

A contribution to the Slovenian spider fauna – V

Žan KURALT^{1*}, Neža PAJEK ARAMBAŠIČ², Maja FERLE³, Rok KOSTANJŠEK⁴

¹Genialis d.o.o., Vojkova cesta 63, SI-1000 Ljubljana, Slovenia

²Faculty of Computer and Information Science, University of Ljubljana, Večna pot 113, SI-1000 Ljubljana, Slovenia

³National Institute of Biology, Večna pot 121, SI-1000 Ljubljana, Slovenia

⁴Department of Biology, Biotechnical Faculty, University of Ljubljana, Jamnikarjeva 101, SI-1000 Ljubljana, Slovenia

*corresponding author; E-mail: zan.kuralt@gmail.com

Abstract. The present study discusses and reports on 29 spider species new to Slovenian fauna, specifically: *Larinioides patagiatus*, *Cyrtarachne ixoides*, *Pritha nana*, *Marinarozelotes adriaticus*, *Micaria micans*, *Scotophaeus blackwalli*, *Zelotes similis*, *Agyneta orites*, *Donacochara speciosa*, *Lasiargus hirsutus*, *Trichoncus sordidus*, *Walckenaeria vigilax*, *Alopecosa taeniata*, *Pardosa oreophila*, *Pardosa sordidata*, *Pardosa paludicola*, *Pardosa sphagnicola*, *Xerolycosa miniata*, *Mimetus laevigatus*, *Philodromus laricum*, *Philodromus vagulus*, *Attulus rupicola*, *Marpissa radiata*, *Micrommata ligurina*, *Euryopsis quinqueguttata*, *Parasteatoda tabulata*, *Phoroncidia paradoxa*, *Rhomphaea rostrata*, and *Robertus mediterraneus*.

Key words: Araneae, new records, spiders, Slovenia, endemics, Neozoa, Southern Alps

Izvleček. Prispevek k slovenski favni pajkov – V – Prispevek obravnava najdbe 29 vrst pajkov, ki v Sloveniji doslej še niso bile zabeležene, in sicer: *Larinioides patagiatus*, *Cyrtarachne ixoides*, *Pritha nana*, *Marinarozelotes adriaticus*, *Micaria micans*, *Scotophaeus blackwalli*, *Zelotes similis*, *Agyneta orites*, *Donacochara speciosa*, *Lasiargus hirsutus*, *Trichoncus sordidus*, *Walckenaeria vigilax*, *Alopecosa taeniata*, *Pardosa oreophila*, *Pardosa paludicola*, *Pardosa sordidata*, *Pardosa sphagnicola*, *Xerolycosa miniata*, *Mimetus laevigatus*, *Philodromus laricum*, *Philodromus vagulus*, *Attulus rupicola*, *Marpissa radiata*, *Micrommata ligurina*, *Euryopsis quinqueguttata*, *Parasteatoda tabulata*, *Phoroncidia paradoxa*, *Rhomphaea rostrata* in *Robertus mediterraneus*.

Ključne besede: Araneae, prve najdbe, pajki, Slovenija, endemiti, Neozoa, južne Alpe



Introduction

Slovenia's geographic position in the contact area of the Alpine, Pre-Alpine, Dinaric, sub-Pannonic, and sub-Mediterranean biogeographical regions is reflected in its diverse flora and fauna (Mršić 1997; Ciglič & Perko 2012). Although still considered under-surveyed, the spider fauna in Slovenia is no exception in this respect (Kostanjšek & Kuntner 2015). The spider fauna of the Pre-Alpine region can be considered the best studied due to its size, relative accessibility and, above all, the extensive work of the most renowned Slovenian arachnologist Anton Polenec (summarized in Kostanjšek & Kuntner 2015), while other biogeographic regions still lack comprehensive surveys.

The present paper reports on twenty-nine new species records for the Slovenian spider fauna, deriving from sampling efforts in different parts of Slovenia and revisions of some previously unidentified specimens.

Materials and methods

The majority of focused and organized araneological fieldwork in Slovenia in the past few decades has been conducted during the yearly »Biology Students Research Camps« (herein: biology camps), traditionally taking place in the second half of July. In the past few years, however, araneological fieldwork implemented during biology camps was complemented with other studies, (1) single-day samplings known as BioBlitz conducted yearly, (2) monthly surveys of spider fauna at Škocjan Caves Park (2017-2021), and (3) occasional coincidental findings. We also conducted a review of some older material provided by Rok Kostanjšek and Matjaž Gregorič.

Specimens were collected using different sampling methods (hand-collecting, forceps, aspirator, round sweep net, inverted leaf blower, leaf litter sifter, and pitfall traps) and preserved in denatured 70% ethanol. We used several determination keys for the identification of the collected material (Roberts 1995; Nentwig et al. 2023; Oger 2023). Extraction, identification, preparation, and observation of the specimens were performed at the Department of Biology of the Biotechnical Faculty, University of Ljubljana, using light stereomicroscopes.

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

For each new species, we provide data on the collecting site, geographic latitude and longitude (WGS84), altitude in metres above sea level (a.s.l.), date of collection, sampling method (if available), material provider (leg.), species determinator (det.), followed by data on the distribution of the species in other countries and comments on the findings.

The majority of specimens are deposited at the Department of Biology, Biotechnical Faculty, University of Ljubljana. Vouchers of *Mimetus laevigatus*, *Pardosa paludicola*, *Larinioides patagiatus*, *Micrommata ligurina*, and *Robertus mediterraneus* are stored at the Jovan Hadži Institute of Biology, Research Centre of the Slovenian Academy of Sciences and Arts.

Results and discussion

In the first part, we present new records for the Slovenian spider fauna, including specimens and sampling information, followed by comments and a discussion of distribution for individual species. We provide a general discussion at the end.

New records

Larinioides patagiatus (Clerck, 1757) – Araneidae

- 2.2 km W of Vnanje Gorice; Drpalež pri Vnanjih Goricah; lat: 46.0094°N; lon: 14.448°E; 290 m a.s.l.; riparian vegetation; 7. 5. 2008; 1 ♀; leg.: Gregorič M.; det.: Gregorič M., Kostanjšek R.

Distribution and comment: The species has a global distribution. It has been recorded in every European country except Albania and, until now, Slovenia (World Spider Catalog 2023). This species inhabits lower twigs of trees and bushes at forest edges (Nentwig et al. 2023). In our case, it was found in bushes of riparian vegetation. Due to its presence in neighbouring countries, the record of *L. patagiatus* in Slovenia was expected.

Cyrtarachne ixoides (Simon, 1870) – Araneidae

- 500 m NW of Bertoki; Škocjanski zatok; lat: 45.547121 N; lon: 13.760057 E; 3 m a.s.l.; riparian vegetation; multiple ♀; 17. 6. 2018; leg.: Vadnjal D.; det.: Ferle M.
- Ibidem, 29. 5. 2018; 2 ♀; leg.: Kastelic M.; det.: Gregorič M.
- Ibidem, 18. 6. 2018; 2 ♀; leg.: Kastelic M.; det.: Gregorič M.
- 2.4 km SE of Ankaran; lat: 45.568576 N; lon: 13.765808 E; 5 m a.s.l.; riparian vegetation; 1 ♀; 3. 7. 2020; leg.: Vadnjal D.; det.: Ferle M.
- 1.6 km NE of Bertoki; lat: 45.532522 N; lon: 13.756273 E; 20 m a.s.l.; vineyard; 1 ♀; 2. 7. 2021; leg.: Vadnjal D.; det.: Ferle M.

Distribution and comment: Multiple specimens were observed and photographed but not collected in the past years by two avid nature photographers Duša Vadnjal and Miroslav Kastelic at the Slovenian coast. Vadnjal provided us with photographs depicting an unmistakable habitus of the species, while Kastelic uploaded photographs to the Invertebrates Photo Database (Slovenian Museum of Natural History 2024) and were identified by Matjaž Gregorič. *Cyrtarachne ixoides* is a Mediterranean species. Females sit on leaves, imitating bird droppings (Nentwig et al. 2023)



Figure 1. Photographs of three different specimens of *Cyrtarachne ixoides*: A - 20. 7. 2018, Škocjanski zatok; B, C - 3. 7. 2020, Sermin (photo: Duša Vadnjal).

Slika 1. Fotografije treh osebkov vrste *Cyrtarachne ixoides*: A - 20. 7. 2018, Škocjanski zatok; B, C - 3. 7. 2020, Sermin (fotografija: Duša Vadnjal).

***Pritha nana* (Simon, 1868) – Filistatidae**

- 600 m SE from Osp; Mišja peč; lat.: 45.5674 N; lon.: 13.8638 E; 103 m a.s.l.; forest edge and stone wall; 1 ♀; 22. 7. 2018; leg.: Ferle M., Kuralt Ž., Pajek Arambašič N., Velkavrh M., Mihelič P.; det.: Ferle M., Kuralt Ž., Pajek Arambašič N., Kostanjšek R.
- Ibidem; 3 ♀; 29. 8. 2018; leg.: Ferle M., Kuralt Ž., Pajek Arambašič N.; det.: Ferle M., Kuralt Ž., Pajek Arambašič N., Kostanjšek R.

Distribution and comment: *Pritha nana* is a Mediterranean species occurring under stones, on walls and buildings, where it builds an irregular messy cribellate web with a tube (Nentwig et al. 2023), often extending into small cracks or crevices, used by the species as a primary retreat. Usually, its web is covered with particulate and dust debris. This species, like other members of the *Pritha* genus, are often hemisynanthropic, as their webs are commonly encountered on the building walls and other man-made structures (Legittimo et al. 2017). Females can live for several years, while males are short-lived and occur in their adult form only for a short period of time in late spring or early summer (Nentwig et al. 2023).

***Marinarozelotes adriaticus* (Caporiacco, 1951) – Gnaphosidae**

- SE of Koper; Osnovna šola Marezige; lat.: 45.5098 N; lon.: 13.8000 E; 269 m a.s.l.; school building and its vicinity; 1 ♀; 25. 7. 2018; leg.: Ferle M., Kuralt Ž., Pajek Arambašič N., Velkavrh M., Mihelič P.; det.: Ferle M., Kuralt Ž., Pajek Arambašič N., Kostanjšek R.

Distribution and comment: The species is distributed from Italy to China (World Spider Catalog 2023) and recently in Portugal (Nentwig et al. 2023). The records on its presence in the Balkan Peninsula include Croatia, Albania, and a few Greek islands.

Micaria micans (Blackwall, 1858) – Gnaphosidae

- N of Otlica; Kališki vrh; Primožev kal; lat: 45.9350 N; lon: 13.9226 E; 1040 m a.s.l.; riparian vegetation and meadow; 1 ♀; 22. 7. 2021; leg.: Kuralt Ž., Pajek Arambašič N., Čeferin R., Ferlan N.; det.: Kuralt Ž., Pajek Arambašič N., Kostanjšek R.

Distribution and comment: *Micaria micans* can be found in Europe, the Caucasus, Russia (from Europe to South Siberia), Kazakhstan, and Central Asia (World Spider Catalog 2023). In Europe, it's been recorded in relatively warm parts of the Palearctic region (Řezáč et al. 2021). This ant-mimicking spider prefers dry, warm and sunny open habitats such as grassland fields, gardens, and forest edges (Muster & Michalik 2020).

Scotophaeus blackwalli (Thorell, 1871) – Gnaphosidae

- N of Ajdovščina; Otlica; Cerkovna; lat: 45.9268 N; lon: 13.9090 E; 815 m a.s.l.; forest and forest edge; found at night; 1 ♂; 21. 7. 2021; leg.: Kuralt Ž., Pajek Arambašič N., Čeferin R., Ferlan N.; det.: Kuralt Ž., Pajek Arambašič N., Kostanjšek R.

Distribution and comment: This species has a Palearctic distribution (Nentwig et al. 2023) and its presence in Slovenia was expected. *S. blackwalli* occurs under bark, in tree stumps, in other natural cavities as well as buildings. Adult females can be found throughout the year, while males reach their maturity period in late summer through early autumn (Christian 2015).

Zelotes similis (Kulczyński, 1887) – Gnaphosidae

- SE of Predmeja; Otlica; trail to Otiško okno; lat: 45.9213 N; lon: 13.9102 E; 800 m a.s.l.; thermophilic meadow; 1 ♀; 17. 7. 2021; leg.: Kuralt Ž., Pajek Arambašič N., Čeferin R., Ferlan N.; det.: Kuralt Ž., Pajek Arambašič N., Kostanjšek R.

Distribution and comment: The species is distributed from Central Europe to Turkey (World Spider Catalog 2023). It inhabits warm slopes with dwarf shrubs, heath and woodland with scarce vegetation up to 1,500 m (Nentwig et al. 2023), a habitat corresponding to the collection site of the present specimen.

Agyneta orites (Thorell, 1875) – Linyphiidae

- N of Hrib-Loški potok; 3 km E of Travniki; lat: 45.6888 N; lon: 14.6366 E; 850 m a.s.l.; meadow; 1 ♂; 24. 7. 2014; leg.: Kuralt Ž., Horvat E., Gregor P., Jager T.; det.: Pajek Arambašič N.
- N of Otlica; Kališki vrh; Primožev kal; lat: 45.9350 N; lon: 13.9226 E; 1040 m a.s.l.; riparian vegetation and meadow; 3 ♀, 2 ♂; 27. 7. 2021; leg.: Kuralt Ž., Pajek Arambašič N., Čeferin R., Ferlan N.; det.: Kuralt Ž., Pajek Arambašič N., Kostanjšek R.

Distribution and comment: *Agyneta orites* is an alpine species that has been found in Spain and the Alps (France, Italy, Switzerland, Austria, and Germany). The species is considered rare, since only very few specimens have been found so far (Nentwig et al. 2023).

Donacochara speciosa (Thorell, 1875) – Linyphiidae

- 500 m SW of Župančiči; E of Koštabona; Pinjevec; lat: 45.4788 N; lon: 13.7630 E; 100 m a.s.l.; riparian vegetation; pitfall traps; 1 ♀; 21. 7. 2018; leg.: Ferle M., Kuralt Ž., Pajek Arambašič N., Velkavrh M., Mihelič P.; det.: Ferle M., Kuralt Ž., Pajek Arambašič N., Kostanjšek R.

Distribution and comment: The species is distributed in Europe and Central Asia (World Spider Catalog 2023). It can be found in reeds of lakes and ponds and adjacent swamp meadows (Nentwig et al. 2023). Our specimen was caught in a pitfall trap set in riparian vegetation near the river.

Lasiargus hirsutus (Menge, 1869) – Linyphiidae

- N of Gornja Radgona; 1 km N of Ptujška cesta; lat: 46.6249 N; lon: 16.0035 E; 240 m a.s.l.; meadow; 3 ♀; 26. 7. 2011; leg.: Kostanjšek R., Horvat D., Koršič M., Kuralt Ž., Pretnar G., Sivec N., Velkavrh M.; det.: Pajek Arambašič N., Kostanjšek R.

Distribution and comment: The species inhabits low plants in coastal areas and sandy localities. Although widespread throughout Europe, the species is rarely found (Nentwig et al. 2023).

Trichoncus sordidus (Simon, 1884) – Linyphiidae

- NW of Črni Kal; 600 m SE of Osp; Mišja peč; lat: 45.567502°N; lon: 13.863681°E; 103 m a.s.l.; holm oak forest and rock wall; hand picking; 1 ♀; 22. 7. 2018; leg.: Ferle M., Kuralt Ž., Pajek Arambašič N., Velkavrh M., Mihelič P.; det.: Ferle M., Kuralt Ž., Pajek Arambašič N., Kostanjšek R.

Distribution and comment: The species is distributed in Europe, current data confirm its presence in France, Germany, Italy, Slovakia, Balearic Islands, Croatia, Albania, and Greece. Its biology is mostly unknown and it is rarely found according to Nentwig et al. (2023).

Walckenaeria vigilax (Blackwall, 1853) – Linyphiidae

- 500 m E of Nemški Rovt; lat: 46.273361°N; lon: 13.987028°E; 760 m a.s.l.; forest; pitfall traps; 2 ♀, 1 ♂; 3. 7. 2022; leg.: Ferle M.; det.: Ferle M., Kuralt Ž.

Distribution and comment: The species has a Holarctic distribution (World Spider Catalog 2023). It prefers humid conditions and can be found in the wet places on the grass and mosses (Locket & Millidge 1953), as well as in arable fields (Nentwig et al. 2023).

Alopecosa taeniata (C. L. Koch, 1835) – Lycosidae

- 5.2 km SE of Črna na Koroškem; Peca; lat: 46.5068°N; lon: 14.8049°E; 2125 m a.s.l.; scarce vegetation above treeline on the summit of Mt Peca; 1 ♀ 1 ♂; 17. 7. 2023; leg.: Pajek Arambašič N., Pušnar Ž., Erzin M., Cigoj K.; det.: Pajek Arambašič N., Kuralt Ž., Kostanjšek R.
- 4.6 km SE of Črna na Koroškem; Podpeca; lat: 46.491773°N; lon: 14.798741°E; 1410 m a.s.l.; parking lot; 1 ♂; 17. 7. 2023; leg.: Pajek Arambašič N., Pušnar Ž., Erzin M., Cigoj K.; det.: Pajek Arambašič N., Kuralt Ž., Kostanjšek R.

Distribution and comment: *A. taeniata* is distributed in Europe and Russia (World Spider Catalog 2023). The species is eurytopic (with wide ecological amplitude) and adaptable to various conditions (Muster 2001).

Pardosa oreophila (Simon, 1937) – Lycosidae

- 5.2 km SE of Črna na Koroškem; Peca; lat: 46.5068°N; lon: 14.8049°E; 2125 m a.s.l.; scarce vegetation above treeline on the summit of Mt Peca; 3 ♀ 3 ♂; 17. 7. 2023; leg.: Pajek Arambašič N., Pušnar Ž., Erzin M., Cigoj K.; det.: Pajek Arambašič N., Kuralt Ž., Kostanjšek R.

Distribution and comment: This species is present in Central and Southern Europe (World Spider Catalog 2023). It can be found in meadows and open areas from 1,000 to 2,700 metres above sea level (Nentwig et al. 2023).

Pardosa paludicola (Clerck, 1757) – Lycosidae

- 2.3 km W of Dolina pri Lendavi; 1.7 km NE of Petišovci; confluence of Ledava and Črnec spring; lat: 46.5379°N; lon: 16.4756°E; 160 m a.s.l.; riparian vegetation; 1 ♀, 1 ♂; 30. 3. 2008; leg.: Čandek K., Gregorič M.; det.: Pajek Arambašič N., Kostanjšek R.
- Mali Ribnik pond; lat: 46.4349°N; lon: 15.6791°E; 250 m a.s.l.; riparian vegetation; 1 ♀; 15. 6. 2018; leg.: Kuralt Ž., Sivec N., Knapič T.; det.: Kuralt Ž., Knapič T.

Distribution and comment: The species has a global distribution and has been recorded in most European countries (World Spider Catalog 2023). Consequently, its occurrence in Slovenia was expected. The species inhabits damp areas and is described by Nentwig et al. (2023) as not frequent.

Pardosa sordidata (Thorell, 1875) – Lycosidae

- 4.6 km SE of Črna na Koroškem; Peca; trail to Mt Peca below treeline; mountain hut below Peca; lat: 46.491773°N; lon: 14.798741°E; 1665 m a.s.l.; 3 ♀; 17. 7. 2023; leg.: Pajek Arambašič N., Pušnar Ž., Erzin M., Cigoj K.; det.: Pajek Arambašič N., Kostanjšek R.

Distribution and comment: *P. sordidata* is rarely found throughout Europe. However, it has been identified multiple times in different parts of Austrian mountain ranges. It can be found in moist tall herbaceous meadows, stream banks, as well as forest clearings and edges in mountain ranges from 700 m to 1,500 m (Komposch 2000, 2023).

Pardosa sphagnicola (Dahl, 1908) – Lycosidae

- Ljubljana; 200 m SW of Ljubljana ZOO; Department of Biology; wet meadow; lat: 46.051856°N; lon: 14.470328°E; 297 m a.s.l.; 1 ♀; 26. 7. 2017; leg.: Kuralt Ž., Velkavrh M., Šramel N., Premate E., Štrekelj N., Pajek Arambašič N., Ferle M.; det.: Kuralt Ž., Kostanjšek R.

Distribution and comment: The species is found in Europe and Russia, widely distributed in the north, including Iceland (Thaler & Buchar 1996). Its presence was confirmed in Northern, Eastern, Western, and Central Europe, but is missing in some Mediterranean and Balkan countries. The species is boreomontane, inhabiting bogs and raised bogs (Nentwig et al. 2023).

Xerolycosa miniata (C. L. Koch, 1834) – Lycosidae

- NE of Lozice; Strmec; Podraška bajta; lat: 45.79466°N; lon: 14.01907°E; 810 m a.s.l.; xerophilic meadow; 1 ♀; 18. 7. 2021; leg.: Gabor M.; det.: Kuralt Ž., Pajek Arambašič N., Kostanjšek R.
- 1 km NE of Draga; S of Hrib-Loški potok; lat: 45.639212°N; lon: 14.660902°E; 800 m a.s.l.; forest clearing; 1 ♀; 24. 7. 2014; leg.: Kuralt Ž., Horvat E., Gregor P., Jager T.; det.: Kuralt Ž.

Distribution and comment: The species has a Palearctic distribution. It inhabits sunny open areas with short grass. Its presence in Slovenia was expected, as it has already been confirmed in all of the neighbouring countries (Nentwig et al. 2023).

Mimetus laevigatus (Keyserling, 1863) – Mimetidae

- 1.3 km NW of Divača; 500 m E of Gorenje pri Divači; lat: 45.6937°N; lon: 13.9624°E; 415 m a.s.l.; riparian vegetation; 1 ♀; 25. 5. 2012; leg.: Pipan M.; det.: Pajek Arambašič N., Kostanjšek R.

Distribution and comment: The species is distributed from the Mediterranean to Central Asia (World Spider Catalog 2023). It inhabits bushes and can also be found under stones. The species appears to be short-lived, since the presence of adult specimens appears confined to May and June (Nentwig et al. 2023).

Philodromus laricum (Simon, 1875) – Philodromidae

- 6 km SE of Šoštanj; Solčava; Podolševa; lat: 46.445774°N; lon: 14.673639°E; 1,405 m a.s.l.; under a stone; handpicking; 1 ♀; 19. 7. 2023; leg.: Kepić T.; det.: Pajek Arambašič N., Kuralt Ž., Kostanjšek R.

Distribution and comment: *P. laricum* is an endemic species of (south)-western-European mountain ranges. According to Muster et al. (2009), it is distributed from the southwestern Alps to the northern calcareous Alps in Tyrol, residing on tree branches, in crevices of limestone rocks, and on scree slopes (Muster et al. 2009).

***Philodromus vagulus* (Simon, 1875) – Philodromidae**

- 5.2 km SE of Črna na Koroškem; Peca; lat: 46.5068°N; lon: 14.8049°E; 2125 m a.s.l.; scarce vegetation above treeline on the summit of Mt Peca; 8 ♀; 17. 7. 2023; leg.: Pajek Arambašič N., Pušnar Ž., Erzin M., Cigoj K.; det.: Pajek Arambašič N., Kuralt Ž., Kostanjšek R.

Distribution and comment: It has European distribution (World Spider Catalog 2023). Arboreal species, occasionally found in heath (Muster 2001).

***Attulus rupicola* (C. L. Koch, 1837) – Salticidae**

- W of Lendava; 1 km W of Hotiza; Ložič; lat: 46.556219°N; lon: 16.333299°E; 170 m a.s.l.; xerophilic meadow; 2 ♂; 16. 7. 2022; leg.: Barbo J., Jeromen M., Pajek Arambašič N., Pušnar Ž.; det.: Pajek Arambašič N., Kuralt Ž., Kostanjšek R.
- SW of Črna na Koroškem; Bukovnik; Mt Grohot; lat: 46.422031°N; lon: 14.744593°E; 1,460 m a.s.l.; meadow; 1 ♀, 2 ♂; 20. 7. 2023; leg.: Kuralt Ž., Pušnar Ž., Cigoj K., Erzin M.; det.: Pajek Arambašič N., Kuralt Ž., Kostanjšek R.

Distribution and comment: European species. It can be found among stones and rocks up to 1,700 m (Nentwig et al. 2023), where it prefers warm places (Žabka 1997). Its presence in Slovenia was expected, as it has already been confirmed in three of the neighbouring countries.

***Marpissa radiata* (Grube, 1859) – Salticidae**

- SE of Lendava; 2.3 km NE of Podturen; Črni jarek; lat: 46.476988°N; lon: 16.572355°E; 160 m a.s.l.; riparian vegetation; 1 ♀; 17. 7. 2022; leg.: Barbo J., Jeromen M., Pajek Arambašič N., Pušnar Ž.; det.: Pajek Arambašič N., Kostanjšek R.

Distribution and comment: Palearctic species. It can be found in wet meadows and near standing waters, especially in bent leaves of cattail (*Typha*) and common reed (*Phragmites*), where it builds typical retreats (Žabka 1997).

***Micrommata ligurina* (C. L. Koch, 1845) – Sparassidae**

- NE of Sežana; 800 m SE of Griže; lat: 45.7505°N; lon: 13.9509°E; 484 m a.s.l.; overgrowth; 1 ♀; 21. 6. 2011; leg.: Gregorič M., Čandek K.; det.: Pajek Arambašič N., Kostanjšek R.

Distribution and comment: *Micrommata ligurina* is a Mediterranean species (Nentwig et al. 2023). In more temperate climates, the species is frequently overlooked due to misidentification as a much more common *M. virescens*.

***Euryopis quinqueguttata* (Thorell, 1875) – Theridiidae**

- SE of Lendava; 2.2 km S of Dolina pri Lendavi; Ledava and Črnc stream confluence; lat: 46.535334°N; lon: 16.477790°E; 160 m a.s.l.; riparian vegetation; 1 ♂; 18. 7. 2022; leg.: Barbo J., Jeromen M., Pajek Arambašič N. Pušnar Ž.; det.: Pajek Arambašič N., Kostanjšek R.

Distribution and comment: Widely distributed species. It is partial to very warm places where hiding under stones. It can be found on south-exposed slopes only in some places in Central Europe (Nentwig et al. 2023). Its presence in Slovenia was expected, since it has already been confirmed in three of the neighbouring countries.

***Parasteatoda tabulata* (Levi, 1980) – Theridiidae**

- E of Trebnja Gorica; 200 m N of Gradiček; Krka spring; lat: 45.886679°N; lon: 14.768162°E; 300 m a.s.l.; riparian vegetation and cave entrance; 1 ♀ 1 ♂; 19. 7. 2019; leg.: Ferle M., Kuralt Ž., Pajek Arambašič N., Mihelič P.; det.: Ferle M., Kuralt Ž., Pajek Arambašič N.
- JZ of Škofja Loka; Gorenja vas; Ivan Tavčar Gorenja vas primary school buildings; lat: 46.101155°N; lon: 14.140822°E; 420 m a.s.l.; 1 ♀ 1 ♂; 17. 7. - 26. 7. 2020; leg.: Ferle M., Kuralt Ž., Pajek Arambašič N., Prevc J.; det.: Ferle M., Kuralt Ž., Pajek Arambašič N., Kostanjšek R.

Distribution and comment: Species of Asian origin, introduced to Europe (Nentwig et al. 2023). Its presence has already been confirmed in Eastern and Central European countries. It is found on south-exposed walls of buildings, commonly synanthropic (Nentwig et al. 2023).

***Phoroncidia paradoxa* (Lucas, 1846) – Theridiidae**

- SE of Divača; 750 m N of Matavun; Betanja; lat: 45.664775°N; lon: 13.988571°E; 417 m a.s.l.; holm oak forest; pitfall traps; 1 ♀; 19. 9. 2018; leg.: Ferle M., Kuralt Ž., Pajek Arambašič N.; det.: Ferle M., Kuralt Ž., Pajek Arambašič N., Kostanjšek R.

Distribution and comment: The species is distributed in the Mediterranean area. It inhabits holm oak forest, garrigue, heathlands, and the bush layer (Nentwig et al. 2023).

***Rhomphaea rostrata* (Simon, 1873) – Theridiidae**

- SE of Koper; Marezige; Ivan Babič-Jager Marezige primary school; lat: 45.509851°N; lon: 13.800083°E; 269 m a.s.l.; vegetation in the vicinity of Ivan Babič-Jager Marezige primary school; 1 ♂; 25. 7. 2018; leg.: Kos A.; det.: Kuralt Ž., Kostanjšek R.

Distribution and comment: Mediterranean species, inhabiting garrigue, on oaks and heather (Nentwig et al. 2023).

***Robertus mediterraneus* (Eskov, 1987) – Theridiidae**

- NE of Sežana; 800 m SE of Griže; lat: 45.7505°N; lon: 13.9509°E; 484 m a.s.l.; forest; 1 ♀; 21. 6. 2011; leg.: Gregorič M., Čandek K.; det.: Pajek Arambašič N., Kostanjšek R.

Distribution and comment: As the name implies, *R. mediterraneus* is a Mediterranean species, found in the ground layer of forests of medium altitudes (Nentwig et al. 2023). Its distribution range extends from the Caucasus through Romania to Italy, South Tyrol, and Ticino (Komposch et al. 2023).

General discussion

The present paper, the fifth in the series (see Kostanjšek 2010; Kostanjšek & Gorjan 2013; Kuralt & Kostanjšek 2016, 2019), presents twenty-nine new records of spider species for Slovenia. The extent of the newly recorded species and the fact that most of the additions to the Slovenian spider fauna reported here can be considered expected, confirm the previously noted under-recording of the spider fauna in Slovenia compared to neighbouring countries (Kostanjšek & Kuntner 2015; Kuralt & Kostanjšek 2016). The fact that many of the new records in our study originate from the sub-Mediterranean region of the country is also not surprising and could arise from the fact that the region has not been thoroughly studied yet. Apart from having higher spider diversity compared to other biogeographical regions in Slovenia (Kuntner & Kostanjšek 2000), the sub-Mediterranean region additionally represents the most likely dispersal area for true Mediterranean species in the face of impending climate change (Thuiller 2004; Hampe & Petit 2005; Krehenwinkel et al. 2016; Kuralt 2016). One of such species is *Micrommata ligurina*, a Mediterranean species resembling a widespread *Micrommata virescens* and could be misidentified as the latter, especially in the sub-Mediterranean region. Another species worth mentioning is *Parasteatoda tabulata*, an introduced species originating in Asia that has been spreading throughout Eastern Europe in recent years (Nentwig et al. 2023).

Given that the reported species were documented in Slovenia for the first time, assessing their conservation status poses a challenge. However, we can derive insights into their status by referencing neighbouring countries or similar zoogeographical regions. Notably, the Carinthian Red List of Spiders (Komposch 2023) includes 14 of the abovementioned species, categorizing them as vulnerable (*Agyneta orites*, *Xerolycosa miniata*, *Attulus rupicola*, *Philodromus laricum*, *Improphantes nitidus*), endangered (*Zelotes similis*, *Donacochara speciosa*, *Hypomma bituberculatum*, *Lasiargus hirsutus*, *Pardosa paludicola*, *Marpissa radiata*, *Robertus mediterraneus*, *Pardosa sordidata*), and even critically endangered (*Pardosa sphagnicola*).

In summary, this study highlights the importance of ongoing faunistic efforts in Slovenia. Continued endeavours are crucial to fill gaps in our understanding of spider biodiversity and to accurately assess the conservation statuses of these species. By prioritizing further field surveys and collaborative research, we can provide for a more comprehensive understanding of spider fauna in Slovenia and contribute to possible conservation strategies.

Povzetek

Prispevek je peti v seriji prispevkov o favni pajkov Slovenije. Obravnava 29 vrst pajkov, ki do sedaj v Sloveniji še niso bile zabeležene, in sicer: *Larinioides patagiatus* (Clerck, 1757), *Cyrtarachne ixoides* (Simon, 1870), *Pritha nana* (Simon, 1868), *Marinarozelotes adriaticus* (Caporiacco, 1951), *Micaria micans* (Blackwall, 1858), *Scotophaeus blackwalli* (Thorell, 1871), *Zelotes similis* (Kulczyński, 1887), *Agyneta orites* (Thorell, 1875), *Donacochara speciosa* (Thorell, 1875), *Lasiargus hirsutus* (Menge, 1869), *Trichoncus sordidus* (Simon, 1884), *Walckenaeria vigilax* (Blackwall, 1853), *Alopecosa taeniata* (C. L. Koch, 1835), *Pardosa oreophila* (Simon, 1937), *Pardosa paludicola* (Clerck, 1757), *Pardosa sordidata* (Thorell, 1875), *Pardosa sphagnicola* (Dahl, 1908), *Xerolycosa miniata* (C. L. Koch, 1834), *Mimetes laevigatus* (Keyserling, 1863), *Philodromus laricum* (Simon, 1875), *Philodromus vagulus* (Simon, 1875), *Attulus rupicola* (C. L. Koch, 1837), *Marpissa radiata* (Grube, 1859), *Micrommata ligurina* (C. L. Koch, 1845), *Euryopsis quinqueguttata* (Thorell, 1875), *Parasteatoda tabulata* (Levi, 1980), *Phoroncidia paradoxa* (Lucas, 1846), *Rhomphaea rostrata* (Simon, 1873) in *Robertus mediterraneus* (Eskov, 1987).

Poleg nekaterih redkih vrst – na primer *Lasiargus hirsutus*, *Trichoncus sordidus* in *Philodromus vagulus* – je bila večina vrst, živečih v Sloveniji in predstavljenih v prispevku, pričakovana. Omeniti pa gre velik delež toploljubnih in mediteranskih vrst, ki smo jih zabeležili v jugozahodnem delu države, kar kaže na pomanjkljivo raziskanost favne pajkov nekaterih zoogeografskih regij Slovenije.

Acknowledgements

We thank Matjaž Gregorič, who provided us with the following specimens: *Larinioides patagiatus*, *Pardosa paludicola*, *Robertus mediterraneus*, *Micrommata ligurina*, and *Mimetes laevigatus*. The latter was sampled by Miha Pipan. We also thank members of the araneological group throughout the years - Klemen Čandek, Davorin Horvat, Matevž Koršič, Gregor Pretnar, Nataša Sivec, Manca Velkavrh, Eva Horvat, Tadej Jager, Nina Šramelj, Ester Premate, Nina Strekelj, Primož Mihelič, Jošt Prevč, Ronja Čeferin, Nika Ferlan, Matic Jeromen, Žak Pušnar, Jure Barbo, Mojca Erzin, Katja Cigoj – who worked tirelessly in the field and in the lab. We express our gratitude to Matic Gabor, who provided the specimen of *Xerolycosa miniata*, to Tinkara Kopic who provided the specimen of *Philodromus laricum*, to Duša Vadrnjak who provided multiple photos of *Cyrtarachne ixoides*, and to Miroslav Kastelic, who uploaded photos of *Cyrtarachne ixoides* to the Database of Invertebrate Pictures curated by the Slovenian Museum of Natural History.

References

- Christian S. 2015. *Micaria subopaca* (Westring, 1861), *Scotophaeus blackwalli* (Thorell, 1871) and *S. scutulatus* (L. Koch, 1866): three species of gnaphosids new to Luxembourg (Arachnida, Gnaphosidae). Bulletin de la Société des naturalistes luxembourgeois. 117: 87-90.
- Ciglič R, Perko D. 2012. Slovenia in geographical typifications and regionalizations of Europe. Geografski vestnik. 84(1): 23-37.
- Gregorič M, Kuntner M. 2009. Epigean spider diversity in the classical karst. Hacquetia. 8(1): 67-78. <https://doi.org/10.2478/v10028-009-0005-z>

- Hampe A, Petit RJ. 2005. Conserving biodiversity under climate change: The rear edge matters. *Ecology Letters*. 8: 461-467. <https://doi.org/10.1111/j.1461-0248.2005.00739.x>
- Komposch C. 2000. Bemerkenswerte Spinnen aus Südost-Österreich I (Arachnida: Araneae). *Carinthia* II. 190/110: 343-380.
- Komposch C. 2023. Spinnen (Arachnida: Araneae). Unter Mitarbeit von Lamprecht Julia, Waldner Laura. In: Komposch C. Rote Liste gefährdeter Tiere Kärntens. Naturwissenschaftlicher Verein für Kärnten. Klagenfurt. 481–568.
- Kostanjšek R. 2010. A contribution to the Slovenian spider fauna – I. *Natura Sloveniae*. 12: 23-33. <https://doi.org/10.14720/ns.12.2.23-33>
- Kostanjšek R., Gorjan A. 2013. A contribution to the Slovenian spider fauna - II. *Natura Sloveniae*. 15: 5-12. <https://doi.org/10.14720/ns.15.1.5-12>
- Kostanjšek R, Kuntner M. 2015. Araneae Sloveniae: a national spider species checklist. *ZooKeys*. 474: 1-91. <https://doi.org/10.3897/zookeys.474.8474>
- Krehenwinkel H, Rödder D, Năpăruș-Aljančič M, Kuntner M. 2016. Rapid genetic and ecological differentiation during the northern range expansion of the venomous yellow sac spider *Cheiracanthium punctorium* in Europe. *Evolutionary Applications*. 9: 229-240. <https://doi.org/10.1111/eva.12392>
- Kuntner M, Kostanjšek R. 2000. Prispevek k poznavanju favne pajkov zahodne Slovenije (Arachnida: Araneae). *Natura Sloveniae*. 2(1): 13-28. <https://doi.org/10.14720/ns.2.1.13-28>
- Kuralt Ž. 2016. Bioclimatic model of potential distribution of Mediterranean black widow (*Latrodectus tredecimguttatus*) [Master's thesis]. [Ljubljana (SLO)]: University of Ljubljana, Biotechnical Faculty.
- Kuralt Ž, Kostanjšek R. 2016. A contribution to the Slovenian spider fauna – III. *Natura Sloveniae*. 18: 69-75. <https://doi.org/10.14720/ns.18.2.69-75>
- Kuralt Ž, Kostanjšek R. 2019. A contribution to the Slovenian spider fauna – IV. *Natura Sloveniae*. 21: 21-45. <https://doi.org/10.14720/ns.21.1.21-45>
- Legittimo CM, Simeon E, Di Pompeo P, Kulczycki A. 2017. The Italian species of *Pritha* (Araneae, Filistatidae): a critical revision and description of two new species. *Zootaxa*. 4243(2): 201-248. <https://doi.org/10.11646/zootaxa.4243.2.1>
- Locket GH, Millidge AF. 1953. British spiders. Vol. 2. London (GB): Ray Society.
- Mršič N. 1997. Biotic diversity in Slovenia: Slovenia - the »hot spot« of Europe. Ministrstvo za okolje in prostor, Uprava RS za varstvo narave, Ljubljana, p. 55-61.
- Muster C. 2001. Biogeographie von Spinnentieren der mittleren Nordalpen (Arachnida: Araneae, Opiliones, Pseudoscorpiones). *Verhandlungen des Naturwissenschaftlichen Vereins in Hamburg (NF)*. 39: 5-196. <https://doi.org/10.1071/IS08044>
- Muster C. 2009. Phylogenetic relationships within Philodromidae, with a taxonomic revision of *Philodromus* subgenus *Artanes* in the western Palearctic (Arachnida: Araneae). *Invertebrate Systematics*. 23: 135-169. <https://doi.org/10.1111/zsc.12404>
- Muster C, Michalik P. 2020. Cryptic diversity in ant-mimic *Micaria* spiders (Araneae, Gnaphosidae) and a tribute to early naturalists. *Zool Scripta*. 49: 197- 209.

- Nentwig W, Blick T, Bosmans R, Gloor D, Hänggi A, Kropf C. 2023. Spiders of Europe. Version 10.2023. [accessed on 20. 10. 2023]; <https://www.araneae.nmbe.ch/>
- Oger P. 2023. Les araignées de Belgique et de France. [accessed on 20. 10. 2023]; <http://arachno.piwigo.com/>
- Řezáč M, Růžicka V, Hula V, Dolanský J, Machač O, Roušar A. 2021. Spiders newly observed in Czechia in recent years – overlooked or invasive species? BioInvasions Records. 10(3): 555-566. <https://doi.org/10.3391/bir.2021.10.3.05>
- Roberts MJ. 1995. Collins Field Guide. Spiders of Britain & Northern Europe. London (GB): HarperCollins Publishers Ltd.
- Slovenian Museum of Natural History, Invertebrate Department. Database of Invertebrate Pictures. [accessed on 15. 1. 2024]; <https://www1.pms-lj.si/animalia/galerija.php?load=5529>
- Thaler K, Buchar J. 1996. Die Wolfspinnen von Österreich 3: Gattungen *Aulonia*, *Pardosa* (p. p.), *Pirata*, *Xerolycosa* (Arachnida, Araneae: Lycosidae). Faunistisch tiergeographische Übersicht. Carinthia II. 186/106: 393-410.
- Thuiller W. 2004. Patterns and uncertainties of species' range shifts under climate change. Global Change Biology. 10: 2020-2027. <https://doi.org/10.1111/j.1365-2486.2004.00859.x>
- World Spider Catalog. 2023. Version 24.5. Natural History Museum Bern. [accessed on 20.10.2023]; <http://wsc.nmbe.ch>
- Żabka M. 1997. Salticidae: Pajaki skaczace (Arachnida: Araneae) (Salticidae of Poland). Fauna Polski (Fauna Poloniae). 19: 1-188.



© 2024 Žan Kuralt, Neža Pajek Arambašič, Maja Ferle, Rok Kostanjšek

To je prostodostopen članek, objavljen pod določili licence Creative Commons Priznanje avtorstva 4.0 Mednarodna, ki dovoljuje neomejeno rabo, razširjanje in kopiranje v kakršnemkoli mediju ter obliki, pod pogojem, da sta navedena avtor in vir.

This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.