

# NEW CAVE-DWELLING SPECIES OF THE GENUS *TROGLOHYPHANTES* (ARANEAE, LINYPHIIDAE) FOR THE CROATIAN FAUNA

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In this paper 5 species of cave-dwelling spiders of the genus *Troglohyphantes* are listed as new for the Croatian fauna. They are *T. troglodytes* (Kulczyński, 1914), *T. pugnax* Deeleman-Reinhold, 1978, *T. salax* (Kulczyński, 1914), *T. sketi* Deeleman-Reinhold, 1978 and *T. subalpinus* Thaler, 1967. All five species are known from neighboring countries. New localities are marked on the map and the ecological status is given for every species. With these five species the total number of *Troglohyphantes* taxa in Croatia has risen to 22 taxa.

**Key words:** spiders, Araneae, Sheet-web spiders (Linyphiidae), *Troglohyphantes*, cave-dwelling fauna, Croatia, biogeography

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U ovom je radu navedeno 5 vrsta špiljskih pauka iz roda *Troglohyphantes* novih za faunu Hrvatske. To su *T. troglodytes* (Kulczyński, 1914), *T. pugnax* Deeleman-Reinhold, 1978, *T. salax* (Kulczyński, 1914), *T. sketi* Deeleman-Reinhold, 1978 i *T. subalpinus* Thaler, 1967. Svih 5 vrsta su bile poznate za faune susjednih zemalja te su ovim radom prošireni njihovi areali. Daje se karta Hrvatske s označenim lokalitetima za svih 5 vrsta te je za svaku dan ekološki status. S ovih 5 vrsta rod *Troglohyphantes* je trenutno u fauni Hrvatske zastupljen s 22 svojte.

**Ključne riječi:** pauci, Araneae, baldahinski pauci (Linyphiidae), *Troglohyphantes*, špiljska fauna, Hrvatska, biogeografija

## INTRODUCTION

The description of the genus *Troglohyphantes* dates from 1881 when Joseph found an unknown male spider in a cave in Kranjska (Carniola), Slovenia. The species was named *polyophthalmus*. The first record of the *Troglohyphantes* species for Croatia dates back to the end of the 19th century, 1894, when C. Chyzer described *T.*

*croaticus*, placing it, however, in the genus *Taranucnus*. More *Troglohyphantes* species were discovered at the end of 19th and the beginning of the 20th century, but were also placed in other genera (*Linyphia*, *Taranucnus*). KULCZYŃSKI (1914) created the genus *Typhloneta* and described 3 new *Troglohyphantes* species from Croatia under the names: *Taranucnus dalmaticus*, *Taranucnus giromettai* and *Typhloneta affinis*. LOUIS FAGE (1919) transferred all *Taranucnus* species except *T. setosus* to *Troglohyphantes*, synonymized the genus *Typhloneta* and listed 4 *Troglohyphantes* species for Croatia. J. KRATOCHVIL described *T. diurnus* and *T. strandi* (KRATOCHVIL, 1932), created a genus *Stygohyphantes* and described three new taxa from Croatia: *S. dinaricus*, *S. svilajensis* and *S. s. noctiphilus* (KRATOCHVIL, 1948). In later years the greatest contributions for Dinaric *Troglohyphantes* species were made by di Caporiacco, Roewer, Drensky, Wiehle, Brignoli and Miller & Polenec (DEELEMEN-REINHOLD, 1978). CHRISTA L. DEELEMEN-REINHOLD (1978) in her work »Revision of the cave-dwelling and related spiders of the genus *Troglohyphantes* Joseph (Linyphiidae), with special reference to the Yugoslav species« divided the genus into 3 subgenera: *Stygohyphantes* (all Kratochvil's *Stygohyphantes* species), *Troglodytia* (a newly described subgenus) and *Troglohyphantes*. She listed 13 previously known and described 4 new taxa for Croatia which makes a total of 17 taxa. NIKOLIĆ & POLENEC (1981) listed 14 *Troglohyphantes* taxa for Croatia, MATONIČKIN *et al.* (1999) mentioned 50 *Troglohyphantes* taxa for Croatia and neighboring countries. OZIMEC (2001; 2002) listed 14 taxa for the cave-dwelling fauna of Croatia. 14 *Troglohyphantes* taxa have their type locality in Croatia: 13 caves and one epigeal type locality (BEDEK *et al.*, 2006).

In this paper five species are reported as being new to the arachnid fauna of Croatia.

## MATERIAL AND METHODS

Examined *Troglohyphantes* material was collected from 1993 to the end of 2005 from 57 speleological features and 2 epigeal localities all around Croatia by the authors and other biospeleologists and cavers. Identifications were made on the basis of the identification key for central European spiders (NENTWIG *et al.*, 2005) and the key for Yugoslav *Troglohyphantes* taxa (DEELEMEN-REINHOLD, 1978), including works with descriptions of *Troglohyphantes* taxa (THALER, 1967). The material was reviewed for the graduation thesis »Faunistic, ecological and biogeographic characteristics of the cave-dwelling spiders of the genus *Troglohyphantes* (Linyphiidae, Araneae) in Croatia« written by M. Pavlek at the Zoological Department, Faculty of Science, University of Zagreb. The material is deposited in the Croatian Biospeleological Society Collection (CBSC), a part of the Croatian Natural History Museum (CNHM) collections.

After isolation from other faunistic groups the remaining spider material (2280 adult and juvenile specimens) was separated into families: Linyphiidae 991 specimens, Nesticidae 478, Agelenidae 162, Leptonetidae 147, Pholcidae 68, Dysderidae 178 and for 371 specimens no family was identified. The linyphiid material contained 124 adult *Troglohyphantes* specimens (PAVLEK, 2006). In this paper only taxa new for the Croatian fauna have been presented.

For all taxa, the type locality has been presented. All new localities are listed and the 10 x 10 km<sup>2</sup> UTM code has been added for each one of them according to the world UTM maps 1:500 000. The biogeographic data are outlined after the model for the Croatian geographic macro regions (NIKOLIĆ *et al.*, 1998): **A.** Mediterranean macro region; **B.** Mountain macro region; **C.** West Pannonian macro region; **D.** East Pannonian macro region. The ecological status is partly organized by the authors of taxa and to the system according to BEDEK *et al.* (2006), and partly by the authors of this work: **TB:** troglobiont; **TP:** troglophile (microcavernicole).

Names of type localities are presented as in the original papers. New localities and data on more precise geographical positions (up to mountain and country) are given only in Croatian due to translation problems. Frequent terms for types of feature are: špilja, pećina = cave; jama/jame = pit; jezero = lake; polje = field, selo = village, brdo = hill.

## RESULTS

### List of species new for Croatian fauna:

Genus *Troglohyphantes* Joseph, 1881

Subgenus *Troglodytia* Deeleman-Reinhold, 1978

*Troglohyphantes (Troglodytia) troglodytes* (Kulczyński, 1914)

Type locality: Vilina pećina prope Trebinje, Bosnia and Herzegovina (KULCZYŃSKI, 1914)

Distribution: south Dinarides (Bosnia and Herzegovina (KULCZYŃSKI, 1914), Montenegro (DEELEMEN-REINHOLD, 1978), Croatia)

Ecological status: **TP**

New localities:

1. Jezero špilja, Kuna, Cavtat, Mt. Sniježnica; BN81, **A**; 2♂  
Leg. Roman Ozimec, March 16th 2002
2. Škrabuljica špilja, Kuna, Cavtat, Mt. Sniježnica; BN81, **A**; 1♂  
Leg. Helena Bilandžija, November 1st 2003

Subgenus *Troglohyphantes* Deeleman-Reinhold, 1978

*Troglohyphantes (Troglohyphantes) pugnax* Deeleman-Reinhold, 1978

Type locality: Velika pećina near Divin, Fatničko polje, Stolac, Bosnia and Herzegovina (DEELEMEN-REINHOLD, 1978)

Distribution: south Dinarides (Bosnia and Herzegovina (DEELEMEN-REINHOLD, 1978), Croatia)

Ecological status: **TB**

New locality:

1. Glogova jama, Kuna, Cavtat, Mt. Sniježnica; BN81, **A**; 1♀  
Leg. Martina Pavlek, August 28th 2005

*Troglohyphantes (Troglohyphantes) salax* (Kulczyński, 1914)

Type locality: Baba pećina, Popovo polje, Bosnia and Herzegovina (KULCZYŃSKI, 1914)

Distribution: south Dinarides (Bosnia and Herzegovina (KULCZYŃSKI, 1914), Croatia)

Ecological status: **TB**

New locality:

1. Jezero špilja, Kuna, Cavtat, Mt. Sniježnica; BN81, A; 1♂  
Leg. Roman Ozimec, May 28th 2004

*Troglohyphantes (Troglohyphantes) cf. sketi* Deeleman-Reinhold, 1978

Type locality: Jama v mežnarjevi ogradi near Lož, Inner Carniola, Slovenia (DEELEMEN-REINHOLD, 1978)

Distribution: north Dinarides (Slovenia (DEELEMEN-REINHOLD, 1978), Croatia)

Ecological status: **TB**

New locality:

1. Bedara jama, Tihočaj, Mt. Žumberak; WL46, C; 1♀  
Leg. Roman Ozimec, August 24th 2002

*Troglohyphantes (Troglohyphantes) subalpinus* Thaler, 1967

Type locality: nördlich Vorderkeiserfelden, Innsbruck, North Tirol, Austria (THALER, 1967)

Distribution: Alps, north Dinarides (Austria (THALER, 1967), Germany (PLATNICK, 2009), Slovenia (NOVAK, 2005), Croatia)

Ecological status: **TP**

New localities:

1. Velika peć na Rogu, Stubica, Mt Medvednica; WL88, C; 3♀, 3juv  
Leg. Helena Bilandžija, March 20th 2005
2. Židovske jame, Stubica, Mt Medvednica; WL89, C; 6♀, 6juv  
Leg. Jana Bedek (3♀, 3 juv); Roman Ozimec (3♀, 3 juv), April 23rd 2005

## DISCUSSION

New *Troglohyphantes* taxa for Croatian fauna are: *T. troglodytes*, *T. pugnax*, *T. salax*, *T. sketi* and *T. subalpinus*. With these five species the total number of *Troglohyphantes* taxa in Croatia now comes to 22.

The subgenus *Troglodytia* is distributed from coastal parts of Montenegro, over Herzegovina and southern Dalmatia as far as central Dalmatia (DEELEMEN-REINHOLD, 1978).

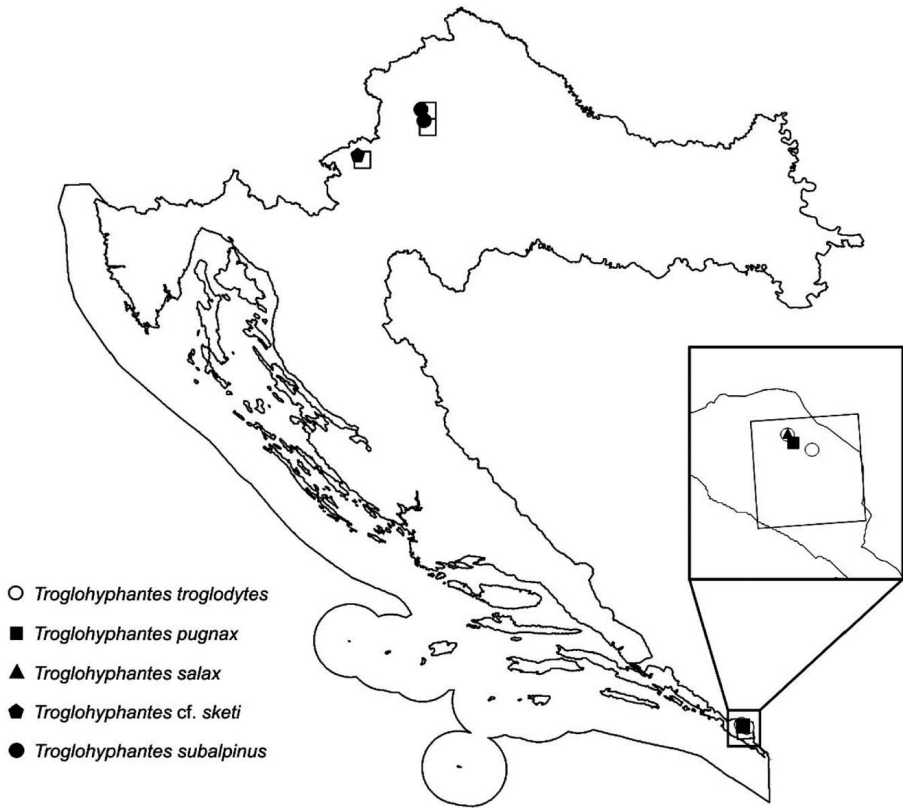


Fig. 1. Distribution of five new cave-dwelling *Troglodyphantes* species in Croatia. Localities for every species are marked with different signs and placed within the appertaining 10x10 km UTM field. Localities for three species (*T. troglodytes*, *T. pugnax* and *T. salax*) are within the same UTM field.

***Troglodyphantes (Troglodytia) troglodytes* (Kulczyński, 1914)**

Species *T. troglodytes* has been known from caves in Bosnia and Hercegovina (KULCZYŃSKI, 1914) and Montenegro (DEELEMEN-REINHOLD, 1978). New localities are situated on Mt. Snježnica in the Konavle region, south Dalmatia, about 60 km in a south-west direction from the type locality. Both localities are situated on the continental slopes of Snježnica (1234 m) at an altitude of 700-900 m. New data provide more evidence, presumed by DEELEMEN (1978), that *T. troglodytes* and the related *T. boudewijni* are ecologically separated: *troglodytes* is found in more inland mountainous regions while *boudewijni* has a preference for the lower coastal areas. The species was identified on the basis of three male specimens and it is necessary to gather some females during future visits.



Fig. 2. *Troglohyphantes subalpinus* (♀) in its typical habitat in the locality Židovske jame, photo: R. Ozimec.

The subgenus *Troglohyphantes* is the most widespread subgenus. It is distributed throughout Europe: Cantabria, Pyrenees, Carpathians, Rhodopes, Alps, Apennines and Dinarides (DEELEMEN-REINHOLD, 1978). According to DEELEMEN-REINHOLD (1978) it is divided into 3 series and 12 groups. Series A consists of three groups: *furcifer*, *herculanus* and *cerberus*, series B of five groups: *henroti*, *marqueti*, *roberti*, *polyophthalmus* and *diurnus* and series C of four groups: *noricus*, *salax*, *orpheus* and *croaticus*. Species in our research belong to series B and C.

### *Troglohyphantes (Troglohyphantes) pugnax* Deeleman-Reinhold, 1978

Species *T. pugnax* belongs to series C, the *salax* group. It has been known previously from the type locality and one cave in Herzegovina, BH in the area of Fatničko and Dabarsko polje (DEELEMEN-REINHOLD, 1978). The new locality, Glogova jama, is situated on Mt. Sniježnica in the region of Konavle, south Dalmatia, around 50 km to the south. The species was identified only on the basis of one female specimen. It is important to collect more material, especially males.

***Troglohyphantes (Troglohyphantes) salax* (Kulczyński, 1914)**

Species *T. salax* belongs to series C, the *salax* group. It was known previously from a number of caves in the area of Popovo polje and Zavala village in eastern Herzegovina, BH (DEELEMEN-REINHOLD, 1978). The new locality, Jezero špilja, is some 45 km to the south-east. The species was identified only on the basis of one male specimen. It is important to collect more material.

***Troglohyphantes (Troglohyphantes) cf. sketi* Deeleman-Reinhold, 1978**

The species belongs to series B, the *polyopthalmus* group (DEELEMEN-REINHOLD, 1978). It is very similar to *T. confusus* and *T. poleneci* (species found in Slovenia, so far not recorded for Croatia). Since we did not have any comparative material we could not be sure in the identification. Species *T. cf. sketi* has been known to date from the type locality and from one more cave near Dolenje in Slovenia (DEELEMEN-REINHOLD, 1978). The new locality for *T. cf. sketi* on Mt. Žumberak is some 75 km to the east, but the distribution area of *T. confusus* is closer, around 20 km to the west. The distribution area of *T. poleneci* is the most distant, some 120 km north-west from Bedara jama pit on Mt. Žumberak. Only one female specimen was collected. It is important to collect more material.

***Troglohyphantes (Troglohyphantes) subalpinus* Thaler, 1967**

The species belongs to series C, the *orpheus* group. This group is distributed in the French Pyrenees, the Cévennes, French and Italian Maritime Alps, south Switzerland, North Tyrol, and Lower Austria (DEELEMEN-REINHOLD, 1978). It is the first species from this group found in Croatia and the easternmost finding for the group. New localities are 340 km south-east of the type locality in Austria and about 100 km east-south-east of localities in Slovenia. The species was identified on the basis of six female specimens and it is important to collect male material.

Our findings confirm that the area of the South Dinarides, especially the Dubrovnik region and the coastal mountains southwards as far as Mt. Orjen and Mt. Sniježnica, are a real hotspot for *Troglohyphantes* taxa, as well as other troglobitic spiders and other troglobitic fauna. This underground habitat absolutely deserves world heritage status, with urgent protection priority.

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## SAŽETAK

**Nove špiljske vrste roda *Troglohyphantes* (Araneae, Linyphiidae)  
za faunu Hrvatske**

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U špiljskim staništima Hrvatske najzastupljenija porodica pauka su baldahinski pauci (Linyphiidae), a u okviru porodice rod *Troglohyphantes*. Obradom materijala sakupljanog u speleološkim objektima Hrvatske u razdoblju od 1993. do 2005. godine i analizom svih dostupnih literaturnih podataka, za faunu Hrvatske utvrđeno je 5 novih vrsta roda *Troglohyphantes*: *T. troglodytes* (Kulczyński, 1914), *T. pugnax* Deeleman-Reinhold, 1978, *T. salax* (Kulczyński, 1914), *T. sketi* Deeleman-Reinhold, 1978 i *T. subalpinus* Thaler, 1967. Svih 5 vrsta su otprije zabilježene za faune susjednih zemalja (Austrija, Bosna i Hercegovina, Crna Gora i Slovenija).

Od novoutvrđenih svojti jedna vrsta pripada podrodu *Troglodytia*, dok ostale četiri pripadaju podrodu *Troglohyphantes*. Među njima dvije vrste pripadaju grupi *salax* (*T. pugnax*, *T. salax*), a po jedna grupi *polyophthalmus* (*T. sketi*) i *orpheus* (*T. subalpinus*). Nalazom vrste *T. subalpinus* areal ove vrste, kao i cijele grupe *orpheus*, pomaknut je za gotovo 100 km na jugoistok te je ovo ujedno prvi nalaz grupe *orpheus* za faunu Hrvatske.

Od utvrđenih novih svojti za faunu Hrvatske dvije su pretežito mikrokavernikolnog karaktera, odnosno troglifili (*T. troglodytes*, *T. subalpinus*), dok su ostale tri troglobionti (*T. pugnax*, *T. salax*, *T. sketi*).

S ovih 5 vrsta rod *Troglohyphantes* je u fauni Hrvatske trenutno zastupljen s 22 svojte.