheiroseius borealis* (5 %), *Zerconopsis apodius* (5 %), *Zerconopsis remiger* (45 %).

Oak-hornbeam forest (*Querceto-Carpinetum*): *Arctoseius cetratus* (12,5 %), *Arctoseius eremitus* (12,5 %), *Asca aphidioides* (12,5 %), *Cheiroseius curtipes* (25 %), *Cheiroseius borealis* (12,5 %), *Leioseius bicolor* (12,5 %), *Zerconopsis remiger* (12,5 %).

Table 1. Vertical distribution of Ascidae in Slovakia

Altitude (m a.s.l.)	0-200	201-600	601-900	901-1,200	1,201-1,550
Cheiroseius unguiculatus			+		
Cheiroseius necorniger	+				
Cheiroseius curtipes	+	+	+		
Cheiroseius salicorniae	+	+	+		
Cheiroseius cassiteridium	+		+		
Cheiroseius serratus	+		+	+	
Cheiroseius longipes	+	+	+		
Cheiroseius mutilus	+	+	+		
Cheiroseius viduus	+	+			
Cheiroseius borealis	+	+		+	
Cheiroseius bryophilus		+			
Platyseius subglaber		+	+		
Plesiosejus major	+	+			
Plesiosejus italicus	+	+	+		
Zerconopsis apodius		+			
Zerconopsis remiger	+	+	+	+	
Zerconopsis muestairi	+				
Zerconopsis slovacus	+				
Iphidozercon gibbus	+		+	+	
Arctoseius semiscissus	+	+	+		
Arctoseius cetratus	+	+	+	+	
Arctoseius magnanalis		+	+	+	+
Arctoseius venustulus		+	+		
Arctoseius eremitus	+	+		+	
Arctoseius brevichelis			+	+	
Arctoseius pristinus		+	+	+	
Arctoseius resinae		+			
Arctoseius insularis		+			
Arctoseius minutus	+	+			
Asca aphidioides	+	+	+		
Asca bicornis	+	+	+	+	
Leioseius minusculus	+	+	+		
Leioseius elongatus		+			
Leioseius naglitschi	+				
Leioseius bicolor	+	+			
Species number (expected)	25	26 (30)	20 (22)	10	1

\+ species registered

Less representatives of the mites from family Ascidae preferred other forest biocenoses:

Stellario-Alnetum-glutinosae: *Arctoseius cetratus* (100 %).
Carpinetum: *Asca bicornis* (100 %).
Fagetum: *Asca bicornis* (20 %), *Cheiroseius mutilus* (20 %), *Leioseius bicolor* (20 %), *Leioseius elongatus* (20 %), *Zerconopsis remiger* (20 %).
Fageto-Aceretum: *Arctoseius cetratus* (50 %), *Arctoseius magnanalis* (50 %).
Fageto-Piceetum: *Arctoseius magnanalis* (33 %), *Asca bicornis* (33 %), *Zerconopsis remiger* (33 %).
Spruce (fir) forest: *Arctoseius cetratus* (6,3 %), *Arctoseius eremitus* (6,3 %), *Arctoseius semiscissus* (6,3 %), *Asca aphidioides* (6,3 %), *Asca bicornis* (44 %), *Cheiroseius borealis* (6,3 %), *Cheiroseius curtipes* (12, 6 %), *Leioseius bicolor* (6,3 %), *Zerconopsis remiger* (6,3 %).
Acereto-Piceetum: *Arctoseius magnanalis* (100 %).
Beech-fir-spruce forest: *Arctoseius brevichelis* (20 %), *Arctoseius magnanalis* (20 %), *Arctoseius venustulus* (20 %), *Asca bicornis* (20 %), *Arctoseius minutus* (20 %).
Xerophilous forest-steppe: Asca aphidioides (16,5 %), Asca bicornis (72,2 %), *Cheiroseius curtipes* (5,5 %), *Leioseius naglitschi* (5,5 %).

2. Drier or mesohygrophilous soils

Very intensive exploatation of fertile soils can cause the degradation of species richness in many groups of soil mites including the family Ascidae. Due to this mainly tolerant species within this family can rather scarcely populate the arable soils.

Arable soil (luvisoil) - *Arctoseius cetratus* (5 %), *Arctoseius semiscissus* (90 %), *Leioseius bicolor* (5 %).

Arable soil (chernosoil) - *Arctoseius cetratus* (12,5 %), *Arctoseius semiscissus* (87,5 %).

Sandy soil - *Arctoseius eremitus* (7,1 %), *Arctoseius minutus* (7,1 %), *Asca bicornis* (50 %), *Leioseius bicolor* (28,6 %), *Leioseius naglitschi* (7,1 %).

3. Meadows

Rich root system of various herbs can provide appropriate living conditions for more groups of soil mesofauna and microfauna. Undisturbed soil surface, upper soil layers with rich organic material and sufficient soil moisture enable completed life cycle for mainly edaphic mites including the family Ascidae. Some species with higher sensibility to the changes of soil moisture can occur mainly there (e.g. some species in genera *Cheiroseius* and *Plesioseius*). Besides tolerant species (*Asca bicornis*) the meadows are inhabited by scarce representatives with specific demands to soil conditions (e.g. *Cheiroseius serratus*).

Wet meadow: *Arctoseius eremitus* (1 %), *Arctoseius minutus* (4,1 %), *Asca aphidioides* (1 %), *Asca bicornis* (10,5 %), *Cheiroseius borealis* (2,1 %), *Cheiroseius curtipes* (17,9 %), *Cheiroseius necorniger* (2,1 %), *Cheiroseius salicorniae* (1 %), *Cheiroseius serratus* (1 %), *Cheiroseius viduus* (6,3 %), *Iphidozercon gibbus* (2,1 %), *Leioseius bicolor* (9,5 %), *Leioseius minusculus* (28,4 %), *Plesiosejus italicus* (9,5 %), *Plesiosejus major* (3,2 %).

Caricetum goodenowii: *Asca aphidioides* (9,1 %), *Cheiroseius borealis* (9,1 %),

Cheiroseius curtipes (18,2 %), *Cheiroseius mutilus* (9,1 %), *Cheiroseius viduus* (45,5 %), *Leioseius minusculus* (9,1 %).

***Caricetum*:** *Asca bicornis.*

***Molienietum coerulae*:** *Asca bicornis* (16,7 %), *Cheiroseius borealis* (50 %) , *Cheiroseius curtipes* (16,7 %), *Cheiroseius longipes* (16,7 %).

Ruderal meadow: *Asca bicornis.*

Lowland mesohygrophilous meadow: *Arctoseius cetratus* (63,6 %), *Arctoseius eremitus* (9,1 %), *Arctoseius semiscissus* (9,1 %), *Asca aphidioides* (9,1 %), *Cheiroseius curtipes* (9,1 %).

Mesohygrophilous colline zone meadow: *Arctoseius insularis* (20 %), *Asca aphidioides* (20 %), *Asca bicornis* (60 %).

Mesohygrophilous pasture: *Arctoseius magnanalis* (10 %), *Asca aphidioides* (10 %), *Asca bicornis* (40 %), *Cheiroseius borealis* (10 %), *Cheiroseius curtipes* (20 %), *Leioseius bicolor* (10 %).

Submountain meadow: *Cheiroseius curtipes* (25 %), *Cheiroseius viduus* (25 %), *Leioseius minusculus* (25 %), *Zerconopsis remiger* (25 %).

Mountain meadow: *Arctoseius eremitus* (33 %), *Asca bicornis* (33 %), *Zerconopsis remiger* (33 %).

Xerophile meadow: *Asca aphidioides* (8,3 %), *Asca bicornis* (83 %), *Leioseius bicolor* (8,3 %).

4. Specific habitats and ecotones

Mainly within ascids there are some species inhabiting specific conditions with higher moisture and rich ammount of decaying organic material. Decomposition process is slower in wet habitats and the organic material creates thick layers with rich root system of plants and a big ammount of humus. On the other side, the ecotones connect very often too wet habitats with drier ones and the occurrence of mainly mesohygrophilous and hygrophilous species used to be higher in these conditions.

Littoral zones: *Arctoseius cetratus* (6,7 %), *Arctoseius semiscissus* (16,2 %), *Asca aphidioides* (1 %), *Cheiroseius borealis* (1 %), *Cheiroseius cassiteridium* (6,7 %), *Cheiroseius curtipes* (1 %), *Cheiroseius longipes* (1 %), *Cheiroseius mutilus* (2 %), *Cheiroseius salicorniae* (1 %), *Cheiroseius serratus* (1 %), *Cheiroseius viduus* (5,7 %), *Iphidozercon gibbus* (3,8 %), *Leioseius bicolor* (16,6 %), *Leioseius minusculus* (24,8 %), *Plesiosejus italicus* (8,6 %), *Plesiosejus major* (2,9 %).

Banks of brooks (pond), alluvia of brooks: *Arctoseius cetratus* (7,7 %), *Arctoseius eremitus* (2,6 %), *Asca aphidioides* (2,6 %), *Asca bicornis* (12,8 %), *Cheiroseius borealis* (7,7 %), *Cheiroseius curtipes* (23,1 %), *Cheiroseius longipes* (2,6 %), *Cheiroseius mutilus* (5,2 %),

Cheiroseius salicorniae (5,2 %), *Cheiroseius viduus* (2,6 %), *Iphidozercon gibbus* (2,6 %), *Leioseius bicolor* (2,6 %), *Leioseius minusculus* (5,2 %), *Platyseius subglaber* (5,2 %), *Platyseius sp.* (5,2 %), *Plesiosejus italicus* (2,6 %), *Plesiosejus major* (5,2 %).

Reed stands (*Phragmitetum*): *Arctoseius cetratus* (6,6 %), *Arctoseius insularis* (0,9 %), *Arctoseius semiscissus* (16 %), *Asca bicornis* (0,9 %), *Cheiroseius cassiteridium* (2,8 %), *Cheiroseius curtipes* (9,3 %), *Cheiroseius cassiteridium* (4,7 %), *Cheiroseius mutilus* (3,8 %), *Cheiroseius necorniger* (1,8 %), *Cheiroseius serratus* (0,9 %), *Cheiroseius viduus* (5,7 %), I*phidozercon gibbus* (2,8 %), *Leioseius bicolor* (7,5 %), *Leioseius minusculus* (24,5 %), *Plesiosejus italicus* (8,5 %), *Plesiosejus major* (3,8 %).

Peat-boggs: *Asca bicornis* (30,8 %), *Cheiroseius cassiteridium* (7,7 %), *Cheiroseius curtipes* (15,4 %), *Cheiroseius longipes* (7,7 %), *Cheiroseius serratus* (7,7 %), *Cheiroseius unguiculatus* (15,4 %), *Leioseius minusculus* (7,7 %), *Plesiosejus italicus* (7,7 %).

Marshlands: *Asca bicornis* (14,2 %), *Cheiroseius borealis* (7,1 %), *Cheiroseius curtipes* (28,6 %), *Cheiroseius mutilus* (21,3 %), *Leioseius minusculus* (7,1 %), *Platyseius subglaber* (7,1 %), *Plesiosejus italicus* (7,1 %), *Zerconopsis slovacus* (7,1 %).

Caves: *Arctoseius pristinus* (10 %), *Arctoseius semiscissus* (80 %), *Arctoseius venustulus* (10 %).

5. Microhabitats

Taking into account the occurrence of mites in various biocenoses, each of the species prefers some small microareal with the most appropriate conditions. Resulting from this, some species are more frequently found in sometimes untypical microhabitats (in specific natural material), reflecting the degree of decomposition process, moisture and other natural conditions. Such, these specific microhabitats can elucidate more details in requirements of mainly scarce mite species. The higher frequency of the occurrence of some mite species can indicate similar microconditions in sometimes seemingly different microhabitats.

Leaf litter: *Arctoseius brevichelis* (2,4 %), *Arctoseius eremitus* (2,4 %), *Arctoseius magnanalis* (2,4 %), *Arctoseius minutus* (2,4 %), *Arctoseius semiscissus* (2,4 %), *Arctoseius venustulus* (2,4 %), *Asca aphidioides* (2,4 %), *Asca bicornis* (31 %), *Cheiroseius borealis* (2,4 %), *Cheiroseius curtipes* (9,5 %), *Cheiroseius mutilus* (2,4 %), *Cheiroseius viduus* (2,4 %), *Leioseius bicolor* (2,4 %), *Zerconopsis apodius* (2,4 %), *Zerconopsis muestairi* (2,4 %), *Zerconopsis remiger* (28,6 %).

Humus: *Arctoseius magnanalis* (4 %), *Arctoseius venustulus* (4 %), *Asca aphidioides* (4 %), *Asca bicornis* (28 %), *Cheiroseius borealis* (8 %), *Cheiroseius cassiteridium* (4 %), *Cheiroseius curtipes* (16 %), *Cheiroseius mutilus* (12 %), *Cheiroseius serratus* (4 %), *Cheiroseius unguiculatus* (8 %), *Cheiroseius viduus* (8 %).

Detritus: *Arctoseius eremitus* (2,8 %), *Arctoseius magnanalis* (2,8 %), *Arctoseius minutus* (2,8 %), *Arctoseius semiscissus* (8,3 %), *Arctoseius venustulus* (2,8 %), *Asca aphidioides* (2,8 %), *Asca bicornis* (25 %), *Cheiroseius curtipes* (2,8 %), *Cheiroseius mutilus* (2,8 %), *Cheiroseius viduus* (2,8 %), *Leioseius bicolor* (2,8 %), *Zerconopsis apodius* (2,8 %), *Zerconopsis muestairi* (2,8 %), *Zerconopsis remiger* (36,1 %).

Moss (wet moss): *Arctoseius eremitus* (2,6 %), *Asca aphidioides* (2,6 %), *Asca bicornis* (22,2 %), *Cheiroseius borealis* (10,5 %), *Cheiroseius cassiteridium* (2,6 %), *Cheiroseius curtipes* (23,7 %), *Cheiroseius longipes* (2,6 %), *Cheiroseius bryophilus* (2,6 %), *Cheiroseius mutilus* (5,2 %), *Cheiroseius unguiculatus* (5,2 %), *Iphidozercon gibbus* (2,6 %), Leioseius bicolor (5,2 %), *Platyseius subglaber* (2,6 %), *Plesiosejus italicus* (8,3 %), *Zerconopsis remiger* (5,2 %).

Soil samples (taken from the soil without root system): *Arctoseius minutus* (4,5 %), *Arctoseius semiscissus* (13,6 %), *Asca bicornis* (9,1 %), *Cheiroseius borealis* (4,5 %), *Cheiroseius curtipes* (36,4 %), *Cheiroseius longipes* (9,1 %), *Cheiroseius viduus* (9,1 %), *Leioseius bicolor* (4,5 %), *Zerconopsis remiger* (4,5 %).

Rhisosphere of grass with soil: *Arctoseius cetratus* (4,2 %), *Arctoseius eremitus* (1,4 %), *Arctoseius insularis* (1,4 %), *Arctoseius magnanalis* (4,2 %), *Arctoseius minutus* (1,4 %), *Arctoseius semiscissus* (5,6 %), *Arctoseius venustulus* (1,4 %), *Asca aphidioides* (1,4 %), *Asca bicornis* (33,1 %), *Cheiroseius borealis* (4,2 %), *Cheiroseius cassiteridium* (1,4 %), *Cheiroseius curtipes* (11,1 %), *Cheiroseius longipes* (4,2 %), *Cheiroseius mutilus* (1,4 %), *Cheiroseius salicorniae* (2,8 %), *Cheiroseius serratus* (1,4 %), *Cheiroseius viduus* (2,8 %), *Iphidozercon gibbus* (1,4 %), *Leioseius bicolor* (8,3 %), *Leioseius minusculus* (2,8 %), *Leioseius naglitschi* (1,4 %), *Plesiosejus major* (1,4 %), *Zerconopsis remiger* (1,4 %).

6. Nests

The nests are very specific places for the occurence of mite species, when some of them can be found there in higher quantities as compared to other habitats or microhabitats. Mainly the bottom parts of the nests with higher moisture and sometimes with decaying plant material (contact with the ground moisture) is very suitable for detritophagous species. When the nest are directly situated in the soil, the bulks of organic material and higher (but suitable) moisture there can serve as very attractive conditions for some mites.

A. Mammal nests in the soil

Talpa europaea: *Arctoseius minutus* (33 %), *Arctoseius pristinus* (33 %), *Asca aphidioides* (33 %).
***Apodemus flavicollis* (hair and nests):** *Platyseius subglaber* (66,7 %), *Platyseius sp.* (16,7 %), *Plesiosejus italicus* (16,7 %).
***Pitymys subterraneus*:** *Platyseius sp.*

B. Bird nests situated on the ground

Acrocephalus scirpaceus: *Arctoseius semiscissus* (50 %), C*heiroseius necorniger* (50 %).
Acrocephalus arundinaceus: *Asca bicornis* (50 %), *Cheiroseius necorniger* (50 %).
Anas platyrhynchos: A*rctoseius cetratus* (5,8 %), *Arctoseius semiscissus* (9,3 %), *Asca bicornis* (1,9 %), *Cheiroseius cassiteridium* (7,7 %), *Cheiroseius curtipes* (13,9 %), *Cheiroseius mutilus* (3,8 %), *Cheiroseius serratus* (1,9 %), *Cheiroseius viduus* (9,3 %), *Iphidozercon gibbus* (1,9 %), *Leioseius bicolor* (13 %), *Leioseius minusculus* (18,5 %), *Plesiosejus italicus* (11,1 %), *Plesiosejus major* (1,9 %).
Anas strepera: *Cheiroseius borealis.*
Anser anser: *Arctoseius semiscissus* (33,3 %), *Iphidozercon gibbus* (33,3 %), *Leioseius minusculus* (33,3 %).

Aythia fuligula: *Arctoseius semiscissus* (20 %), *Cheiroseius cassiteridium* (20 %), *Cheiroseius curtipes* (20 %), *Leioseius minusculus* (20 %), *Plesiosejus italicus* (20 %).

Aythia ferina: *Arctoseius semiscissus* (14,3 %), *Cheiroseius cassiteridium* (14,3 %), *Leioseius minusculus* (42,9 %), *Plesiosejus italicus* (14,3 %).

Emberiza schoeniclus: *Cheiroseius cassiteridium* (33,3 %), *Cheiroseius mutilus* (33,3 %), *Leioseius minusculus* (33,3 %).

Fulica atra: *Arctoseius semiscissus* (12,5 %), *Cheiroseius cassiteridium* (37,5 %), *Leioseius bicolor* (37,5 %), *Leioseius minusculus* (12,5 %).

Ixobrychus minutus: *Arctoseius semiscissus* (16,7 %), *Cheiroseius cassiteridium* (16,7 %), *Cheiroseius mutilus* (16,7 %), *Leioseius minusculus* (16,7 %), *Plesiosejus major* (16,7 %).

Cygnus olor: *Cheiroseius cassiteridium* (67 %), *Cheiroseius curtipes* (33 %).

Circus aeruginosus: *Arctoseius cetratus* (22,2 %), *Arctoseius semiscissus* (11,1 %), *Asca bicornis* (11,1 %), *Cheiroseius cassiteridium* (22,2 %), *Cheiroseius curtipes* (11,1 %), *Leioseius bicolor* (11,1 %), L*eioseius minusculus* (11,1 %).

Podiceps cristatus: *Arctoseius semiscissus* (16,7 %), *Cheiroseius cassiteridium* (16,7 %), *Cheiroseius curtipes* (16,7 %), *Cheiroseius mutilus* (16,7 %), *Leioseius minusculus* (16,7 %), *Plesiosejus major* (16,7 %).

C. Bird nests situated on trees, shrubs or herbs

Acrocephalus arundinaceus: *Arctoseius semiscissus* (25 %), L*eioseius bicolor* (25 %), *Leioseius minusculus* (50 %).

Acrocephalus scirpaceus: *Arctoseius semiscissus.*

Aquila pomarina: *Arctoseius cetratus* (50 %), *Arctoseius semiscissus* (50 %).

Aquila heliaca: *Arctoseius cetratus* (25 %), *Arctoseius semiscissus (*25 %), *Leioseius bicolor* (25 %), *Leioseius elongatus* (25 %).

Chloris chloris: *Leioseius bicolor.*

Fringilla sp.: *Leioseius bicolor.*

Lanius collurio: *Leioseius bicolor.*

Lanius minor: *Leioseius bicolor.*

Porzana parva: *Cheiroseius cassiteridium* (50 %), *Leioseius minusculus* (50 %).

Passer sp. + Apodemus sp.: *Leioseius bicolor.*

Passer sp. + Martes sp.: *Leioseius bicolor.*

Passer montanus: *Leioseius bicolor.*

Sturnus vulgaris: *Leioseius bicolor* (67 %), *Leioseius minusculus* (33 %).

Turdus merula: *Leioseius bicolor.*

Turdus philomelos: *Asca bicornis* (50 %), *Cheiroseius borealis* (50 %).

Sylvia sp: *Leioseius bicolor* (50 %), *Zerconopsis remiger* (50 %).

D. Bird nests situated on water level

Fulica atra: *Arctoseius cetratus* (14,3 %), **Arctoseius insularis** (14,3 %), *Arctoseius semiscissus* (14,3 %), *Leioseius minusculus* (42,3 %), *Plesiosejus major* (14,3 %).

Apparently, some species prefer specific conditions, however the majority of Ascidae populate several different types of biocenoses or habitats. Besides this division the information on ecological requirements of species studied coming from literature is stated in the text of the paper (in each species separately below species diagnosis).

Food requirements of the majority of species are still not exactly defined. Some of them are known as predators on small microarthropods. Species of the genera *Asca, Iphidozercon, Arctoseius, Cheiroseius* and *Leioseius* have been known preying on Collembola, on other mainly juvenile mites or mite eggs (KARG, 1993). Among the food of these species the nematode helmints can appear very often. However, FENĎA & MAŠÁN (2003) consider the majority of Ascidae detricolous mites. With regard to absence of an exact study on food requirements

Table 2. Ecological classification of Ascidae

Ecological categories	A	B	C	D	E	F	G	H	I	J
Cheiroseius unguiculatus		+		+			+			+
Cheiroseius necorniger		?	?		+	?			+	
Cheiroseius curtipes	+		+		+	+	?		+	
Cheiroseius salicorniae		+	+		+	+	?			+
Cheiroseius cassiteridium		+	+		+	+				+
Cheiroseius serratus		+	+		+	?				+
Cheiroseius longipes		+	+		+	+			+	
Cheiroseius mutilus		+	+		+	+				+
Cheiroseius viduus	?		+		+	+			+	
Cheiroseius borealis		+	+		+	?			+	
Cheiroseius bryophilus		+		+	?	+				+
Platyseius subglaber		+	+			+				+
Plesiosejus major		+	+		+	+				+
Plesiosejus italicus		+	+		+	+				+
Zerconopsis apodius		?	+		+	?			+	
Zerconopsis remiger	?		+		+	+		?	+	
Zerconopsis muestairi		?	?		+	?			+	
Zerconopsis slovacus		+		?	?	?				?
Iphidozercon gibbus		?	+		+	+			+	?
Arctoseius semiscissus	+		+		+	+		+		
Arctoseius cetratus	+		+		+	+	+	+		
Arctoseius magnanalis	+		+			+	+	+		
Arctoseius venustulus	+		+		+	+			+	
Arctoseius eremitus			+		+	+	+	+		
Arctoseius brevichelis		?	+			+	+		+	
Arctoseius pristinus		+	+		+	+	+		?	
Arctoseius resinae		+		?	+	?			?	
Arctoseius insularis		+		?	+	?			?	
Arctoseius minutus		?	+		+	?			?	
Asca aphidioides	+		+		+	+	+	+		
Asca bicornis	+		+		+	+	+	+		
Leioseius minusculus	?		+		+	+	+		+	
Leioseius elongatus		?	+		+	?			?	
Leioseius naglitschi		+		+	+	?			?	
Leioseius bicolor	+		+		+	?		+		

A – eurytopic; B – stenotopic; C – mesozonal; D – stenozonal; E – thermotolerant; F – semipsychrotolerant; G – psychrotolerant; H – xerotolerant; I – mesohygrophilous; J – hygrophilous species

of Ascidae, both these food strategies are possible. The morphology of chelicerae indicate the adaptations to both predaceous and detricolous life styles. Detricolous nourishment can prevail in mainly mesohygrophilous species, populating drier or mildly wet soils with sufficient ammount of decaying wooden material and leaf detritus.

Some species of the family Ascidae are considered a phoretic species. BINNS (1972) found the mite *Arctoseius cetratus* on sciarid flies, while PETROVA & MAKAROVA (1991) described a new ascide species *Arctoseius tajmyricus* PETROVA & MAKAROVA, 1991 phoretic on the flies of the family Trichoceridae from Siberian Taymir. Also, another genera and species of the family Ascidae are associated with Diptera. RACK (1976) found and subseequently described a new species *Zerconopsis limoniae* RACK, 1976, attached on tipulids. This author also considers another ascide representatives as phoretic on Diptera (*Cheiroseius serratus, Ch. necorniger*). Further information on the phoresy of Ascidae on Diptera is in the papers of WHITSELL & SCHOEPPNER (1973) from America and of MAŠÁN & ORSZÁGH (1995) who found out the phoresy of *Iphidozercon gibbus* on biting midge *Culicoides obsoletus* (Diptera: Ceratopogonidae) from Slovakia.

Zoogeographic analyse

Geographic distribution

The geographic distribution of mites within the family Ascidae includes many geographic areas. On one side, this recent distribution depends on the development both of the genera and the species during the period of fylogeny. On the other side, some taxons are adapted to different living conditions (including the phoresy). Due to the scarcity of many species of the family Ascidae the knowledge on their geographic distribution is still unsufficiently know. Untill now, several species have been known as widely distributed on several continents except for Antarctica. While the occurrence of some species reflects very specific environmental conditions, there are the genera and species inhabiting wide range of climatic conditions and occurring from lowlands to mountains.

The family Ascidae involves both genera and species, with known distribution in some geographic areas only. But, these taxons have one typical feature. They are scarce and the knowledge on their geographic distribution needs long and intensive period of the research. The research of the mites within the family Ascidae in Palearctic region has a long history in comparison to other geographic regions. Mainly the species, described in 18-th and 19-th centuries, have been the best known (the genus *Asca).* During the last decades the attention was devoted to the study of Ascidae, the interest of the authors resulted from the fact, that some of these mites used to occurr frequently in very specific conditions. Thanking to this, the numbers of new species substantialy increased. Mainly the representatives of the genus *Asca*, originally coming from Europe, have been registered (KARG, 1996) from various geographic areas untill now (Tab. 3). The representatives within the genus *Asca* in Europe are known from many countries (KARG, 1971, 1993, BREGETOVA, 1977) mainly from West and Central Europe, including The United Kingdom and Scandinavia. The information on zoogeographic distribution of other taxons within this family in the territory of Europe has still been very uncompleted.

Table 3. Geographic distribution of Ascidae

Ascidae	Holarctic	Ethiopic	Australian	Neotrophic
Asca v. Heyden, 1826	+	+	+	+
Arctoseius Sig Thor, 1930	+	-	-	-
Cheiroseius Berlese, 1916	+	+	+	+
Iphidozercon Berlese, 1903	+	-	+	-
Leioseius Berlese, 1916	+	-	-	+
Platyseius Berlese, 1916	+	+	+	+
Plesiosejus Evans, 1960	+	-	-	-
Zercoseius Berlese, 1916	+	-	-	-
Zerconopsis Hull, 1918	+	-	-	-

+ genus present, - genus absent

Chorological characteristic

For the present, the majority of mites from the family Ascidae belong to the less known among all gamaside mites. The information on zoogeographic distribution of each species depends on faunistic data from separate countries or areas. Several species have been known thanking to their regular occurrence in various areas or countries. Such, the facts in published papers can allow the more acurrate estimation of their chorological characteristics. Unfortunately, more ascids are known from a few or unique findings without any supporting information on altitude, habitat or ecological factors.

Therefore, there a problem arises, how to evaluate both historical origin of the species in various geographic areas and their chorological development. Moreover, some ascide species (e.g. in the genus *Cheiroseius*) can populate various habitats through different hypsographic zones and to investigate the origin of the species can be impossible now. More known species like *Asca aphidioides* or *A. bicornis* were registered within several geographic areas. These two species (Tab. 4) can serve as an examples of representatives populating disjunctive area. Both these species are characterized by intercontinental Holarctic boreo-mountain distribution, where besides large areal in Palearct they also occur in North America. The original distribution of above mentioned species probably came from Pleistocene periglacial period. The *Asca* species are widely distributed in several continents and the distribution of the representatives within this genus covers mainly subtropical and tropical zones. Two above mentioned *Asca* species originate from South and during the Tertiary period probably inhabited both Palearct and North America. Then, during the Periglacial periodes penetrated to northern parts of Holarctic region. These species show wider ecological adaptability to various conditions, but they mainly occur in warmer or mild climatic conditions (including a little warmer microclimatic conditions in higher hypsographic zones).

Another species with very interesting disjunctive distribution there is *Cheiroseius cassiteridium* with its distribution both in Holarctic and Neotropic regions. We cannot exclude, that this species can be cosmopolitan, but there is no information on its distribution in other geographic areas. The chorology of furter species *Ch. serratus* or *Ch. borealis* indicate the tendence to Palearctic boreo-mountain disjunction when the species show the preference to colder and wet conditions. The distribution of both these species probably originates from Pleistocene glaciation, when the inhabitants of northern parts of Palearct continuously penetrated to the south and survived in colder and more wet conditions (peat-boggs, marshland in mountain and submountain areas).

Despite of the fact, that the majority of Ascidae are scarce, we can suppose, that mainly current and widely distributed species *A. aphidioides* and *A. bicornis* have a continual distributin in Slovak territory. These species were found in many various habitats in several hypsographic zones. The distribution of rare species or solely found in Slovakia is still unknown and there are no relevant information on the chorology of these species. However, the partial information from other countries stated in literature can allow preliminary classification of some species into categories, corresponding to the recent knowledge on the origin of their geographic distribution (Tab. 4). The knowledge on an orographic origin of more species very much depends on the information on ecology. This is visible in the species regularly occurring in specific microhabitats including various bird nests, on captured small mammals or in burrows of small mammals. The details of specific life style of e.g. the species from the genera *Platyseius* or *Plesioseius* are still practically unknown. Ambros (1983, 1990), Ambros et al. (1982, 1992), Stanko (1987, 1988a, 1988b, 1989, 1995) and Stanko et al. (1992) stated these species, with apparently regular affinity to mammals or to nests, from several localities in submountain and mountain areas of Slovakia. However, their distribution in Slovak territory can be expected in more orographic units, but the research of nest inhabiting invertebrate fauna in Slovakia is still unsufficient. The same can be said on phoretic mite species, when the phoresy enables very wide geographic distribution of the species during a relatively short period.

Table 4. Preliminary zoogeographical classification of Ascidae from Slovakia

Holarctic and Neotropic region	*Cheiroseius cassiteridium*
Holarctic region	
South-Holarctic elements	*Asca aphidioides, Asca bicornis*
Holarctic-boreo-mountain elements	*Leioseius minusculus, Cheiroseius curtipes, Cheiroseius mutilus, Cheiroseius borealis*
Palearctic region	
Palearctic-boreo-mountain element	*Cheiroseius mutilus, Leioseius magnanalis, Cheiroseius salicorniae*
European region	
European elements (unclear origin)	*Leioseius elongatus, Arctoseius insularis, Arctoseius minutus, Arctoseius semiscissus, Iphidozercon gibbus, Platyseius subglaber*
Boreo-mountain elements	*Cheiroseius serratus, Cheiroseius bryophilus*
Central European elements	*Arctoseius brevichelis, Arctoseius pristinus, Arctoseius resinae, Cheiroseius longipes, Zerconopsis apodius, Zerconopsis muestairi, Zerconopsis remiger*
East Carpathian elements	*Cheiroseius mutilus*
Subatlantic elements	*Cheiroseius necorniger, Arctoseius cetratus, Platyseius subglaber?, Plesioseius italicus, Plesioseius major*
Submediterranean and Mediterranean elements	*Arctoseius eremitus*

Systematics

Ascidae - Oudemans, 1905

1968 - Aoki - *Asca aphidioides* (Linné)(Acari, *Blattisocidae*), Bull. Nat. Sci. Mus. Tokyo 11: 149-152; **1952** - Baker & Wharton, Mc Millan, New York 1-465; **1892** - Berlese Acari nuovi I. Redia 1: 35-252; **1882-1903** - Berlese, Acari, myriapoda et Scorpiones hucusque in Italia reperta, Port. Pad. I-XCVIII; **1963** - Bernhard, Ascaidae (Oudemans, 1905), Beitr. Syst. Okol. Mitteleur.2: 33-178; **1977** - Bregetova et al., Izd. Nauka, Moscow 1-716; **1958** - Evans, Proc. Zool. Soc. London, 131: 177-229; **1960** - Evans & Hyatt, Bull. Brit. Mus. (Nat. Hist.) Zool. 6: 27-101; **1998** - Halliday, Walter & Lindquist, Invert. Taxon. 12: 1-54; **1971** - Karg, Gustav Fisher Verlag Jena 1-475; **1993** - Karg, Gustav Fisher Verlag Jena 1-523; **1965** - Lindquist & Evans, Mem. Ent. Soc. Can. 47: 1-64; **1960** - Sanšiňák, Čs. parasitol. 7: 297-307; **1971** - Sanšiňák & Dusbábek, Československ. Akad. Ved 313-352; **1930** - Thor, Skr. Svalbard Ishavet, Oslo 27: 1-156;

General morphology of the family Ascidae

Small and/or middle body size. Slight chelicerae with the trend to tweezers shape. Digitus mobilis mostly with two teeth, opisthonotal part of dorsal shield frequently without setae S2. Dorsal shield of adults with solid margins or with distinct shallow incisions. More than 21 pairs of setae on dorsal shield (usually 23 - 26 pairs), setae mostly nude or slightly hairy, sometimes indented, seldom broadened. Sternal shield with 3 pairs of sternal setae. Metasternal sclerites (if present) small, oval, rhomboid or triangular, wearing one pair of setae. MSt setae sometimes on soft cuticle. Genital shield usually reaches behind coxae IV. Lateral margins of genital shield parallel, shield caudally broadened, with nearly direct caudal margin. One pair of genital setae on the shield or closed to lateral margins. Ventral shield frequently confluenced with anal shield, enlarged, wearing several pairs of ventrianal setae. In some species anal shield can be visible only, wearing 3 anal setae. Small sclerites (1 - 3 pairs) between genital and ventrianal/anal shields.

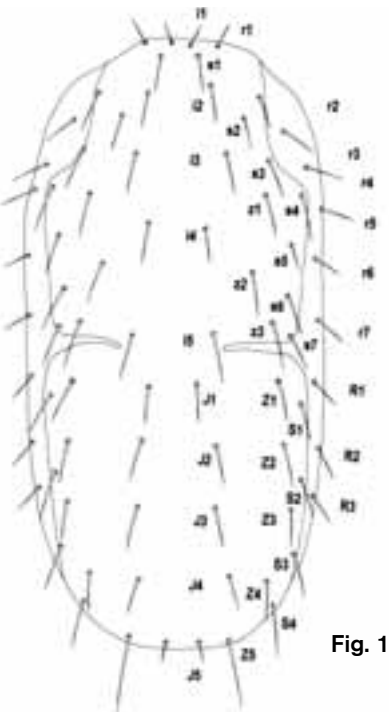

Fig. 1. Basic numbering of setae of dorsal side in Ascidae

Metapodal shields small, oval (1 - 2 pairs). In females 1- 2 pairs of endopodal shields. In males usually two shields visible on ventral side; genitosternal and ventrianal, the shields are confluenced together very seldom. Peritremes and peritremal shields narrow or wide. Peritremes sometimes exceed both stigmae and coxae IV. Tectum of various shape, gnathosomal setae usually equal and nude, however rostral setae sometimes whip-shaped (prolonged), corniculi acuminated terminally. Stable-forked seta on tarsus of pedipalpa two-fold, setae on palptrochanter equal or inner seata long, whip-shaped. Chelicerae normal, digits with several teeth or with the row of denticles. Male spermatodactyl simple. Legs with short claws, leg I sometimes without claws, medial part of pulvillae on praetarsi wide and rounded or narrow and sharp. Tarsi IV in several species with two long and apically curved dorso-medial setae. Dorsal side of larvae and nymphs uniform, with several sclerites between carapax and pygidial shiels. Free living predaceous mites. Occurring in forest litter, under bark, in decaying matter, in wetlands, in moss near wells.

Fig. 2. *Cheiroseius serratus* - leg II

Fig. 3. *Zerconopsis remiger* - leg II

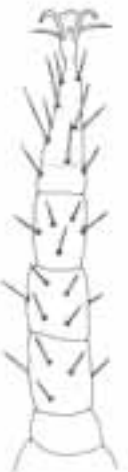

Fig. 4. *Arctoseius pristinus* - leg II

Ascidae - key to genera (females)

1 (8) Tarsi II - IV with a pair of long, sometimes apically curved dorso-medial setae (Fig. 2). Rostral hypognathal and interior setae on palpfemur (Fig. 5) long, whipshaped.

2 (7) Tarsi II - IV apically with membraneous, medially spiky (poorly visible!) pulvilles between claws (Fig. 2). Seta Z5 normal, not broadened apically.

3 (4) Opisthosomal part of dorsal shield (Figs. 23, 27) with 15 pairs of dorsal setae (I1 - I5, S1 - S5, Z1 - Z5), tibia II with 10 setae
..... ***Cheiroseius*** BERLESE, 1916

4 (3) Opisthonotal part of dorsal shield (Fig. 29) with reduced row I (I2 - I4).

5 (6) Ventrianal shield of female with 6 - 7 pairs of setae (Fig. 30), dorsal shield with I1, I4 and I5, dorsal marginal setae extremely long (Fig. 29), tibia II with 9 setae
..... ***Platyseius*** BERLESE, 1916

6 (5) Ventrianal shield of female with 4 - 5 pairs of setae (Figs. 32, 34), very long basal part of tritosternum, dorsal shield with I1, I3 (I4) and I5; I2 always absent (Figs. 31, 33)
..... ***Plesioseius*** EVANS, 1960

7 (2) Tarsi II - IV apically with membraneous, medially rounded pulvilles between claws (Fig. 3), seta Z5 broadened. Opisthonotal part of dorsal shield with setae I1 - I5, Z1 - Z5, S1, S3, S4, S5; seta S2 always absent. Seta Z5 broadened apically (Fig. 35, 37), majority of setae on leg I sitting on bumps
..... ***Zerconopsis*** HULL, 1918

8 (1) Tarsi II - IV without long dorso-medial setae (Fig. 4), rostral hypognathal and interior setae on palpfemus normal, not whip-shaped (Fig. 6).

Fig. 5. *Cheiroseius serratus* - gnathosoma

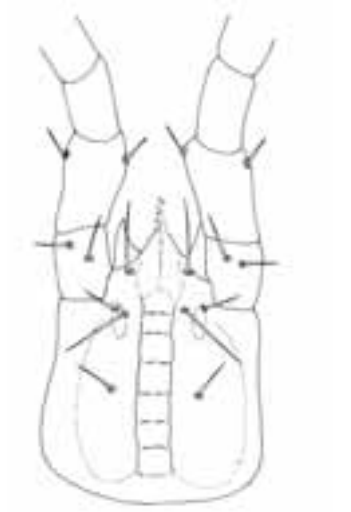

Fig. 6. *Arctoseius pristinus* - gnathosoma

9 (12) Adult female with anal shield only (Figs. 44, 46), wearing 1 pair of adanal setae (exception *Arctoseius magnanalis* with 2 pairs), genital setae outside from genital shield, dorsal setae S2 (or S1) sometimes absent.

10 (11) Frontal part of adults with strongly sclerotized vertex, dorsal shield always uniform (Figs. 43, 44), the base of i1 situated ventrally (i1 dorsally not visible), hypostomal groove without lateral margins
..... ***Iphidozercon*** BERLESE, 1903

11 (10) Frontal part of adults without sclerotized vertex, hypostomal groove with 3 - 8 rows of denticles (polyodont - more than 6) and with lateral margins, dorsal shield with lateral incision or sometimes with lateral scratch (Figs. 45, 53, 57 59)
..... ***Arctoseius*** SIG THOR, 1930

12 (9) Adult female with ventrianal shield, wearing more than 1 pair of adanal setae (Figs. 70, 78). Opisthonotal part of dorsal shield (Figs. 71, 79) regularly with 15 setae (l1 - l5, Z1 - Z5, S1 - S5) (exception - *Leioseius ulmi* with 12 pairs), genital setae of female on genital shield (on lateral margins).

13 (14) Caudal margin with pair of protuberances wearing 1-2 setae (Fig. 69, 71), dorsal shield always divided into propodosomal and opisthosomal parts
..... ***Asca*** v. HEYDEN, 1826

14 (15) Caudal margin without protuberances. Dorsal shield divided (Fig. 73) or uniform with lateral incision (Fig. 75, 79), female ventrianal shield with almost 6 pairs of setae (Figs. 74, 78), hypostomal groove always oligodont (almost 6 denticles in row) with distinct lateral margins
..... ***Leioseius*** BERLESE, 1916

15 (14) Dorsal shield uiform, dorsal setae broadened, ventrianale with 8 pairs of setae, hypostomal groove with polyodont rows of denticles
..... ***Zercoseius*** BERLESE, 1916
(not found in Slovakia, but expected)

Genus *Cheiroseius* BERLESE, 1916

1977 - BREGETOVA et al., Izd. Nauka, Moscow 1-716; **1971** - KARG, Gustav Fisher Verlag Jena 1-475; **1981**- KARG *Cheiroseius* BERLESE, 1916, Zool. Jb. 51-69; **1993** - KARG, Gustav Fisher Verlag Jena 1-523;

Diagnosis:
Peritremes caudally extended, reaching behind coxae IV, vertical setae i1unstriking, mainly diagonally and laterally directed.

Cheiroseius - key to subspecies (females)

1 (2) Peritremes extended from stigmae caudally behing coxae IV, mostly curved, frontal dorsal seta i1 small, needle-shaped, laterally and diagonally directed (Figs. 8, 10)
..... subgenus ***Posttrematus*** KARG, 1981

2 (1) Peritremes less extended caudally, not overstepping coxae IV, frontal dorsal seta i1 strong and direct, together with r1 situated on at fore standing vertex (Figs. 24, 26)
..... subgenus ***Cheiroseius*** BERLESE, 1916

Subgenus *Posttrematus* - key to females

1 (12) On leg I tarsus longer than tibia.

2 (4) Claws on tarsus I as big as claws on other legs, or bigger.

3 (2) Leg I without praetarsus, claws on tarsus I bigger than claws on legs II, III, IV. Length of seta i2 = cca 1/2 of distance i2 - i3, dorsal shield without patttern, but with fine dots (Fig. 7), ♀ ventrianal shield with 5 pairs of setae (Fig. 8)
. . . . . ***Ch. unguiculatus*** (BERLESE, 1887)

4 (2) Claws on Tarsus I substantially smaller than claws on legs II - IV, leg I shorter than idiosoma.

5 (7) Leg I distinctly longer than idiosoma.

6 (5) Dorsal shield with scale net structure, central part with irregular pattern, dorsal setae needle-shaped, I1 longer than 1/2 of the distance between I1 - I2; I2 = distance between I2 - I3; Z1 = distance between Z1 - Z2 (Fig. 9). Setae i1, r1, I5 shorter than other dorsal setae. Female sternal shield with expressive frontal corners, short genital shield with pair of genital setae. Female ventrianal shield as long as wide, anteriorly concave, wearing 4 pairs of needle-shaped setae (Fig. 10). Digitus mobilis of female chelicere with 1 tooth. Idiosoma ♀♀ 550 - 745 μm long
. . . . . ***Ch. necorniger*** (OUDEMANS, 1903)

7 (5) Leg I shorter than idiosoma.

8 (11) Tarsus I less than two times longer than tibia I.

9 (10) Dorsal setae s1 long and reach the base of s2, setae I1 - I3 reach the base of following setae, dorsal shield with distinct scale-shaped pattern (Fig. 13), ventrianal shield with fine dots (Fig.14), leg I a little shorter than body. Female movable digit with 2 teeth. Length of leg I = 370-520 μm long
. . . . . ***Ch. curtipes*** (HALBERT, 1923)

10 (9) Dorsal setae s1 shorter than distance between s1 - i2, setae I1 - I3 shorter, not reaching following setae, dorsal shield with strong pattern laterally, female sternal shield without structure (Figs.15, 16)
. . . . . ***Ch. salicorniae*** (WILLMANN, 1949)

11 (8) Tarsus I two times longer than tibia I, peritremes behind coxae not steeply curved, majority of dorsal setae sitting not on bumps, almost marginal setae on bumps, foward directed setae i1 standing together, ♀ ventrianal shield with 4 pairs of setae (Figs. 11, 12)
. . . . . ***Ch. cassiteridium*** (EVANS & HYATT, 1960)

12 (1) On leg I tarsus shorter than tibia.

13 (15) Leg I as long as idiosoma.

14 (13) Peritremes behind coxae IV extended (Fig. 22) and curved, creating 90°, digitus fixus with a row of big denticles in distal half ("serratus"), dorsal setae relatively short, setae in row I (Fig. 21) not reaching following setae (sometimes I3 can reach I4), Z5 normal, female ventrianal shield as long as wide
. . . . . ***Ch. serratus*** (HALBERT, 1915)

15 (13) Leg I distinctly longer than idiosoma.

16 (17) Dorsal shield with scale-shaped pattern (Fig.17), dorsal setae in row I (I1 - I3) not reaching following setae, I4 shorter than 1 of distance between I4 - I5, female ventrianal shield (Fig. 18) broader as long, sternal shield fronto-medially with m-shaped structure

..... ***Ch. longipes*** (WILLMANN, 1951)

17 (16) Dorsal shield with strong net pattern, dorsal setae longer, I1, I2 and I3 reaching the base of following setae (Fig. 19), I4 longer than 1 of distance between I4 - I5, dorsal setae sitting on bumps, female ventrianal shield broader as long, sternal shield (Fig. 20) distally with m-shaped structure

..... ***Ch. mutilus*** (BERLESE, 1916)

Subgenus *Cheiroseius* - key to species (females)

1 (2) Tarsus I without claws, setae i1 big and strong (two times longer than i2), forward directed (Figs. 23, 24), long and sclerotized vertex with setae i1, s1 and r1. Dorsal shield with scale-shaped pattern in frontal and opisthosomal parts, medio-lateral part with irregular pattern, setae in row I short (sometimes I3 reach the base of I4)

..... ***Ch. viduus*** C. L. KOCH, 1839

2 (1) Tarsus I with claws.

3 (4) Female ventrianal shield with 5 pairs of setae, frontal setae i1 longer than i2, s1 reach base of i2, length of i4 = 1 of distance i4 - z2, dorsal shield with scale-shaped pattern, opisthosomal part consisting of very wide scales, I1-I3 reaching base of following setae (Figs. 25, 26)

..... ***Ch. borealis*** (BERLESE, 1904)

4 (3) Female ventrianal shield with 4 pairs of setae, shield distinctly dotted in caudal part (Fig. 27). Dorsal setae i1 a little shorter than i2; i4 nearly as long as distance i4 - z2. Dorsal shield with scale-shaped structure mainly in medio-frontal and opisthosomal parts, central part with irregular fine structure, fronto-lateral margins with strong pattern (Fig. 28), sternal shield frontally with braid-shaped structure

..... ***Ch. bryophilus*** KARG, 1969

Subgenus *Posttrematus* KARG, 1981

Type species: *Hypoaspis necorniger* OUDEMANS, 1903

1981- KARG Cheiroseius BERLESE, 1916, Zool. Jb. 51-69; **1993** - KARG, Gustav Fisher Verlag Jena 1-523;

Diagnosis:
Peritremes long, caudally extended from stigmae, reaching behind coxae IV. The caudal extension of peritremes long, wider and sometimes curved medio-centrally. Vertical setae i1 unstriking, mainly diagonally and laterally directed, relatively short in comparison to other dorsal setae.

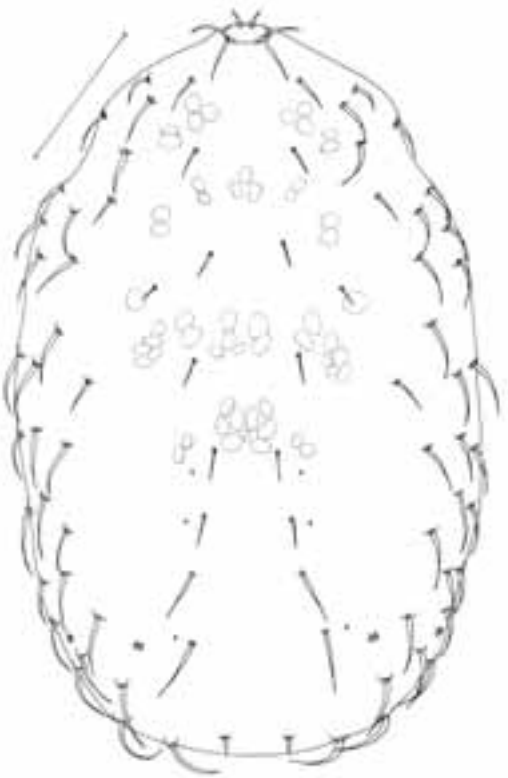

Fig. 7: *Cheiroseius unguiculatus* - dorsal side of female. Scale: 100 μm

Cheiroseius (Posttrematus) unguiculatus (BERLESE, 1887)

(Figs. 7, 8, Pl. 1B)

1882-1903 - BERLESE, Acari, myriapoda et Scorpiones hucusque in Italia reperta, Port. Pad. I-XCVIII;

Morphology

Peritremes caudally extended, their caudal part not curved medio-centrally, reaching behind coxae IV. Vertical setae i1 unstriking, mainly diagonally and laterally directed, shorter than r1, i2 nearly 1 of the distance between i2 and i3. Tarsus I longer than tibia I. Claws on tarsus I stronger and bigger than claws on tarsi II-IV, arrow-shaped thicker setae on tarsus I. Praetarsus on leg I absent, claws directly attached on tarsus. Dorsal shield 480 μm long, 314 μm wide, without typical net pattern. Dorsal setae mainly in lateral rows (s, S, z, Z) curved, slightly lanceolate, majority of setae in medio-central part (i2 to I2) smaller than lateral ones (an exception - I3, I4), I5 are the shortest, lanceolate. The length of setae: Z4 = 46 μm, z1 = 12 μm, I5 = 10 μm long. Three pairs of small pores laterally at the levels of I1, I2, I4, one pair of big pores between I4 - S4. Sternal shield with net pattern, centro-medial part with oblong braid pattern. Genital shield caudally straight, with nearly parallel lateral margins. Ventral side with 3-4 pairs of elongate postgenital sclerites. Ventrianal shield big, with 5 pairs of setae and with steeply rounded lateral margins. Dotted structure on ventrianal shield caudally and laterally. Anal opening small,

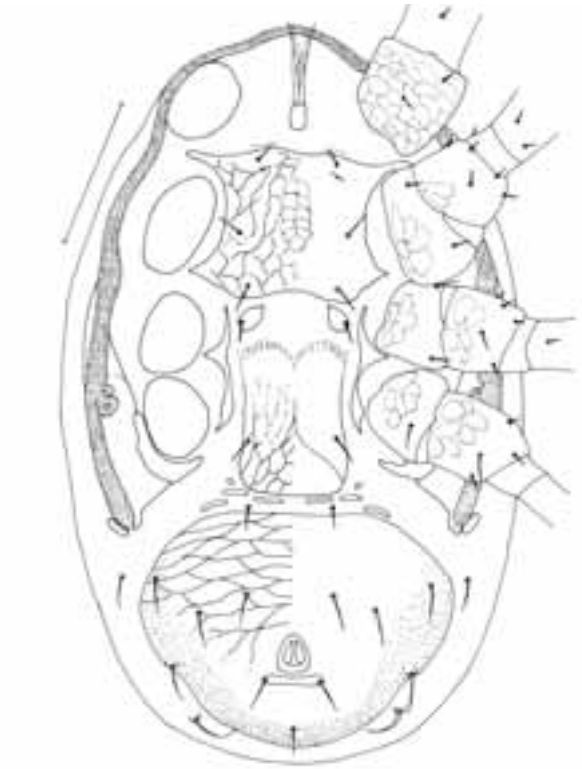

Fig. 8: *Cheiroseius unguiculatus* - ventral side of female. Scale: 100 μm

situated in caudal half of shield. Three pairs of free ventral setae. Coxae I-IV and trochanters II-IV with expressive pearl-shaped pattern. Idiosoma of female 500 - 580 μm, in male 400 μm long. Dorsal setae nude, on tarsi I lanceolate setae (broadened, arrow-shaped).

Geographic distribution: Europe

Vertical distribution in Slovakia: 700 - 760 m a. s. l.

Ecology: Rare species occurring in moss, in deciduous tree growth (*Robinia, Populus)*, in soil of grassy places. In the nests of small mammals. In Slovakia found in boggy habitats and wet moss.
Edaphic detricolous species in submountain and mountain areas.

Habitat preference: Strongly preferring wet boggy habitats in mountain areas.

Published records from Slovakia: Kysucké Beskydy Mts.: 1 ♀, 1 ♂ - 1.7.1997, Nová Bystrica, Chmúra [6680] (Fenďa, 1999).

Specimens examined: Oravské Beskydy Mts.: 1 ♀ - 11.7.2001, Mútne village, Hraničný Kriváň, peat - bog [6482];

Specimen depicted: Kysucké Beskydy Mts.: 1♀, 1 ♂ - 1.7.1997, Nová Bystrica, Chmúra [6680] (Fenďa, 1999).

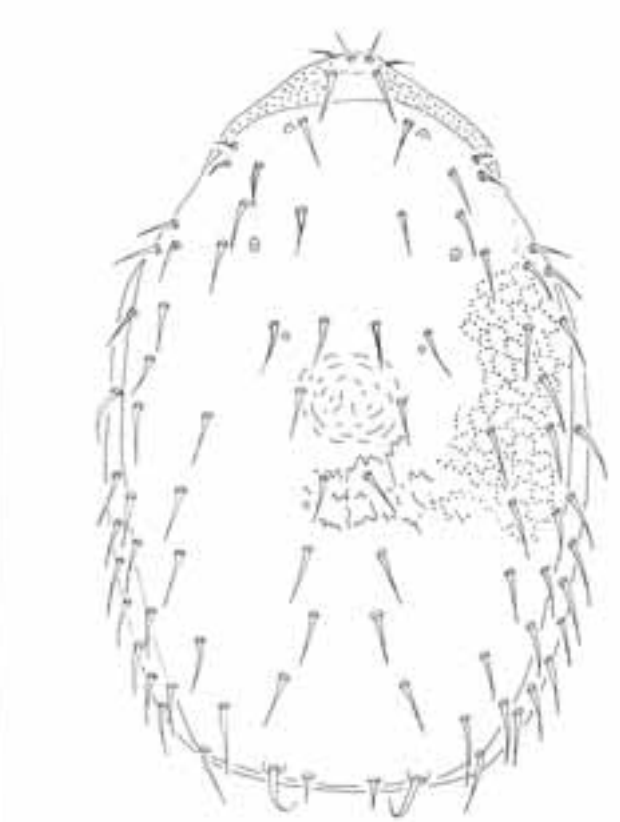

Fig. 9: *Cheiroseius necorniger* - dorsal side of female. Scale: 100 µm (according EVANS & HYATT, 1960)

Cheiroseius (Posttrematus) necorniger (OUDEMANS, 1903)
(Figs. 9, 10)

1903 - OUDEMANS, Tijdschr. Ent. Amsterdam 45: 123-150

Synonyms: *Platyseius (Cheiroseius) insculptus* (BERNHARD, 1963)

Morphology
Peritremes caudally extended, reaching behind coxae IV, vertical setae i1unstriking, mainly diagonally and laterally directed. Tarsus I longer than tibia I. Claws in tarsus I strikingly smaller than claws on legs II-IV. Leg I distinctly longer than idiosoma. In front of sternal shield (proximally) 2 halfbend-shaped structures developed. Dorsal setae of middle length, I1 longer than ½ of the distance I1 - I2, I2 = I2 - I3, Z1 = Z1 - Z2, dorsal shield scale-shaped, ventrianal shield nearly as long as wide; Width: Length = 1 : 0,9 - 1,1. Female digitus mobilis with 1 tooth, Idiosoma ♀♀ 550 - 745 µm long. Setae i1 short, 2 pairs of postgenital sclerites or first pair confluenced into one narrow sclerite, lateral margins of ventrianal shield extended outside. Ventrianal

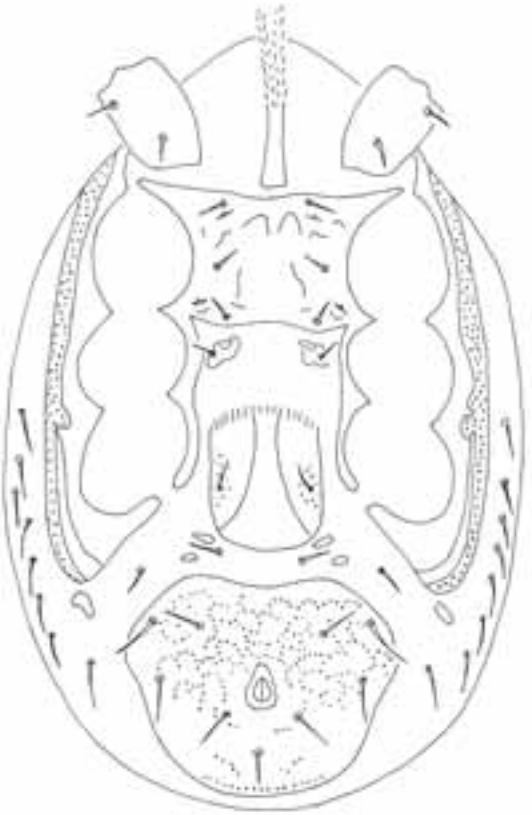

Fig. 10: *Cheiroseius necorniger* - ventral side of female. Scale: 100 μm (according EVANS & HYATT, 1960)

shield bigger, frequently with convex lateral margins, shield caudally getting narrow to wide rounded caudal margin. Ventrianal shield with 4 pairs of setae, bases of i1 closed together.

Geographic distribution: Europe, Africa.

Vertical distribution in Slovakia: Found in lowlands

Ecology: Seldom occurring in arable soils (potatoes), in coasts, black soils, in humus among roots of reed, in wet moss, among roots of Salicornia. Sometimes inhabiting nests of birds: *Acrocephalus arundinaceus, Acrocephalus scirpaceus.*

Habitat preference: Probably preferring wet substrates and decaying plant material (nests) in wet meadows and marshlands.

Published records: Slovakia: 5 ♀♀ in the nest of *Acrocephalus arundinaceus* (Aves), 2 ♀♀ in the nests of *Acrocephalus scirpaceus* (Aves) - without localities (KRIŠTOFÍK, MAŠÁN & ŠUSTEK, 2001).

Specimen depicted: according EVANS & HYATT, 1960

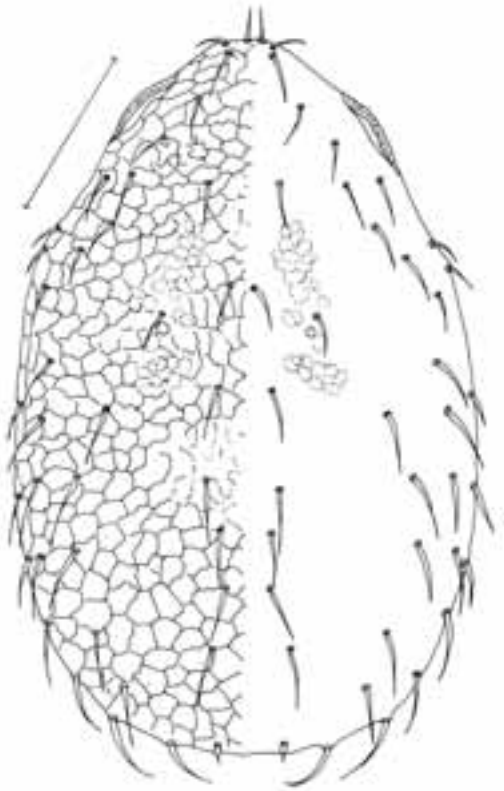

Fig. 11: *Cheiroseius cassiteridium* - dorsal side of female. Scale: 100 μm

Cheiroseius (Posttrematus) cassiteridium

(EVANS & HYATT,1960) (Figs. 11, 12, Pl. 3A)

1960 - EVANS & HYATT, Bull. Brit. Mus. (Nat. Hist.) Zool. 6: 27-101;

Morphology

Peritremes caudally extended, reaching behind coxae IV. Vertical setae i1 very tightly standing together, as long as r1, i1 longer than distance i1 - i1, I4 = 2/3 of distance of I4 - I5. Tarsus I longer than tibia, claws on tarsus I strikingly smaller than claws on legs I-IV. Leg I shorter than idiosoma. Tarsus I two times longer than tibia I, ventrianal shield with 4 pairs of setae, majority of dorsal setae without plinth, caudal setae with small plinths only, I5 shortest wide lanceolated. Peritremes caudally broad but not expressively hooked. Dorsal shield 405 μm long, 262 μm wide, with scale pattern, unclear in central part. Dorsal lateral margins sometimes unequally "indented". Marginal scales in proximal half of shield fronto-caudally prolonged, scales in caudal part bigger than in frontal one. Dorsal setae lanceolate, both in rows I (besides I4) and S reaching following setae. Length of setae: S5 = 45 μm, i1 = 19 μm, I5 = 12 μm long. Sternal shield relatively long, with weak net structure, wearing three pairs of short sternal setae. Two very weakly visible U-shaped, upside down orientated structures on sternal shield. Genital shield slightly rounded caudally, with a little concave lateral margins. Three pairs of small elon-

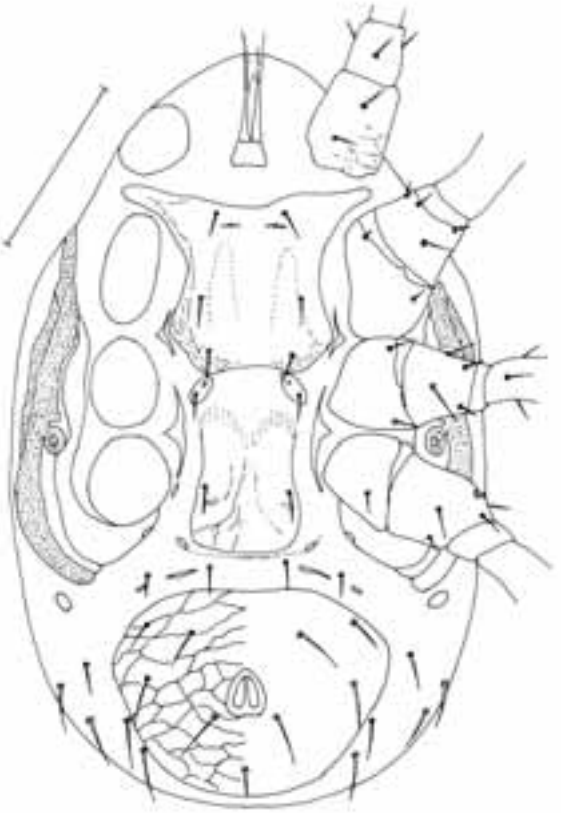

Fig. 12: *Cheiroseius cassiteridium* - ventral side of female. Scale: 100 μm

gate postgenital sclerites. Ventrianal shield big, with gently concave frontal margin, slightly convex posterior lateral margins and rounded caudal margin. Four pairs of setae and net pattern on ventrianal shield. Anal opening situated centrally. Tarsus I 1,5 - 1,75 times longer than tibia. Legs short (leg I 370 - 390 μm long). Idiosoma ♀♀ 435 - 480 μm long.

Geographic distribution: Europe, South America.

Vertical distribution in Slovakia: 110 - 760 m a. s. l.

Ecology: Rare species occurring in the soil among roots, on wet meadows. In Slovakia found in peat - bog, in lowlands in the growth of littoral reed stand (*Phragmitetum*), in floodplain forest of *Salici-Populetum*, but mainly in the nests of birds; *Aythya ferina, Aythya fuligula, Anas platyrhynchos, Circus aeruginosus, Podiceps cristatus, Porzana parva, Ixobrychus minutus* and *Emberiza schoeniclus*, situated in the growth of reed stands. Another interesting findings came from the bird nests of *Fulica atra* and of *Cygnus olor* situated on water level.
Edaphic detricolous species.

Habitat preference: Preferring wet microhabitats with decaying organic material (peat-bog, decaying remains of reed - bed and of other plants, mainly in the bottom parts of the birds' nests).

Published records from Slovakia: Borská nížina lowland: 3 ♀♀, 1 ♂ - 27.5.1997, Jakubov, Jakubovské rybníky (*Aythya ferina*) [7567]; 1 ♀ - 27.5.1997, Jakubov, Jakubovské rybníky (*Aythya fuligula*) [7567]; 9 ♀♀ - 30.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 4 ♀♀ - 25.6.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos)* [7567]; 4 ♀♀ - 27.8.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 12 ♀♀ - 13.12.1997, Jakubov, Jakubovské rybníky (*Circus aeruginosus*) [7567]; 3 ♀♀ - 27.1.1998, Jakubov, Jakubovské rybníky (*Circus aeruginosus)* [7567]; 27 ♀♀ - 4.8.1998, Jakubov, Jakubovské rybníky (*Podiceps cristatus*) [7567]; 1 ♀ - 21.8.1998, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 2 ♀♀ - 23.6.1998, Jakubov, Jakubovské rybníky [7567] (Fenďa, & Schniererová, 2005); **Podunajská rovina lowland:** 10 ♀♀, 3 ♂♂ 3 DN - 17.6.1995, Číčov, Číčovské mŕtve rameno [8272] (Fenďa et al. 1998).

Specimens examined : Oravské Beskydy Mts.: 1 ♀ - 11.7.2001, Mútne village, Hraničný Kriváň, peat - bog [6482]; Podunajská rovina lowland: 2 ♀♀ - 23.6.1997, Číčov, Lyon (*Ixobrychus minutus*) [8272]; 63 ♀♀, 24 ♂♂ 1 DN - 4.6.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769]; 1 ♂ - 4.6.1998, Svätý Jur, NNR Šúr (Aves sp.) [7769]; 8 ♀♀, 2 ♂♂ - 10.6.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769]; 2 ♀♀ - 10.6.1998, Svätý Jur, NNR Šúr (*Cygnus olor*) [7769]; 1 ♀ - 16.6.1999, Číčov, Číčovské mŕtve rameno (*Emberiza schoeniclus*) [8272]; 1 ♀ - 6.8.1998, Svätý Jur, NNR Šúr (*Cygnus olor*) [7769]; **Trnavská pahorkatina wold:** 3 ♀♀ - 10.8.1998, Trnava, Trnavské rybníky [7671].

Specimens revised : Podunajská rovina lowland: 2 ♀♀ - 30.11.1994, Bodíky, Bodícka brána, *Salici-Populetum* [8170], published as *Cheiroseius necorniger* (Kalúz, 1997b);

Specimen depicted: Borská nížina lowland: 27 ♀♀ - 4.8.1998, Jakubov, Jakubovské rybníky (*Podiceps cristatus*) [7567]

Cheiroseius (Posttrematus) curtipes (Halbert, 1923)

(Figs. 13, 14, Pl. 2A)

1923 - Halbert, J. Linn. Soc. (Zool.), London 35: 363-376

Synonyms: *Lasioseius glaber,* var. *curtipes* Halbert, 1923; *Episeius ovaspini* Schweizer, 1949), (? = *Episeius ovaspini* Schweizer, 1949, in Bregetova, 1977)

Morphology

Peritremes caudally extended, hooked and reaching behind coxae IV. Vertical setae i1 unstriking, mainly diagonally and laterally directed, as long as r1 and two times shorter than s1. Dorsal setae s1 long, reaching the bases of i2. Majority of dorsal setae lanceolate, long, mainly in rows I and S reaching following setae, I5 short. Length of setae: I1 = 45 μm, i1 = 12 μm, I5 = 14 μm long. Lateral parts of dorsal shield with scale-shaped structure, scales in central and proximal half of caudal part of shield irregular, with wavy frontal and caudal margins. Sternal shield 452 μm long, 281 μm wide, with fine pattern. Several elongate postgenital sclerites (4-5 pairs). Ventrianal shield big, widest in proximal third, with scale structure, caudally with fine pores. Four pairs of ventrianal setae, lateral margins of ventrianal shield slightly concave in caudal part. Anal opening situated in central part of shield. Female digitus mobilis with 2 teeth. Tarsus I longer than tibia I, claws on tarsus I strikinly smaller than claws on legs II-IV. Leg I shorter than idiosoma, tarsus I not strongly prolonged. Smaller mites with short legs I (375 - 518 μm long). Idiosoma ♀♀ 450 - 529 μm long.

Geographic distribution: Europe, Central and North America.

Vertical distribution in Slovakia: 120 - 810 m a. s. l.

Ecology:

Regularly occurring in wet areas, moss-grown meadows and coastal areas, in humus, moss near springs, wet litter among roots, preferring oozing wetlands and very wet substrat, rotting grass, in the nests of small rodents, in alpine meadows. In Slovakia found in floodplain forests of *Salici-Populetum*, floodplain meadows, littoral reed stand (Phragmition), bank of lake with mesohygrophilous *Typha angustifolia* and grass, in alluvia and banks of brooks with herbaceous vegetation (*Petasites*), in marshland, wet moss and soil, in gravel banks of the rivers, alder

Fig. 13: *Cheiroseius curtipes* - dorsal side of female. Scale: 100 μm

forests, bog - transition mire, bank of brook with *Alnus incana, Picea abies*, in mountain spruce forest, mountain hay meadows, peat - bog, marsh habitats with *Stellario-Alnetum-glutinosae, Filipendulo-Caricetum buekii*, wet meadow (*Molinietum coerulae*), in moss of forest-steppe *Querceto-Crataegetum*, *Querceto-Aceretum*, bank of lake with mesohygrophilous grass, in bird nests of *Anas platyrhynchos, Circus aeruginosus, Podiceps cristatus* and *Aythya fuligula* in littoral reed stands, in nests of *Cygnus olor* (Aves) on water level, in sandy soils with rhizosphere of grass, in leaf litter and soil samples.
Edaphic, detricolous, probably cosmopolitan species.

Habitat preference: Species requiring wet conditions (more than 50 % of average soil moisture) and habitats with decaying organic material.

Published records from Slovakia: Borská nížina lowland: NNR Abrod [7468] (Kalúz & Čarnogurský, 2000, Kalúz, 2003); 2 ♀♀ - 10.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos)* [7567]; 1 ♂ - 27.5.1997, Jakubov, Jakubovské rybníky (*Aythya fuligula*) [7567]; 29 ♀♀, 10 ♂♂ - 25.6.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 40 ♀♀, 5 ♂♂, 2 DN - 23.7.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 18 ♀♀, 1 DN - 27.8.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 4 ♀♀ - 24.9.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 49 ♀♀ - 27.10.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 3 ♀♀ - 13.12.1997, Jakubov, Jakubovské rybníky (*Circus aeruginosus*) [7567]; 1 ♀ - 13.12.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 6.11.1998, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 10.2.1999, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567] (Fenďa & Schniererová, 2005); **Bukovské vrchy Mts.:** 1 ♀ - 19.6.1998, Nová Sedlica, dolina Zbojského potoka (bank of brook) [6901]; 16 ♀♀ - 6.6.1999, Nová Sedlica, dolina Zbojského potoka [6901]; 2 ♀♀, 1 ♂, 1 DN, 1 PN 1 L - 7.6.1999, Uličˇ, Ulička [7000]; 8 ♀♀, 2 DN - 9.6.1999, Stakčín, Ruské

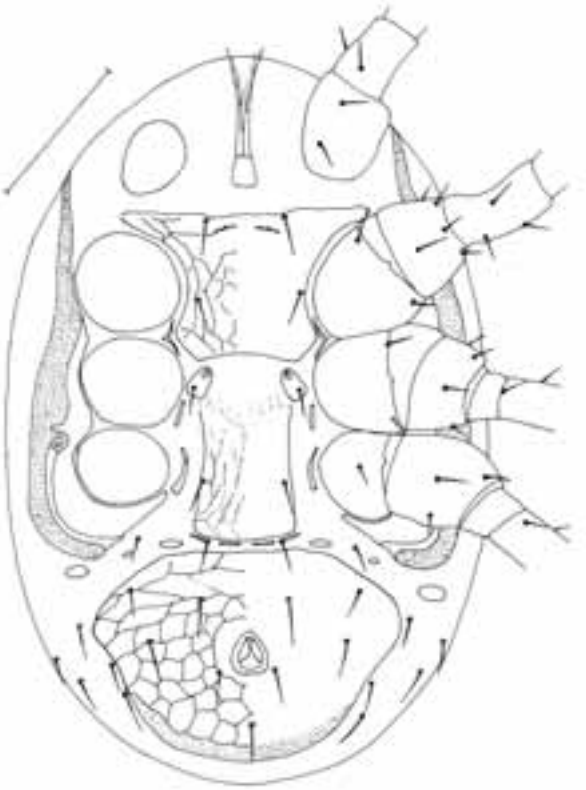

Fig. 14: *Cheiroseius curtipes* - ventral side of female. Scale: 100 μm

[6800]; 15 ♀♀, 2 ♂♂ - 10.6.1999, Runina [6900]; 14 ♀♀, 1 DN - 11.6.1999, Zboj, Stinská slatina [6901]; 1 ♀ - 21.9.1999, Nová Sedlica, Grófske chyžky [6900]; 1 ♀ - 24.9.1999, Ruský Potok, pod Poloňom [6900] (Fenďa & Mašán, 2003); **Malé Karpaty Mts.:** NNR Devínska Kobyla [7867]; NR Devínska lesostep [7867]; Devín, Fialková dolina [7868]; Štokeravská vápenka [7768] (Kalúz, 2005b); **Ondavská vrchovina highland:** Ruská Poruba [6896] (Mrciak, 1963 as *Episeius ovaspini = Seius curtipes* Halbert); Podunajská rovina lowland: Bodícka brána [8070] (Kalúz, 1997b); Slovenský kras karst: Jašteričie jazierko [7489] (Kalúz, 1994e, 1995a); **Tríbeč Mts.:** Solčany, Úkropová [7475] (Ambros, 1990).

Specimens examined: Borská nížina lowland: 3 ♀♀ - 28.8.1996, Devínske jazero, Temreis, meadow [7767]; 1 ♀ - 14.3.1997, Devínske jazero, Temreis [7767]; 2 ♀♀ - 4.7.1997, Devínske jazero, Temreis [7767]; 3 ♀ - 20.8.1997, Devínske jazero, Temreis [7767]; 4 ♀ - 28.8.1996, Devínske jazero, [7667]; 1 ♀ - 14.3.1997, Devínske jazero [7667]; 12 ♀♀ - 25.4.1997, Devínske jazero [7667]; 4 ♀♀ - 4.7.1997, Devínske jazero [7667]; 5 ♀♀ - 3.6.1998, Malacky, Štvrtý rybník [7568]; 1 ♀ - 30.6.1999, Závod, NNR Abrod, *Molinietum coerulae* [7468]; 1 ♀ - 10.8.1999, Závod NNR Abrod, swamp meadow [7468]; **Kysucké Beskydy Mts.:** 2 ♀♀ - 1.7.1997, Nová Bystrica, Chmúra [6680]; **Nízke Tatry Mts.:** 1 ♀ - 24.6.2005, Ipoltická dolina valey, [7085]; 1 ♀ - 23.6.2005, Dolina Čierneho Váhu valey [6985]; 1 ♀ - 22.6.2005, Sopotnická dolina valey [7182]; **Podunajská rovina lowland:** 2 ♀♀, 2 DN - 6.8.1998, Svätý Jur, NNR Šúr (*Cygnus olor*) [7769]; **Turzovská vrchovina highland:** 3 ♀♀, 1 DN - 2.7.1997, Korňa (soil) [6577]; **Oravské Beskydy Mts.:** 2 ♀♀ - 1.7.2001, Hraničný Kriváň, [6482];

Specimens revised: Nízke Tatry Mts.: 5 ♀♀ - 4.6.1997, 6 ♀♀ 10.6.1998, Chopok Mt., northern slope [7083], published as *Cheiroseius necorniger* (Kalúz, 2005a); **Podunajská rovina lowland**: 4 ♀♀ - 30.11.1994, Bodíky, Bodícka brána, Salici-Populetum [8170], published as *Cheiroseius necorniger* (Kalúz, 1997b); **Slovenský kras karst:** 2 ♀♀ - 27.7.1987, Silica, Jašteričie jazierko [7489], published as *Cheiroseius necorniger* (Kalúz, 1994e, 1995a); 1 ♀ - 16.9.1987, Silica, Jašteričie jazierko [7489], published as *Cheiroseius necorniger* (Kalúz, 1994e, 1995a); 1 ♀ - 21.10.1987, Silica, Jašteričie jazierko [7489], published as *Cheiroseius necorniger* (Kalúz, 1994e, 1995a); 1 ♀ - 27.7.1987, Silica, NNR Pod Fabiankou [7489], published as *Cheiroseius necorniger* (Kalúz, 1994e, 1995a); 1 ♀ - 16.9.1987, Silica, NNR Pod Fabiankou [7489], published as *Cheiroseius necorniger* (Kalúz,1994e, 1995a).

Specimen depicted: Podunajská rovina lowland: 1 ♀ - 30.11.1994, Bodícka brána [8070] (Kalúz, 1997b)

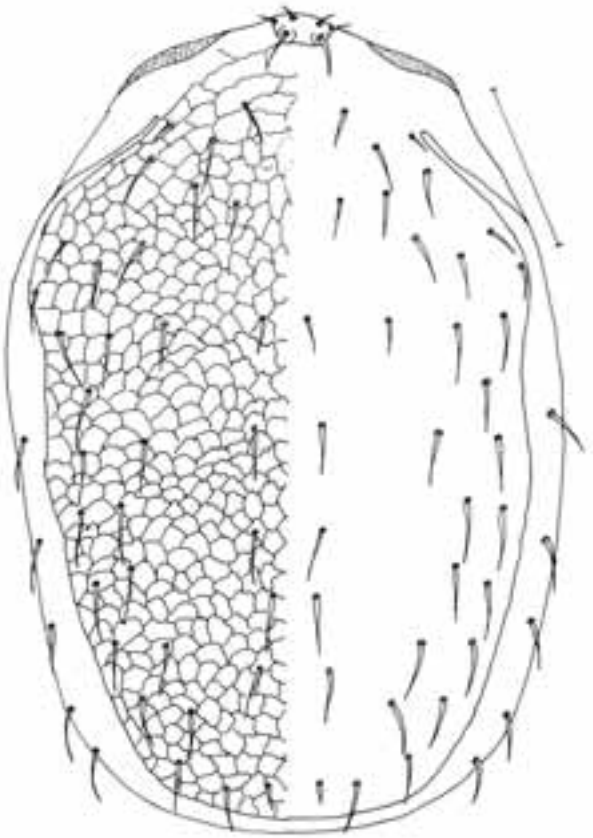

Fig. 15: *Cheiroseius salicorniae* - dorsal side of female. Scale: 100 μm

Cheiroseius (Posttrematus) salicorniae (WILLMANN, 1949)

(Figs. 15, 16, Pl. 2B)

1949 - WILLMANN, Ver. Mus. Nat. Bremen 1: 106-135

Morphology

Peritremes caudally extended, wide, slightly hooked and reaching behind coxae IV. Vertical setae i1 short, as long as r1 (i1 = 1 s1), unstriking, mainly diagonally and laterally directed. Setae s1 (= 40 μm long) shorter than distance of s1 - s2 (= 40 μm long), dorsal shield 471 μm long, 293 μm wide, with strong scale structure. Very wide scale pattern in frontal part of dorsal shield, scales in medial and central part of shield of normal shape, but heading frontally. Dorsal lanceolate setae relatively short, not reaching following setae. I5 very short, bilatelarly lanceolate. Length od setae: I3 = 34 μm, i1 = 10 μm, I5 = 12 μm long. Sternal shield with pattern, but without line structure. Genital shield wider in caudal part, with strait caudal margin and several postgenital sclerites (4-5 pairs). Ventrianal shield big, wearing 4 pairs of setae, shield with scale pattern. Shield with concave anterior margin, posteriorly with concave lateral margins, caudal part of shield dotted and rounded. Anal opening situated in proximal part of caudal half of ventrianal shield. Four pairs of free ventral setae. Coxae of leg I with scale pattern. Tarsus I longer than tibia I, claws on tarsus I strikinly smaller than ones on legs II-IV. Leg I shorter than idiosoma, tarsus I not strongly prolonged. Leg I

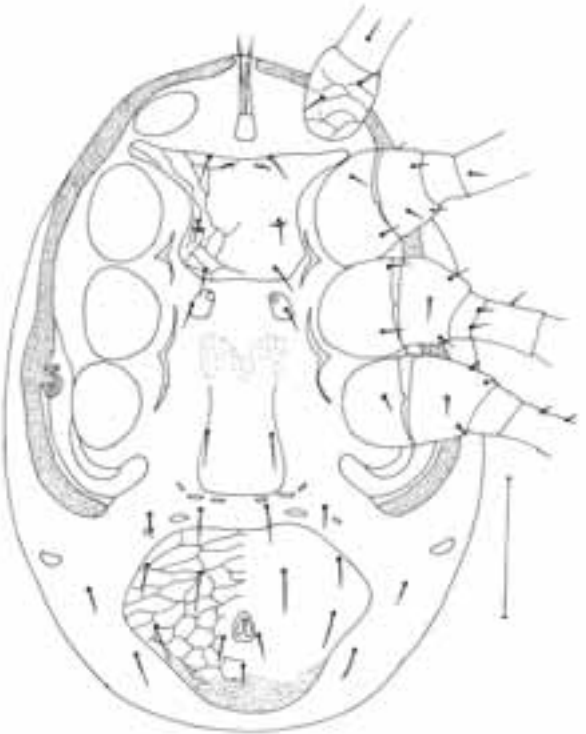

Fig. 16: *Cheiroseius salicorniae* - ventral side of female. Scale: 100 μm

520 μm, Tarsus I 130 μm, Tibia I 90 μm, leg II 440 μm, leg III 400 μm, leg IV 540 - 580 μm long. Idiosoma ♀♀ 488 - 580 μm.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 120 - 610 m a. s. l.

Ecology: Rare European mite, occurring in wet, salty soils of meadows. In Slovakia found in lowland floodplain forest of *Salici-Populetum*, wet meadow (*Molinietum coerulae*) on sandy soils, wet bank of lake (*Typha angustifolia*) on limestones, in gravel banks of the river, rhizosphere of grass with sand. Edaphic detricolous species with the areal of distribution in large part of Europe.

Habitat preference: Species with the preference to very wet habitats (KARG, 1993), strongly requiring high soil moisture and decaying plant material.

Published records from Slovakia: **Bukovské vrchy Mts.:** 2 ♀♀ - 7.6.1999, Uličˇ, Uličˇka [7000] (FENĎA, 2002; FENĎA & MAŠÁN, 2003);

Specimens revised: **Borská nížina lowland:** 1 ♀ - 24.5.1999, Závod, NNR Abrod, wet meadow [7468]; **Podunajská rovina lowland:** 2 ♀♀ - 30.11.1994, Bodíky, Bodícka brána, *Salici-Populetum* [8170], published as *Cheiroseius necorniger* (KALÚZ, 1997b); **Slovenský kras karst:** 2 ♀♀ - 27.7.1987 Jašteričie jazierko, wet bank od pond [7489], published as *Cheiroseius necorniger* (KALÚZ, 1994e, 1995a).

Specimen depicted: Borská nížina lowland: 1 ♀ - 24.5.1999, Závod, NNR Abrod

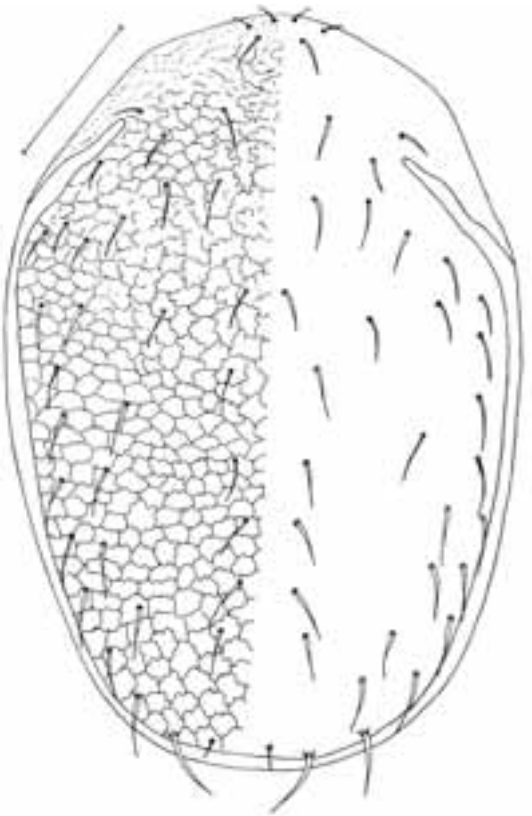

Fig. 17: *Cheiroseius longipes* - dorsal side of female. Scale: 100 μm

Cheiroseius (Posttrematus) longipes (WILLMANN, 1951)

(Figs. 17, 18, Pl. 4A)

1951 - WILLMANN, Sitz. Oest. Akad. Math Nat. Kl. Abt. 160: 91-176

Morphology

Peritremes very wide (10% of the width of idiosoma), caudally extended, hooked and reaching behind coxae IV. Vertical setae i1 unstriking, mainly diagonally and laterally directed, as long as r1 and two times shorter than s1. Frontal part of sternal shield in some specimens with m-shaped structure. Dorsal shield 467 μm long, 305 μm wide, with different patterns, frontally dotted only, central and caudal parts with wavy scales, other parts of dorsal shield with normal scale-shaped structure. Dorsal setae 30 - 37 μm long, I1, I2 and I3 not reaching the bases of the following setae, setae I4 shorter than 1/2 of the distance between I4 - I5, setae Z5 = 45- - 50 μm long, i1 = 12 μm, I5 = 12 μm long. Sternal shield with weak net pattern, wearing m-shaped structure medio-frontally. Genital shield with parallel lateral margins and strait caudal margin. Two pairs of elongate postgenital sclerites in line. Ventrianal shield oval, a little wider than long, with strait proximal, rouded and dotted caudal margin and slightly concave lateral margins caudally. Expressive net structure and 4 long setae on ventrianal shield. Big, elongate anal opening situated centrally. One pair of small adanal lateral sclerites. Lateral and caudal ventral setae lanceolate. Other free ventral setae (4 pairs) needle-shaped. Leg I = maximal 1

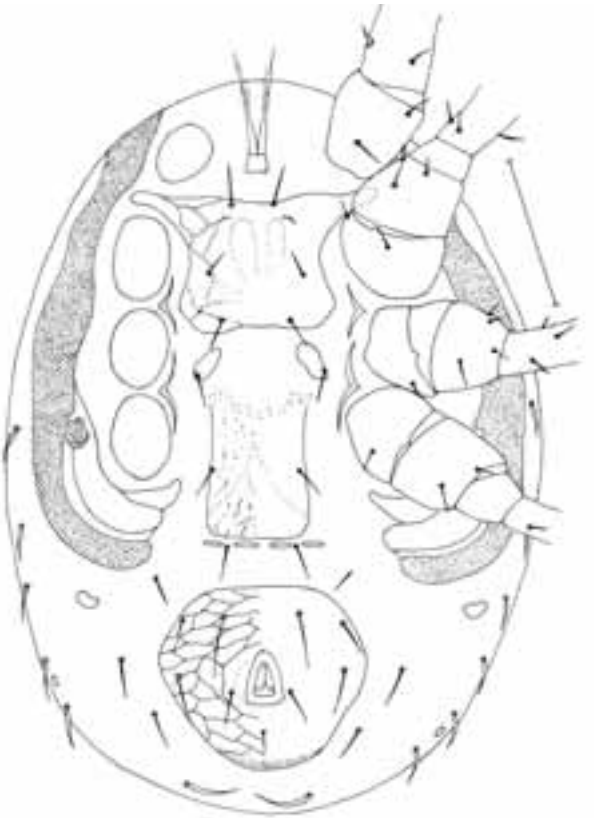

Fig. 18: *Cheiroseius longipes* - ventral side of female. Scale: 100 μm

1/3 of the length of idiosoma. Tarsus I shorter than Tibia I. Leg I strikingly longer than idiosoma. Coxae without pattern. Leg I 620 - 700 μm long, idiosoma ♀♀ 460 - 550 μm long.

Geographic distribution: Central Europe.

Vertical distribution in Slovakia: 120 - 760 m a. s. l.

Ecology: Rare species, seldom occurring in meadow soils, occurring in wet areas, in wet moss, between wet plant roots. In Slovakia found in lowland floodplain forests of *Salici-Populetum*, wet floodplain *Salici-Populetum* with *Leucojum aestivum*, in wet soil of bank of lake with *Typha angustifolia* and grass (pasture), in mountain peat - bog.

Rare Central European mite belonging to edaphic and detricolous species.

Habitat preference: Preferring wet marsh habitats with high soil moisture (more than 50 %) and decaying organic material.

Published records from Slovakia: Borská nížina lowland: 1♀ - 14.9.1999, Závod village, NNR Abrod, wet meadow, *Molinietum coerulae* [7468] (Kalúz & Čarnogurský 2000; Kalúz 2003);

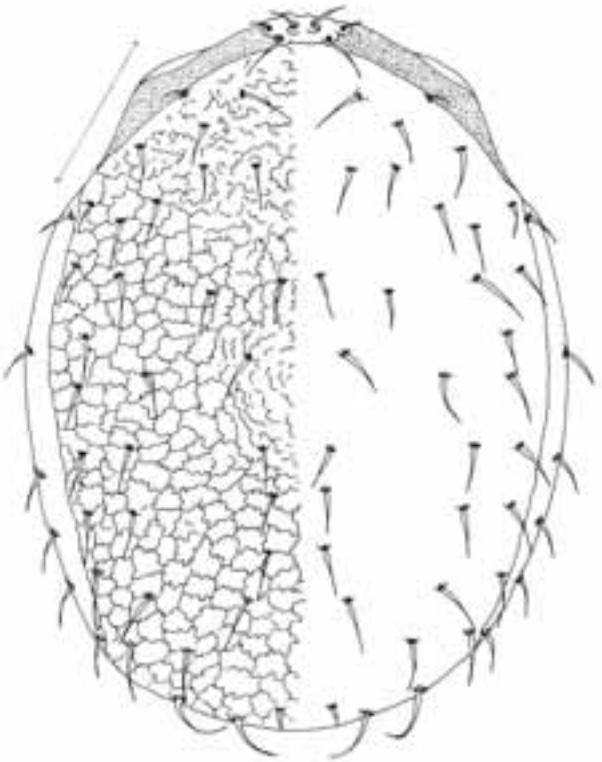

Fig. 19: *Cheiroseius mutilus* - dorsal side of female. Scale: 100 μm

Specimens examined: Podunajská rovina lowland: 1 ♀ - 17.4.1989, Gabčíkovo, Istragov, *Salici-Populetum* [8171]; 1 ♀ - 14.10.1991, Bodíky, Bodícka brána, *Salici-Populetum* [8070]; **Oravské Beskydy Mts.:** 1♀, 1 ♂ - 11.7.2001, Mútne village, Hraničný Kriváň, peat - bog [6482];

Specimens revised: Podunajská rovina lowland: 1 ♀ - 17.6.1991, Trstená na Ostrove, Kráľovská lúka, *Salici-Populetum* [8170], published as *Cheiroseius necorniger* (KALÚZ 1994b); 1 ♀ - 24.11.1994, Trstená na Ostrove, Kráľovská lúka, *Salici-Populetum* [8170], published as *Cheiroseius necorniger* (KALÚZ 1994b); **Slovenský kras karst:** 1 ♀ - 27.7.1987 Jašteričie jazierko [7489], published as *Cheiroseius necorniger* (KALÚZ 1994e, 1995a),.

Specimen depicted: Borská nížina lowland: 1 ♀ - 14.9.1999, Závod, NNR Abrod

Cheiroseius (Posttrematus) mutilus (BERLESE, 1916)

(Figs. 19, 20, Pl. 4B)

1916 - BERLESE, Redia, Firenze, 12

Synonyms: *Sejus serratus* (EVANS & HYATT, 1960)

Morphology

Peritremes wide, caudally extended, hooked and reaching behind coxae IV. Vertical setae i1 normal, unstriking, mainly diagonally and laterally directed, longer than r1. Tarsus I shorter than tibia I. Leg I strikingly longer than idiosoma, leg I = maximal 1 1/3 of the length of idiosoma. Dorsal shield 440-570 μm long, 280 - 350 μm wide. Dorsal setae longer, I1, I2 and I3 outgrow the

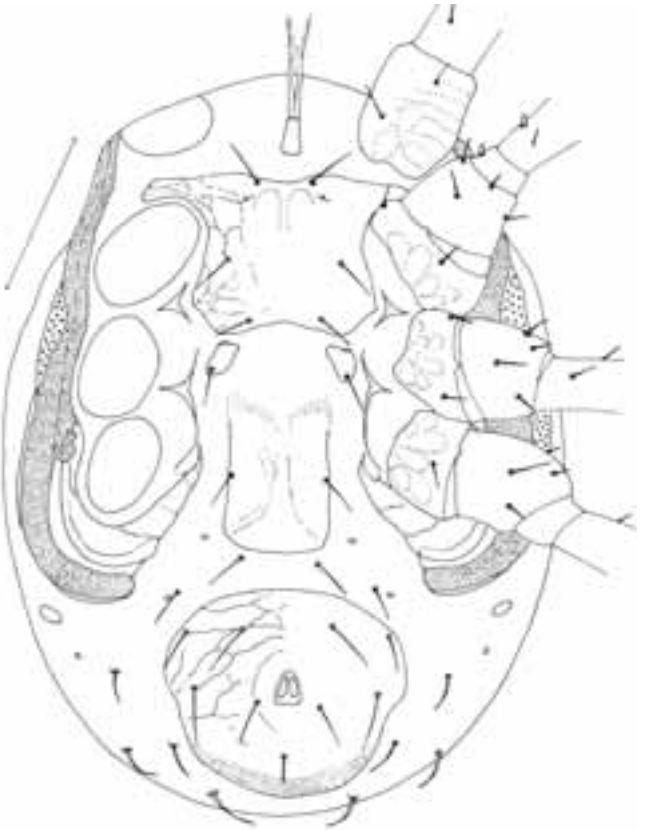

Fig. 20: *Cheiroseius mutilus* - ventral side of female. Scale: 100 μm

basis of following setae. I4 longer than 1/2 of the distance I4 - I5, Z5 = 40 - 60 μm long, r1 = 24 μm, I5 = 12 μm long. Dorsal setae mostly 48 - 50 μm long, their bases on small bumps. Dorsal shield with strong net-ledge pattern, undistinct in proximal 1/3 of dorsal shield and in central part of dorsal shield. Ventrianal shield rouded, wider than long in proximal half, with concave posterior lateral margins and dotted caudal margin. Sternal shield laterally with pattern, frontal part of sternal shield in some specimens with badly visible m-shaped pattern sometimes resembling a pair of rounded marks. Mostly three pairs of small postgenital sclerites. All coxae with gentle pearl-shaped pattern. Ventrianal shield with 4 pairs of setae and with smarty rounded lateral margins. Female digitus fixus with fine indented, slice at the level of pilus dentilis. Tarsus I shorter than tibia I. Leg I strikingly longer than idiosoma, leg I = maximal 1 1/3 of the length of idiosoma. Idiosoma ♀♀ 500 - 550 μm, ♂♂ 360 μm long.

Geographic distribution: Europe, North America.

Vertical distribution in Slovakia: 110 - 760 m a. s. l.

Ecology: Rare European mite with wide zoogeographic areal. Seldom occurring in meadow soil, soil with lucerne, scarce in wet sites; in humus among roots, in subsoils with rotten deciduous leaves, in *Sphagnum*. In Slovakia found in littoral reed stand (Phragmition), wet moss and soil, marshland, gravel banks of the river, lowland floodplain forest of *Salici-Populetum*, alluvia of

brooks, alder forests, mountain hay meadows, peat - bog, beech forest (*Fagion sylvaticae*), rhizosphere of grass with soil and sand, leaf litter and soil detritus, in soil samples. Frequently found in birds' nests; nests of *Anas platyrhynchos, Aythya ferina, Podiceps cristatus, Ixobrychus minutus, Acrocephalus arundinaceus* and *Emberiza schoeniclus* in lowland littoral reed stand (Phragmition) of SW Slovakia.
Considered as an edaphic, detricolous species, widely distributed in various habitats, the species with apparent affinity to the wet plant material in the bottom of bird nests situated mainly on the ground.

Habitat preference: Preferring from wet to mildly wet subsoils, mainly with sufficient ammount of decaying plant material.

Published records from Slovakia: Borská nížina lwland: 8 ♀♀, 5 DN - 27.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 2 ♀♀ - 27.5.1997, Jakubov, Jakubovské rybníky (*Aythya ferina*) [7567]; 3 ♀♀, 1 PN - 27.10.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 2 ♀♀ - 4.8.1998, Jakubov, Jakubovské rybníky (*Podiceps cristatus*) [7567] (Fenďa & Schniererová 2005); **Bukovské vrchy Mts.:** 1 ♀ - 7.6.1999, Uličˇ, Uličˇka [7000]; 2 ♀♀, 1 DN - 21.9.1999, Nová Sedlica, Grófske chyžky [6900] (Fenďa 2002; Fenďa & Mašán 2003); 6 ♀♀, 1 ♂ - 6.6.1999, Nová Sedlica, dolina Zbojského potoka [6901]; 1 ♀ - 11.6.1999, Uličské Krivé, NNR Rožok [7000]; 12 ♀♀ - 9.6.1999, Stakčín, Ruské [6800]; 1 ♀ - 24.9.1999, Ruský Potok, pod Poloňom [6900] (Fenďa & Mašán 2003); **Podunajská rovina lowland:** 1 ♀ - 18.6.1995, Gabčíkovo, Malé Vranie [8171] (Fenďa et al. 1998 as *Cheiroseius necorniger* (Oudemans, 1903); Fenďa 2002 revised); 2 ♀♀ - 23.6.1997, Číčov, Lyon (*Ixobrychus minutus*) [8272] (Fenďa 2002).

Specimens examined: Podunajská rovina lowland: 1 ♀ - 16.6.1999, Číčov, Číčovské mŕtve rameno (*Emberiza schoeniclus*) [8272]; **Oravské Beskydy Mts.:** 1 ♀ - 11.7.2001, Hraničný Kriváň, [6482]; **Turzovská vrchovina highland:** 3 ♀♀ - 2.7.1997, Korňa (soil) [6577].

Specimen depicted: Bukovské vrchy Mts.: 1 ♀ - 9.6.1999, Stakčín, Ruské [6800]

Cheiroseius (Posttrematus) serratus (Halbert, 1915)

(Figs. 21, 22, Pl. 3B)

1915 - Halbert, Proc. Roy Iirish. Acad. 31: 45-136

Synonyms: (*Platyseius serratus* sensu Westerboer, 1963, non *Sejus serratus* sensu Evans et Hyatt, 1960)

Morphology

Peritremes wide, caudally extended, hooked and reaching behind coxae IV. Vertical setae i1 unstriking, mainly diagonally and laterally directed, as long as r1. Claws on leg I smaller than claws on legs II-IV. Distal part (half) of digitus fixus armed with row of big denticles ("serratus"). Lateral margins of dorsal shield slightly serrate, dorsal shield 448 - 500 μm long and 290 - -304 μm wide. Dorsal setae relatively short, sitting on small bumps, setae in the row I not reaching the bases of following setae, I3 sometimes reach I4 only, S3 = 34 μm, r1 = 12 μm and I5 is the shortest (7 μm long). Lateral dorsal setae a little stronger. Z5 not remarkably long, its base mostly not on bump. Dorsal shield with an interesting pattern creating expressively crater-shaped structure medio-laterally, irregular pattern proximally, centrally and caudally. Second third of caudal part of dorsal shield with a typical strong net ledge. Sternal shield laterally with pattern, front part of sternal shield in some specimens with m-shaped pattern mostly resembling a pair of rounded marks. Female genital shield caudally straight, with parallel lateral margins. Ventrianal shield smaller, rounded, as wide as long (120 -130 μm), two times wider than genital one, wearing 4 pairs of setae. Coxae with expressive pearl-shaped pattern. Tarsus I

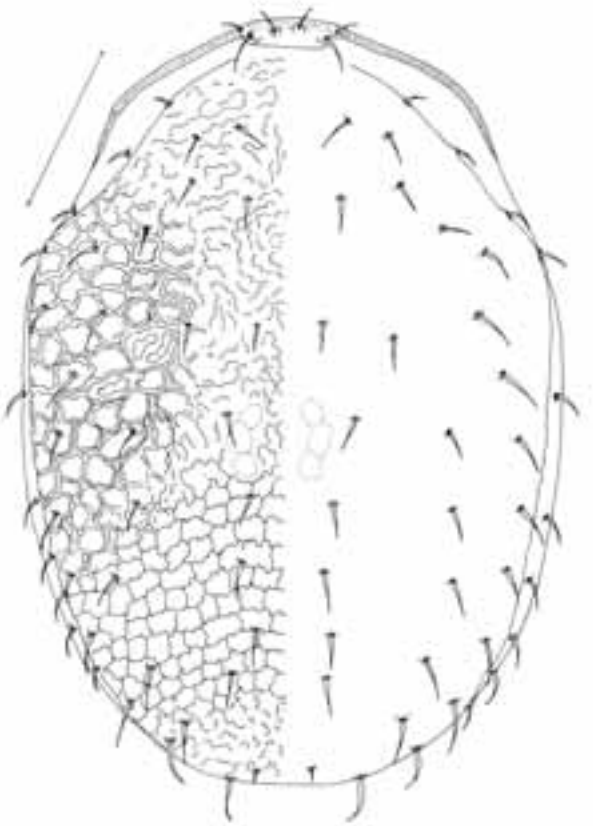

Fig. 21: *Cheiroesius serratus* - dorsal side of female. Scale: 100 μm

shorter than tibia I. Leg I generally as long as idiosoma or shorter (seldom longer - 530 μm long), legs II-III-IV always shorter (420 - 320 - 400 μm long respectively). All setae on legs II-IV thin. Leg I 450 - 500 μm long, idiosoma ♀♀ 445 - 500 μm ♂♂ 330 μm long.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 150 - 760 m a. s. l.

Ecology: Scarcely occurring in wet pine forests, meadow soil, sea shore; in *Sphagnum,* in moss among grass, in decaying straw, preferring clayey and black soils. In Slovakia found in lowland reed stands (Phragmition), nest of *Anas platyrhynchos*, gravel banks of the river, rhizosphere of grass with sand, in moss and peat - bogs. Phoretic mite on Diptera (Nematocera) Edaphic detricolous species.

Habitat preference: Strongly hygrophilous species, preferring mainly moss and very wet decaying plant material.

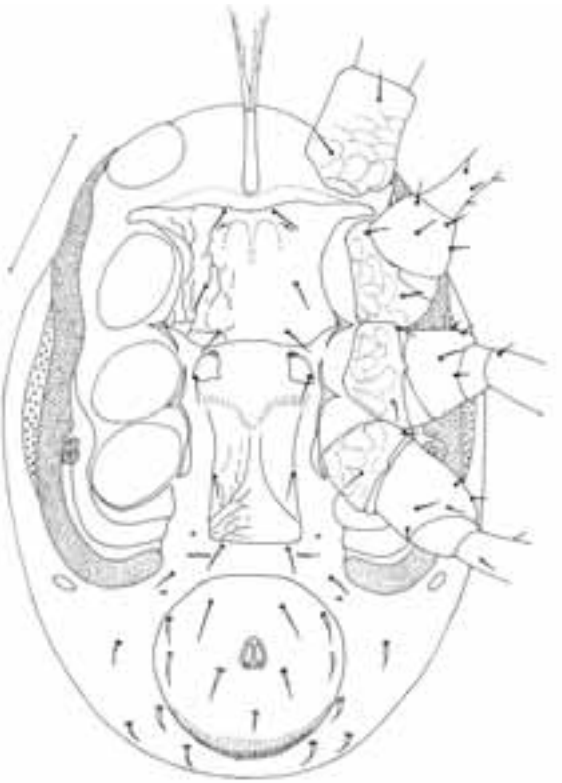

Fig. 22: *Cheiroseius serratus* - ventral side of female. Scale: 100 μm

Published records from Slovakia: Borská nížina lowland: 1♀ - 27.8.1997, Jakubov, Jakubovské rybníky [7567] (Fenďa & Schniererová 2005); **Bukovské vrchy Mts.:** 4 ♀♀, 1 ♂ - 7.6.1999, Uličˇ, Ulička [7000] (Fenďa & Mašán 2003); **Kysucké Beskydy Mts.:** 5 ♀♀, 1 ♂ - 1.7.1997, Nová Bystrica, Chmúra [6680] (Fenďa 1999).

Specimens examined: Oravské Beskydy Mts.: 11 ♀♀ 11.7.2001, Mútne village, Hraničný Kriváň, peat - bog [6482];

Specimen depicted: Borská nížina lowland: 1 ♀ - 27.8.1997, Jakubov, Jakubovské rybníky [7567] (Fenďa & Schniererová 2005)

Subgenus *Cheiroseius* Berlese, 1916

Type species: *Sejus viduus* C. L. Koch, 1839

Diagnosis

Peritremes caudally not or very little enlarged behind stigmae, the extension is mainly slender and straight, never distinctly reaching behind coxae IV. Vertical setae i1 strikingly apically directed, sometimes longer than other dorsal setae, i1 together with setae r1 sitting on at fore standing vertex.

Cheiroseius (Cheiroseius) viduus C. L. Koch, 1839

(Figs. 23, 24, Pl. 5A)

1839 - Koch, Fasc. 27, F. Putset, Regensburg

Synonyms: *Epicrius corniger* (Berlese, 1891); *Episeiella heteropoda* (Willmann, 1938)

Morphology

Peritremes broad, but caudally not or very little enlarged behind stigmae, caudal part of peritremes not hooked and never distinctly reaching behind coxae IV. Vertical setae i1 the longest in comparison to other dorsal setae (i1 nearly 1 1/2 times longer than i2), strikingly apically directed, together with setae r1 and s1 sitting on at fore standing vertex. Tarsus I without claws. Dorsal shield 498 μm long, 317 μm wide, with strong, net-shaped pattern in proximal and caudal third, irregular in medial part. Dorsal setae curved, lanceolate, sitting on expressive bumps, i1 = 67 μm, r1 = 17 μm, l5 = 9 μm long. Lateral margins of dorsal shield irregularly serrate. All ventral shields with net pattern. Medio-frontal elongate pattern on sternal shield braid-shaped, broader in frontal part. Female genital shield with nearly parallel lateral margins, ventrianal shield with 4 pairs of setae, one pair longer than other ones. Two pairs of small, elongate postgenital sclerites in line. Anal opening small, situated in proximal half of ventrianal shield. Majority of free ventral setae slightly lanceolate. Coxae I with pearl-shaped pattern, other coxae nude. Tectum with 3 prongs. Idiosoma ♀♀ 530 μm, ♂♂ 375 μm long.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 120 - 550 m a. s. l.

Ecology: Scarce species occurring in wet meadow soils, in alder lumber, in wood litter, among grass roots, in mos, in the nests of small rodents. In Slovakia found in lowland floodpalin forests of *Salici-Populetum* with *Leucojum aestivum*, floodplain meadows, meadow mountain hay meadow, alder forest with *Fraxinus sp*., frequently in the nests of *Anas platyrhynchos* in reed stands of SW Slovakia, in rhizosphere of grass and other herbs, in soil samples.

Considered as an edaphic detricolous species occurring mainly in lowlands and submountain areas.

Habitat preference: Requiring from wet to mildly wet conditions, soils mainly with rich root system or decaying plant material (bottom parts of the nests on ground).

Published records from Slovakia: Borská nížina lowland: 1 ♀ - 27.8.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 24.9.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 3 ♀♀ - 24.9.1997, Jakubov, Jakubovské rybníky (soil) [7567]; 1 ♀ - 27.10.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 6.11.1998, Jakubov, Jakubovské rybníky (Anas platyrhynchos) [7567]; 2 ♀♀ - 10.2.1999, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 15.4.1999, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567] (Fenďa & Schniererová 2005); **Bukovské vrchy Mts.:** 1 ♀ - 22.9.1999, Zboj, Oblazy [6900] (Fenďa & Mašán 2003); **Štiavnické vrchy Mts.**: 12.5.1932, Vyhnianska dolina (= Vihnyei völgy) [7478] (Willmann 1938, as E*piseiella heteropoda* Willmann, 1938); **Podunajská rovina lowland**: Istragov [8171] (Kalúz 1993b, 1995b); Bodícka brána [8070] (Kalúz 1997b).

Specimens examined: Turzovská vrchovina highland: 1 ♀ - 2.7.1997, Korňa (soil) [6577]. **Borská nížina lowland:** 1 ♀ - 26.7.1996, Devínske jazero, Bratislava [7767]; **Podunajská rovina lowland:** 1 ♀ - 20.7.1989, Gabčíkovo, Istragov, *Salici-Populetum* [8171]; 1 ♀ - 26.8.1992, Bodíky, Bodíska brána, *Salici-Populetum* [8070];

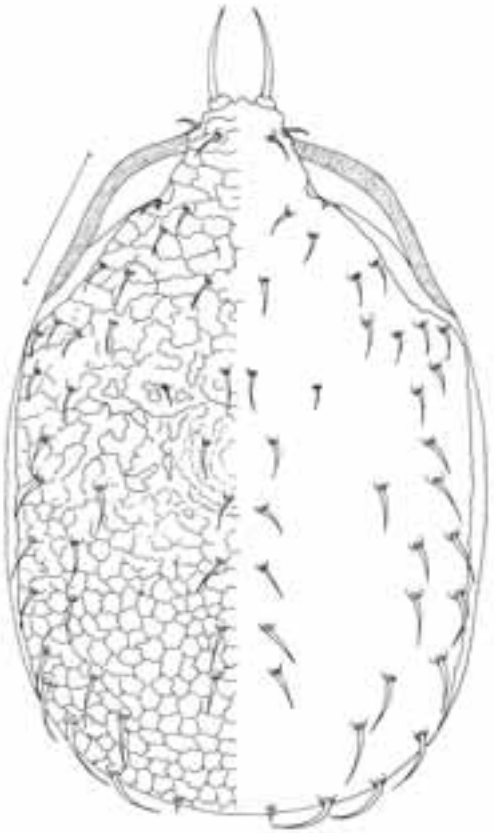

Fig. 23: *Cheiroseius viduus* - dorsal side of female. Scale: 100 μm

Specimen depicted: Borská nížina lowland: 1 ♀ - 26.7.1996, Devínske jazero, Bratislava

Cheiroseius (Cheiroseius) borealis (Berlese, 1904)

(Figs. 25, 26, Pl. 5B)

1904 - Berlese, Redia, Firenze 2: 154-176;

Synonyms: *Episeius montanus* (Willmann, 1949)

Morphology

Peritremes caudally not or very little extended behind stigmae, never distinctly reaching behind coxae IV. Peritremes from stigma with short, narrow, strait and caudally striking projection. Vertical setae i1 long, strikingly apically directed, together with setae r1 on at fore standing vertex. Vertical setae i1 (45 μm long) longer than i2 (not change with s1!!!). Dorsal shield 517 μm long, 338 μm wide, with scale-shaped structure, pattern irregular centrally. Scales in caudal part very wide, with wavy frontal and caudal margins. Dorsal setae needle-shaped, slightly curved, sitting on expressive bumps. Setae relatively long, reaching following setae in caudal part of shield mainly in rows I and S, Z; S4 = 60 μm, i1 = 43 μm, r1 = 24 μm, l5 = 14 μm long. Two

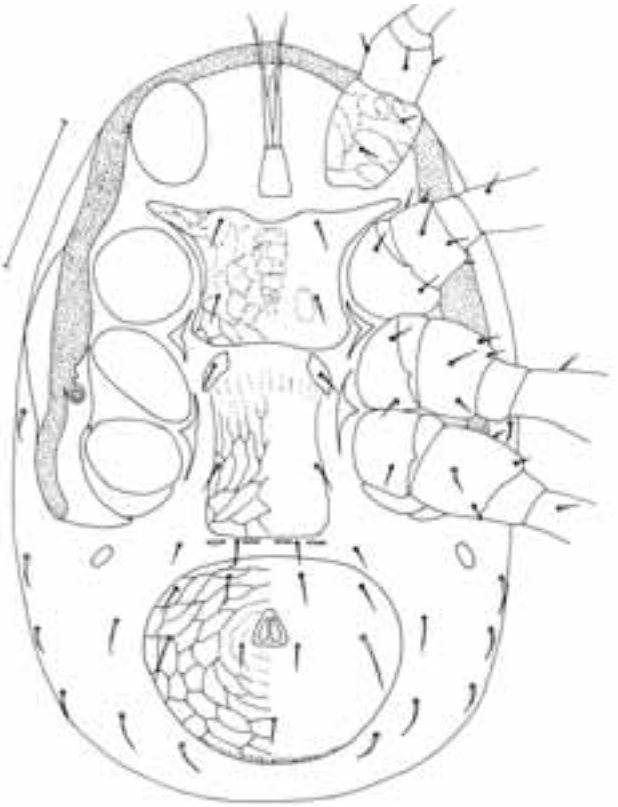

Fig. 24: *Cheiroseius viduus* - ventral side of female. Scale: 100 μm

pairs of big pores on dorsal shield, first one laterally in the neighbour of i4-i5, second one at the level of I4-Z4. Sternal shield with net pattern, medio-frontal braid-shaped structure on sternal shield elongate, reaching to 2/3 of shield. One pair of small praesternal sclerites. Genital shield wider in proximal part, with strait caudal margin and with expressive pattern on surface. Ventral side with 2-3 pairs of small postgenital sclerites. Ventrianal shield oval, proximally strait, caudally rounded, with 5 pairs of setae and latero-proximally with one pair of pores. Small dot pattern on caudal margin of ventrianal shield. Anal opening situated in proximal half of ventrianal shield. Tarsus I with claws, but in majority of specimens the claws are smaller than claws in other legs. Leg I 530 - 580 μm long. Idiosoma ♀♀ 490 - 580 μm long.

Geographic distribution: Europe, North America, North Caucasus.

Vertical distribution in Slovakia: 115 - 1030 m a. s. l.
Ecology: Rare Palearctic species, but regularly occurring in meadow soil, in fallow arable soils, in soils with lucerne, seldom in cattle excrements and in mixed woods, especially in black soils, wet and humose soil, in mouldering litter, in reed remnants, in moss, in the nests of small rodents, in old trunks; preferring subsoils from mildly to wet. Rare species in Slovakia; found in spruce forest, beech forest (*Abieti-Fagetum)*, *Querceto- Aceretum*, mesophilous pasture, arable

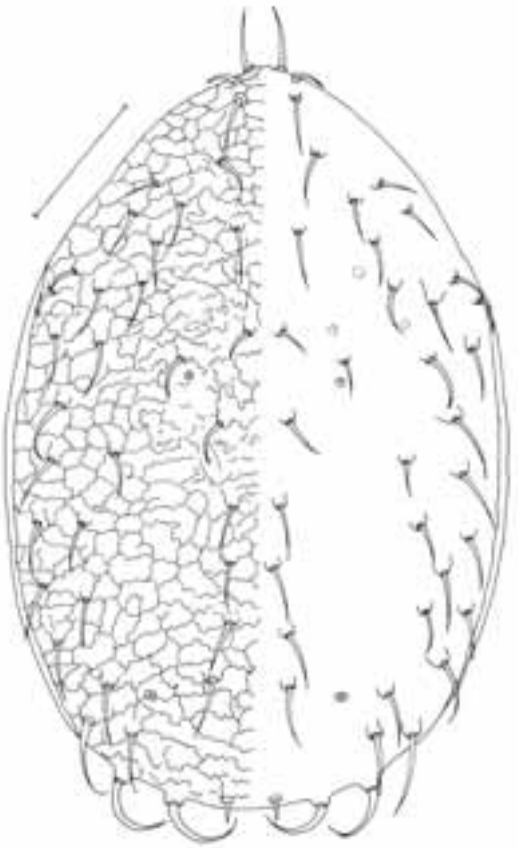

Fig. 25: *Cheiroseius borealis* - dorsal side of female. Scale: 100 μm

soil, floodplain forest of *Salici-Populetum, Populetum*, wet meadow (*Molinietum coerulae potentiletosum albae*), *Molinietum coerulae, Caricetum goodenowii*, in bird nests of *Anas strepera, Turdus philomelos* and *Turdus merula*, in rhizosphere of grass, soil samples, leaf litter and soil detritus.

Considered as an edaphic detricolous species.

Habitat preference: Preferring mildly wet or wet conditions with higher ammount of organic material (black soils, roots, detritus, decaying leaf litter).

Published records from Slovakia: **Borská nížina lowland:** Jakubov, Jakubovské rybníky (*Anas strepera*) [7567] (Ambros et al. 1992); NNR Abrod [7468] (Kalúz & Čarnogurský 2000, Kalúz 2003); Bukovské vrchy Mts.: 9 ♀♀, 1 PN - 19.6.1998, Nová Sedlica, dolina Zbojského potoka (pasture) [6901]; 1 ♀ - 24.9.1999, Ruský Potok, Kamenistý [6900]; 1 ♀ - 25.9.1999, Nová Sedlica, Stinská Mt. [6901] (Fenďa & Mašán 2003); **Malé Karpaty Mts.:** Devín, Fialková dolina [7868] (Kalúz 2005b); **Východoslovenská pahorkatina wold**: Trhovište, Dražkové [7297] (Kováč et al. 1999); **Západné Tatry Mts.:** 40 ♀♀, 3 DN - 10.7.1989, Zuberec, dolina Studeného potoka [6784] (Fenďa et al. 1998).

Specimens examined: **Borská nížina lowland:** 1 ♀ - 24.9.1996, Moravský Ján, *Salici-Populetum* [7467]; 3 ♀♀ - 24.9.1996, Moravský Ján, *Populetum* [7368]; 2 ♀♀ - 30.6.1999, Závod, NNR Abrod, *Caricetum goodenowii* [7468]; 1 ♀ -

Fig. 26: *Cheiroseius borealis* - ventral side of female. Scale: 100 μm

14.9.1999, Závod, NNR Abrod, *Molinietum coerulae* [7468]; 1♀ - 14.9.1999, Závod, NNR Abrod, *Molinietum coerulae potentiletosum albae* [7468].

Specimen depicted: Borská nížina lowland: 1 ♀ - 14.9.1999, Závod, NNR Abrod [7468] (Kalúz & Čarnogurský 2000)

Cheiroseius (Cheiroseius) bryophilus Karg, 1969

(Figs. 27, 28, Pl. 6A)

1969 - Karg, Zool. Anz. 182: 393-406

Morphology

Tarsus I with claws, but in majority of specimens the claws are smaller than claws in other legs. Peritremes from stigmae caudally with striking, narrow and nearly strait projections. Setae i4 nearly as long as the distance between i4 - z2, vertical setae i1 (32-37 μm long) a little shorter than setae i2 (42 - 52 μm long). Dorsal shield 495 μm long, 303 μm wide, dorsal setae on bumps (besides I5), majority of setae nearly reaching following ones in rows I and S; S4 = 55 μm, i1 = 37 μm, Z5 = 50 μm, I5 = 14 μm long. Scale pattern developed on dorsal shield, unvis-

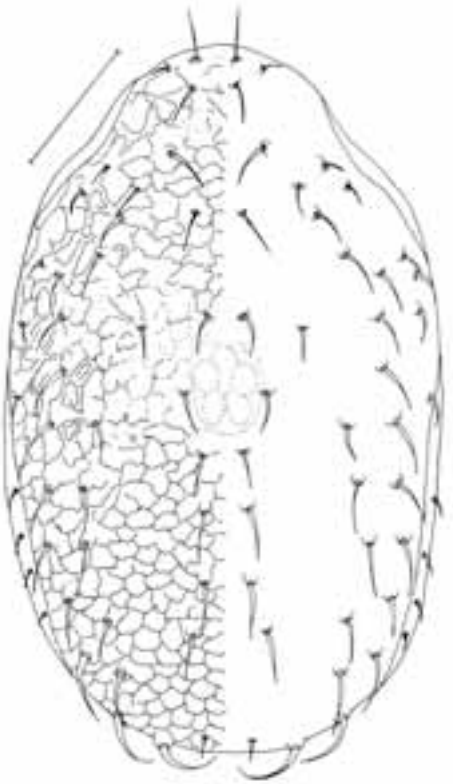

Fig. 27: *Cheiroseius bryophilus* - dorsal side of female. Scale: 100 μm

ible in central part, shield without net structure. Lateral part of dorsal shield with weakly developed rib-net structure. Sternal shield with fronto-caudally prolonged net pattern and with wide medio-central braid structure, following whole length of sternal shield. Genital shield with slightly concave lateral margins and gently rounded caudal margin. Postgenital sclerites unvisible. Ventrianal shield widely rouded frontally, widest at the level of anal opening, with nearly strait lateral margins, with dotted and rouded caudal margin, shield wearing 5 pairs of short setae. Majority of ventral setae very short, two pairs of free ventral setae longer. Small anal opening situated in proximal half of ventrianal shield. Medial prong of tectum a little longer than lateral prongs. Leg I 440 μm long, idiosoma ♀♀ 470 - 495, ♂♂ 580 μm long.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 360 m a. s. l.

Ecology: Rare Central European species, seldom occurring in deciduous and pine forests, in moss, preferring very wet subsoils. In Slovakia found in rhizosphere of grass and litter in wetter terrain depresion of *Querceto-Crataegetum*.

Considered as an edaphic detricolous species.

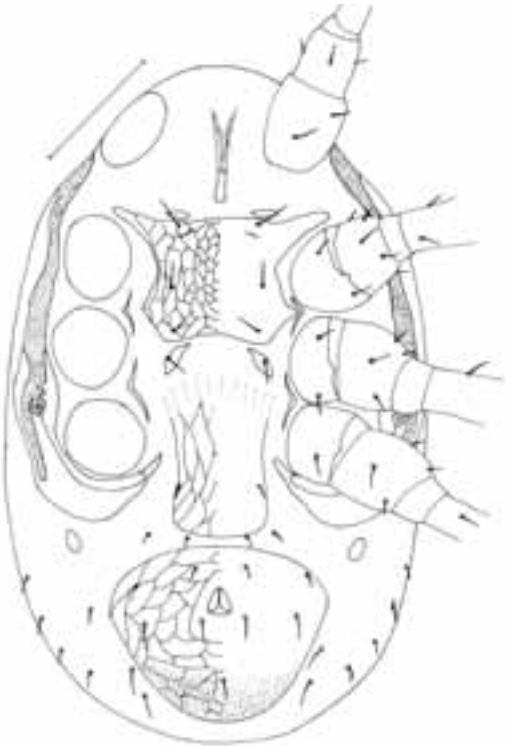

Fig. 28: *Cheiroseius bryophilus* - ventral side of female. Scale: 100 μm

Habitat preference: Unknown. Probably preferring mildly wet or wet subsoils with sufficient ammount of organic material.

Specimens examined: **Malé karpaty Mts.:** 1 ♀ - 23.8.2000, Bratislava, Devín, NNR Devínska Kobyla [7868].

Specimen depicted: 1 ♀ - 23.8.2000, Bratislava, Devín, NNR Devínska Kobyla [7868].

Platyseius - Berlese, 1916

1903 - Oudemans, Tijdschr. Ent. Amsterdam 45: 123-150; **1916** - Berlese, Redia, Firenze 12; **1960** - Evans & Hyatt, Bull. Brit. Mus. (Nat. Hist.) Zool. 6: 27-101;

Synonyms: *Plesioseius Evans & Hyatt*, 1960 ; Lindquist & Evans, 1965, with changes

Platyseius subglaber (Oudemans, 1903)

(Figs., 29, 30, Pl. 6B)

1903 - Oudemans, Tijdschr. Ent. Amsterdam 45: 123-150

Type species: *Hypoaspis subglabra* (Oudemans, 1903)

Synonyms: *Lasioseius (Platyseius) capillatus* Berlese, 1916; *Lasioseius listrophorus* Schweizer, 1924

Morphology
Mites with nearly rounded body. Peritremes very wide and long, reaching proximally to r1, caudally overstepping coxae IV, caudal part slightly curved. Dorsal shield with I1, I4 and I5, majority of dorsal setae extremely long. Dorsal shield uniform, 507 μm long and 429 μm wide. Dorsal setae different in length. Opisthomatal row I of dorsal setae reduced, wearing I1, I4 and I5 setae, proximal and lateral dorsal setae extremly long. Dorsal setae i4 and I1 short, shorter than I4, i1 very thin and short (18 μm long), I5 very short (7 μm long), three pairs of dorso-central setae 3-3,5 times shorter than marginal setae, marginal setae 164 - 186 μm long. Idiosoma broad, dorsal side with 10-12 pairs of oval or rounded garlande structures, mainly in proximal and central parts. Two pairs of rounded weakly visible structures caudally between S5 - S5, 7 pairs of pores situated mainly laterally. Short sternal shield without pattern, with distinct proximal and distal corners. St1 very short, St2-St3 longer (3-4 times), very short MSt on metasternal sclerites. Genital shield caudally rounded, with parallel lateral margins, caudally with fine net structure, genital setae on the shield. Between genital and ventrianal shields 3 - 4 pairs of narrow sclerites and a pair of short setae. Big ventrianal shield of female wide elliptic, with net structure in proximal part, wearing 6-7 pairs of setae. Anal opening situated in proximal half of shield. Coxae I - IV with fine pearl-like structure. Ventral side with 5 pairs of free setae on soft cuticle latero-caudally. Chelicerae slender. Digitus mobilis in ♀ nearly three times longer than the width of its base, armed with 1-2 teeth in distal part. Spermatodactyl of ♂ nearly 3-times longer than digitus mobilis of chelicera. Pulvillae on tarsi II-IV medially and laterally sharp and spiky. Idiosoma in ♀♀ 500-520 μm long and 360-470 μm wide, in ♂♂ 425-467 μm long and 340-370 μm wide. Material measured: Dorsal shield of female 507 μm long, 429 μm wide, Z5 = 61 μm, I5 = 7 μm, i1 = 18 μm long.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 280 - 1200 m a. s. l.

Ecology
The species occurs in wet conditions, inhabiting moss (peat wetlands) with *Sphagnum sp.*, wet moss on the banks of brooks, marshs, found in the nests of the vole *Microtus economus*. Rare

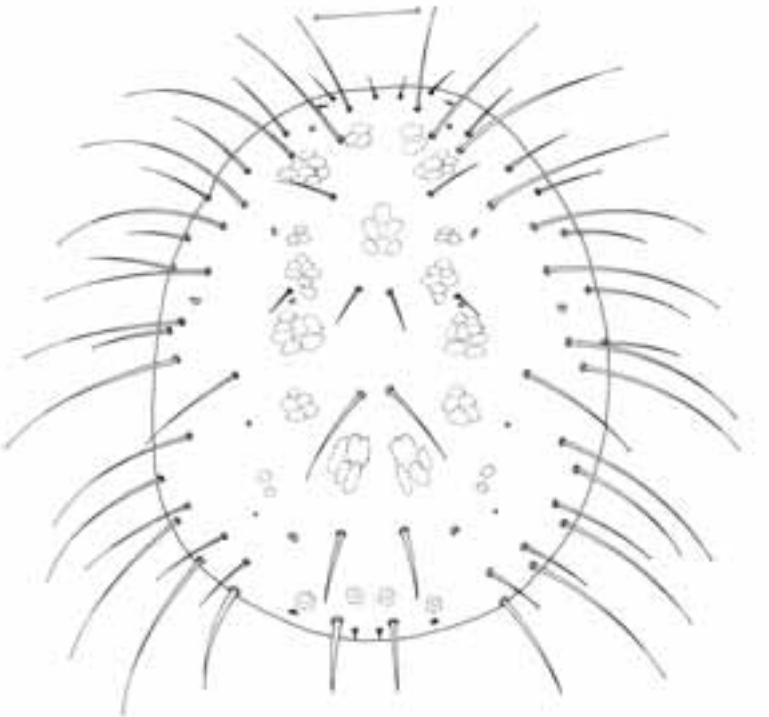

Fig. 29: *Platyseius subglaber* - dorsal side of female. Scale: 100 μm

in the upper layers of the soil of mixed forests. Inhabiting wet root systems with decaying organic material, fern growth, various types of decaying organic substrates, in oozing wetlands with various rotting substrates. In Slovakia found on the hair of captured small rodents (*Apodemus flavicollis*) in mountain areas, in bog - marshland and wet moss. Distributed probably from lowlands to mountains.

Considered as an edaphic detricolous species probably with the affinity to the plant remnants in the bottom parts of the nests of mammals in burrows.

Habitat preference

According to the information from literature and resulting from the findings from Slovak territory, this species prefers wet conditions, sometimes considered as strongly hygrophilous species. However its occurrence in the nests of rodents indicates less wet conditions, but with various degree of decaying plant material and with mild microclimatic moisture.

Published records from Slovakia: Bukovské vrchy Mts.: 1 ♀ - 25.8.1994, Ulič, Mikoľova dolina valey (*Apodemus flavicollis*) [7000] (Stanko 1995, Fenďa & Mašán 2003); 1 ♀, 2 ♂♂ 1 DN - 11.6.1999, Zboj, Stinská slatina bog [6901] (Fenďa & Mašán 2003); Volovské vrchy Mts.: 2 ♀♀ - VIII.1985, Hýľov, Hlboká dolina valey (*Apodemus flavicollis*) [7292] (Stanko 1987, 1988b, Stanko et al. 1992), Zlatá Idka, pramene Idy [7291] (Stanko et al. 1992).

Specimen depicted: 1 ♀ - 11.6.1999, Zboj, Stinská slatina [6901] (Fenďa & Mašán 2003)

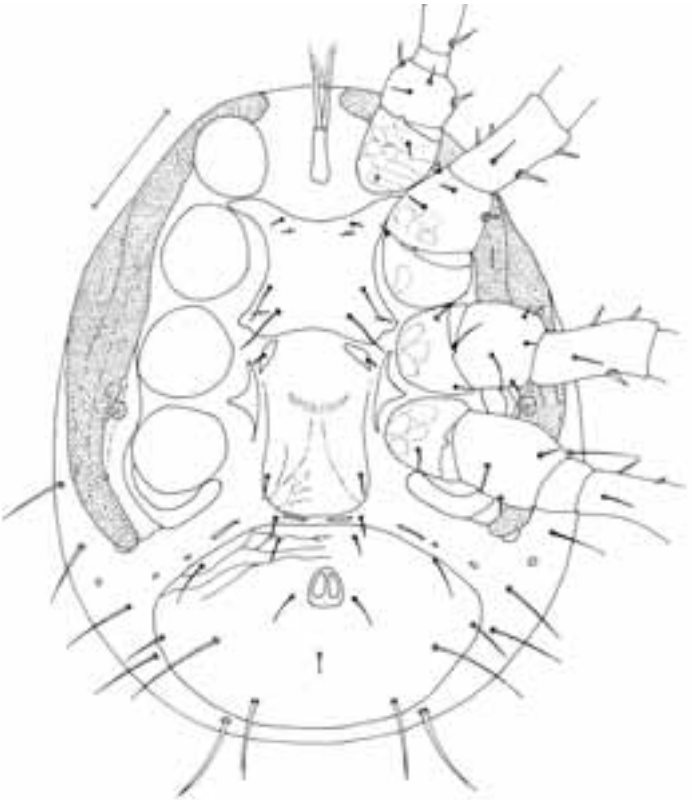

Fig. 30: *Platyseius subglaber* - ventral side of female. Scale: 100 μm

Plesioseius EVANS & HYATT, 1960

1960 - EVANS & HYATT, Bull. Brit. Mus. (Nat. Hist.) Zool. 6: 27-101; **1993** - KARG, Gustav Fisher Verlag Jena 1-523;

Type species: *Ameroseius italicus* BERLESE, 1905

Morphology
Mites with oval body. Peritremes long and very wide, proximally reaching to r1, from stigmae caudally extended, overstepping coxae IV, caudal part a little narower and slightly curved. Dorsal shield with I1, I3 (I4) and I5; I2 always absent. Dorsal shield uniform, 662 μm long and 479 μm wide. Dorsal setae a little different in length. Female ventrianal shield big and broad, wearing 4-5 pairs of setae.

Plesioseius - key to species (females)

1 (2) Ventrianal shield wearing 5 pairs of setae (Figs. 31, 32), anal opening situated centrally, bend structure between I4 - I4 absent, the distance I4 - I4 = 4 times I5 - I5,

dorsal setae longer, setae in rows s-S reaching following setae. Lateral and caudal dorsal setae sitting on small bumps, chitinose bend-shaped structure behind anal opening

..... ***P. major*** (HALBERT, 1923)

2 (1) Ventrianal shield with 4 pairs of setae, anal opening situated in proximal half of ventrianal shield, chitinose bend structure between I4 - I4 (Figs. 33, 34), distance I4 - I4 = two times I5 - I5, dorsal setae short, not reaching following setae in rows s-S. Lateral and caudal dorsal setae not on small bumps

..... ***P. italicus*** (BERLESE, 1905

Plesioseius major (HALBERT, 1923)

(Figs. 31, 32, Pl. 7A)

1923 - HALBERT, Jour. Linn. Soc. (Zool.) London 35: 363-376

Synonyms: *Lasioseius tenuipes* (SCHWEIZER, 1922)

Morphology

Between I4 - I4 bend structure absent, the distance I4 - I4 = 4 times I5 - I5. Dorsal setae i1 extremely short (4 μm), I1 short (41 μm long), I5 very short (15 μm long), marginal setae longer. Idiosoma broad, dorsal shield 662 μm long and 479 μm wide, with scale-shaped pattern. Scales mainly in central and caudal part of dorsal shield with wavy margins. Proximal garland structures at level of i2, medio-distal rouded garland situated rather centrally, closed to I3. Dorsal setae slightly lanceolate, majority of them of middle length; Z5 = 44 μm, S4 = 76 μm. Lateral and caudal dorsal setae sitting on small bumps. Two pairs of very short setae on the shield; i1 = 4 μm and I5 = 15 μm long. Dorsal shield with three pairs of big, rounded pores. At the base of tritosternum two pairs of narrow lateral praesternal sclerites. Short sternal shield without distinct pattern, with expressive proximal and rounded distal corners. St1 very short, St2-St3 longer (3-4 times), very short MSt on metasternal sclerites. Genital shield short and wide, caudally straight, with rounded caudal corners and with fine net structure, genital setae on the shield. Between genital and ventrianal shields 3 pairs of narrow oblonged sclerites, two pairs of small rounded sclerites and a pair of setae. Big, laterally extended ventrianal shield of female wide elliptic, with distinct net structure and concave lateral posterior margins, wearing 5 pairs of setae. Ventrianal shield caudally dotted, with chitinose bend-shaped structure behind anal opening. Anal opening situated in distal half of shield. Coxae I - IV and trochanters II - IV with distinct pearl-like structure. Ventral side with 1 pair of free setae on soft cuticle latero-caudally. Chelicerae slender. Digitus mobilis in ♀ nearly three times longer than the width of its base, armed with 1-2 teeth in distal part. Spermatodactyl of ♂ as long as digitus mobilis of chelicera. Pulvillae on tarsi II-IV medially and laterally sharp, spiky. Idiosoma in ♀♀ 500-520 μm long (KARG, 1993), 590 - 750 μm long (BREGETOVA, 1977) and 360-470 μm wide, in ♂♂ 425-467 μm long (KARG, 1993), 550 μm long (BREGETOVA, 1977) and 340-370 μm wide. Material measured: Female dorsal shield 662 μm long, 479 v wide, Z5 = 44 μm, I5 = 15 μm, i1 = 4 μm, S4 = 76 μm long.

Geographic distribution: Europe.

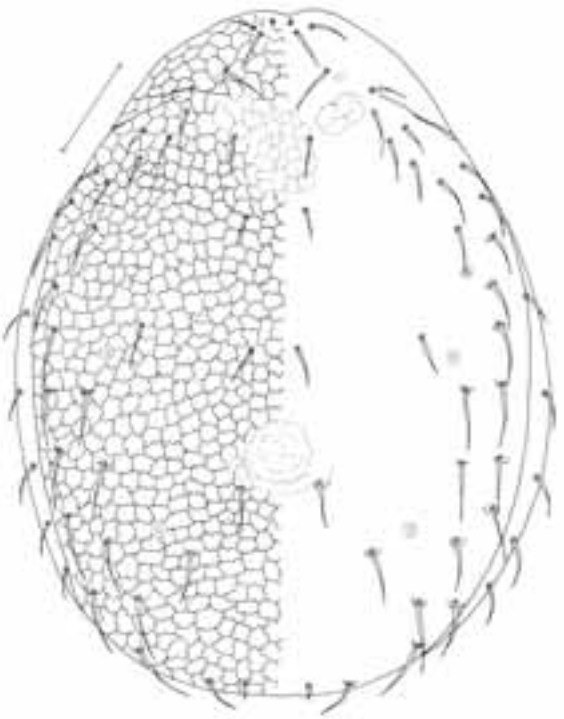

Fig. 31: *Plesiosejus major* - dorsal side of female. Scale: 100 μm

Vertical distribution in Slovaka: 130 - 560 m a. s. l.

Ecology
The species occurs in wet conditions, inhabiting moss (peat wetlands) with *Sphagnum sp.*, wet moss on the banks of creeks, wet meadows. Scarce in mixed forests. Preferring wet conditions with decaying organic materials, fern growth, various types of decaying organic substrates in wetlands. Occurring in marsh, banks, rare in mixed forests, among wet roots with decaying organic material, under fern, in humus with moss and in wet moss in the neighbour of streems, occurring in oozing wetlands with rotting substrat. In Slovakia found in lowland littoral reed stands (Phragmition), bank of brook, rhizosphere of grass. Ocurring in ground nests of birds *Podiceps cristatus, Ixobrychus minutus* in reed stands and in the nests of *Fulica atra* (Aves) on water level.

European edaphic detricolous mite.

Habitat preference
Strongly hygrophilous species, preferring microhabitats with high moisture and rotting plant

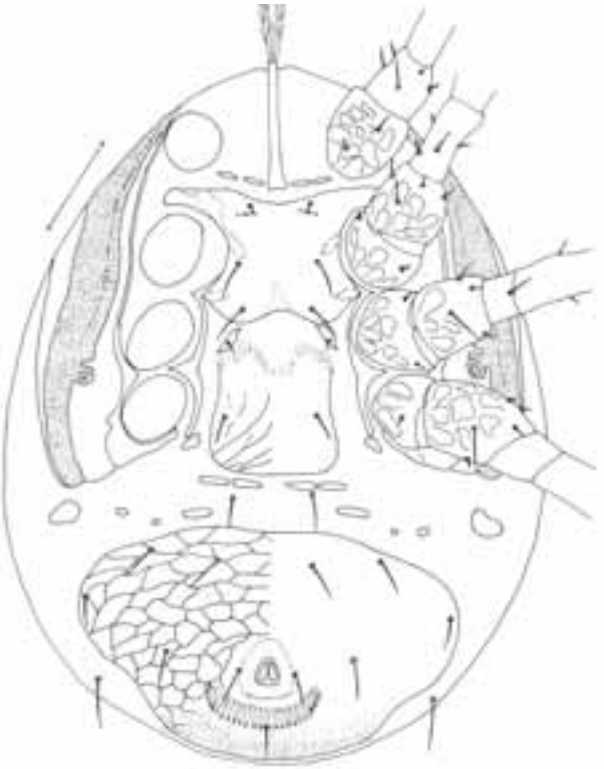

Fig. 32: *Plesiosejus major* - ventral side of female. Scale: 100 μm

material. Apparently preferring decaying plant material in the bottom parts of the nests situated on the ground.

Published records from Slovakia: Borská nížina lowland: 8 ♀♀, 5 ♂♂, 1 DN, 1 PN - 4.8.1998, Jakubov, Jakubovské rybníky (*Podiceps cristatus*) [7567]; 1 ♀ - 21.8.1998, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀, 1 DN - 9.9.1999, Jakubov village, Nová Šutrovňa (*Ixobrychus minutus*) [7567] (Fenďa & Schniererová 2005); **Bukovské vrchy Mts.:** 3 ♀♀, 3 ♂♂, 5 L - 10.6.1999, Runina [6900] (Fenďa & Mašán 2003); **Hronská pahorkatina wold:** 13.4.1933, Rybník (= Garamszöllös) [7777] (Willmann 1938, as *Episeius major* (Halbert, 1923) subsp. *incisus* Willmann, 1938).

Specimens examined: Podunajská rovina lowland: 2 DN - 4.6.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769].

Specimen depicted: Bukovské vrchy Mts.: 1 ♀ - 10.6.1999, Runina [6900] (Fenďa & Mašán 2003).

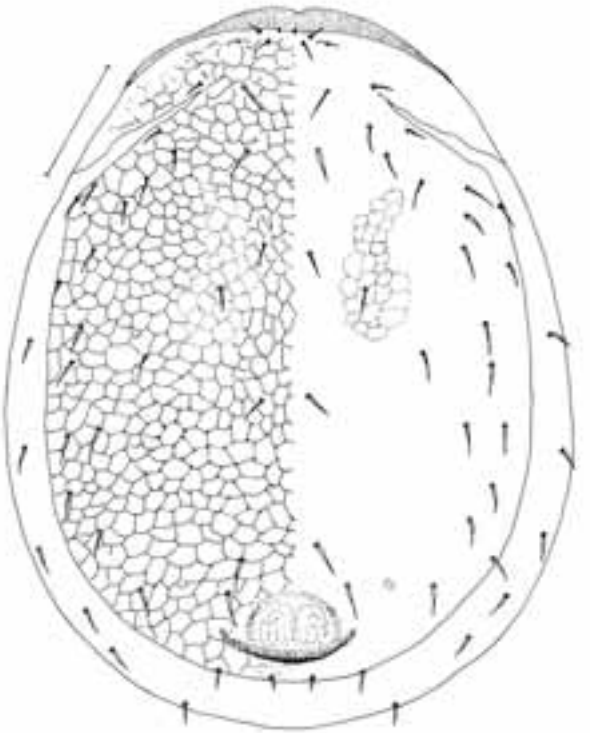

Fig. 33: *Plesiosejus italicus* - dorsal side of female. Scale: 100 μm

Plesioseius italicus (BERLESE, 1905)

(Figs. 33, 34, Pl. 7B)

1905 - BERLESE, Redia, Firenze 3: 66-304

Type species: *Ameroseius italicus* (BERLESE, 1905)

Synonyms: *Paraseius tenuipes* (HALBERT, 1915; *Lasioseius tenuipes* (SCHWEIZER, 1922); *Leioseius (Episeius) michaeli* (HALBERT, 1923)

Morphology

Chitinose bend structure between I4 - I4, distance I4 - I4 = two times I5 - I5. Dorsal setae i1 extremely short (3 μm), I5 very short (9 μm long), marginal setae longer (20 - 26 μm long. Idiosoma broad, dorsal shield 544 μm long and 391 μm wide, with scale-shaped pattern. Proximal tasselled garland structure laterally from i4. Dorsal setae slightly lanceolate, majority of them of middle length; Z5 = 21 μm, S4 = 26 μm. Lateral and caudal dorsal setae sitting on straigth sur-

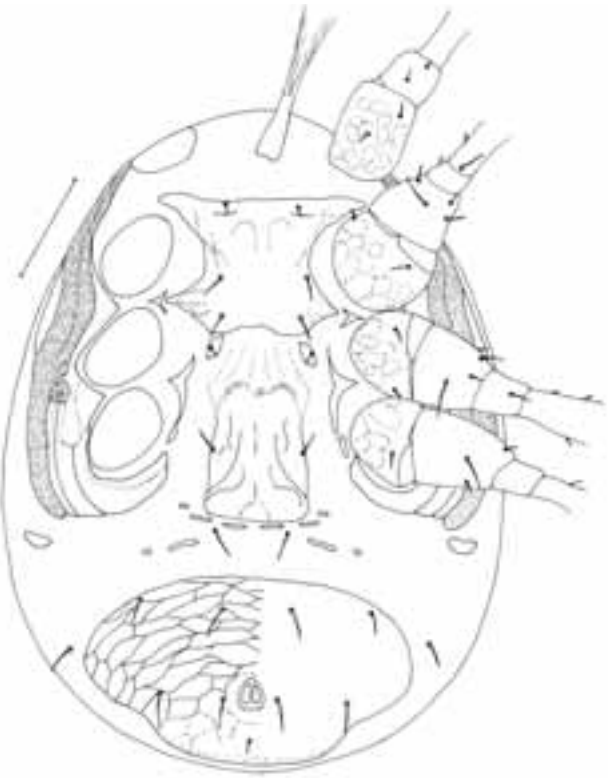

Fig. 34: *Plesiosejus italicus* - ventral side of female. Scale: 100 µm

face, not on small bumps. Dorsal shield with one pair of rounded pores caudally. Tritosternum with short basal part. Base of tritosternum without praesternal sclerites. Short sternal shield without distinct pattern, but with an expressive proximal and smaller distal corners. St1 very short, St2-St3 longer (3-4 times), very short MSt on metasternal sclerites. Genital shield with rounded caudal corners and with fine structure, genital setae on lateral margins. Between genital and ventrianal shields 3 pairs of narrow oblonged and two pairs of small rounded sclerites and a pair of setae. Big, laterally extended ventrianal shield of female with distinct net structure and concave lateral posterior margins, wearing 4 pairs of setae. Caudal margin of ventrianal shield caudally gently dotted, without chitinose bend-shaped structure behind anal opening. Anal opening situated in distal half of shield. Coxae I - IV with distinct pearl-like structure, trochanters without pattern. Ventral side with 1 pair of free setae on soft cuticle laterally at the level of broadest part of ventrianal shield. Chelicerae slender. Digitus mobilis in ♀ nearly three times longer than the width of its base, armed with 1-2 teeth in distal part. Spermatodactyl of ♂ three times longer than digitus mobilis of chelicera. Pulvillae on tarsi II-IV medially and laterally sharp, spiky. Idiosoma in ♀♀ 550-650 µm long (Karg, 1993), 550 - 650 µm long and 400 µm wide (Bregetova, 1977), in ♂♂ 467-507 µm long (Karg, 1993), 470 - 500 µm long and 280 -310 µm wide (Bregetova, 1977). Material measured: Female dorsal shield 544 µm long, 391 µm wide, Z5 = 21 µm, l5 = 9 µm, i1 = 3 µm long.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 150 - 700 m a. s. l.

Ecology

The species occurs in wet conditions, under decaying leaves on marshs, inhabiting moss (peat wetlands), wet moss on the banks of mountain brooks, mos on stones. Scarcely in deciduous and pine forests, preferring oozing wetlands and marshs, between wet root systems with decaying organic material, in humus and rotting plant remnants, in various types of decaying organic substrates. In Slovakia found in the nests of birds in lowland littoral reed stands; *Anas platyrhynchos, Aythya ferina, Aythya fuligula*, on the hair of small rodents (*Apodemus flavicollis)*, in bank of gravel pit, in bogs with moss.

Considered as an European edaphic detricolous mite.

Habitat preference

Strongly hygrophilous species inhabiting mainly boggy habitats and banks of brooks. Preferring bog - peats with high moisture and rich ammount of plant material. Apprently preferring decaying plant material in the bird nests on the groud.

Published records from Slovakia: **Borská nížina lowland:** 1 ♀ - 27.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 3 ♂♂, 14 DN, 2 PN - 27.5.1997, Jakubov, Jakubovské rybníky (*Aythya ferina*) [7567]; 8 ♀♀, 10 DN - 27.5.1997, Jakubov, Jakubovské rybníky (*Aythya fuligula*) [7567]; 1 PN - 30.5.1997, Jakubov, Jakubovské rybníky (*Aythya ferina*) [7567]; 1 ♂ - 25.6.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 23.7.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 DN - 24.9.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos)* [7567]; 2 ♀♀ - 28.5.1998, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 14 ♀♀, 9 ♂♂, 23 DN, 2 PN, 2 L - 21.8.1998, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567] (Fenďa & Schniererová 2005); **Bukovské vrchy Mts.:** 37 ♀♀, 39 ♂♂, 15 DN, 4 PN, 2 L - 20.6.1998, Uličˇ [7000]; 1 ♀, 2 ♂♂, 1 DN - 11.6.1999, Zboj, Stinská slatina [6901] (Fenďa & Mašán 2003); **Kysucké Beskydy Mts.:** 2 ♀♀, 1 ♂ - 1.7.1997, Nová Bystrica, Chmúra [6680] (Fenďa 1999); **Slanské vrchy Mts.:** Hermanská dolina (*Apodemus flavicollis*) [7094] (Stanko 1988a).

Specimen depicted: **Borská nížina lowland:** 1 ♀ - 21.8.1998, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567] (Fenďa & Schniererová 2005);

Zerconopsis Hull, 1918

1918 - Hull, Trans. Nat. Hist. Soc. Northumberland, London 5: 13-88; **1977** - Bregetova et al., Izd. Nauka, Moscow 1-716; **1971** - Karg, Gustav Fisher Verlag Jena 1-475; **1993** - Karg, Gustav Fisher Verlag Jena 1-523;

Type species: *Gamasus remiger* Kramer, 1876

Morphology

Smaller mites (♀♀ 350-630 μm). Dorsal shield uniform, in some species with more or less developed medio-lateral incision, frontal part of body without strongly developed vertex. Dorsal shield with coarse pattern, 37-42 pairs of setae on the shield, setae lanceolate or needle-shaped, 1-5 pairs of dorsal setae broadened apically, spade-shaped. Setae Z5 distally broadened. Opisthonotal part of dorsal shield with 13-14 pairs of setae: I1-I5, Z1-Z5, S1, S3, S4, S5, setae S2 always absent. Peritremal shields frontally confluenced with dorsal shield, peritremes long. Proximal corners of sternal shield confluenced with endopodal shields and strongly expanded between coxae I- II. Metasternal setae situated on soft cuticle, 1-3 pairs of small

sclerites between genital and ventrianal shields in female. Ventrianal shield in ♀ big, wearing in majority of european species 2-7 pairs (in ♂ 8-9 pairs) of setae. Genital setae mostly closed to genital shield (in *Z. remiger* and *Z. muestairi* on genital shield). Hypostomal groove with well developed lateral margins. One pair of distal hypostomal seate and one whip-shaped long seta on palptrochanter. Long seta on palptarsus absent. Tectum with three secondary indented tips. Chelicerae very slender, digitus mobilis of females approximately three times longer than itęs base, two teeth on distal third of digitus mobilis. Pulvillae on Tarsi II-IV rounded. Tarsi II-IV medio-dorsally with 2 long curved spiky setae.

***Zerconopsis* -** key to species (females)

1 (3) Tarsus I without claws.

2 (1) Dorsal shield with strong pattern, creating irregular small depressions (Fig. 35). Dorsal setae needle-shaped, Z5 broadened apically only, female ventrianal shield with 6 pairs of setae (Fig. 36), digitus fixus on female chelicera with 2 and 2 teeth, tectum with three slender and apically branched prongs
..... ***Z. apodius*** Karg, 1969

3 (1) Tarsus I with claws.

4 (5) Dorsal shield uniform, without medio-lateral incision (Fig. 37), dorsal setae I1 - I4 longer, reaching following setae, broad ventrianal shield (Fig. 38) with six pairs of setae (one pair longer), small anal opening in caudal third of ventrianal shield, pair of adanal setae behind anal opening
..... ***Z. remiger*** (Kramer, 1876)

5 (4) Dorsal shield with medio-lateral incision, dorsal setae I1 - I4 short, not reaching following setae.

6 (7) Medio-lateral incision very short (Fig. 39). Genital shield with parallel lateral margins, caudally rounded, pair of genital setae on the shield. Ventrianal shield (Fig. 40) broad, wearing 6-7 pairs of equally short setae, bigger anal opening closed to central part of ventrianal shield, pair of adanal setae as long as other ventrianal setae
..... ***Z. muestairi*** (Schweizer, 1949)

7 (6) Medio-lateral incision longer (Fig. 41), reaching to level of setae z3. Genital shield caudally broadened, semi-rounded (Fig. 42), genital setae aside the shield. Ventrianal shield broad, wearing 6 pairs of setae, V8 longer, adanal setae shorter. Anal opening very small
..... ***Z. slovacus*** Mašán, 1998

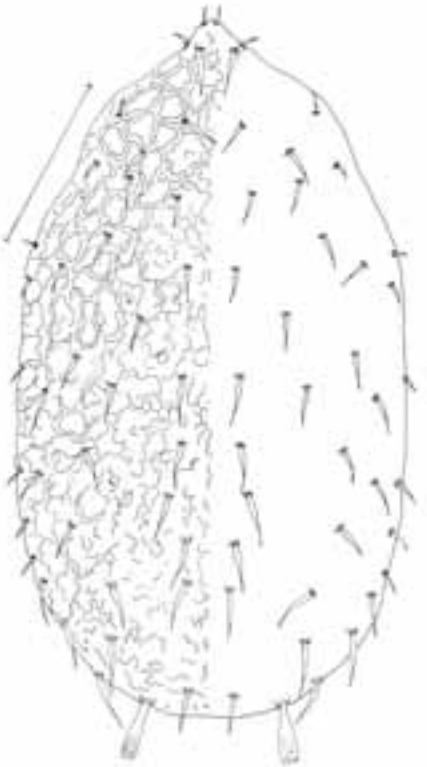

Fig. 35: *Zerconopsis apodius* **-** dorsal side of female. Scale: 100 μm

Zerconopsis apodius KARG, 1969

(Figs. 35, 36, Pl. 8A)

1969 - KARG, Zool. Anz. 182: 393-406

Morphology

Tarsus I without claws. Dorsal shield uniform, without medio-lateral incision. Peritremes narrow, long, reaching to r1. Smaller mites with oval body, dorsal shield, with distinct cavity-like structure on proximal and lateral sides. Central and caudal parts of dorsal shield with a little finer irregular pattern. Majority of dorsal setae lanceolate, some setae are needle-shaped, differ in length. Shoulder setae short, Z5 terminally broadened; i4 = 18 μm, I1 = 23 μm, I2 = 24 μm, I5 = 18 μm, and Z5 = 24 μm long. Tritosternum with short base. Sternal shield with expressive frontal corners and rounded caudal corners, wearing net pattern in lateral parts and three pairs of needle-shaped setae. Wide praesternal sclerites confluenced with sternal shield. MSt on small metasternal sclerites or on soft cuticle. Genital shield narrow, caudally rounded, with fine pattern. Genital setae aside from shield, on soft cuticle. Two pairs of short setae and 1 - 4 pairs of postgenital sclerites on soft cuticle between genital and ventrianal shields. Female ventrianal shield big, broad, with slightly concave or nearly rounded anterior margin, wearing 6 pairs of setae. Anal opening longer then adanal setae, situated centrally. Soft cuticle in the neighbour

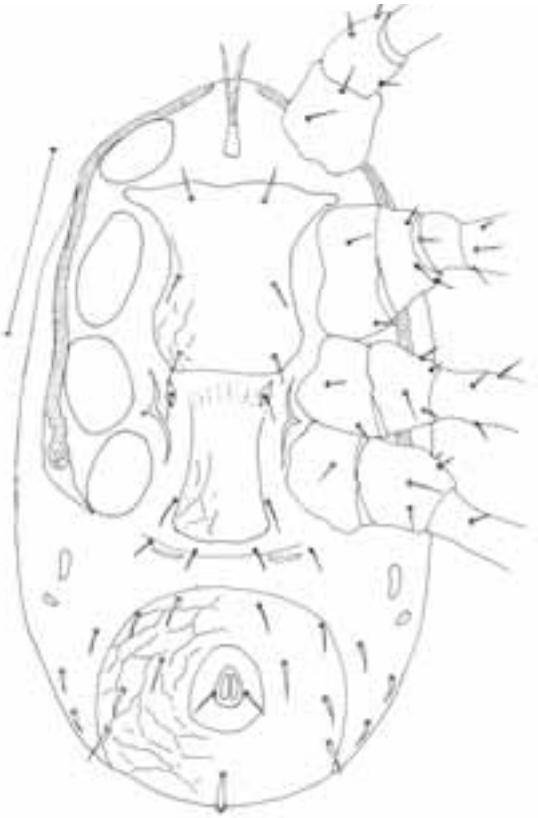

Fig. 36: *Zerconopsis apodius* - ventral side of female. Scale: 100 μm

of ventrianal shield with three pairs of free lanceolate setae. Postanal seta apically broadened. Digitus fixus of female distally with 2 and 2 teeth. Spermatodactyl of male short, spade-liked. Idiosoma ♀♀ 350 - 380 μm long, ♂♂ 310 - 350 μm long. Material measured: Female dorsal shield 378 μm long, 193 μm wide, Z5 = 31 μm, I5 = 20 μm, I4 = 29 μm, I1 = 23 μm, i1 = 9 μm long.

Geographic distribution: Central Europe.

Vertical distribution in Slovakia: 560 m a. s. l.

Ecology
Found in forest litter, in mouldering wood material, in decaying tree trunks, preferring mildly wet substrates. In Slovakia found in oak forest (*Quercetum)* in leaf litter and trunk detritus. Edaphic detricolous species.

Habitat preference
Little known. Preferring mildly wet substrates in deciduous forests (leaf litter and trunk detritus), not strongly hygrophilous.

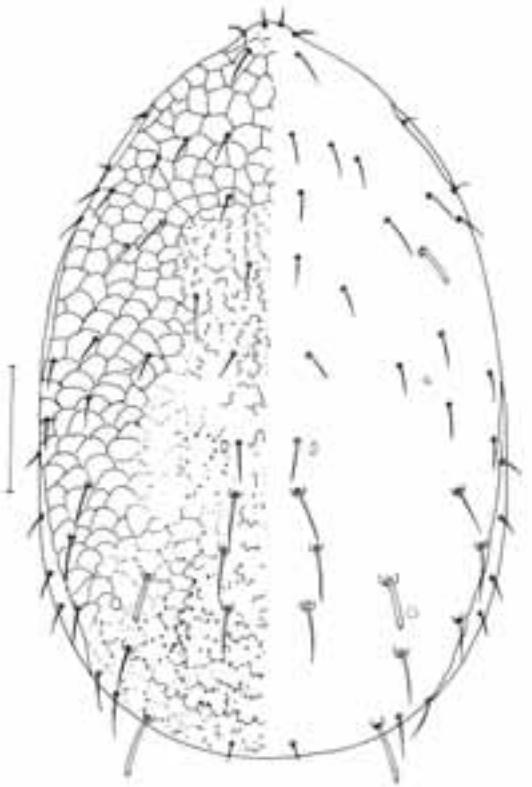

Fig. 37: *Zerconopsis remiger* - dorsal side of female. Scale: 100 μm

Specimens examined: **Štiavnické vrchy Mts.:** 1 ♀ - 21.6.2004, Čajkov [7778]; 1 ♀ - 26.6.2005, Ladzany [7779].

Specimen depicted: **Štiavnické vrchy Mts.:** 1 ♀ - 26.6.2005, Ladzany [7779]

Zerconopsis remiger (KRAMER, 1876)

(Figs. 37, 38, Pl. 8B)

1876 - KRAMER, Arch. Naturg. Leipzig 42: 46-105

Type species: *Gamasus remiger* (KRAMER, 1876)
Synonyms: (*Gamasus remiger* KRAMER, 1876; *Ameroseius bispinosus* BERLESE, 1890)

Morphology

Tarsus I with claws, genital setae on the shield. Dorsal shield uniform, without medio-lateral incision. Peritremes narrow, long, reaching nearly to r1. Smaller mites with oval body, dorsal shield in ♀♀ 597 μm long and 373 μm wide, with distinct scale-like structure on proximal and lateral sides. Central and caudal parts of dorsal shield with fine irregular pattern. Majority of dorsal setae needle-shaped, of different length, z3, Z3 and Z5 terminally broadened, Z5 = 50 μm,

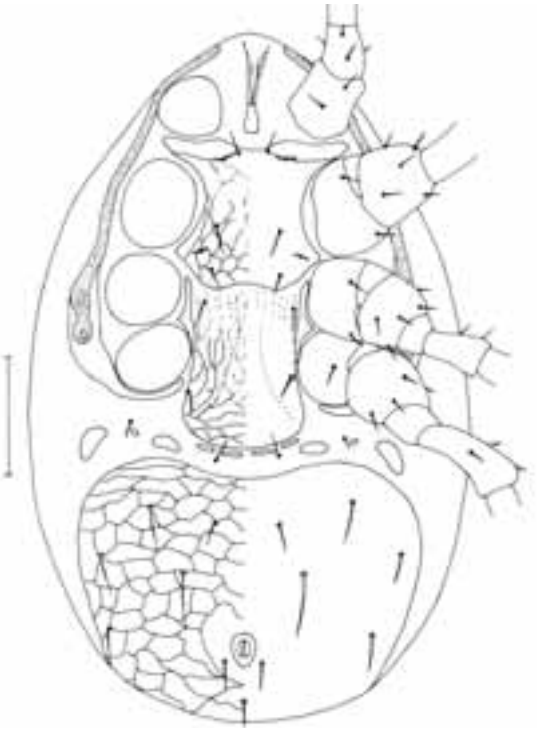

Fig. 38: *Zerconopsis remiger* - ventral side of female. Scale: 100 μm

l5 = 12 μm, l4 = 47 μm and i1 = 12 μm long. Tritosternum with short base. Sternal shield with expressive frontal corners, rounded caudal corners, wearing net pattern in caudal part. Wide praesternal sclerites confluenced with sternal shield. MSt on soft cuticle. Genital shield caudally rounded, with net structure. Two pairs of short setae and 4 pairs of postgenital sclerites on soft cuticle between genital and ventrianal shields. Ventrianal shield big, broad, with concave anterior margin, wearing distinct net pattern and 6 pairs of setae. Anal opening small, situated in caudal third of ventrianal shield. Soft cuticle in the neighbour of ventrianal shield without free setae. Idiosoma ♀♀ 570 - 660 μm long, ♂♂ 530 - 550 μm long. Material measured: Female dorsal shield 597 μm long, 373 μm wide, Z5 = 50 μm, l5 = 12 μm, l4 = 47 μm, i1 = 12 μm.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 120 - 970 m a. s. l.

Ecology
Seldom occurring in mixed forests, in mouldering wood material, among wet roots with decaying organic material, in humus between roots, mainly inhabiting wet substrates. In Slovakia found under the bark of trees (*Fagus, Quercus, Acer*), under stones, in soil substrate, in *Abieto-*

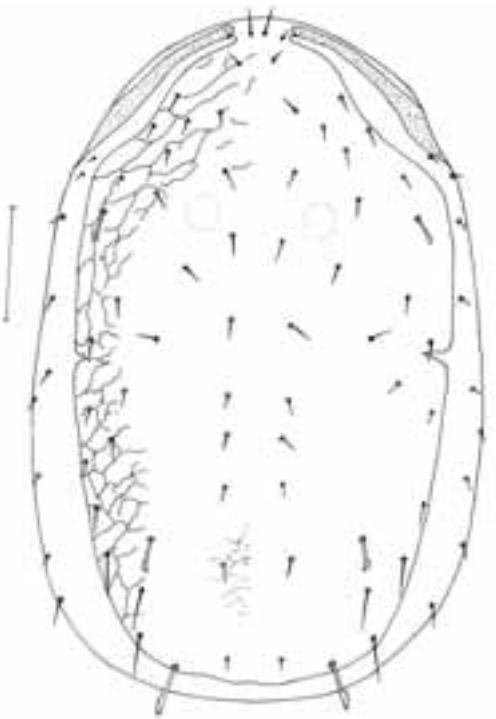

Fig. 39: *Zerconopsis muestairi* - dorsal side of female. Scale: 100 μm

Fagetum forests, soil substrate on limestones, in lowland floodplain forests of *Salici-Populetum* with *Leucojum aestivum*, leaf litter, detritus in *Quercetum*, mesohygrophilous forest-steppes, in mountain *Fagetum* on limestones, oak-hornbeam forest (*Querceto-Carpinetum*), in leaf litter and soil detritus; in mountain hay meadow with solitery limes (*Tilia sp.*), in rhizosphere of grass in mountain hay meadow, in rhizosphere of grass, in soil samples. Considered as an edaphic detricolous species.

Habitat preference

Probably less hygrophilous species, preferring mildly wet or drier subsoils with decaying plant materials, mainly in deciduous oak and beech forests of lowlands and submountain areas.

Published records from Slovakia: Bukovské vrchy Mts.: Zboj, Sušice [6901]; NNR Riaba skala [6900]; NNR Stužica [6901]; Topoľa [6999] (Fenďa & Mašán 2003); **Malá Fatra Mts.:** 3 ♀♀, 2 ♂♂ - 29.7.1996, Terchová, Štefanová [6780] (Krumpál et al. 1998); **Podunajská rovina lowland:** Trstená na Ostrove, Kráľovská lúka [8170] (Kalúz 1993b, 1994b).

Specimens examined: Krupinská planina plateau: 1 ♀ - 25.5.2001, Plášťovce, *Quercetum* [7879]; 1 ♀ - 26.5.2001, Ipeľské Úľany, *Quercetum* [7880]; **Malá Fatra Mts.:** 1 ♀ - 24.10.1996, NNR Rozsutec, *Fagetum,* moss [6780]; **Malé Karpaty Mts.:** 1 ♀ - 20.4.2001, Bratislava, Devín, *Quercetum* [7867]; 1 ♀ - 26.6.2002, Bratislava, Kamzík, *Quercetum* [7868]; 1 ♀ - 14.7.2005, Bratislava, Kamzík, *Quercetum* [7868]; 1 ♀ - 21.7.2005, Bratislava, Rača, *Quercetum* [7768]; **Myjavská pahorkatina wold:** 3 ♀♀ - 13.7.1997, Stará Turá, Dubník [7272]; Volovské vrchy Mts.: 1 ♀ - 26.5.2004, Kováčová, *Quercetum* [7390]; **Turzovská vrchovina highland:** 2 ♀♀, 2 ♂♂ - 2.7.1997, Korňa (leaf litter) [6577]; 4 ♀♀ - 2.7.1997, Korňa (soil) [6577].

Specimen depicted: Malé Karpaty Mts.: 1 ♀ - 20.4.2001, Bratislava, Devín [7867].

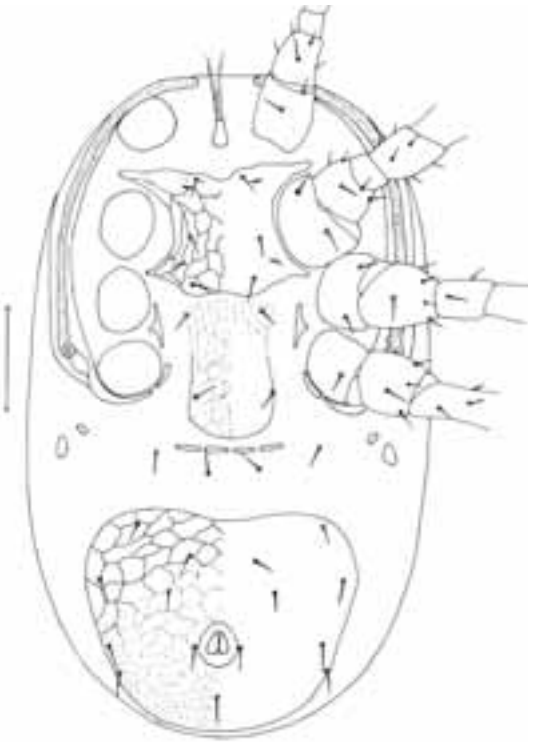

Fig. 40: *Zerconopsis muestairi* - ventral side of female. Scale: 100 μm

Zerconopsis muestairi (SCHWEIZER, 1949)

(Figs. 39, 40, Pls. 9A)

1949 - SCHWEIZER, Erg. Wiss. Unters. Schweiz. Nationalparks, Liestal 2: 1-99

Morphology

Tarsus I with claws, genital setae situated on the shield. Dorsal shield uniform, with short mediolateral incision. Peritremes narrow, long, reaching to r1. Smaller mites with prolonged oval body, dorsal shield in females 588 μm long and 332 μm wide. Distinct net structure on proximal and lateral sides only. Other parts of dorsal shield without any pattern. Majority of dorsal setae short, needle-shaped, s4 ("shoulder setae"), Z3 and Z5 terminally broadened, Z5 = 44 μm, l5 = 9 μm, l4 = 17 μm and i1 = 23 μm long. Tritosternum with short base. Sternal shield with expressive frontal and caudal corners, wearing net pattern and short sternal setae. Praesternal sclerites absent, MSt on soft cuticle. Genital shield smaller, caudally rounded, with very fine net structure. Two pairs of short setae and 4 pairs of narrow postgenital sclerites on soft cuticle between genital and ventrianal shields. Ventrianal shield big, broad, wider than long, with concave anterior margin. Distinct net pattern in proximal part of ventrianal shield, dotted pattern in it's caudal part, shield wearing 7 pairs of equally short needle-shaped setae. Anal opening situated in caudal half of ventrianal shield. Soft cuticle laterally from ventrianal shield without or with 1-2 pairs of free setae. Female cheliceral digitus fixus with 2 and 1 teeth, male spermatodactyl finger-shaped. Idiosoma ♀♀ 585 - 630 μm long, ♂♂ 467 - 498 μm long. Material measured: Female dorsal shield

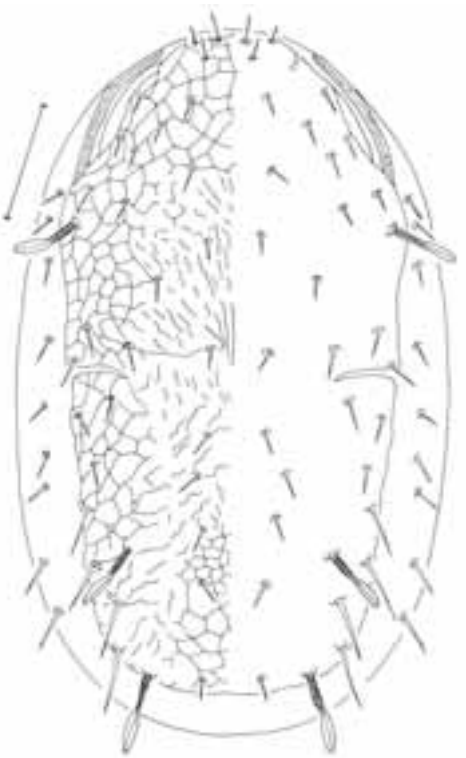

Fig. 41: *Zerconopsis slovacus* - dorsal side of female. Scale: 100 μm (according MAŠÁN, 1998)

588 μm long, 332 μm wide, Z5 = 44 μm, I5 = 9 μm, I4 = 17 μm, i1 = 23 μm long.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 120 m a. s. l.

Ecology
Rare species seldom occurring in moss, wet moss on banks of brooks. In Slovakia found in floodplain forest (*Salici-Populetum* with *Leucojum aestivum*) in soil samples.
Edaphic detricolous species.

Habitat preference
Little known, probably preferring various wet conditions and mossy habitats in lowlands.

Specimens revised: **Podunajská rovina lowland:** 8 ♀♀ - 20.7.1989, Trstená na Ostrove, Královská lúka [8070], published as *Leioseius quinquesetosus* (KALÚZ, 1994).

Specimen depicted: **Podunajská rovina lowland:** 1 ♀ - 20.7.1989, Trstená na Ostrove, KráĻovská lúka [8070]

Fig. 42: *Zerconopsis slovacus* - ventral side of female. Scale: 100 μm (according MAŠÁN, 1998)

Zerconopsis slovacus MAŠÁN, 1998

(Figs. 41, 42, Pl. 9B)

1998 - MAŠÁN, Fragm. Entomol, Roma 30: 75-78

Morphology

Tarsus I with praetarsus and claws, dorsal shield uniform, with short, but distinctive medio-lateral incision, reaching approximately to the level of z3. Peritremes narrow, long, reaching to r1. Peritremal shields apically narrowed and arch-likely curved caudally around trochanter IV. Smaller mites with prolonged dorsal shield. Distinct net structure on shield covering proximal part, lateral sides and medio-caudal part from I3 to I5. Central part of dorsal shield without regular pattern. Dorsal shield wearing 32 pairs of setae, majority of them short, needle-shaped (i4 = 17 - 22 μm long). Setae S3, S4, S5 and Z4 distinctively longer. Setae s5, Z3 and Z5 (Z5 = 62,5 μm long) thickened, prolonged and apically broadened, half paddle-shaped. Sternal shield with expressive frontal corners, wearing weak pattern and 3 pairs of short sternal setae. Praesternal sclerites absent, St1 situated on frontal margin of sternal shield. Metasternal sclerites absent, MSt on soft cuticle. Genital shield smaller, caudally semi-rounded, without net structure, genital setae outside of genital shield, on soft cuticle. Two pairs of short setae, 2 pairs of narrow and one pair of thicker postgenital sclerites on soft cuticle between genital and ven-

trianal shields. Metapodal shield present and unequally divided into two parts. Nearly quadratic ventrianal shield big, broad, wider than long, with concave anterior margin. Distinct net pattern in proximal part of ventrianal shield, dotted pattern in it's caudal part, shield wearing 6 pairs of short needle-shaped setae. Very small anal opening situated in caudal half of ventrianal shield. Soft cuticle laterally from ventrianal shield with 2 pairs of free setae. Female cheliceral digitus fixus with 2 and 1 teeth, digitus mobilis with 2 teeth. Idiosoma ♀♀ 555 - 595 μm long, male unknown.

Geographic distribution: SW-Slovakia

Vertical distribution in Slovakia: 120 m a. s. l.

Ecology
Unknown, the species was found in floodplain area near Gabčíkovo in the soil of the growth of *Carex sp.* forming large tufs. The locality was under the influence of underground water several times yearly.

Habitat preference: Unknown, but like other representatives of the genus *Cheiroseius* this species can be probably mesohygrophilous or hygrophilous.

Published records: **Podunajská rovina lowland:** 3 ♀♀ - 16.10.1991, Gabčíkovo [8171] (Mašán 1998).

Specimen depicted: according Mašán (1998).

Genus Iphidozercon

1903 - BERLESE, Redia, Firenze, 2; **1977** - BREGETOVA et al., Izd. Nauka, Moscow 1-716; **1971** - KARG, Gustav Fisher Verlag Jena 1-475; **1993** - KARG, Gustav Fisher Verlag Jena 1-523.

Synonym: *Arctoseiopsis* (EVANS, 1954) - according BREGETOVA, 1977
Type species: *Eviphis gibbus* BERLESE, 1903

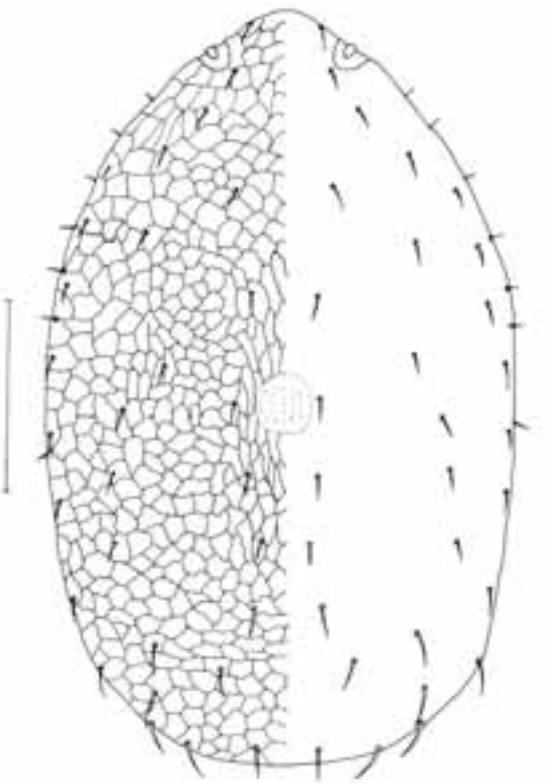

Fig. 43: *Iphidozercon gibbus* - dorsal side of female. Scale: 100 μm

Iphidozercon gibbus BERLESE, 1903

(Figs. 43, 44, Pl. 10A)

Synonym: *Leioseius (Arctoseius) stammeri* BERNHARD, 1963

Morphology

Dorsal shield of adults uniform, 393 μm long, 244 μm wide, covering whole dorsal side, without medio-lateral incisions, wearing 32 needle-shaped, short and nude setae (i4 = 13 μm, I4 = 16-19 μm, I5 = 10 μm, S4 = 18 μm, Z5 = 22 - 27 μm long). Dorsal shield growing narrow frontally and wide rounded caudally. Dorsal shield sometimes frontally overlapping to

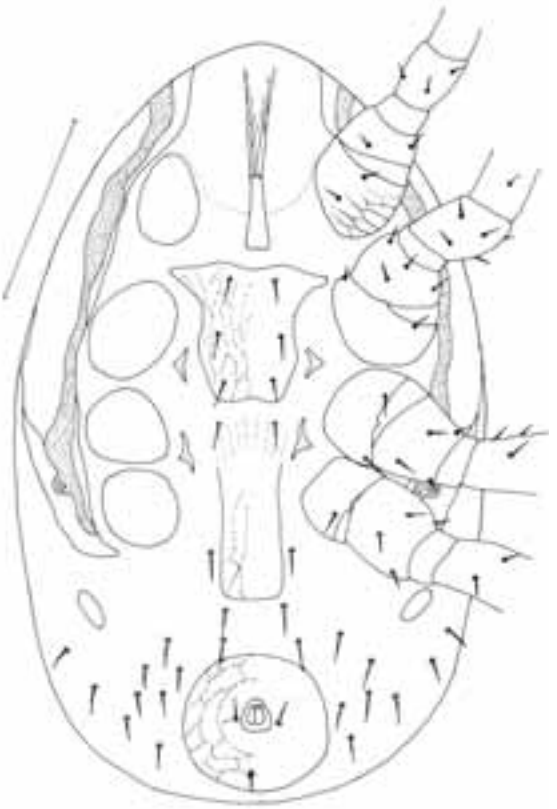

Fig. 44: *Iphidozercon gibbus* - ventral side of female. Scale: 100 μm

ventral side, in this case i1 are not visible. Reticulate pattern of dorsal shield covers it's proximal and lateral parts, other dorsal parts gently dotted. Sternal shield of female prolonged, with three pairs of setae and three pairs of pores. Narrow posterior part of sternal shield separated from endopodal shields, MSt on soft cuticle. Digitus fixus in female with 3 + 1 teeth, digitus mobilis in females with two teeth, in males with 1 tooth. Genital shield narrow, prolonged, without setae. Anal shield rounded, with three anal setae, anal opening situated centrally. Ventral side with 10 pairs of short needle-shaped setae on soft cuticle. Peritremal shield well developed, overlaping from stigmae caudally, curved to IV coxae. Peritremes of various width, proximally long, oversteping I coxae and reaching nearly to r1. Metapodal shields small, oval. Ventral side of ♂ with large genitosternal and ventrianal shield, peritremal shields closed (but separated) to ventrianal shield. Tectum with three pilose tips. Ventral side of male with two large genitosternal and ventrianal shields. Small mites, idiosoma in females 300 - 325 μm long.

Geographic distribution: Widely distributed from European part of Russia to West Europe, North Africa (Algerie).

Vertical distribution in Slovakia: 130 - 620 m a. s. l.

Ecology
Occurring in the soil of meadows, arable soils with lucerne, fallows, compost substrates, especially in wet soils with rich root systems, in dung, compost among roots, decaying organic matter, in the nests of small mammals. In Slovakia found in littoral reed stand (Phragmition), wet moss and soil, lake bank with wet grass rhizosphere on limestones, in the ground nests of birds *Anas platyrhynchos* and *Aythya ferina* in lowland littoral reed stand. Phoretic mite on *Culicoides obsoletus* (Diptera - Nematocera) (MAŠÁN & ORSZÁGH 1994). Edaphic detricolous species occurring mainly in lowlands and submountain areas. Probably inhabiting suitable habitats in whole Slovakia.

Habitat preference
Hygrophilous species preferring from wet to mildly wet subsoils with sufficient ammount of decaying plant material. Mainly in wet microhabitats of the banks (ponds, lakes, brooks). Apparently with the affinity to the decaying plant material in the bird nests on the ground.

Published records from Slovakia: Borská nížina lowland: 1 ♀ - 10.5.1997, Jakubov, Jakubovské rybníky [7567]; 31 ♀♀, 1 ♂ - 27.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 27.5.1997, Jakubov, Jakubovské rybníky (*Aythya ferina*) [7567]; 1 ♀ - 30.5.1997, Jakubov, Jakubovské rybníky [7567]; 1 ♀ - 25.6.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 2 ♀♀ - 27.8.1997, Jakubov, Jakubovské rybníky [7567] (FENĎA & SCHNIEREROVÁ 2005); **Bukovské vrchy Mts.:** 2 ♀♀ - 21.9.1999, Nová Sedlica, Grófske chyžky [6900] (FENĎA & MAŠÁN 2003); **Podunajská rovina lowland**: Bratislava, Ovsište [7868] (MAŠÁN & ORSZÁGH 1994).

Specimens revised: Slovenský kras karst: 1 ♀ - 21.10.1987, Silica, Jašteričie jazierko [7489], published as *Iphidozercon sp* . (KALÚZ, 1998).

Specimen depicted: Slovenský kras karst: 1 ♀ - 21.10.1987, Silica, Jašteričie jazierko [7489].

Genus Arctoseius SIG THOR, 1930

1977 - BREGETOVA et al., Izd. Nauka, Moscow 1-716; **1971** - KARG, Gustav Fisher Verlag Jena 1-475; **1993** - KARG, Gustav Fisher Verlag Jena 1-523; **1961** - LINDQUIST, Hilgardia 30: 301-350; **1930** - THOR, Skr. Svalbard Ishavet, Oslo 27: 1-156;

Synonyms: *Tristomus* (HUGHES, 1948); *Arctotarseius* (WILLMANN, 1949)
Type species: *Arctoseius laterincisus* THOR, 1930

Morphology
Majority of species belong to rather small mites (less than 500 μm). Vertex absent in frontal part of idiosoma, tectum with 2-3 single and nude prongs (medial prong divided very seldom). Pulvilles on tarsi II-IV medially rounded, digitus mobilis in females almost nearly two times longer than the width of its base, with 2 teeth in distal half. Hypostomal groove with lateral margins, wearing 3-8 polyodont rows of denticless, each row with more than 6 denticles. Dorsal shield both in adults and nymphs with shallow medio-lateral incision, shield with 31-34 pairs of setae (14 of them on caudal part). Setae Z5 normal, needle-shaped. Sternal shield in ♀ wears 3 pairs of setae, St1 sometimes on praesternal sclerites, MSt usually on soft cuticle. Ventral side of females usually with genitosternal and with anal shield. Genital shield mostly narrow, with nearly direct or slightly curved caudal margin, without setae and pores. Anal shield in females small, wearing three setae. Peritremes in several species a little shortened, reaching middle of coxae II. Male generally more slender like female.

Ecology and habitat preference
Occurring in the soil, in humus, in the nests of small rodents, scarcelly inhabiting decaying plant or wooden material in the nests of birds.

Arctoseius - key to species (females)

1 (5) Tectum with 2 prongs.

2 (3) Dorsal shield uniform, lateral incision distinctly visible, peritremes not extended caudally from stigmae.

3 (4) Dorsal setae relatively long, Z1 and Z2 reaching the bases of the following setae (Figs. 45, 46), but Z5 not essentially longer than other dorsal setae (Z1 - Z4 = 40 μm, Z5 = 50 - 70 μm long), digitus fixus of female chelicera with 2+2 teeth, anal shield nearly rounded, idiosoma ♀♀ 355 - 415 μm long
. . . . . ***A. semiscissus*** (BERLESE, 1892)

4 (3) Dorsal setae shorter, Z1 and Z2 never reaching the bases of following setae (Z1 - Z4 = 16 - 22 μm long) only Z5 dictinctly longer = 35 - 45 μm long (Figs. 47, 49), longitudinally situated garlande between Z and I rows. Between I4 and I5 lateral, apically directed row of pores, female digitus fixus with row of 6-8 denticles and with 1-2 terminal fork-shaped teeth. Spermatodactyl short, finger-shaped, anal shield caudally broadened (Figs. 48, 50), idiosoma ♀♀ 310 - 360 μm, ♂♂ 270 - 280 μm long
. . . . . ***A. cetratus*** (SELLNICK, 1940)

5 (1) Tectum with three single prongs, smaller species, idiosoma less than 500 μm long.

6 (8) Female with large, nearly quadratic ventrianal shield, wearing 2 pairs of setae.

7 (6) Setae on caudal dorsal margin enlarged: Z5 = 58 μm, Z4 = 42 μm long (Figs. 53, 54). Medial setae short: i4 = 16 - 18 μm, I1 - I4 = 16 μm long, dorsal shield with weakly visible net structure, sternal and ventrianal shields with visible net pattern, genital shield wearing short line-shaped dots, female digitus fixus with 3+1 teeth, spermatodactyl pointed, idiosoma ♀♀ 440 - 480 μm, ♂♂ 380 - 400 μm long
. . . . . ***A. magnanalis*** EVANS, 1958

8 (9) Female always with anal shield only, wearing 1 pair of setae.

10 (20) Female idiosoma longer than 350 μm, dorsal shield regularly with distinct lateral incision (in *A. venustulus* sometimes badly visible).

11 (14) Female anal shield remarkably big, nearly as long as sternal shield or a little longer (sternal shield without praesternal sclerites).

12 (13) All dorsal setae very short (Figs. 55, 57); i4 = I1 = 10 μm, Z5 = 13 μm long, anal shield as long as wide or a little longer (Figs. 56, 58), small claws of leg I on slender praetarsus, claws on other legs nearly two times bigger than those on leg I. Tarsus I slender 80 - 90 μm long, ♀ digitus fixus with 3+1 teeth, spermatodactyl finger-shaped, idiosoma ♀♀ 365 - 445 μm, ♂♂ 325 - 375 μm long
. . . . . ***A. venustulus*** (BERLESE, 1917)

13 (12) Dorsal setae Z5 (= 67 - 69 μm long) distinctly longer (Fig. 59) than other dorsal setae (i4 = I4 = 24 μm, Z4 = 45 - 50 μm), anal shield (Fig. 60) broader than long (width = 98, length = 78 - 90 μm), claws on praetarsus I nearly as big as those on legs II - IV, claws on praetarsus I with surrounding membrane, tarsus I plump (= 82 μm long), idiosoma + 390 - 415 μm long
..... ***A. eremitus*** (BERLESE, 1918)

14 (15) Female anal shield smaller, always shorter than sternal shield.

15 (16) Caudal setae Z5 relatively long, 2-times longer than i4, Z5 = 52 - 68 μm, i4 = 21 - 29 μm long (Figs. 61, 62), ♀ chelicerae remarkably short, digitus mobilis with one tooth distally, corniculi very slender, nearly 1 ½ times longer than chelicerae, tectum with 3 blunt prongs, claws on all legs of equal size, tarsus I clumsy, male spermatodactyl shorter, blunt stick-shaped, idiosoma ♀♀ 400 - 440 μm, ♂♂ 340 μm long
..... ***A. brevichelis*** KARG, 1969

16 (17) Setae Z5 not so remarkably long, chelicerae normal, longer than corniculi, female digitus mobilis with 2 teeth, tarsus I slender, claws on leg I smaller that ones on legs II-IV.

17 (18) All dorsal setae short (i4 = 15 - 16; I1 = 13 - 15; Z5 = 18 - 23 μm long.), prongs on tectum with fine chip-shaped, sometimes weakly visible terminal gap, dorsal shield with fine net structure, on which mainly joining dots are visible only, genital shield caudally slender (Figs. 63, 64), anal shield small, rounded, female digitus fixus with 4+1 teeth, idiosoma ♀♀ 360 - 390 μm long
..... ***A. pristinus*** KARG, 1962

18 (17) Dorsal setae longer (i4 = 19 μm, I1 = 18 μm, Z4 = 24 μm), Z5 distinctly longer than other dorsal setae, Z5 = 30 μm long. Dorsal shield with distinct net structure in medio-opisthosomal part (Fig. 65), lateral frontal and opisthosomal parts of dorsal shield with scale structure longitudinally directed, ♀ genital shield caudally broadened, anal shield oval, oblonged, anal opening in proximal half of anal shield (Fig. 66). Fixed digit in female with 3 and 1 tooth. Idiosoma ♀♀ 360 μm long
..... ***A. resinae*** KARG, 1969

19 (20) Idiosoma of females shorter than 350 μm, lateral medio-dorsal incision absent or weakly visible.

21 (22) Dorsal shield with irregular pattern frontally, with fine net structure centrally and with scale-shaped pattern in opisthosomal part (Fig. 51). Setae I1 = 16 μm, I3 = distance between I3 - I4, Z5 = 18 μm long. Caudal setae on soft cuticle of ventral side of ♀ short, lanceolate. Genital shield caudally broadened and rounded (Fig. 52). Idiosoma ♀♀ 285 μm, ♂♂ 260 - 270 μm long
..... ***A. insularis*** (WILLMANN, 1952)

22 (21) Proximal border of dorsal shield with scale pattern (Fig. 67), medially and caudally with pore-shaped structure, creating net in males. Dorsal setae short, needle-shaped (i4 = I1 = 13 μm, Z4 = 16 μm, S5 = 10 μm, Z5 = 13 μm), setae Z4 and Z5 caudally directed, female digitus fixus with 3+1 teeth, male spermatodactyl broad, finger--shaped. Idiosoma ♀♀ 270 - 325 μm, ♂♂ 250 - 260 μm long
..... ***A. minutus*** (HALBERT, 1915)

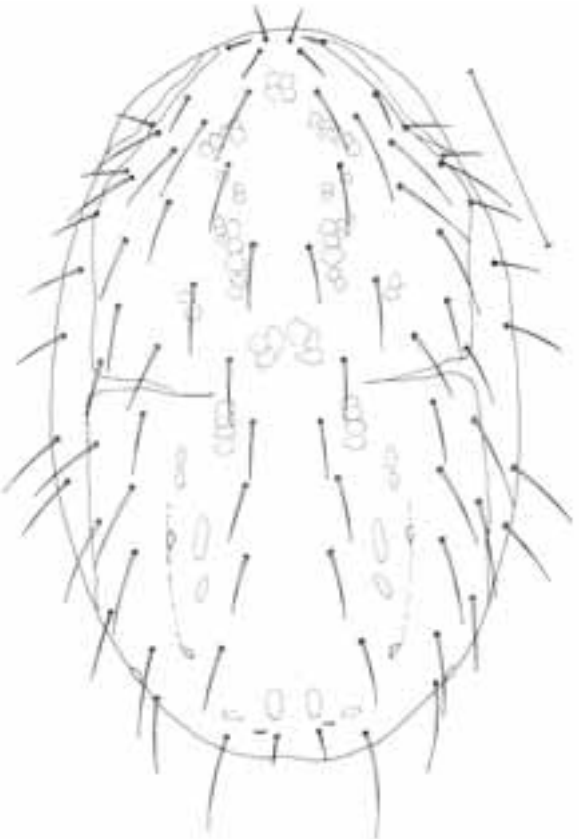

Fig. 45: *Arctoseius semiscissus* - dorsal side of female. Scale: 100 μm

Arctoseius semiscissus (BERLESE, 1892)

(Figs. 45, 46, Pl. 10B)

1882-1903 - BERLESE, Acari, Myriapoda et Scorpiones hucusque in Italia reperta, Port. Pad. I-XCVIII: 1-143

Synonyms: *Lasioseius bispinatus* (WEIS-FOGH, 1947); *Arctoseius sellnicki* (KARG, 1962)

Morphology

Tectum with 2 prongs. Peritremes narrow, proximally reaching coxae II, not extending behind stigmae IV caudally. Dorsal shield in adults uniform, without net structure, in female 340 μm long and 151 μm wide, with medio-lateral incision and with expressive "shoulders" in propodosomal part. Weakly visible garland structures in propodosomal part creating medial ring, following setae i2-s2-i3-i4. Two pores connected by dotted line present between I - Z rows on opistosomal dorsal part. Dorsal setae relatively short, i1 = 21 μm, r1 = 12 μm, l5 = 5 μm, Z1 and Z2 nearly reaching the bases of the following setae, but Z5 not remarkably longer than other dorsal setae (Z1 - Z4 = 40 μm, Z5 = 44 - 70 μm long). Ventral shields and coxae without net structure. Ventral shield rectangular, long, with concave anterior and posterior margins, with slihgtly convex and irregular lateral margins. Sternal setae closed to margins. Genital

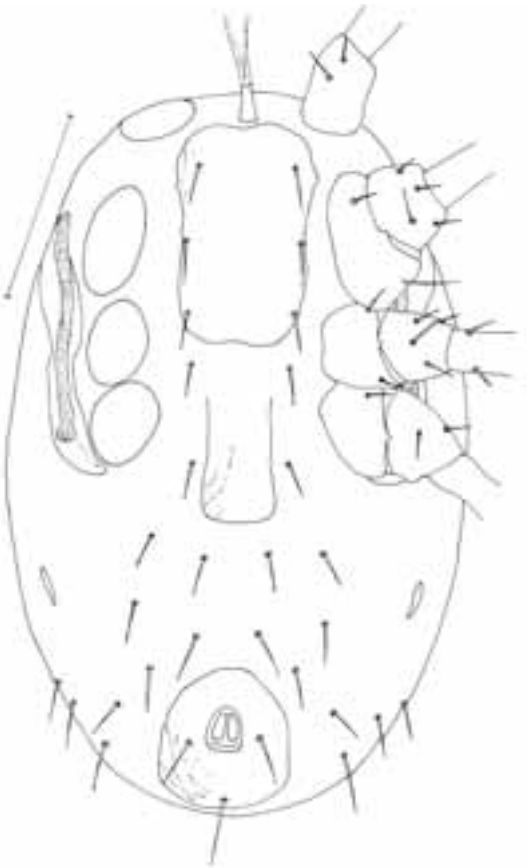

Fig. 46: *Arctoseius semiscissus* - ventral side of female. Scale: 100 μm

shield narrow, caudally broadened, with nearly strait posterios margin. Genital setae standing aside from shield. Oval anal shield broadened caudally, anal opening situated in proximal half of anal shield. Soft cuticle on ventral side with 11 pairs of needle-shaped setae. Digitus fixus of female chelicera with 2+2 teeth, Idiosoma ♀♀ 355 - 415 μm long. Material measured: Dorsal shield 340 μm long, 151 μm wide, Z5 = 44 μm, l5 = 5 μm, i1 = 20 μm, r1 = 12 μm long.

Geographic distribution: Europe

Vertical distribution in Slovakia: 120 - 870 m a. s. l.

Ecology
Seldom occuring in soil of forests, arable soils, under remnants of rotten fruit, compost soil (mangel beet), in mixtured forests, lime soils, meadow soils, in the nests of small mammals, in hotbeds, strongly rotten compost material, in humus between roots of grass, in debris, dropped leaves, preferably in mildly wet subsoils. In Slovakia found in arable soils, agrocenose with white beet, *Zea mays* and *Triticum durum*, in meadovs, depression of arable soil, littoral reed stand (Phragmition), in vineyard, in forests of *Carpineto-Quercetum*, forests of *Pinus silvestris*, lowland

floodplain forests of *Salici-Populetum,* sandy soils, pine forests, montane spruce forest (*Vaccinio-Piceetum)*, beech forest, in caves. Frequently inhabiting decaying organic material in caves (guano). Regularly found in wood detritus and in soil samples. At the same time occurring in the nests of birds: *Circus aeruginosus, Anas platyrhynchos, Anser anser, Aythya fuligula, Aythya ferina, Fulica atra, Podiceps cristatus, Turdus pilaris, Acrocephalus arundinaceus, Hirundo rustica* and seldom in the nests of *Aquila heliaca.*

Considered as an edaphic detricolous species.

Habitat preference

Species with wide ecological tolerance to various habitats, but preferring wet or mildly wet organic material.

Published records from Slovakia: Bodvianska pahorkatina wold: Janík [7491] (Kováč et al. 1999); **Borská nížina lowland:** 9 ♀♀ - 10.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 28 ♀♀, 4 ♂♂ - 10.5.1997, Jakubov, Jakubovské rybníky (*Anser anser*) [7567]; 1 ♀ - 10.5.1997, Jakubov, Jakubovské rybníky (*Circus aeruginosus*) [7567]; 3 ♀♀ - 10.5.1997, Jakubov, Stará Šutrovňa [7567]; 13 ♀♀, 3 ♂♂, 2 DN - 27.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 2 ♀ - 27.5.1997, Jakubov, Jakubovské rybníky (*Aythya fuligula*) [7567]; 20 ♀♀, 2 ♂♂ - 30.5.1997, Jakubov, Jakubovské rybníky (*Aythya ferina*) [7567]; 89 ♀♀, 1 DN 1 PN - 25.6.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 3 ♀♀ - 13.12.1997, Jakubov, Jakubovské rybníky (*Circus aeruginosus)* [7567]; 3 ♀♀ - 23.6.1998, Jakubov, Jakubovské rybníky [7567]; 39 ♀♀ - 25.5.1999, Jakubov, Jakubovské rybníky (*Fulica atra*) [7567]; 1 ♀ - 9.9.1999, Jakubov village, Nová Šutrovňa [7567] (Fenďa & Schniererová 2005); 1 ♀ - 16.10.1998, Jakubov, Jakubovské rybníky [7567]; 5 ♀♀ - 3.12.1998, Jakubov village, Nová Šutrovňa [7567] (Fenďa & Schniererová 2004, 2005); **Ipeľská pahorkatina wold:** Žemberovce [7778] (Kalúz 1994d); Košická kotlina basin: Janik [7491]; 3 ♀♀ - 1.1.1991 - 31.3.1993 (Kováč et al. 1999). **Nízke Tatry Mts.**: 2 ♀♀ - 27.9.2000, Demänovská jaskyňa mieru [6983] (Kováč et al. 2002); **Podunajská rovina lowland:** Topoľové hony [7969]; Hamuliakovo [7969]; Jurovský les [8071] (Čarnogurský et al. 1994); Kráľovská lúka [8170] (Kalúz 1994b); 1 ♀ - 27.4.1992 Istragov [8171] (Kalúz 1995b); Bratislava, Rusovce [7968] (Mašán & Országhová 1995); Most na Ostrove [7869] (Kalúz 1996); 2 ♀♀, 1 ♂ - 17.6.1995, Čičov, Čičovské mŕtve rameno [8272] (Fenďa et al. 1998); 3 ♀♀ - 23.6.1997, Čičov, Lyon (*Acrocephalus arundinaceus*) [8272] (Fenďa & Schniererová 2004); **Trnavská pahorkatina wold:** Pezinok [7669] (Kalúz 1994c); **Východoslovenská rovina lowland:** Parchovany [7296] (Kováč et al. 1999).

Specimens examined: Borská nížina lowland: 2 ♀♀ - 11.6.1986, Plavecké Podhradie village, forest of *Pinus silvestris*, sandy soil [7569]; 1 ♀ - 28.6. 1995, Vysoká pri Morave village, *Salici-Populetum,* fluvisoil, soil sample [7667]; 22 ♀♀ - 3.6.1998, Malacky, Štvrtý rybník [7568]; **Košická kotlina basin:** 2 ♀♀ - 15.8.1989, Haniská [7393]; **Ipeľská pahorkatina wold**: 1 ♀ - 8.12.1981, Žemberovce village, vineyard, pitfall trap [7778] ; **Laborecká vrchovina highland:** 4 ♀♀ - 31.10.1998, Palota, Starý stavenec [6798]; **Podunajská rovina lowland:** 6 ♀♀ - 11.6.1981, Most na Ostrove village, agrocenose, white beet , pitfall trap [7869]; 2 ♀♀- 11.10.1982, Vydrany village, agrocenose, *Triticum durum,* soil sample [7971]; 3 ♀♀ - 14.3.1983, Vydrany village, agrocenose, *Triticum durum*, soil sample [7971]; 1 ♀ - 14.4.1983, Vydrany village, agrocenose, *Triticum durum*, soil sample [7971]; 9 ♀♀ - 16.8.1983, Vydrany village, agrocenose, *Triticum durum*, soil sample [7971]; 37 ♀♀ - 13.10.1983, Vydrany village, agrocenose, *Triticum durum*, soil sample [7971]; 16 ♀♀ - 16.11.1983, Vydrany village, agrocenose, *Triticum durum*, soil sample [7971]; 62 ♀♀ - 18.4.1984, Vydrany village, agrocenose, *Triticum durum*, soil sample [7971]; 1 ♀ - 4.6.1984, Svätý Jur, NNR Šúr (*Anas platyrhynchos*) [7769]; 3 ♀♀ - 17.4.1986, Svätý Jur, NNR Šúr (*Anas platyrhynchos*) [7769]; 1 ♀ - 27.4.1992, Gabčíkovo, Istragov, *Salici-Populetum*, soil detritus [8171]; 1 ♀ - 10.8.1992, Gabčíkovo, Istragov, *Salici-Populetum*, soil detritus [8171]; 3 ♀♀ - 2.12.1992, Gabčíkovo, Istragov, *Salici-Populetum,* soil detritus [8171]; 22 ♀♀, 2 DN - 4.6.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769]; 4 ♀♀ - 10.6.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769]; **Považský Inovec Mts.**: 50 ♀♀ - 9.6.1998, Kálnica [7273]; **Slovenský kras karst**: 4 ♀♀ - 12.9.2003, Krásnohorská Dlhá Lúka, Krásnohorská jaskyňa (pitfall trap) [7389]; 15 ♀♀, 1 DN - 12.9.2003, Krásnohorská Dlhá Lúka, Krásnohorská jaskyňa (guano) [7389]; 31 ♀♀, 21 ♂♂, 11 DN, 6 PN - 12.9.2003, Krásnohorská Dlhá Lúka, Krásnohorská jaskyňa (bait) [7389]; **Slovenský raj Mts.:** 34 ♀♀, 17 ♂♂, 9 DN - 14.6.1999, Hrabušice, Ružová jaskyňa [7088]; 1 ♀ - 1.8.1999, Spišské Tomášovce, Tomášovská jaskyňa [7088]; 5 ♀♀, 3 DN - 22.10.1999, Spišské Tomášovce, Čertova jaskyňa [7088]; 1 ♂ - 25.10.1999, Hrabušice, Kláštorná jaskyňa [7088]; 383 ♀♀, 94 ♂♂, 70 DN, 95 PN, 112 L - 25.10.1999, Hrabušice, Ružová jaskyňa [7088]; **Trnavská pahorkatina wold:** 1♀ - 10.7.1981, Pezinok village, agrocenose with *Zea mays*, pitfall trap [7669]; 12 ♀♀ - 15.7.1986, Viničné village, agrocenose with *Zea mays*, soil sample[7768]; 6 ♀♀ - 1.9.1986, Viničné village, agrocenose with *Zea mays*, soil sample [7768]; **Volovské vrchy Mts.:** 31 ♀♀, 8 ♂♂, 2 DN - 23.10.1999, Poráč village, Poráčska jaskyňa cave [7190].

Specimen depicted: Slovenský raj Mts.: 1 ♀ - 14.6.1999, Hrabušice, Ružová jaskyňa [7088];

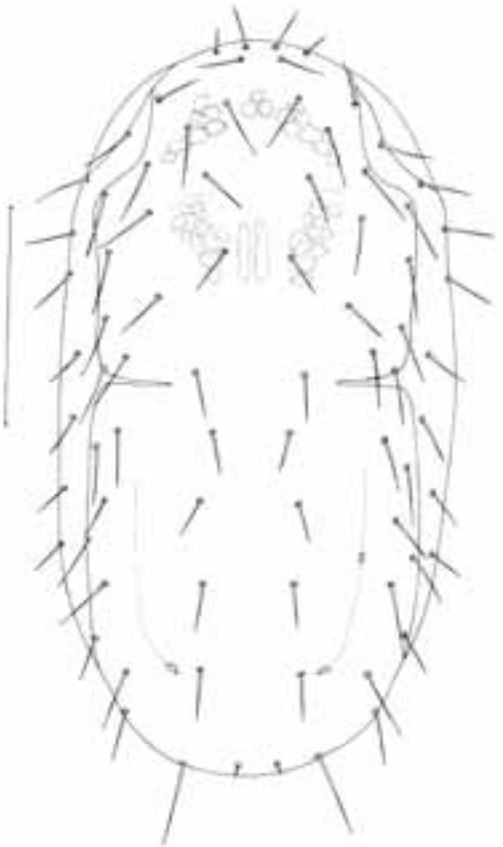

Fig. 47: *Arctoseius cetratus* - dorsal side of female. Scale: 100 μm

Arctoseius cetratus (SELLNICK, 1940)

(Figs. 47, 48, 49, 50, Pl. 11A)

1940 - SELLNICK, Vetensk. Samh. Handl., Göteborg 6: 1-129

Synonyms: *Arctoseius bispinatus* (WEIS-FOGH, 1947); *Arctoseius halophilus* (WILLMANN, 1949); *Arctoseius erlamgensis* (HIRSCHMANN, 1951; SELLNICK, 1958)

Morphology

Dorsal shield in adults uniform, medially with medio-lateral incision, tectum with 2 prongs. Medio-lateral incision distinctly visible, peritremes reaching the level of coxae II proximally, not extended behind stigmae caudally. Dorsal shield with an expressive "shoulders" in propodosomal part, in females 277 μm lond and 122 μm wide, without any pattern. Dorsal setae relatively short, narrow and needle-shaped, i1 = 11 μm, I5 = 7 μm long, Z1 and Z2 never reaching the bases of following setae (Z1 - Z4 = 16 - 22 μm long) only Z5 dictinctly longer = 34 - 45 μm long, Longitudinaly situated garlande between Z and I rows. Between I4 and I5 sometimes lateral, apically directed row of pores visible, female digitus fixus with row of 6-8 denticles and with 1-2 terminal fork-shaped teeth. Spermatodactyl short, finger-shaped. Sternal shield rectangular, narrow with concave anterior and posterior margins. Genital shield narrow, caudally broad-

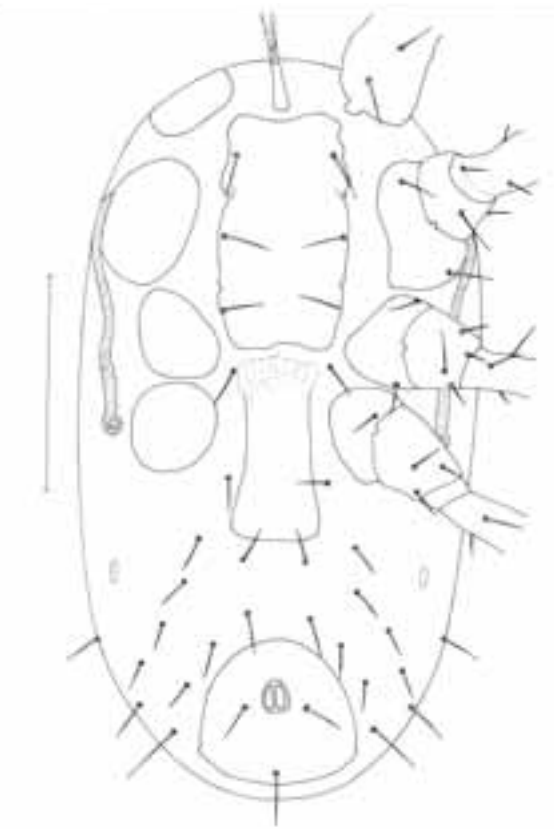

Fig. 48: *Arctoseius cetratus* - ventral side of female. Scale: 100 μm

ened, with slightly rounded posterior margin. Genital setae aside the shield. Anal shield broadened and dotted caudally. Ventral side with 11 pairs of free needle-shaped setae. Anal opening situated in proximal half of anal shield. Idiosoma ♀♀ 310 - 360 μm, ♂♂ 270 - 280 μm long. Material measured: Dorsal shield 277 μm long, 122 μm wide, Z5 = 34 μm, l5 = 7 μm, i1 = 11 μm long.

Geographic distribution: Europe

Vertical distribution in Slovakia: 100 - 610 m a. s. l.

Ecology
Regularly inhabiting meadow soil, arable soil with potatoes, cabbage, lucerne, fallows, regularly found in compost substrate, in deciduous and mixed forests, in chalky soil, in strongly rotten compost material, decaying hay, in moldering litter, humus among grass roots, preferring evenly mildly wet subsoils. In Slovakia found mainly in lowlands, submountain and mountain areas. Found in beech forests, spruce forests, inhabiting reed stands (Phragmition), found in mesophilous pasture, rhizosphere of grass, gravel banks of the river, rhizosphere of grass in sandy soil, in arable soil, agrocenose with white beet, *Triticum durum* in marsh habitat with *Stellario-Alnetum-glutinosae, Filipendulo-Caricetum buekii*, lake banks, pasture grass, montane

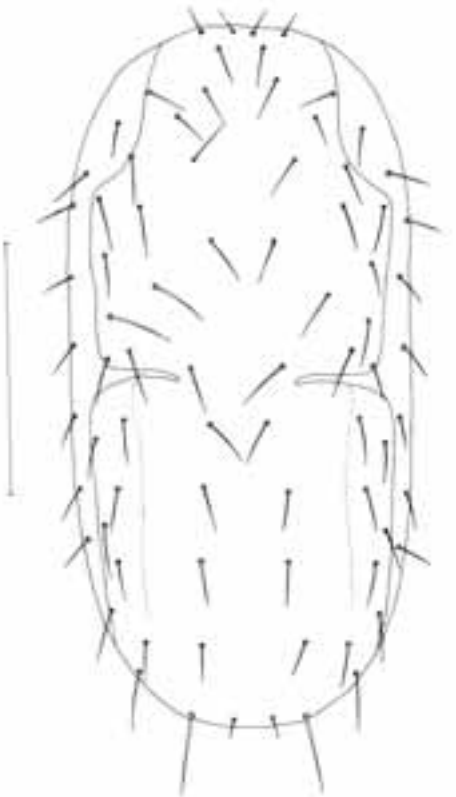

Fig. 49: *Arctoseius cetratus* - dorsal side of female. Scale: 100 μm

spruce forest (*Vaccinio-Piceetum*), in soil samples. Probably also inhabitant of arable soils with organic material (straw, manure) and meadows.

Habitat preference

Regularly occurring in the nests of various birds: *Anas platyrhynchos, Anser anser, Fulica atra, Circus aeruginosus, Podiceps cristatus, Acrocephalus scirpaceus, Acrocephalus arundinaceus, Ixobrychus minutus,* seldom in the nest of *Aquila pomarina.* Species preferring habitats with higher soil moisture and sufficient ammount of decaying organic material. Apparently with the affinity to the less or more wet decaying material in the bottom of birds' nests situated both on the ground and on the plants

Considered as an edaphic detricolous species.

Published records from Slovakia: **Bodvianska pahorkatina wold:** Janík [7491] (Kováč et al. 1999); Borská nížina lowland: 4 ♀♀ - 27.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 2 ♀♀, 1 ♂ - 25.6.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 27.10.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 2 ♀♀ - 25.5.1999, Jakubov, Jakubovské rybníky (*Fulica atra*) [7567] (Fenďa & Schniererová 2005); 3 ♀♀ - 25.5.1999, Jakubov, Jakubovské rybníky (*Phragmites australis*) [7567] (Fenďa & Schniererová 2004, 2005); **Bukovské vrchy Mts.:** 1 ♀, 1 ♂ - 19.6.1998, Nová Sedlica, dolina Zbojského potoka (bank of brook) [6901]; 4 ♀♀ - 6.6.1999, Nová Sedlica, dolina Zakasárenského potoka [6901]; 6 ♀♀, 1 DN - 7.6.1999, Uličˇ, Uličˇka river [7000] (Fenďa & Mašán 2003); **Košická kotlina basin:** Šebastovce [7393]; Valaliky [7393]; Péder [7491] (Kováč et al. 1999); **Podunajská rovina lowland:** Most na Ostrove [7869] (Kalúz 1996); **Slovenský kras karst:** 5 ♀♀ - 6.5.1987, Silica, NPR Pod Fabiankou, *Stel-*

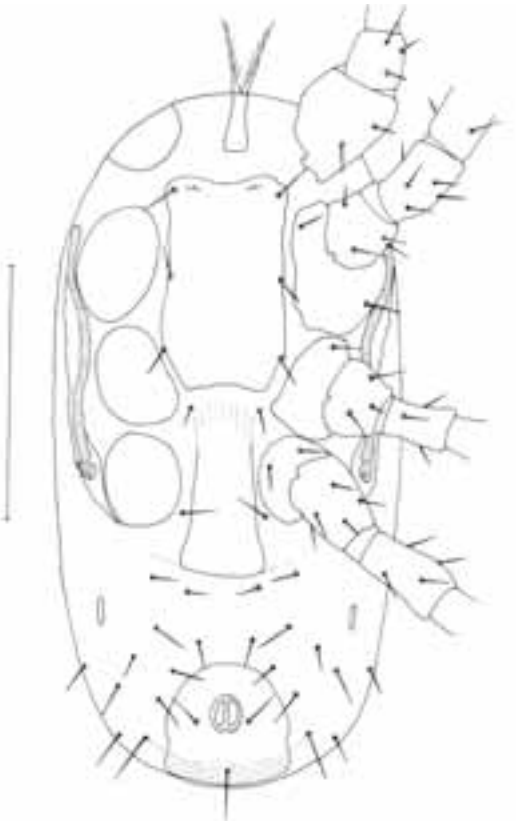

Fig. 50: *Arctoseius cetratus* - ventral side of female. Scale: 100 μm

lario-alnetum-glutinosae, *Filipendulo-Caricetum buekii,* [7489]; 2 ♀♀ - 16.9.1987, Silica, NPR Pod Fabiankou, *Stellario-alnetum-glutinosae*, *Filipendulo-Caricetum buekii,* [7489] (KALÚZ 1992); 5 ♀♀ - 16.9.1987, Silica, Jašteričie jazierko, bank of pond (meadow), [7489] (KALÚZ 1995a); **Východoslovenská pahorkatina wold:** Egreš [7395]; Trhovište, Kapustianky [7296]; Trhovište, Dražkové [7297]; **Východoslovenská rovina lowland:** Čičarovce, Veľká Oršina [7498]; Čičarovce, Mokriny [7498]; Hraň [7496]; Svätá Mária [7597]; Parchovany [7296] (KOVÁČ et al. 1999).

Specimens examined: Borská nížina lowland: 1 ♀ - 10.5.1997, Jakubov, Jakubovské rybníky (*Circus aeruginosus*) [7567]; 1 ♀ - 13.12.1997, Jakubov, Jakubovské rybníky (*Circus aeruginosus*) [7567]; **Laborecká vrchovina highland**: 1 ♀ - 31.10.1998, Palota, Starý stavenec [6798]; **Podunajská rovina lowland:** 1 ♀ - 20.5.1981, Most na Ostrove village, agrocenose, white beet, pitfall trap [7869]; 1 ♀ - 10.9.1981, Most na Ostrove village, agrocenose, white beet , pitfall trap [7869]; 1 ♀♀ - 7.7.1982, Vydrany village, agrocenose, *Triticum durum*, soil sample [7869]; 1 ♀♀ - 11.10.1982, Vydrany village, agrocenose, *Triticum durum*, soil sample [7869]; 1 ♀♀ - 14.6.1983, Vydrany village, agrocenose, *Triticum durum*, soil sample [7869]; 1 ♂ - 4.6.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769]; **Považský Inovec Mts.**: 6 ♀♀ - 9.6.1998, Kálnica [7273]. **Slovenský kras karst**: 2 ♀♀ - 16.9.1987, Silica village, Jašteričie jazierko lake, bank of lake, grass, [7489]; 1 ♀ - 21.10.1987, Silica village, Jašteričie jazierko lake, bank of lake, grass, [7489];

Specimen depicted: Slovenský kras karst: 1 ♀ - 16.9.1987, Pod Fabiankou [7489] (KALÚZ 1992); **Laborecká vrchovina highland:** 1 ♀ - 31.10.1998, Palota, Starý stavenec [6798]

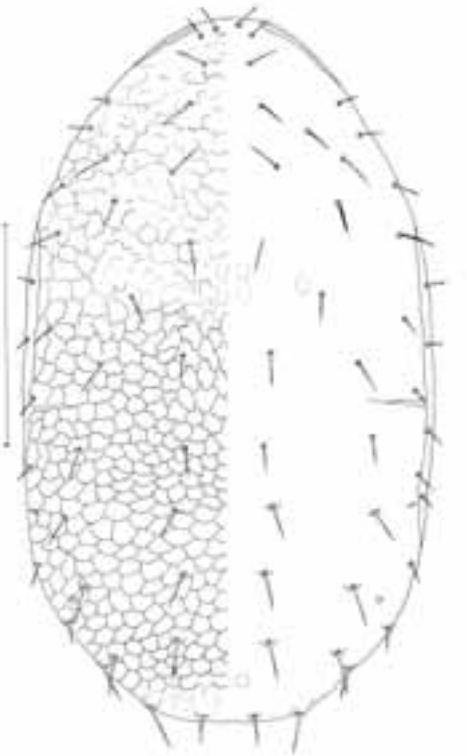

Fig. 51: *Arctoseius insularis* - dorsal side of female. Scale: 100 μm

Arctoseius insularis (WILLMANN, 1952)

(Figs. 51, 52, Pl. 14B)

1952 - WILLMANN, Ver. Inst. Meers. Bremen 1: 139-186

Morphology

Dorsal shield undivided, but sometimes with not very expressive medio-lateral incision from s7. Shield of female 319 μm long and 169 μm wide, with distinct scale-shaped structure mainly in opisthosomal part. Dorsal shield withot visible "shoulders." Proximal part of dorsal shield wearing irregular, weakly visible scales with wavy margins, pattern centrally better developed and well visible. All dorsal setae needle-shaped. Setae I1 = 16 μm, I3 = distance I3-I4, i1 = 12 μm, I = 14 μm, Z5 = 16 - 22 μm long. Bases of majority of dorsal setae in caudal part sitting on protuberances. Peritremes frontally overlapping coxae I. Female sternal shield shorter, without net structure, proximally bilaterally rounded, lateral margins deeply concave, shield broader in distal part. Genital shield concave laterally, broadened and rounded caudally, genital setae outside the shield. Female with oblonged anal shield only, with net pattern and wearing 3 anal setae. Small anal opening situated in proximal half of anal shield. Ventral part with 11 pairs of free setae, postgenital setae needle-shaped, lateral and caudal ones broader, lanceolate. Tectum with 3 nude prongs. Male spermathodactyl thick, finger-shaped, inner part with teeth distally. Small species, idiosoma ♀♀ 285 - 340 μm, ♂♂ 260 - 270 μm long. Material measured: Dorsal shield 319 μm long, 169 μm wide, Z5 = 22 μm, I5 = 14 μm, i1 = 12 μm long.

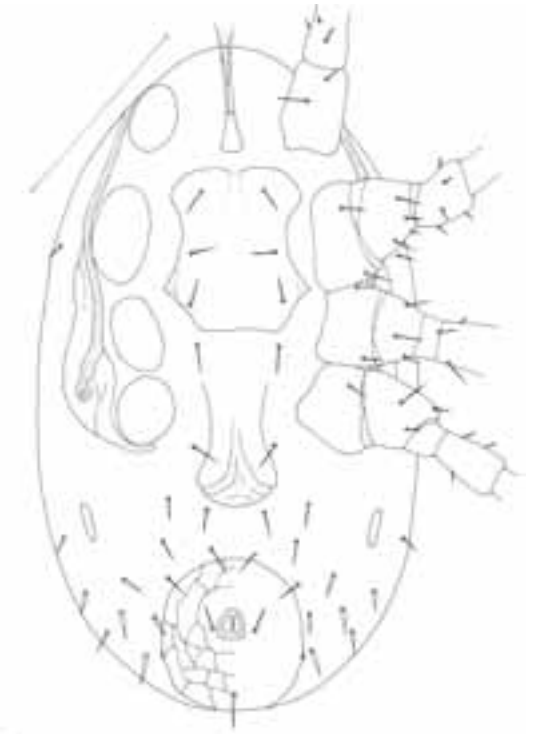

Fig. 52: *Arctoseius insularis* - ventral side of female. Scale: 100 μm

Geographic distribution: Europe

Vertical distribution in Slovakia: 110 - 440 m a. s. l.

Ecology
Occurrnig in meadow soil, in decaying plant remains, in sand between roots, under seaweed on shoreline. In Slovakia found in arable soils in lowland, in soil of floodplain forest of *Salici-Populetum*, in littoral reed stand (Phragmition), in nests of *Fulica atra* on water level, in the soil of mesophilous pasture, rhizosphere of grass. In Slovakia found mainly in lowlands.

Habitat preference
Preferring mainly wet or mesohygrophilous subsoils.

Published records from Slovakia: Východoslovenská rovina lowland: Svätá Mária [7597] (Kováč et al. 1999).

Specimens examined: Borská nížina lowland: 1 ♀ - 28.6.1995, Vysoká pri Morave, *Salici-Populetum* [7667]; **Podunajská rovina lowland:** 3 ♀♀, 2 ♂♂ - 4.6.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769].

Specimens revised: Bukovské vrchy Mts.: 1 ♀ - 19.6.1998, Nová Sedlica, dolina Zbojského potoka (pasture) [6901] (Fenďa & Mašán 2003) published as *Arctoseius minutus*;

Specimen depicted: Podunajská rovina lowland: 1 ♀ - 4.6.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769].

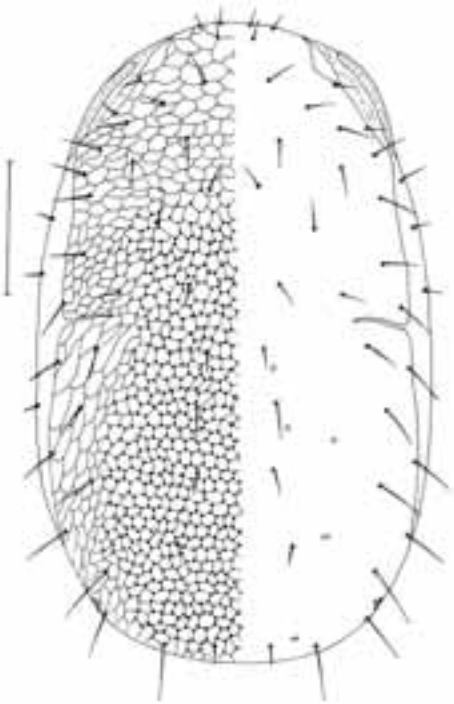

Fig. 53: *Arctoseius magnanalis* - dorsal side of female. Scale: 100 μm

Arctoseius magnanalis EVANS, 1958

(Figs. 53, 54, Pl. 11B)

1958 - EVANS, Proc. Zool. Soc. London 131: 177-229

Morphology

Peritremes reaching coxae I. Dorsal shield of ♀ 476 μm long and 274 μm wide, with different pattern. Proximal part of dorsal shield scale-shaped, lateral opisthosomal parts with longitudinally situated oblonged scales, medio-central and caudal parts of dorsal shield with fine net structure. Shield with shallow medio-lateral incision and several pairs (5 - 6) of pores. Setae on caudal dorsal margin enlarged; Z5 = 43 - 58 μm, Z4 = 42 μm long, I5 = 14 μm, i1 = 12 μm, medial setae short; i4 = 16 - 18 μm, I1 - I4 = 16 μm long, Sternal shield with visible net structure and lateral proximal sclerites, ♀ genital shield narrow, caudally rounded, with short line-shaped dotts. Female with large, nearly quadratic ventrianal shield with expressive net pattern, wearing 2 pairs of setae. Soft cuticle of ventral side with 10 pairs of needle-shaped setae. Female digitus fixus with 3+1 teeth, ♂ spermatodactyl pointed. Smaller species, idiosoma ♀♀ 440 - 480 μm, ♂♂ 380 - 400 μm long. Material measured: Dorsal shield 476 μm long, 274 μm wide, Z5 = 43 μm, I5 = 14 μm, i1 = 12 μm long.

Geographic distribution: Central Europe, England

Vertical distribution in Slovakia: 440 - 1400 m a. s. l.

Ecology

Regularly in litter of deciduous and mixed forests, mouldering litter and moss. In Slovakia found in fir-beech forest (*Abieti-Fagetum*), mesophilous pasture, spruce forest with *Vaccinium myrtilus*,

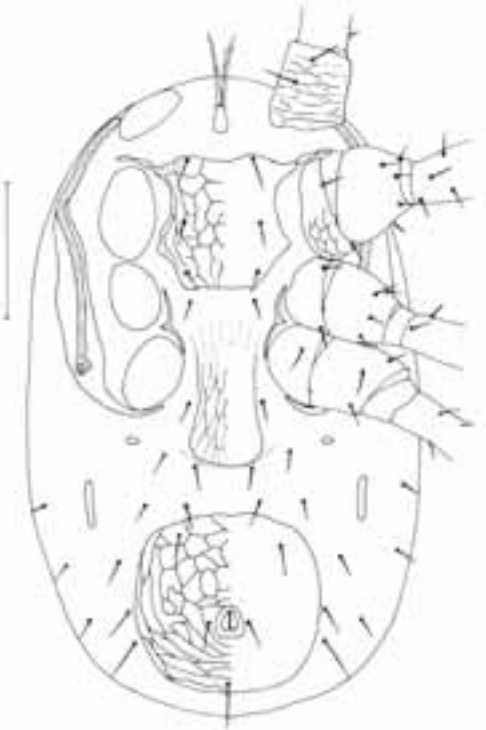

Fig. 54: *Arctoseius magnanalis* - ventral side of female. Scale: 100 μm

forest of *Picea abies*, mesophilous pasture, rhizosphere of grass, in the soil of mountain phytocenoses *Fagetum, Fageto-Aceretum, Acereto-Piceetum, Fageto-Piceetum*. In Slovakia occurring mainly in submountain and mountain areas.
Considered as an edaphic detricolous species.

Habitat preference

Mainly in leaf litter and raw humus, in the soil of mesophilous pastures, rhizosphere of grass, leaf litter and soil detritus - species showing wider ecological demands.

Published records from Slovakia: Bukovské vrchy Mts.: 1 ♀ - 8.6.1999, Nová Sedlica, NNR Stužica [6901]; 1 ♀ - 21.9.1999, Runina, Žurkovec Mt. [6800]; 1 ♀ - 25.9.1999, Nová Sedlica, Vrch hrbu Mt. [6901] (Fenďa & Mašán 2003); **Malá Fatra Mts.:** NNR Šrámková [6880] (Kalúz & Žuffa 1986); NNR Šútovská dolina [6880] (Kalúz 1997a); **Veľká Fatra Mts.:** NNR Skalná Alpa [7081]; Tanečnica Mt. [7081].

Specimens examined: Bukovské vrchy Mts.: 1 ♀ - 20.6.1998, Nová Sedlica, pasture [6901] **Malá Fatra Mts:** 1 ♀ - 16.9.1991, Šútovská dolina valley, forest of *Picea abies,* leaf litter and soil detritus [6880]; 1 ♀ - 24.10.1996, Štefanová village, NNR Rozsutec, *Fagetum*, leaf litter and soil detritus [6780]; **Veľká Fatra Mts:** 1 ♀ - 30.5.1985, Smrekovica, NNR Skalná Alpa, *Fageto Aceretum,* leaf litter and soil detritus [7081]; 3 ♀♀ - 3.7.1985, Smrekovica, NNR Skalná Alpa, *Acereto-Piceetum*, leaf litter and soil detritus [7081]; 2 ♀♀ - 3.7.1985, Smrekovica, NNR Skalná Alpa, *Fageto-Aceretum*, leaf litter and soil detritus [7081]; 1 ♀ - 3.7.1985, Smrekovica, NNR Skalná Alpa, *Fageto-Piceetum*, leaf litter and soil detritus [7081]; 3 ♀♀ - 7.8.1985, Smrekovica, NNR Skalná Alpa, *Acereto-Piceetum*, leaf litter and soil detritus [7081]; 1 ♀ - 7.8.1985, Smrekovica, NNR Skalná Alpa, *Fageto-Aceretum*, leaf litter and soil detritus [7081]; 2 ♀♀ - 7.8.1985, Smrekovica, NNR Skalná Alpa, *Fageto-Piceetum*, leaf litter and soil detritus [7081]; 1 ♀ - 7.8.1985, Smrekovica, NNR Skalná Alpa, *Fageto-Aceretum,* leaf litter and soil detritus [7081]; 2 ♀♀ - 7.8.1985, Smrekovica, NNR Skalná Alpa, *Fageto-Aceretum*, leaf litter and soil detritus [7081]; 2 ♀♀ - 4.9.1985, Smrekovica, NNR Skalná Alpa, *Fageto-Aceretum*, leaf litter and soil detritus [7081];

Specimen depicted: Veľká Fatra Mts.: 1 ♀ - 7.8.1985, NNR Skalná Alpa [7081]

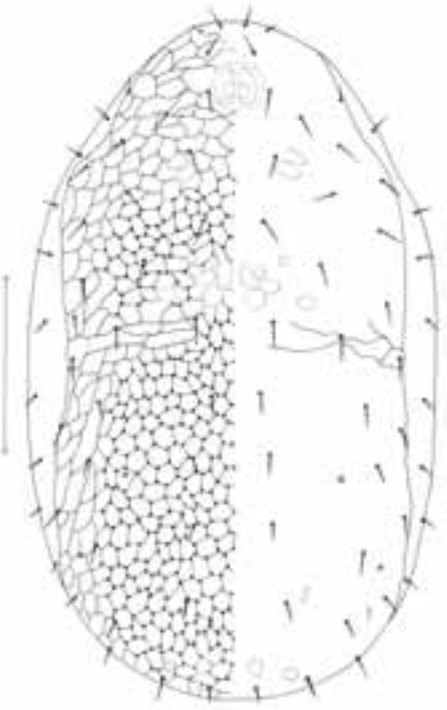

Fig. 55: *Arctoseius venustulus* - dorsal side of female. Scale: 100 μm

Arctoseius venustulus (BERLESE, 1917)

(Figs. 55, 56, 57, 58, Pl. 12A)

1917 - BERLESE, Redia, Firenze, 12

Synonyms: *Arctoseius pannonicus* (WILLMANN, 1949)

Morphology

Smaller species, claws of leg I on slender praetarsus, claws on other legs nearly two times bigger than those on leg I. Dorsal shield in ♀ 410 μm long, 210 μm wide, regularly with distinct lateral incision (sometimes badly visible, or both parts od shield grown together). Dorsal shield proximally and laterally with scale-shaped pattern, frontal and lateral opisthosomal scales oblonged, other parts of dorsal shield with fine net structure. All dorsal setae very short, needle-shaped, i4 = l1 = 10 μm, Z5 = 14 μm, l5 = 9 μm, i1 = 12 μm long. Coxae I with scale-shaped pattern. Female sternal shield with net pattern, praesternalia developed. Genital shield narrow, slightly broadened and rounded or straith caudally. Female always with elliptic anal shield only, wearing 1 pair of setae. Anal shield remarkably big, nearly as long as sternal shield or a little longer, proximally with net structure and caudally dotted. Very small anal opening situated in proximal half of anal shield. Soft cuticle of ventral side with 8 pairs of short needle--shaped free setae. Tarsus I slender, 80 - 90 μm long, female digitus fixus with 3+1 teeth, ♂ spermatodactyl finger-shaped, idiosoma ♀♀ 365 - 445 μm, ♂♂ 325 - 375 μm long. Material measured: Dorsal shield 410 μm long, 210 μm wide, Z5 = 14 μm, l5 = 9 μm, i1 = 9 μm long.

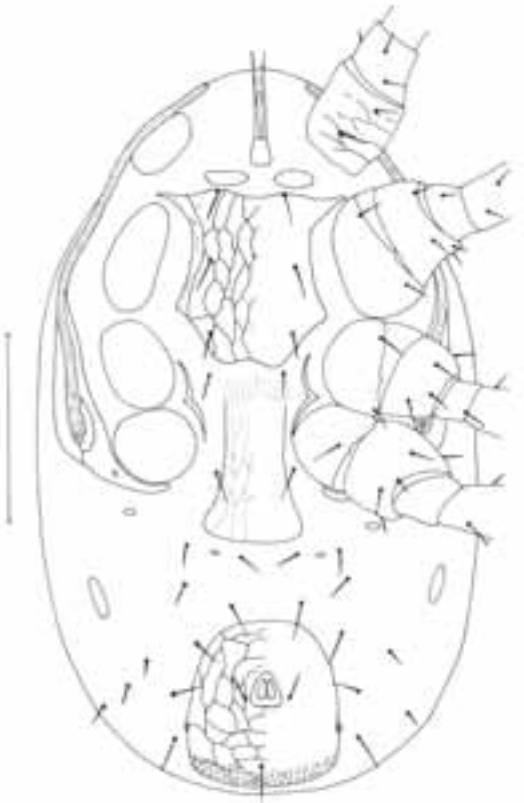

Fig. 56: *Arctoseius venustulus* - ventral side of female. Scale: 100 μm

Geographic distribution: Europe

Vertical distribution in Slovakia: 520 - 950 m a. s. l.

Ecology
Regularly occurring in arable soil (with corns, beet, lucerne) and in meadow soils, especially in black soil and clayey soil, seldom in composte material, forests, in humus and litter, preferring mildly wet subsoils. In Slovakia found in mountain forest of old *Piceeto-Fageto-Abietum* (+120 years), *Piceetum* and submountain *Fageto- Aceretum* on limestones, in the soil of pasture with *Quercetum*, in leaf litter and grass rhizosphere.
Considered as an edaphic detricolous species.

Habitat preference
Unknown, probably preferring mildly wet substrates.
Published records from Slovakia: Malá Fatra Mts.: NNR Šrámková [6880] (Kalúz & Žuffa 1986); **Slovenský kras karst:** 1 ♀ - 27.7.1987, Silica, Silická Ľadnica cave [7489] (Kalúz 1993a, 1994e).

Specimens examined: Štiavnické vrchy Mts.: 1 ♀ - 11.6.1998, Dobrá Niva. [7478].

Specimen depicted: Štiavnické vrchy Mts.: 1 ♀ - 11.6.1998, Dobrá Niva. [7478]; **Slovenský kras karst:** 1 ♀ - 27.7.1987, Silica, Silická Ľadnica cave [7489]

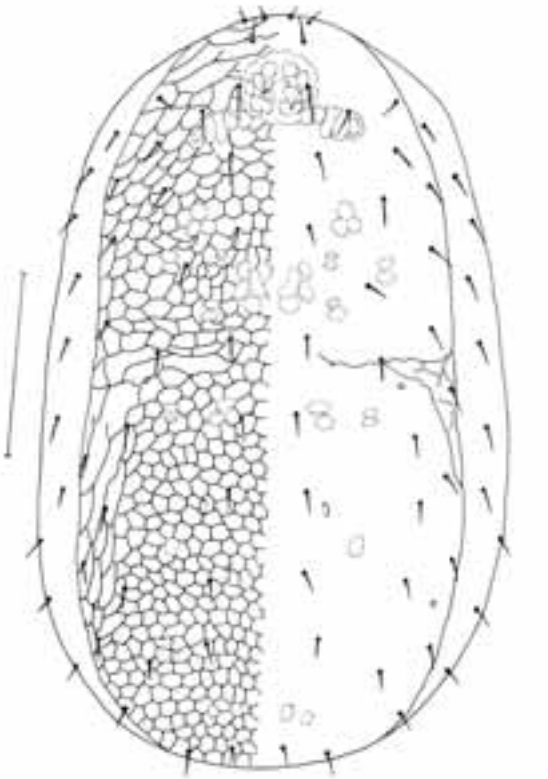

Fig. 57: *Arctoseius venustulus* - dorsal side of female. Scale: 100 μm

Arctoseius eremitus (BERLESE, 1918)

(Figs. 59, 60, Pl. 12B)

1918 - BERLESE, Redia, Firenze, 13: 115-192

Synonyms: *Arctoseius austriacus* (WILLMANN, 1949)

Morphology

Smaller species, peritremes reach to coxae I. Dorsal shield regularly with distinct medio-lateral incision. Dorsal shield in ♀ 391 μm long, 191 μm wide, without any net structure. Badly visible garland structures (6-7) situated on propodosomal part, "shoulders" present, opisthosomal dorsal part with 6 pairs of pores. Dorsal setae needle-shaped, different in length, Z5 (= 53 - 69 μm) distinctly longer than other dorsal setae (i4 = l4 = 24 μm, Z4 = 45 μm), l5 = 7 μm, i1 = 11 μm long. Female sternal shield without structure, proximally convex, caudally concave, lateral proximal parts concave, sternal setae sitting on margins. Genital shield caudally rounded. Female anal shield remarkably big, rounded (width = 98, length = 78 - 90 μm), nearly as long as sternal shield or a little longer. One specimen with well developed anal shield is sufficient for measurments. Caudal margin of anal shield with chain-shaped garland structure. Small anal

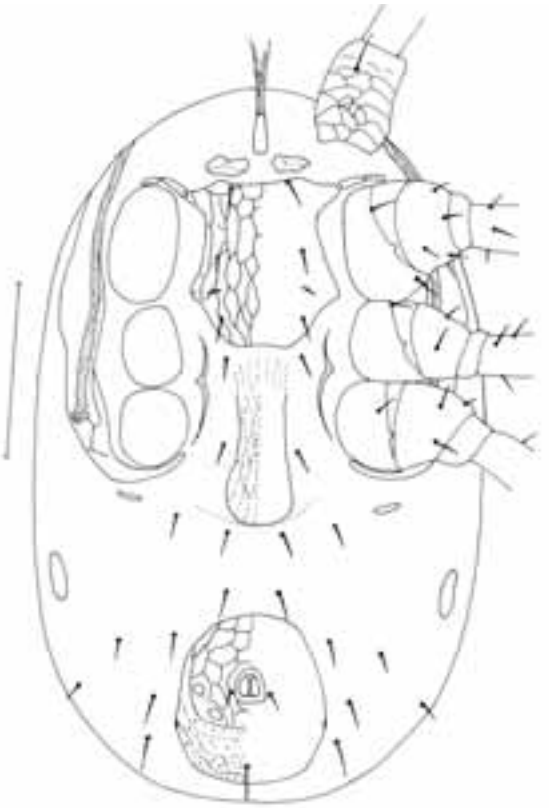

Fig. 58: *Arctoseius venustulus* - ventral side of female. Scale: 100 μm

opening situated centrally. Soft cuticle of ventral side with 7 pairs of needle-shaped free setae, caudal pair is the longest. Claws on praetarsus I nearly as big as those on legs II - IV, tarsus I plump (= 82 μm). Idiosoma ♀♀ 390 - 415 μm long. Material measured: Dorsal shield 391 μm long, 191 μm wide, Z5 = 53 μm, l5 = 7 μm, i1 = 11 μm long.

Geographic distribution: Central and South Europe, Ukraine.

Vertical distribution in Slovakia: 140 - 1170 m a. s. l.

Ecology
Rare in arable soils, seldom in deciduous forests, nests of small mammals, especially in mountain forest litter, mouldering leaves, in moss, lichens and humus. In Slovakia found in: floodplain forests of *Salici - Populetum*, meadows, subxerophile meadow, mountain meadow, mountain hay meadows, spruce forests with *Vaccinium myrtilus*, forests of *Querceto-Crataegetum*, forest steppe biocenoses, lake banks, pastures on limestones.
Considered as an edaphic detricolous species.

Habitat preference
Occurring in rhizosphere of grass, leaf litter and soil detritus in upper layers, showing wider adaptations to various conditions without a special preference to habitat.

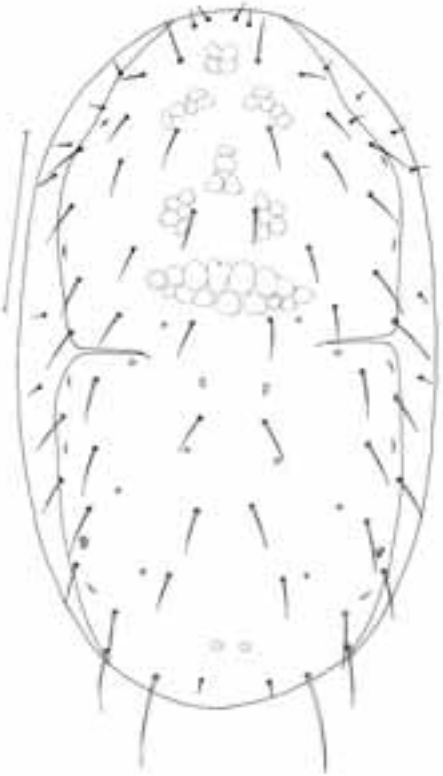

Fig. 59: *Arctoseius eremitus* - dorsal side of female. Scale: 100 μm

Published records from Slovakia: Borská nížina lowland: Vysoká pri Morave [7667] (Kalúz 1994a); **Bukovské vrchy Mts.:** 6 ♀♀ - 10.6.1999, Kolbasov, NNR Bzaná (litter) [6900]; 1 ♀ - 21.9.1999, Nová Sedlica, Riaba skala Mt. [6800] (Fenďa & Mašán 2003); **Malá Fatra Mts.:** NNR Šrámková [6880] (Kalúz & Žuffa 1986); **Malé Karpaty Mts.:** Devínska lesostep [7867] (Kalúz 2005b); **Slovenský kras karst:** Jašteričie jazierko [7489] (Kalúz 1995a).

Specimen examined: Borská nížina lowland: 1 ♀ - 12.8.1992, Vysoká pri Morave village - *Salici-Populetum*, fluvisoil, soil sample [7667]; **Malé Karpaty Mts.:** 1 ♀ - 26.6.2002, Bratislava, Kamzík, *Quercetum*, leaf litter and soil detritus [7868]; **Turzovská vrchovina highland:** 1 ♀ - 2.7.1997, Korňa (leaf litter) [6577].

Specimen depicted: Bukovské vrchy Mts.: 1 ♀ - 10.6.1999, Kolbasov, NNR Bzaná (litter) [6900];

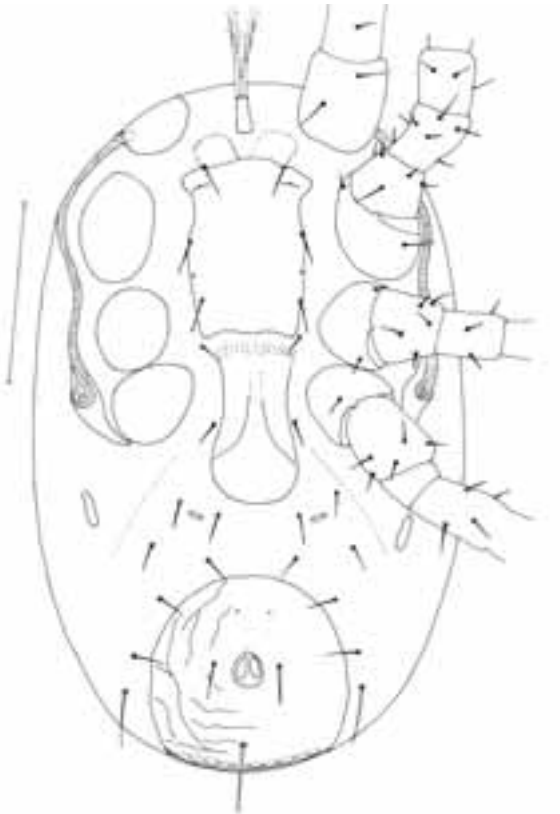

Fig. 60: *Arctoseius eremitus* - ventral side of female. Scale: 100 μm

Arctoseius brevichelis KARG, 1969

(Figs. 61, 62, Pl. 13A)

1969 - KARG, Zool. Anz. 182: 393-406

Morphology

Smaller species, chelicerae remarkably short, female digitus mobilis with one tooth distally, corniculi very slender, nearly 11/2 times longer than chelicerae, tectum with 3 blunt prongs. Peritremes shorter, reach coxae II. Dorsal shield in ♀ 380 μm long, 180 μm wide, with distinct lateral incisions, without net structure, fine garland structures (9 - 10) badly visible on propodosomal part. Dorsal setae needle-shaped, caudal setae Z5 relatively long, 2-times longer than i4, Z5 = 49 - 68 μm, i4 = 21 - 29 μm long, l5 = 6 μm, i1 = 16 μm long. Female sternal shield rectangular, sternal setae on margins, big praesternalia present. Genital shield long, narrow, caudally rounded. Ventral shields practically without structure (anal shield with weakly visible net pattern). Female always with oval anal shield only, wearing 1 pair of setae. Anal shield not remarkably enlarged, always shorter than sternal shield, small anal opening in proximal half of shield. Soft cuticle of ventral side of ♀ with 10 pairs of needle-shaped setae, caudal ones longer. Claws on all legs of equal size, tarsus I clumsy, male spermatodactyl shorter, blunt stick-shaped.

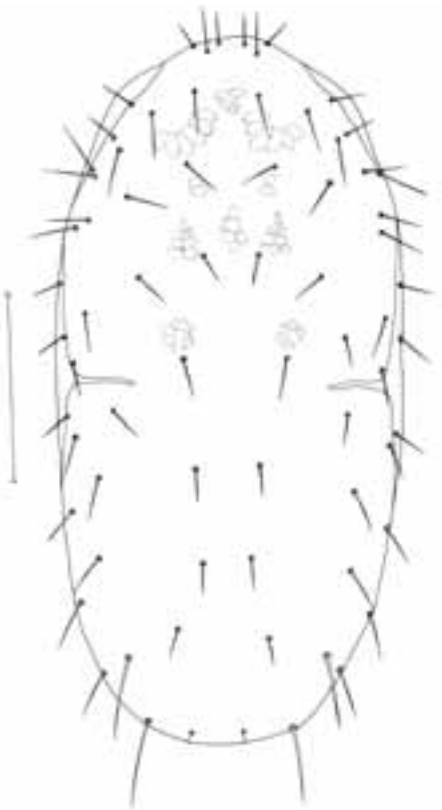

Fig. 61: *Arctoseius brevichelis* - dorsal side of female. Scale: 100 μm

Idiosoma ♀♀ 400 - 440 μm, ♂♂ 340 μm long. Material measured: Dorsal shield 380 μm long, 180 μm wide, Z5 = 49 μm, I5 = 6 μm, i1 = 16 μm long.

Geographic distribution: Central Europe.

Vertical distribution in Slovakia: 410 - 1150 m a. s. l.

Ecology
Little known. Seldom in deciduous and pine forests, likewise im meadow soils, in humus among roots of grass, in pine litter and in moss. Occurrence in Slovakia - spruce forest with *Vaccinium myrtilus*, pasture on limestones. Rather scarce species, in Slovakia known from submountain and mountain areas.

Habitat preference
Unknown, species probably adapted to wider ecological conditions without strictly defined habitat requirements.

Published records from Slovakia: Malá Fatra Mts.: NNR Šrámková [6880] (Kalúz & Žuffa 1986); **Slovenský kras karst:** NR Kráľova Studňa [7489] (Kalúz 2001).

Specimen depicted: Podunajská rovina lowland: 22.9.1993, Dobrohošť village, Dunajské Kriviny - willow-poplar floodplain forest (*Salici-Populetum*), soil sample, soil detritus; 122 m a. s. l. [DFS: 8070].

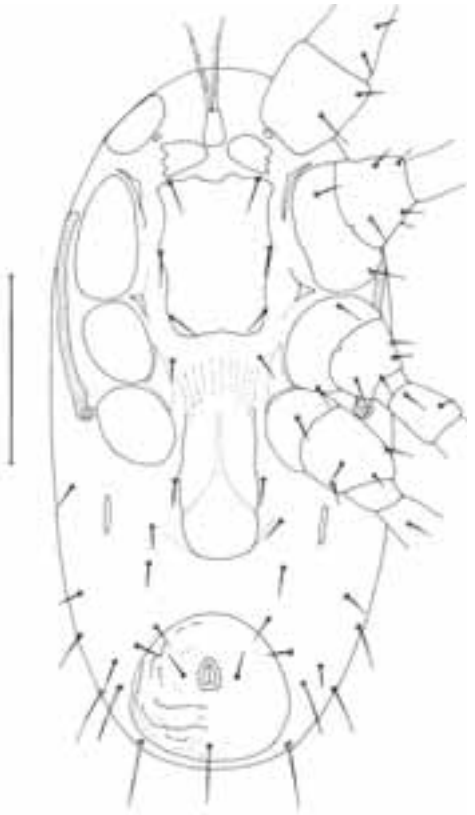

Fig. 62: *Arctoseius brevichelis* - ventral side of female. Scale: 100 μm

Arctoseius pristinus KARG, 1962

(Figs. 63, 64, Pl. 13B)

1962 - KARG, Mitt. Zool. Mus. Berlin 38: 23-119

Synonyms: *Leioseius denticulosus* (BERNHARD, 1963)

Morphology

Smaller species, peritremes reach nearly coxae I. Dorsal shield in ♀ 418 μm long, 192 μm wide, regularly with distinct lateral incision, dorsal shield with fine net structure, on which mainly joining dots are visible only. Several badly visible garland structures on propodosomal and opisthosomal parts of dorsal shield. All dorsal setae needle-shaped, short, i4 = 15 - 16 μm, l1 = 13 - 15 μm, Z5 = 18 - 23 μm, l5 = 13 μm, i1 = 14 μm long. Female sternal shield proximally rounded, laterally and caudally concave, praesternalia developed. Female genital shield small, narrow, caudally rounded. Female always with anal shield only, wearing 1 pair of setae. Oval anal shield not remarkably enlarged, always shorter than sternal shield. Soft cuticle of ventral side in female with 9 pairs of short, free needle-shaped setae. Chelicerae normal, longer than corniculi, tarsus I slender, claws on leg I smaller that ones on legs II-IV. Prongs on tectum with fine chip-shaped, sometimes badly visible terminal gap. Female digitus fixus with 4+1 teeth, digitus mobilis with 2 teeth. Idiosoma ♀♂ 360 - 390 μm long. Material measured: Dorsal shield 418 μm long, 192 μm wide, Z5 = 21 μm, l5 = 13 μm, i1 = 14 μm long.

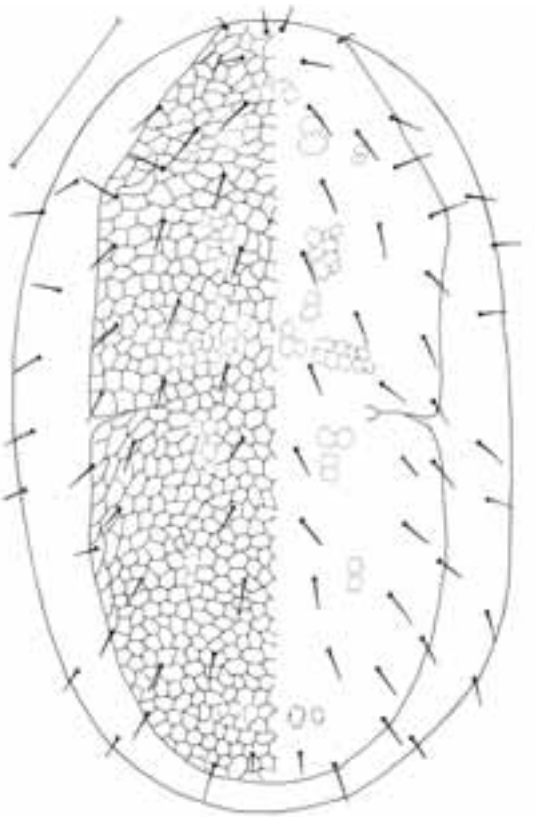

Fig. 63: *Arctoseius pristinus* - dorsal side of female. Scale: 100 μm

Geographic distribution: Central Europe

Vertical distribution in Slovakia: 220 - 1100 m a. s. l.

Ecology
Rare species in arable soil (potatoes), in deciduous and pine forests, in mouldering litter, rotting straw, in moss on stones, in moldering plant remnants (heaps of decaying plant). In Slovakia found in the winter nests of the common mole *Talpa europaea* in valey of creek with *Alnus glutinosa* and in caves. Probably edaphic psychrophilous species.

Habitat preference
Unknown, probably requiring psychrophilous conditions with decaying organic material (caves, winter mole nests).

Published records from Slovakia: Belianske Tatry Mts.: 1 ♀ - 18.4.2002, Belianska jaskyňa [6787]; 1 ♀ - 12.9.2001, Belianska jaskyňa [6787]; 8 ♀♀ - 10.10.2003, Belianska jaskyňa [6787] (Fenďa & Košel 2004); **Malé Karpaty Mts.:** Borinka [7768] (Mašán et al. 1994); **Nízke Tatry Mts.:** 1 ♀ - 27.9.2000, Demänovská jaskyňa slobody [7083]; 3 ♀♀ - 28.9.2000, Demänovská ľadová jaskyňa [6983] (Kováč et al. 2002).

Specimen depicted: Nízke Tatry Mts.: 1 ♀ - 28.9.2000, Demänovská ľadová jaskyňa [6983] (Kováč et al. 2002).

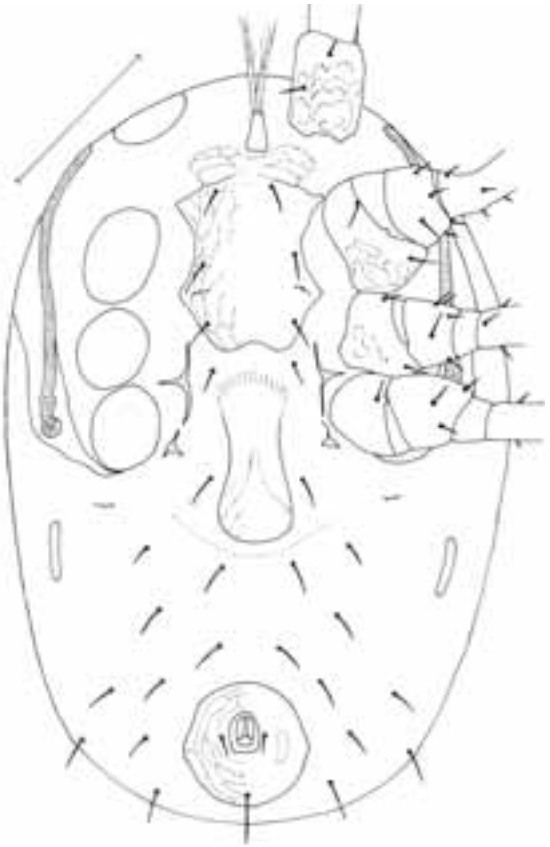

Fig. 64: *Arctoseius pristinus* - ventral side of female. Scale: 100 μm

Arctoseius resinae KARG, 1969

(Figs. 65, 66, Pl. 14A)

1969 - KARG, Zool. Anz. 182: 393-406

Morphology

Smaller species, peritremes very long, overstepping coxae I. Dorsal shield in ♀ 548 μm long, 257 μm wide, regularly with distinct medio-lateral incision. Pattern on dorsal shield different, fronto-laterally scale-shaped and medio-caudally with fine net structure. Central part of shield with irregular fine structure. Fine garland pattern on propodosomal part, three pores situated medially and 4 rounded structures caudally on opistohsomal part. All dorsal setae needle-shaped, of middle length; i4 = 19 μm, l1 = 18 μm, Z4 = 24 μm, l5 = 12 μm, i1 = 10 μm long. Z5 not distinctly longer than other dorsal setae, Z5 = 30 - 38 μm long, Sternal shield with net structure, praesternalia well developed. Genital shield narrow, caudally broadened, with fine structure. Female always with anal shield only, wearing 1 pair of setae. Anal shield not remarkably enlarged, oval, always shorter than sternal shield. All ventral shields with well or less developed net structure. Soft cuticle on ventral side with 10 pairs of needle-shaped setae. Chelicerae normal, longer than corniculi, female digitus mobilis with 2 teeth, fixed digit with 3 and 1 tooth.

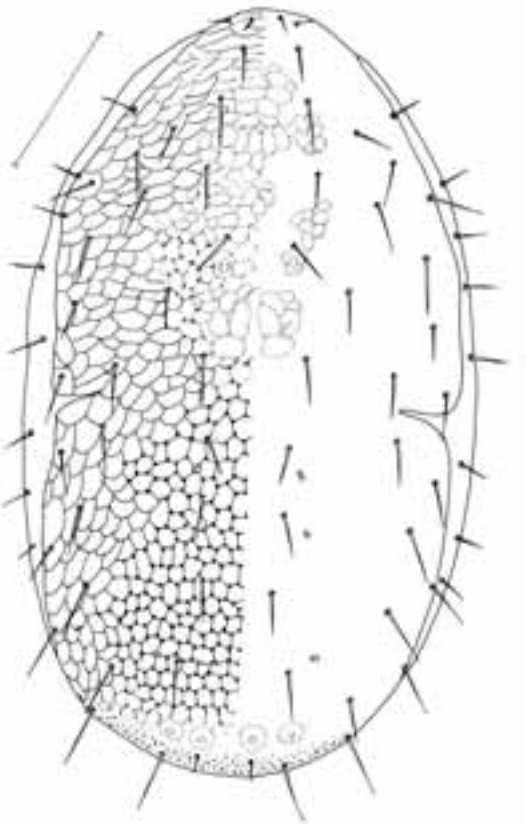

Fig. 65: *Arctoseius resinae* - dorsal side of female. Scale: 100 μm

Tarsus I slender, claws on leg I smaller that ones on legs II-IV. Idiosoma ♀♀ 360 μm long. Material measured: Dorsal shield 548 μm long, 257 μm wide, Z5 = 38 μm, I5 = 12 μm, i1 = 10 μm long.

Geographic distribution: Central Europe

Vertical distribution in Slovakia: 380 m a. s. l.

Ecology
Rare species sometimes found in deciduous forests, in straw and litter substrates (medium mountain altitudes). In Slovakia found in leaf litter and detritus of oak forest (*Quercetum).*

Habitat preference: Unknown.

Specimens examined: Malé Karpaty Mts: 1 ♀ - 15.5.2001, Bratislava, Devín [7867];

Specimen depicted: Malé Karpaty Mts: 1 ♀ - 15.5.2001, Bratislava, Devín [7867];

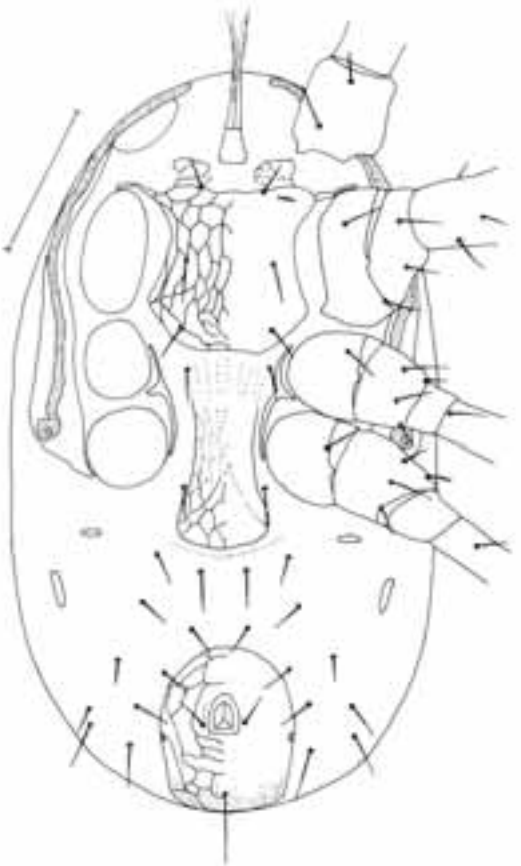

Fig. 66: *Arctoseius resinae* - ventral side of female. Scale: 100 μm

Arctoseius minutus (HALBERT, 1915)

(Figs. 67, 68, Pl. 15A)

1915 - HALBERT, Proc. Roy. Irish Acad., Dublin 31: 45-136

Synonyms: *Lasioseius pulvisculus* (BERLESE, 1921).

Morphology

Smaller species, idiosoma less than 500 μm long. Female always with anal shield only, wearing 1 pair of setae. Idiosoma of females shorter than 350 μm, medio-lateral dorsal incision absent or badly visible. Dorsal shield without hole-shaped depressions, all dorsal setae needle-shaped, spermatodactyl thick, finger-shaped. Proximal border of dorsal shield with scale structure, dorsal surface medially and caudally porous, creating net in males. Dorsal setae short, needle-shaped (i4 = I1 = 13 μm, Z4 = 16 μm, S5 = 10 μm, Z5 = 13 μm), setae Z4 and Z5 caudally directed, female digitus fixus with 3+1 teeth, male spermatodactyl broad, finger-shaped. Idiosoma ♀♀ 270 - 325 μm, ♂♂ 250 - 260 μm long.

Fig. 67: *Arctoseius minutus* - dorsal side of female. Scale: 100 μm (according BERNHARD, 1963 - in BREGETOVA, 1977)

Geographic distribution: Europe

Vertical distribution in Slovakia: 110 - 220 m a. s. l.

Ecology
Seldom occurring in meadow soil, arable soils, also in mixtured forests, regularly in wet areas, in humus, decaying litter, in moss (*Sphagnum*). In Slovakia found in the winter nest of the common mole *Talpa europaea* (valey of creek with *Alnus glutinosa*), in lowland floodplain forest of Salici-Populetum, in acacia forest (*Robinia pseudoacacia*) on sands. Probably edaphic species, in Slovakia not found in leaf litter.

Habitat preference
Unknown, inhabiting probably deeper layers of mildly wet or drier soils, rhizosphere of grass in sandy soil.

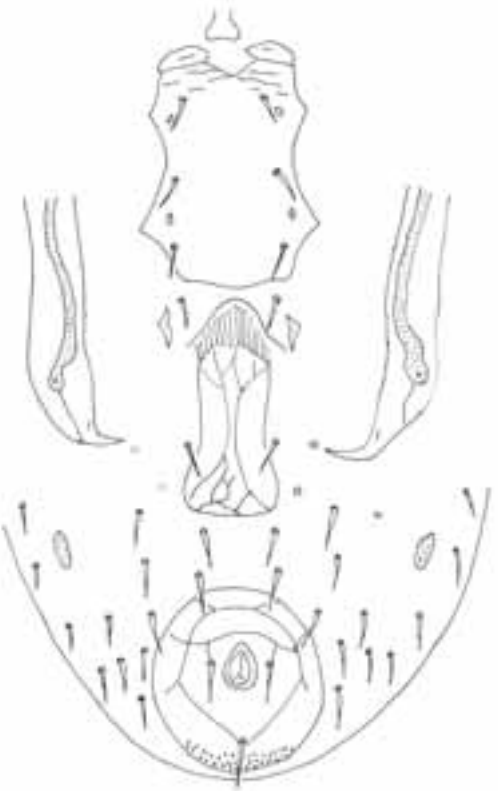

Fig. 68: *Arctoseius minutus* - ventral side of female. Scale: 100 μm (according BERNHARD, 1963 - in BREGETOVA, 1977)

Published records from Slovakia: Malé Karpaty Mts.: Borinka [7768] (MAŠÁN et al. 1994).

Specimens examined: Borská nížina lowland: 1 ♀ - 28.6. 1995, Vysoká pri Morave village - *Salici-Populetum,* fluvisoil, soil sample [7667]; **Hronská pahorkatina wold:** 1 ♀ - 10.4.2003, Chotín, Chotínske piesky [8175].

Specimens revised: Borská nížina lowland: Vysoká pri Morave village, NNR Horný les [7667] (KALÚZ 1999), published as *Iphidozercon minutus*; 1 ♀ - 15.5.1996, Vysoká pri Morave [7667]; 6 ♀♀- 26.7.1996, Devínske jazero, Temreis, meadow [7767]; 1 ♀ - 28.8.1996, Devínske jazero, meadow [7667]; 1 ♀ - 20.8.1997, Devínske jazero, Temreis, meadow [7767]; 1 ♀ - 3.8.1995, Devínske jazero, Šrek, meadow [7767]; **Podunajská rovina lowland**: 1 ♀ - 21.4.1994, Bodícka brána [8070] (KALÚZ 1997b), published as *Iphidozercon minutus*; Veľká Fatra Mts.: 1 ♀ - 23.10.1985, NNR Skalná Alpa, spruce forest, litter [7081] (KALÚZ & ŽUFFOVÁ, 1989), published as I*phidozercon minutus*.

Specimen depicted: according BERNHARD, 1963 (in BREGETOVA, 1997)

Genus *Asca* V. Heyden, 1826

1968 - Aoki, *Asca aphidioides* (Linné) (Acari, Blattisocidae), Bull. Nat. Sci. Mus. Tokyo 11: 149-152; **1977** - Bregetova et al., Izd. Nauka, Moscow 1-716; **1971** - Karg, Gustav Fisher Verlag Jena 1-475; **1993** - Karg, Gustav Fisher Verlag Jena 1-523; **1961** - Ryke, *Asca*, Zool. Anz. 167: 127-135

Type species: *Acarus aphidioides* (Linnaeus, 1758)
Synonyms: *Ceratozercon* (Berlese, 1913)

Diagnosis
Small mites (250 - 480 μm). Body oval, dorso-ventraly pressed, wearing in Palearctic species 2 cylindrical dorso-lateral outgrowths on widely rounded caudal margin, present in all praeimaginal and adult stages. Each this outgrowth of the pore PoZ4 wears 1-3 setae. Tightly connected, but separated proximal and distal dorsal shields cover whole dorsal side. Dorsal setae nude or hairy. Female carapax with 16-18 pairs, male carapax with 16-20 pairs of setae, notogaster with 13-15 pairs of setae, i2 absent, l5 usually the shortest dorsal setae. Majority of marginal setae outside of dorsal shields. Sternal shield in female with 2-3 pairs of setae, St1 sometimes on separate praesternal sclerites or on soft cuticle, MSt always outside of sternal shield. Genital shield caudally slightly broadened with direct caudal margin, closed to broad ventrianal shield. Genital setae on the shield. Ventrianal shield similar in both sexes, with 5-6 pairs of ventral setae, 2-3 pairs of sclerites closed to this shied proximally. Peritremes long, crossing ventral and dorsal side, reaching proximal margin of idiosoma near i1, peritremal shields broad. Tectum with mostly 3, less with 2 simple apical tips, proximal margin of tectum indented scarcely. Cheliceral digits in both sexes with teeth, digitus mobilis in male with 2 teeth, pilus dentilis short and straight. Female digitus mobilis almost 3-times longer than width of its base. Male spermatodactyl simple and confluenced with digitus mobilis, slightly exceeds movable digit. Palptarsal seta two-fold. Pulvilles on tarsi II-IV of adults with rounded medial part. All legs with praetarsus and claws, dorso-medial setae on tarsi IV sometimes longer with curved apical part.

***Asca* -** key to species (females)

1 (2) Majority of dorsal setae strongly hairy (R2 and l5 nude only), lateral caudal projection of PoZ4 wearing one hairy seta (Figs. 69, 70)
..... ***A. aphidioides*** (Linnaeus, 1758)

2 (1) All dorsal setae nude and needle-shaped, lateral caudal projection of PoZ4 wearing two nude setae (Figs. 71, 72)
..... ***A. bicornis*** (Canestrini & Fanzago, 1887)

Asca aphidioides (Linnaeus, 1758)

(Figs. 69, 70, Pl. 15B)

1968 - Aoki, *Asca aphidioides* (Linné)(Acari, Blattisocidae), Bull. Nat. Sci. Mus. Tokyo 11: 149-152; **1977** - Bregetova et al., Izd. Nauka, Moscow 1-716; **1971** - Karg, Gustav Fisher Verlag Jena 1-475; **1993** - Karg, Gustav Fisher Verlag Jena 1-523;

Synonyms: *Zercon bicornis* (Berlese, 1882/92)

Morphology
Peritremes long and narrow, reaching coxae I, peritremal shields wide and long, caudally broadened with nearly straigth caudal margins. All dorsal setae hairy from base to tip, l5 very short

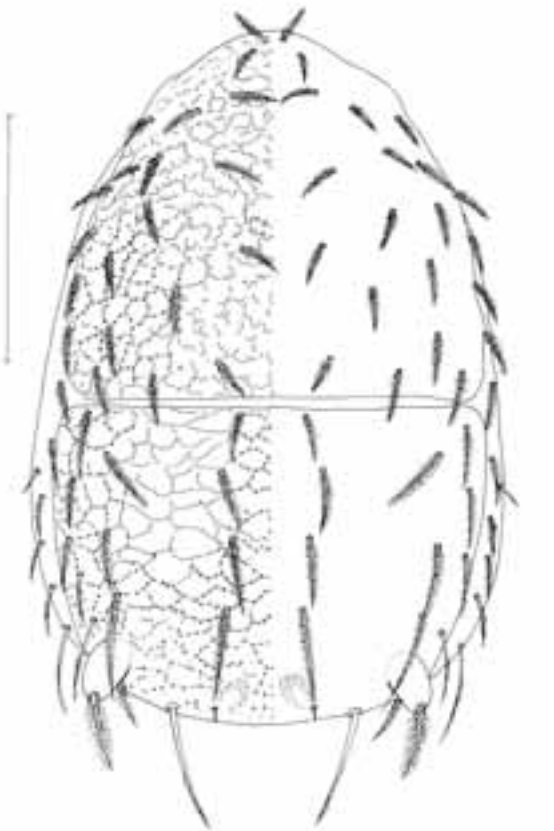

Fig. 69: *Asca aphidioides* - dorsal side of female. Scale: 100 μm

(l5 = 4 μm long) and nude, resembling microcheta. Lateral caudal projection of PoZ4 wearing one strongly hairy seta (33 μm long), setae on proximal part of dorsal shield shorter (i1 = 16 μm, i5 = 17 μm long), setae on distal part longer, l1 = 18 μm, l4 = 37 μm, Z5 = 51 μm long. Setae R2 short and nude, setae S4, R5, R6 longer and less hairy than other dorsal setae. Proximal part of dorsal shield 148 μm long and 175 μm wide, wearing 21 pairs of setae, dorsal surface with irregular structure, fine net pattern closed to lateral margins. Distal part of dorsal shield 126 μm long and 183 μm wide, scale-like pattern between rows l1 - l3 and Z1 - Z3, other parts with fine ner structure. Tectum with three tips of the same length. Sternal shield big, praesternal sclerites confluenced with sternal shield (wavy proximal margin), proximal corners sharp, caudal margin of shield slightly concave. Genital shield of ♀ broad, caudally wider, with straigth caudal margin, MSt and genital setae on the shield. Postgenital sclerites between genital and ventrianal shields, small rounded sclerites (3-4 pairs) situated laterally between peritremal and ventrianal shields. Very big ventrianal shield (110 μm long and 183 μm wide) tightly closed to genital shield, wearing distinct net pattern and 8 pairs of short setae (6 - 13 μm long). Anal opening small, situated in caudal half of ventrianal shield. One pair of short setae on soft cuticle laterally closed to ventrianal shield. All three prongs of tectum equally long, nude or hairy both on the top and on margins. Idiosoma of ♀♀ 270 - 305 μm long.

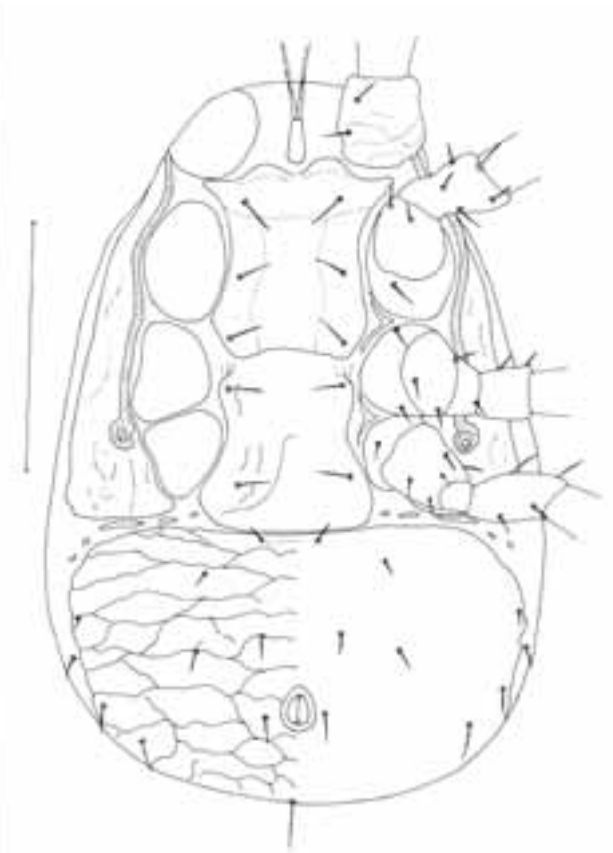

Fig. 70: *Asca aphidioides* - ventral side of female. Scale: 100 Ķm

Geographic distribution: Widely distributed in Europe and North America.

Vertical distribution in Slovakia: 110 - 670 m a. s. l.

Ecology
Seldom occurring in meadow soils, arable soils (corn); more frequently in deciduous and mixtured forests, in humus, mouldering litter, in moss and lichens; in mouldering wood and under bark, in the nests of small mammals, scarcely in the nests of birds. Preferring mildly wet substrates. In Slovakia found in pine forests on sandy soils, beech forests on limestones, mountain spruce forests (*Piceetum abietinum*), *Piceetum, Piceeto-Quercetum,* oak forests, xerophile forest-steppe *Querceto-Crataegetum,* mesohygrophilous *Quercetum*, xerothermic forest steppe with oak, hornbeam forest (*Querceto-Carpinetum)*, lowland floodplain forests of *Salici-Populetum*, in wet soil of the growth of *Caricetum goodenowii*, in river gravel bank (*Epilobio-Myricarietum)*, in wet meadows, in mesophilous pasture, rhizosphere of grass and soil, leaf litter and soil detritus, rhizosphere of grass in sandy soil, in soil samples and trunk detritus.

Considered as an edaphic detricolous species.

Habitat preference

Wide range of ecological demand without any preference of habitat. Species occurring rather in warmer climatic conditions (localities).

Published records from Slovakia: Borská nížina lowland: NR Bezodné [7668] (Kalúz 1994a); NNR Abrod [7468] (Kalúz & Čarnogurský 2000, Kalúz 2003); 1 ♀ - 25.5.1999, Jakubov, Jakubovské rybníky (*Phragmites australis*) [7567] (Fenďa & Schniererová 2004, 2005); **Bukovské vrchy Mts.:** 2 ♀♀ - 7.6.1999, Kolbasov, Kýčera [7000] (Fenďa & Mašán 2003); **Malé Karpaty Mts.:** Borinka [7768] (Mašán et al. 1994); NNR Devínska Kobyla [7867]; Devín, hrad [7867]; NR Devínska lesostep [7867]; Devín, Fialková dolina [7868]; Štokeravská vápenka [7768] (Kalúz 2005b); **Podunajská rovina lowland:** Topošové hony [7969] (Čarnogurský et al. 1994); **Slovenský kras karst:** Jašteričie jazierko [7489] (Kalúz 1995a); Hačava, Grečov vrch [7390] (Kalúz 1998).

Specimens examined: Borská nížina lowland: 1 ♀ - 28.6. 1995, Vysoká pri Morave village *Salici-Populetum*, fluvisoil, soil sample [7667]; 1 ♀ - 27.9.1996, Vysoká pri Morave, *Salici-Populetum* [7667]; 1 ♀ - 30.6.1999, Závod village, NNR Abrod, wet meadow, *Caricetum goodenowii* [7468]; 1♀, 1 N - 24.5.2000, Závod, Dúbrava [7467]; 2 ♀♀ - 26.9.2002, Studienka [7468], 1 ♀ - 26.9.2002, Lakšarská N. Ves [7469]; 1 ♀ - 26.9.2002, Borský Mikuláš [7369]; 1♀ - 27.9.2002, Plavecký Štvrtok [7668]; 2 ♀♀ - 27.9.2002, Malacky [7568]; 3 ♀♀ - 24.9.2005, Borský Jur [7368]. **Cerová vrchovina highland:** 1 ♀ - 1.5.2000, Šiatorská Bukovinka [7884]; **Kozie chrbty Mts.:** 3 ♀♀ - 10.7.2003, Vikartovce, Závozy [6986]; **Krupinská planina plateau:** 1 ♀ - 25.5.2001, Plášťovce, *Quercetum* [7879]; 2 ♀♀ - 26.5.2001, Ipeľské Úľany, *Quercetum* [7880]; 1 ♀ - 26.5.2001, Medovarce, *Quercetum* [7780]; **Malé Karpaty Mts.:** 3 ♀♀ - 2.5.2004, Bratislava, NNR Devínska Kobyla [7867]; 2 ♀♀ - 31.7.2004, Višňové, Višňovská dolina [7272]; **Pieniny Mts.:** 3 ♀♀, 1 DN, 1 PN, 3 L - 29.6.1999, Červený Kláštor, NNR Prielom Dunajca [6588]; **Rimavská kotlina basin:** 1 ♀ - 29.5.2004, Rimavská Sobota, *Quercetum* [7685]; 1 ♀ - 29.5.2004, Gemerská Panica [7587]; **Stolické vrchy Mts.** : 1 ♀ - 12.9.2003, Tisovec, Suché doly [7385]; **Štiavnické vrchy Mts.:** 1 ♀ - 26.6.2005, Čajkov, *Quercetum* [7677]; 1 ♀ - 26.6.2005, Krupina [7680]; 2 ♀♀ - 26.6.2005, Ladzany, *Quercetum* [7779]; **Vihorlatské vrchy Mts.:** 1 ♀ - 17.6.2004, Vinné, NR Viniansky hradný vrch [7197]; **Volovské vrchy Mts.:** 1 ♀ - 26.5.2004, Kováčová , **Quercetum** [7390]; 2 ♀♀ - 26.5.2004, Krásnohorské Podhradie, *Quercetum* [7389]; 17 ♀♀ - 28.5.2004, Betliar [7289]; **Východoslovenská pahorkatina wold:** 3 ♀♀ - 16.6.2004, Úbrež, Karná [7298]; 3 ♀♀ - 16.6.2004, Jovsa, NR Jovsianska hrabina [7198]; **Zemplínske vrchy Mts.:** 1 ♀ - 2.6.2004, Ladmovce, NNR Kašvár [7596].

Specimen depicted: Borská nížina lowland: 1 ♀ - 25.5.1999, Jakubov, Jakubovské rybníky (*Phragmites australis*) [7567] (Fenďa & Schniererová 2004, 2005);

Asca bicornis (Canestrini & Fanzago, 1887)

(Fig. 71, 72, Pl. 16A)

1977 - Bregetova et al., Izd. Nauka, Moscow 1-716; **1971** - Karg, Gustav Fisher Verlag Jena 1-475; **1993** - Karg, Gustav Fisher Verlag Jena 1-523;

Synonyms: *Asca nova* (Willmann, 1939)

Morphology

Peritremes long, reaching coxae I, peritremal shield broad. Lateral caudal projection of PoZ4 wearing two nude setae (31 - 38 μm long). All dorsal setae nude, needle-shaped, i1 and other frontal setae shorter, caudal part of body with longer setae. Proximal part of sternal shield 167 μm long and 193 μm wide, with reticulate pattern in fronto-lateral sides, wearing 17 pairs of setae, i1 = 14 μm, i5 = 16 μm long. Garland structures mainly in frontal and medial parts. Opisthosomal part of dorsal shield 157 μm long and 201 μm wide, with fine and big scale-like pattern in medio-proximal part, shield wearing 16 pairs of nude setae, I5 microcheta (3 μm

long), Z5 = 54 μm, I1 = 15 μm, I3 = 31 μm long. Remaining parts of dorsal shields without pattern. Big sternal shield without sctucture, shield with expressive proximal corners, praesternal sclerites confluenced with sternal shield. MSt on soft cuticle or on genital shield, St1 on sternal shield (very seldom on separate praesternal sclerites). Genital shield caudally broadened, with straigth caudal margin, pair of genital setae on lateral margins. Sternal and genital shields without pattern. Two pairs of narrow, oblonged postgenital sclerites and two pairs of short needle-shaped setae between genital and ventrianal shields. Ventrianal shield big, proximally slightly concave and caudally rounded, with cross-running parallel pattern in proximal part. Shield wearing 7 pairs of nude setae (9 - 12 μm long), two caudal pairs longer (26 - 35 μm long). Anal opening situated in caudal half of ventrianal shield. Postanal seta nude (sometimes hairy). Idiosoma ♀♀ 340 - 365 μm, ♂♂ 270 - 301 μm long.

Geographic distribution: Europe, North America. In Slovakia widely distributed in various orographic units.

Vertical distribution in Slovakia: 115 - 1060 m a. s. l.

Ecology

Scarce holarctic species, but regularly occurring in arable and meadow soils (light and heavy soils), seldom in deciduous and pine forests, in mouldering litter, humus, moss and mouldering wood, preferring mildly wet substrates. In Slovakia found in: sandy dune with *Pinus silvestris*, subxerophile meadow, xerophile meadow, mesohygrophilous meadow, xerophile forest-steppe, xerothermic steppe on slope with well prepared limestone rocks, xerothermic forest steppe with juniper (*Juniperus communis)* and solitery maple (*Acer* sp.), *Corneto-Crataegetum* forest-steppe xerotherm, *Querceto-Crataegetum* forest-steppe, *Quercetum*, mesohygrophile pasture with juniper, pasture, meadow with solitery trees (*Pyrus sp., Carpinus betulus, Corylus avellana*), forest *Robinia pseudoacacia* on sandy soil, glade in montane spruce forest (*Piceetum abietinum*) with solitery beeches (*Fagus sylvaticus*), fir-beech forest (*Abieti-Fagetum*), forest of *Picea abies*, moorgrass bog in pine forest (*Pinus sylvestris*), mountain hay meadow, floodplain meadow, wet meadow with *Caricetum goodenowii*, wet meadow with *Molinietum coerulae*, wet meadow (*Molinietum coerulae potentiletosum albae*), arable soil, ruderal meadow, alluvium of brook, growth of *Petasites* sp., littoral reed stand (Phragmition), bank of creek with *Alnus incana* and *Picea abies*, marshland, wet moss, bank of gravel pit, in rhizosphere of grass, leaf litter, leaf litter and soil detritus in various types of soil, in peat bog and trunk detritus. At the same time the species was found in the nests of birds: *Anas platyrhynchos, Circus aeruginosus, Turdus merula, Acrocephalus arundinaceus* and *Lullula arborea*.
Considered as an edaphic detricolous species.

Habitat preference

Species inhabiting very different conditions and habitats from cold and wet to xerothermic biocenoses (wide scale of conditions including the extremes). Belongs to eurytopic species with wide ecological adaptability and an unclear preference to habitat.

Published records from Slovakia: Belianske Tatry Mts.: 1 ♀ - 2.8.2004, Dolina siedmich prameňov valey, litter [6787]; **Borská nížina lowland:** Borová [7467] (Kalúz 1994a); NNR Abrod [7468] (Kalúz & Čarnogurský 2000, Kalúz 2003); 2 ♀♀- 10.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 13.12.1997, Jakubov, Jakubovské rybníky (*Circus aeruginosus*) [7567] (Fenďa & Schniererová 2005); Zohor [7667] (Krištofík et al. 2005); **Bukovské vrchy Mts.:** 11 ♀♀, 1 ♂, 1 DN - 19.6.1998, Nová Sedlica, dolina Zbojského potoka (pasture) [6901]; 11 ♀♀, 2 ♂♂ - 20.6.1998, Uličˇ [7000]; 4 ♀♀- 6.6.1999, Nová Sedlica, dolina Zbojského potoka [6901]; 3 ♀♀, 1 ♂ - 9.6.1999, Stakčín, Ruské [6800]; 3 ♀♀- 10.6.1999, Kolbasov, NNR Bzaná (soil) [6900]; 3 ♀♀- 23.9.1999, Nová Sedlica, NNR Stužica [6901] (Fenďa & Mašán 2003); **Malé Karpaty Mts.:** NNR Devínska Kobyla [7867]; Devín, hrad [7867]; NR Devínska lesostep

Fig. 71: *Asca bicornis* - dorsal side of female. Scale: 100 μm

[7867]; Devín, Fialková dolina [7868]; Štokeravská vápenka [7768] (Kalúz 2005b); **Malá Fatra Mts.:** NNR Šútovská dolina [6880] (Kalúz 1997a); **Oravská vrchovina highland:** 1 ♀ - 21.7.1989, Nižná, pod Lučivným vrchom [6683] (Fenďa et al. 1998); **Revúcka vrchovina highland:** 36 ♀♀, 2 ♂♂ - 18.9.1999, Ružiná [7583] (Fenďa & Schniererová 2004); **Slovenský kras karst:** Jašteričie jazierko [7489] (Kalúz 1995a); NNR Turniansky hradný vrch [7391]; Kečovské škrapy [7588] (Kalúz 2001); **Východoslovenská pahorkatina wold:** Trhovište, Dražkové [7297] (Kováč et al. 1999); **Západné Tatry Mts.:** 4 ♀♀ - 16.7.1989, Zuberec, dolina Studeného potoka [6784] (Fenďa et al. 1998).

Specimens examined: **Borská nížina lowland:** 1 ♀ - 27.9.1993, Veľké Leváre village, Borová - sandy dune with *Pinus silvestris*, soil sample [7467]; 15 ♀♀ - 13.7.1995, Devínske jazero, Šrek, meadow [7767]; 1 ♀ - 3.8.1995, Devínske jazero, Šrek, meadow [7767]; 1 ♀ - 2.11.1995, Moravský Ján, meadow [7367]; 1 ♀ - 3.8.1995, Vysoká pri Morave, meadow [7667]; 5 ♀♀ - 13.7.1995, Devínske jazero village, floodplain meadow, grass, soil sample, [7767]; 3 ♀♀ - 3.8.1995, Devínske jazero village, floodplain meadow, grass, soil sample, [7767]; 1 ♀ - 13.8.1995, Devínske jazero village, floodplain meadow, grass, soil sample, [7767]; 8 ♀ - 26.7.1996, Devínske jazero, Šrek, meadow [7767]; 1 ♀ - 30.6.1999, Závod village, NNR Abrod, wet meadow, *Caricetum goodenowii*, [7468]; 3 ♀♀ - 14.9.1999, Závod village, NNR Abrod, wet meadow, *Molinietum coerulae*, [7468]; 3 ♀♀ - 29.9.1999, Závod village, NNR Abrod, wet meadow, *Molinietum coerulae*, [7468]; 11 ♀♀, 1 ♂ - 12.11.2003, Šaštín-Stráže, Gazárka [7368]; 40 ♀♀, 1 ♂, 1 DN - 12.11.2003, Šaštín-Stráže, Zváčov mlyn [7368]; 29 ♀♀, 4 ♂♂, 1 PN - 13.11.2003, Sekule, Mláky [7368]; **Hronská pahorkatina wold:** 1 ♀ - 25.5.2002, Mochovce, Dobrica Mt. [7776]; 5 ♀♀, 13 DN - 10.4.2003, Chotín, Chotínske piesky [8175]; **Kozie chrbty Mts.:** 1 ♀ - 9.7.2003, Svit, Tabličky [6986]; 12 ♀♀, 1 ♂ - 10.7.2003, Vikartovce, Závozy [6986]; **Krupinská planina plateau:** 2 ♀♀ - 25.5.2001, Pláštovce, *Quercetum* [7879]; 3 ♀♀ - 26.5.2001, Ipeľské Úľany, *Quercetum* [7880]; **Levočské vrchy Mts.:** 1 ♀ - 7.5.2000, Levoča, Levočská dolina [6989]; **Liptovská kotlina basin:** 2 ♀♀ - 22.6.2001, Pribilina, Záhatie [6884]; **Malá Fatra Mts.:** 1 ♀ - 24.10.1996, NNR Rozsutec, *Fagetum* [6780]; **Malé Karpaty Mts.:** 2 ♀♀ - 20.4.2001, Bratislava, Devín, *Quercetum* [7867];

Fig. 72: *Asca bicornis* - ventral side of female. Scale: 100 m

1 ♀ - 26.6.2002, Bratislava, Kamzík, *Quercetum* [7868]; 5 ♀♀ - 14.7.2005, Bratislava, Kamzík, *Quercetum* [7868]; 4 ♀♀ - 21.7.2005, Bratislava, Rača, *Quercetum* [7768]; 17 ♀♀, 5 ♂♂, 1 DN - 31.7.2004, Višňové, Višňovská dolina [7272]; **Nízke Tatry Mts.:** 1 ♀ - 22.6.2005, Sopotnická dolina valey [7182]; 4 ♀♀ - 24.6.2005, Ipoltická dolina valey, [7085]; 2 ♀♀ - 23.6.2005, Dolina Čierneho Váhu valey [6985]; 2 ♀♀ - 25.6.2005, Liptovská Teplička village, litter [7086; **Ondavská vrchovina highland:** 3 ♀♀ - 9.7.2002, Zborov, Zborovská slatina [6693]; **Oravská kotlina basin:** 5 ♀♀ - 10.7.2001, Suchá Hora, NR Rudné [6684]; 1 ♀ - 11.7.2001, Bobrov, Poľanový Kriváň [6583]; 2 ♀♀ - 13.7.2001, Trstená, NR Surdíky [6583]; **Oravské Beskydy Mts.:** 3 ♀♀ - 11.7.2001, Hraničný Kriváň, [6482]; **Podunajská rovina lowland:** 15 ♀♀, 2 DN - 2.10.2001, Bratislava, NNR Ostrov Kopáč [7968]; **Slovenský kras karst:** 1 ♀ - 27.5.2004, Kečovo, NR Domické škrapy [7588]; 3 ♀♀ - 28.5.2004, Hrušov, Jablonovské sedlo [7389]; **Štiavnické vrchy Mts.:** 3 ♀ - 26.6.2005, Ladzany *Quercetum* [7779]; 2 ♀ - 21.6.2004, Čajkov *Quercetum* [7778]; **Turčianska kotlina basin:** 3 ♀♀ - 20.6.2003, Turčianske Teplice, Háj [7179]; **Vihorlatské vrchy Mts.:** 3 ♀♀ - 17.6.2004, Vinné, NR Viniansky hradný vrch [7197]; **Vysoké Tatry Mts.:** 2 ♀♀ - 3.8. 2004, Stará Lesná, spruce forest [6887]; **Východoslovenská rovina lowland:** 1 ♀ - 17.6.2003, Leles [7598]; 1 ♀ - 17.6.2003, Sirník [7496]; 7 ♀♀, 1 ♂, 2 DN - 31.5.2004, Malý Horeč, NR Poniklecová lúčka [7597]; 2 ♀♀, 3 ♂♂ - 2.6.2004, Veľký Kamenec, Tarbucka Mt. [7696]; 19 ♀♀ , 4 ♂♂, 2 DN - 2.6.2004, Svätuše [7597]; Vtáčnik Mts.: 1 ♀ - 29.6.2004, Ostrý Grúň, NR Ivanov salaš [7377]; Zemplínske vrchy Mts.: 6 ♀♀, 4 ♂♂ - 2.6.2004, Ladmovce, NNR Kašvár [7596].

Specimen depicted: **Podunajská rovina lowland:** 1 ♀ - 2.10.2001, Bratislava, NNR Ostrov Kopáč [7968];

Genus *Leioseius* - Berlese, 1916

1916 - Berlese, Redia, Firenze 12; **1977** - Bregetova et al., Izd. Nauka, Moscow 1-716; **1971** - Karg, Gustav Fisher Verlag Jena 1-475; **1993** - Karg, Gustav Fisher Verlag Jena 1-523;

Type species: *Ameroseius minusculus* (Berlese, 1916)
Synonyms: *Gamasellodes* (Athias-Henriot, 1961); *Arctoseiodes* (Willmann, 1949)

Diagnosis
Small mites (idiosoma of ♀♀ 280 - 480 µm long), elongated body with nearly parallel lateral margins. Dorsal shield with 32 (scarcely with 31 or 33) usually short, nude needle-shaped setae (very seldom wearing thin short hairs). Dorsal shield divided or uniform with lateral incision between podosoma and opisthosoma. Opisthosomal part of dorsal shield with 15 pairs of setae. Dorsal setae normal, needle-shaped. Fore corners of sternal shield confluenced with endopodal sclerites, extended between coxae I and II. Sternal shield with 2-3 pairs of setae and 3 pairs of pores. St1 sometimes on small praesternal sclerites, MSt on soft cuticle. Ventrianal shield in female big, wearing 2-5 pairs of ventral setae, genital shield with pair of setae. Ventrianal shield with 6 pairs of setae (exception: *Leioseius ulmi* with anal shield only). Two shields on ventral side of male: genitosternal and ventrianal, St1 always on shield. Peritremal shields in both sexes narrow, frontally confluenced with dorsal shield and caudally (from IV coxae only) with exopodal sclerites. Digitus mobilis almost three times longer than its base, with two teeth in its distal half. Hypostomal groove with distinct lateral margins, hypostomal rows always oligodont (each with less than 6 denticles). Legs short, thick, wearing claws and pulvillae, leg I longer than legs II-IV. Pulvillae on Tarsi II-IV medially rounded.

Leioseius - key to species (females)

1 (5) Dorsal shield uniform, medially with short medio-lateral incision (in some specimens weakly visible or confluenced), tectum at most with three prongs.

2 (3) Female ventrianal shield elongate (Fig. 78), frontally narrowed, with 3 pairs of setae, ventrianal shield longer than sternal shield. Dorsal shield with fine net structure (Fig. 77), caudal part wearing irregular pattern with dots. Sternal shield with long anterior corners, St1 on praesternal sclerites. Digitus fixus of ♀ with row of 9 and 1 denticles
..... ***L. minusculus*** Berlese, 1905

3 (4) Female ventrianal shield trapezoid with broad caudal margin, wearing 4 pairs of setae (Fig. 76). Pair of narrow sclerites between genital and ventrianal shields. Dorsal pattern irregular (Fig. 75), dorsal setae short, needle-shaped, Z5 longer, nude. Digitus fixus ♀ with 9 and 1-2 teeth, idiosoma ♀♀ 390 - 455 µm long
..... ***L. elongatus*** Evans, 1958

4 (3) Female ventrianal shield broad, with 5 pairs of setae (Fig. 80). Dorsal shield with scale-shaped structure between rows of setae I1-I3 and Z1 - Z3, other parts of dorsal shield with irregular dotted pattern. Setae Z5 hairy, other setae short (Fig. 79), needle-shaped. St1 on weakly sclerotized cuticle of sternal shield. Anal opening situated centrally. Digitus fixus od ♀ with 3 and 3 teeth
..... ***L. naglitschi*** Karg, 1965

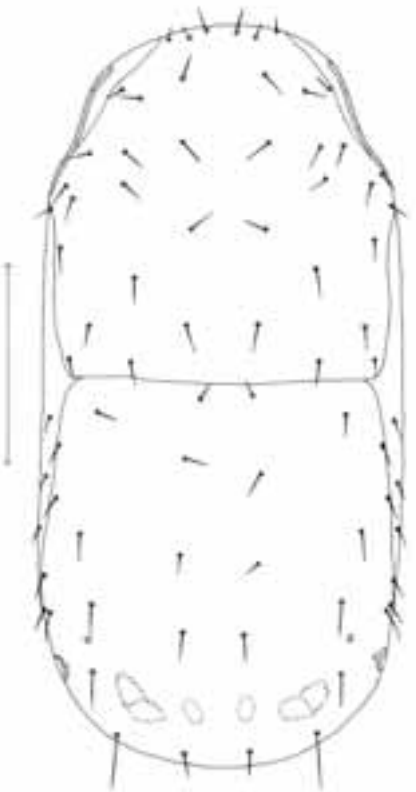

Fig. 73: *Leioseius bicolor* - dorsal side of female. Scale: 100 µm

5 (1) Dorsal shield of adults divided, double oval garland structure caudally between Z4-Z4 and Z5-Z5 (Fig. 73). Tectum with three single (or indented) prongs, long peritremes reaching r2, ♀ ventrianal shield broad, with dotted pattern caudally (Fig. 74) and with 5 pairs of setae, anal opening situated centrally. Spermatodactyl of ♂ distally hooked. Idiosoma ♀♀ 310-400 µm, ♂♂ 250-290 µm long
..... ***L. bicolor*** (BERLESE, 1918)

Leioseius bicolor (BERLESE, 1918)

(Figs. 73, 74, Pl. 18A)

1918 - BERLESE, Redia, Firenze 13: 115-192

Synonyms: *Digamasellus circuliformis* (LEITNER, 1946)

Morphology

Peritremes narrow, reach r2, tectum with 3 or more prongs. Dorsal shield of adults distinctly medially divided into propodosomal and opisthosomal parts, 377 µm long and 171 µm wide, with "shoulders" fronto-laterally. Shield without any net pattern, dorsal setae short, needle-

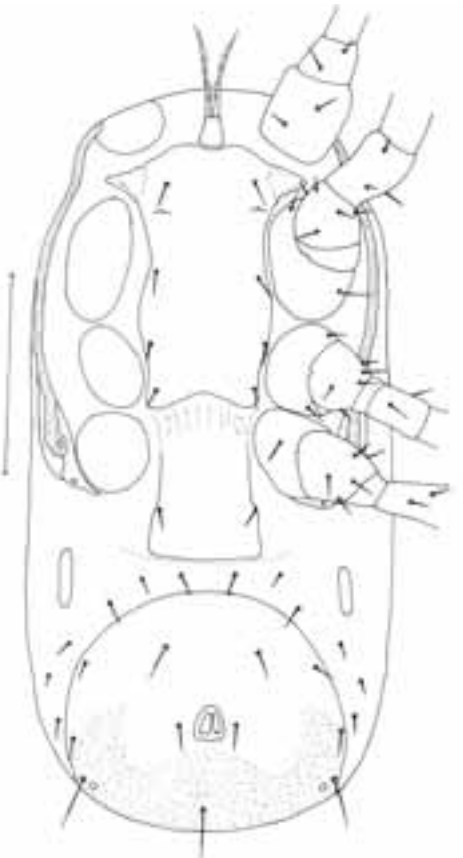

Fig. 74: *Leioseius bicolor* - ventral side of female. Scale: 100 μm

shaped, Z5 = 29 μm, l5 = 12 μm, l3 = 8 μm, i1 = 14 μm. Dorsal shield with garland structure behind Z4 - Z4, longer lateral garlande closed frontally to Z5, between l4 - l5 a pair of shorter rounded garlande. Dorsal shield caudally very slightly undulate, wearing laterally from Z3 - Z4 one pair of small ones and another pair of bigger pores. All ventral shields and coxae without net pattern. Sternal shield long, with expressive proximal corners, st2-st4 closed to margins of sternal shield. Genital shield laterally and caudally rectangular, broader in posterior part, with straight caudal margin. Genital setae on lateral margins of shield. Big, rounded female ventri-anal shield with 5 pairs of setae, latero-caudally with pair of pores, caudal part of shield with lustrous dots. Anal opening situated centrally. Male spermatodactylus apically hooked. Idiosoma ♀♀ 310 - 400 μm, ♂♂ 250 - 290 μm long. Material measured: dorsal shield 377 μm long, 171 μm wide, Z5 = 29 μm, l5 = 12 μm, l3 = 8 μm, i1 = 14 μm long.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 100 - 520 m a. s. l.

Ecology

Scarcely in arable soil (humid sand, sandy clay with corns, clover) and in meadow soil, regularly occurring in deciduous and pine forests; in humus, mouldering straw, in moss, tree mould; also in horse and rabbit dung; preferring from mildly wet to dry substrates. In Slovakia found in lowland sandy dune with *Pinus silvestris*, lowland reed stands (Phragmition), wet alder forest (*Alnion glutinosae*), willow-poplar flood-plain forest (*Salici-Populetum*), herbaceous vegetation (*Petasites sp.)* along brook, acacia forest (*Robinia pseudoacacia*) with moss and sand, oak-hornbeam forest (*Querceto-Carpinetum*), beech forest, subxerophile meadow, xerothermic forest steppe, spruce forest, moss, rhizosphere of grass, arable soil, leaf litter and soil detritus. Regularly inhabiting nests of various birds; *Circus aeruginosus, Anas platyrhynchos, Fringilla sp., Chloris chloris, Passer montanus* (combined with *Martes sp.*- Mammalia), T*urdus sp., Turdus merula, Acrocephalus arundinaceus, Sylvia sp.* in spruce forest, combined nest of *Parus major* and *Apodemus sp.* (Aves, Mammalia), *Sturnus sp., Lullula arborea, Aquila heliaca* on beech and *Fulica atra* on water level. The occurrence of *L. bicolor* in bird nests of *Lanius collurio* and *Lanius minor* was published without localities by Krištofík et al. (2002). Majority of findings come from lowlands.

Edaphic detricolous species occurring mainly in lowlands and submountain areas in large part of Slovak territory.

Habitat preference

The species inhabiting wide spectrum of habitats with different microclimatic conditions. Despite of its frequent occurrence in the nests, this species cannot be considered as strictly nidicolous species. Rather preferring mildly wet decaying material.

Published records from Slovakia: Borská nížina lowland: 1 ♀ - 6.5.1993, Veľké Leváre village, Borová, sandy dune with *Pinus silvestris*, soil sample [7467]; 2 ♀♀ - 8.6.1993, Veľké Leváre village, Borová, sandy dune with *Pinus silvestris*, soil sample [7467]; 1 ♀ - 27.9.1993, Veľké Leváre village, Borová, sandy dune with *Pinus silvestris*, soil sample [7467]; 1 ♀ - 6.5.1993, Veľké Leváre, Borová, sand dune [7467] (Kalúz 1994a); 11 ♀♀, 2 DN - 27.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 3 ♀♀ - 25.6.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 24.9.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 27.10.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 3 ♀♀ - 13.12.1997, Jakubov, Jakubovské rybníky (*Circus aeruginosus*) [7567]; 3 ♀♀ - 27.1.1998, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 2 ♀♀ - 25.3.1998, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 19 ♀♀ - 10.2.1999, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567] (Fenďa & Schniererová 2005); **Bukovské vrchy Mts.:** 1 ♀ - 10.6.1999, Kolbasov, NNR Bzaná (soil) [6900]; 1 ♀ - 19.6.1998, Nová Sedlica, dolina Zbojského potoka (bank of brook) [6901]; 4.6.1997, 1 ♀ - Topoľa [6999] (Fenďa & Mašán 2003); **Jablunkovské medzihorie wold:** 2 ♀♀ - 28.12.1985, Svrčinovec [6578] (FENĎA et al. 1998); **Podunajská rovina lowland:** 1 ♀ - 11.6.1985, Svätý Jur town, NNR Šúr (*Chloris chloris*) [7769]; 3 ♀♀ - 11.6.1985, Svätý Jur town, NNR Šúr (*Turdus merula*) [7769] (Fenďa et al. 1998); 1 ♀ - 25.11.1994, Dobrohošť, Dunajské Kriviny (*Passer montanus*) [8070] (Fenďa et al. 1998; Krumpál et al. 2001); **Revúcka vrchovina highland:** 10 ♀♀ - 18.9.1999, Ružiná [7583] (Fenďa & Schniererová 2004); **Starohorské vrchy Mts.:** 3 ♀♀ - 20.8.1990, Staré Hory, Richtárová [7180] (Fenďa et al. 1998); **Východoslovenská rovina lowland:** Svätá Mária [7597] (Kováč et al. 1999).

Specimens examined: Borská nížina lowland: 3 ♀♀ - 24.5.2000, Závod, Dúbrava [7467]; **Myjavská pahorkatina wold:** 2 ♀♀ - 13.7.1997, Stará Turá, Dubník [7272]; **Podunajská rovina lowland:** 12 ♀♀, 1 ♂ - 19.1.1986, Vojka nad Dunajom [8070]; 2 ♀♀ - 17.4.1986, Svätý Jur, NNR Šúr [7769]; 2 ♀♀, 1 DN - 25.11.1994, Dobrohošť, Dunajské Kriviny (*Passer + Martes*) [8070]; 37 ♀♀ - 25.11.1994, Dobrohošť, Dunajské Kriviny (*Parus + Apodemus*) [8070]; 1 ♀ - 4.12.1995, Dobrohošť, Dunajské Kriviny (*Sturnus vulgaris)* [8070]; 23 ♀♀, 1 ♂, 30 DN - 4.12.1995, Dobrohošť, Dunajské Kriviny (*Turdus sp.*) [8070]; 3 ♀♀, 3 ♂♂ - 4.12.1995, Dobrohošť, Dunajské Kriviny (*Sturnus sp.*) [8070]; 4 ♀♀ - 4.6.1998, Svätý Jur town, NNR Šúr (Fulica atra) [7769]; 46 ♀♀, 14 ♂♂, 4 DN - 4.6.1998, Svätý Jur town, NNR Šúr (Aves sp.) [7769]; 1 ♀ - 4.3.1999, Svätý Jur, NNR Šúr (**Passer montanus**) [7769]; 1 ♀ - 27.7.1999, Svätý Jur, NNR Šúr (*Passer montanus*) [7769]; 1 ♀ - 1.3.2000, Svätý Jur, NNR Šúr (*Passer montanus*) [7769]; 1 ♀ - 7.3.2001, Svätý Jur, NNR Šúr (*Passer montanus*) [7769]; **Považský Inovec Mts.:** 2 ♀♀,1 ♂ - 9.6.1998, Kálnica [7273]; **Východoslovenská rovina lowland:** 2 ♀♀, 1 ♂, 1 DN - 17.6.2003, Soľnička [7597]; 1 ♀ - 2.6.2004, Svätuše [7597]; 2 ♀♀, 1 DN - 2.6.2004, Vojka [7597].

Specimen depicted: Borská nížina lowland: 1 ♀ - 27.1.1998, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]

Fig. 75: *Leioseius elongatus* - dorsal side of female. Scale: 100 μm (according EVANS, 1958)

Leioseius elongatus EVANS, 1958

(Figs. 75, 76, Pl. 17A)

1958 - EVANS, Proc. Zool. Soc. London 131: 177-229

Synonyms: *Leioseius brevipilis (*BERNHARD, 1963)

Morphology

Dorsal shield uniform with distinct "shoulders" and medial lateral incision, tectum with three prongs. Shield proximally and laterally with fine pattern wears short needle-shaped dorsal setae, majority of them equally short, i1 and Z5 longer, setae I5 the shortest resembling microchaeta. Marginal setae (11 pairs) shorter than dorsal ones. Peritremes narrow, long, reaching r1. Setae St1 on soft cuticle. Both sternal and genital shields without pattern. Genital shield narrow, posteriorly slightly broadened with strait caudal margin, genital setae situated on lateral margins. Three pairs of small sclerites outside of genital shield and between genital and ventrianal shields. Big female ventrianal shield widely elliptic, with slightly concave fronto-lateral margins, wearing 4 pairs of nude needle-shaped setae, caudal pair the longest. Lateral part of ventrianal

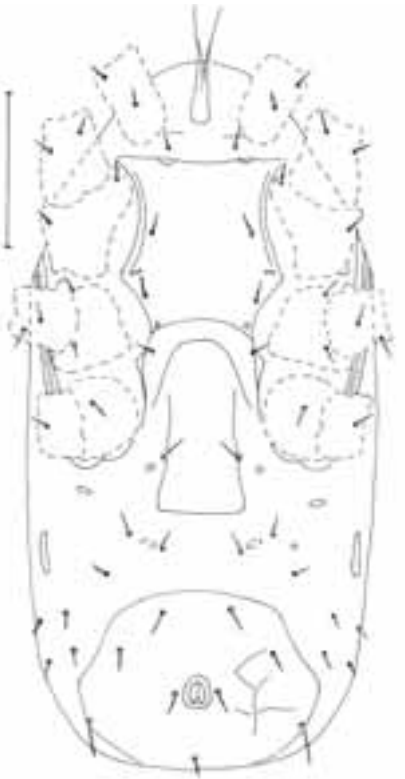

Fig. 76: *Leioseius elongatus* - ventral side of female. Scale: 100 μm (according EVANS, 1958)

shield with wide net pattern. Ventral soft cuticle with 7 pairs of short needle-shaped setae. Digitus fixus of ♀ with 9 and 1-2 teeth, idiosoma ♀♀ 390 - 455 μm.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 215 m a. s. l.

Ecology
Rare European mite scarcely occurring in deciduous forests (beech) in decaying straw and wood material. In Slovakia found in one habitat - beech forest (nest of *Aquila heliaca*).

Habitat preference
Unknown, but probably like other Ascidae preferring decaying plant material.

Published records from Slovakia: Považský Inovec Mts.: 1 ♀ - 7.4.1991, Kálnica [7273] (MAŠÁN 2001).

Specimen depicted: according EVANS & HYATT (1958)

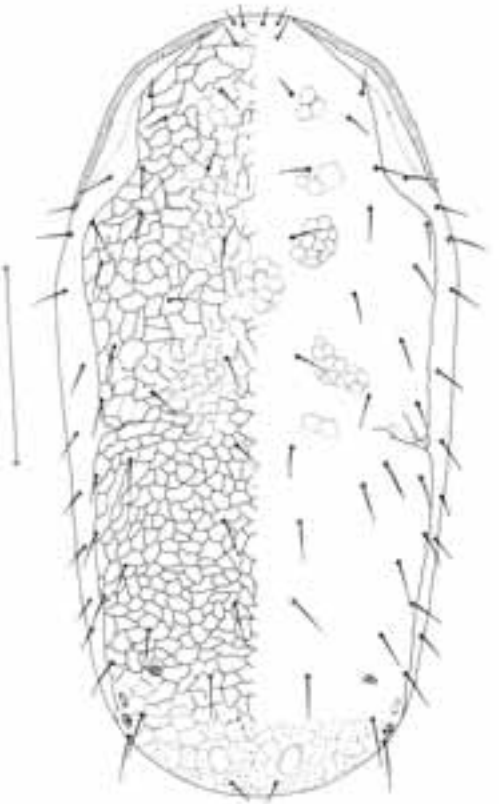

Fig. 77: *Leioseius minusculus* - dorsal side of female. Scale: 100 μm

Leioseius minusculus BERLESE, 1905

(Figs. 77, 78, Pl. 16B)

1905 - BERLESE, Redia, Firenze 3: 66-304

Morphology

Peritremes narrow and long, reaching nearly r1, tectum with 3 prongs. Dorsal shield uniform, 403 μm long and 183 μm wide, wearing short medio-lateral incision. Dorsal shield proximally with "shoulders", scale-shaped irregular pattern developed mainly fronto-laterally and in great part of opisthosoma. Caudal part of shield with weak structure, dotted. Oval garland structures mainly in proximal part between rows of seate i2 - i5 and s2 - z3. One pair of oval garlands present in dotted caudal part closed to I5. Two pairs of big pores caudally between S4 - I4 and S4 - S5. Ventral shields with very weak net structure, mainly laterally. One or two pairs of praesternal sclerites or sclerites confluenced with sternal shield. Sternal shield with expressive proximal corners, St1 sitting on praesternal sclerites or on soft cuticle, shield broader, other St setae not closed to margins. Coxae without pattern. Genital shield broader caudally with straight posterior margin, genital setae on lateral margins. Two pairs of setae and one pair of small sclerites between genital and ventrianal shields. Female ventrianale proximally prolonged and growing narrow, shield caudally dotted, with oval garland structures and a pair of pores on

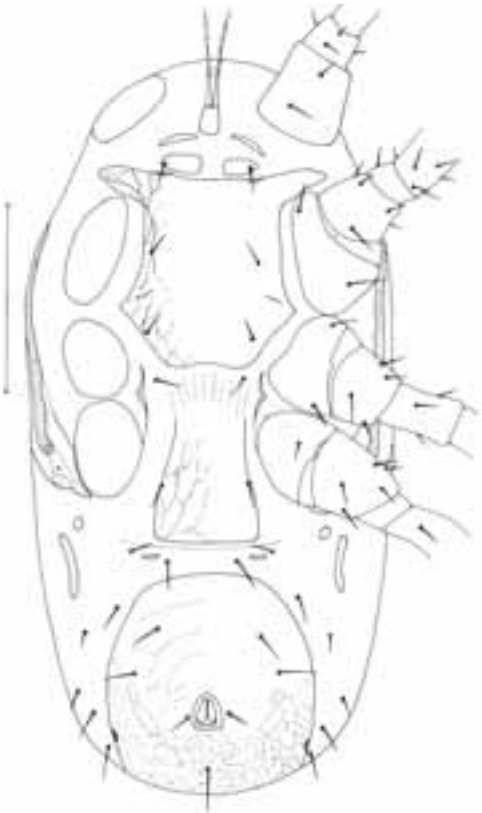

Fig 78: *Leioseius minusculus* - ventral side of female. Scale: 100 μm

latero-caudal margin. Shield wears 3 - 4 pairs of setae. Anal opening sitauted in caudal half of shield. Six pairs of short needle-shaped setae on ventral soft cuticle. Digitus fixus in ♀ with row of 9 and 1 denticles. Idiosoma ♀♀ 380 - 410 μm, ♂ 320 μm long. Material measured: dorsal shield 403 μm long, 183 μm wide, l4 = 23 μm, l5 = 13 μm, i1 = 9 μm, S4 = 22 μm long.

Geographic distribution: Europe.

Vertical distribution in Slovakia: 110 - 760 m a. s. l.

Ecology
Scarcely occurring in meadow soil, regularly in swamp meadows, coastal areas; in humus among grass roots, in litter, reed and grass remnants. In Slovak territory found in littoral reed stands (Phragmition), lake banks with *Typha angustifolia* and wet grass, wet alder forest (*Alnion glutinosae*), in mountain hay meadow, peat - bogs, rhizosphere of gras, in soil samples. Frequently inhabiting bird nests on both ground and trees; *Anas platyrhynchos, Anser anser, Aythya ferina, Aythya fuligula, Fulica atra, Circus aeruginosus, Ixobrychus minutus, Acrocephalus arundinaceus, Emberiza schoeniclus* and *Porzana parva* in littoral reed stand (Phragmition), *Sturnus vulgaris* on trees in parks.
Edaphic detricolous species.

Habitat preference

Mite found mainly in bottom parts of bird nests with higher moisture and decaying plant material, but not strictly nidicolous. Inhabitant of various habitats in littoral zones of mainly lowlands and submountain areas, with the preference to higher moisture.

Published records from Slovakia: Borská nížina lowland: 110 ♀♀, 7 ♂♂, 4 DN - 10.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 10 ♀♀ - 10.5.1997, Jakubov, Jakubovské rybníky (*Anser anser*) [7567]; 3 ♀♀ - 10.5.1997, Jakubov, Stará Šutrovňa [7567]; 44 ♀♀, 8 ♂♂, 2 DN, 2 PN - 27.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos)* [7567]; 15 ♀♀, 1 ♂ - 27.5.1997, Jakubov, Jakubovské rybníky (*Aythya ferina*) [7567]; 20 ♀♀ - 27.5.1997, Jakubov, Jakubovské rybníky (*Aythya fuligula*) [7567]; 4 ♀♀ - 27.5.1997, Jakubov, Jakubovské rybníky (*Fulica atra*) [7567]; 12 ♀♀, 1 ♂, 2 DN - 30.5.1997, Jakubov, Jakubovské rybníky (*Aythya ferina*) [7567]; 54 ♀♀, 1 ♂ - 25.6.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 25.6.1997, Jakubov, Jakubovské rybníky (*Aythya ferina*) [7567]; 17 ♀♀ - 27.8.1997, Jakubov, Jakubovské rybníky [7567]; 7 ♀♀ - 24.9.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 21 ♀♀ - 27.10.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 11 ♀♀ - 13.12.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 9 ♀♀ - 13.12.1997, Jakubov, Jakubovské rybníky (*Circus aeruginosus*) [7567]; 2 ♀♀ - 23.6.1998, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567]; 1 ♀ - 21.8.1998, Jakubov, Jakubovské rybníky [7567]; 6 ♀♀ - 10.2.1999, Jakubov, Jakubovské rybníky [7567]; 6 ♀♀ - 15.4.1999, Jakubov, Jakubovské rybníky [7567]; 1 ♀ - 1.8.1999, Jakubov, Jakubovské rybníky (*Ixobrychus minutus*) [7567] (Fenďa & Schniererová 2005); 2 ♀♀ - 16.10.1998, Jakubov, Jakubovské rybníky [7567]; 1 ♀ - 12.7.1999, Jakubov, Nová Šutrovňa [7567]; 1 ♀ - 1.8.1999, Jakubov, Nová Šutrovňa (*Phragmites australis*) [7567]; 3 ♀♀ - 13.10.1999, Jakubov, Jakubovské rybníky [7567]; 22 ♀♀ - 3.11.1999, Jakubov, Jakubovské rybníky [7567] (Fenďa & Schniererová 2004, 2005); **Podunajská rovina lowland:** 5 ♀♀ - 17.6.1995, Číčov, Číčovské mŕtve rameno [8272] (Fenďa et al. 1998); 2 ♀♀ - 23.6.1997, Číčov, Lyon (*Acrocephalus arundinaceus*) [8272]; 3 ♀♀ - 16.6.1999, Číčov, Číčovské mŕtve rameno (*Acrocephalus arundinaceus*) [8272] (Fenďa & Schniererová 2004); **Slovenský kras karst:** Jašteričie jazierko [7489] (Kalúz 1994e, 1995a).

Specimens examined: Borská nížina lowland: 16 ♀♀, 3 ♂♂ - 3.6.1998, Malacky, Štvrtý rybník [7568]; **Malé Karpaty Mts.:** 1 DN - 30.5.2000, Bratislava, Botanical garden [7868]; Oravské Beskydy Mts.: 13 ♀♀ - 11.7.2001, Mútne village, Hraničný Kriváň, peat - bog [6482]; **Podunajská rovina lowland:** 1 ♀ - 17.4.1986, Svätý Jur, NNR Šúr [7769]; 17 ♀♀, 2 ♂♂ - 23.6.1997, Číčov, Lyon (*Ixobrychus minutus*) [8272]; 264 ♀♀, 3 ♂♂, 13 DN, 3 PN 4 L - 4.6.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769]; 28 ♀♀, 1 ♂, 1 PN - 10.6.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769]; 1 ♀ - 6.8.1998, Svätý Jur, NNR Šúr (*Fulica atra*) [7769]; 9 ♀♀ - 16.6.1999, Číčov, Číčovské mŕtve rameno (*Emberiza schoeniclus*) [8272]; **Trnavská pahorkatina wold:** 1 ♀ - 10.8.1998, Trnava, Trnavské rybníky [7671]; **Turzovská vrchovina highland:** 1 ♀ - 2.7.1997, Korňa (soil) [6577].

Specimen depicted: Borská nížina lowland: 1 ♀ - 10.5.1997, Jakubov, Jakubovské rybníky (*Anas platyrhynchos*) [7567];

Fig. 79: *Leioseius naglitschi* - dorsal side of female. Scale: 100 μm

Leioseius naglitschi KARG, 1965

(Figs. 79, 80, Pl. 17B)

1965 - KARG, Mitt. Zool. Mus. Berlin 41: 193-340

Morphology

Peritremes narrow, long, reaching nearly r1. Dorsal shield uniform, 321 μm long, 178 μm wide, with short medio-lateral incision. Dorsal pattern different, propodosomal part with irregular structure and with dots, anterior part od opisthosoma scale-shaped. Caudal part of dorsal shield with net structure creating by dots. Rounded garland structures (one pair) in central part of propodosoma between i3 - i4, two pairs of badly visible semi-rounded garlands on opisthosoma, caudally between I4 - I5. Two pairs of big pores laterally between Z3 - S5. Dorsal setae short and needle-shaped, besides hairy Z5, Z5 two times longer than S5 (11-12 μm long); Z5 = 22 - 27 μm, I5 = 10 μm, i1 = 11 μm, S4 = 12 μm long. Sternal shield with fine structure, anteriorly with nearly straigth margin and with praesternal sclerites. St1 on praesternal sclerites, St2 - St3 on lateral margins, St4 on soft cuticle. Base of coxae I with net structure. Genital shield shorter, caudally broadened, bell-shaped, with rounded posterior margin, genital setae on lateral margins. Two pairs of sclerites present, standing apart laterally between genital and ventrianal shield. Female ventrianal shield with expressive pattern, with 5 pairs of setae, concave lateral posterior and dotted caudal margins. Setae ZV1 present on ventrianal shield.

Fig. 80: *Leioseius naglitschi* **-** ventral side of female. Scale: 100 μm

Anal opening situated centrally. Ventral side with 5 pairs of short setae on soft cuticle. Digitus fixus ♀ with 3 + 3 teeth. Idiosoma + 350 μm long. Material measured: Dorsal shield 321 μm long, 179 μm wide, Z5 = 27 μm, I5 = 10 μm, i1 = 11 μm, S4 = 12 μm long.

Geographic distribution: Central Europe.

Vertical distribution in Slovakia: 110 - 140 m a. s. l.

Ecology
Scarcely occurring in arable soil (light sandy soils with lucerne). In Slovakia found in lowland sandy areas; sand dune (rhizosphere of grass) and xerothermic forest steppe (rhizosphere of grass) South-East Slovakia.

Habitat preference
Unknown due to scarce occurrence.

Specimens examined: **Východoslovenská rovina lowland:** 2 ♀♀ - 17.6.2003, Leles [7598]; 1 ♀ - 18.6.2003, Veľký Kamenec, Tarbucka Mt. [7696].

Specimen depicted: **Východoslovenská rovina lowland:** 1 ♀ - 17.6.2003, Leles [7598];

Dubious data and misidentification

Arctoseius butleri (HUGHES, 1948)

Published records from Slovakia: Žitavská pahorkatina wold: Veľké Janíkovce [7774] (SIDOR 1986). One date only from the stable on horse farm.

Remarks. Material is not available for the revision, probably a misidentification. No additional data on this material are in disposal.

Arctoseius insularis (WILLMANN, 1952)

Published records from Slovakia: Východoslovenská rovina lowland: Svätá Mária [7597] (KOVÁČ et al. 1999).

Remarks. Misidentification is not excluded, because well sclerotized adult females of *A. insularis* are morphologically very similar to *A. minutus*. The material from East Slovakia is not available.

Cheiroseius (Posttrematus) curtipes (HALBERT, 1923)

Published records from Slovakia: Ondavská vrchovina highland: Ruská Poruba [6896] (MRCIAK 1963 as *Episeius ovaspini = Seius curtipes* HALBERT.

Remarks. The specimen from Ruská Poruba is not available for the revision, the misidentification is not excluded.

Cheiroseius (Cheiroseius) viduus C. L. KOCH, 1839

Published records from Slovakia: Štiavnické vrchy Mts.: 12.5.1932, Vyhnianska dolina (= Vihnyei völgy) [7478] (WILLMANN 1938, as *Episeiella heteropoda* WILLMANN, 1938);

Remarks. WILLMANN described the species *Episeiella heteropoda* WILLMANN, 1938 as synonym of *Cheiroseius (Cheiroseius) viduus* C. L. KOCH, 1839. Comparing other representatives within the genus *Cheiroseius*, in the species *Ch. viduus* the missidentification is practically impossible and we can suppose the correct identification by WILLMANN.

Platyseius subglaber (OUDEMANS, 1903)

Published records from Slovakia: Bukovské vrchy Mts.: Ulič, Mikošova dolina valey (*Apodemus flavicollis*) [7000] (STANKO 1995); **Volovské vrchy Mts.:** Hýľov, Hlboká dolina valey (*Apodemus flavicollis*) [7292] (STANKO 1987, 1988b, STANKO et al. 1992), Zlatá Idka, pramene Idy [7291] (STANKO et al. 1992).

Remarks. The material from Bukovské vrchy and Volovské vrchy is not available. However, resulting from the well defined morphological characters both of the genus *Platyseius* and the species *Platyseius subglaber* in identification keys and taking into account the ecology of the species, the specimens mentioned above probably can be *Platyseius subglaber*.

Platyseius sp.

Published records from Slovakia: Krupinská planina plateau: 3 ♀♀ - VI.1983, Pliešovce, Zábava (*Apodemus flavicol-*

lis) [7581] (Stanko 1989a, 1989b); **Stolické vrchy Mts.:** 2 ♀♀ - 17.7.1981, Svarínska dolina (*Apodemus flavicollis*) [7485] (Ambros et al. 1985); **Veľká Fatra Mts.:** 1 ♀ - IV.1980, údolie Lubochnianky, Jarabinská (*Pitymys subterraneus*) [6980] (Ambros 1983); Volovské vrchy Mts.: 1 ♀ - 10.6.1983, Vyšný Medzev, Humel [7291] (Stanko et al. 1992).

Remarks. The published mite material is not available for the revision (probably lost). We cannot exclude the possibility, that the material could involve the representatives of the species *Platyseius subglaber.*

Plesioseius major (Halbert, 1923)

Published records from Slovakia: Hronská pahorkatina wold: 13.4.1933, Rybník (= Garamszöllös) [7777] (Willmann 1938, as *Episeius major* (Halbert, 1923) *subsp. incisus* Willmann, 1938).

Remarks. Unfortunately, the material is not available for the revision. Both species within the genus *Plesioseius* are inhabiting wet places (littoral zone, nests), neighbouring the ponds. However, the morphological characters in these two species (*P. major, P. italicus*) in Slovakia varies and there is the possibility of misidentification.

Plesioseius italicus (Berlese, 1905)

Published records from Slovakia: Slanské vrchy Mts.: Hermanská dolina (*Apodemus flavicollis*) [7094] (Stanko 1988a).

Remarks. The published material is not available and the same can be said, like in above mentioned P. major.

Leioseius bicolor (Berlese, 1918)

Published records from Slovakia: Východoslovenská rovina lowland: Svätá Mária [7597] (Kováč et al. 1999).

Remarks. The material is not available for reliable revision, but the species *Leioseius bicolor* is well defined in available taxonomical literature and its correct identification cannot be excluded.

Summary

During the study altogether 35 species, belonging to the family Ascidae have been reliably recorded from Slovak territory, four of them as a new members of Slovak acarofauna; *Arctoseius resinae* Karg, 1969, *Cheiroseius (Cheiroseius) bryophilus* Karg, 1969, *Leioseius naglitschi* Karg, 1965 and *Zerconopsis apodius* Karg, 1969.

Geographic distribution of Ascidae includes the elements from various geographic areas. One species has the distribution in Holarctic and Nearctic regions (*Cheiroseius cassiteridium*), six species belong to Holarctic and three to Palearctic elements. The orographic origine of other species occurring in Slovak territory comes from various Europaean provinences.

Species within the family Ascidae found in Slovak territory inhabited differrent habitats, but they are always rare in comparison to other soil mites. The majority of them are able to occur in

several types of habitats. The basic ecological requirements of the species indicate that the species can be considered hygrophilous (mainly species in the genus *Cheiroseius*) and mesohygrophilous (the majority of the species occurring in Slovakia can be included into this ecological group). Two species show wider ecological adaptations to the environmental conditions (*Asca aphidioides* and *Asca bicornis*), occurring in very wide spectrum of biocenoses and habitats from drier, through mildly wet to wet ones, while other species are less adapted. These species together with several representatives of the genus *Arctoseius* (*A. cetratus, A. magnanalis, A. semiscissus, A. venustulus*) are considered as eurytopic species.

A more specialized species of Ascidae can prefer mainly birdęs nest material, where they are occurring regularly (*Plesiosejus italicus, Plesiosejus major)*, these species with *Platyseius subglaber*, found mainly on mammals, preferred wet conditions, while *Leioseius bicolor* preferred drier or mildly wet nest material.

The adaptations to the temperature conditions in Ascidae can allow the preliminary conclusions only. According to the recent knowledge on ecology, the majority of species are thermotolerant and psychrotolerant, they tolerate wider temperature span. Several species tolerate drier substrates (*Arctoseius cetratus, A. eremitus, A. magnanalis, A. semiscissus*) and create a group of xerotolerant species.

Vertical distribution of Ascidae in Slovakia does not include all hypsographic zones, they occur mainly in lower altitudes from planar to mountain zones. The only species *Arctoseius magnanalis* was registered in supramountain zone in Slovakia. Resulting from this, the species occurring in Slovakia, can be classified as mesosonal (the majority of Ascidae) and a few species can be included into stenozonal species, only.

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Plate 1

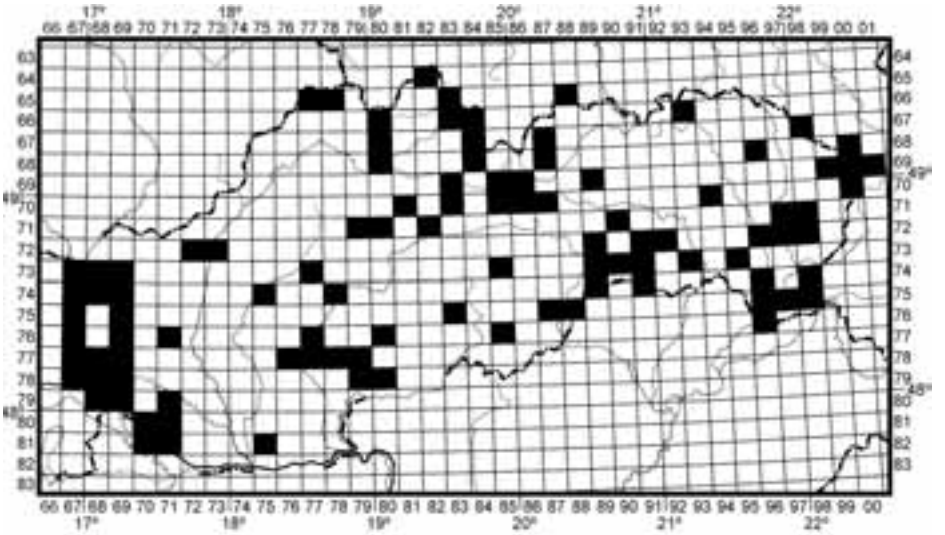

Plate 1A: Family Ascidae - known geographic distribution in Slovakia

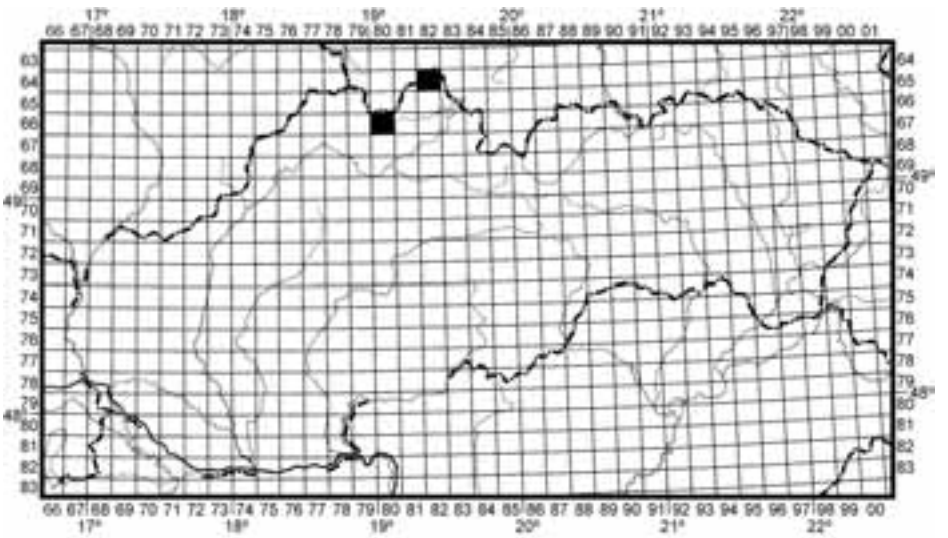

Plate 1B: *Cheiroseius unguiculatus* - known geographic distribution in Slovakia

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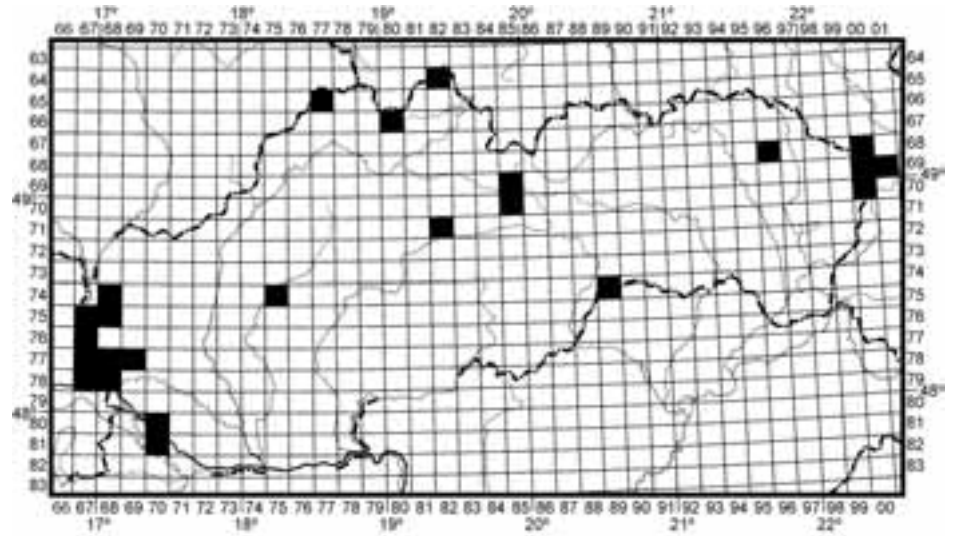

Plate 2A: *Cheiroseius curtipes* - known geographic distribution in Slovakia

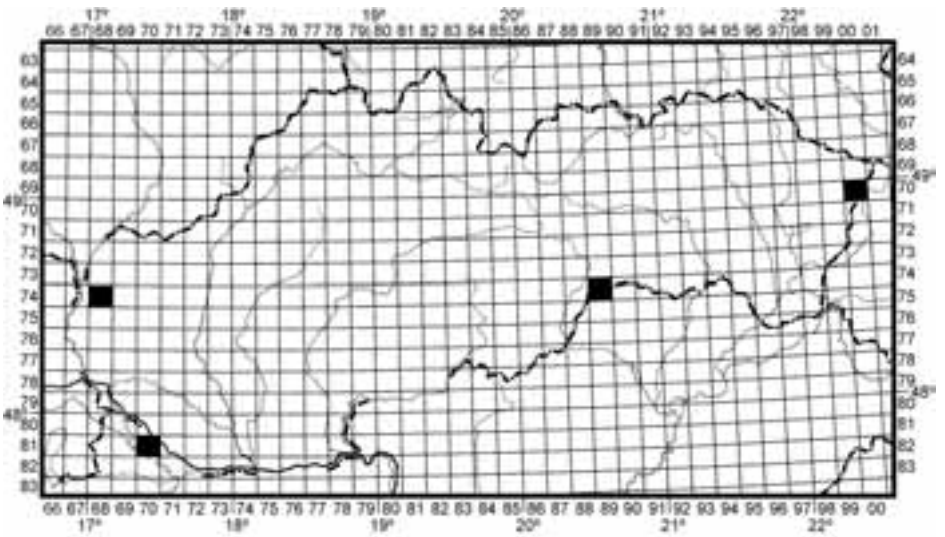

Plate 2B: *Cheiroseius salicorniae* - known geographic distribution in Slovakia

Plate 3

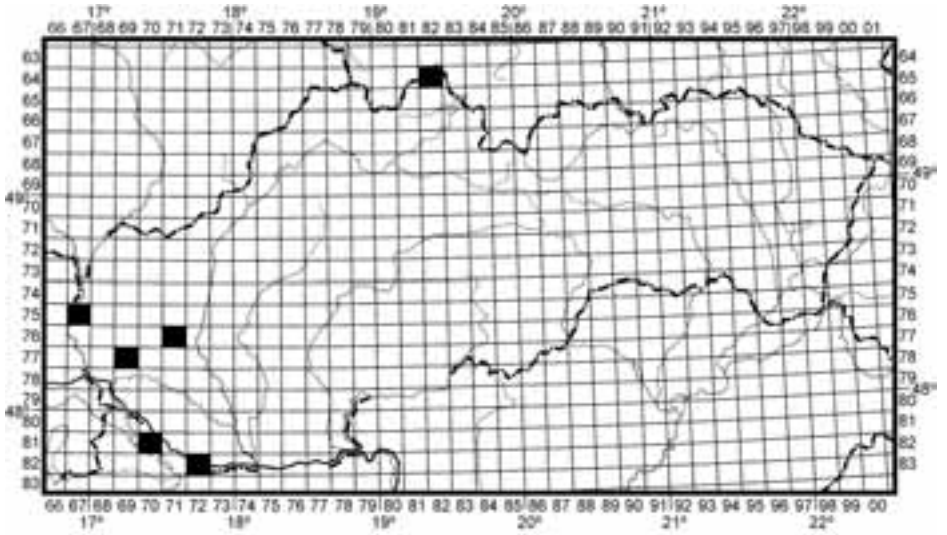

Plate 3A: *Cheiroseius cassiteridium* - known geographic distribution in Slovakia

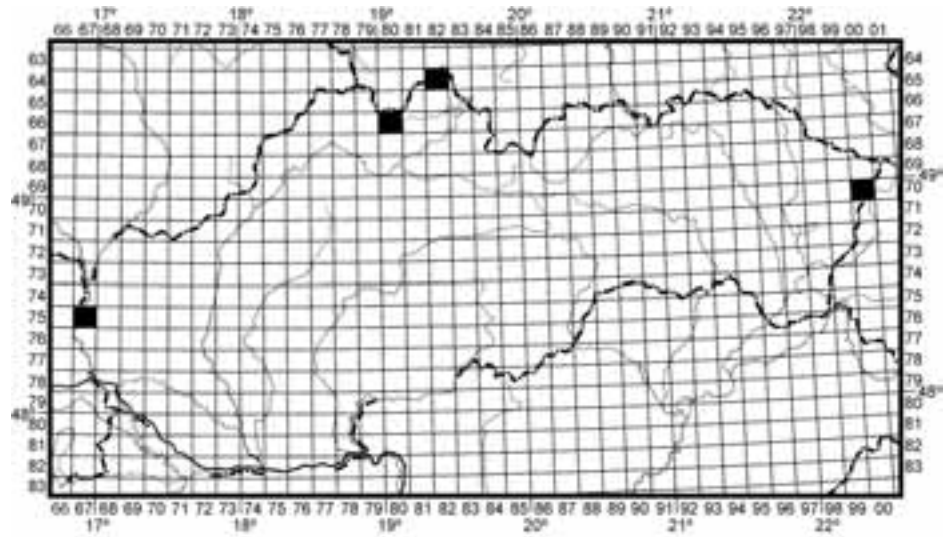

Plate 3B: *Cheiroseius serratus* - known geographic distribution in Slovakia

Plate 4

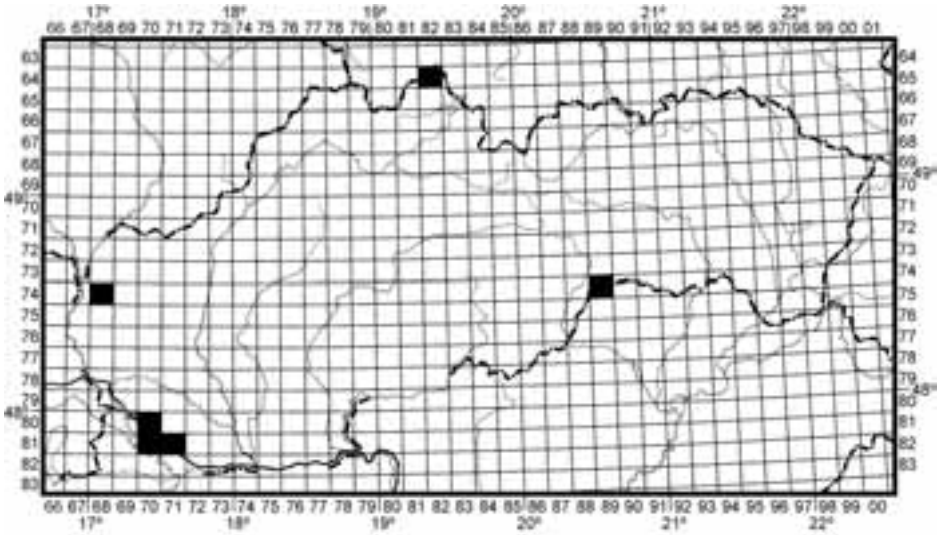

Plate 4A: C*heiroseius longipes* - known geographic distribution in Slovakia

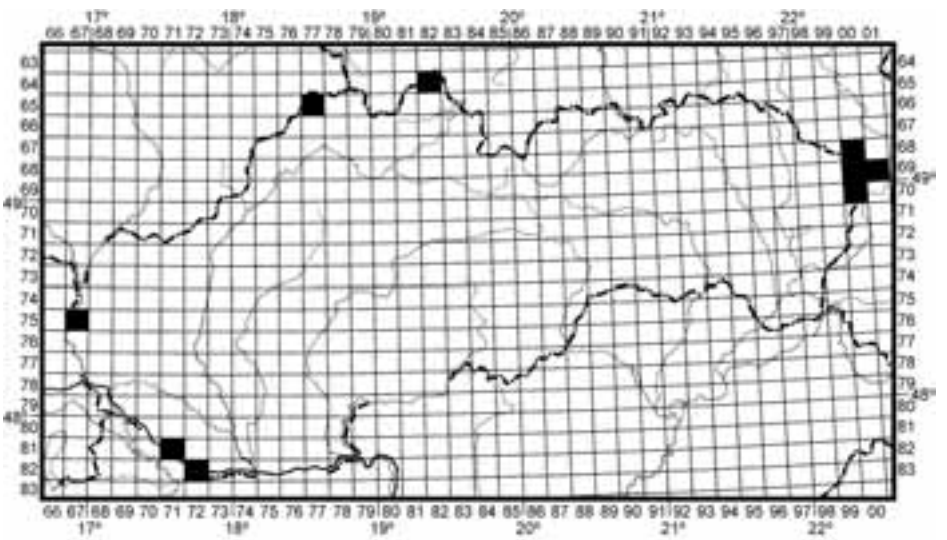

Plate 4B: *Cheiroseius mutilus* - known geographic distribution in Slovakia

Plate 5

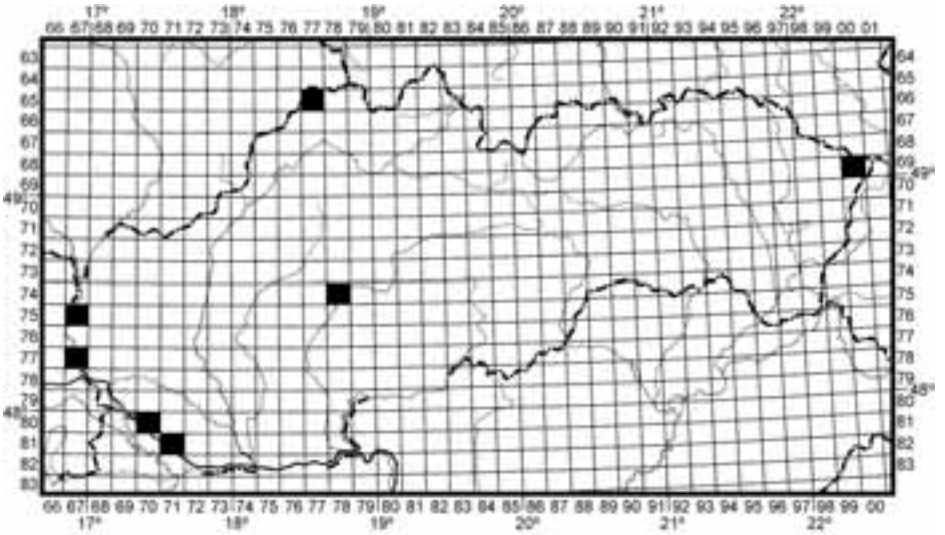

Plate 5A: *Cheiroseius viduus* - known geographic distribution in Slovakia

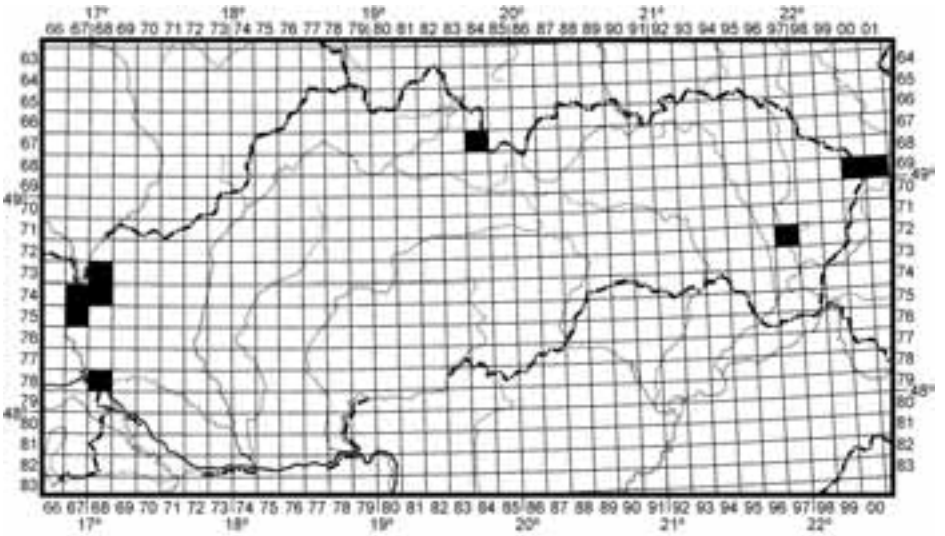

Plate 5B: *Cheiroseius borealis* - known geographic distribution in Slovakia

Plate 6

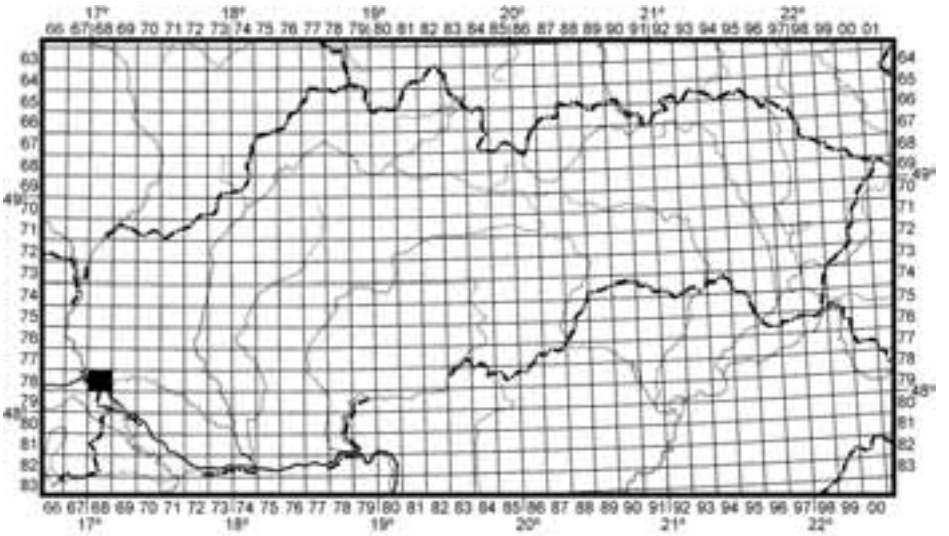

Plate 6A: *Cheiroseius bryophilus* - known geographic distribution in Slovakia

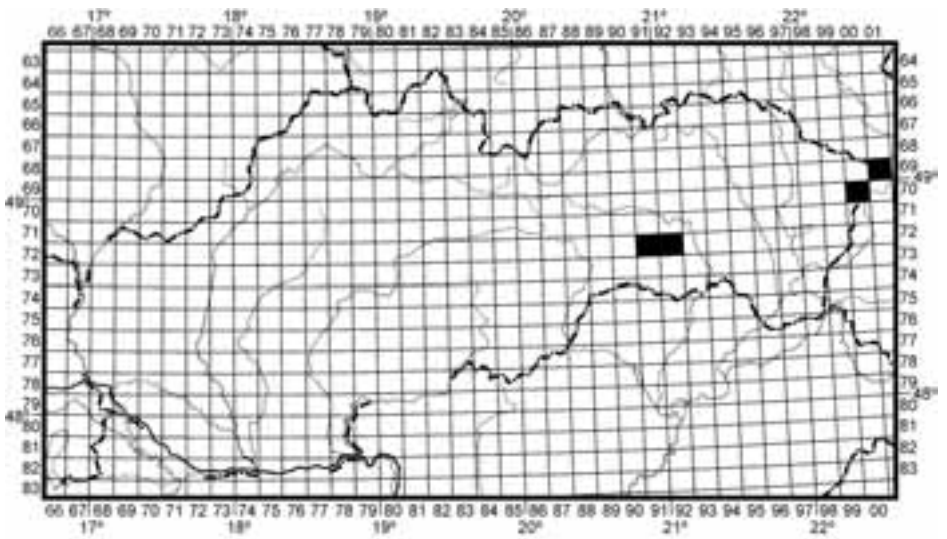

Plate 6B: *Platyseius subglaber* - known geographic distribution in Slovakia

Plate 7

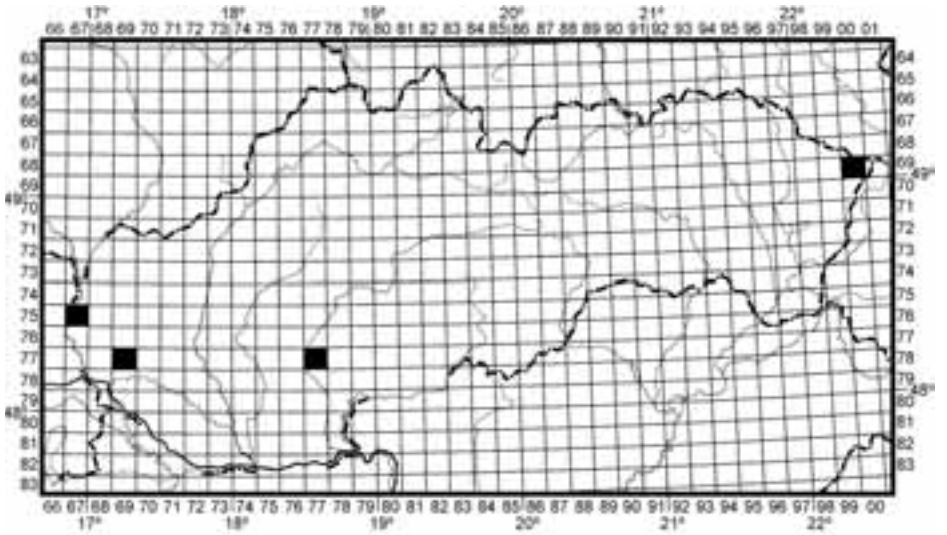

Plate 7A: *Plesiosejus major* - known geographic distribution in Slovakia

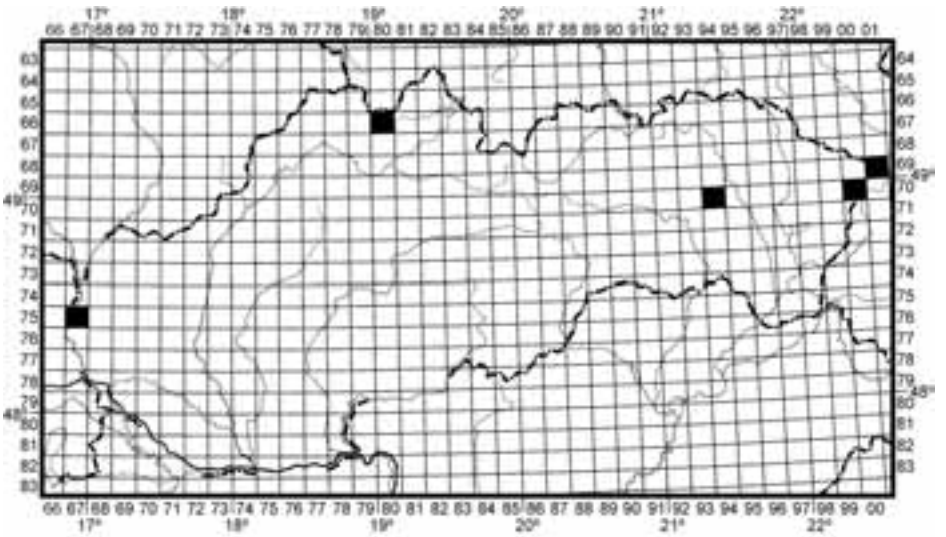

Plate 7B: *Plesiosejus italicus* - known geographic distribution in Slovakia

Plate 8

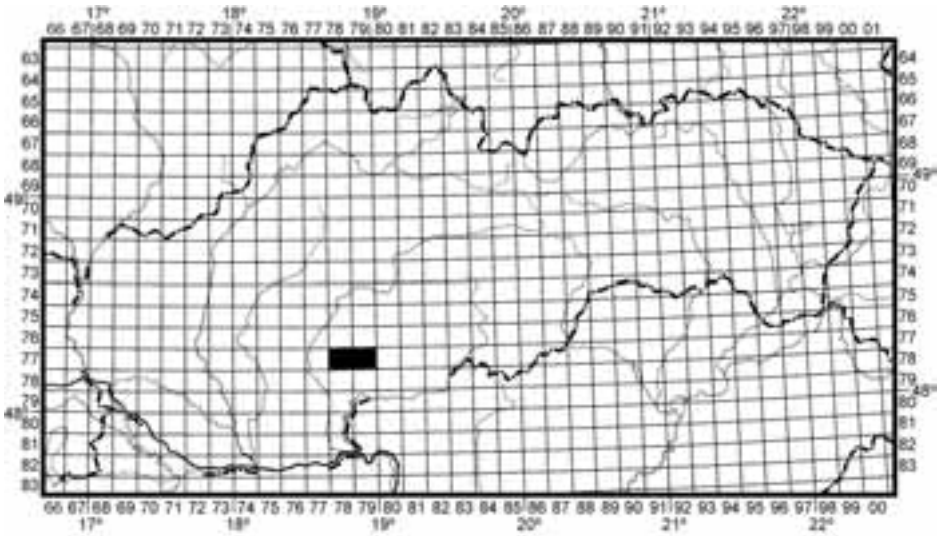

Plate 8A: *Zerconopsis apodius* - known geographic distribution in Slovakia

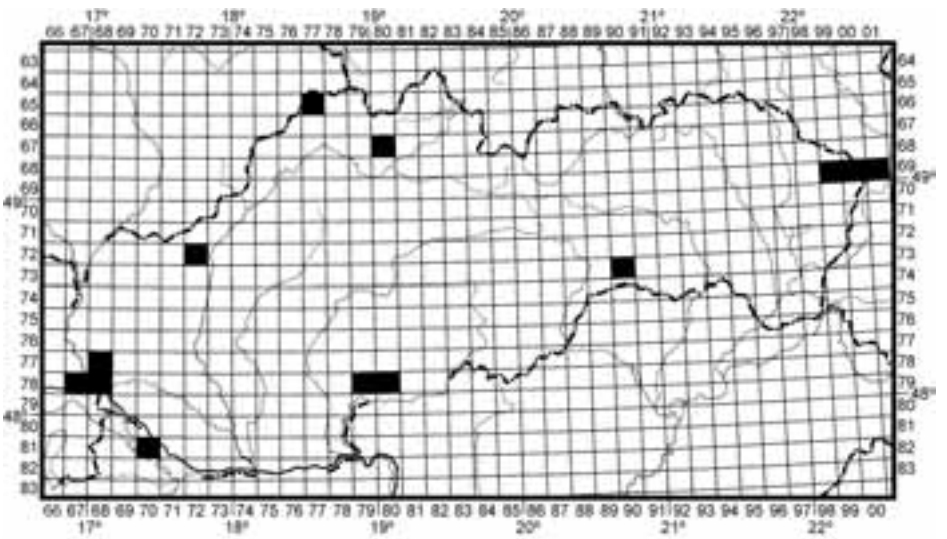

Plate 8B: *Zerconopsis remiger* - known geographic distribution in Slovakia

Plate 9

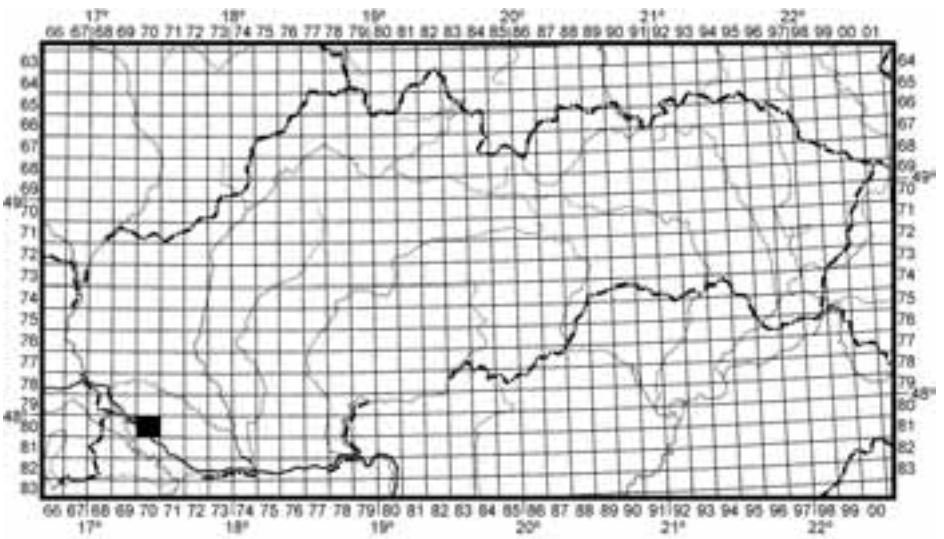

Plate 9A: *Zerconopsis muestairi* - known geographic distribution in Slovakia

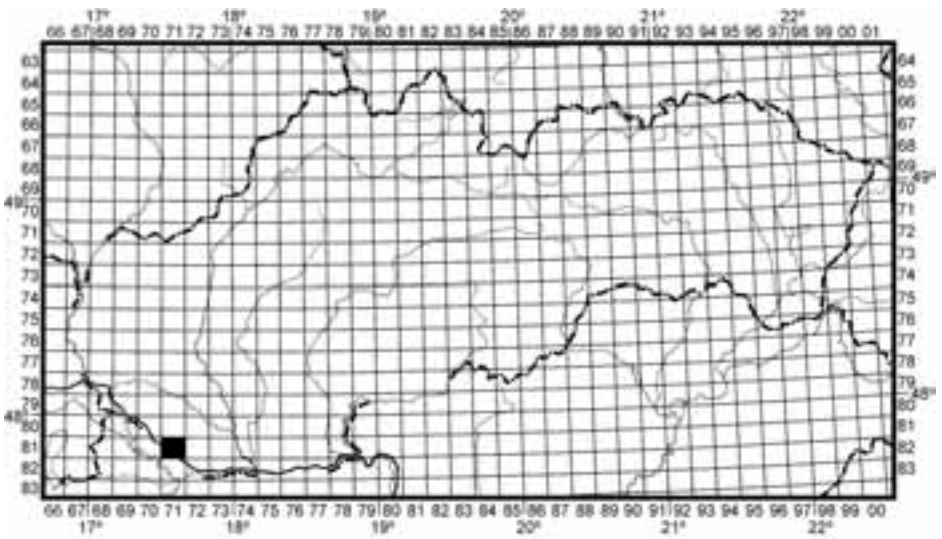

Plate 9B: *Zerconopsis slovacus* **-** known geographic distribution in Slovakia

Plate 10

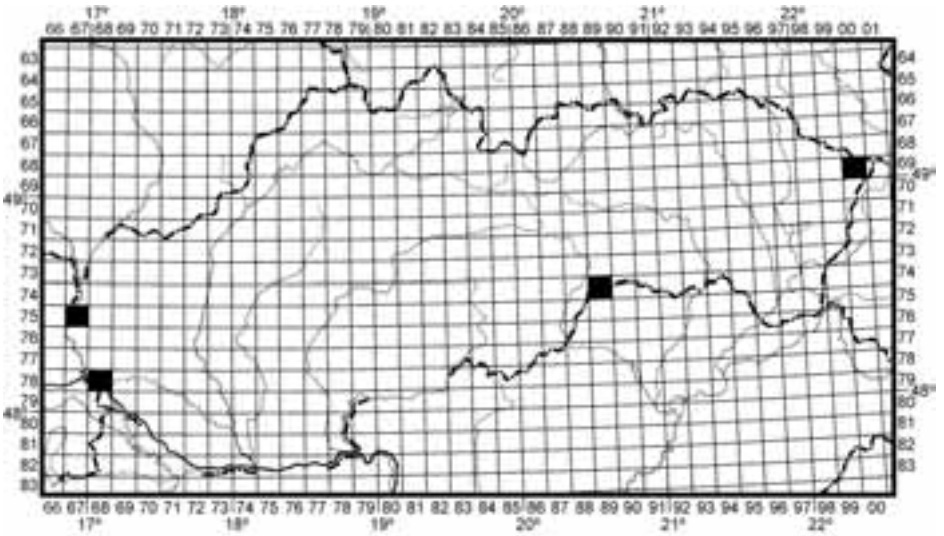

Plate 10A: *Iphidozercon gibbus* - known geographic distribution in Slovakia

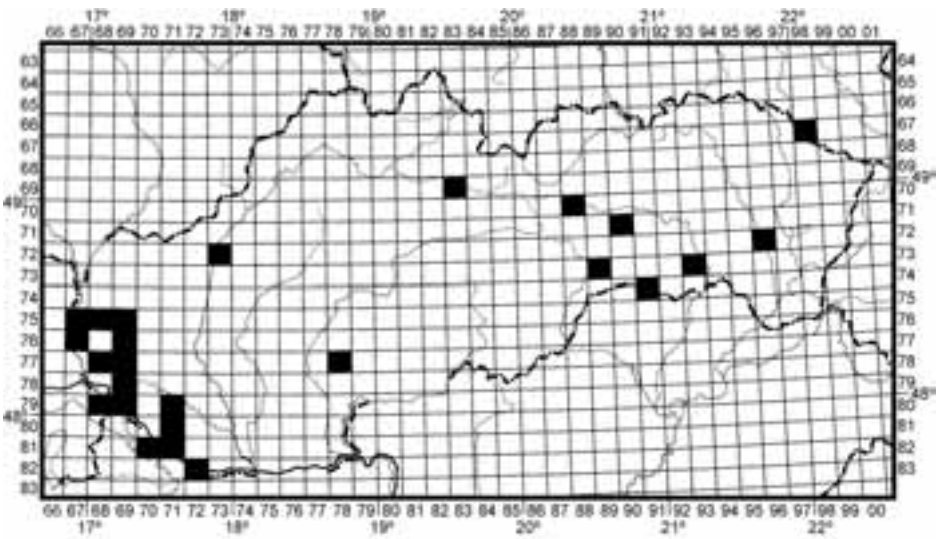

Plate 10B: *Arctoseius semiscissus* - known geographic distribution in Slovakia

Plate 11

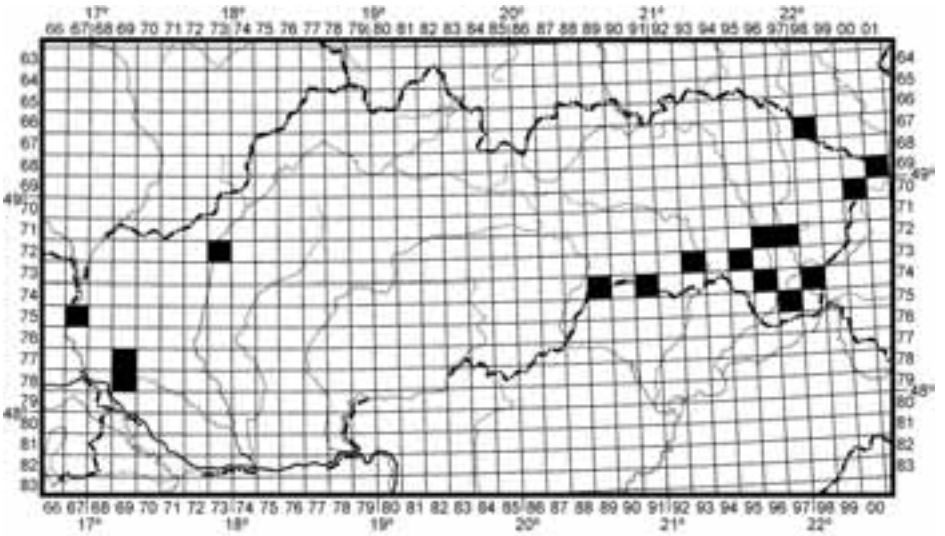

Plate 11A: *Arctoseius cetratus* - known geographic distribution in Slovakia

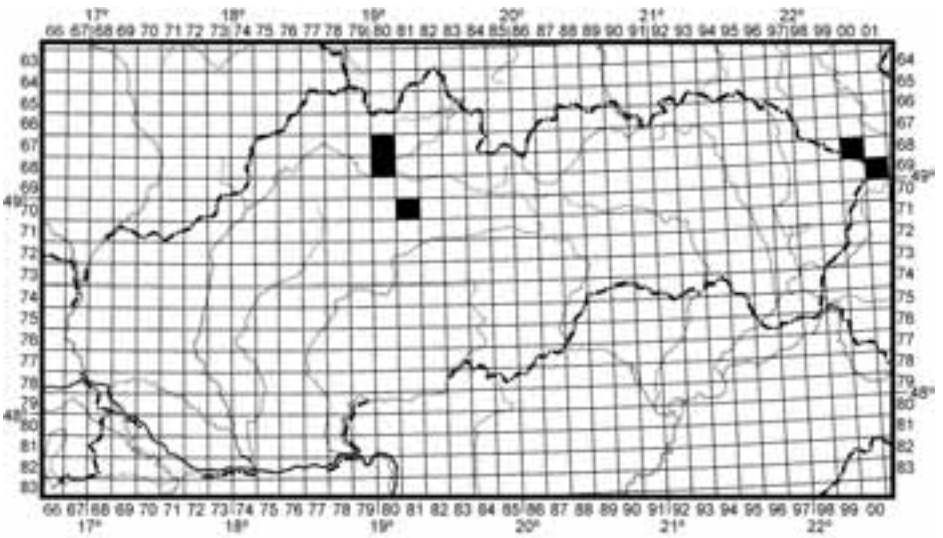

Plate 11B: *Arctoseius magnanalis* - known geographic distribution in Slovakia

Plate 12

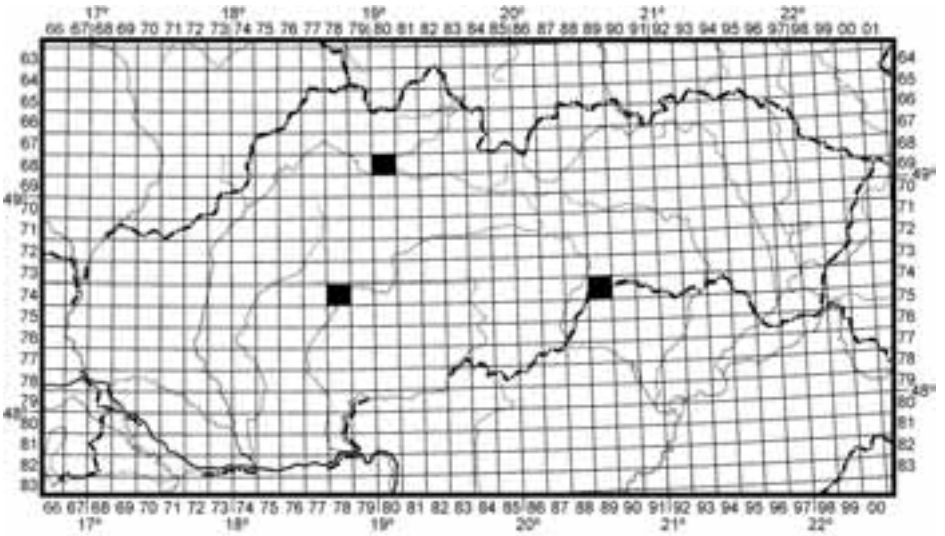

Plate 12A: *Arctoseius venustulus* - known geographic distribution in Slovakia

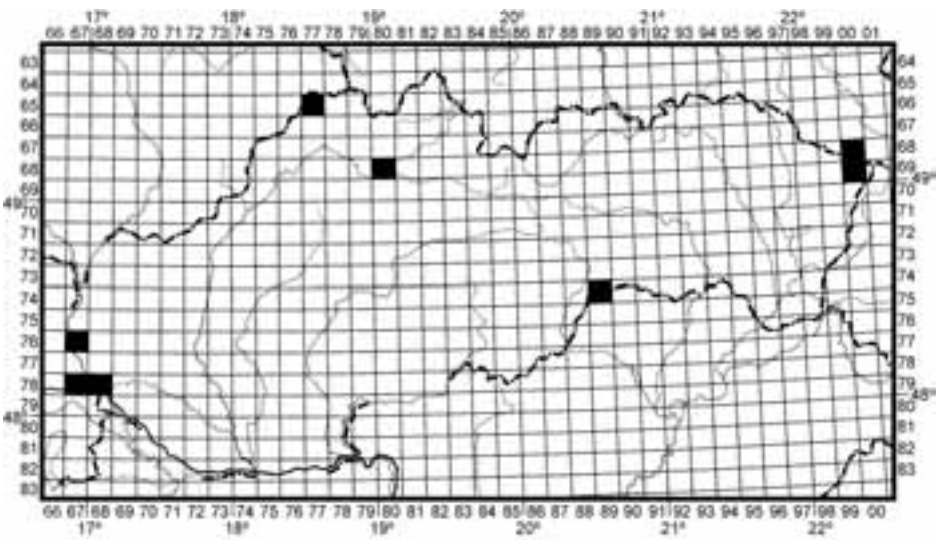

Plate 12B: *Arctoseius eremitus* - known geographic distribution in Slovakia

Plate 13

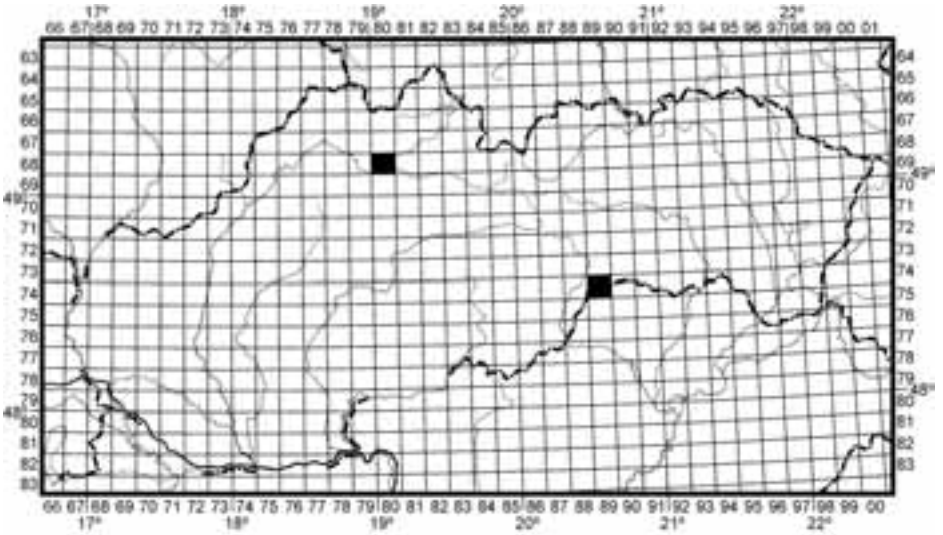

Plate 13A: *Arctoseius brevichelis* - known geographic distribution in Slovakia

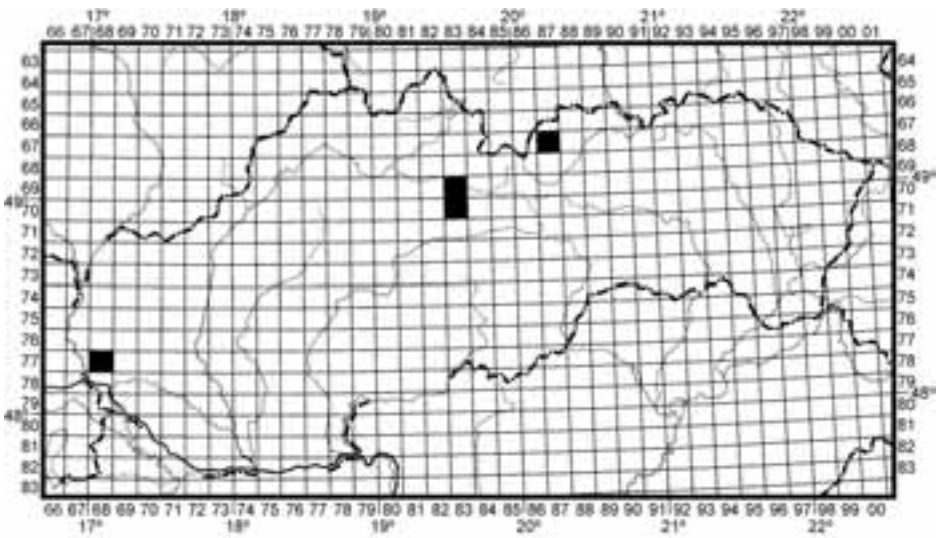

Plate 13B: *Arctoseius pristinus* - known geographic distribution in Slovakia

Plate 14

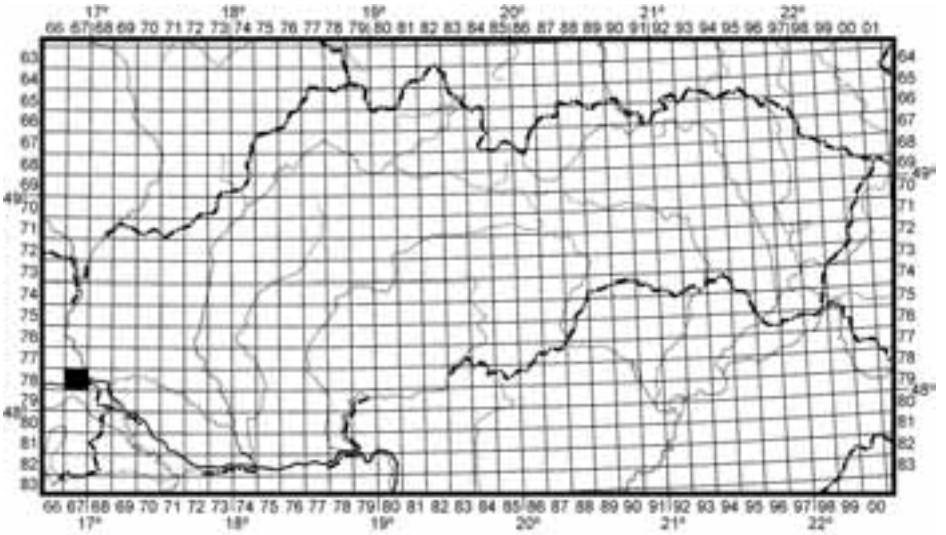

Plate 14A: *Arctoseius resinae* - known geographic distribution in Slovakia

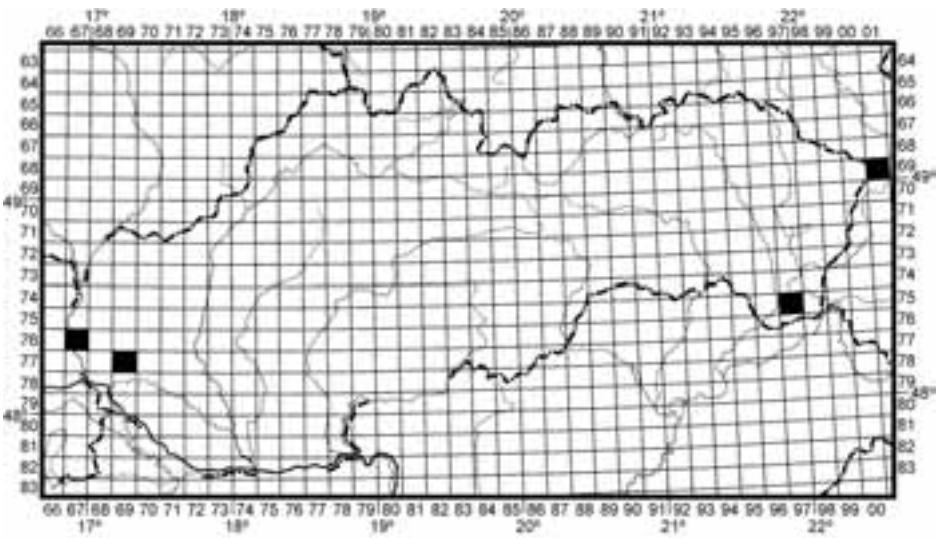

Plate 14B: *Arctoseius insularis* - known geographic distribution in Slovakia

Plate 15

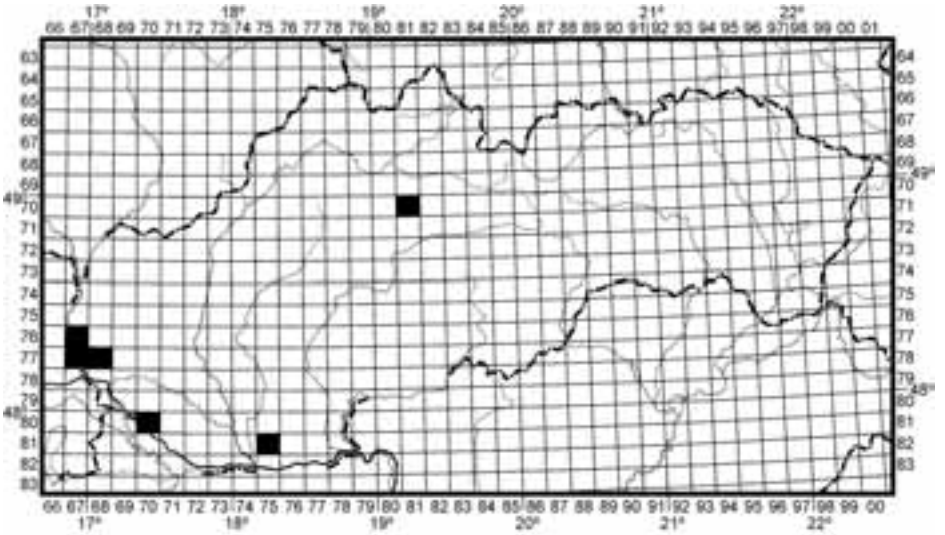

Plate 15A: *Arctoseius minutus* - known geographic distribution in Slovakia

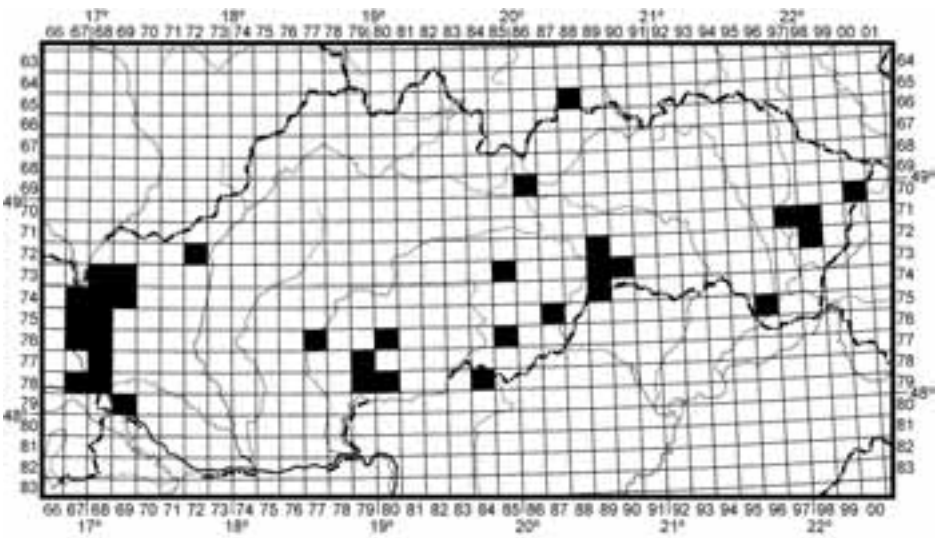

Plate 15B: *Asca aphidioides* - known geographic distribution in Slovakia

Plate 16

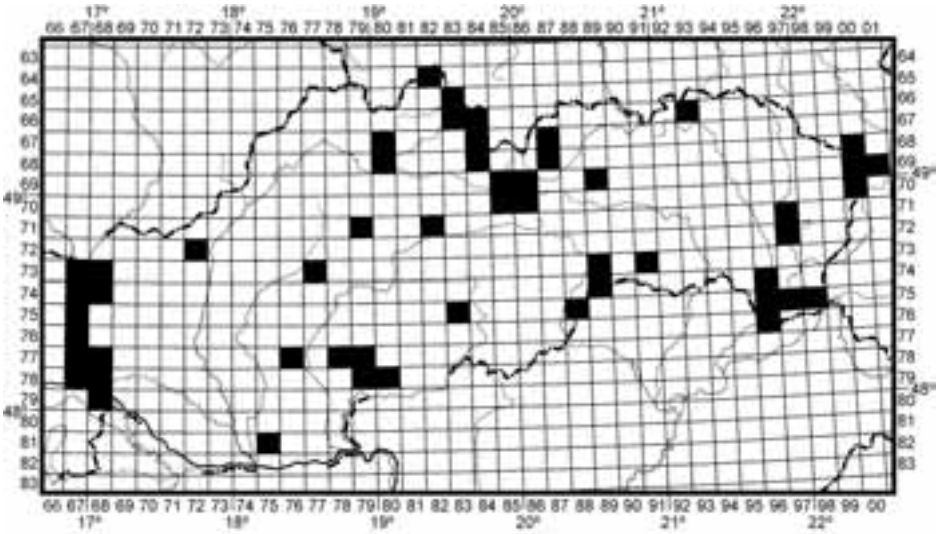

Plate 16A: *Asca bicornis* - known geographic distribution in Slovakia

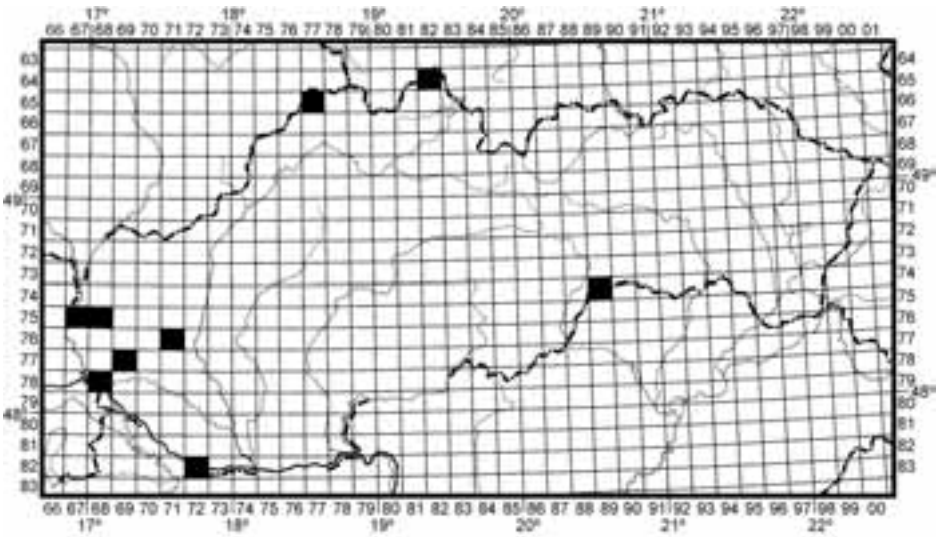

Plate 16B: *Leioseius minusculus* - known geographic distribution in Slovakia

Plate 17

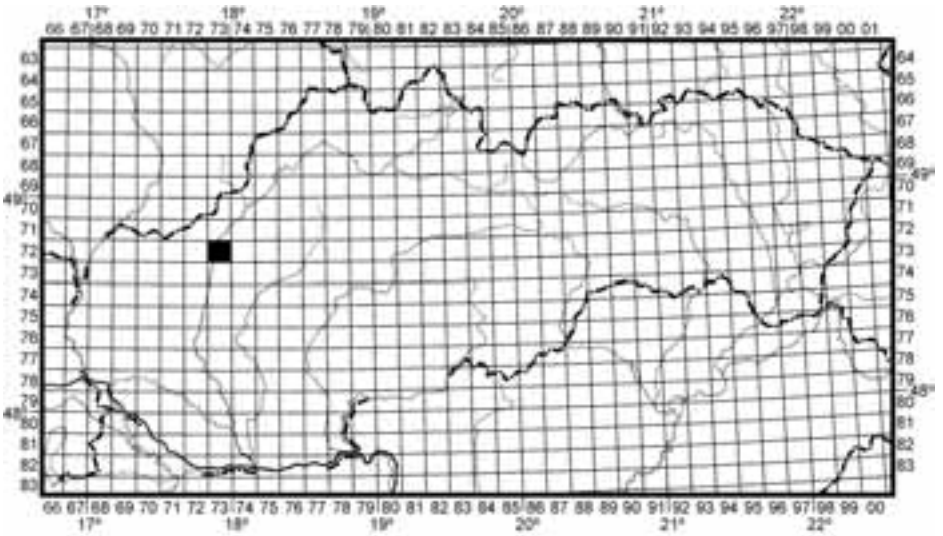

Plate 17A: *Leioseius elongatus* - known geographic distribution in Slovakia

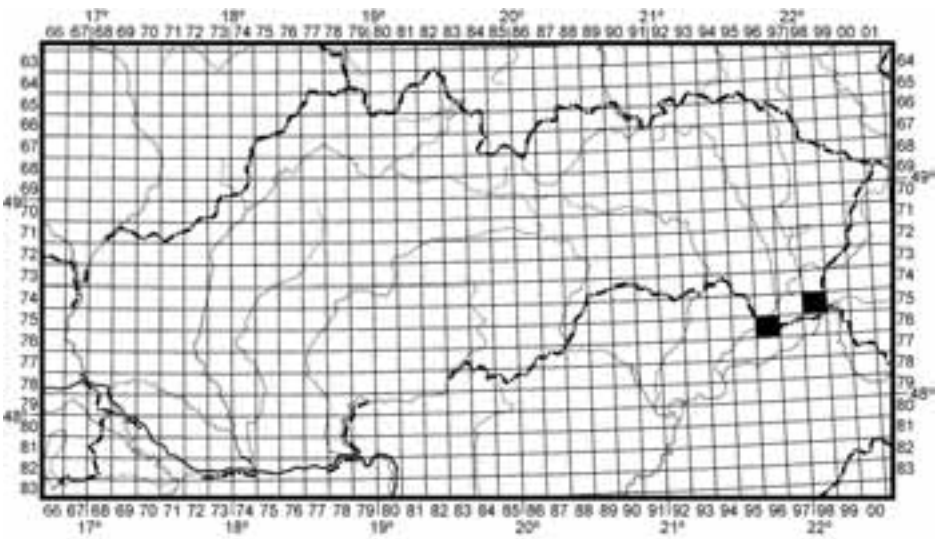

Plate 17 B: *Leioseius naglitschi* - known geographic distribution in Slovakia

Plate 18

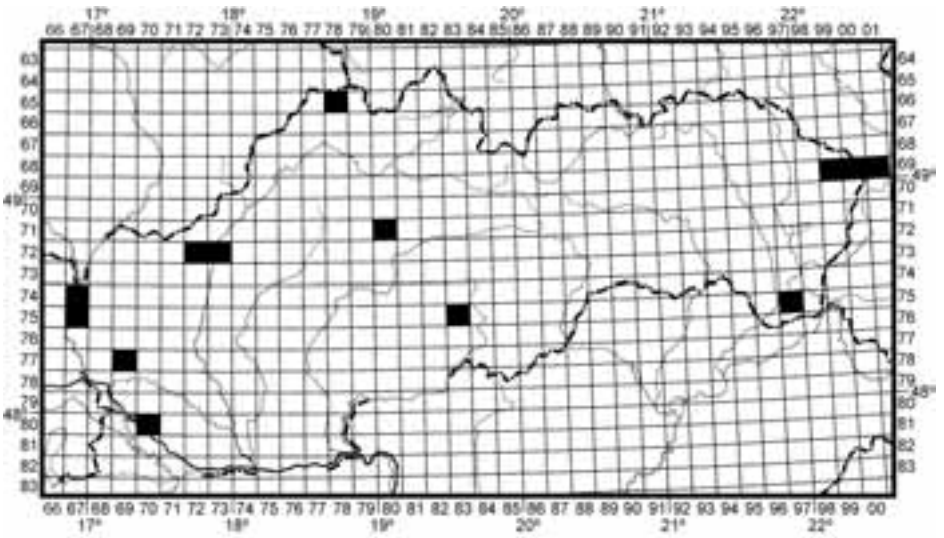

Plate 18A: *Leioseius bicolor* - known geographic distribution in Slovakia