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Spiders (Araneae) of the abandoned pasture near the village of Malé Kršteňany (Western Slovakia)

Introduction

Our research site is located on the SE slope of the hill of Drieňový vrch (cadaster of the village of Malé Kršteňany). It is the southernmost edge of the Strážovské vrchy Mountains (Mts) (48°55′46″N; 18°26′05″E), separated from the central massif by the river flow Nitrica. This area is considerably influenced by human activity: In the past, it had massive deforestation and agricultural use (mainly as pasture), recently, it is dominated by mining activities (several quarries). The whole area is out of the territorial protection, with the exception of the little Nature reserve Veľký vrch, surrounded by two quarries, and the left one is more or less abandoned. In the past, this area was used mainly for grazing, but this is currently very limited. Our research site is an abandoned pasture; therefore, ecological succession is carried out intensively here. Forgotten after-utility areas (abandoned quarries, pastures, industrial sites) are usually considered to be 'sterile' and unattractive for zoological research, but this may not always correspond to reality. Even in our research site, we have carried out several rare and surprising findings. We would like to present the results of our research in this paper.

It is sad, but a large amount of abandoned pastures is scattered throughout Slovakia. This contradicts the fact that traditional methods of farming (especially grazing) are most suitable for the sustainable development of suburban and rural partially agricultural land. Grazing helps to preserve steppe character of the habitats in Central Europe. Grazing restriction, evident almost in the whole of Europe, is unnecessary and counterproductive also in protected areas. On the other hand, it should be supported. It does not concern intensive and concentrated grazing in a small plot of course – it causes destruction of the soil, including fauna. Scattered grazing in the meadows, in sparse forests and xerothermic slopes, is the most desirable from the gene-pool point of view; and it does not only concern spiders and insects.

Material and methods

The research of spiders of the Nature reserve Veľký vrch had been carried out already in 1994, and the results were published later (Gajdoš, 1996). The author used different sampling methods (mainly pitfall trapping in the mentioned protected territory) while we dealt especially with individual collecting on the secondary habitat outside the nature reserve, and then the faunal comparison between these two sites may be methodologically inadequate.

Our study area is west of the reserve Veľký vrch, above the more-or-less abandoned quarry (Fig. 1–2). Coordinates of the centre of the research site: 48°38′49.41″N; 18°26′44.37″E, the altitude 270–385 m. The research of spiders was carried out during the vegetation season of 2015 and in 1 sampling excursion in March 2017. We applied current methods of sampling, especially sifting of leaf litter and detritus, sweeping the vegetation, and shaking down the spiders from tree branches. We also dealt with individual exploration under the bark and in rotten wood of old trunks and stumps. We took merely a small number of individuals, and easily identifiable species were mostly noted down only. The spiders were identified according the keys by Miller (1971) and Heimer, Nentwig (1991) and the specialised web-site: *https://araneae.unibe.ch/*.

Several documented species are often cited in various Red Lists of European countries. Later will be evaluated and compared their ecosozological status according to the following Red Lists: Slovakia (Gajdoš, Svatoň, 2001), Czech Republic (Kůrka et al.,

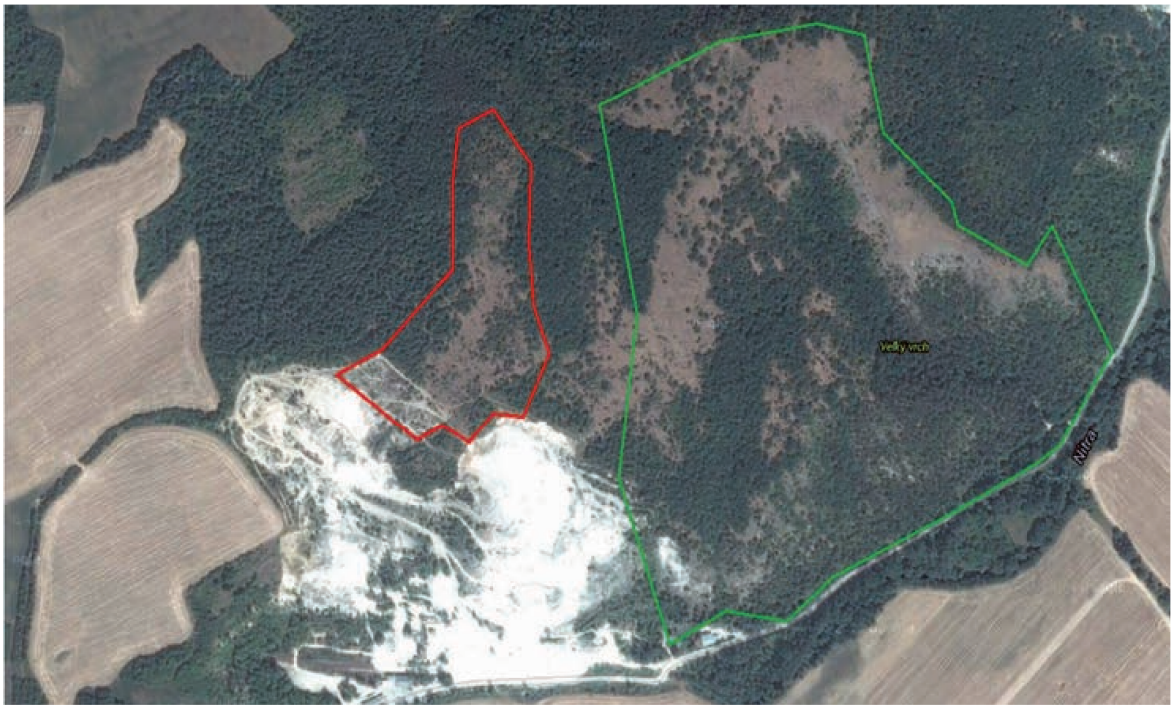

Fig. 1. Research site above the quarry (red line), green line indicates NR Veľký vrch (Source: https://www.google.sk/maps/@48.6486548,18.4538526,1464m/data=!3m1!1e3)

Fig. 2. Panoramic view on the Veľký vrch hill; study site is indicated by red arrow. It is nearly unbelievable that this Nature Reserve (green arrow) is in the immediate vicinity of the active quarry (Photo. M. Fašanga)

2015), Austria – the Carinthia county (Komposch, Steinberger, 1999), Poland (Staręga et al., 2002), and Germany (Blick et al., 2016). The further old and undated records will be not mentioned. Coordinates of the sites are added only in the case of thoroughly localised records. The code DFS (Databank of Fauna of Slovakia) is cited only in several inaccurately mentioned records, where the coordinates are not exactly detectable. Additional data, if possible, are listed in chronological order.

Results and discussion

A total of 146 spider species belonging to 25 families were collected in the studied territory (Appendix 1 – Tab. 1). Some records deserve special note (marked by "◂" in table 1):

1. *Acartauchenius scurrilis* – a scarce species of xerothermic meadows and pastures. Notable due to its ecology: It occurs sporadically in the colonies of ants *Tetramorium caespitum*, especially under stones. A larger number of recent records is available.

2. *Centromerus albidus* – a rare species of well-preserved forest habitats, little known due to its hidden way of life. Formerly, it had been considered to be utmost rare (Miller, 1971). Usually found under larger stones and in rock fissures. Several recent records are available: Tríbeč Mts – Nature Reserve (later only 'NR') Zoborská lesotep (DFS 7674), April 13, 1978, 1 ♀ (Gajdoš, 1985); Krupinská planina plateau – Plášťovce (48°10′15.63″N; 19°0′24.78″E, 279 m a. s. l. – later only 'm'), May 23, 1995, 1 ♀ (Franc, 1999); Cerová vrchovina Mts – NR Steblová skala (48°4′44.61″N; 19°58′46.96″E, 442 m), May 6, 1995, 1 ♀; and NR Pohanský hrad – the Nyári cave

(48°11′54.71″N; 19°55′22.77″E, 570 m), May 29, 1995, 10 ♀ (Franc, Hanzelová, 1995); Muránska planina plateau – NR Šiance (48°46′24.60″N; 20°05′22.66″E, 898 m), June 22, 2001; and NR Šarkanica (48°42′34.55″N; 19°58′35.37″E, 710 m), June 25, 2001 (Franc, 2014); Bystrická vrchovina Mts – Stará kopa Mt (48°43′38.05″N; 19°10′53.19″E; 486 m), May 11, 2002, 1 ♀ (Franc, 2005); Krupinská planina plateau – Príbelce (48°12′14.70″N; 19°14′49.88″E, 362 m), between rocks in shady oak forest, June 21, 2008 (Franc, 2010a); Cerová vrchovina Mts – Nature Monument Belinské skaly (48°13′45.83″N; 19°51′39.74″E, 471 m), June 6, 2006, P. Gajdoš lgt. (Svatoň et al., 2009).
Note: Its conspicuously pale colouration reflects that it tends to underground way of life. Despite not documented in neighbouring countries, its discovery is expectable, especially in the Czech Republic and Austria.

3. *Frontinellina frutetorum* – a scarce species of xerothermic habitats and edges of open deciduous forests. A larger number of recent records is available.

4. *Mermessus trilobatus* – an allochthonous species, originally known from North America, where it is quite frequent. He was brought into Europe by traffic, probably with US Army soldiers, and it now occurs in several Western and Central European countries (Dolanský et al., 2009). It prefers semi-natural and disturbed habitats.

5. *Theonina cornix* – occurs locally and rarely in rocky and sandy steppes and open dry deciduous forests. It is also known from the site located 8.5 km on the north: Strážovské vrchy Mts – Horné Vestenice (48°43′19.96″N; 18°25′37.71″E, 436 m), April 28, 2002, 2 ♂ (Franc, 2004). Several further recent records are accessible; hitherto known from 13 grid mapping squares of the DFS (Gajdoš, in verb.). It may be locally more abundant in the southwestern part of Slovakia: Malé Karpaty Mts – Svätý Jur (DFS 7769), old vineyards, undated, 16 specimens! (Dankaninová, Gajdoš, 2012).

6. *Trichoncus affinis* – a scarce species of rocky steppes. More than 50 recent records from Slovakia are accessible. It always indicates well-preserved warm habitats.

7. *Phycosoma inornatum* – a scattered and very rare species of xerothermic (often karst) grasslands and open forests. Known only from three further recent records: Strážovské vrchy Mts – Dolné Vestenice: Záviničie (48°42′01″N; 18°23′17″E, 230 m), pitfall trap, 2001, 4 specimens (Gajdoš et al., 2009); Starohorské vrchy Mts – Jakub Protected Site (48°46′0.16″N; 19°08′34.32″E, 434 m), April 9, 2004, 1 ♂ P. Gajdoš rev. (Franc et al., 2009); Krupinská planina plateau – Príbelce (48°12′16.35″N; 19°15′0.89″E, 328 m), forest steppe above the shooting range, June 21, 2008, 2 ♂ (Franc, 2010a). Very rarely found also in the neighbouring Czech Republic (Buchar et al., 2002), and apparently elsewhere.
Note: It ranks among little known species, because the species of the former genus *Dipoena* are difficult to identify.

8. *Altella biuncata* – a very rare species of forest steppes. Known only from a few isolated records: Krupinská planina plateau – Plášťovce (DFS 6879), December 15,

year is not mentioned, probably the 50s, F. Miller lgt. – it is apparently the first record from the territory of Slovakia! (Kůrka, 1994); Malá Fatra Mts – the Starhradská valley, surely it is contemporary NR Krivé (DFS 6879), open deciduous forest, pitfall trap, August 23, 1974, 1 ♀ (Svatoň, 1981); NR Hradová (48°40′47.58″N; 19°55′21.40″E, 795 m), forest steppe with the south exposition, 1979–1980, date unavailable (Svatoň, 1985) – the last two records from mountain altitudes are highly notable; Malé Karpaty Mts – NR Devínska Kobyla (DFS 7868), undated (Gajdoš, 2005a); Burda Mts – NR Burdov (DFS 8178), undated, 1 ♀ J. Svatoň lgt. (Gajdoš, 2016).

9. *Brommella falcigera* – another very rare species of xerothermic habitats. Only a small amount of records is available: Malé Karpaty Mts – NR Devínska Kobyla (DFS 7868), undated (Gajdoš, 2005a); NR Ostrovné lúčky (48°02′25.40″N; 17°10′31.23″E, 129 m), September 19, 1993, 1 ♂ and 4 ♀ lgt. P. Gajdoš (unpublished); National Park Poloniny – NR Hrúnok (49°0′50.79″N; 22°14′9.70″E, 350 m), September 21, 1998, 1 ♀ (Svatoň et al., 2003); Cerová vrchovina Mts – Protected site Vinohrady (48°16′33.92″N; 20°10′8.51″E, 238 m), June 8, 2006, 1 ♀ lgt. S. Korenko (Svatoň et al., 2009); Strážovské vrchy Mts – Dolné Vestenice (48°42′44.69″N; 18°23′56.88″ E, 348 m), xerothermic karst slope, March 24, 2011, 2 ♂ V. Franc lgt. (previously unpublished).

10. *Mastigusa arietina* – found under the stone in the colony of *Camponotus ligniperdus* (Latreille, 1802). A rare species of warmer grasslands and xerothermic habitats, living in or near ant colonies; nevertheless, its relationship with ants is not clear (the same concerns all myrmecophilous spiders). Referred finding is remarkable because the occurrence in association of this ant species has not hitherto been published. The following records from Slovakia are available: NR Rohy near the town of Detva (48°32′53.27″N; 19°21′11.58″E, 577 m), in an under-stone colony of *Lasius niger*, March 3, 1991, 1 ♂; Krupinská planina plateau – Plášťovce (48°10′15.63″N; 19°0′24.78″E, 279 m), May 23, 1995, 1 ♀ in the colony of *Messor structor* on a xerothermic slope, April 1, 1994, 2 ♀ – together with the very rare leiodid-beetle *Attaephilus arenarius* (Hampe, 1852)! (Franc, 1999); Krupinská planina plateau – Rykynčice (48°12′21.70″N; 18°57′40.40″E, 267 m, the same circumstances, April 9, 1994, 2 ♂, 1 ♀, all records V. Franc and A. Hanzelová lgt.; Ostrôžky Mts – Nedelište (48°23′30.62″N; 19°25′8.63″E, 457 m), in the colony of *Lasius alienus* in a xerothermic oak forest, April 22, 2000, 1 ♂ V. Franc lgt. (all records Franc, 2007); NR Zoborská lesostep near the town of Nitra (DFS 7674), April 29, 1978 (Gajdoš, Krumpál, 1987); National Park Poloniny – Ruské (49°07′7.37″N; 22°19′51.91″E, 568 m), semi-xerothermic pasture, pitfall trap, 1 specimen undated (Žila, Gajdoš, 2014); Ostrôžky Mts – Praha (48°22′07.69″N; 19°30′26.27″E, 504 m), xerothermic shrubby pasture, in the colony of *Messor structor*, 3 ♀ (Franc, 2010b). Its abundance is recently probably increasing due to the global warming.

11. *Diaea livens* – a rare species of warmer deciduous forests and groves, formerly had been ranked among utmost rare species. The first record from Slovakia was pub-

lished from Protected site Gavurky (48°27′51.53″N; 19°07′53.90″E, 466 m), May 22, 1992, 1 ♂ (Franc, Hanzelová, 1996). The second finding has been carried out in the site Jasenov – Hôrka (DFS 7097), June 15, 1994, 1 ♂, and published as a new species for the Slovakian fauna (Thomka, 1996), because the author did not have information on the first record from Gavurky. The further records: Cerová vrchovina Mts – Obručná (DFS 7885), 20. 5. 1999, 1 ♂, lgt. Eva Svatoňová, det. J. Svatoň (Svatoň et al., 2009); Poľana Mts – forest steppe above the Bátovský boulder (48°39′39.88″N; 19°22′47.46″E, 736 m), May 13, 2005, 1 ♂, V. Franc lgt., J. Svatoň rev. (Franc, 2013); Ostrôžky Mts – Lysec (48°20′52.41″N; 19°27′40.54″E, 633 m), June 25, 2007, 2 ♂ (Franc, 2010b); Krupinská planina plateau – Príbelce (48°12′16.35″N; 19°15′0.89″E, 328 m), forest steppe above the shooting range, June 21, 2008, 1 ♂ (Franc, 2010b); NR Šúr (DFS 7769), salty grassland, May 28, 2009, 1 ♂, lgt. O. Majzlan (Gajdoš, 2010). Recent records are also accessible from the Slovenský kras Mts – surroundings of the Domica cave (DFS 7588), shrubby and tree margin of the dry calcareous grassland, but undated (Gajdoš, 2005b). Maybe, its abundance is recently increasing due to the global warming as well.

12. *Tmarus stellio* – a rare thermophilous species of forest steppes and edges of open deciduous forests. Several records from Slovakia are accessible: Krupinská planina plateau – Medovarce (48°14′13.54″N; 18°59′18.12″E, 242 m), swept from the vegetation of forest steppe, May 16, 1992, 1 ♀ (Franc, 1999); Poľana Mts – forest steppe above the Bátovský boulder (48°39′39.88″N; 19°22′47.46″E, 736 m), June 1, 2004, 1 ♂ (Franc, 2013); Poľana Mts – Hrochoť, forest steppe above the Beňova valley (48°39′12.94″N; 19°19′44.08″E, 660 m), June 19, 2005, 1 ♂ and 1 ♀ (Franc, 2013); Ostrôžky Mts – Lysec (48°20′51.41″N; 19°27′41.74″E, 622 m), June 14, 2007, 2 ♂ (Franc, 2010b); Malé Karpaty Mts – Svätý Jur (DFS 7769), old vineyards, undated, 1 specimen (Dankaninová, Gajdoš, 2012); Burda Mts – Burdov (DFS 8178), June 19, 2005 (Gajdoš, 2016).

13. *Chalcoscirtus brevicymbialis* – a local and rare species, known from a few records in the warmest sites. Only a few recent records from Slovakia are accessible: NR Turecký vrch (DFS 7273), July 12, 1978, 1 ♀ P. Gajdoš lgt. – the first record for the territory of Slovakia (Gajdoš et al., 1984)*; Strážovské vrchy Mts – NR Kňaží stôl (48°48′15.70″; 18°17′30.35″E, 542 m), June 3, 1984, 1 ♀ (Gajdoš, 1986a)*; Pohronský Inovec Mts – NR Včelár (48°27′01.48″N; 18°28′41.17″E, 383 m), June 28, 1984, 1 ♀ (Gajdoš, 1987)*; Strážovské vrchy Mts – NR Veľký vrch (48°8′54.07″N; 18°27′13.82″E, 385 m), summer 1985, several specimens (Gajdoš, 1986b)*. Krupinská planina plateau – Medovarce (48°14′13.54″N; 18°59′18.12″E, 242 m), between rocks of a forest steppe, May 27, 1995, 1 ♂ (Franc, 1999). Strážovské vrchy Mts – Dolné Vestenice (48°42′44.69″N; 18°23′56.88″E, 348 m), xerothermic karst slope, July 2, 2002, 1 ♂ (Franc, 2004); Burda Mts – Burdov (DFS 8178), 1 specimen J. Buchar lgt. (Gajdoš, 2016).
*Note: Cited as *Chalcoscirtus infimus* (Simon, 1868), despite it has not been hitherto documented from Slovakia. These species may be confused; nevertheless, the male

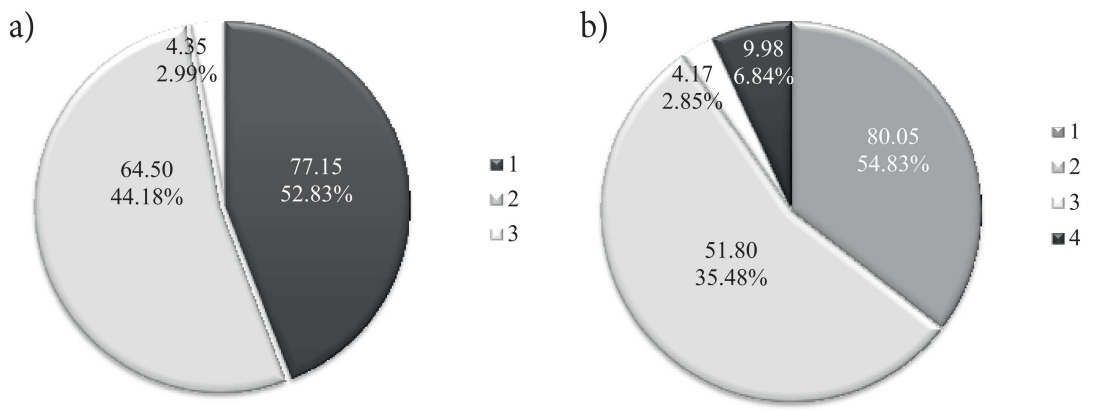

Fig. 3. Spider faunal composition according to thermopreference – a): 1 – thermophilous, 2 – mesophilous, 3 – oreophilous species; Spider faunal composition according to originality of habitat – b): 1 – climax, 2 – semi-natural, 3 – disturbed, 4 – artificial habitats

palpal organ of *Ch. brevicymbialis* is apparently shorter than in *Ch. infimus* (it reflects in its name). Faunistic records on these tiny jumping spiders may be sometimes debatable, because the taxonomic situation in this genus may be not clear, especially in older identification keys.

14. *Pellenes nigrociliatus* – a rare species of rocky steppes. A larger number of recent records is available. It always indicates well-preserved warm habitats.

In our introductory research, we found out 146 spider species. This number is not definitive, of course. Some of documented species rank among infrequent or up to rare ones, including *Theonina cornix*, *Phycosoma inornatum*, *Altella biuncata*, *Brommella falcigera*, *Mastigusa arietina*, *Diaea livens*, *Tmarus stellio*, *Chalcoscirtus brevicymbialis*, *Pellenes nigrociliatus* and *Haplodrassus kulczynskii*. Several findings in this anthropogenous habitat are surprising. Later, we will deal with instructive analysis of the thermopreference (Fig. 3a) and the originality of habitats (Fig. 3b) from the perspective of individual species. We assumed that the share of thermophilous species will be prevailing – it is more than half: 52.83%. The species of warm and moderate habitats together represent more than 97% of the spider fauna. The analysis of the spider faunal composition according to originality of habitat is even more interesting. The share of climax species is surprisingly high – 54.83%, despite this habitat is not at all 'pristine'. Experts opinions on the climax, especially those of a conservative nature, require revision and comprehensive view of modern ecology. We suppose that some particular stages of the on-going succession process can be interpreted as 'partial climax stages' tending towards the 'final' arrangement of the biota. It is necessary to emphasize that the climax is not at a 'definitive' and 'constant' stage, on the contrary, it is a highly dynamic and variable process.

References

Blick, T., Finch O.-D., Harms, K.-H., Kiechle, J., Kielhorn, K.-H., Kreuels, M., Malten, A., Martin, D., Muster, C., Nährig, D., Platen, R., Rödel, I., Scheidler, M., Staudt, A., Stumpf, H., Tolke, D. (2016). Rote Liste und Gesamtartenliste der Spinnen (Arachnida: Araneae) Deutschlands. *Naturschutz und Biologische Vielfalt*, *70(4)*, 383–510. [In German]

Buchar, J., Vlastimil Růžička, V., Merrett, P. (2002). *Catalogue of spiders of the Czech Republic*. Praha: Peres.

Dankaninová, L., Gajdoš, P. (2012). Epigeic spider communities in historical structures of agricultural landscape (vineyard landscape in the Svätý Jur area). *Folia Faunistica Slovaca*, *17(3)*, 275–290. [In Slovak]

Dolanský, J., Řezáč, M., Kůrka, A. (2009). *Mermessus trilobatus* (Emerton, 1882) (Araneae, Linyphiidae) – nový druh pavučenky v České republice. Východočeské muzeum Pardubice: *Sborník přírodovědný*, *16*, 143–144. [In Czech]

Franc, V. (1999). Príspevok k poznaniu pavúkov oblasti Litavy. In: P. Urban, P. Bitušík, (eds.), *Príroda Krupinskej planiny a jej ochrana*. Proc. of conference. Zvolen: SAŽP, 83–91. [In Slovak]

Franc, V. (2004). Contribution to the knowledge on spiders (Araneae) of the Strážovské vrchy Mts. In: V. Franc (ed.), *Strážovské vrchy Mts – research and conservation of Nature*. Proceedings of the conference, Belušské Slatiny (Slovakia), 67–76. [In Slovak]

Franc, V. (2005). Contribution to the knowledge on spiders (Araneae) in the surroundings of Banská Bystrica (Slovakia). *Entomofauna Carpathica*, *17*, 48–54.

Franc, V. (2007). Prevailingly trophic relations between spiders (Araneae) and ants (Formicoidea) in Slovakia. In: K. Tajovský, J. Schlaghamerský, V. Pižl (eds.), *Contributions to Soil Zoology in Central Europe II*. České Budějovice: ISB Biological Centre, Czech Academy of Sciences, 41–45.

Franc, V. (2010a). Príspevok k poznaniu pavúkov (Araneae) okolia Príbeliec, In: P. Urban, M. Uhrin (eds.), *Príroda Príbeliec a širšieho okolia Mikroregiónu Východný Hont*. Zborník referátov z odbornej konferencie. Príbelce, 147–158. [In Slovak]

Franc, V. (2010b). Pavúky (Araneae) orografického celku Ostrôžky, In: I. Kaczarová (ed.), *Ján Šalamún Petian Petényi, život – dielo – odkaz*. Zborník príspevkov z konferencie, Lučenec: Novohradské múzeum a galéria v Lučenci, Banskobystrický samosprávny kraj, 68–86. [In Slovak]

Franc, V. (2013). Spiders (Araneae) the Hrochotská dolina valley (Poľana Mts, Slovakia). *Naturae Tutela*, *17(2)*, 189–202.

Franc, V. (2014). Contribution to the knowledge on spiders (Araneae) of the Muránska planina Mts. *Naturae Tutela*, *18(2)*, 153–161.

Franc, V., Hanzelová, A. (1995). *Pavúky (Araneida) Cerovej vrchoviny*. Rimavská Sobota – Banská Bystrica: Rimava, 25–43. [In Slovak]

Franc, V., Hanzelová, A. (1996). New and remarkable findings of spiders (Araneida) in Slovakia and their ecosozological value. *Acta Univiversitatis Carolinae, Biologica*, *40*, 365–382.

Franc, V., Kopecký, T., Korenko, S. (2009). *Selected arthropod groups of the Panský diel massif (Starohorské vrchy Mts, Slovakia)*. Banská Bystrica: Fakulta prírodných vied UMB.

Gajdoš, P. (1985). Pavúky (Araneae) Zobora, 2. *Rosalia*, 2: 143–158. [In Slovak]

Gajdoš, P. (1986a). K výskytu pavúkov v okrese Topoľčany. In: J. Gregor (ed.), *Zborník odborných prác Západoslov. TOP-u*. Bratislava: *Topoľčianske Podhradie*, 101–114. [In Slovak]

Gajdoš, P. (1987). Pavúky (Araneae) Štátnej prírodnej rezervácie Včelár (Pohronský Inovec). *Rosalia*, *4*, 209–229. [In Slovak]

Gajdoš, P. (1996). Pavúky ŠPR Veľký vrch. In: J. Gregor (ed.), *Zborník odborných prác 3. Západoslovenského Tábora ochrancov prírody*. Bratislava: Krajský ústav štátnej pamiatkovej starostlivosti a ochrany prírody, 73–99. [In Slovak]

Gajdoš, P. (2005a). Pavúky (Araneae). In: O. Majzlan (ed.), *Fauna Devínskej Kobyly*. Bratislava: Asociácia priemyslu a ochrany prírody, 33–43. [In Slovak]

Gajdoš, P. (2005b). Spiders of the Domica drainage area (Slovak Karst Mts): community composition and habitat evaluation (Araneae). In: C. Deltshev, P. Stoev (eds.), *European Arachnology 2005*. *Acta zoologica bulgarica*, *1(Suppl.)*, 101–114.

Gajdoš, P. (2010). Pavúky (Araneae) PR Šúr. In: O. Majzlan, Ľ. Vidlička, (eds.), *Príroda rezervácie Šúr*. Bratislava: Ústav krajinnej ekológie SAV, 89–104. [In Slovak]

Gajdoš, P. (2016). Pavúky (Araneae) pohoria Burda a jeho okolia. *Ochrana prírody*, *27*, 22–38. [In Slovak]

Gajdoš, P., Krumpál, M. (1987). Pavúky (Araneae) Zobora 1. ÚŠOP. *Ochrana prírody*, *8*, 309–328. [In Slovak]

Gajdoš, P., Majzlan, O., Ambros, M. (2009). Pavúky (Araneae) masívu Rokoša (Strážovské vrchy). *Rosalia*, *20*, 49–58. [In Slovak]

Gajdoš, P., Svatoň, J. (2001). Červený (ekosozologický) zoznam pavúkov (Araneae) Slovenska. In: D. Baláž, K. Marhold, P. Urban (eds.), *Červený zoznam rastlín a živočíchov Slovenska. Ochrana prírody, 20(Suppl.)*, 80–86. [In Slovak]

Gajdoš, P., Svatoň, J., Krumpál, M. (1984). New and unusual records of spiders from Slovakia I. (Araneae: Atypidae, Dictynidae, Gnaphosidae, Clubionidae, Zoridae, Salticidae, Lycosidae). *Biológia*, *39(2)*, 223–225.

Heimer, S., Nentwig, W. (1991). *Spinnen Mitteleuropas*. Berlin – Hamburg: Paul Parey Verlag. [In German]

Komposch, Ch., Steinberger, K.H. (1999). Rote Liste der Spinnen Kärntens (Arachnida: Araneae), In: W.E. Holzinger, P. Mildner, T. Rottenburg, C. Weiser (eds.), *Rote Listen gefährdeter Tiere Kärntens*. Klagenfurt, 567–616.

Kůrka, A. (1994). Přehled druhů pavouků ve sbírce prof. F. Millera (Zoologické sbírky Přírodovědeckého muzea – Národního muzea), část I. *Časopis národního muzea*, *Řada přírodovědná*, *163(1–4)*, 43–54. [In Slovak]

Kůrka, A., Řezáč, M., Macek, R., Dolanský, J. (2015). *Pavouci České republiky*. Praha: Academia. [In Czech]

Miller, F. (1971). Pavouci (Araneida). In: M. Daniel, V. Černý (eds.), *Klíč zvířeny ČSR*, 4. Praha: Academia, 51–306. [In Czech]

Nentwig, W., Blick, T., Gloor, D., Hänggi, A., Kropf, C. (2017). Spiders of Europe. Ex *www.araneae.unibe.ch*

Staręga, W., Błaszak, C., Rafalski, J. (2004). Arachnida – Pajęczaki. In: Z. Głowaciński (ed.), *Czerwona lista zwierząt ginących i zagrożonych w Polsce*. Kraków: Instytut Ochrony Przyrody PAN, 133–140. [In Polish]

Svatoň, J. (1981). Einige neue oder Unvollkommen bekannte Spinnenarten aus der Slowakei. *Biológia*, *36(2)*, 167–177. [In German]

Svatoň, J. (1985). K poznaniu pavúkov (Araneida) južnej časti Muránskej planiny. *Stredné Slovensko*, *4*, 108–124. [In Slovak]

Svatoň, J., Gajdoš, P., Černecká, Ľ., Franc, V., Korenko, S., Kovalčík, R., Krumpálová, Z. (2009). Pavúky – Araneae. In: P. Mašán, I. Mihál (eds.), *Pavúkovce Cerovej vrchoviny*. Banská Bystrica: Štátna ochrana prírody SR, Rimavská Sobota: Správa CHKO Cerová vrchovina, Bratislava: Ústav zoológie SAV, Zvolen: Ústav ekológie lesa SAV, 21–123. [In Slovak]

Svatoň, J., Thomka, V., Gajdoš, P. (2003). Pavúky – Araneae. In: P. Mašán, J. Svatoň (eds.), *Pavúkovce Národného parku Poloniny (Arachnida: Araneae, Pseudoscorpiones, Opiliones, Acari – Parasitiformes)*. Banská Bystrica: Štátna ochrana prírody SR, Snina: Správa Národného parku Poloniny, 21–113. [In Slovak]

Thomka, V. (1996). Fauna pavúkov (Arachnida, Araneae) na lesostepných lokalitách Humenských vrchov. *Natura Carpatica*, *37*, 137–150. [In Slovak]

Žila, P., Gajdoš, P. (2014). Pavúky (Araneae) nelesných stanovíšť vysťahovaného územia Hornej Cirochy. *Folia Faunistica Slovaca*, *19(3)*, 269–285. [In Slovak]

Appendix 1

Tab. 1. Spiders (Araneae) of the abandoned pasture near the village of Malé Kršteňany

Family / Species	Codes of records	Thermo-preference	Originality of habitat	Ecosozological status				
				Sk	Cz	AK	G	Pl
Pholcidae								
Pholcus opilionoides (Schrank, 1871)	C-/1⁺	T (M)	C SN D					
Dysderidae								
Harpactea hombergi (Scopoli, 1763)	C-/1⁺	T M	C SN					
H. rubicunda (C.L. Koch, 1839)	A1/-⁺	T M	C SN A					
Uloboridae								
Hyptiotes paradoxus (L. Koch, 1834)	H1/-⁺	M	SN					
Araneidae								
Araneus diadematus (Clerck, 1757)	E1/-⁺	T M O	C SN D					
A.(= *Atea*) *triguttatus* (Fabricius, 1793)	B1/1	(T) M	C SN		NT			
A. sturmi (Hahn, 1831)	C-/1	T M	C SN		NT			
Araniella cucurbitina (Clerck, 1757)	E3/1⁺	T M	C SN D					
A. opisthographa (Kulczyński, 1905)	D1/-	T M	C SN					
Cyclosa conica (Pallas, 1772)	B-/1 D-/1	(T) M	C SN					
Gibbaranea bituberculata (Walckenaer, 1802)	C-/1 D-/2	T (M)	C (SN)		NT			
G. gibbosa (Walckenaer, 1802)	D3/3⁺	T M	C SN		VU			
Mangora acalypha (Walckenaer, 1802)	B1/-⁺	T M	C SN D					
Nuctenea umbratica (Clerck, 1757)	B-/1 E-/2⁺	(T) M	C SN A					
Zilla diodia (Walckenaer, 1802)	B-/1 C-/1 D1/1⁺	M	C SN		NT			
Mimetidae								
Ero aphana (Walckenaer, 1802)	J-/1s	T	C (SN)	LC	NT			
Tetragnathidae								
Metellina (= *Meta*) *merianae* (Scopoli, 1763)	F-/1	T M O	C SN A					
Pachygnatha degeeri (Sundevall, 1830)	B1/- D1/-	T M (O)	C SN D					
Tetragnatha montana (Simon, 1874)	E1s/-	(T) M	C SN					
T. pinicola (L. Koch, 1870)	E1/-	T M	C SN					
Linyphiidae								
Abacoproeces saltuum (L. Koch, 1872)	E-/1	(T) M	C SN					

Acartauchenius scurrilis (O.P.-Cambridge, 1872)[1]	C-/1	T M	C SN	LC	VU		NT	VU
Agyneta (= *Meioneta*) *rurestris* (C.L. Koch, 1836)	J2/1^{Gd}	T M O	C SN D					
Centromerus albidus (Simon, 1929)[2]	C-/1	M	C (SN)	NT	∅	∅	∅	∅
Diplostyla concolor (Wider, 1834)	B-/1	T M O	C SN D					
Frontinellina frutetorum (C.L. Koch, 1834)[3]	E2/-	T	C		EN	NT	VU	VU
Linyphia triangularis (Clerck, 1757)	H-/3	T M	C SN D					
Maso sundevalli (Westring, 1851)	E-/1	T M (O)	C SN					
Mermessus trilobatus (Emerton, 1882)[4]	J2/2^{Gd}	alien sp.	SN D					
Minicia marginella (Wider, 1834)	E-/1	T M	C SN		VU	NT	NT	
Neriene clathrata (Sundevall, 1830)	B2/-	T M	C SN					
Neriene peltata (Wider, 1834)	B-/1	M	C SN					
Porrhomma microphthalmum (O.P.-Cambridge, 1871)	J1/1^{Gd}	T M	C SN D					VU
Tapinocyba insecta (L. Koch, 1869)	B-/1	T M	C SN					
Tenuiphantes tenuis (Blackwall, 1852)	J-/1^{Gd}	T M	C SN D					
Theonina cornix (Simon, 1881)[5]	J-/1^{Gr}	T	C	NT	VU	NT	VU	VU
Thyreosthenius parasiticus (Westring, 1851)	F-/1	M O	C SN D					
Trematocephalus cristatus (Wider, 1834)	E-/1	(T) M	C SN					
Trichoncus affinis (Kulczyński, 1894)[6]	B-/1 E-/1	T M	C SN		VU		EN	EN
T. auritus (L. Koch, 1869)	A1/-	T	C		VU		ER	
Walckenaeria corniculans (O.P.-Cambridge, 1875)	F-/1	M	C SN					
Walckenaeria cucullata (C.L. Koch, 1836)	B-/1	M (O)	C SN					
W. dysderoides (Wider, 1834)	B1/-	(T) M	C SN					
Theridiidae								
Asagena (= *Steatoda*) *phalerata* (Panzer, 1801)	E1/-$^{+}$	T M	C SN		VU			
Cryptachaea (= *Achaearanea*) *riparia* (Blackwall, 1834)	E2/-	(T) M	C SN					
Dipoena melanogaster (C.L. Koch, 1837)	D1/1 E1/2^{+}	T (M)	C SN			VU		
Enoplognatha ovata (Clerck, 1757)	E1/-	T M	C SN D					
E. thoracica (Hahn, 1833)	C-/1 D-/2 E1/2^{+}	T M	C SN D					

Episinus truncatus (Latreille, 1809)	E1/- F1/-	T	C SN		NT			
Euryopis flavomaculata (C.L. Koch, 1836)	E2/-	T M	C SN			NT		
Heterotheridion nigrovariegatum (Simon, 1873)	E2/-$^{+}$	T	C SN		VU	NT	VU	
Lasaeola (= *Dipoena*) *tristis* (Hahn, 1833)	E1/2 F-/2	(T) M	C SN		NT	NT		
Neottiura bimaculata (Linnaeus, 1767)	E2/-	T M	C SN D					
Parasteatoda (= *Achaearanea*) *lunata* (Clerk, 1757)	F1/-	(T) M	C SN					
Phycosoma inornatum (O.P.-Cambridge, 1861)◄[7] (= *Dipoena inornata*)	B1/-	T M	C SN	EN	CR	?	VU	VU
Phylloneta (= *Theridion*) *impressa* (L.Koch, 1881)	E3/-$^{+}$	T M (O)	C SN D					
Platnickina (= *Keijia*) *tincta* (Walckenaer, 1802)	D1/- E2/2^{+}	T M	C SN					
Robertus arundineti (O.P.-Cambridge, 1871)	B-/1 D1/1	(T) M	C SN D					
R. lividus (Blackwall, 1836)	B2/1	T M O	C SN					
Sardinidion (= *Theridion*) *blackwalli* (O.P.-Cambridge, 1871)	E1/-	T M	C SN A	VU				
Steatoda albomaculata (De Geer, 1778)	J-/1s	T M	C SN		NT		NT	
S. triangulosa (Walckenaer, 1802)	D1/- E1/-	T	D A					
Theridion mystaceum (L. Koch, 1870)	B-/1s	M	C SN					
T. pinastri (C.L. Koch, 1872)	E2/-	T M	C SN					
Dictynidae								
Altella biuncata (Miller, 1949)◄[8]	-/1^{Gr}	T	C	VU	EN	ER	EN	DD
Dictyna (=*Brigittea*) *latens* (Fabricius, 1775)	E1/-	T	C		VU		NT	VU
Dictyna uncinata (Thorell, 1856)	J-/1	(T) M	C SN D					
Brommella falcigera (Balogh, 1935)◄[9]	D-/1^{Gd}	T	C	EN	EN		EN	EN
Lathys humilis (Blackwall, 1855)	B1/- C1/-	T	C		VU			
Mastigusa arietina (Thorell, 1871)◄[10]	B-/1	T M (O)	C	VU	VU		DD	VU
Titanoecidae								
Titanoeca quadriguttata (Hahn, 1833)	H-/1^{+}	T M	C SN			NT		VU
Amaurobiidae								
Amaurobius fenestralis (Ström, 1768)	B-/1^{+}	M O	C SN					

Agelenidae								
Eratigena (= *Tegenaria*) *agrestis* (Walckenaer, 1802)	H-/2	T M	C SN D					
Textrix denticulata (Olivier, 1789)	H-/1⁺	T	C		NT			VU
Urocoras (= *Coelotes*) *longispinus* (Kulczyński, 1897)	D-/1⁺	T	C (SN)		∅		∅	
Zodariidae								
Zodarion germanicum (C.L. Koch, 1837)	B-/1s C1/-⁺	T M	C SN			VU	VU	VU
Zodarion rubidum (Simon, 1914)	E-/2	T	C SN					
Lycosidae								
Alopecosa cuneata (Clerck, 1757)	E-/1	T M (O)	C SN D					
A. fabrilis (Clerck, 1757)	D-/1	M	C	DD	CR		VU	
Alopecosa farinosa (Herman, 1879) (= *accentuata* (Latreille, 1817))	B1/1	T M	SN			NT		
A. sulzeri (Pavesi, 1873)	C1/-	T	C		VU	EN	EN	
Pardosa alacris (C.L. Koch, 1833)	B1/-	T (M)	SN D	DD				
Trochosa terricola (Thorell, 1856)	B-/1 E-/2⁺	T M (O)	C SN D					
Pisauridae								
Pisaura mirabilis (Clerck, 1757)	B-/1 E-/1⁺	T M	C SN D					
Thomisidae								
Coriarachne depressa (C.L. Koch, 1837)	H-/1s E-/1s	T M	C SN		NT			
Cozyptila blackwalli (Simon, 1875)	B2/-⁺	T	C		VU	VU	EN	
Diaea livens (= *pictilis*) (Simon, 1876)◄[11]	D1/-	T M	C	CR	EN		DD	
Ebrechtella (= *Misumenops*) *tricuspidata* (Fabricius, 1775)	D2/-	T (M)	C SN					
Misumena vatia (Clerck, 1757)	D-/1⁺	T M	C SN D					
Ozyptila claveata (Walckenaer, 1837)	B2/-	T M	C		NT			
Pistius truncatus (Pallas, 1772)	C1s/- E1/-	T M	C SN		NT			
Synema globosum (Fabricius, 1775)	B1/-⁺	T M	C SN		NT	NT		VU
Tmarus piger (Walckenaer, 1802)	D2/1 H-/3s⁺	T (M)	C SN		VU	VU		VU
T. stellio (Simon, 1875)◄[12]	E-/1	T	C	LC	EN		∅	
Xysticus audax (Schrank, 1803)	D1/-	(T) M (O)	C SN					
X. cristatus (Clerck, 1757)	D2/-⁺	T M (O)	C SN D					
X. erraticus (Blackwall, 1834)	E2/-	(T) M	C SN			NT		
X. kochi (Thorell, 1872)	F-/1	T M	C SN (D)					
X. lanio (C.L. Koch, 1835)	E1/-	T M	C SN		NT			
Anyphaenidae								
Anyphena accentuata (Walckenaer, 1802)	D-/1 E1/-⁺	T M	C SN					

Clubionidae							
Clubiona comta (C.L. Koch, 1839)	C-/1 E-/3⁺	T M	C SN				
C. brevipes (Blackwall, 1841)	J-/1	T (M)	C SN		NT		
Philodromidae							
Philodromus aureolus (Clerck, 1757)	E-/1	T M	C SN D				
P. buchari (Kubcová 2004)	E2/-	T M	C SN		NT		
P.margaritatus (Clerck, 1757)	C-/1s	T M	C SN		VU		
Thanatus formicinus (Clerck, 1757)	B2/- H1s/-	T M	C SN		NT	NT	NT
Tibellus oblongus (Walckenaer, 1802)	B1/-	T M	C SN				
Salticidae							
Ballus chalybeius (Walckenaer, 1802)	E1/-⁺	T M	C SN				
Carrhotus xanthogramma (Latreille, 1819)	C1/-	T	C		VU		VU
Dendryphantes rudis (Sundevall, 1833)	H-/1	(T) M	C SN				
Euophrys frontalis (Walckenaer, 1802)	D1/- E1/-	T M	C SN				
Evarcha arcuata (Clerck, 1757)	B1/-⁺	T M	C SN				
E. falcata (Clerck, 1757)	F-/1	(T) M	C SN				
Evarcha laetabunda (C.L. Koch, 1846)	E2/-	T (M)	C		VU	NT	
Heliophanus cupreus (Walckenaer, 1802)	D3/- E3/-⁺	T M	C SN				
Chalcoscirtus brevicymbialis (Wunderlich, 1980)◄13	B2/-⁺	T	C		VU	EN	
Leptorchestes berolinensis (C.L. Koch, 1846)	C1/- D1/-⁺	T	C (SN)		VU	EN	VU
Macaroeris (= *Eris*) *nidicolens* (Walckenaer, 1802)	D1/-	T	C (SN)		VU		
Marpissa muscosa (Clerck, 1757)	B1/- D-/1⁺	T M	C SN		NT	NT	
Pellenes nigrociliatus (Simon, 1875)◄14	C1/1	T	C		VU	EN	VU
Pseudeuophrys lanigera (Simon, 1871)	B1/-	T M	SN A				
P. obsoleta (Simon, 1868)	C2/2 D1/1	T	C		VU	NT	EN VU
Pseudicius encarpatus (Walckenaer, 1802)	E1/-	T M	C SN	LC	NT		EN
Salticus scenicus (Clerck, 1757)	E1/-	T M	C SN A				
S. zebraneus (C.L. Koch, 1837)	D2/-	T M	C SN				
Sitticus pubescens (Fabricius, 1775)	E3/1⁺	M	C SN A			NT	
Miturgidae							
Zora nemoralis (Blackwall, 1861)	E-/1⁺	(T) M	C SN			NT	

Z. pardalis (Simon, 1878)	C1/1	T	C SN		CR			
Z. spinimana (Sundevall, 1833)	A1/- B1/-	T M O	C SN D					
Eutichuridae								
Cheiracanthium elegans (Thorell, 1875)	E-/1	T	C		EN		EN	
Ch. mildei (L. Koch, 1864)	D-/1	T (M)	SN A				NT	
Gnaphosidae								
Callilepis schuszteri (Herman, 1879) (Appendix 2 – Fig. 4)	E-/2	T	C		VU	NT	VU	
Drassodes lapidosus (Walckenaer, 1802)	D1/- E1/-	T M	C SN					
Drassyllus (= *Zelotes*) *praeficus* (L. Koch, 1866)	F-/2	T M	C SN					VU
D. pusillus (C.L. Koch, 1833)	C1/-	T M	C SN (D)					
D. villicus (Thorell, 1875)	E-/2	T	C		VU	NT	NT	
Gnaphosa lucifuga (Walckenaer, 1802)	C1/- H1/1	T	C		NT		VU	NT
G. montana (L. Koch, 1866) (Appendix 2 – Fig. 5)	E-/2	M O	C SN	NT	VU		VU	EN
G. opaca (Herman, 1879)	F-/1	T	C		VU		EN	EN
Haplodrassus kulczynskii (Lohmander, 1942)◄14	C-/1	T	C	LC	VU	VU	NT	DD
Micaria fulgens (Walckenaer, 1802)	B1/-	T M	C SN		NT	NT		
Scotophaeus quadripunctatus (Linnaeus, 1758)	F-/2	T M	C SN A					
S. scutulatus (L. Koch, 1866)	A-/1 H-/1	T M	C SN A					
Zelotes hermani (Chyzer, 1897)	D-/1	T	C		∅	NT	∅	
Z. petrensis (C.L. Koch, 1839)	B1/2 C-/1+	T M	C SN					
Phrurolithidae								
Phrurolithus festivus (C.L. Koch, 1835)	E 1/1	T M	C SN					

Codes of records: A – March 28, 2015, B – April 17, 2015, C – April 24, 2015, D – May 12, 2015, E – June 6, 2015, F – June 18, 2015, G – June 26, 2015, H – October 2, 2015, I – October 30, 2015, J – March 10, 2017; 1/- one male, 1/2 – one male and two females, 1/-+ – one male, but more specimens observed, s – subadult specimen; Gd – P. Gajdoš det., Gr – P. Gajdoš rev.

Thermopreference: T – thermophilous, M – mesophilous, O – oreophilous.

Originality of habitat: C – climax, SN – semi-natural, D – disturbed, A – artificial habitat.

Ecosozological status (ESS): Sk – Slovakia, Cz – Czech Republic, AK – Austria (the Carinthia county), Pl – Poland, G – Germany.

Categories of ESS: CR – critically endangered, EN – endangered, VU – vulnerable, NT – near threatened, LC – least concern, DD – data deficient, ER – extremely rare, ∅ – not documented in this country till now, ? – the species is surprisingly missing in referred Red List.

Appendix 2

Fig. 4. *Callilepis schuszteri* (Herman, 1879) – quite abundant species on xerothermic habitats (Photo. Ľ. Černecká)

Fig. 5. *Gnaphosa montana* (L. Koch, 1866) – scarce species on edges of open deciduous forests (Photo. Ľ. Černecká)

Abstract

Abandoned pastures are frequent phenomenon throughout central Europe due to the reduction of grazing. This also concerns the abandoned pasture near the village of Malé Kršteňany (Western Slovakia). We dealt with the research of spiders in this site in 2015 and spring of 2017. Despite it is a secondary anthropogenous habitat, the fauna of spiders is relatively rich, including infrequent or up to rare species, including *Theonina cornix*, *Phycosoma inornatum*, *Altella biuncata*, *Brommella falcigera*, *Mastigusa arietina*, *Diaea livens*, *Tmarus stellio*, *Chalcoscirtus brevicymbialis*, *Pellenes nigrociliatus* and *Haplodrassus kulczynskii*. The species of warm and moderate habitats are highly prevailing here – together it is 97%. The analysis of the spider faunal composition according to originality of habitat is even more interesting. The share of climax species is surprisingly high – 54.83%, despite this habitat is not at all 'pristine'. Experts opinions on the climax, especially those of a conservative nature, require revision and a comprehensive view of modern ecology. We suppose that some particular stages of the on-going succession process can be interpreted as "partial climax stages" tending towards the 'final' arrangement of the biota. It is necessary to emphasize that the climax is not at the 'definitive' and 'constant' stage, on the contrary, it is a highly dynamic and variable process.

Key words: abandoned pasture, Araneae, Malé Kršteňany, Slovakia, spiders, succession

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Pająki (Araneae) odłogowanych pastwisk w pobliżu miejscowości Malé Kršteňany (Zachodnia Słowacja)

Streszczenie

Ze względu na zmniejszenie wypasu, odłogowanie pastwisk jest zjawiskiem częstym w Europie Środkowej. Dotyczy to również zaniedbanych gospodarczo pastwisk w pobliżu miejscowości Malé Kršteňany (Zachodnia Słowacja). W 2015 roku oraz wiosną 2017, podjęto badania pająków w okolicach wyżej wymienionej miejscowości. Mimo, że jest to wtórne siedlisko antropogeniczne, fauna pająków jest tu stosunkowo bogata. Obejmuje ona, zarówno nieczęste, jak i rzadkie gatunki, w tym: *Theonina cornix*, *Phycosoma inornatum*, *Altella biuncata*, *Brommella falcigera*, *Mastigusa arietina*, *Diaea livens*, *Tmarus stellio*, *Chalcoscirtus brevicymbialis*, *Pellenes nigrociliatus* i *Haplodrassus kulczynskii*. Dominują tutaj gatunki siedlisk ciepłych i umiarkowanych (łącznie 97%). Ciekawostką jest analiza składu pająków według oryginalności siedliska. Udział gatunków klimaksowych jest tu zaskakująco wysoki – 54.83%, mimo, że siedlisko to nie jest „pierwotne". W nowoczesnej ekologii, opinie specjalistów na temat klimaksu, zwłaszcza te konserwatywne, wymagają rewizji i kompleksowego spojrzenia. Przypuszczamy, że pewne konkretne etapy postępującego procesu sukcesji można interpretować jako „częściowe etapy klimaksu", zmierzające w kierunku „ostatecznego" rozmieszczenia bioty. Należy podkreślić, że klimaks nie jest etapem „ostatecznym" i „stałym", a wręcz przeciwnie, jest to bardzo dynamiczny i zmienny proces.

Słowa kluczowe: odłogowane pastwisko, Araneae, Malé Kršteňany, Słowacja, pająki, sukcesja

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