
ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN – POLONIA

VOL. LXXI, 1

SECTIO C

2016

ROBERT ROZWĄŁKA¹; TOMASZ RUTKOWSKI²;
PAWEŁ BIELAK-BIELECKI³

¹Department of Zoology, Maria Curie-Skłodowska University

Akademicka 19, 20-033 Lublin, Poland; e-mail: arachnologia@wp.pl

²Natural History Collections, Faculty of Biology, Adam Mickiewicz University

Umultowska 89, 61-614 Poznań, Poland; e-mail: pardosa@gazeta.pl

³Raławicka 11/18, 20-040 Świdnik, Poland; e-mail: p.bielak-b@wp.pl

New data on introduced and rare synanthropic spider species (Arachnida: Araneae) in Poland (II)

SUMMARY

Over the last decades, a large number of introduced spider species (Araneae) has been noted in Europe. Some of these newcomers have been introduced incidentally. However, the others develop permanent populations, for example in greenhouses or botanical gardens, and become synanthropic species. Introduction and synanthropization of new spider species also occurs in Poland. New records presented herein extend the list of introduced arachnofauna by seven species: *Aphantaulax trifasciata*, *Cheiracanthium furculatum*, *Cyrtophora citricola*, *Olios argelasius*, *Nurscia albomaculata*, *Phoneutria boliviensis* and *Triaeris stenaspis*. In addition, new posts of rarely reported so far in Poland synanthropic spiders such as: *Amaurobius ferox*, *A. similis*, *Cheiracanthium mildei*, *Hasarius adansoni*, *Holocnemus pluchei*, *Nesticella mogera*, *Psilochorus simoni*, *Pseudeuophrys lanigera*, *Scytodes thoracica* and *Uloborus plumipes* are presented. The data complement the deployment of these species in Poland as well as indicate their potential expansion routes.

Keywords: Araneae, synanthropic spiders, introduced and alien species.

STRESZCZENIE

W Europie Środkowej, w tym także w Polsce, w ciągu ostatnich dekad zanotowano szereg gatunków pająków (Araneae) pochodzących z innych kontynentów, które zostały introdukowane. Również część gatunków pochodzących z południowej części Europy, wskutek naturalnej ekspansji poszerza swój zasięg w kierunku północnym, często zasiedlając biotopy synantropijne, jako przyczółki swojej ekspansji. Autorzy w pracy przedstawiają informację o stwierdzeniu

w Polsce po raz pierwszy takich gatunków jak: *Aphantulax trifasciata*, *Cheiracanthium furculatum*, *Cyrtophora citricola*, *Nurscia albomaculata*, *Olios argelasius*, *Phoneutria nigriventer* i *Triaeris stenaspis*. Oprócz tych gatunków omówiono nowe stanowiska sporadycznie lub rzadko dotychczas wykazywanych na terenie Polski pajaków synantropijnych takich jak: *Amaurobius ferox*, *Amaurobius similis*, *Cheiracanthium mildei*, *Hasarius adansoni*, *Holocnemus pluchei*, *Icius hamatus*, *Mermessus trilobatus*, *Nesticella mogera*, *Psilochorus simoni*, *Pseudeuophrys lanigera*, *Scytodes thoracica*, *Sosticus loricatus* i *Uloborus plumipes*. Przedstawione dane uzupełniają stan poznania rozmieszczenia tych gatunków w Polsce o nowe lokalizacje oraz wskazują drogi potencjalnej ekspansji. Wykazano także, że *Holocnemus pluchei* i *Triaeris stenaspis* posiadają w Polsce duże, rozmnażające się i trwałe populacje.

Słowa kluczowe: Araneae, pająki synantropijne, gatunki obce i introdukowane.

INTRODUCTION

Recently, an increasing number of introduced spider species is observed in Western and Central Europe (68). This phenomenon is favoured by growing international and intercontinental transport (47, 68, 70). Many of these exotic spiders, are represented only by solitary specimens incidentally introduced and recorded outside their natural area of occurrence, e.g. *Badumna longinqua* (46), *Latrodectus mactans* (38) or *Phoneutria boliviensis* (39). However, some introduced species become synanthropic and inhabit niche microhabitats, e.g. greenhouses. In a large part of Europe, exotic species such as *Hasarius adansoni*, *Nesticella mogera* and *Uloborus plumipes* have established permanently in greenhouses of botanical gardens or horticultural holdings (42, 83). Moreover, some South European species as *Holocnemus pluchei* and *Scytodes thoracica* have extended their range to the North or East Europe (69). Thus, as a result of natural expansion or introduction, they become representatives of the synanthropic arachnofauna of Central Europe. In this study, the data on new records of introduced species of spiders in Poland are presented. Additionally, new localities of several rare, synanthropic and invasive species are provided.

LIST OF ABBREVIATIONS

Following abbreviations of the names are used in the text: RR – Robert Rozwałka, TR – Tomasz Rutkowski, PBB – Paweł Bielak-Bielecki, UPH – Siedlce University of Natural Sciences and Humanities, AR Wrocław – Wrocław University of Environmental and Life Sciences.

SPECIES NEW TO THE POLISH FAUNA

Family: Araneidae

Cyrtophora citricola (FORSSKÅL, 1775)

Lublin-Felin [FB 17], Witosa Str., large garden-building center, on the *Euphorbia* spp. (import from Netherlands), 31.10.2014 – 1 juv. (cult.); 04.11.2014 – 1♂, leg., PBB, det. RR.

This species is very commonly widespread in tropical and subtropical parts of Asia, Africa and Australia. It also occurs in the Middle East, Southern Europe and in the Canary Islands (26, 61, 105, 106), and it was introduced into the Caribbean and both Americas (2, 60, 98, 105). This is a social species; sometimes sharing large nets built by few hundred individuals but frequently occurs also individually (24, 28, 58). It inhabits mostly dry environments (5, 41, 61). In the region of the Adriatic Sea and the Canary Islands specimens are often observed on the opuntias, agaves and other succulent plants growing on ruderal or synanthropic areas (obs. TR et RR). Figure 1a shows the male palp of *C. citricola*.

Family: Ctenidae

***Phoneutria boliviensis* (F. O. PICKARD-CAMBRIDGE, 1897)**

Milicz [XT 51], Trzebnicka Str., in discount store, in bananas (import from Columbia), 15.12.2014 – 1♀ with egg cocoon, leg. unknown, det. RR.

The species is widely distributed in South and Central America, known as “banana spider”, although this colloquial term is also applicable to other spider species (e.g., *Phoneutria* spp., *Heteropoda* spp.), several times introduced into North America (34, 97). It inhabits different forest environments and scrubs, often near buildings and orchards, banana plants and fruit trees (34). In Europe, it has been recorded in Germany (39), as in this case, in the transport of bananas from South America. A study on the composition of the venom of *P. boliviensis* showed great similarities to the venom of other species from the genus *Phoneutria* (27), therefore it must be regarded as potentially dangerous for human health.

Family: Eutichuridae

***Cheiracanthium furculatum* KARSCH, 1879**

Lublin-Felin [FB 17], Witosa Str., hypermarket, in black grape fruit imported from Morocco, 29.06.2015 – 1sub♂ (cult. – ♂); 01.07.2015 – 1sub♀ (cult. – ♀); 02.07.2015 – 1♀; 09.07.2015 – 1 juv.; 14.07.2015 – 1♂; 15.07.2015 – 1♀ with cocoon (after 11 days of incubation 106 young spiders came out); 10.07.2016 – 1 juv., 21.07.2016 – 1 juv., leg. et det. RR, cult. PBB.

Note: in breeding this species shows an aggressive behaviour.

The species is widespread mostly in the southern part of Africa, where it occurs in a variety of open and synanthropic biotopes (63). It has been recorded recently in Europe, in Belgium (14) and in Germany (3). In both cases, the speci-

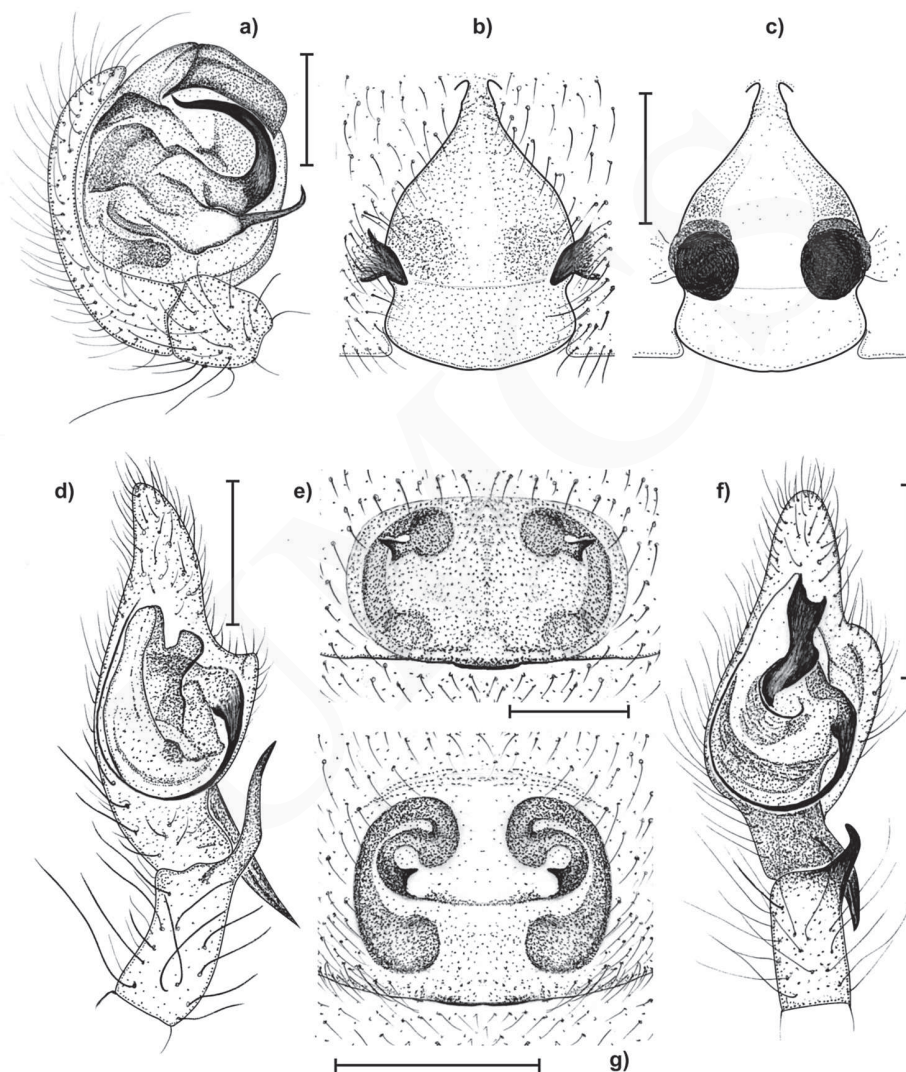


Figure 1. *Cyrtophora citricola*: male palp medial view – 1a; *Phoneutria boliviensis*: epigyne – 1b, and vulva dorsal – 1c; *Cheiracanthium furculatum*: male palp ventral – 1d, and epigyne – 1e; *Cheiracanthium mildei*: male palp ventral – 1f, and epigyne – 1g. Scale bar: 1a – 0.2 mm, 1b-c – 1.0 mm; 1d-g – 0.5 mm.

mens of *C. furculatum* were found in grapes imported from South Africa (14) and Morocco (3).

The specimens collected in Lublin confirm the observations of Bosselaers (14) and Bayer (3), that this species arrived in Europe with shipments of fruits, especially grapes. The scale of this import is probably quite large, because together

with the collected specimens there were reported several empty cocoons and exuviae of spiders of the genus *Cheiracanthium* C.L. KOCH, 1839, which probably belonged to the representatives of *C. furculatum*. The climatic conditions in Central and Western Europe rather exclude an acclimatization of *C. furculatum* in the wild, but it is likely that this species may be settling in the south of the continent.

Family: Gnaphosidae

***Aphantaulax trifasciata* (O. P.-CAMBRIDGE, 1872)**

Lublin-Felin [FB 17], Witosa Str., hypermarket, in pomegranate (import from Turkey), 20.11.2014 – 2 juv. (cult.), leg. PBB, det. RR.

The species is widespread in Southern and South-Eastern Europe, the Middle East and North Africa. It occurs both on the herbaceous plants and under stones in a variety of warm environments (31, 69). Often inhabits orchards of pomegranates, olives and citrus fruits (69, 73), which explains how the two juveniles were introduced to Poland.

Family: Oonopidae

***Triaeris stenaspis* SIMON, 1891**

Łańcut [EA 84], Orchid House of Castle Museum in Łańcut, under stone in greenhouse, 05.06.2015 – 1♀; 17.08.2015 – 12♀♀, 5 juv. and some ex. obs.; leg. et det. RR.

This species is widely distributed across the pantropical belt (77). On the base of a distribution of other species of the genus *Triaeris* SIMON, 1891, it is likely that it originated in East Africa or India. According to Nentwig et al. (69) and Nentwig (68), its homeland is Central America. From tropics it was introduced into the greenhouses of the botanical gardens and similar locations in France, Germany (42, 44, 92), Finland (69), Czech Republic (50) and in Slovakia (49, 51). Probably, the only introduced spider in Europe reproducing itself exclusively by parthenogenesis (49, 51).

Family: Sparassidae

***Olios argelasius* (WALCKENAER, 1805)**

Łódź-Widzew [DC 03], Rokicińska Str., in warehouse (in transport from Italy), 17.07.2015 – 1♀, doc. phot. anonymous, det. RR.

This middle sized species occurs in several countries of the Mediterranean basin. It is usually found on the warm, scantily covered areas, often in citrus orchards, vineyards, etc. (5, 69). So far, no cases of its introduction into Central Europe have been reported.

Family: Titanoecidae

***Nurscia albomaculata* (LUCAS, 1846)**

Lublin-Felin [UTM FB 17], Witosa Str., hypermarket, in pomegranate imported from Greece, 13.11.2014 – 1 juv. (cult.), leg. Ł. Dawidowicz, det. RR; 15.11.2014 – 1 juv. (cult.), leg. et det. RR.

The species is listed from the Iberian Peninsula, through whole Southern Europe, Turkey, Middle East, the Caucasus to Central Asia. It is also recorded in Egypt (25, 69, 72, 101, 105). Like other spiders from the family Titanoecidae, it occurs under stones and among low plants in dry areas of high insolation (69, 101). El-Hennawy (25) also reports that *N. albomaculata* was numerous on arable lands and in greenhouses, which indicates a potential synanthropization of this species.

Both juveniles were collected in the leaf stalks of pomegranates, which is slightly unusual place for this species, because it occurs mainly under stones in a variety of warm, dry, rocky habitats (69). In Turkey, it was recorded from the orchards of pomegranates (73) so importing along with these fruits seems to be likely.

NEW DATA ON SOME RARE SYNANTHROPIC SPIDERS SPECIES IN POLAND

Family: Amaurobidae

***Amaurobius ferox* (WALCKENAER, 1830)**

Czarnków [XU 06], under stones on old railway line, 17.10.2012 – 1♂, 4 juv., leg. et det. TR.

Kalisz [BC 93], undergrounds of old factory, 25.01.2013 – 1♀, leg. et det. TR.

Kostrzyn distr. Gorzów [VU 72], ruins of the Old Town, on the walls, 25.10.2013 – several specimens observed, TR.

Kraków [DA 24], Mikołaja Kopernika 27 Str., Botanical Garden of Jagiellonian University, under stones, between roots and in similar places in glass-houses, 30–31.05.2015 – 3♀♀, 11 juv., and several specimens observed, leg., det. et obs. RR.

Łańcut [EA 84], Orchid House of Castle Museum in Łańcut, under a stone and under flower pots in glasshouses, 05.06.2015 – 1♀, 6 juv., leg. et det. RR; 18.08.2015 – several specimens observed, RR.

Słonek distr. Sulęcín [VU 82], cellars of abandoned house, 05.11.2012 – 1♂, leg. et det. TR.

Twardogóra [XS 79], brick tunnel under railway line, 06.01.2016 – 1♂, leg. et det. TR.

Warszawa [EC 08], Aleje Ujazdowskie 4 Str., Botanical Garden, under a stone in glasshouses, 29.01.2015 – 1♂, 2♀, 12 juv., leg. et det. RR.

This spider is widespread in Central and Southern Europe (69) and also was introduced into North America (59). It inhabits mainly anthropogenic habitats, caves, crevices, spaces under rocks, caves, cellars and similar environments (1, 69, 86).

In Poland it is known from sites located in the western and central parts of the country (78), to the East it becomes rare (Fig. 2). The alleged presence in the High Tatras (78, 93, 99) is certainly a mistake, as it has been highlighted already by Kulczyński (56).

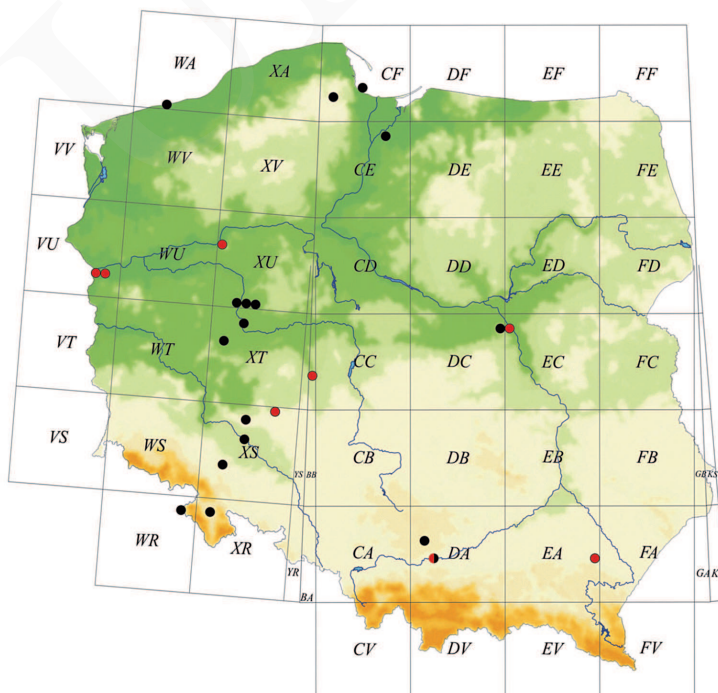


Figure 2. Distribution of *Amaurobius ferox* in Poland: black points – literature data, red points – new data, red-black points – confirmed data.

***Amaurobius similis* (BLACKWALL, 1861)**

Gorzów [WU 14], Walczaka Str., ruins of the old brewery, on the wall, 19.01.2016 – 1♀, leg. et det. TR.

Kołobrzeg [WA 30], Budowlanych Str., on the wall, 21.01.2016 – 1♀, leg. et det. TR.

Kostrzyn distr. Gorzów [VU 72], ruins of the Old Town, on the wall, 25.10.2013 – 1♂, leg. et det. TR.

Koszalin [WA 70], Batalionów Chłopskich Str., in the cellar, 10.02.2014 – 1♂, 1♀, 1 juv., leg. et det. TR.

Wrocław [XS 46], Zaporoska Str., in the cellar, 05.09.2009 – 1 juv., leg. PBB, det. RR.

Wrocław [XS 46], Zoological Garden, in the cellar in terrarium, 27.09.2009 – 6 juv., leg. PBB, det. RR.

This western European species was introduced to North America (33, 74, 59) and New Zealand (29). In Western Europe *Amaurobius similis* is a widespread species. It occurs both in natural and anthropogenic environments – under rocks in the woods, under the protruding bark of trees, in the ruins, the basements, crevices in the walls, cellars, etc. (33, 69). In Central Europe it is rare and noted only in synanthropic habitats (69).

In Poland *A. similis* is a rare species, reliably reported from Warsaw (90), Kołobrzeg, Rogalin and Malbork (19, 21, 22). Information from the Dahl (17) and Jeschke (40) with sites of *A. similis* in Lower Silesia was questioned in the past (19, 78, 90, 91). However, new sites presented in this work, seem to prove these data (Fig. 3).

Notes: Nentwig (68) and Nentwig et al. (69) described *A. similis* as a species of North American origin, brought over to Europe. However, American authors (59, 74) consider it as an European species, introduced into the USA and Canada. The European origin of *A. similis* is indicated by the lack of morphologically related species in North America, with their simultaneous presence in Europe, e.g. *A. obtusus* L. KOCH, 1868, *A. fenestralis* (STRÖM, 1768).

Family: Eutichuridae***Cheiracanthium mildei* L. KOCH, 1864**

Lublin-Bronowice [FB 17], Grabskiego Str. discount store, in pomegranate (import from Turkey) 18.11.2014 – 1 juv.; in pomegranate (import from Spain); 14.10.2015 – 1 juv., (cult. – ♂), leg. et det. RR.

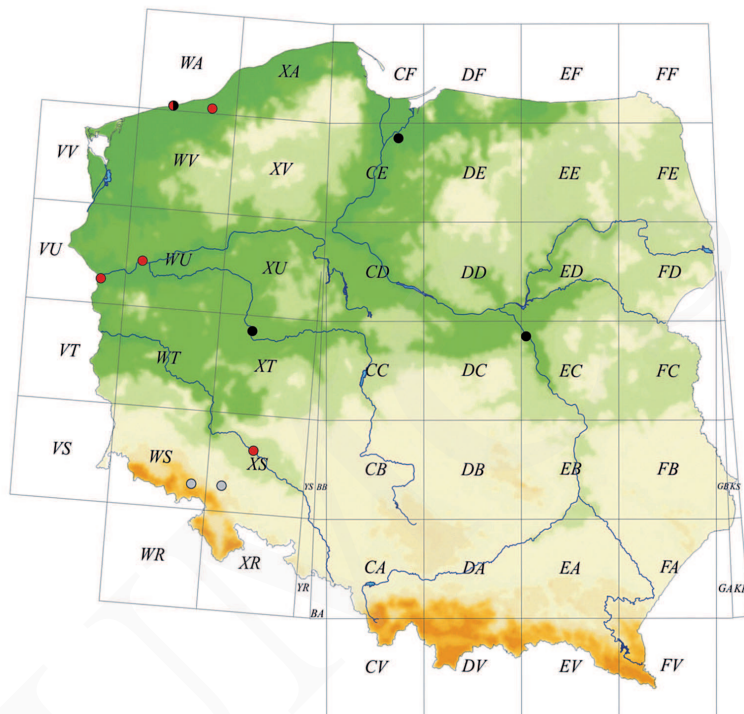


Figure 3. Distribution of *Amaurobius similis* in Poland: black points – literature data, red points – new data, red-black points – confirmed data, grey points – probable data known from the literature.

Lublin-Felin [FB 17], Witosa Str., hypermarket, in pomegranate (import from Greece), 26.11.2014 – 1♀, leg. Ł. Dawidowicz, det. RR; 10.12.2014 – 1♀, 1 juv., leg. Ł. Dawidowicz, det. RR, in pomegranate (import unknown); 08.11.2014 – 1♂, leg et det. RR; in pomegranate (import from Greece); 12.11.2014 – 1♂, 2 juv., leg et det. RR; 21.12.2014 – 1♀ (with remains of cocoon) and some juv., leg et det. RR; in grapes (import from Italy); 21.11.2015 – remains of ♀, leg. et det. RR; in pomegranate (import from Turkey), 29.10.2016 – 2 juv. (cult. – 1♂ and 1♀), leg. et det. RR,

Lublin-Węglin Południowy (Węglin South) [FB 07], Orkana Str., hypermarket, in pomegranate (import from Turkey); 02.01.2014 – 1 juv., leg. et det. RR.

Lublin-Felin [FB 17], Zygmunt Augusta Str., on the wall inside a house (probability specimen brought from purchased grapes) – 1 juv. (cult. – ♂), leg. et det. RR¹.

¹ In addition to above mentioned specimens of *Ch. mildei*, in pomegranates and grapes unidentified remnants of several dead specimens, exuviae and very young spiders belonging to genus *Cheiracanthium* likely representing *Ch. mildei* have been found.

This Mediterranean species was also introduced into the New World (105). In Southern Europe and the Middle East it is very common and frequent in orchards, vineyards, gardens (13, 65, 66, 93, 107). In Central and Western Europe it is still fairly rare, though increasingly more often recorded, usually in gardens and inner-city parks. It is an invasive species (32, 36, 64, 67, 96, 107).

The presence of *C. mildei* in Poland was recently reported on the basis of a single juvenile individual found in pomegranate (83). A number of further findings, suggests that the scale of import of this species with fruit to Poland and presumably to other countries of Central Europe is significant. Findings of females, cocoons and juveniles of *C. mildei* in imported fruits suggest the possibility of a sustained acclimatization, e.g. in heated all year round fruit ripening depots or storage buildings. This is also one of the few spider species found in Central Europe, whose bites can cause clinical symptoms in humans in the form of nausea and vomiting (69).

Family: Gnaphosidae

***Sosticus loricatus* (L. KOCH, 1866)**

Dębno [VU 74], Kosynierów Str., found dead in the barn, 26.06.2014 – 1♀, leg. et det. TR.

In addition, other locations on the basis of unpublished notes of Prof. W. Staręga:

Ostrołęka [ED 38] buildings, (no further details), det. W. Staręga.

Siedlce [EC 88], buildings, (no further details), det. W. Staręga.

Sompolno [CD 30], (no further details), leg. H. Pruska, det. A. Dziabaszewski.

In Poland reported from Kraków (48, 55, 71), Warsaw (89), Głuchołazy (103, 104), Gomunice near Radomsko (90), Goniądz (57) and Zakopane on the basis of notes of W. Kulczyński (78).

Notes: An occurrence of *S. loricatus* in Warsaw reported by Taczanowski (94) and repeatedly cited (54, 75, 78, 91) is a mistake. Taczanowski's comment (1866: p. 3; as *Drassus fuscus*) "common in Warsaw, under bark, leaves, etc." clearly indicates a species from the genus *Scotophaeus* or *Haplodrassus*. Also the information by Sanocka-Wołoszyn (85), about the presence of *S. loricatus* in a cave in the vicinity of Chęciny (Świętokrzyskie Mountains), is highly questionable.



Figure 4. Distribution of *Sosticus loricatus* in Poland: black points – literature data, red points – new data, grey points – probable data known from the literature.

Family: Linyphiidae

Mermessus trilobatus (EMERTON, 1882)

Bolestraszyce, distr. Przemyśl [FA 32], Arboretum, on the swamp plants, hand collected, 06.06.2015 – 1♂, leg. et det. RR.

Bydgoszcz-Fordon [CD 09], surroundings Traktorzystów Str., psammophilous grassland, sieved from the litter of restharrow, 04.01.2015 – 1♂, leg. et det. TR.

Bydgoszcz-Otorowo [CD 08], meadow near river, in the mosses, 27.02.2016 – 1♂, 1♀, leg. et det. TR.

Czarnków [XU 06] xerothermic grassland, pitfall traps, 7.09–18.09.2013 – 1♀, leg. P. Sienkiewicz, det. RR.

Czarnowska Górka in Ujście Warty National Park [VU 82], dune, pitfall traps, 06–23.03.2014 – 1♂, leg. et det. TR.

Czarnowska Górka in Ujście Warty National Park [VU 82], dune, sieved from Grey Hair-grass, 26.12.2014 – 1♂, leg. et det. TR.

Dalewo distr. Śrem [XT 36], rye fields, biocenometer, 14.07.2014 – 1 ex., leg. J. Konik, det. M. Oleszczuk.

Dalewo distr. Śrem [XT 36], woodlots between fields, biocenometer, 06.03.2013, 03.12.2013, 16.09.2014, 28.11.2014, 9.03.2015 – total 24 exx., leg. J. Konik, det. M. Oleszczuk.

Dobra Nadzieja distr. Pleszew [XT 94], old gravel pit, sieved from Scots pine litter, 27.02.2015 – 2♀♀, leg. et det. TR.

Gąsienicowa Valley in Tatra National Park [DV 25], around Litworowe Stawki (ca 1,700 m a.s.l.), under a stone, hand collected, 07.07.2013 – 1♀, leg. et det. RR.

Gołuchów distr. Pleszew [YT 04], meadow in the park, pitfall traps, 16–21.07.2015 – 1♂, leg. P. Żurawlew, det. TR.

Gotówka distr. Chełm [FB 77], meadows, pitfall traps, 31.07–20.08.2013 – 1♂, mat. of UPH Siedlce, det. RR.

Kamień Śląski distr. Krapkowice [BB 90], shrubs on meadow edge, sieved from the hawthorn litter, 23.09.2015 – 1♀, leg. et det. TR.

Koczów distr. Chełm [FB 85], meadows, pitfall traps, 09–31.07.2013 – 1♂, mat. of UPH Siedlce, det. RR.

Kraków [DA 24], Botanic Garden of the Jagiellonian University under a stone near a pond, hand collected, 31.05.2015 – 1♂, leg. et det. RR.

Leszczany distr. Chełm [FB 85], meadows, pitfall traps, 03–30.07.2014 – 1♂, mat. of UPH Siedlce, det. RR.

Lisówki distr. Poznań [XT 19], xerothermic grassland, pitfall traps, 18–30.04.2013 – 1♂; 14.06–03.07.2013 – 1♂, leg. et det. TR.

Lisówki distr. Poznań [XT 19], young Scots pine forest, pitfall traps, 13.03–18.04.2013 – 1♀, leg. et det. TR.

Lublin-Sławin [FB 08], Botanic Garden, on the table in the cafeteria (aeronauc specimens), 03.05.2015 – 1♀, leg. et det. RR.

Lublin-Sławin [FB 08], on insectivorous plants (*Sarracenia* spp.) imported from Piaseczno [DC 96] near Warsaw, 03.10.2015 – 1♂, 2♀♀, 2 juv.; leg. et det. RR.

Lublin-Zemborzyce [FB 07], rushes near the Bystrzyca River, entomological scooper, 10.06.2014 – 1♂, leg. et det. RR.

Lubowierz distr. Włodawa [FC 60], meadows, pitfall traps, 20–30.06.2014 – 1♂, mat. of UPH Siedlce, det. RR.

Łęgi Głogowskie Reserve [WT 72], meadows, pitfall traps, 19.07–08.08.2014 – 1♂, leg. P. Sienkiewicz, det. RR.

Mała Wieś Dolna distr. Zgorzelec [WS 06], in the field, under stones on the base of wind turbine, hand collected, 14.05.2015 – 1♀, leg. et det. TR.

Mosina near Poznań [XT 29], xerothermic grassland, postindustrial area, pitfall traps, 24.04–08.05.2015 – 1♂; 22.05–11.06.2015 – 1♂, leg. et det. TR.

Mosina [XT 29], xerothermic grassland, abandoned allotment gardens, pitfall traps, 08–12.05.2015 – 1♂; 22.05–11.06.2015 – 1♂, leg. et det. TR.

Mosina [XT 29], old railway line, pitfall traps, 24.04–08.05.2015 – 3♂♂; under stones, hand collected, 24.04.2015 – 1♂, leg. et det. TR.

Nieszkowice distr. Wołów [XS 19], complex of old gravel pits, sandy grassland, pitfall traps, 01–15.06.2013 – 1♂; 15.06–01.07.2013 – 1♂, leg. et det. TR.

Osiniec distr. Czarnków/Trzcianka [XU 07], xerothermic grassland, pitfall traps, 20.04–07.05.2013 – 1♀, leg. G. Wojtaszyn, det. TR.

Pegów distr. Trzebnica [XS 37], agrocenosis, pitfall traps: 13–27.08.2013 – 2sub♂, mat. of AR Wrocław, det. RR; entomological scooper: 27.08.2013 – 2 juv.; 11.09.2013 – 1♂; 26.09.2013 – 1♀, mat. of AR Wrocław, det. RR.

Pierusza distr. Wołów [XS 29], xerothermic grassland localised on south exposed slope, pitfall traps, 01–15.06.2013 – 1♂, 1♀, leg. et det. TR.

Pierusza distr. Wołów [XS 29], mosaic complex of small gravel pits and sandy grassland, pitfall traps, 15.06–01.07.2013 – 1♂, leg. et det. TR.

Plewiska distr. Poznań [XU 20], in the garden, 28.03.2016 – 1♂, leg. Sz. Konwerski, det. TR.

Poznań-Junikowo [XU 20], dune, sieved from the litter of young Scots pine, 09.01.2015 – 4♀♀, leg. et det. TR.

Skwierzyna [WU 22], clearing under the power line, covered with heather and lichens, pitfall traps, 02–10.07.2012 – 1♂, leg. et det. TR.

Stary Załom Reserve [WU 78], extensive meadows, pitfall traps, 28.06–4.08.2012 – 1♂; 20.05–28.06.2013 – 1♂, 1♀, leg. P. Sienkiewicz, det. RR.

Sulików distr. Zgorzelec [WS 05], beech forest, pitfall traps, 19–30.06.2015 – 1♂, leg. et det. TR.

Szklarka Przygodzicka distr. Ostrzeszów [XT 90], dry Scots pine forest, pitfall traps, 24.07–05.08.2012 – 1♂, leg. et det. TR.

Szostaki distr. Biała Podlaska [FC 74], meadows, pitfall traps, 15–25.05.2015 – 1♂; 16–29.06.2015 – 1♂; mat. of UPH Siedlce, det. RR.

Trzcinica Wołowska distr. Wołów [XT 20], complex of old gravel pits, sandy grassland, pitfall traps, 18–31.05.2013 – 1♂, leg. et det. TR.

Ustka [XA 14], grey dune, in grasses, hand collected, 06.05.2015 – 1♀, leg. et det. TR.

Widnica distr. Miechów [DA 38] xerothermic grasslands, pitfall traps, 28.03–24.04.2015 – 1♂, leg. et det. M. Oleszczuk.

Wilków distr. Głogów [WT 82], embankment, pitfall traps, 20.07–07.08.2014 – 1♂; extensive meadow, pitfall traps, 20.07–07.08.2014 – 1♂, 1♀; sedge meadow, pitfall traps, 20.07–07.08.2014 – 1♂, leg. P. Sienkiewicz, det. RR.

Wińsko distr. Wołów [XT 10], mosaic complex of old gravel pits and xerothermic grassland, pitfall traps, 18–31.05.2013 – 1♂; 31.05–15.06.2013 – 1♂; 10–24.07.2013 – 1♂, leg. et det. TR.

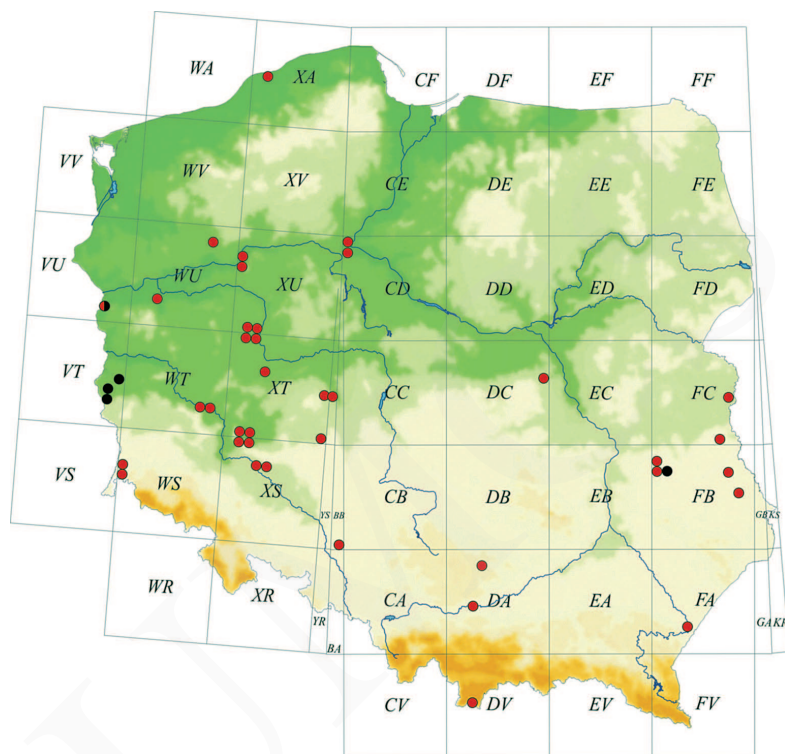


Figure 5. Distribution of *Mermessus trilobatus* in Poland: black points – literature data, red points – new data, red-black points – confirmed data.

Wrocław-Pawłowice [XS 47], agrocenosis, pitfall traps, 29.05–9.06.2011 – 1 sub♂; mat. of AR Wrocław, det. RR.

Zakrzewo distr. Poznań [XU 10], clearing under the power line, sieved from the grasses, 05.03.2016 – 1♂, 1♀, leg. et det. TR.

Spider species native to North America, introduced in the second half of the 20th century to Europe and now colonized most of the countries of Western and Central Europe (69, 83). In Poland, until now, rarely found (82, 83) but presented materials indicate that this expansive species of spider has been already widespread (Fig. 5).

Family: Nesticidae

***Nesticella mogera* (YAGINUMA, 1972)**

Warszawa [EC 08], Aleje Ujazdowskie 4 Str., Botanical Garden, under stones and under flower pots in glasshouses, 29.01.2015 – 1♂, 3♀♀, 2 juv., leg. et det. RR;

Łańcut [EA 84], Orchid House of Castle Museum in Łańcut, under flower pots, 05.06.2015 – 1♀, 1 juv., 17.08.2015 – 1♀, 3 juv., and remains of ♂ in nets of *Parasteatoda* spp. leg. et det. RR.

Tropical species originated in South-East Asia and introduced to Europe. It inhabits the spaces under rocks, pieces of wood or flower pots in damp and warm greenhouses of botanical gardens, zoos, etc. locations (10, 43, 83). It is known so far from few sites in England (88), Germany (43, 45), Poland (10, 83) and Hungary (76). New findings presented in this study, indicate that *Nesticella mogera* is wider distributed in Poland, and probably also in Europe.

Family: Pholcidae

***Holocnemus pluchei* (SCOPOLI, 1763)**

Bydgoszcz [CD 08], Fabryczna Str., on the ornamental plants in large building-garden hypermarket, 06.12.2014 – 2♀♀, 5 juv. and numerous specimens observed during several visits in 2015; leg., det. et obs. TR.

Southern European species is widespread in the Mediterranean basin, where it occurs both in the wild and synanthropic habitat. In last decades clearly in expansion, as evidenced by expanding range and increasing number of findings in Western and Central Europe (32, 52, 69, 79, 92). In Poland reported from Lublin only (84), but there it did not produce a permanent population (Rozwałka, unpubl.). Presented observations from Bydgoszcz give a proof that *H. pluchei* has been established permanently in Poland.

***Psilochorus simoni* (BERLAND, 1911)**

Kielce-Bukówka [DB 73], Wojska Polskiego Str., in the house and in the cellar, 02.08.2015 – 1♀, doc. phot. W. Sikora, and several specimens observed and photographed in the next few days. det. RR.

Plewiska distr. Poznań [XU 20], inside the house, 05.10.2015 – 1♀, leg. Sz. Konwerski, det. TR.

Warszawa [EC 08], Aleje Ujazdowskie 4 Str., Botanical Garden, under stones in glasshouses, 29.01.2015 – 1 juv.; leg. et det. RR.

A widely distributed but quite rare synanthrope, known from a few posts in Europe, Turkey, Iran and western regions of the U.S. (4, 6, 7, 16, 87). It has been found mostly in warm (10–18°C) cellars, wine and cheese ripening depots, etc. locations, where it lives under the boards, boxes (16, 30, 33, 35, 87). In places of its presence, *Psilochorus simoni* often develops very numerous populations (9, 7,

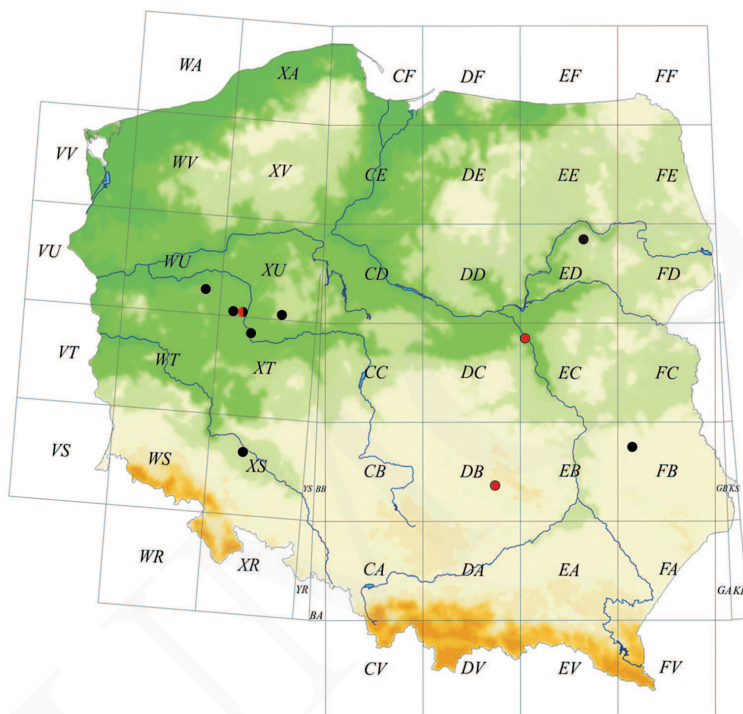


Figure 6. Distribution of *Psilochorus simoni* in Poland: black points – literature data, red points – new data, red-black points – confirmed data.

18, 23, 35, 83), but it is rarely found, perhaps because of the small size of the body. In Poland it was known from the 10 sites (83), and the subsequent records suggest that the species is gradually becoming increasingly common.

Family: Salticidae

Hasarius adansoni (AUDOUIN, 1826)

Dąbrówka distr. Poznań [XU 10], hypermarket, on ornamental plants (*Phalenopsis* hybr.) from Polish ornamental flowers farm (Warszawa, Krakowska Avenue, UTM: DC98); 23–24.07.2015 – 8 juv., leg. TR, det. RR.

Lublin-Węglin Południowy [FB 07], Zwycięska Str., large building-garden hypermarket, on ornamental plants (*Phalenopsis* hybr.), 26.09.2015 – 1♀, leg. PBB, det. RR.

Lublin-Bronowice [FB 17], Chemiczna Str., large building-garden hypermarket, on ornamental plants (*Phalenopsis* hybr.), 26.09.2015 – 1♀, leg. PBB, det. RR.

Lublin-Bronowice [FB 17], Witosa Str., supermarket, on ornamental plants (*Phalenopsis* hybr.), 19.07.2014 – 1 juv., leg. PBB, det. RR.

Pantropical species (69, 105), uncommon in Europe, mainly occurs in greenhouses, botanical gardens or large horticultural holdings (11, 32, 36, 37, 42, 44, 83). For years known in Poland only from the Palm House in Poznań and from solitary specimens incidentally introduced with flowers from Western Europe (20, 80, 83). Recently, permanent and numerous populations were reported (83), similarly to presented data. The existence of populations of *H. adansoni* in national horticultural farms provides a steady supply of individuals of this species to a variety of shops selling potted plants, without the participation of individuals from import and creates the possibility of further and more rapid expansion.

***Icius hamatus* (C.L. KOCH, 1846)**

Lublin-Bronowice [FB 17], Grabskiego Str., discount store, in pomegranate (import from Greece), 22.11.2014 – remains of 1♀ with cocoon and 2 juv., leg. et det. RR; in pomegranate (import from Spain), 21.10.2015 – 1 juv. (cult.), leg. Ł. Dawidowicz, det. RR.

Lublin-Felin [FB 17], Witosa Str., supermarket, in persimmon fruit, 31.10.2014 – 1 juv. (cult. – ♀); in pomegranate (import from Italy), 21.12.2014 – 1 ♂; in pomegranate (import from Turkey), 29.10.2016 – 1♀, 2 juv.; in pomegranate (import from Turkey), 30.10.2016 – 2♀♀; in pomegranate (import from Turkey), in pomegranate (import from Turkey), 4.11.2016 – remains of 1♀ with cocoon and some juv., all leg. et det. RR.

Lublin-Czechów Południowy [FB 08], Chodźki Str., supermarket, in persimmon fruit (import from Spain), 07.01.2017 – 1♂, leg et det. PBB.

Sosnowiec-Śródula [CA 67], discount store, in pomegranate, 29.01.2017 – 1♀ with over 100 juv., leg. K. Gruba, det. RR.

Species common in the Mediterranean area, where it inhabits orchards and gardens (69). Introduced occasionally with fruits to Central Europe (95). In Poland reported only from Wrocław (95), although the present results from Lublin indicate that it is probably a spider quite often introduced.

***Pseudeuophrys lanigera* (SIMON, 1871)**

Ostromecko distr. Bydgoszcz [CD 19], on the wall of the palace, 03.06.2013 – 1♀, leg. et det. TR.

Spider reported from Central, Western and Southern Europe (with exception of the Balkans and Turkey), southern Russia and Georgia (69). In the South-Western Europe and the Caucasus, found in various warm rocky environments (15, 62). In the western and central part of the continent it is synanthropic, inhabiting well sun-heated walls and roofs of buildings, sometimes even entering into their interiors (5, 32, 33, 69). The species is common in Western Europe, but in Central Europe is rare. In the recent years expansion of *P. lanigera* is observed (12, 92, 102).

Despite the expansion, in Poland *Pseudeuophrys lanigera* is still very rare synanthropic species, previously reported only from Wrocław (100) and Sady near Poznań (83).

Family: Scytodidae

***Scytodes thoracica* (LATREILLE, 1802)**

Lublin-Felin [UTM FB 17], Witosa Str., hypermarket, in pomegranate, imported from Greece, 22.11.2014 – 1 juv. (cult. – ♂), leg. et det. RR.

Kraków [DA 24], Mikołaja Kopernika 27 Str., Botanical Garden of Jagiellonian University, on the brick wall, 01.05.2015 – 1 juv., leg. et det. RR.

Poznań [UTM: XU 20], Polna Str., inside hospital, 01.07.2014 – 1♀, leg. D. Wiewióra, det. TR.

Zielona Góra [WT 35], on the house wall, 12.09.2014 – 1♀, leg. R. Orzechowski, ver. RR.

This species is native to the Mediterranean region but now becomes cosmopolitan as a result of the numerous introductions (69, 105). Recently, its range is clearly expanding to the North and the North-East of Europe. An increasing number of known sites in Germany (92) or Poland (53, 83, this data) is an evidence of its spread occurrence. Data from Silesia without closer localization (8, 101), not marked in Figure 7.

Finding of this species in imported pomegranate fruits may indicate a potential way in which this spider can travel from the south of the continent to Central Europe.

Family: Uloboridae

***Uloborus plumipes* LUCAS, 1846**

Bydgoszcz [CD 08], Fabryczna Str., on the ornamental plants in large building-garden hypermarket, 06.12.2014, several specimens observed, det. TR.

Bydgoszcz [CD 09], Skarżyńskiego Str., on the ornamental plants in large hypermarket, 13.03.2013 – 1♀, leg. et det. TR.

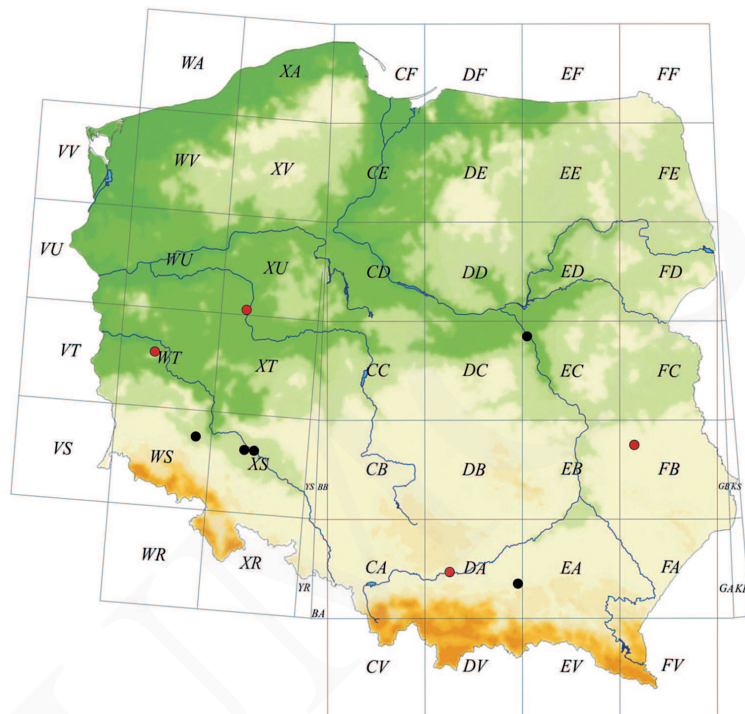


Figure 7. Distribution of *Scytodes thoracica* in Poland: black points – literature data, red points – new data.

Bydgoszcz-Myślęcinek [CD 09], Zoological Garden, inside terrarium, on the plants, 02.05.2016 – 1 ex. obs. TR.

Płuszowice-Kolonia [EB 98], garden center, 04.05.2016 – 1 ♀ and several specimens observed, leg. et obs. RR

Rzeszów [EA 74], Emilii Plater Str., garden center, on the plants, on the racks, etc. 18.03.2016 – 1 ♀, and several specimens observed, leg et obs. RR.

Warszawa [EC 08]; Aleje Ujazdowskie Str., Botanical Garden, in glasshouses, 29.01.2015 – 1 ♀, leg. et det. RR.

Zabrze [CA 47], M. Curie-Skłodowskiej Str., in small flower shop, 20.07.2015 – 1 cocoon; obs. RR.

Species from West and Central Africa, currently spread over almost the entire pantropical area and partially in moderate climate (69, 105). In Poland creates large populations in greenhouses of big horticultural holdings (83). It also occurs in small populations in large garden centres or potted flowers wholesalers. Individual specimens are transported to the flower shops and then they are often moved to homes (81).

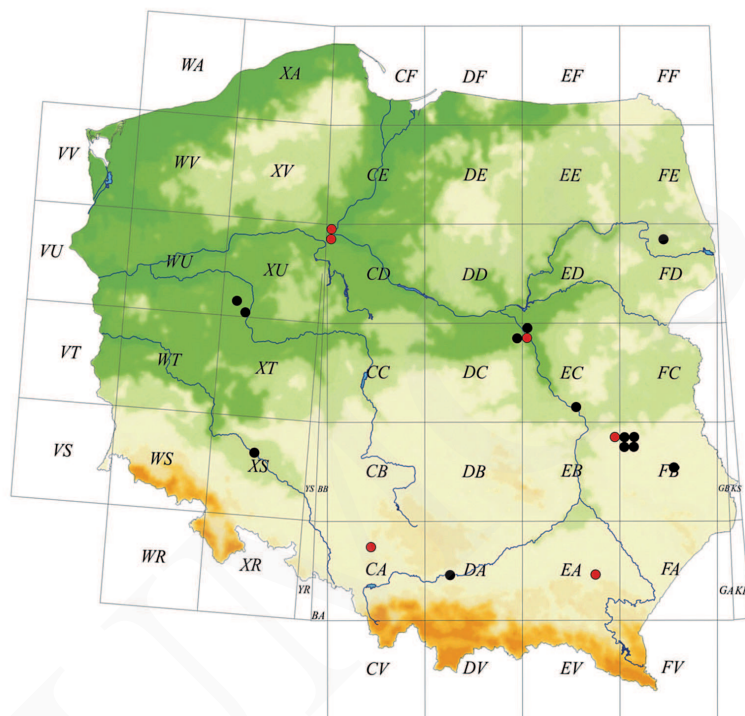


Figure 8. Distribution of *Uloborus plumipes* in Poland: black points – literature data, red points – new data.

DISCUSSION

The new findings, presented in this study, extend the list of the Polish synanthropic araneofauna by seven species: *Aphantulax trifasciata*, *Cheiracanthium furculatum*, *Cyrtophora citricola*, *Nurscia albomaculata*, *Olios argelasius*, *Phonetreria nigriventer*, and *Triaeris stenaspis*. These species should be considered as occasionally introduced, with the exception of *T. stenaspis*, for which a stable, permanent population has been detected. Furthermore, our study provides data on new locations in Poland for *Amaurobius ferox*, *A. similis*, *Cheiracanthium mildei*, *Hasarius adansoni*, *Holocnemus pluchei*, *Icius hamatus*, *Mermessus trilobatus*, *Nesticella mogera*, *Psilochorus simoni*, *Pseudeuophrys lanigera*, *Scytodes thoracica*, *Sosticus loricatus*, and *Uloborus plumipes*, and indicate routes for a potential expansion of these spiders. The majority of mentioned above spiders are synanthropic species (*Amaurobius similis*, *Psilochorus simoni*) or hemisynanthropic species (*Amaurobius ferox*, *Scytodes thoracica*, and *Sosticus loricatus*). They are well known and have been established in Poland for a long time, though they are still rather rare component of Polish araneofauna. In contrast,

Mermessus trilobatus – the species, initially recorded in Poland as introduced with potted plants (82), was soon found in several natural locations (83). Currently, it quickly colonized most of the territory of Poland and is commonly recorded in a variety of natural environments, up to high-altitude grasslands in the Tatra Mountains. The other listed species are occasionally introduced with fruits (*Cheiracanthium mildei*, *Icius hamatus*) or with potted plants (*Holocnemus pluchei*, *Nesticella mogera*, *Uloborus plumipes*). In the case of *Pseudeuophrys lanigera*, the ways of its spread as well as its status are not obvious. Our record, on the sun-heated wall of the historic Palace, is in accordance with previously described environment for this species (5, 33, 69), and might indicate a gradual acclimatization of this spider to the climatic conditions prevailing in Poland.

The present discovery of stable, autochthonous populations of *Holocnemus pluchei* and *Triaeris stenaspis* in Poland, may point out that similar localizations of these species in Poland are possible and indicate their expansion.

Most of newly discovered species (*Aphantaulax trifasciata*, *Cheiracanthium furculatum*, *Nurscia albomaculata*, *Phoneutria boliviensis*) were represented by single or few specimens imported in fruits. They may be treated as species incidentally introduced, with very limited chances for acclimatization and producing local populations. In contrast, the species spread with potted plants (*Holocnemus pluchei*, *Nesticella mogera*, *Triaeris stenaspis*) are easily finding favourable conditions in greenhouses etc., and create local populations (68).

These relationships are clear, when the differences in the methods of transport are compared. In fruits, the spiders are often transported in a low temperature and at reduced oxygen content in the atmosphere (68). Then, they eventually go to a totally different environment in comparison with that they come from. In contrast, species occurred on the potted plants are transported along with part of their niche, in stable thermal conditions and with optimal humidity for plants, usually also exotic and thermophilic. Hence, the introduced spiders are in a better shape and they are going to new places with “part of their environment” (68). On the base of the data, concerning the spiders introduced with fruits, we have to note that this is the pathway of the spread of aggressive species like *Ch. furculatum* or potentially harmful for human health (*Cheiracanthium mildei*) or even life (*Phoneutria boliviensis*).

ACKNOWLEDGEMENTS

We are grateful to the following persons: Maria Oleszczuk, Berenika Rutkowska, Dorota Wiewióra, Łukasz Dawidowicz, Kamil Gruba, Szymon Konwerski, Ryszard Orzechowski, Wojciech Sikora, Paweł Sienkiewicz, Grzegorz Wojtaszyn, Przemysław Żurawlew, and students and employees of the Department of Biology of Siedlce University of Natural Science and Humanities for their share in collection of the material.

REFERENCES

1. Almquist S. 2006. Swedish Araneae, part 2 – families Dictynidae to Salticidae. *Entomologica scandinavica*, Suppl. 63: 287–603.
2. Álvares É. S. S., De Maria M. 2004. First record of *Cyrtophora citricola* (Forskål) in Brazil (Araneae, Araneidae). *Revista Brasileira de Zoologia*, 21(1): 155–156. DOI: 10.1590/S0101-81752004000100026
3. Bayer S. 2014. Miscellaneous notes on European and African *Cheiracanthium* species (Araneae: Miturgidae), *Arachnologische Mitteilungen*, 47: 19–34. DOI: 10.5431/aramit4704
4. Bayram A., Allahverdi H., Danisman T., Yiğit N., Kunt K. B. 2008. A new genus and species record from Turkey: *Psilochorus simoni* (Berland, 1911) (Araneae, Pholcidae). *Turkish Journal of Arachnology*, 1: 91–97.
5. Bellmann H. 2006. *Kosmos-Atlas Spinnentiere Europas*. Franckh-Kosmos Verlags-GMBH & Co., Stuttgart, 304 pp.
6. Benhadi J. M. 2010. First record of *Psilochorus simoni* (Berland, 1911) in the Iberian Peninsula. *Revista Ibérica de Aracnología*, 18: 101–104.
7. Benhadi J. M., Ferrández M. Á. 2012. La enrevesada historia de *Psilochorus simoni*, una araña recientemente encontrada en España. *Quercus*, 314: 42–46.
8. Bertkau P. 1880. Verzeichnis der bisher bei Bonn beobachteten Spinnen. *Verhandlungen des Naturhistorischen Vereins der preußischen Rheinlande und Westfalens*, 37: 215–343.
9. Bielak-Bielecki P., Rozwałka R. 2007. *Psilochorus simoni* (Berland, 1911) (Araneae: Pholcidae) – nowy gatunek pająka dla Wyzyny Lubelskiej. *Przegląd zoologiczny*, 51: 143–145.
10. Bielak-Bielecki P., Rozwałka R. 2011. *Nesticella moegera* (Yaginuma, 1972) (Araneae: Nesticidae) in Poland. *Acta biologica*, Szczecin, 18: 137–141.
11. T., Bosmans R., Buchar J., Gajdoš P., Hänggi A., van Helsdingen P., Ružicka V., Staręga W., Thaler K. 2004. Checkliste der Spinnen Mitteleuropas. Checklist of the spiders of Central Europe. (Arachnida: Araneae). Version 1. Dezember 2004. Internet: http://arages.de/wp-content/uploads/2013/05/checklist2004_araneae.pdf.
12. Blick T., Hänggi A., Wittenberg R. 2006. Spiders and allies – Arachnida [In:] *Invasive alien species in Switzerland. An inventory of alien species and their threat to biodiversity and economy in Switzerland*. R. Wittenberg (ed.). FOEN, Bern, 29/06: 101–113.
13. Bogya S., Szinetár Cs., Markó V. 1999. Species composition of spider (Araneae) assemblages in apple and pear orchards in the Carpathian Basin. *Acta phytopathologica et entomologica hungarica*, 31: 99–121.
14. Bosselaers J. 2013. An alien in the grapes: a potentially aggressive African spider imported into Belgium. *Nieuwsbrief van de Belgische arachnologische Vereniging*, 28: 22–28.
15. Buchholz S., Kreuels M. 2009. Diversity and distribution of spiders (Arachnida: Araneae) in dry ecosystems of North Rhine-Westphalia (Germany). *Arachnologische Mitteilungen*, 38: 8–27. DOI: 10.5431/aramit3803
16. Camacho A. I., Prieto C. 2012. La vida oculta del mundo subterráneo. *Karaitza Bilduma. Euskal Espeleologoen Elkargoa. Colección Karaitza Unión de espeleólogos vascos*, 64–83.
17. Dahl M. 1935: Araneae und Opiliones. [In:] *Zur Kenntnis der Spinnentiere Schlesiens* (Araneae, Opiliones, Pseudoscorpionida, Acarina, Tardigrada) [Eds.] M. Dahl, H. Hedicke, A. Kästner, E. Marcus, P. Schulze, H. Vitzthum, SB. *Ges. Naturf. Fr.*, Berlin, 337–353.
18. Dziabaszeński A. 1967. *Physocyclus simoni* Berland, nowy przedstawiciel Pholcidae w faunie Polski i Europy środkowej. *Przegląd Zoologiczny*, 11: 139–141.
19. Dziabaszeński A. 1973. Z badań nad pająkami (Aranei) Wielkopolski. I. Badania fizjograficzne nad Polską zachodnią, B, 26: 231–237.

20. Dziabaszewski A. 1978. Z badań nad pająkami (Aranei) Niziny Wielkopolskiej. IV. Badania fizjograficzne nad Polską zachodnią, C, 30: 75–84.
21. Dziabaszewski A. 1983. Dalsze spostrzeżenia nad fauną pajaków (Aranei) miast na przykładzie Warszawy, Poznań i Kołobrzegu. Streszczenia Referatów XIII Zjazdu PTZool., Katowice; 44.
22. Dziabaszewski A. 1991. Nowe gatunki pajaków (Aranei) dla miasta Poznań. Prace Komisji biologicznej PTPN, 73: 27–31.
23. Dziabaszewski A. 1995. Pająki (Aranei) zabudowań Poznań. Badania fizjograficzne nad Polską zachodnią, C, Poznań, 42: 7–38.
24. Edwards G. B. 2006. *Cyrtophora citricola* (Araneae: Araneidae), a Colonial Tentweb Orb-weaver Established in Florida. Florida Department of Agriculture and Consumer Services Division of Plant Industry, Entomology Circular, 411: 1–4.
25. El-Hennawy H. K. 2009. Arachnida of Ain Gudeirat (Sinai), with notes on family Titanocidae in Egypt. Serket, 11: 110–118.
26. Elverici M., Tekşam I., Özkütük R. S., Kunt K. B. 2012. *Cyrtophora citricola* (Araneae: Araneidae: Cyrtophorinae), a first record for Turkey. Arachnologische Mitteilungen, 44: 7–9. DOI: 10.5431/aramit4402
27. Estrada-Gomez S., Vargas Muñoz L. J., Lanchero P., Latorre S. C. 2015. Partial Characterization of Venom from the Colombian Spider *Phoneutria boliviensis* (Araneae: Ctenidae). Toxins, 7(8): 2872–2887; doi: 10.3390/toxins7082872
28. Foelix R. F. 1996. Biology of Spiders. New York: Oxford University Press, 330 pp.
29. Forster R. R., Wilton C. L. 1973. The spiders of New Zealand. Part IV. Otago Museum Bulletin, 4: 1–309.
30. Fürst P.-A., Blandenier G. 1993. *Psilochorus simoni* (Berland, 1911) (Araneae, Pholcidae): Découvertes de nouvelles stations suisses et discussion de son écologie. Bulletin de la Société Neuchâteloise des Sciences Naturelles, 116: 75–85.
31. Grimm U. 1985. Die Gnaphosidae Mitteleuropas (Arachnida, Araneae). Abhandlungen des Naturwissenschaftlichen Vereins in Hamburg, 26: 1–318.
32. Hänggi A., Straub S. 2016. Storage buildings and greenhouses as stepping stones for non-native, potentially invasive spiders (Araneae) – a baseline study in Basel, Switzerland, Arachnologische Mitteilungen, 51: 1–8.
33. Harvey P. R., Nellist D. R., Telfer M. G. 2002. Provisional Atlas of British Spiders (Arachnida, Araneae). Biological Records Centre, Vol. 1 & 2, 404 pp.
34. Hazzi N. A. 2014. Natural history of *Phoneutria boliviensis* (Araneae: Ctenidae): habitats, reproductive behavior, postembryonic development and prey wrapping. Journal of Arachnology, 42: 303–310.
35. Huber B. A. 1994. Genital morphology, copulatory mechanism and reproductive biology in *Psilochorus simoni* (Berland, 1911) (Pholcidae; Araneae). Netherlands Journal of Zoology, 44 (1-2): 85–99.
36. Jäger P. 2000. Selten nachgewiesene Spinnenarten aus Deutschland (Arachnida: Araneae). Arachnologische Mitteilungen, 19: 50–57.
37. Jäger P. 2008. *Pandava laminata*, eine weitere nach Deutschland importierte Spinnenart (Araneae: Titanocidae). Arachnologische Mitteilungen, 36: 4–8.
38. Jäger P. 2009. *Latrodectus mactans* nach Deutschland eingeschleppt (Araneae: Theridiidae). Arachnologische Mitteilungen, 37: 35–37.
39. Jäger P., Blick T. 2009. Zur Identifikation einer nach Deutschland eingeschleppten Kammspinnenart (Araneae: Ctenidae: *Phoneutria boliviensis*). Arachnologische Mitteilungen, 38: 33–36.

40. Jeschke K. 1938. Die Abhängigkeit der Tierwelt vom Boden nach Beobachtungen im schlesischen Hügellande. Breslau, 81 pp.
41. Jones D. 1990. Guide des Araignées et des Opilions d'Europe, traduit, adapté et complété par J.C. Ledoux et M. Emerit - Ed. Delachaux et Niestlé.
42. Kielhorn K.-H. 2008. A glimpse of the tropics – spiders (Araneae) in the greenhouses of the Botanic Garden Berlin-Dahlem. Arachnologische Mitteilungen, 36: 26–34.
43. Kielhorn K.-H. 2009. First records of *Spermophora kerinci*, *Nesticella mogera* and *Pseudanapis aloha* on the European Mainland (Araneae: Pholcidae, Nesticidae, Anapidae). Arachnologische Mitteilungen, 37: 31–34.
44. Kielhorn K.-H. 2009. Neu- und Wiederfunde von Webspinnen (Araneae) in Berlin und Brandenburg, Teil 2. Märkische Entomologische Nachrichten, 11(1): 101–116.
45. Kielhorn K.-H. 2013. Bemerkenswerte Spinnenfunde aus Sachsen-Anhalt Teil II. Entomologische Zeitschrift, 123(2): 83–89.
46. Kielhorn K.-H., Rödel I. 2011. *Badumna longinqua* nach Europa eingeschleppt (Araneae: Desidae). Arachnologische Mitteilungen, 42: 1–4.
47. Kobelt M., Nentwig W. 2008. Alien spider introductions to Europe supported by global trade. Diversity Distributions, 14: 273–280.
48. Koch L. 1870. Beiträge zur Kenntniss der Arachniden-fauna Galiziens. – Jahrbuch der Kaiserlich-Königlichen Gelehrten Gesellschaft in Krakau, 41: 1–56.
49. Korenko S., Hamouzová K., Pekár S. 2014. Trophic niche and predatory behavior of the goblin spider *Triaeris stenaspis* (Oonopidae): a springtail specialist. Journal of Arachnology, 42(1): 74–78.
50. Korenko S., Řezáč M., Pekár S. 2007. Spiders (Araneae) of the family Oonopidae in the Czech Republic. Arachnologische Mitteilungen, 34: 6–8.
51. Korenko S., Šmerda S., Pekár S. 2009. Life-history of the parthenogenetic oonopid spider, *Triaeris stenaspis* (Araneae: Oonopidae). European Journal of Entomology, 106: 217–223.
52. Kovács G., Szinetár Cs., Eichardt J. 2006. A márványos álkaszáspók (*Holocnemus pluchei* [Scopoli, 1763]) (Araneae: Pholcidae) Magyarországon, Állattani Közlemények, 91: 9–18.
53. Król Z., Mąkol J. 2012. Nowe dane o występowaniu i rozmieszczeniu *Scytodes thoracica* (Latreille, 1802) (Araneae) w Polsce z uwagami na temat biologii gatunku. Zeszyty Naukowe Uniwersytetu Przyrodniczego we Wrocławiu, 587: 11–15.
54. Krzyżanowska E., Dziabaszewski A., Jackowska B., Staręga W. 1981. Spiders (Arachnoidea, Aranei) of Warsaw and Mazovia. Memorabilia zoologica, 34: 87–110.
55. Kulczyński W. 1876. Dodatek do fauny pajęczaków Galicji. Sprawozdania Komisji Fizyograficznej, 10: 41–67.
56. Kulczyński W. 1881. Wykaz pająków z Tatr, Babiej Góry i Karpat szlązkich z uwzględnieniem pionowego rozsiadlenia pająków żyjących w Galicji zachodniej. Sprawozdania Komisji Fizyograficznej, 15: 1–75.
57. Kupryjanowicz J. 2005. Pająki (Araneae) Biebrzańskiego Parku Narodowego. [In:] Dyrzc A., Werpachowski C. (Eds.). Przyroda Biebrzańskiego Parku Narodowego. Biebrzański Park Narodowy, Osowiec-Twierdza, 275–299.
58. Leborgne R., Cantarella T., Pasquet A. 1998. Colonial life versus solitary life in *Cyrtophora citricola* (Araneae, Araneidae). Insectes Sociaux, 45: 125–134.
59. Leech R. 1971. The introduced Amaurobiidae of North America, and *Callobius hokkaido* n. sp. from Japan (Arachnida: Araneida). The Canadian Entomologist. 103(1): 23–32.
60. Levi H. W. 1997. The American orb weavers of the genera *Mecynogea*, *Manogea*, *Kapogea* and *Cyrtophora* (Araneae: Araneidae). Bulletin of the Museum of Comparative Zoology at Harvard College, 155: 215–255.

61. Levy G. 1998. Twelve genera of orb-weaver spiders (Araneae, Araneidae) from Israel. *Israel Journal of Zoology*, 43: 311–365.
62. Logunov D. V., Guseinov E. F. 2001. Faunistic review of the jumping spiders of Azerbaijan (Aranei: Salticidae), with additional faunistic records from neighbouring Caucasian countries. *Arthropoda Selecta*, 10: 243–260.
63. Lotz L. N. 2007. The genus *Cheiracanthium* (Araneae: Miturgidae) in the Afrotropical region. 1. Revision of known species. *Navorsinge van die Nasionale Museum Bloemfontein*, 23: 1–76.
64. Machač O., Tuf I.H. 2016. Spiders and harvestmen on tree trunks obtained by three sampling methods. *Arachnologische Mitteilungen*, 51: 67–72.
65. Mansour F., Rosen D., Shulov A. 1980. Biology of the spider *Cheiracanthium mildei* (Arachnida: Clubionidae). *Entomophaga*, 25: 237–248.
66. Mansour F., Whitecomb W. H., 1986. The spiders of citrus grape in Israel and their role as bio-control agents of *Ceroplastes floridensis* (Comoptera: Coccidae). *Entomophaga*, 31: 269–276. DOI 10.1007/BF02373336
67. Muster C., Herrmann A., Otto S., Bernhard D. 2008 Zur Ausbreitung humanmedizinisch bedeutsamer Dornfinger-Arten *Cheiracanthium mildei* und *C. puncturium* in Sachsen und Brandenburg (Araneae: Miturgidae). *Arachnologische Mitteilungen*, 35: 13–20. DOI 10.5431/ar-arnit3502
68. 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
69. Nentwig W., Blick T., Gloor D., Hänggi A., Kropf C. 2016. Spiders of Europe. www.araneae.unibe.ch; version: 01.2016; accessed on 5.01.2016
70. Nentwig W., Kobelt M. 2010. Spiders (Araneae). Chapter 7.3. [In:] Roques A. et al. (Eds.) Alien terrestrial arthropods of Europe. *BioRisk*, 4(1): 131–147. DOI: 10.3897/biorisk.4.48
71. Nowicki M. 1870. Zapiski faunistyczne. Sprawozdania Komisji Fizyograficznej, 4: 1–28.
72. Otto S. 2015. Caucasian Spiders. A faunistic database on the spiders of the Caucasus. Version 1.4.3. Internet: caucasus-spiders.info.
73. Öztürk N., Danişman T., Tüfekli M., Ulusoy M. R. 2013. Spider fauna of pomegranate and olive orchards in the Eastern Mediterranean Region of Turkey. *Turkish Bulletin of Entomology*, 3(2): 67–73.
74. Paquin P., Dupérré N. 2003. Guide d'identification des araignées de Québec. *Fabreries, Suppl.*, 11: 251 pp.
75. Petruszewicz K. 1937. Katalog der echten Spinnen (Araneae) Polens. *Festschr. E. Strand, Riga*, 3: 140–216.
76. Pfliegler W. P. 2014. Records of some rare and interesting spider (Araneae) species from anthropogenic habitats in Debrecen, Hungary. *e-Acta Naturalia Pannonica*, 7: 143–156.
77. Platnick N. I., Dupérré N., Ubick D., Fannes W. 2012. Got males? The enigmatic goblin spider genus *Triaeris* (Araneae, Oonopidae). *American Museum Novitates*, 3756: 1–36.
78. Prószyński J., Staręga W. 1971. Pająki – Aranei. *Katalog Fauny Polski*, 33: PWN Warszawa, 382 pp.
79. Reiser N., J. Neumann J. 2014. *Holocnemus pluchei* (Araneae, Pholcidae) in Getränke- und Baumärkten in Deutschland. *Arachnologische Mitteilungen*, 48: 24–27.
80. Rozwałka R. 2007. Nowe dane o występowaniu *Hasarius adansonii* (Savigny et Audouin, 1825) (Araneae: Salticidae) w Polsce. *Przegląd zoologiczny*, 51: 139–141.
81. Rozwałka R. 2007. *Uloborus plumipes* Lucas, 1846 (Araneae: Uloboridae) w Polsce. *Przegląd zoologiczny*, 51: 131–137.
82. Rozwałka R. 2011. *Mermessus trilobatus* (Emerton, 1882) (Araneae: Linyphiidae) – nowy gatunek pająka dla fauny Polski. *Przegląd zoologiczny*, 52-54: 163–166.

83. Rozwałka R., Rutkowski T., Bielak-Bielecki P. 2013. New data on introduced and rare synanthropic spider species (Arachnida: Araneae) in Poland. *Annales UMCS, sec. C*, 68: 127–150.
84. Rozwałka R., Stachowicz J. 2010. *Holocnemus pluchei* (Scopoli, 1763) – new for Poland introduced species of pholcid spider (Araneae: Pholcidae). *Annales UMCS, sec. C*, 65: 73–78.
85. Sanocka-Wołoszyn E. 1964. Uwagi nad rozmieszczeniem i ekologią pająków (Araneae) z jaskiń Gór Świętokrzyskich. Seminarium Speleologiczne I Ogólnopolskiego Zjazdu Badaczy Krasu. Kieleckie TN, Kielce, 73–86.
86. Sanocka-Wołoszyn E. 1981. Badania pajęczaków (Aranei, Opiliones, Pseudoscorpionida) Wyżyny Krakowsko-Częstochowskiej. *Acta Universitatis Wratislaviensis*, 548, Prace Zoologiczne, 11: 92 pp.
87. Slowik J. 2009. A review of the cellar spider genus *Psilochorus* Simon 1893 in America north of Mexico (Araneae: Pholcidae). *Zootaxa*, 2144: 1–53.
88. Snazell R., Smithers P. 2007. *Pseudanapis aloha* Forster (Araneae, Anapidae) from the Eden Project in Cornwall, England. *Bulletin of the British Arachnological Society*, 14: 74–76.
89. Staręga W. 1974. Materiały do znajomości rozmieszczenia pająków (Aranei) w Polsce. *Fragmenta faunistica*, 19: 395–420.
90. Staręga W. 1978. Materiały do znajomości rozmieszczenia pająków (Aranei) w Polsce, III–VII. *Fragmenta faunistica*, 23: 259–302.
91. Staręga W. 1983. Wykaz krytyczny pająków (Aranei) Polski. *Fragmenta faunistica*, 27: 150–268.
92. Staudt A. 2016. Nachweiskarten der Spinnentiere Deutschlands. (Arachnida: Araneae, Opiliones, Pseudoscorpiones). Internet site: <http://www.spiderling.de/arages/>
93. Sterghiu C. 1985. Fam. Clubionidae. [In:] Fauna Republicii Socialiste România: Arachnida, Academia Republicii Socialiste România, Bucharest, Vol. V, Fasc. 4: 165 pp.
94. Taczanowski W. 1866. Spis pająków zebranych w okolicy Warszawy w ciągu roku 1865 r. Wykaz Szkoły Głównej Warszawskiej, Warszawa, 5: 1–14.
95. Tomasiewicz B., Wesołowska W. 2006. *Icius hamatus* (Salticidae, Araneae) in Poland? *Polskie Pismo Entomologiczne*, 75: 339–342.
96. Van Keer K., Van Keer J., De Koninck H., Vanuytven H. 2007. Another Mediterranean spider, *Cheiracanthium mildei* L. Koch, 1864 (Araneae: Miturgidae), new to Belgium. *Nieuwsbrief van de Belgische Arachnologische Vereniging*, 22(1): 61–64.
97. Vetter R. S., Crawford R. L., Buckle D. J. 2014. Spiders (Araneae) Found in Bananas and Other International Cargo Submitted to North American Arachnologists for Identification. *Journal of Medical Entomology*, 51: 1136–1143.
98. Viquez C. 2007. First record of *Cyrtophora citricola* (Forskål) from Costa Rica, with notes on some related species (Araneae: Araneidae). *Boletín de la Sociedad Entomológica Aragonesa*, 40: 385–388.
99. Wajgiel L. 1874. Pajęczaki galicyjskie. *Kołomyja*, 36 pp.
100. Wesołowska W., Rozwałka R. 2008. *Pseudeuophrys lanigera* (Simon, 1871), new species of jumping spider (Araneae, Salticidae) for Poland. *Polskie Pismo Entomologiczne*, 77: 39–41.
101. Wiehle H. 1953. Spinnentiere oder Arachnoidea (Araneae) IX: Orthognatha – Cribellatae – Haplogynae – Entelegynae (Pholcidae, Zodariidae, Oxyopidae, Mimetidae, Nesticidae). *Die Tierwelt Deutschlands*, Gustav Fischer Verlag, Jena, 42, 150 pp.
102. Wijnhoven H. 1997. *Euophrys lanigera* (Simon) met recht op de nederlandse soortenlist. *Nieuwsbrief Spined*, 12: 1–3.
103. Woźny M. 1978. Nowe i rzadkie gatunki pająków (Aranei) dla fauny Polski. *Przegląd zoologiczny*, 22: 260–262.

104. Woźny M., Czajka M., Pilawski S., Bednarz S. 1988. Pająki (*Aranei*) polskich Sudetów. Acta Universitatis Wratislaviensis. Warszawa, 972: 54–130.
105. WSC 2016. World Spider Catalog. Natural History Museum Bern, online at <http://wsc.nmbe.ch>, version 16.5; accessed on 5.01.2016.
106. Wunderlich J. 1987. Die Spinnen der Kanarischen Inseln und Madeiras: Adaptive Radiation, Biogeographie, Revisionen und Neubeschreibungen. Triops Verlag, Langen, West Germany, 435 pp.
107. Wunderlich J. 2012. Few rare and a new species of spiders (Araneae) from Portugal, with resurrection of the genus *Chiracanthops* Mello-Leitao 1942 (Clubionidae: Eutichurinae). Beiträge zur Araneologie, 8: 183–191.