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## New remarkable records of myrmecophilous spiders (Araneae) in Slovakia

### Introduction

Myrmecophilous spiders rank among little known and ‘hidden’ arthropods, deserving of increased attention (Nelson, Jackson, 2009). Myrmecophiles are arthropods that live in or near ant nests and are considered true symbionts. Myrmecomorphy in spiders is generally considered a type of Batesian mimicry in which spiders gain protection from predators through their resemblance to aggressive or unpalatable ants. Selection pressure from spider predators and egg-sac parasites may trigger greater integration of myrmecophilous spiders into ant colonies. The adaptations by which this integration is possible are not well understood, although it is hypothesised that most spider myrmecophiles are chemical mimics and some are even phoretic on their hosts (Cushing, 1997, 2012).

The aim of our research was to present the distribution of three rare myrmecophilous spiders in Slovakia.

### Methods

Over several years, we carried out occasional research on myrmecophilous arthropods in Slovakia. We applied current methods of sampling, particularly individual exploration under stones and sifting the detritus of *Formica* genus ant colonies.

Old and undated records were not included in the record summary. The geographic coordinates of the sites were included only for thoroughly localised records. The four-digit numeric code, DFS (Databank of Fauna of Slovakia), is only cited for several inaccurately localised records, where the coordinates were not clearly determinable. Other records with a three-digit numeric code were cited according to the Code of the geomorphological units of Slovakia.

## Results and discussion

**Linyphiidae**

1) *Acartauchenius scurrilis* (O. P.-Cambridge, 1873) – occurs sporadically and scarcely in xerothermic grasslands and also live near ants (Nentwig et al., 2020). It was documented also warm dry oak forests, sand habitats, stone habitats, etc. and from anthropogenic habitats (e.g. vineyards).

Host ants: *Lasius niger* L., *L. flavus* Fabricius, *Formica rufa* L. and *Tetramorium caespitum* L. (Cushing, 1997; Buchar, Růžička, 2002). Obenberger (1949) and Miller (1971) mentioned only *T. caespitum*. Apparently, it highly prefers the last ant species (Franc, 2007).

Recent record: Domaníky (48°15'35.30" N, 18°58'44.08" E, 208 m a. s. l.), andesite rocky grassland, in the colony of *T. caespitum*, May 4, 2020, 3 ♂ and 2 ♀. A relatively large number of records from Slovakia are available (Gajdoš et al., 1999; Franc, 2007).

The further recent record: Jurský Šúr surroundings (7769), April 2009 – 2011, 2 specimens (Dankaninová, Gajdoš, 2012); Malé Kršteňany (7376), April 2015 (Franc, Fašanga, 2017); Dolné Vestenice (7276), April – May 2010 (Melicherčíková, 2010).

2) *Thyreosthenius biovatus* (O. P.-Cambridge, 1875) – occurs sporadically and rarely together with ants (Nentwig et al., 2020) especially in forests and grasslands of warmer areas, though it may be locally abundant.

Host ants: *Formica polyctena* Foerster, *F. pratensis* Retzius, *F. fusca* L. and *F. sanguinea* Latreille (Cushing, 1997; Buchar, Růžička, 2002), also *F. lugubris* Zetterstedt (Robinson, 1998). Miller (1971) mentioned the same ant species except as *F. polyctena*, while Obenberger (1949) noted only *F. pratensis* and *F. rufa*. It has also occasionally been recorded away from ant nests (Roberts, 1987).

Recent records: Hajnáčka (48°12'46.74" N, 19°56'17.93" E, 290 m a. s. l.) in the colony of *Formica rufa* in the older deciduous forest (beech, oak and hornbeam) February 17, 2019, more than 10 ♀ V. Franc and V. Hemala lgt.; Banská Štiavnica – the 'Little Water Dam' (48°28'05.48" N, 18°53'03.94" E, 778 m a. s. l.), in the colony of *F. rufa* in a mixed forest February 14, 2020, 8 ♀, V. Franc and V. Hemala lgt. et coll.

Only a few records from Slovakia are available, for example: the town of Banská Bystrica (7280) (Franc, 2007) and surroundings (Franc, 2005); the Hronská pahorkatina hills (804), Dudich et al. 1940 (in Gajdoš et al., 1999); Malanta near the town of Nitra (7674d) (Gajdoš, 1993) and in the town Žilina (6778) (Kratochvíl, Miller, 1937). It is a little-known species, due to its hidden way of life, but it actually seems to be rather abundant.



Fig 1. The colony of red wood ant *Formica rufa* L. near the village of Jalovec in the Západné Tatry Mts (Photo. V. Hemala)

## Hahniidae

3) *Mastigusa arietina* (Thorell, 1871) – this scattered species occurs rarely in warm habitats, especially open forests (Fig. 1) and on xerothermic slopes. They live under bark or in formicaries (Nentwig et al., 2020).

Host ants: in the nests of the ants *Lasius brunneus* and *L. fuliginosus* (Brian, 1977). They are not specified in the literature, it obviously may live together with a large range of ant species.

New recent records: Jalovec (49°09'28.00" N, 19°37'54.70" E, 768 m a. s. l.), in the colony of *Formica rufa* near the chapel (Fig. 1), March 10, 2019, 1 ♀ and 2 juveniles V. Franc and V. Hemala lgt. This mountain record at the foot of the Západné Tatry Mts is highly notable!; Banská Štiavnica – the 'Little Water Dam' (48°28'05.48" N, 18°53'03.94" E, 778 m a. s. l.), in the colony of *F. rufa* in mixed forest February 14, 2020, 1 ♀ and 1 juvenile, V. Franc and V. Hemala lgt. et coll.

The following records from Slovakia are available, for example: the Rohy National Nature Reserve near the town of Detva (7482a/c), in a under-stone colony of *Lasius niger*, March 3, 1991, 1 ♂; the village of Plášťovce (7879b), in the colony of *Messor muticus* Nylander, on a xerothermic slope, April 1, 1994, 2 ♀ [together with the very rare leiodid-beetle *Attaephilus arenarius* Hampel!]; the Rykynčice village (7779d), in the same circumstances, April 9, 1994, 2 ♂, 1 ♀, all records V. Franc and A. Hanzelová lgt.; the village of Nedelište (7682a/b), in a colony of *Lasius alienus* Foerster in a xerothermic oak forest, April 22, 2000, 1 ♂ V. Franc lgt. (Franc, 2007); the Zobor National Nature Reserve near the town of Nitra (7674), April 29, 1978 (Gajdoš, Krumpál, 1987);

Jurský Šúr surroundings: Malé Nové Hory (7769), April 2009 – 2011 (Dankaninová, Gajdoš, 2012); Ruské (49°7.970' N, 22°20.443' E, 568 m), 1 ex (Žila, Gajdoš, 2015). Identified also in undated records from the Slovenský kras Mts. (060) J. Svatoň lgt. (Gajdoš et al., 1999) and the Urpín hill near the town of Banská Bystrica (7280d) (Svatoň, 1985).

### Conflict of interest

The authors declare no conflict of interest related to this article.

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## Abstract

The authors of this article provide data on the occurrence and ecology of three little-known myrmecophilous spiders (*Acartauchenius scurrilis* O.P.-Cambridge, *Thyreosthenius biovatus* O.P.-Cambridge and *Mastigusa arietina* Thorell) in Slovakia. The mountain record of *M. arietina* at the foot of the Západné Tatry Mts is especially remarkable.

**Key words:** Araneae, faunistic, myrmecophiles, spiders

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## Nowe i niezwykle notowania myrmecofilnych pająków (Araneae) na Słowacji

### Streszczenie

Autorzy tego artykułu podają dane o występowaniu i ekologii trzech mało znanych pająków myrmekofilnych (*Acartauchenius scurrilis* O. P.-Cambridge, *Thyreosthenius biovatus* O. P.-Cambridge i *Mastigusa arietina* Thorell) na Słowacji. Zwłaszcza górskie notowanie *M. arietina* u podnóża Zachodnich Tatr jest bardzo niezwykle.

**Słowa kluczowe:** Araneae, faunistyczny, myrmekofile, pająki

### Information on the authors

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He is a lecturer of general zoology and systematic invertebrate zoology. He has deal with the research of beetles and spiders for more than 30 years, with special regard to the nature conservation and the problems of biological indication and the factors of endangerment of separate animal taxa.

#### Vladimír Hemala

He is interested in phenology and distribution of bugs (*Hemiptera* sp.) in Europe.