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Pseudoscorpions (Arachnida: Pseudoscorpiones) living in tree microhabitats in Slovakia

Šťúriky (Arachnida: Pseudoscorpiones) žijúce v stromových mikrohabitatoch na Slovensku

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Abstract. Pseudoscorpions living in tree microhabitats (dead wood, tree hollows and on or under tree bark) in Slovakia were studied. A total of 504 specimens of 19 taxa from four families were identified from material collected at 63 localities in Slovakia over 11 years. The most numerous species were *Mundochthonius carpaticus* Rafalski, 1948 and *Allochernes wideri* (C. L. Koch, 1843), only one specimen of *Chthonius heterodactylus* Tömösváry, 1882 was present in the studied material. The species *Dactylochelifer latreillii* (Leach, 1817) and *Chernes hahnii* (C. L. Koch, 1843) were found in all studied microhabitat types. Altogether 37 specimens of eight species were present in dead wood samples. Low specimen numbers characterised the species in this microhabitat type, the only exception being *A. wideri*. A total of 32 specimens of nine taxa were collected on or under tree bark. *Neobisium sylvaticum* (C. L. Koch, 1835) and *Neobisium erythrodactylum* (L. Koch, 1873) were collected on tree bark using the method of beating branches. The species *C. hahnii* was found using a tree trunk photoeclector. A total of 435 specimens of 14 taxa were extracted from mould samples from tree hollows. The most numerous species in this habitat type were *M. carpaticus* and *A. wideri*, only one specimen was collected each of *Chthonius fuscimanus* Simon, 1900 and *N. erythrodactylum*. Pseudoscorpion occurrence in different tree species, height of entry hole and relative humidity is reported.

INTRODUCTION

Trees, especially old ones, act as a resource or habitat that provides animals with shelter, and a place for reproduction and development. Pseudoscorpions search for microhabitats situated on trees, especially for tree hollows and spaces under the tree bark, which provide them with relatively stable temperature, humidity and atmospheric conditions (Růžička & Boháč 1991, Ranius & Wilander 2000).

It was not until the beginning of the 21st century that the first data on pseudoscorpions from tree hollows in Slovakia were published. Krumpál & Krumpálová (2003) found the species *Dinocheirus panzeri* (C. L. Koch, 1837) in a beech hollow in Bukovské vrchy Mountains. Christophoryová (2010) identified eight species from tree hollows across Slovakia; the most abundant were *D. panzeri* and *Allochernes wideri* (C. L. Koch, 1843). Christophoryová & Krumpál (2010) collected the species *Neobisium carcinoides* (Hermann, 1804), *Chernes cimicoides* (Fabricius, 1793) and *A. wideri* from mould in the Nature Reserve Šúr. Krajčovičová & Christophoryová (2014) identified 13 taxa from four families from tree hollows across Slovakia; the most frequent and numerous species were *A. wideri* and *Pselaphochernes scorpioides* (Hermann, 1804). Christophoryová et al. (2016) found four species in hollows in cemeteries, without new records from this habitat type in Slovakia. On the contrary, Christophoryová et

al. (2014) and Krajčovičová & Christophoryová (2017) collected seven taxa from oak and ash hollows, among them *Atemnus politus* (Simon, 1878), *Lamprochernes nodosus* (Schrank, 1803) and *Beierochelifer peloponnesiacus peloponnesiacus* (Beier, 1929) were recorded for the first time from tree hollows in Slovakia. Summarizing all the published data, 17 taxa are known to occur in this habitat type in Slovakia.

Until recently, records of 15 pseudoscorpion taxa were published from the subcortical (under tree bark) microhabitat from Slovakia, of which the pseudoscorpions *Rhacochelifer quadrimaculatus* (Tömösváry, 1882), *R. peculiaris* (L. Koch, 1873) and *Mesochelifer ressli* Mahnert, 1981 represented the first records for the Slovak fauna (Tömösváry 1882, Verner 1960, Krumpálová & Krumpál 1993, Krumpál & Christophoryová 2007, Christophoryová 2010, Krajčovičová & Christophoryová 2014). Currently the Mediterranean species *Rhacochelifer disjunctus* (L. Koch, 1873), regarded as subcortical, was identified in tree habitats in Slovakia (Krajčovičová et al. 2017). Following the known data, *M. ressli*, *C. cimicoides* and *Chernes hahnii* (C. L. Koch, 1839) can be considered as the species with the closest association with the subcortical microhabitat (Krajčovičová & Christophoryová 2014).

Tree trunks provide specific microhabitats, especially for bark-dwelling invertebrates. There are less-used sampling methods that are suitable for collecting pseudoscorpions moving up tree trunks. The species *C. hahnii* was collected on *Quercus petrea* bark at the Martinský les locality in Slovakia using tree trunk photoeclectors (Krajčovičová & Christophoryová 2014). Migration up tree trunks by the species *Neobisium erythrodactylum* L. Koch, 1873 and *N. sylvaticum* (C. L. Koch, 1835) was shown using cardboard strips, during the study of Krajčovičová & Christophoryová (2014).

Dead wood and decaying tree stumps also provide shelter and food resources for pseudoscorpions (Humphrey et al. 2002, Drogla & Lippold 2004, Persson et al. 2013). In Slovakia, *P. scorpioides*, *C. cimicoides* and *D. panzeri* and the representatives of the epigeic fauna of the families of Chthoniidae and Neobisiidae, were collected in decaying tree stumps (Christophoryová & Krumpál 2010, Krajčovičová & Christophoryová 2014).

There is a special category for literature dealing with pseudoscorpions occurring in birds' nests and bat guano in tree hollows. Christophoryová et al. (2011b) recorded seven pseudoscorpion species in bird nests in tree hollows in Slovakia; the most abundant were *A. wideri* and *C. hahnii*. The species *Larca lata* (Hansen, 1884) was found in a tawny owl nest in a tree hollow at the Sobotište locality, representing the first record of the family Larcidae in Slovakia (Christophoryová et al. 2011a). Two pseudoscorpions, *D. panzeri* and *A. wideri*, were collected in bat guano from *Myotis daubentoni* (Kuhl, 1817) and *Nyctalus noctula* (Schreber, 1774) taken from tree hollows (Krajčovičová et al. 2015).

The aim of the present study was to provide new data about pseudoscorpions occurring in the tree hollows, on or under tree bark and in dead wood, based on the detailed sampling across Slovakia.

MATERIALS AND METHODS

Pseudoscorpions were collected by several collectors at 63 localities in Slovakia (Fig. 1, Table 1) over 11 years (2005–2007, 2009–2016) from three microhabitat types. Samples of mould in tree hollows, and of dead wood were sifted or collected into plastic bags and afterwards heat extracted in Tullgren funnels. The mould was sampled from i) ground tree hollows (the entry hole situated on the ground, or more precisely the entry hole was in the direct connection with the ground) and from ii) above-ground hollows (entry hole was situated at different heights above the

Table 1. Checklist of localities.
Tabuľka 1. Zoznam lokalít.

Code Kód	Locality Lokalita	N S	E V	a.s.l. (m) m n. m.	Environment Prostredie
1	Abrod	48°32′0.93″	16°59′16.02″	147	forest edge
2	Abrod	48°32′07.54″	16°59′39.23″	155	forest edge
3	Abrod	48°32′08.33″	16°59′21.11″	149	forest edge
4	Abrod	48°32′09.27″	16°59′27.65″	164	forest edge
5	Abrod	48°32′09.29″	16°59′25.45″	159	forest edge
6	Bodíky	47°56′02.00″	17°26′52.20″	119	floodplain forest
7	Bodíky	47°56′05.70″	17°26′52.70″	118	floodplain forest
8	Borinka	48°16′17.02″	17°07′24.18″	421	oak forest
9	Bratislava, Devínska Nová Ves	48°12′26.45″	16°58′08.49″	141	forest
10	Bratislava, Kamzík	48°10′54.00″	17°05′37.00″	435	beech forest
11	Bratislava, Karlova Ves	48°08′48.11″	17°03′45.92″	142	floodplain forest
12	Bratislava, Pečniansky les	48°08′03.60″	17°04′43.80″	185	floodplain forest
13	Bratislava, Železná studnička	48°11′34.85″	17°05′15.64″	242	oak-beech forest
14	Bujanov	48°51′47.95″	21°03′21.20″	400	mixed forest
15	Bujanov	48°52′12.72″	21°02′45.02″	420	mixed forest
16	Čermeľské údolie	48°45′03.56″	21°12′24.01″	290	willow-alder forest
17	Červený rybník	48°34′34.18″	17°07′34.57″	140	vegetation near bog
18	Červený rybník	48°34′51.78″	17°08′23.42″	220	vegetation near bog
19	Číčov	47°46′34.68″	17°43′57.42″	117	floodplain forest
20	Gajary	48°28′33.37″	16°52′54.75″	170	elm-oak forest
21	Horné Semerovce	48°07′40.94″	18°52′57.99″	130	park
22	Humenec	48°51′43.96″	21°10′20.21″	600	beech-oak forest
23	Humenec	48°51′45.04″	21°10′33.74″	480	beech forest
24	Humenec	48°51′46.30″	21°11′15.97″	420	beech forest
25	Jablonka	48°43′23.23″	17°36′29.34″	298	oak-beech forest
26	Jelenec	48°24′29.00″	18°10′30.00″	411	oak-hornbeam forest
27	Kováčová	48°38′12.00″	19°04′59.00″	450	beech forest
28	Kráľová lúka	48°09′40.66″	17°02′05.08″	285	beech-oak forest
29	Kulháň, NR	48°39′18.29″	18°07′12.66″	260	oak-hornbeam forest
30	Láb	48°22′22.70″	16°55′07.00″	145	alder forest
31	Láb	48°22′24.00″	16°55′07.70″	148	alder forest
32	Láb	48°22′25.10″	16°55′04.80″	149	alder forest
33	Láb	48°22′25.90″	16°55′04.00″	149	alder forest
34	Láb	48°22′45.18″	16°54′37.04″	178	mixed forest
35	Láb	48°22′46.92″	16°55′13.44″	139	mixed forest
36	Láb	48°22′47.64″	16°55′13.02″	141	mixed forest
37	Láb	48°23′05.50″	16°55′38.50″	148	oak forest
38	Martinský les	48°16′28.00″	17°22′21.00″	118	oak forest
39	Parížske močiare, NNR	47°51′27.49″	18°30′43.75″	118	vegetation near bog
40	Pod Riabou skalou	49°05′55.97″	22°26′27.79″	1065	beech-maple forest
41	Pod Rožkom	48°58′38.21″	22°27′48.17″	639	beech forest

42	Pravenec	48°35′44.00″	18°38′45.01″	317	riverbank vegetation
43	Réca pri Senci	48°13′56.21″	17°26′43.77″	122	park
44	Senné	48°40′08.05″	22°02′11.50″	100	forest
45	Stupava	48°16′41.10″	17°03′15.06″	211	park
46	Stupava	48°16′43.32″	17°02′43.86″	187	park
47	Stupava	48°16′44.94″	17°03′09.42″	232	park
48	Šaštín-Stráže	48°37′11.68″	17°08′53.30″	198	pine forest
49	Špišská Nová Ves, Šulerloch	48°55′22.51″	20°33′27.38″	534	pine forest
50	Šúr, NR	48°13′47.50″	17°12′05.90″	154	mixed forest
51	Šúr, NR	48°13′55.62″	17°12′31.80″	131	alder forest
52	Tesárske Mlyňany	48°19′21.33″	18°21′49.03″	170	arboretum
53	Tvrdošovce	48°05′29.78″	18°05′10.92″	117	salt marches vegetation
54	Údolie Sopotnice	48°51′50.26″	21°10′39.83″	275	bank vegetation
55	Údolie Sopotnice	48°52′05.02″	21°11′17.99″	270	forest near bank
56	Važec	49°03′17.67″	19°58′45.76″	817	forest
57	Veľké Kosihy	47°45′24.27″	17°51′50.97″	111	willows
58	Veľké Kosihy	47°45′31.88″	17°51′48.43″	110	willows
59	Veľké Kosihy	47°46′06.68″	17°51′53.90″	107	willows
60	Vinné	48°49′12.68″	21°57′00.76″	318	castle surroundings
61	Vozárska, NNR	48°50′23.75″	21°06′52.78″	550	fir-beech forest
62	Východná	49°02′51.18″	19°54′51.20″	790	pine forest
63	Vysoká pri Morave	48°19′51.07″	16°54′15.63″	143	garden

ground). We were unable to obtain full details of some samples from collectors, including the precise height of the entry hole of some hollows situated above-ground (height not specified in Table 5). The relative humidity of mould samples was measured using a humidity meter, but only for the samples collected by the authors of the present paper (36% of the total samples collected). Dead wood refers to fallen dead trees in various stages of decomposition, and the samples included wood-mould, pieces of tree bark and sometimes moss growing on bark.

Pseudoscorpions living on or under tree bark were collected individually using forceps, or using by beating branches or with a tree trunk photoeclector. The use of tree trunk photoeclectors is described in detail in Dubovský & Masarovič (2007).

The body and dissected appendages of specimens were studied as permanent slide mounts in Swann's fluid or as a temporary slide mounts using lactic acid for clearing, before being returned to 70% ethanol. The species were identified using the key in Christophoryová et al. (2011c). The material is deposited in the zoological collections in Comenius University in Bratislava, Slovakia.

RESULTS

During the research, 504 specimens of 19 taxa and four families were identified (Table 2). The pseudoscorpions *Neobisium* sp. (only nymphal stages were found) and *Lamprochernes* sp. (molecular and taxonomic analysis of the genus in Slovakia is being performed) were identified only to genus level.

Concrete faunistic data about recorded taxa

The list of the taxa collected is given below, with microhabitat type, locality code (see Table 1), sample type and method, date, number of developmental stages (female: ♀, male: ♂, adult without sex determination: A, protonymph: p, deutonymph: d, tritonymph: t), and collectors name.

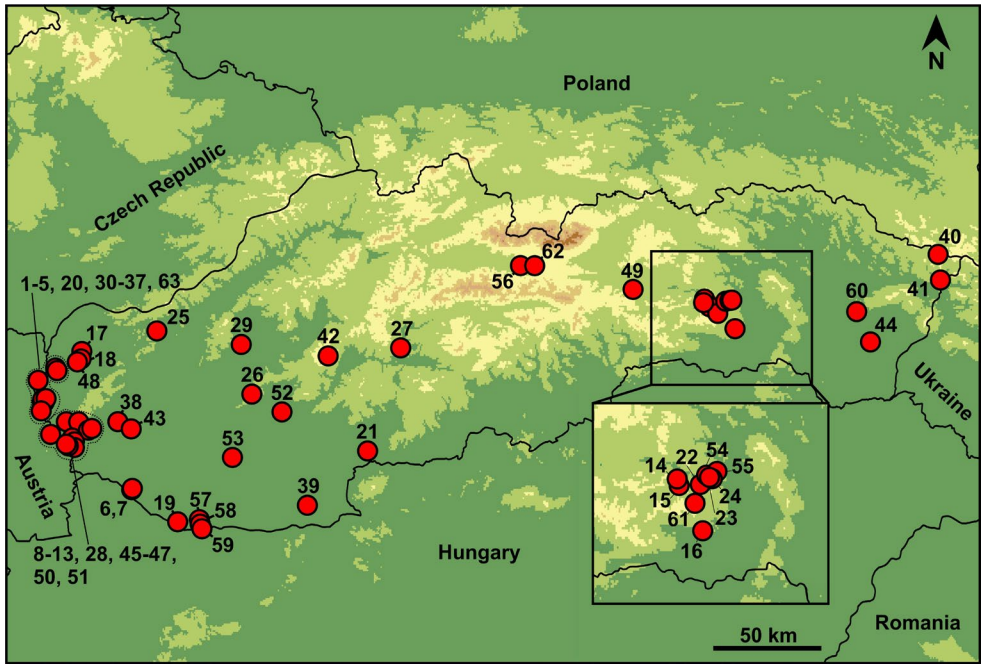


Fig. 1. Position of the studied localities in Slovakia. For locality codes see Table 1.
Obr. 1. Rozmiestnenie študovaných lokalít na Slovensku. Pre kódy lokalít viď Tabuľku 1.

Chthoniidae Daday, 1888

Chthonius* (*Chthonius*) *carinthiacus Beier, 1951
Tree hollow: 15: *Prunus avium*, sample extraction, 03.vii.2006, 1 d, lgt. A. Mock; **24:** *Fagus sylvatica*, sample extraction, 06.vi.2006, 1 ♀, lgt. P. Bílená, D. Compľová, A. Mock; **54:** *Ulmus* sp., sieving, 06.vi.2006, 1 ♀, lgt. P. Bílená, D. Compľová, A. Mock.

Chthonius* (*Chthonius*) *heterodactylus Tömösváry, 1882
Dead wood: 61: fallen trunk of *Abies* sp., sample extraction, 17.viii.2005, 1 ♂, lgt. A. Mock.

Chthonius* (*Chthonius*) *ressli Beier, 1956
Tree hollow: 52: *Quercus* sp., sample extraction, 10.x.2013, 2 ♀♀, 1 ♂, 1 d, 2 t, lgt. J. Christophoryová, D. Gruľa, K. Krajčovičová.

Chthonius* (*Ephippiochthonius*) *fuscimanus Simon, 1900
Dead wood: 8: fallen decomposing trunk, sample extraction, 17.ix.2015, 1 d, lgt. J. Christophoryová.
Tree hollow: 13: *Quercus* sp., sieving, 01.xi.2013, 1 ♀, lgt. O. Majzlan.

Chthonius* (*Ephippiochthonius*) *tetrachelatus (Preyssler, 1790)
Tree hollow: 6: *Salix* sp., sample extraction, 18.iv.2015, 1 t, lgt. D. Jajcayová; **7:** *Salix* sp., sample extraction, 18.iv.2015, 1 p, 4 d, 1 t, lgt. D. Jajcayová; **8:** *Fagus sylvatica*, sample

extraction, 03.xi.2013, 2 ♀♀, lgt. D. Gruľa; **12:** *Acer* sp., sample extraction, 18.v.2015, 1 t, lgt. D. Jajcayová; **26:** *Quercus* sp., sample extraction, 24.x.2015, 2 ♀♀, 1 d, lgt. A. Farkaš; **28:** tree stump, sample extraction, 05.x.2013, 3 ♀♀, 1 ♂, 1 A, 1 d, 5 t, lgt. K. Krajčovičová; **52:** *Quercus* sp., sample extraction, 10.x.2013, 1 t, lgt. J. Christophoryová, D. Gruľa, K. Krajčovičová; **63:** *Populus* sp., sample extraction, 28.iii.2014, 2 ♂♂, lgt. D. Gruľa, D. Jajcayová.
Under tree bark: 18: *Quercus* sp., individually collected, 25.vi.2015, 2 ♀♀, lgt. S. Korenko.

Mundochthonius carpaticus Rafalski, 1948
Tree hollow: 22: *Fagus sylvatica*, sample extraction, 08.vi.2006, 1 ♀, 1 ♂, 3 d, lgt. P. Bílená, D. Compľová, A. Mock; **40:** *Acer* sp., sample extraction, 08.viii.2013, 1 ♀, 3 t, lgt. K. Krajčovičová; **54:** *Ulmus* sp., sieving, 06.vi.2006, 1 p, lgt. P. Bílená, D. Compľová, A. Mock; **56:** *Picea* sp., sample extraction, 11.x.2012, 28 ♀♀, 20 ♂♂, 22 p, 33 d, 23 t, lgt. M. Krumpál; **62:** *Pinus* sp., sample extraction, 12.ix.2015, 4 ♀♀, 7 ♂♂, 2 d, 3 t, lgt. J. Christophoryová.

Neobisiidae Chamberlin, 1930

Neobisium* (*Neobisium*) *carcinoides (Hermann, 1804)
Dead wood: 8: fallen decomposing trunk, sample extraction, 17.ix.2015, 1 d, 1 p, lgt. J. Christophoryová; **61:** fallen trunk of *Abies* sp., sample extraction, 17.viii.2005, 1 t, lgt. A. Mock.
Tree hollow: 14: *Alnus* sp., sample extraction, 03.vii.2006, 1 d, lgt. A. Mock; **20:** *Quercus* sp., sieving, 10.i.2014, 1 t, lgt. O. Majzlan; **25:** *Fagus sylvatica*, sieving, 29.v.2013, 1 ♀, lgt. O. Majzlan; **28:** tree stump, sample extraction, 05.x.2013, 1 ♂, lgt. K. Krajčovičová; **32:** *Alnus glutinosa*, sample extraction, 07.iii.2015, 1 ♀, lgt. D. Jajcayová; **32:** *Alnus glutinosa*, sample extraction, 07.iii.2015, 3 t, lgt. D. Jajcayová; **45:** *Crataegus* sp., sample extraction, 05.xi.2014, 1 d, lgt. D. Jajcayová; **56:** *Picea* sp., sample extraction, 11.x.2012, 1 ♀, 1 ♂, 1 p, 3 d, 2 t, lgt. M. Krumpál; **62:** *Pinus* sp., sample extraction, 12.ix.2015, 1 p, lgt. J. Christophoryová.

Neobisium* (*Neobisium*) *erythrodactylum L. Koch, 1873
Tree hollow: 29: *Quercus* sp., sieving, 10.x.2013, 1 ♂, lgt. O. Majzlan.
On tree bark: 27: *Fagus sylvatica*, beating branches, 29.x.2015, 1 t, lgt. S. Korenko.

Neobisium* (*Neobisium*) *fuscimanum (C. L. Koch, 1843)
Dead wood: 16: fallen trunk of *Alnus* sp., sieving, 10.v.2007, 2 ♀♀, lgt. A. Mock.
Tree hollow: 56: *Picea* sp., sample extraction, 11.x.2012, 2d, 1 t, lgt. M. Krumpál.

Neobisium* (*Neobisium*) *sylvaticum (C. L. Koch, 1835)
On tree bark: 27: *Fagus sylvatica*, beating branches, 29.x.2015, 4 ♀♀, 3 ♂♂, 7 t, lgt. S. Korenko.

***Neobisium* (*Neobisium*) sp.**
Tree hollow: 40: *Acer* sp., sample extraction, 08.viii.2013, 2 t, lgt. K. Krajčovičová.
Under tree bark: 62: *Pinus* sp., individually collected, 12.ix.2015, 1 d, lgt. J. Christophoryová.



Fig. 2. The rare species *Mesochelifer ressli* collected under tree bark in Slovakia. Photographs by A. Šestáková.
Obr. 2. Vzácny druh *Mesochelifer ressli* zbieraný pod kôrou stromu na Slovensku. Fotografovala A. Šestáková.

Cheliferidae Risso, 1827

Dactylochelifer latreillii (Leach, 1817)
Dead wood: 43: fallen decomposing trunk, sample extraction, 11.vii.2010, 1 ♀, 3 ♂♂, lgt. not labelled.
Tree hollow: 31: *Alnus glutinosa*, sample extraction, 07.iii.2015, 1 ♀, lgt. D. Jajcayová; **33:** *Alnus glutinosa*, sample extraction, 07.iii.2015, 1 ♀, lgt. D. Jajcayová
Under tree bark: 17: fallen tree trunk, individually collected, 25.vi.2015, 1 ♂, lgt. K. Hrúzová.

Mesochelifer ressli Mahnert, 1981 (Fig. 2)
Under tree bark: 48: *Pinus* sp., individually collected, 24.vi.2015, 1 ♀, lgt. J. Christophoryová, A. Kaňuchová, K. Krajčovičová; **49:** *Pinus* sp., individually collected, 26.i.2013, 1 ♂, lgt. A. Šestáková.

Chernetidae Menge, 1855

Chernes cimicoides (Fabricius, 1793)
Under tree bark: 41: *Fagus sylvatica*, individually collected, 07.viii.2013, 1 ♀, 1 t, lgt. K. Krajčovičová; **51:** *Alnus glutinosa*, individually collected, 29.xi.2009, 1 ♂, lgt. J. Christophoryová.

Chernes hahnii (C. L. Koch, 1839)
Dead wood: 21: fallen decomposing trunk, sample extraction, 10.x.2013, 1 ♂, lgt. J. Christophoryová, D. Gruľa, K. Krajčovičová, A. Šestáková.
Tree hollow: 10: *Fagus sylvatica*, sieving, 08.i.2012, 1 t, lgt. O. Majzlan; 20: *Quercus* sp., sieving, 10.i.2014, 1 ♂, lgt. O. Majzlan; **21:** tree stump, sample extraction, 10.x.2013, 1 ♂, 1 t, lgt. J. Christophoryová, D. Gruľa, K. Krajčovičová, A. Šestáková; **35:** *Quercus petrea*, sample extraction, 18.x.2014, 1 p, 1 t, lgt. Diana Jajcayová; **39:** *Salix* sp., sieving, 24.iv.2014, 1 ♂, lgt. P. Gajdoš, P. Žila.
On tree bark: 38: *Quercus cerris*, tree trunk photoeclector, 17.x.2010, 1 ♀, lgt. R. Masarovič.
Under tree bark: 9: not specified tree, individually collected, 10.v.2014, 1 ♂, lgt. A. Šestá-

Table 2. Specimen numbers of recorded pseudoscorpion taxa from studied microhabitat types. Abbreviations: DW – dead wood, TB – on or under tree bark, TH – tree hollow. The number of positive samples is given in parentheses. Tabuľka 2. Počet jedincov zaznamenaných taxónov šťúrikov zo študovaných typov makrohabitatov. Skratky: MD – mŕtve drevo, KS – na alebo pod kôrou stromov, DS – dutiny stromov. Počet pozitívnych vzoriek je uvedený v zátvorkách.

Taxon/ Microhabitat **Taxón/ Mikrohabitat**	**DW** **MD**	**TB** **KS**	**TH** **DS**	∑ ∑
Chthoniidae				
Chthonius (*Chthonius*) *carinthiacus* Beier, 1951			3(3)	3
C. (*C.*) *heterodactylus* Tömösváry, 1882	1(1)			1
C. (*C.*) *ressli* Beier, 1956			6(1)	6
C. (*E.*) *fuscimanus* Simon, 1900	1(1)		1(1)	2
C. (*E.*) *tetrachelatus* (Preyssler, 1790)		2(1)	27(8)	29
Mundochthonius carpaticus Rafalski, 1948			152(5)	152
Neobisiidae				
Neobisium (*Neobisium*) *carcinoides* (Hermann, 1804)	3(2)		18(9)	21
N. (*N.*) *erythrodactylum* (L. Koch, 1873)		1(1)	1(1)	2
N. (*N.*) *fuscimanum* (C. L. Koch, 1843)	2(1)		3(1)	5
N. (*N.*) *sylvaticum* (C. L. Koch, 1835)		14(1)		14
Neobisium sp.		1(1)	2(1)	3
Cheliferidae				
Dactylochelifer latreillii (Leach, 1817)	4(1)	1(1)	2(2)	7
Mesochelifer ressli Mahnert, 1981		2(2)		2
Chernetidae				
Chernes cimicoides (Fabricius, 1793)		3(2)		3
Chernes hahnii (C. L. Koch, 1839)	1(1)	6(5)	7(5)	14
Dinocheirus panzeri (C. L. Koch, 1837)			27(8)	27
Allochernes wideri (C. L. Koch, 1843)	24(1)		105(18)	129
Lamprochernes sp.		2(2)		2
Pselaphochernes scorpioides (Hermann, 1804)	1(1)		81(13)	82
∑	**37**	**32**	**435**	**504**

ková; **34:** *Fraxinus* sp., individually collected, 31.x.2015, 2 t, lgt. D. Jajcayová; **44:** *Prunus domestica*, individually collected, 28.vi.2015, 1 ♂, lgt. A. Kaňuchová; **60:** *Tilia* sp., individually collected, 26.v.2011, 1 ♂, lgt. J. Christophoryová.

Dinocheirus panzeri (C. L. Koch, 1837)
Tree hollow: 12: *Acer* sp., sample extraction, 18.v.2015, 1 p, 2 t, lgt. D. Jajcayová; **22:** *Acer* sp., sample extraction, 08.vi.2006, 1 ♂, lgt. P. Bílená, D. Compľová, A. Mock; **23:** *Acer pseudoplatanus*, sample extraction, 08.vi.2006, 1 p, 1 d, 3 t, lgt. P. Bílená, D. Compľová, A. Mock; **28:** tree stump, sample extraction, 05.x.2013, 1 ♂, 1 p, 2 t, lgt. K. Krajčovičová; **36:** *Quercus* sp., sample extraction, 18.x.2014, 1 ♂, lgt. D. Jajcayová; **47:** *Aesculus hippocastanum*, sample extraction, 05.xi.2014, 2 ♀♀, 2 d, lgt. D. Jajcayová; **52:** *Quercus* sp., sample extraction, 10.x.2013, 2 ♀♀, 1 p, 4 d, lgt. J. Christophoryová, D. Gruľa, K. Krajčovičová; **55:** *Quercus petrea*, sample extraction, 06.vi.2006, 1 ♀, 1 ♂, lgt. P. Bílená, D. Compľová, A. Mock.

Allochernes wideri (C. L. Koch, 1843)
Dead wood: 21: fallen decomposing trunk, sample extraction, 10.x.2013, 3 ♀♀, 2 ♂♂, 4 p, 13 d, 2 t, lgt. J. Christophoryová, D. Gruľa, K. Krajčovičová, A. Šestáková.
Tree hollow: 3: *Alnus glutinosa*, sample extraction, 28.iii.2014, 3 ♀♀, 3 p, 1 d, 1 t, lgt. D. Gruľa, D. Jajcayová; **4:** *Salix* sp., sample extraction, 28.iii.2014, 1 ♀, 3 p, 2 d, lgt. D. Gruľa, D. Jajcayová; **7:** *Salix* sp., sample extraction, 18.iv.2015, 1 p, lgt. D. Jajcayová; **10:** *Fagus sylvatica*, sieving, 08.i.2012, 1 ♂, lgt. O. Majzlan; **12:** *Acer* sp., sample extraction, 18.v.2015, 8 ♀♀, 1 ♂, 5 p, 5 d, 5 t, lgt. D. Jajcayová; **13:** *Quercus* sp., sieving, 01.xi.2013, 1 ♂, lgt. O. Majzlan; **20:** *Quercus* sp., sieving, 10.i.2014, 5 ♀♀, 4 ♂♂, lgt. O. Majzlan; **21:** tree stump, sample extraction, 10.x.2013, 1 ♀, lgt. J. Christophoryová, D. Gruľa, K. Krajčovičová, A. Šestáková; **30:** *Alnus glutinosa*, sample extraction, 07.iii.2015, 1 ♀, lgt. D. Jajcayová; **37:** *Quercus* sp., sample extraction, 14.iii.2015, 1 p, lgt. D. Jajcayová; **42:** *Salix* sp., sieving, 08.i.2015, 1 ♂, lgt. O. Majzlan; **46:** *Aesculus hippocastanum*, sample extraction, 05.xi.2014, 2 ♀♀, 1 ♂, 2 p, 1 t, lgt. D. Jajcayová; **50:** *Salix alba*, sample extraction, 08.v.2015, 18 p, 6 d, 2 t, lgt. D. Jajcayová; **52:** not specified tree, sample extraction, 10.x.2013, 2 ♀♀, 1 ♂, 4 p, 2 d, lgt. J. Christophoryová, D. Gruľa, K. Krajčovičová; **53:** *Populus canadensis*, sieving, 05.v.2011, 2 ♀♀, 1 ♂, 1 t, lgt. O. Majzlan; **57:** *Salix* sp., sample extraction, 23.x.2015, 2 p, lgt. I. Stolárik; **58:** *Salix* sp., sample extraction, 23.x.2015, 1 d, lgt. I. Stolárik; **59:** *Salix* sp., sample extraction, 23.x.2015, 1 ♀, 1 p, 1 t, lgt. I. Stolárik.

***Lamprochernes* sp.**
Under tree bark: 9: not specified tree, individually collected, 10.v.2014, 1 ♂, lgt. A. Šestáková; **11:** *Salix* sp., individually collected, 14.ix.2015, 1 ♂, lgt. A. Šestáková.

Pselaphochernes scorpioides (Hermann, 1804**)**
Dead wood: 19: tree stump, sample extraction, 12.ix.2015, 1 ♂, lgt. D. Gruľa.
Tree hollow: 1: *Populus* sp., sample extraction, 28.iii.2014, 1 ♀, 2 ♂♂, 1 p, 1 d, lgt. D. Gruľa, D. Jajcayová; **2:** *Quercus* sp., sample extraction, 28.iii.2014, 2 ♀♀, 2 ♂♂, 1 p, 4 d, 1 t, lgt. D. Gruľa, D. Jajcayová; **3:** *Alnus glutinosa*, sample extraction, 28.iii.2014, 6 ♀♀, 1 ♂, lgt. D. Gruľa, D. Jajcayová; **5:** *Populus* sp., sample extraction, 28.iii.2014, 4 ♀♀, 1 ♂, 1 p, 15 d, 5 t, lgt. D. Gruľa, D. Jajcayová; **8:** *Fagus sylvatica*, sample extraction, 03.xi.2013, 1 ♀, 3 ♂♂, lgt. D. Gruľa; **10:** *Fagus sylvatica*, sieving, 08.i.2012, 1 ♀, lgt. O. Majzlan; **20:** *Quercus* sp., sieving, 10.i.2014, 4 ♀♀, 1 ♂, lgt. O. Majzlan; **29:** *Quercus* sp., sieving, 10.x.2013, 2 ♀♀, lgt. O. Majzlan; **30:** *Alnus glutinosa*, sample extraction, 07.iii.2015, 2 d, 2 t, lgt. D. Jajcayová; **47:** *Aesculus hippocastanum*, sample extraction, 05.xi.2014, 6 p, 1 d, lgt. D. Jajcayová; **48:** *Quercus* sp., sample extraction, 24.vi.2015, 2 ♀♀, 1 ♂, lgt. A. Kaňuchová; **58:** *Salix* sp., sample extraction, 23.x.2015, 2 ♀♀, lgt. I. Stolárik; **63:** *Populus* sp., sample extraction, 28.iii.2014, 3 ♀♀, 1 ♂, 1 d, lgt. D. Gruľa, D. Jajcayová.

Pseudoscorpions found in dead wood

Altogether 37 specimens of eight species from four families were present in dead wood (Table 2). The majority of the fallen dead trees were preserved only as trunks that could not be identified. Species in this microhabitat type were characterised by low specimen numbers, only exception being species *Allochernes wideri* with 24 specimens collected from one sample (Table 2), among which all nymphal stages were present. Nymphal stages of *N. carcinoides* were also present in the samples of dead wood.

Table 3. Specimen numbers of recorded pseudoscorpion taxa on/ under bark of different trees. Abbreviations: Ct – *C. tetrachelatus*, Ne – *N. erythrodactylum*, Ns – *N. sylvaticum*, Nsp – *Neobisium* sp., Dl – *D. latreillii*, Mr – *M. ressli*, Cc – *C. cimicoides*, Ch – *C. hahnii*, Lsp – *Lamprochernes* sp.
Tabuľka 3. Počet jedincov zaznamenaných taxónov šťúrikov na alebo pod kôrou rôznych stromov. Skratky: Ct – *C. tetrachelatus*, Ne – *N. erythrodactylum*, Ns – *N. sylvaticum*, Nsp – *Neobisium* sp., Dl – *D. latreillii*, Mr – *M. ressli*, Cc – *C. cimicoides*, Ch – *C. hahnii*, Lsp – *Lamprochernes* sp.

Taxon	Ct	Ne	Ns	Nsp	Dl	Mr	Cc	Ch	Lsp
Alnus glutinosa							1		
Fagus sylvatica		1	14				2		
Fraxinus sp.								2	
Pinus sp.				1		2			
Prunus domestica							1		
Quercus cerris								1	
Quercus sp.	2								
Salix sp.									1
Tilia sp.								1	
Not specified					1			1	1

Pseudoscorpions found on or under tree bark

A total of 32 specimens of nine taxa and four families were collected on or under tree bark (Tables 2, 3). The species *Neobisium sylvaticum* was collected by beating branches of *Fagus sylvatica*, together with one *N. erythrodactylum* specimen (Table 3); even tritonymphs of both species were present on tree trunks. One *Chernes hahnii* female was found in a photoeclector installed on a *Quercus cerris* trunk. The remaining species were collected individually under tree bark using forceps. The most abundant was *C. hahnii* (Table 2) found under the bark of different trees (Table 3). *Mesochelifer ressli* was collected only under *Pinus* sp. bark (Fig. 2, Table 3). The species *Neobisium* sp., *Chernes cimicoides* and *C. hahnii* were also represented by nymphal stages under the tree bark.

Pseudoscorpions found in tree hollows

During the study, 435 specimens of 14 taxa belonging to four families were extracted from the mould samples from tree hollows (Table 2). The most numerous were *Mundochthonius carpaticus* and *Allochernes wideri*; only one specimen each was collected of *Chthonius fuscimanus* and *Neobisium erythrodactylum* (Tables 2, 4). Whereas *M. carpaticus* dominated in hollows of *Picea* sp., *A. wideri* and *Pselaphochernes scorpioides* occurred in relatively equal distribution in hollows of several tree species (Table 4). The high abundance of *M. carpaticus* was mainly a result of the presence of 126 specimens in one sample collected at the Važec locality, probably in the most suitable conditions for the species' occurrence.

The occurrence of 89% specimens was categorized (388 specimens) according to the height of the entry hole from the ground (Table 5). Five species were found only in hollows on the ground level, among which *M. carpaticus* dominated. The species *A. wideri* dominated in above-ground hollows. *Chthonius ressli* and *Chernes hahnii* occurred only in hollows situated above ground (Table 5).

The relative humidity measured from the samples varied between 73 and 92%. In samples where humidity was measured, the specimens of *Chthonius tetrachelatus*, *Neobisium carcinoides*, *Dactylochelifer latreillii*, *C. hahnii*, *Dinocheirus panzeri*, *A. wideri* and *P. scorpioides* were present.

Table 4. Specimen numbers of recorded pseudoscorpion taxa in hollows of different trees. Abbreviations: Cc – *C. carinthiacus*, Cr – *C. ressli*, Cf – *C. fuscimanus*, Ct – *C. tetrachelatus*, Mc – *M. carpaticus*, Nc – *N. carcinoides*, Ne – *N. erythrodactylum*, Nf – *N. fuscimanum*, Nsp – *Neobisium* sp., Dl – *D. latreillii*, Ch – *C. hahnii*, Dp – *D. panzeri*, Aw – *A. wideri*, Ps – *P. scorpioides*. The number of positive samples is given in parentheses.
Tabuľka 4. Počet jedincov zaznamenaných taxónov šťúrikov v dutinách rôznych stromov. Skratky: Cc – *C. carinthiacus*, Cr – *C. ressli*, Cf – *C. fuscimanus*, Ct – *C. tetrachelatus*, Mc – *M. carpaticus*, Nc – *N. carcinoides*, Ne – *N. erythrodactylum*, Nf – *N. fuscimanum*, Nsp – *Neobisium* sp., Dl – *D. latreillii*, Ch – *C. hahnii*, Dp – *D. panzeri*, Aw – *A. wideri*, Ps – *P. scorpioides*. Počet pozitívnych vzoriek je uvedený v zátvorkách.

Taxon	**Cc**	**Cr**	**Cf**	**Ct**	**Mc**	**Nc**	**Ne**	**Nf**	**Nsp**	**Dl**	**Ch**	**Dp**	**Aw**	**Ps**
Acer pseudoplatanus												5(1)		
Acer sp.				1(1)	4(1)				2(1)			4(2)	24(1)	
Aesculus hippocastanum												4(1)	6(1)	7(1)
Alnus glutinosa						4(2)				2(2)			9(2)	11(2)
Alnus sp.						1(1)								
Crataegus sp.						1(1)								
Fagus sylvatica	1(1)			2(1)	5(1)	1(1)					1(1)		1(1)	5(2)
Picea sp.					126(1)	8(1)		3(1)						
Pinus sp.					16(1)	1(1)								
Populus canadensis													4(1)	
Populus sp.				2(1)										36(3)
Prunus avium	1(1)													
Quercus petrea											2(1)	2(1)		
Quercus sp.		6(1)	1(1)	4(2)		1(1)	1(1)				1(1)	8(2)	11(3)	20(4)
Salix alba													26(1)	
Salix sp.				7(2)							1(1)		14(6)	2(1)
Ulmus sp.	1(1)				1(1)									
Not specified				11(1)		1(1)					2(1)	4(1)	10(2)	

DISCUSSION

In Europe, mainly chernetid and cheliferid species are actively associated with tree microhabitats; representatives of Chthoniidae and Neobisiidae are epigeic and edaphic and occur in tree microhabitats more accidentally (Beier 1963, Christophoryová 2010, Krajčovičová & Christophoryová 2014).

During the present research, six species from the family Chthoniidae were recorded in the studied tree microhabitat types. The samples included surprisingly large numbers of *Mundochthonius carpaticus* specimens, but these were found in hollows with direct connection with the soil and leaf litter. The occurrence of this species in ground hollows or dead wood is known from Slovakia (Christophoryová 2010, Krajčovičová & Christophoryová 2014), as well as from Poland (Rafalski 1967, Jędryczkowski 1985, 1987a, 1987b). *Chthonius tetrachelatus* was also found during the present study in relatively high specimen numbers, and it was present in several hollows with the height of the entry hole 110 – 150 cm above the ground. Christophoryová (2010) classified the occurrence of *C. tetrachelatus* in tree hollows as accidental; Šťáhlavský (2001) collected the species in the Czech Republic from 20 tree hollows with the entry holes always situated lower than 50 cm. During the present research, two females of *C. tetrachelatus* were found under *Quercus* bark. This finding represents the

Table 5. Specimen number of recorded pseudoscorpion taxa at different heights of tree hollow entry holes from the ground. Abbreviation: NS – non-specified height of above-ground entry holes. The number of positive samples is given in parentheses.
Tabuľka 5. Počet jedincov zaznamenaných taxónov šťúrikov v dutinách umiestnených v rôznych výškach. Skratka: NS – nešpecifikovaná výška umiestnenia otvoru nadzemných dutín. Počet pozitívnych vzoriek je uvedený v zátvorkách.

Taxon/ High (cm)	**0**	**15**	**30**	**34**	**40**	**45**	**110**	**120**	**150**	**160**	**220**	**310**	**NS**
Taxón/ Výška (cm)	**0**	**15**	**30**	**34**	**40**	**45**	**110**	**120**	**150**	**160**	**220**	**310**	**NS**
C. carinthiacus	1(1)												
C. ressli						6(1)							
C. tetrachelatus	4(2)					1(1)	1(1)		6(1)				
M. carpaticus	151(4)												
N. carcinoides	14(5)												2(2)
N. fuscimanum	3(1)												
Neobisium sp.	2(1)												
D. latreillii	2(2)												
C. hahnii				2(1)									3(2)
D. panzeri	12(5)					7(1)						4(1)	
A. wideri	40(5)	9(1)			6(1)			26(1)	2(2)	3(1)	2(1)		10(2)
P. scorpioides	52(5)		3(1)						2(1)			7(1)	5(1)
∑	**281**	**9**	**3**	**2**	**6**	**14**	**1**	**26**	**10**	**3**	**2**	**11**	**20**

first record of the species in this microhabitat type in Slovakia. From Central Europe, the species has been collected mainly from tree hollows or found under dead trees (Rafalski 1967, Šťáhlavský 2001, Drogla & Lippold 2004). Other chthoniid species were found in tree microhabitats for the first time in Slovakia: *C. carinthiacus*, *C. ressli* and *C. fuscimanus* in tree hollows, *C. fuscimanus* and *C. heterodactylus* in dead wood.

Five taxa from the family of Neobisiidae were recorded in the studied tree microhabitat types. Three neobisiid species were recorded from the mould of tree hollows. The eurytopic species *N. carcinoides* occurred in tree hollows as well as in dead wood. The occurrence of this species in tree microhabitat types in Slovakia is already known in the published literature (Christophoryová 2010, Christophoryová & Krumpál 2010, Krajčovičová & Christophoryová 2014). The species *N. erythrodactylum* and *N. sylvaticum* were collected during the present study by beating branches. Both species were previously collected using cardboard strips on tree trunks in Slovakia (Krajčovičová & Christophoryová 2014). The authors supposed that this behaviour might be related to the search for food or shelter (Krajčovičová & Christophoryová 2014). The species *N. sylvaticum* has previously been reported as able to climb on shrubs and herbs (Rafalski 1967). In addition, *N. sylvaticum* was recorded in previous studies from tree microhabitats by beating branches (Krumpál & Krumpálová 2003) and under the tree bark (Christophoryová 2010).

Two cheliferid species were identified from the samples, *Dactylochelifer latreillii* even from all studied microhabitat types, but represented by low specimen numbers. The presence of the species in tree hollows and under tree bark in Slovakia is known from the published literature (Christophoryová 2010, Krajčovičová & Christophoryová 2014). Christophoryová (2010) classified the species as accidentally occurring in tree hollows, which that corresponds

with the data obtained in the current study, as only two females were present in ground hollows. *Mesochelifer ressli* was classified as the species with the closest association with the subcortical microhabitat (Krajčovičová & Christophoryová 2014). Records of this species in Slovakia are still quite rare, and only three localities are known. In all cases, including the present study, it was found under bark of *Pinus* (Krumpálová & Krumpál 1993, Krajčovičová & Christophoryová 2014). During the present study, two more distribution localities in Slovakia were discovered.

Six chernetids were extracted from the samples. Based on published literature as well as data obtained in the present study, the species *Chernes cimicoides*, *C. hahnii*, *Dinocheirus panzeri*, *Allochernes wideri* and *Pselaphochernes scorpioides* can be considered as true tree inhabitants (Krumpál & Krumpálová 2003, Christophoryová 2010, Christophoryová & Krumpál 2010, Krajčovičová & Christophoryová 2014). In the current study, *C. hahnii* was present in all microhabitats studied; *C. cimicoides* was only collected under tree bark. The species *C. hahnii* and *A. wideri* were found for the first time in Slovakia in the dead wood microhabitat.

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REFERENCES

BEIER M. 1963: *Ordnung Pseudoscorpionidea (Afterskorpione)*. *Bestimmungsbücher zur Bodenfauna Europas*. *Vol. 1*. Akademie-Verlag, Berlin, 313 pp.

CHRISTOPHORYOVÁ J. 2010: Šťúriky (Pseudoscorpiones) pod kôrou stromov, v dutinách a hniezdach na Slovensku. (Pseudoscorpions under the bark of trees, in tree hollows and nests in Slovakia). *Folia Faunistica Slovaca* **15**: 1–12 (in Slovak, English abstract).

CHRISTOPHORYOVÁ J., FENĎA P. & KRIŠTOFÍK J. 2011a: Chthonius hungaricus and Larca lata new to the fauna of Slovakia (Pseudoscorpiones: Chthoniidae, Larcidae). *Arachnologische Mitteilungen* **41**: 1–6.

CHRISTOPHORYOVÁ J., KRAJČOVIČOVÁ K. & KAŇUCHOVÁ A. 2016: Pseudoscorpions (Arachnida: Pseudoscorpiones) collected in cemeteries in Slovakia. *Klapalekiana* **52**: 33–41.

CHRISTOPHORYOVÁ J. & KRUMPÁL M. 2010: Šťúriky (Pseudoscorpiones) PR Jurský Šúr. (Pseudoscorpions (Pseudoscorpiones) of NR Šúr). Pp. 105–114. In: MAJZLAN O. & VIDLIČKA Ľ. (eds): *Príroda rezervácie Šúr.* (*Nature of NR Šúr*). Ústav zoológie SAV, Bratislava, 410 pp. (in Slovak, English summary).

CHRISTOPHORYOVÁ J., KRUMPÁLOVÁ Z., KRIŠTOFÍK J. & ORSZÁGHOVÁ Z. 2011b: Association of pseudoscorpions with different types of bird nests. *Biologia* **66**: 669–677.

CHRISTOPHORYOVÁ J., ŠŤÁHLAVSKÝ F. & FEDOR P. 2011c: An updated identification key to the pseudoscorpions (Arachnida: Pseudoscorpiones) of the Czech Republic and Slovakia. *Zootaxa* **2876**: 35–48.

CHRISTOPHORYOVÁ J., ŠŤÁHLAVSKÝ F. & KRAJČOVIČOVÁ K. 2014: Šťúriky (Arachnida, Pseudoscorpiones) pohoria Burda (NPR Kováčovské kopce). (Pseudoscorpions (Arachnida, Pseudoscorpiones) of Burda Mts.). *Folia Faunistica Slovaca* **19**: 161–167 (in Slovak, English abstract).

DROGLA R. & LIPPOLD K. 2004: Zur Kenntnis der Pseudoskorpion-Fauna von Ostdeutschland (Arachnida, Pseudoscorpiones). *Arachnologische Mitteilungen* **27–28**: 1–54.

DUBOVSKÝ M. & MASAROVIČ R. 2007: Bark-dwelling thrips (Thysanoptera) and other arthropods in xerothermophilous oak woods in SW Slovakia (preliminary results). *Thysanopteron Pismo Entomologiczne* **3**: 9–13.

HUMPHREY J., STEVENSON A., WHITFIELD P. & SWAILES J. 2002: *Life in the deadwood*. Forest Enterprise, Edinburgh, 17 pp.

JĘDRYCZKOWSKI W. B. 1985: Zaleszczotki (Pseudoscorpiones) Mazowsza. (Pseudoscorpions (Pseudoscorpiones) of Mazovia). *Fragmenta Faunistica Musei Zoologici Polonici* **29**: 77–83 (in Polish, English abstract).

JĘDRYCZKOWSKI W. B. (1987a): Zaleszczotki (Pseudoscorpiones) Bieszczadów. (Pseudoscorpions (Pseudoscorpiones) of the Bieszczady Mts). *Fragmenta Faunistica Musei Zoologici Polonici* **30**: 341–349 (in Polish, English abstract).
JĘDRYCZKOWSKI W. B. (1987b): Zaleszczotki (Pseudoscorpiones) Gór Świętokryskich. (Pseudoscorpions (Pseudoscorpiones) of Świętokrzyskie Mts). *Fragmenta Faunistica Musei Zoologici Polonici* **31**: 135–157 (in Polish, English abstract).
KRAJČOVIČOVÁ K. & CHRISTOPHORYOVÁ J. 2014: Faunistic survey of pseudoscorpions (Arachnida: Pseudoscorpiones) collected from trees and using Malaise traps in Slovakia and the Czech Republic. *Klapalekiana* **50**: 167–180.
KRAJČOVIČOVÁ K. & CHRISTOPHORYOVÁ J. 2017: First record of Beierochelifer Mahnert, 1977 (Pseudoscorpiones: Cheliferidae) from Slovakia. *Check List* **13 (2)**: 1–4.
KRAJČOVIČOVÁ K., CHRISTOPHORYOVÁ J. & LUČENIČOVÁ T. 2015: Pseudoscorpions (Arachnida: Pseudoscorpiones) found in bird nests and in bat guano in Slovakia and Germany. *Munis Entomology & Zoology* **10**: 428–434.
KRAJČOVIČOVÁ K., CHRISTOPHORYOVÁ J. & MAHNERT V. 2017: Rhacochelifer disjunctus (Pseudoscorpiones: Cheliferidae) new to the fauna of Slovakia. *Arachnologische Mitteilungen* **53**: 38–42.
KRUMPÁL M. & CHRISTOPHORYOVÁ J. 2007: Šťúriky (Pseudoscorpiones) PR Ostrov Kopáč. (Pseudoscorpions of the Nature Reserve Ostrov Kopáč). Pp. 95–100. In: MAJZLAN O. (ed): *Príroda ostrova Kopáč.* (*Nature of NR Kopáč*). Fytoterapia OZ pri Pedagogickej fakulte UK, Bratislava, 287 pp. (in Slovak, English summary).
KRUMPÁL M. & KRUMPÁLOVÁ Z. 2003: Šťúriky – Pseudoscorpiones. [Pseudoscorpions]. Pp. 115–126. In: MAŠÁN P. & SVATOŇ J. (eds): *Pavúkovce Národného parku Poloniny (Arachnida: Araneae, Pseudoscorpiones, Opiliones, Acari – Parasitiformes)*. (*Arachnids of the Poloniny National Park (Arachnida: Araneae, Pseudoscorpiones, Opiliones, Acari – Parasitiformes)*). Štátna ochrana prírody SR Banská Bystrica a Správa Národného parku Poloniny Snina, 241 pp. (in Slovak, English summary).
KRUMPÁLOVÁ Z. & KRUMPÁL M. 1993: Funde von für die Slowakei neuen und seltenen Spinnentierarten (Arachnoidea). *Arachnologische Mitteilungen* **6**: 36–41.
PERSSON T., LENOIR L. & VEGERFORS B. 2013: Which macroarthropods prefer tree stumps over soil and litter substrates? *Forest Ecology and Management* **290**: 30–39.
RAFALSKI J. 1967: Zaleszczotki. [Pseudoscorpions]. Pseudoscorpionidea. *Katalog Fauny Polski* **32 (1)**: 1–34 (in Polish).
RANIUS T. & WILANDER P. 2000: Occurrence of Larca lata H. J. Hansen (Pseudoscorpionida: Garypidae) and Allochernes wideri C. L. Koch (Pseudoscorpionida: Chernetidae) in tree hollows in relation to habitat quality and density. *Journal of Insect Conservation* **4**: 23–31.
RŮŽIČKA V. & BOHÁČ J. 1991: Bezobratlí živočíchové dutých stromů. [Invertebrates of tree hollows]. *Živa* **46**: 265–267 (in Czech).
ŠŤÁHLAVSKÝ F. 2001: Štírci (Arachnida: Pseudoscorpiones) Prahy. (Pseudoscorpions of Prague). *Klapalekiana* **37**: 73–121 (in Czech, English summary).
TÖMÖSVÁRY O. 1882: Egy új alak hazánk Arachnoida faunájában Zemplén megyeböl. [A new form in the Arachnoida fauna from our homeland, Zemplén county]. *Természetrajzi Füzetek* **6**: 226–228, 296–298 (in Hungarian)
VERNER P. H. 1960: Příspěvek k poznání štírků Československa (Pseudoscorpionidea). [Contribution to the knowledge of pseudoscorpions of Czechoslovakia]. *Věstník Československé Zoologické Společnosti* **24**: 167–169 (in Czech).

SÚHRN

Cieľom práce bol výskum šťúrikov žijúcich v stromových mikrohabitatoch (mŕtve drevo, stromové dutiny, na alebo pod kôrou stromov). Celkovo bolo identifikovaných 504 jedincov šťúrikov patriacich do 19 taxónov a 4 čeľadí. Materiál bol zbieraný počas 11 rokov (2005–2007, 2009–2016) na 63 lokalitách Slovenska. Šťúriky boli spracované na dočasné aj trvalé mikroskopické preparáty.

Vo vzorkách boli najpočetnejšie zastúpené druhy *Mundochthonius carpaticus* Rafalski, 1948 a *Allochernes wideri* (C. L. Koch, 1843), naopak z druhu *Chthonius heterodactylus* Tömösváry, 1882 bol nájdený len jeden jedinec. Druhy *Dactylochelifer latreillii* (Leach, 1817) a *Chernes hahnii* (C. L. Koch, 1843) boli prítomné vo všetkých študovaných mikrohabitatoch.

Vo vzorkách mŕtveho dreva bolo extrahovaných 37 jedincov patriacich ku 8 druhom. Druhy boli v mŕtvom dreve zastúpené len malým počtom jedincov, jedinou výnimkou bol druh *A. wideri*, nájdený v jednej vzorke vo vyššom počte. Na kôre alebo pod kôrou stromov bolo nazbieraných 32 jedincov patriacich ku 9 taxónom. Druhy *Neobisium sylvaticum* (C. L. Koch, 1835) a *N. erythrodactylum* (L. Koch, 1873) boli získané oklepom, druh *C. hahnii* pomocou stromového fotoeklektora.

Z práchna dutín stromov bolo extrahovaných 435 jedincov patriacich ku 14 taxónom. Najpočetnejšími druhmi v práchne dutín boli *M. carpaticus* a *A. wideri*, len po 1 jedincovi boli zastúpené druhy *Chthonius fuscimanus* Simon, 1900 a *N. erythrodactylum*. Vysokú abundanciu druhu *M. carpaticus* spôsobil nález 126 jedincov vo vzorke z lokality Važec. Päť druhov šťúrikov sa vyskytovalo len v prízemných dutinách, z nich dominoval *M. carpaticus*. Druh *A. wideri* dominoval v nadzemných dutinách.Table 1. List of localities.