

## A contribution to the Slovenian spider fauna – III

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**Abstract.** The study reports on first records of two spider species for Slovenian fauna, *Zodarion rubidum* and *Prinerigone vagans* from the Bela krajina region in southeastern Slovenia. Regarding their presence in the neighbouring countries and distribution in Europe, both species could be considered as expected. The finding of *Z. rubidum* during night time in the urban area demonstrates negligence of sampling at unconventional time and in anthropogenic habitats. Finding two new records during short term field survey also indicates undersampling of the spider fauna and supports the need for further faunistic work in the field of arachnology.

Key words: Araneae, first records, Bela krajina, *Zodarion rubidum*, *Prinerigone vagans*, spiders, Slovenia

**Izvleček. Prispevek k favni pajkov Slovenije – III** – Prispevek obravnava najdbi dveh vrst pajkov v Beli krajini, *Zodarion rubidum* in *Prinerigone vagans*, ki doslej v Sloveniji še nista bili najdeni. Glede na njuna areala v Evropi in potrjeno pojavljanje v sosednjih državah sta bili obe vrsti v Sloveniji pričakovani. Ulov vrste *Z. rubidum* v mestnem okolju ponoči kaže na zapostavljanje vzorčenja v nočnem času in v antropogenem okolju. Najdbi dveh novih vrst za slovensko araneofavno v kratkem času vzorčenja v Beli krajini kažeta na pomanjkljivo poznavanje favne pajkov Slovenije in potrebo po tovrstnih favnističnih študijah.

Ključne besede: Araneae, prve najdbe, Bela krajina, *Zodarion rubidum*, *Prinerigone vagans*, pajki, Slovenija

### Introduction

Slovenian spider fauna currently comprises 750 species (Kostanjšek & Kuntner 2015, CKFF 2016). Compared to the number of recorded spider species in neighbouring countries according to the Fauna Europaea Database (Van Helsdingen 2013) and the variety of zoogeographical regions within Slovenia (such as Submediterranean, Dinaric, Alpine, Prealpine and Subpannonian) (Mršič 1997, Ciglič & Perko 2012), the checklist of Slovenian spiders is still far from complete. In Bela krajina in southeastern Slovenia, data of spiders derive from reports focused on endangered species (Polenec 1992), general surveys of invertebrates (Bole et al. 1980, Kos & Praprotnik 2000) and spider fauna (Kostanjšek 2002), first records for Slovenian fauna (Kostanjšek & Miller 2004, Kostanjšek 2010) and a study focused on spider species richness estimation (Budja 2008). Current knowledge on the araneofauna in Bela krajina is supplemented by several records on the hypogeic spiders (Kratochvil 1934, Nikolić 1963, Deeleman-Reinhold 1978, Nikolić & Polenec 1981).

In the present work, we report on two new species for the Slovenian spider fauna, specifically *Zodarion rubidum* Simon, 1914 from the family Zodariidae and *Prinerigone vagans* (Audouin, 1826) from the family Linyphiidae.

## Materials and methods

### Survey area

Sampling took place in Bela krajina, the region situated in southeastern Slovenia (Fig. 1). Bela krajina is mainly a karst area confined by the Gorjanci and Kočevski Rog mountain ranges in the north and west and the Kolpa River in the south and east. The area is a mosaic of agricultural land, forests, meadows and pastures.

Field surveys were performed during the »27<sup>th</sup> Biology Summer Research Camp – Dragatuš 2015« between 19. and 30. 7. 2015.



**Figure 1.** Sampling area in Bela krajina in southeastern Slovenia (dashed line on the inset), with locations of two new species for Slovenia: *Zodarion rubidum* and *Prinerigone vagans*.

**Slika 1.** Območje vzorčenja v jugovzhodni Sloveniji (črtkana črta na karti Slovenije) z označenimi lokacijami najdb vrst *Zodarion rubidum* in *Prinerigone vagans*.

## Sampling methods, determination and specimen preparation

All specimens were collected with aspirator or forceps and preserved in denatured 70% ethanol. Determination, preparation and observation of the specimens with both light and electron microscopy were performed at the Department of Biology of the Biotechnical Faculty, University of Ljubljana. We used different determination keys for species identification (Roberts 1995, Nentwig et al. 2016, Oger 2016).

The epigyne of one female specimen was dissected and macerated in 15% KOH overnight to remove soft tissue. The prepared sample was inspected with Leica MZ FLIII stereo microscope and photographed by Leica DFC 425 C camera under 100× magnification.

For electron microscopic observation, the male specimen was briefly sonicated in ultrasonic bath PIO Sonis 2 T, air-dried, mounted on aluminium stubs and sputter-coated with platinum. The prepared samples were observed by Jeol JSM-7500F field emission scanning electron microscope.

## Results and discussion

The two spider species, presenting the first records for Slovenia, belong to two different families, Zodariidae and Linyphiidae. They were found on one and two localities, respectively (Fig. 1).

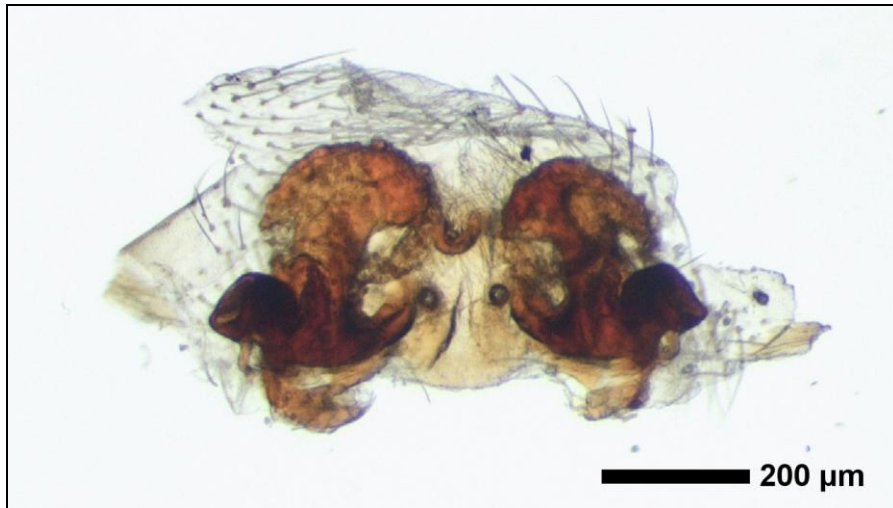
### ***Zodarion rubidum*** Simon, 1914 (fam. Zodariidae)

A single female was collected by araneological group during the night in the vicinity of school buildings in the Dragatuš village (45.52285°N, 15.17992°E; altitude: 176 m a. s. l.) on 21. 7. 2015. Finding of the specimen in the village supports the potential of anthropogenic environments as important, yet overlooked habitats for species rarely found in natural environments (Kostanjšek & Celestina 2008). Epigyne and the vulva are shown in Figs 2-3, respectively.

Like other members of the family Zodariidae, *Z. rubidum* specializes in ant-eating (Pekár & Křál 2002, Pekár 2004). *Zodarion rubidum* mimics red ants and often feeds on *Myrmica sabuleti*, *Tetramorium caespitum* or *Lasius platythorax*. It has up to 5 mm long body and hunts across open ground in the evening and during nighttime (Pekár & Křál 2002, Pekár 2004). Although it shows some spreading tendencies, the species is still considered Central-European (Nentwig et al. 2016). It has also been introduced to North America (Paquin & Dupérré 2006).



**Figure 2.** Ventral view of *Zodarion rubidum*, showing the distinctive epigynal morphology.  
**Slika 2.** Trebušna stran *Zodarion rubidum* z značilno oblikovano epigino.

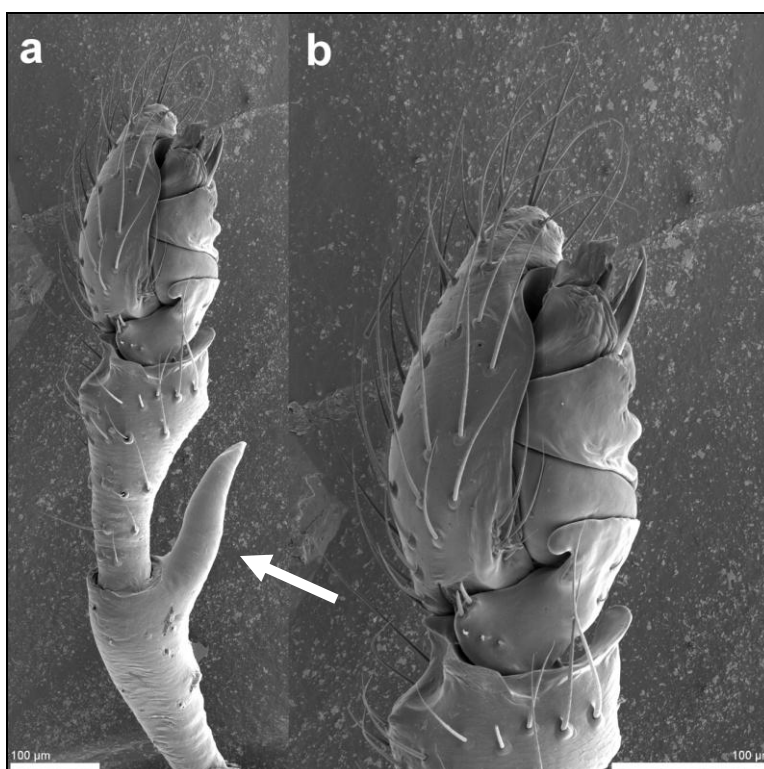


**Figure 3.** The morphology of the internal genitalia (vulva) isolated from the same specimen of *Z. rubidum*, depicted in Fig. 2.  
**Slika 3.** Zgradba notranjih spolnih organov (vulve), izoliranih iz primerka *Z. rubidum*, prikazanega na Sl. 2.

***Prinerigone vagans*** (Audouin, 1826) (fam. Linyphiidae)

Two males were collected by Alja Pirnat and Urška Ratajč on two locations in gravel bars of the Kolpa River on 24. 7. 2015. One male was collected from gravel bars near the Vinica village (45.45869°N, 15.25861°E; altitude: 168 m a. s. l.), the other from gravel bars near the Žuniči village (45.47973°N, 15.36656°E; altitude: 161 m a. s. l.). The specimens were identified based on the distinctive shape of their patellar apophysis and morphology of the distal parts of their pedipalps (Fig. 4).

According to the available literature, *P. vagans* is widespread in western and central Europe (Nentwig et al. 2016), although uncommon in England (Harvey et al. 2002, British Arachnological Society 2016). This species inhabits wet habitats, such as wet grassy meadows, shores of lakes and gravel bars (Harvey et al. 2002, Nentwig et al. 2016). Adult specimens are usually found throughout the year, but are most abundant early to mid-summer and autumn (Harvey et al. 2002, Nentwig et al. 2016).



**Figure 4.** Distinctive patellar apophysis (arrow) of male pedipalp of *Prinerigone vagans* (4a) and detailed morphology of cymbium and bulbar sclerites (4b).

**Slika 4.** Značilna apofiza na pateli pedipalpa samca vrste *Prinerigone vagans* (7a) in povečan prikaz distalnega dela pedipalpa (7b).

According to known distribution and confirmed records in the neighbouring countries (Nentwig et al. 2016), the presence of both species in Slovenia could be expected. Finding of *Z. rubidum* in Bela krajina represents the southernmost record in the Balkans (Nentwig et al. 2016). The vicinity of the national border and high dispersal capabilities of spiders (Foelix 2011) imply the species may be present in Croatia, where it has not been recorded yet (Nentwig et al. 2016). The findings of the two new spider species in a relatively short survey period in July 2015 imply the Slovenian spider fauna is undersampled (Kostanjšek & Kuntner 2015). This supports the need for further faunistic work in the field of arachnology.

## Acknowledgements

We thank the other members of araneological group, Manca Velkavrh and Nina Šramel, for their hard work during the research camp and also to Alja Pirnat and Urška Ratajc for providing the spider samples. We would also like to express our gratitude to CKFF for allowing us to access the araneological data from their Biportal database.

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