

Some rare and remarkable spider species from Hungary (Arachnida: Araneae)

Authors: Mezőfi, László, and Markó, Viktor

Source: Arachnologische Mitteilungen: Arachnology Letters, 55(1) : 1-9

Published By: Arachnologische Gesellschaft e.V.

URL: <https://doi.org/10.30963/aramit5501>

The BioOne Digital Library (<https://bioone.org/>) provides worldwide distribution for more than 580 journals and eBooks from BioOne's community of over 150 nonprofit societies, research institutions, and university presses in the biological, ecological, and environmental sciences. The BioOne Digital Library encompasses the flagship aggregation BioOne Complete (<https://bioone.org/subscribe>), the BioOne Complete Archive (<https://bioone.org/archive>), and the BioOne eBooks program offerings ESA eBook Collection (<https://bioone.org/esa-ebooks>) and CSIRO Publishing BioSelect Collection (<https://bioone.org/csiro-ebooks>).

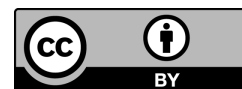
Your use of this PDF, the BioOne Digital Library, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Digital Library content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne is an innovative nonprofit that sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Some rare and remarkable spider species from Hungary (Arachnida: Araneae)

László Mezőfi & Viktor Markó



doi: 10.30963/aramit5501

Abstract. This study reports the first records of two spider species for Hungary: *Cyclosa sierrae* Simon, 1870 (Araneidae) and *Porrhomma oblitum* (O. P.-Cambridge, 1871) (Linyphiidae). *Cyclosa sierrae* also represents the first record of this species from Central Europe. Furthermore, we provide evidence about the occurrence of *Dysdera lata* Reuss, 1834 and *Philodromus marmoratus* Kulczyński, 1891 in Hungary and for six further species we report new data: *Brigittea vicina* (Simon, 1873) (Dictynidae), *Iberina microphthalma* (Snazell & Duffey, 1980) (Hahniidae), *Mermessus trilobatus* (Emerton, 1882) (Linyphiidae), *Pulchellodromus ruficapillus* (Simon, 1885) (Philodromidae), *Lasaeola prona* (Menge, 1868) (Theridiidae) and *Diaea livens* Simon, 1876 (Thomisidae). Comments on the distribution, biology and taxonomy of the ten mentioned spider species are provided.

Keywords: *Cyclosa sierrae*, distribution, *Dysdera lata*, first record, *Philodromus marmoratus*, *Porrhomma oblitum*

Zusammenfassung. Einige seltene und bemerkenswerte Spinnenarten aus Ungarn (Arachnida: Araneae). Diese Untersuchung enthält die Neunachweise von zwei Spinnenarten für Ungarn: *Cyclosa sierrae* Simon, 1870 (Araneidae) und *Porrhomma oblitum* (O. P.-Cambridge, 1871) (Linyphiidae). *Cyclosa sierrae* wird damit auch erstmals für Mitteleuropa gemeldet. Weiterhin werden *Dysdera lata* Reuss, 1834 und *Philodromus marmoratus* Kulczyński, 1891 für Ungarn belegt und von sechs Arten werden neue Daten präsentiert: *Brigittea vicina* (Simon, 1873) (Dictynidae), *Iberina microphthalma* (Snazell & Duffey, 1980) (Hahniidae), *Mermessus trilobatus* (Emerton, 1882) (Linyphiidae), *Pulchellodromus ruficapillus* (Simon, 1885) (Philodromidae), *Lasaeola prona* (Menge, 1868) (Theridiidae) und *Diaea livens* Simon, 1876 (Thomisidae). Verbreitung, Biologie und Taxonomie der zehn Arten werden diskutiert.

In the early twentieth century Chyzer & Kulczyński (1918) published the first comprehensive checklist of the spiders from Hungary, and already listed 742 species. More than 80 years later Samu & Szinetár (1999) updated the list according to the present borders of Hungary, thus their list contains 725 species. Since then many new additions have been reported for the fauna (e.g. Szűts et al. 2003, Pfliegler et al. 2012, Szinetár & Kovács 2013, Pfliegler 2014, Szinetár et al. 2014, 2015, Korányi et al. 2017) and several new species from the country were described (Szinetár & Samu 2003, Szinetár & Kancsal 2007, Szinetár et al. 2009, Kovács et al. 2015a). Presently, the Spiders of Europe database lists 800 spider taxa for Hungary (Nentwig et al. 2017), although the list is still far from complete. In this paper we report two further spider species which are new to the fauna of Hungary. We also provide a new data on the occurrence and biology of some rare and interesting spider species.

Material and methods

The spiders were collected sporadically in various parts of Hungary, mainly in apple orchards (Bács-Kiskun, Pest, Szabolcs-Szatmár-Bereg and Tolna counties) and city parks (Budapest, Gödöllő) from 2013 to 2016. Exact locations are indicated with some comments in the Results. A variety of collecting methods were used, including hand collecting, beating, cardboard bands and litter sampling. For collecting overwintering spiders from apple trees, we used corrugated cardboard stripes (height 20 cm), which were placed around the tree trunks, at about 20 cm above ground usually in September. The bands and litter samples were collected during winter months, and for processing the litter samples we used Winkler extractors (Sakchoowong et al. 2007). Juvenile specimens of *Philodromus marmoratus* Kulczyński, 1891 and *Pulchellodromus ruficapillus* (Simon, 1885) were kept alive

and fed with *Drosophila hydei* Sturtevant, 1921, until its final moult. The collected and reared specimens were stored in 70 % ethanol. Individuals were examined in the laboratory of the Department of Entomology, Szent István University. Identification was made under a binocular stereo microscope (Leica MZ6). In case of female specimens the genitalia were dissected from the specimens, and the epigynes/vulvas were cleared with 20 % KOH. The specimens were identified using various keys (see in the Results section), and were deposited in the first author's private collection. *Philodromus marmoratus* and *P. ruficapillus* habitus pictures were taken with a Nikon D3300 camera equipped with a Sigma 50mm 1:2.8 DG Macro lens. *Iberina microphthalma* (Snazell & Duffey, 1980), *Porrhomma oblitum* (O. P.-Cambridge, 1871) and *P. ruficapillus* epigynes/vulvas were photographed with a Zeiss Imager A2 light microscope equipped with AxioCam MRc5, and in other cases the photographs were taken with a Sony XCD-SX90CR digital interface connected to a Zeiss Stemi 2000 stereomicroscope. The specimens' parameters were measured with an ocular micrometer calibrated with a stage micrometer, and for post-processing work on the photographs, and for the preparation of the scale bars we used Adobe Photoshop CS3 software. Taxonomic names follow the nomenclature of the WSC (2017).

Results and discussion

As a result of our study the following ten new or rare spider species were recorded from Hungary:

Araneidae Clerck, 1757

Cyclosa sierrae Simon, 1870 (Fig. 1)

Determination. Levy 1997, Nentwig et al. 2017

Material examined. 1♂, Sükösd: 17.05.2016 – (46°17'59"N, 19°00'21"E, 100 m a.s.l., organic apple orchard). The specimen (leg. & det. L. Mezőfi) was collected by beating from the canopy of an apple tree.

Distribution. Europe to Georgia (WSC 2017). In Europe it occurs in Albania, Bulgaria, Cyprus, France (exclusively Corsica), Greece (including North Aegean Islands and Crete),

László MEZŐFI, Viktor MARKÓ: Department of Entomology, Faculty of Horticultural Science, Szent István University, Ménési út 44, H-1118 Budapest, Hungary; E-mails: mezofilaszlo@gmail.com, marko.viktor@kertk.szie.hu

submitted 6.7.2017, accepted 14.12.2017, online 27.2.2018

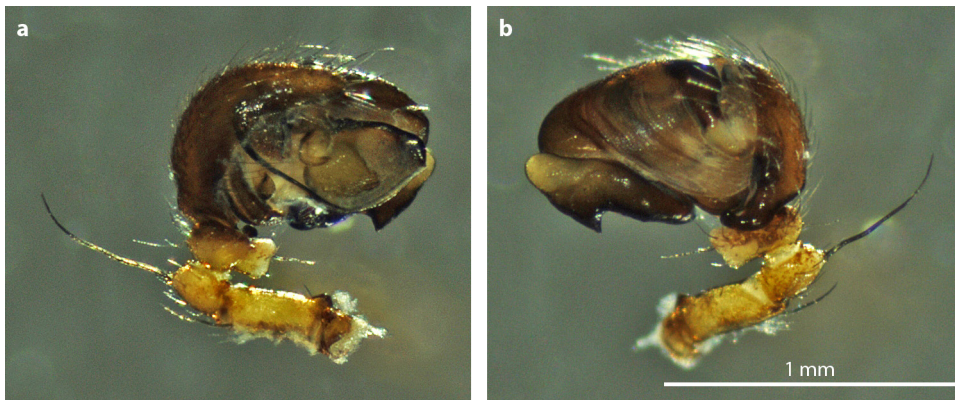


Fig. 1: Left palp of *Cyclosa sierrae* male from Hungary; **a.** prolateral view; **b.** retrolateral view

Italy (including Sardinia), Macedonia, Portugal, Russia (southern European part), Spain, Turkey (European part) and Ukraine (van Helsdingen 2017). It is also present in, e.g., Azerbaijan, Georgia, Iran, Israel, Lebanon, Syria and Turkey (Asian part) (Levy 1997, Kashefi et al. 2013, Komnenov 2013, Uyar et al. 2014).

Remarks. Until now, two representatives of the genus *Cyclosa* were known from Hungary: *C. conica* (Pallas, 1772) and *C. oculata* (Walckenaer, 1802) (Samu & Szinetár 1999). Here we report *C. sierrae* as the third member of this genus in Hungary.

This Mediterranean species usually occurs in steppe-like or shrub vegetations, but also occurs in *Pinus* forests (Komnenov 2013, Polchaninova & Prokopenko 2013, Ijland & van Helsdingen 2014, Uyar et al. 2014). *Cyclosa* spiders are easy to recognise by their habit of placing their prey remains and egg sacs in a vertical line crossing the center of their orb webs (Levy 1997). Furthermore, *Cyclosa* species can usually be easily distinguished from their relatives by, among other features, the posterior-dorsal extended opisthosoma which bears various humps (Levy 1997), but the identification of some species within the genus is difficult. In physical characteristics *C. sierrae* strongly resembles *C. conica*, but according to Mcheidze (2014) these two species can be distinguished on the basis of the sternum colouration: in case of *C. sierrae* the sternum is black (or dark brown) with yellow marks on the edge (one anterior transversal, one apical and two lateral marks), while in *C. conica* the sternum is entirely black, without yellow marks. Presumably the small-sized male specimen of this typically southern species reached the sampling site by ballooning. Spreading of this species in a northern direction has not been detected before in Europe.

Dictynidae O. P.-Cambridge, 1871

Brigittea vicina (Simon, 1873) (syn. *Dictyna vicina*) (Fig. 2)

Determination. Loksa 1969

Material examined. 8♀♀, Budapest: 1♀ 26.05.2016, 3♀♀ 23.06.2016 – Haller park (47°28'29"N, 19°04'48"E, 107 m a.s.l., urban green area); 1♀ 23.06.2016 – Róbert Károly körút (47°32'09"N, 19°03'48"E, 106 m a.s.l., urban green area); 1♀ 19.07.2016, 1♀ 13.09.2016 – Margit Island (47°31'19"N, 19°02'43"E, 103 m a.s.l., urban green area with floodplain-like forest vegetation); 1♀ 19.07.2016 – Vérmező (47°29'60"N, 19°01'43"E, 127 m a.s.l., urban green area). All the specimens (leg. D. Korányi, det. L. Mezőfi) were collected by beating mainly in urban environments, from canopies of *Acer campestre* trees.

Distribution. Mediterranean to Central Asia (WSC 2017). In Europe it is present in Bulgaria, Croatia, Czech Republic, France (including Corsica), Greece (including Crete), Hungary, Italy, Macedonia, Moldova, Romania, probably in Russia (north-western European part), Slovakia, Ukraine and former Yugoslavia (van Helsdingen 2017).

Remarks. A very rare mesophilic species (Havranek & Molnár 1965, Bryja et al. 2005b), which is critically endangered in, for example, the Czech Republic (Řezáč et al. 2015). However, *B. vicina* is not considered to be very rare in Hungary and it can be characterised as a species with a rather sporadic occurrence (Szinetár pers. comm.). It occurs in the herb layer of downy oak forests (Bryja et al. 2005b) or at forest edges (Havranek & Molnár 1965), although *B. vicina* was reported from urban areas (from *Picea abies* trees) as well (Szinetár 1992). In spite of the limited data on this species our results indicate that urban green ecosystems can provide appropriate habitats for *B. vicina*.

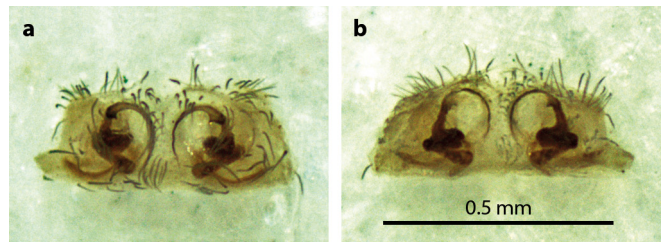


Fig. 2: Cleared, dissected epigyne/vulva of *Brigittea vicina* female from Hungary; **a.** epigyne, ventral view; **b.** epigyne/vulva, dorsal view

Dysderidae C. L. Koch, 1837

Dysdera lata Reuss, 1834 (Fig. 3)

Determination. Kovblyuk et al. 2008, Le Peru 2011, Bosmans et al. 2017

Material examined. 1♂, Budapest: 27.07.2016 – Budai Arborétum (47°28'49"N, 19°02'24"E, 120 m a.s.l., urban green area). The specimen (leg. & det. L. Mezőfi) was collected by hand on a pavement near a rockery in the Botanical Garden of the Szent István University.

Distribution. Mediterranean to Georgia (WSC 2017). In Europe this species occurs in Bulgaria, Cyprus, France (exclusively on Corsica), Greece (including North Aegean Islands, Cyclades and Crete), Moldova, Portugal, Romania, Russia (southern European part), Slovakia, Spain (exclusively on the Balearic Islands) and Ukraine (Otto 2015, Bosmans et al. 2017, van Helsdingen 2017, Lissner 2017).



Fig. 3: Right palp of *Dysdera lata* male from Hungary; **a.** prolateral view; **b.** retrolateral view

Remarks. Deeleman-Reinhold & Deeleman (1988) and Řezáč et al. (2008) suggested that Chyzer & Kulczyński (1897: p. 267, plate 10, fig. 39) and Loksa (1969: pp. 75, 76 and 79, fig. 52 A–B) misidentified *Dysdera westringi* O. P.-Cambridge, 1872 and the species which they actually had was *Dysdera taurica* Charitonov, 1956. Řezáč et al. (2008) also examined some *D. taurica* specimens from Hungary to prove its presence in this country. Nevertheless, in the next year *D. taurica* was established as a junior synonym of *D. lata* by Kovblyuk et al. (2008). The main difference between males of *D. westringi* and *D. lata* is that the former one has no teeth while the latter one has 3–7 teeth on the apical lobe of the bulb (Kovblyuk et al. 2008). In this paper we confirm the occurrence of *D. lata* in Hungary. *Dysdera westringi* is rare in Hungary (Szinetár et al. 2012), and in the light of the above mentioned problems in identification, all records need to be re-checked because they probably all belong to *D. lata*.

Hahniidae Bertkau, 1878

Iberina microphthalma (Snazell & Duffey, 1980)

(syn. *Hahnina microphthalma*) (Fig. 4)

Determination. Snazell & Duffey 1980, Szita et al. 1998

Material examined. 2♀♀, Madocsa: 27.09.2016 – (46°40'50"N, 18°58'32"E, 92 m a.s.l., commercial apple orchard treated with pesticides). The specimens (leg. L. Mezőfi, det. É. Szita) were collected by beating from canopies of apple trees.

Distribution. Only known from Czech Republic, Germany, Great Britain, Hungary and Switzerland (WSC 2017).

Remarks. Little is known about the biology of this rare species. Only a few records are available (Růžička & Dolanský 2016) and the male is still unknown. According to Snazell & Duffey (1980) the posterior median eyes are reduced, but various stages of eye reduction are possible and there may be differences in the form of the translucent copulatory ducts as well (Szita et al. 1998, Hänggi & Stäubli 2012). Růžička & Dolanský (2016) summarised earlier records and found that all previous specimens were collected on the ground surface or in the grass layer by various methods (e.g. by pitfall traps, sweeping), except some specimens that were collected using

pipe traps which were designed to catch subterranean invertebrates. Snazell & Duffey (1980) propose that some of the characteristics of the spider suggest subterranean habitat use and Růžička & Dolanský (2016) consider *I. microphthalma* as a 'soil spider'. Nonetheless, its occurrence in the canopy of apple trees (at a height of approximately 1.5 m above the ground) suggests that besides the soil layer or the ground level *I. microphthalma* can sometimes also occur on plants.

Linyphiidae Blackwall, 1859

Mermessus trilobatus (Emerton, 1882)

Determination. Nentwig et al. 2017, Šestáková et al. 2017

Material examined. 2♂♂, 3♀♀: 2♀♀ 15.12.2015 – Monorierdő (47°19'13"N, 19°31'12"E, 158 m a.s.l., organic apple orchard); 1♂ 05.02.2016 – Újfehértó (47°49'13"N, 21°39'58"E, 121 m a.s.l., organic apple orchard); 1♂, 1♀ 09.12.2016 – Sükösd (46°17'59"N, 19°00'21"E, 100 m a.s.l., organic apple orchard). The specimens (leg. & det. L. Mezőfi) were collected by litter sampling.

Distribution. North America. Introduced to Azores, Europe (WSC 2017). In Europe it is present in Austria, Belgium, Croatia, Czech Republic, France, Germany, Great Britain, Hungary, Italy, Netherlands, Poland, Portugal (exclusively on Azores), Slovakia, Slovenia, Switzerland and Ukraine (Dolanský et al. 2009, Katušić 2009, Kovács et al. 2015b, Szinetár et al. 2015, van Helsdingen 2017, Hirna 2017).

Remarks. This North American linyphiid spider was first found in Germany in the early 1980s and *M. trilobatus* is probably now the most frequently occurring alien spider in Europe (Nentwig & Kobelt 2010). This invasive ground-living species is probably spreading primarily by ballooning (Košulič et al. 2013, Blandenier et al. 2014) and its high colonization ability may relate to this, although the exact reasons for the success of *M. trilobatus* are still unclear (Eichenberger et al. 2009). In Hungary the first specimen was collected in 2012 (Kovács et al. 2015b), and since then it was found in several locations, especially in the western part of the country (e.g.

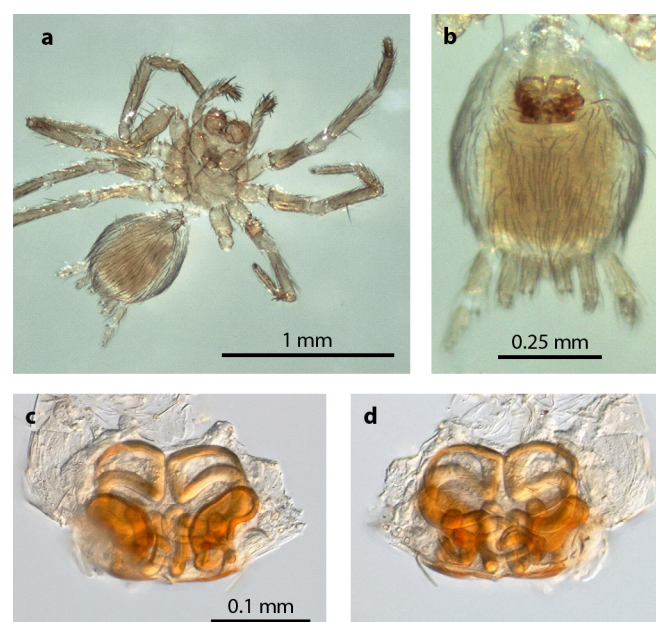


Fig. 4: *Iberina microphthalma* female from Hungary; **a.** general appearance, dorsal view; **b.** opisthosoma with epigyne, ventral view; **c.** epigyne/vulva, dorsal view; **d.** epigyne, ventral view

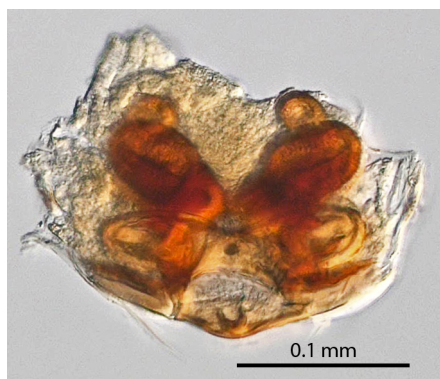


Fig. 5: Cleared, dissected epigyne/vulva of *Porrhomma oblitum* female from Hungary; dorsal view

Kovács & Szinetár 2015, Kovács et al. 2015b, Szinetár et al. 2015). Our results indicate that in recent years this species colonized almost the entire country, the central (Monorierdő), the southern (Sükösd) and the eastern (Újfehértó) parts equally. The species can also be expected to reach Serbia and Romania in the near future.

***Porrhomma oblitum* (O. P.-Cambridge, 1871)** (Fig. 5)

Determination. Merrett 1994, Russell-Smith 2009

Material examined. 1♀, Nagykálló: 05.02.2016 – (47°53'17"N, 21°48'57"E, 116 m a.s.l., organic apple orchard). The specimen (leg. & det. L. Mezőfi) was collected from a cardboard band.

Distribution. Europe (WSC 2017): Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Iceland, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Romania, Russia (Eastern European part), Slovakia and Switzerland (van Helsdingen 2017).

Remarks. Samu & Szinetár (1999) listed seven *Porrhomma* species from Hungary: *P. convexum* (Westring, 1851), *P. errans* (Blackwall, 1841), *P. microphthalmum* (O. P.-Cambridge, 1871), *P. montanum* Jackson, 1913, *P. profundum* Dahl, 1939, *P. pygmaeum* (Blackwall, 1834) and *P. rosenbaueri* (L. Koch, 1872), however the presence of *P. errans* and *P. rosenbaueri*, are uncertain (Samu & Szinetár 1999). Szinetár & Horváth (2006) cited the unpublished M.Sc. thesis of Kovács (2002) for *P. oblitum*, suggesting that the species also occurs in Hungary, but in this thesis *P. oblitum* was not mentioned. Consequently, to the best of our knowledge we report *P. oblitum* for the first time in Hungary, making it the eighth member of its genus in the country.

This species is a facultative bark-dweller and it may occur in arable lands or various open and forest habitats, especially in semi-humid and humid ones (Blick et al. 2000, Szinetár & Horváth 2006). Identification of *Porrhomma* species is quite difficult. Both *P. oblitum* and *P. montanum* belong to the *Porrhomma* group, where the metatarsi are spineless, femur I has only one prolateral spine and the dorsal spines are lacking, and tibia I has a prolateral spine. *Porrhomma oblitum* and *P. montanum* can be distinguished from each other only by small details of the dissected and cleared genitalia (Russell-Smith 2009, Šestáková 2011).

Philodromidae Thorell, 1870

Philodromus marmoratus Kulczyński, 1891

(syn. *P. buddenbrocki* Braun, 1965) (Fig. 6)

Determination. Kubcová 2004, Muster & Thaler 2004

Material examined. 2♂♂, 2♀♀ Budapest: 1♀ (leg. V. Hoffmann, det. L. Mezőfi) 20.04.2016, 1♀, 1♂ (leg. D. Gyóni, det. L. Mezőfi) 29.07.2016 – Margit Island (47°31'19"N, 19°02'43"E, 103 m a.s.l., urban green area with floodplain-like forest vegetation) (The male is a reared specimen, reached maturity after the ninth moult on 29.05.2017.). All specimens were collected by beating from shrubs. 1♂ (det. L. Mezőfi) an additional individual, an offspring of the female collected on 29.07.2016 was also examined. This reared specimen emerged from the egg on 10.08.2016 and reached maturity after the ninth moult on 19.05.2017.

Distribution. Only in Austria, Bulgaria, Czech Republic, Hungary, Slovakia, Ukraine and former Yugoslavia (with newer data from Serbia) (Grbić & Savić 2010, van Helsdingen 2017).

Remarks. A very rare species (Bryja et al. 2005a, 2005b), which is endangered in, e.g., the Czech Republic (Řezáč et al. 2015) and occurs near wetlands or floodplain forests (Jäger 1995, Bryja et al. 2005b). This species belongs to the *Philodromus aureolus* group (Segers 1992) and was originally described as *P. aureolus* ssp. *marmoratus* (in Chyzer & Kulczyński 1891). Segers (1992) firstly mentioned that *P. buddenbrocki* is possibly a synonym of *P. aureolus marmoratus* and later Kubcová (2004) clarified the situation and established *P. buddenbrocki* as a junior synonym of *P. marmoratus*. Although Chyzer & Kulczyński (1918), in their spider checklist reported several *P. aureolus marmoratus* records from the present territory of Hungary, surprisingly *P. marmoratus* was not included in the Hungarian checklist of spiders (Samu & Szinetár 1999), probably because of its uncertain taxonomic status. Our data provide further evidence for the occurrence of *P. marmoratus* in Hungary. Furthermore, one individual (♂) was successfully reared from the egg. After the spider had emerged, it moulted nine times until maturity was reached. The other reared specimen (♂) which had been collected as a small nymph also moulted nine times until it reached adult stage. These observations indicate that *P. marmoratus* may have nine or more instars before maturity.

Pulchellodromus ruficapillus (Simon, 1885)

(syn. *Philodromus ruficapillus*) (Fig. 7)

Determination. Muster et al. 2007, Kastrygina & Kovblyuk 2014

Material examined. 2♀♀, Nagykálló: 09.05.2016 – (47°53'17"N, 21°48'57"E, 116 m a.s.l., organic apple orchard) (reared specimens, final moulting reached on 25.07.2016). The specimens (leg. & det. L. Mezőfi) were collected by beating method from canopy of apple trees.

Distribution. Mediterranean to Kazakhstan (WSC 2017). In Europe it was found in Albania, Austria, France, Greece (including North Aegean Islands and Crete), Hungary, Italy, Portugal, Romania, Spain and Ukraine (van Helsdingen 2017).

Remarks. In 2012 the genus *Pulchellodromus* was separated from the genus *Philodromus* by Wunderlich (2012), and the genus now contains 13 cryptic species (WSC 2017), mostly from the Mediterranean region (Muster et al. 2007, Wunderlich 2012). Two of them have data from Hungary: *P. pulchellus* (Lucas, 1846) (Déri et al. 2007, Kancsal et al. 2010) and *P. ruficapillus*, the latter of which seems to have the largest distribution area among the other species of the genus (Duma

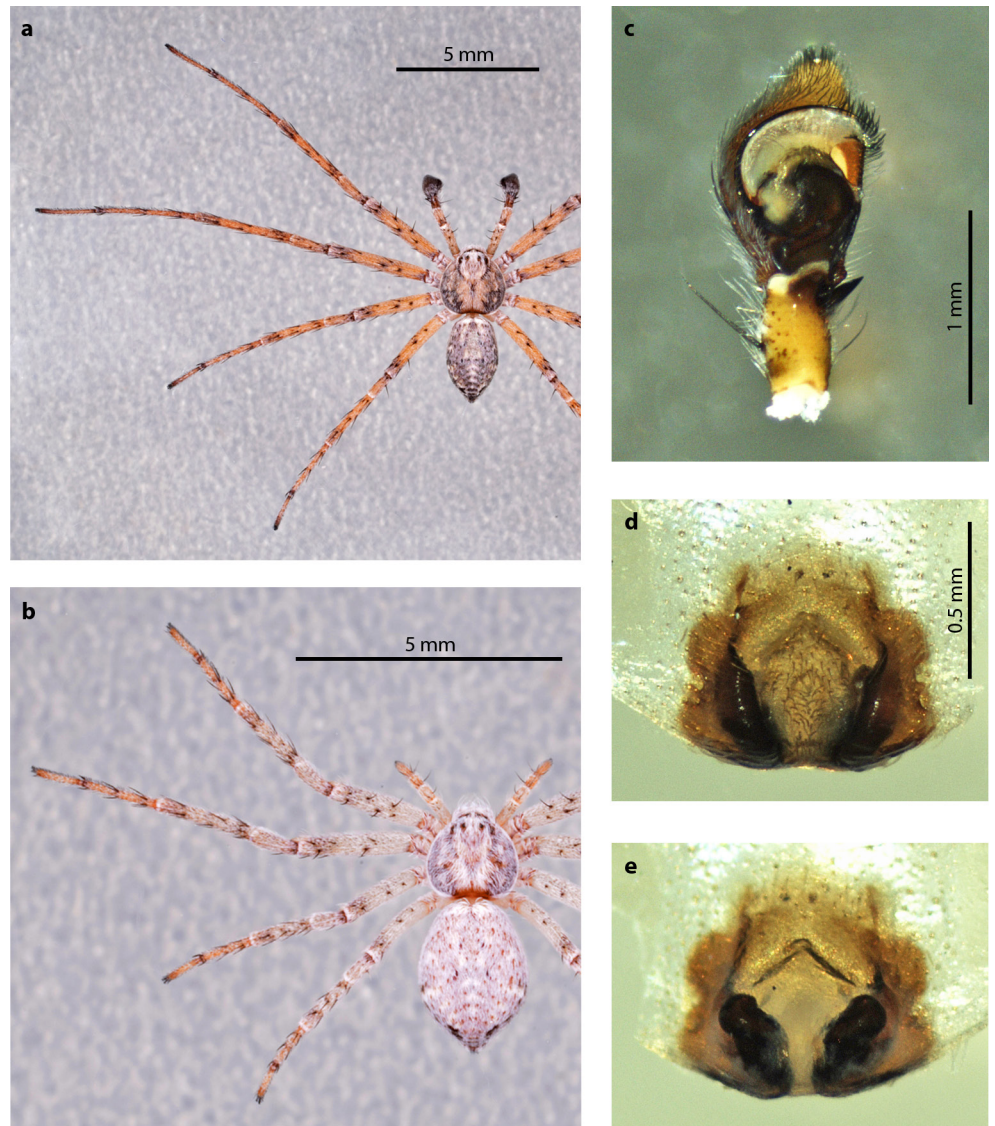


Fig. 6: *Philodromus marmoratus* specimens from Hungary; **a.** male, general appearance, dorsal view; **b.** female, general appearance, dorsal view; **c.** male's left palp, ventral view; **d.** epigyne, ventral view; **e.** epigyne/vulva, dorsal view

2008). Until now, in Hungary *P. ruficapillus* has been found in Fertő-Hanság (Northwestern Hungary) (Muster et al. 2007) and in the Balaton Upland (Szinetár et al. 2016), but our data (Nagykálló, Northeastern Hungary) suggest that it is widespread throughout Hungary. Furthermore, all the records of *P. pulchellus* from Hungary need to be re-checked, because they probably all belong to *P. ruficapillus* (Szinetár et al. 2016). *Pulchellodromus ruficapillus* occurs usually in wetlands or along riverbanks and also on seashores (Muster et al. 2007, Duma 2008, Szinetár et al. 2016).

Theridiidae Sundevall, 1833

Lasaeola prona (Menge, 1868) (syn. *Dipoena prona*)

Determination. Roberts 1985, Le Peru 2011

Material examined. 1♂, 2♀♀, 3 sub ♂♂, 4 sub ♀♀, 1 nymph: 2♀♀ (leg. C. Nagy, det. L. Mezőfi) 28.04.2014 (The specimens were collected from their webs, at the base of apple trees.), 1♂ (leg. & det. L. Mezőfi) 09.07.2014 (This specimen was consumed by a *Carrhotus xanthogramma* (Latreille, 1819) nymph (det. L. Mezőfi) on an apple tree.) – Újfehértó (47°49'13"N, 21°39'58"E, 121 m a.s.l., organic apple orchard). The spi-

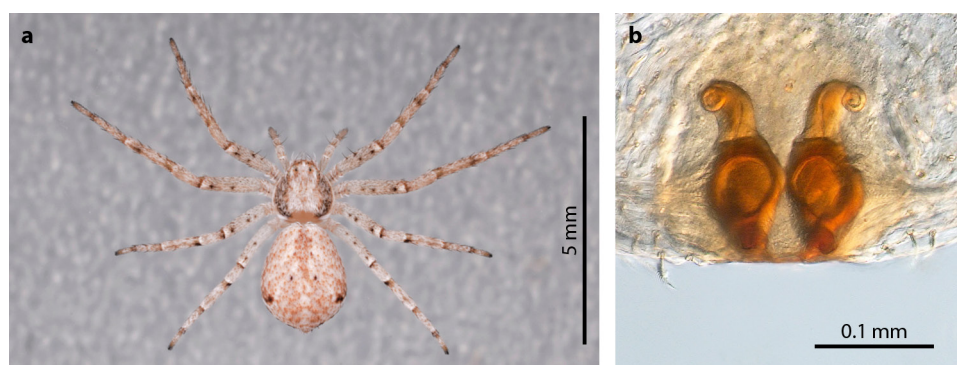


Fig. 7: *Pulchellodromus ruficapillus* female from Hungary; **a.** general appearance, dorsal view; **b.** epigyne/vulva, dorsal view

ders were collected by hand. 1 sub ♂ 01.12.2013 – Zsurk (48°24'54"N, 22°12'45"E, 103 m a.s.l., commercial apple orchard); 1 sub ♀ 01.12.2013 – Zsurk (48°23'30"N, 22°12'52"E, 105 m a.s.l., commercial apple orchard). These specimens (leg. M. Paróczai, det. L. Mezőfi) were collected by the cardboard band method. 1 nymph 22.09.2015 – Nyírsaholy (47°55'17"N, 22°18'43"E, 126 m a.s.l., organic apple orchard); 1 sub ♂ 05.02.2016 – Újfehértó (47°49'13"N, 21°39'58"E, 121 m a.s.l., organic apple orchard). These specimens (leg. & det. L. Mezőfi) were collected by the cardboard band method. 1 sub ♂, 3 sub ♀♀ 05.02.2016 – Újfehértó (47°49'13"N, 21°39'58"E, 121 m a.s.l., organic apple orchard). The specimens (leg. & det. L. Mezőfi) were collected by litter sampling.

Distribution. North America, Europe, Caucasus, Japan (WSC 2017). In Europe it is widely distributed: Albania, Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Russia (eastern European, northern European and Kaliningrad Region), Slovakia, Slovenia, Spain, Sweden, Switzerland and Ukraine (van Helsdingen 2017).

Remarks. Although widely distributed in Europe, this is quite a rare species and its biology is partly unknown (Nentwig et al. 2017). *Lasaeola prona* was classified as near threatened in the Carpathian Red List (Gajdoš et al. 2014), while in the Czech Republic it is critically endangered (Řezáč et al. 2015). Although much of its biology was previously unknown, more is known about it today. This thermophilous species usually occurs in open xerothermic habitats (Bryja et al. 2005b, Franc & Korenko 2008) and is often found at ground level, e.g. under stones (Roberts 1985). Adult individuals appear mostly from early June to the end of August (Szinétár 1995, Franc & Korenko 2008, Kovblyuk et al. 2012, Kostanjšek & Gorjan 2013, Aakra et al. 2016), and our data indicates that the mentioned species overwinters mainly in the subadult stage under bark or in the litter. Therefore, it seems that *L. prona* is a stenochronous species with a summer reproductive and dispersing period. Furthermore, we have observed the two collected female individuals (see above) preying on ants [*Lasius niger* (Linnaeus, 1758), det. C. Nagy]. In *Dipoena* sensu lato myrmecophagy is a known phenomenon (Roberts 1985, Le Peru 2011), therefore *L. prona* is probably also a myrmecophagous species.

Thomisidae Sundevall, 1833

Diaea livens Simon, 1876 [syn. *D. pictilis* (Banks, 1896)]

Determination. Buchar & Thaler 1984, Nentwig et al. 2017

Material examined. 2♂♂, 1 ♀, 2 sub ♂♂, 1 sub ♀, 3 nymphs: 1♀ 30.05.2015 – Gödöllő (47°35'35"N, 19°21'38"E, 222 m a.s.l., urban green area). The spider (leg. V. Hoffmann, det. L. Mezőfi) was collected by hand from a shrub. 1♂ 27.04.2016, 1 sub ♂ 14.10.2016 – Budapest, Normafa (47°30'24"N, 18°57'43"E, 463 m a.s.l., urban green area with deciduous forest vegetation); 1♂ 26.05.2016, 1 nymph 14.09.2016, 1 sub ♂ 14.10.2016 – Budapest, Széchenyi-hegy (47°29'43"N, 18°58'31"E, 462 m a.s.l. urban green area); 1 sub ♀ 14.09.2016, 1 nymph 14.10.2016 – Budapest, Hűvösvölgy (47°32'31"N, 18°57'46"E, 228 m a.s.l. urban green area with deciduous forest vegetation); 1 nymph 14.09.2016 – Budapest, Zugligeti út (47°31'04"N, 18°59'08"E, 180 m a.s.l., urban green area). These specimens (leg. D. Korányi, det. L. Mezőfi) were col-

lected by beating mainly in urban forest areas from canopies of *Acer campestre* trees.

Distribution. Southern and Central Europe, Turkey, Caucasus. Introduced to USA (WSC 2017). In Europe it is present in Albania, Austria, Bulgaria, Czech Republic, France, Germany, Greece, Hungary, Italy, Serbia, Slovakia, Slovenia, Spain, Switzerland, Turkey (European part) and Ukraine (Tomić & Grbić 2008, van Helsdingen 2017).

Remarks. Throughout Europe this is a very rare species (Nentwig et al. 2017) which was classified as vulnerable in the Carpathian Red List (Gajdoš et al. 2014) while in the Czech Republic it is endangered (Řezáč et al. 2015). In Hungary it was firstly detected by Szinetár (1995) and since then the spider was found at several locations within the country (Bogya et al. 1999, Horváth & Szinetár 2002, Szita et al. 2002, Horváth et al. 2009, Kovács et al. 2009, Szinetár et al. 2011, Keresztes 2013, Szita et al. 2014), although *D. livens* is still a quite rare species here. This species is a facultative bark-dweller (Szinétár & Horváth 2006) and occurs almost exclusively in oak forests on shrubs and lower branches of trees (Szinétár 1995, Szinetár et al. 2011, Nentwig et al. 2017). Although it has several records from other habitats/plants: e.g. from apple (Keresztes 2013) and pear (Bogya et al. 1999) orchards, from *Pinus nigra*, *Platanus hybrida* (Szinétár & Horváth 2006), *Tilia* spp. and from *Acer* spp. trees (Stenchly et al. 2007, Keresztes 2013). We collected several specimens from *A. campestre* trees as well, which suggests that *D. livens* might be less tightly bounded to the oak forests. The specimen collected in Gödöllő was consuming a *Smaragdina aurita* (Linnaeus, 1767) (Chrysomelidae) (det. L. Mezőfi) adult on a shrub.

Conclusions

Given their presence in neighbouring countries and distribution in Europe, the occurrence of the new records (*C. sierrae* and *P. oblitum*) for Hungary is not surprising. Probably the two above mentioned species were naturally spread to Hungary, because human-mediated dispersal is less typical for Araneidae and Linyphiidae species (Nentwig 2015). At the moment, the Spiders of Europe database lists 800 spider taxa for Hungary (Nentwig et al. 2017), but the spiders reported here, and the many other recently described and first recorded species, indicate that the list is still far from complete. Therefore, in Hungary the number of spider species can be estimated to be much higher than 800. According to Nentwig (2015) international trade and climate change are the major factors that facilitate the spread and establishment of alien spider species. Currently one alien spider species per year is introduced to Europe, but this rate will surely increase in future. Therefore, it is important to continue the arachnological exploration of Hungary because, as in the case of Europe in general, many new species are expected to emerge in this country and also not all species that supposedly occur in Hungary have been found and listed yet.

Acknowledgements

The authors would like to thank Árpád Szabó for his help with the preparation of the photographs, Éva Szita for her help with the identification of *I. microphthalmus* and checking *D. lata*, and Dávid Korányi, Viktória Hoffmann, Dorottya Gyóni, Csaba Nagy and Márton Paróczai for collecting many of the specimens. We would also like to thank Dóra Hoppál and István Bernát for their assistance

in collecting and processing the samples. The study was financially supported by the National Research, Development and Innovation Office of Hungary (K112743).

References

- Aakra K, Morka GH, Antonsen A, Farlund M, Wrånes RE, Frølandshagen R, Løvbrekke H, Furuseth P, Fjellberg A, Lemke M, Pfliegler WP, Andersen S, Olsen KM, Aadland B & Berggren K 2016 Spiders new to Norway (Arachnida, Araneae) with ecological, taxonomical and faunistic comments. – *Norwegian Journal of Entomology* 63: 6–43
- Blandenier G, Bruggisser OT & Bersier L-F 2014 Do spiders respond to global change? A study on the phenology of ballooning spiders in Switzerland. – *Écoscience* 21: 79–95 – doi: [10.2980/21-1-3636](https://doi.org/10.2980/21-1-3636)
- Blick T, Pfiffner L & Luka H 2000 Epigäische Spinnen auf Äckern der Nordwest-Schweiz im mitteleuropäischen Vergleich (Arachnida: Araneae). – *Mitteilungen der Deutschen für Gesellschaft allgemeine und angewandte Entomologie* 12: 267–276
- Bogya S, Szinetár C & Markó V 1999 Species composition of spider (Araneae) assemblages in apple and pear orchards in the Carpathian Basin. – *Acta Phytopathologica et Entomologica Hungarica* 34: 99–121
- Bosmans R, Lissner J & Hernández-Corral J 2017 The spider family Dysderidae in the Balearic Islands. – *Zootaxa* 4329: 375–391 – doi: [10.11646/zootaxa.4329.4.4](https://doi.org/10.11646/zootaxa.4329.4.4)
- Bryja V, Řezáč M, Kubcová L & Kůrka A 2005a Three interesting species of the genus *Philodromus* Walckenaer, 1825 (Araneae: Philodromidae) in the Czech Republic. – *Acta Musei Moraviae, Scientiae Biologicae* 90: 185–194
- Bryja V, Svatoň J, Chytil J, Majkus Z, Růžicka V, Kasal P, Dolanský J, Buchar J, Chvátalová I, Řezáč M, Kubcová L, Erhart J & Fenclová I 2005b Spiders (Araneae) of the Lower Morava Biosphere Reserve and closely adjacent localities (Czech Republic). – *Acta Musei Moraviae, Scientiae Biologicae* 90: 13–184
- Buchar J & Thaler K 1984 Eine Zweite *Diaea*-Art in Mitteleuropa: *Diaea pictilis* (Araneida, Thomisidae). – *Věstník Československé Zoologické Společnosti v Praze* 48: 1–8
- Chyzer K & Kulczyński L 1891 Araneae Hungariae. Tomus I: Salticoidae, Oxyopoidae, Lycosoidae, Heteropodoidae, Misumenoidae, Euetrioidae, Tetragnathoidae, Uloboroidae, Pholcoidea, Scytodidae, Urocteoidea, Eresoidae, Dictynnoidea. *Academiae Scientiarum Hungaricae, Budapest*. 170 pp. 4 pl.
- Chyzer K & Kulczyński L 1897 Araneae Hungariae. Tomus II, pars posterior: Zodarioidae, Agelenoidae, Drassoidae, Zoropseoidae, Dysderoidae, Filistatoidae, Calommatoidae, Theraphosoidae. *Academiae Scientiarum Hungaricae, Budapest*. pp. 147–366, pl. VI–X
- Chyzer K & Kulczyński L 1918 Ordo Araneae. In: *A Magyar Birodalom Állatvilága. Királyi Magyar Természettudományi Társulat, Budapest*. 33 pp.
- Deeleman-Reinhold CL & Deeleman PR 1988 Revision des Dysderinae (Araneae, Dysderidae), les espèces méditerranéennes occidentales exceptées. – *Tijdschrift voor Entomologie* 131: 141–269
- Déri E, Horváth R, Lengyel S, Nagy A & Varga Z 2007 Zoológiai kutatások a gépi kaszálás hatásának vizsgálatára hat magyarországi tájegységben. [Zoological studies on the effects of mowing in six regions of Hungary]. – *Állattani Közlemények* 92: 59–70
- Dolanský J, Řezáč M & Kůrka A 2009 *Mermessus trilobatus* (Emerton, 1882) (Araneae, Linyphiidae) – nový druh pavučienky v České republice. [Mermessus trilobatus (Emerton, 1882) (Araneae, Linyphiidae) – a new spider species in the Czech Republic]. – *Východočeský sborník přírodovědný – Práce a studie* 16: 143–144
- Duma I 2008 *Philodromus ruficapillus* Simon, 1885 (Araneidae: Philodromidae): new data on the morphological variability and northern distribution limits of the species. – *North-Western Journal of Zoology* 4: 150–153
- Eichenberger B, Siegenthaler E & Schmidt-Entling MH 2009 Body size determines the outcome of competition for webs among alien and native sheetweb spiders (Araneae: Linyphiidae). – *Ecological Entomology* 34: 363–368 – doi: [10.1111/j.1365-2311.2008.01085.x](https://doi.org/10.1111/j.1365-2311.2008.01085.x)
- Franc V & Korenko S 2008 Spiders (Araneae) from the Panský diel (Starohorské vrchy Mts, Slovakia). – *Arachnologische Mitteilungen* 36: 9–20 – doi: [10.5431/aramit3603](https://doi.org/10.5431/aramit3603)
- Gajdoš P, Moscaliuc LA, Rozwałka R, Hirna A, Majkus Z, Gubányi A, Heltai MG & Svatoň J 2014 Red list of spiders (Araneae) of the Carpathian Mts. In: Kadlecík J (ed.) *Carpathian red list of forest habitats and species – Carpathian list of invasive alien species (DRAFT)*. Štátna ochrana prírody Slovenskej republiky, Banská Bystrica. pp. 118–171
- Gričić G & Savić D 2010 Contribution to the knowledge of the spider fauna (Arachnida, Araneae) on the Fruška Gora Mt. – *Acta Entomologica Serbica* 15: 243–260
- Havranek L & Molnár H 1965 Preliminary report on the Arachnidea-fauna of the Tisza-valley. – *Tiscia* 1: 93–107
- Hänggi A & Stäubli A 2012 Nachträge zum „Katalog der schweizerischen Spinnen“ 4. Neunachweise von 2002 bis 2011. – *Arachnologische Mitteilungen* 44: 59–76 – doi: [10.5431/aramit4410](https://doi.org/10.5431/aramit4410)
- Helsdingen PJ van 2017 “Araneae.” In: *Fauna Europaea Database*, Version 2017.1. – Internet: <http://www.european-arachnology.org> (May 16, 2017)
- Hirna A 2017 First record of the alien spider species *Mermessus trilobatus* (Araneae: Linyphiidae) in Ukraine. – *Arachnologische Mitteilungen* 54: 41–43 – doi: [10.5431/aramit5409](https://doi.org/10.5431/aramit5409)
- Horváth R & Szinetár C 2002 Ecofaunistic study of bark-dwelling spiders (Araneae) on black pine (*Pinus nigra*) in urban and forest habitats. – *Acta Biologica Debrecina* 24: 87–101
- Horváth R, Magura T, Szinetár C & Tóthmérész B 2009 Spiders are not less diverse in small and isolated grasslands, but less diverse in overgrazed grasslands: A field study (East Hungary, Nyírség). – *Agriculture, Ecosystems and Environment* 130: 16–22 – doi: [10.1016/j.agee.2008.11.011](https://doi.org/10.1016/j.agee.2008.11.011)
- Ijland S & Helsdingen PJ van 2014 On some spiders (Arachnida, Araneae) from the surroundings of Castellabate, Italy. – *Nieuwsbrief SPINED* 34: 16–33
- Jäger P 1995 Spinnenaufsammlungen aus Ostösterreich mit vier Erstnachweisen für Österreich. – *Arachnologische Mitteilungen* 9: 12–25 – doi: [10.5431/aramit0902](https://doi.org/10.5431/aramit0902)
- Kancsal B, Szinetár C, Bognár V & Angyal D 2010 Data to the spider fauna (Araneae) of Lake Velence. – *Natura Somogyiensis* 17: 133–140
- Kashefi R, Ghassemzadeh F, Kami HG & Mirshamsi O 2013 New data on spider fauna from Golestan province, Iran (Arachnida, Araneae). – *Progress in Biological Sciences* 3: 7–22
- Kastrygina ZA & Kovblyuk MM 2014 The spider genus *Pulchellodromus* Wunderlich, 2012 in the Crimea (Aranei: Philodromidae). – *Arthropoda Selecta* 23: 279–283
- Katušić L 2009 Prvi nález alohtone vrste pauka *Mermessus trilobatus* (Emerton, 1882) (Araneae: Linyphiidae) u Hrvatskoj. [First record of the allochthonous spider species *Mermessus trilobatus* (Emerton, 1882) (Araneae: Linyphiidae) in Croatia]. In: 10. Hrvatski biološki kongres s međunarodnim sudjelovanjem, 14–29 September 2009, Zbornik sažetaka. Hrvatsko biološko društvo, Zagreb. pp. 207–208 (in Croatian and English) – Internet: <http://bib.irb.hr/prikazi-rad?rad=661261> (October 31, 2017)
- Keresztes B 2013 Növényvédelmi technológiák hatása pók (Araneae) együttesekre, fás szárú kertészeti kultúrákban. [Effect of pest management systems on spider (Araneae) assemblages in woody horticultural crops]. Ph.D. thesis, Institute of Plant Protection, Georgikon Faculty, University of Pannonia, Keszthely. 221 pp.
- Kommenov M 2013 Spider fauna of the Osogovo Mt. Range, Northeastern Macedonia. – *Fauna Balkana* 2: 1–267
- Korányi D, Mezőfi L & Markó V 2017 First record of the jumping spider *Icius subinermis* (Araneae, Salticidae) in Hungary. – *Arachnologische Mitteilungen* 54: 38–40 – doi: [10.5431/aramit5408](https://doi.org/10.5431/aramit5408)
- Kostanjšek R & Gorjan A 2013 A contribution to the Slovenian spider fauna – II. – *Natura Sloveniae* 15: 5–12
- Košulić O, Nováková L & Štátná P 2013 Epigeic spiders (Araneae) from the Malá Dohoda Quarry (Moravian Karst Protected Lands-

- cape Area, Czech Republic). – *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 61: 651–662 – doi: [10.11118/actaun201361030651](https://doi.org/10.11118/actaun201361030651)
- Kovács K 2002 Kéreglakó pókok (Araneae) vizsgálata három fafajon. [Study of the bark-dwelling spiders on different trees in West Hungary]. M.Sc. thesis, Department of Zoology, Berzsenyi Dániel College, Szombathely. 34 pp.
- Kovács G, Prazsák I, Eichardt J, Vári G & Gyurkovics H 2015 A new ladybird spider from Hungary (Araneae, Eresidae). – *ZooKeys* 494: 13–30 – doi: [10.3897/zookeys.494.8676](https://doi.org/10.3897/zookeys.494.8676)
- Kovács P & Szinetár C 2015 Az Iváni-szikek Természetvédelmi Terület pókfáunájának jellemzése. [The spider fauna of the Iváni alkaline steppes Natural Reserve]. – *Folia Musei Historico-Naturalis Bakonyiensis* 32: 81–92
- Kovács P, Szinetár C & Eichardt J 2009 A I. Magyar Biodiverzitás Napok (Gyűrűfű 2006–2008) arachnológiai eredményei (Araneae). [Evaluation of spider (Araneae) species collected during the 1st Hungarian Biodiversity Days at Gyűrűfű (2006–2008) in South-Hungary]. – *Natura Somogyiensis* 13: 43–52
- Kovács P, Szinetár C & Takács G 2015 Szigetköz néhány jellemző élőhely-típusának arachnológiai állapotfelmérése (2013–2014). [Arachnological evaluation of Szigetköz's several typical habitat types (2013–2014)]. – *Natura Somogyiensis* 26: 39–54
- Kovblyuk MM, Marusik YM & Omelko MM 2012 A survey of Transcaucasian *Dipoena* sensu lato (Aranei: Theridiidae) with a description of new species. – *Arthropoda Selecta* 21: 247–254
- Kovblyuk MM, Prokopenko EV & Nadolny AA 2008 Spider family Dysderidae of the Ukraine (Arachnida, Aranei). – *Eurasian Entomological Journal* 7: 287–306 [in Russian]
- Kubcová L 2004 A new spider species from the group *Philodromus aureolus* (Araneae, Philodromidae) in Central Europe. – *Denisia* 12: 291–304
- Le Peru B 2011 The spiders of Europe, a synthesis of data: Volume 1 Atypidae to Theridiidae. – *Mémoires de la Société Linnéenne de Lyon* 2: 1–522
- Levy G 1997 Twelve genera of orb-weaver spiders (Araneae, Araneidae) from Israel. – *Israel Journal of Zoology* 43: 311–365
- Lissner J 2017 New records of spiders (Araneae) from Portugal. – *Arachnologische Mitteilungen* 54: 52–58 – doi: [10.5431/aramit5412](https://doi.org/10.5431/aramit5412)
- Loksa I 1969 Pókok I. – *Araneae I.* – *Fauna Hungariae* 97(18.2): 1–133
- Mcheidze T (ed. Otto S) 2014 Georgian Spiders – Systematics, ecology and zoogeographic analysis. vifabioDOC – Virtual Library of Biology, Frankfurt/Main. 425 pp. – doi: [10.5431/mcheidze2014](https://doi.org/10.5431/mcheidze2014)
- Merrett P 1994 *Porrhomma cambridgei*, replacement name for *Porrhomma oblongum* (O. P.-Cambridge, 1871), revalidated and redescribed from southern England (Araneae: Linyphiidae). – *Bulletin of the British arachnological Society* 9: 318–320
- Muster C & Thaler K 2004 New species and records of Mediterranean Philodromidae (Arachnida, Araneae): I. *Philodromus aureolus* group. – *Denisia* 12: 305–326
- Muster C, Bosmans R & Thaler K 2007 The *Philodromus pulchellus*-group in the Mediterranean: taxonomic revision, phylogenetic analysis and biogeography (Araneae: Philodromidae). – *Invertebrate Systematics* 21: 39–72 – doi: [10.1071/IS06014](https://doi.org/10.1071/IS06014)
- Nentwig W 2015 Introduction, establishment rate, pathways and impact of spiders alien to Europe. – *Biological Invasions* 17: 2757–2778 – doi: [10.1007/s10530-015-0912-5](https://doi.org/10.1007/s10530-015-0912-5)
- Nentwig W, Blick T, Gloor D, Hänggi A & Kropf C 2017 Spiders of Europe, version 12.2017. – Internet: <http://www.araneae.unibe.ch> (December 14, 2017)
- Nentwig W & Kobelt M 2010 Spiders (Araneae). Chapter 7.3. In: Roques A, Kenis M, Lees D, Lopez-Vaamonde C, Rabitsch W, Rasplus J-Y & Roy D (eds.) *Alien terrestrial arthropods of Europe*. – *BioRisk* 4: 131–147 – doi: [10.3897/biorisk.4.48](https://doi.org/10.3897/biorisk.4.48)
- Otto S 2015 Commented checklist of the spider species (Araneae) in the Caucasus ecoregion. In: Otto S (ed.) *Caucasian Spiders. A faunistic database on the spiders of the Caucasus*, Version 1.4.3. – Internet: <http://caucasus-spiders.info/checklist> (June 28, 2017)
- Pfiegler WP 2014 Records of some rare and interesting spider (Araneae) species from anthropogenic habitats in Debrecen, Hungary. – *e-Acta Naturalia Pannonica* 7: 143–156
- Pfiegler WP, Pfeiffer KM & Grabolle A 2012 Some spiders (Araneae) new to the Hungarian fauna, including three genera and one family. – *Opuscula Zoologica* 43: 179–186
- Polchaninova NY & Prokopenko EV 2013 Catalogue of the spiders (Arachnida, Aranei) of Left-Bank Ukraine. *Arthropoda Selecta*, Supplement No. 2. KMK Scientific Press, Moscow. 268 pp.
- Řezáč M, Král J & Pekár S 2008 The spider genus *Dysdera* (Araneae, Dysderidae) in central Europe: revision and natural history. – *Journal of Arachnology* 35: 432–462 – doi: [10.1636/H06-38.1](https://doi.org/10.1636/H06-38.1)
- Řezáč M, Kúrka A, Růžicka V & Heneberg P 2015 Red List of Czech spiders: 3rd edition, adjusted according to evidence-based national conservation priorities. – *Biologia* 70: 645–666 – doi: [10.1515/biolog-2015-0079](https://doi.org/10.1515/biolog-2015-0079)
- Roberts MJ 1985 The spiders of Great Britain and Ireland. Volume 1. Harley Books, Colchester. 229 pp.
- Russell-Smith T 2009 Identification of *Porrhomma* species. – *Spider Recording Scheme News* 63. In: The Newsletter of the British arachnological Society 114: 18–23
- Růžicka V & Dolanský J 2016 Catching of spiders in shallow subterranean habitats in the Czech Republic. – *Arachnologische Mitteilungen* 51: 43–48 – doi: [10.5431/aramit5106](https://doi.org/10.5431/aramit5106)
- Sakchoowong W, Nomura S, Ogata K & Chanpaisaeng J 2007 Comparison of extraction efficiency between Winkler and Tullgren extractors for tropical leaf litter macroarthropods. – *Thai Journal of Agricultural Science* 40: 97–105
- Samu F & Szinetár C 1999 Bibliographic check list of the Hungarian spider fauna. – *Bulletin of the British arachnological Society* 11: 161–184
- Segers H 1992 Nomenclatural notes on, and redescrptions of some little-known species of the *Philodromus aureolus* group (Araneae: Philodromidae). – *Bulletin of the British arachnological Society* 9: 19–25
- Šestáková A 2011 The first record of *Porrhomma oblitum* (Araneae, Linyphiidae) in Slovakia. – *Folia faunistica Slovaca* 16: 1–3
- Šestáková A, Suvák M, Krajčovičová K, Kaňuchová A & Christophoryová J 2017 Arachnids from the greenhouses of the Botanical Garden of the PJ Šafárik University in Košice, Slovakia (Arachnida: Araneae, Opiliones, Palpigradi, Pseudoscorpiones). – *Arachnologische Mitteilungen* 53: 19–28 – doi: [10.5431/aramit5304](https://doi.org/10.5431/aramit5304)
- Snazell R & Duffey E 1980 A new species of *Hahnina* (Araneae, Hahnidae) from Britain. – *Bulletin of the British arachnological Society* 5: 50–52
- Stenchly K, Bernhard D & Finch O-D 2007 Arboricolous spiders (Arachnida, Araneae) of the Leipzig floodplain forest – first results. In: Unterseher M, Morawetz W, Klotz S & Arndt E (eds.) *The canopy of temperate floodplain forest*. Universitätsverlag, Leipzig. pp. 72–80
- Szinetár C 1992 Spruce as spider-habitat in urban ecosystem I. – *Folia Entomologica Hungarica* 53: 179–188
- Szinetár C 1995 Data to the Araneae fauna of Őrség (Western Hungary). – *Savaria* 22: 245–251
- Szinetár C & Horváth R 2006 A review of spiders on tree trunks in Europe (Araneae). – *European Arachnology 2005. Acta Zoologica Bulgarica*, Supplement 1: 221–257
- Szinetár C & Kancsal B 2007 *Trebacosa europaea*, a new wolf spider from Hungary (Araneae, Lycosidae). – *Journal of Arachnology* 35: 153–158 – doi: [10.1636/H06-23.1](https://doi.org/10.1636/H06-23.1)
- Szinetár C & Kovács P 2013 Pókfaunisztikai vizsgálatok a szentbékállai Fekete-hegyen. [The arachnological results of the 5th Hungarian Biodiversity Day at Fekete Hill (Balaton Uplands)]. – *Folia Musei Historico-Naturalis Bakonyiensis* 29: 65–72
- Szinetár C & Samu F 2003 *Pelecopsis loksai* sp. n., a new erigonine spider from Hungary (Araneae: Linyphiidae). – *Bulletin of the British arachnological Society* 12: 412–414
- Szinetár C, Eichardt J & Szűts T 2009 The first lowland species of the Holarctic alpine ground spider genus *Parasyrisca* (Araneae,

- Gnaphosidae) from Hungary. – ZooKeys 16: 197–208 – doi: [10.3897/zookeys.16.234](https://doi.org/10.3897/zookeys.16.234)
- Szinetár C, Erdélyi F & Szűts T 2011 Pókfaunisztikai vizsgálatok a nagykovácsi pusztai tölgyesek területén. [Results of the spider fauna (Araneae) investigations in steppe oak woods of Nagykovács]. – Rosalia 6: 209–221
- Szinetár C, Kovács P & Eichardt J 2015 A kistapolcai meszes homokpuszta katonai használatú gyepterületeinek pókfaunája (Araneae). [Spiders (Araneae) of the Győr-Gönyű military shooting range]. – RENCI 1: 237–260
- Szinetár C, Rákóczi AM, Bleicher K, Botos E, Kovács P & Samu F 2012 A Sas-hegy pókfaunája II. A Sas-hegy faunakutatásának 80 éve – A hegyről kimutatott pókfajok kommentált listája. [Spider fauna of Mt Sas-hegy II. 80 years of fauna research on Mt Sas-hegy, with the annotated list of spiders]. – Rosalia 8: 333–362
- Szinetár C, Szita É & Kovács P 2016 Pókfaunisztikai vizsgálatok a szigligeti Kongó-réten. [Arachnofaunistic studies in the Kongó meadow (Szigliget)]. – Folia Musei Historico-Naturalis Bakoyniensis 33: 75–86
- Szinetár C, Török T & Szűts T 2014 *Zoropsis spinimana*, mint új épületlakó pókfaj Magyarországon. [*Zoropsis spinimana* (Dufour, 1820) new synantropic spider species in Hungary]. – A NyME Savaria Egyetemi Központ Tudományos Közleményei XX. Természettudományok 15: 105–113
- Szita É, Fetykó K, Botos E, Rákóczi AM & Samu F 2014 Adatok Simontornya és környéke pókfaunájához (Araneae). In: Szita É, Fetykó K, Kovács T & Horváth A (eds.) Simontornya ízeltlábúi. Magyar Biodiverzitás-kutató Társaság, Budapest. pp. 32–41
- Szita É, Samu F, Bleicher K & Botos E 1998 Data to the spider fauna (Araneae) of Kőrös-Maros National Park (Hungary). – Acta Phytopathologica et Entomologica Hungarica 33: 341–348
- Szita É, Szinetár C & Szűts T 2002 Faunistic investigations on the spider fauna (Araneae) of the Fertő-Hanság National Park. In: Mahunka S (ed.) The fauna of the Fertő-Hanság National Park I. Hungarian Natural History Museum, Budapest. pp. 231–244
- Szűts T, Szinetár C, Samu F & Szita É 2003 Checklist of the Hungarian Salticidae with biogeographical notes. – Arachnologische Mitteilungen 25: 45–61 – doi: [10.5431/aramit2505](https://doi.org/10.5431/aramit2505)
- Tomić V & Grbić G 2008 Preliminary notes on spider fauna of Mt. Fruška Gora. In: Čurčić S & Šimić S (eds.) Invertebrates (Invertebrata) of the Fruška Gora Mountain I. Matica Srpska, Novi Sad. pp. 57–62
- Uyar Z, Bosmans R & Uğurtaş İH 2014 New Faunistic Data for the Family Araneidae (Araneae) in West Anatolia (Turkey). – Entomological News 124: 120–130 – doi: [10.3157/021.124.0207](https://doi.org/10.3157/021.124.0207)
- WSC 2017 World Spider Catalog, version 18.5. Natural History Museum, Bern. – Internet: <http://wsc.nmbe.ch> (December 14, 2017)
- Wunderlich J 2012 Contribution to taxonomy and evolution of the European genera of the spider family Philodromidae (Araneae). – Beiträge zur Araneologie 7: 25–56