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

Nowe dane o introdukowanych i rzadkich gatunkach pająków synantropijnych (Arachnida: Araneae) w Polsce

SUMMARY

In Central Europe, as well as in Poland many introduced spider species have been recorded in the past decades. Most of them are from areas with warm climate, and spreading mainly in synanthropic environment, rarely colonizing natural habitats. Results of research, presented in this paper extend the list of Polish synanthropic araneofauna by four species: *Latrodectus mactans*, *Cheiracanthium mildei*, *Heteropoda venatoria* and *Heliophanus* cf. *apiatus*. In addition, new findings of rare or rarely collected synanthropic spider species (*Nesticella mogera, Scytodes thoracica, Psilochorus simoni, Uloborus plumipes, Parasteatoda tabulata*, *Steatoda triangulosa, Mermessus trilobatus, Ostearius melanopygius, Hasarius adansoni*, *Leptorchestes berolinensis*, *Pseudeuophrys lanigera*) are discussed. Presented data enrich our knowledge about distribution of these species in Poland and show new pathways of potential expansion. For *Uloborus plumipes* and *Hasarius adansoni* presence of stable, permanent populations is shown. Findings of *Mermessus trilobatus* and *Ostearius melanopygius* in open country suggest that these alien species are gradually colonizing natural biotopes.

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 pochodzących z innych stref klimatycznych, które zostały introdukowane i rozprzestrzeniają się w środowiskach synantropijnych. Zaprezentowane w niniejszej pracy wyniki

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badań wydłużają listę stwierdzonych w Polsce przedstawicieli synantropijnej araneofauny o cztery gatunki: *Latrodectus mactans*, *Cheiracanthium mildei*, *Heteropoda venatoria* oraz *Heliophanus* cf. *apiatus.* Oprócz tych gatunków omówiono nowe stanowiska sporadycznie lub rzadko dotychczas wykazywanych w Polsce pająków synantropijnych takich jak: *Nesticella mogera, Scytodes thoracica, Psilochorus simoni, Uloborus plumipes, Parasteatoda tabulata*, *Mermessus trilobatus, Ostearius melanopygius, Hasarius adansoni*, *Leptorchestes berolinensis* i *Pseudeuophrys lanigera.* Przedstawione dane uzupełniają stan poznania rozmieszczenia tych gatunków w Polsce o nowe lokalizacje oraz wskazują drogi potencjalnej ekspansji. Dla *Uloborus plumipes* i *Hasarius adansoni* wykazano istnienie dużych, rozmnażających się w Polsce, trwałych populacji.

Słowa kluczowe: Araneae, pająki synantropijne, introdukowane i rzadkie gatunki

INTRODUCTION

Synanthropic spider species (*sensu lato*) are diverse in origin and microbiotopes preferences, occurring in an environment transformed by human activity. They occur most frequently inside buildings, on outside walls, in greenhouses, warehouses etc. (31, 86, 90, 98, 108). In recent years, in Western and Central Europe there was rapid increase in the number of introduced species. This process is due to more intensive transport and goods exchange, both between continents and within Europe (54, 75, 77, 106). Increasing number of synanthropic spiders has been noted in Poland too, e.g. *Holocnemus pluchei* (Scopoli) (94), *Uloborus plumipes* Lucas (101), *Steatoda triangulosa* (Walckenaer) (93), *Mermessus trilobatus* (Emerton) (92), *Pseudeuophrys lanigera* (Simon) (115). However, the state of knowledge about species composition and distribution of synanthropic spiders in Poland is still poor. This is due to lack of interest paid by Polish arachnologists to synanthropic araneofauna, partially geographical and until recently geopolitical location as well. Information about four introduced species new to Poland, and several new findings of some rarely collected ones are herein presented.

ACKNOWLEDGEMENTS

Authors dedicate this study to Prof. Andrzej Dziabaszewski, Adam Mickiewicz University, Poznań, who is the author of a pioneering series of works on Polish synanthropic araneofauna.

SPECIES NEW TO THE POLISH FAUNA

Theridiidae

***Latrodectus mactans* (Fabricius, 1775)**

Gdańsk [UTM: CF 43], harbor, in a container brought from California, 13.04.2012 – 3 ♀♀, leg. unknown – 1 ♀, det. R. Rozwałka).

Species originating from southern regions of North America (60, 81), also introduced to South America (70), South Africa (65) and South Asia (35, 70, 81). In recent years a few imported specimens of *L. mactans* in Europe were reported: in Belgium (112), in the Netherlands (109), and Germany (44).

Previous data on cases of introduction to Europe of specimens of *L. mactans* are almost homonymous. Specimens of this species were found in the storage

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port or similar locations, mostly on equipment, materials or packaging products imported from the US (44, 109, 112). Also, specimens of *L. mactans* collected in Poland arrived in a container[1] from California (oral inf. employees WIORiN). The results of long-term observation in Belgium, suggest that the incidental import of *L. mactans* into Europe is not particularly rare (112). However, so far there were no cases of stable acclimatization in Europe, due to the high thermal requirements of this species (44, 109, 112).

Miturgidae

***Cheiracanthium mildei* L. Koch, 1864**

Lublin [UTM: FA 17], Władysława Jagiełły Str. 3, stand with fruits and vegetables in shop, in pomegranate "import from Turkey", 21.01.2012 – 1 juv., leg. et det. R. Rozwałka.

Mediterranean species, currently widespread throughout the whole Northern Hemisphere, was also recorded in Argentina (81). Very common species in Southern Europe and Asia Minor, especially often mentioned in orchards and gardens (12, 67, 68, 105). In the US, where it has been introduced in the late 40's and 50's of the 20th century (16), also occurs mainly in orchards and vineyards (40, 66) and on the walls of buildings (24). In Central and Western Europe, *Ch. mildei* it is rare, occasionally appearing in buildings (74), or in gardens and city parks (42, 113).

A specimen of *Ch. mildei* caught in Lublin was hidden in pomegranate stalk imported from Turkey. This observation is direct evidence indicating that the transport of exotic fruits can be a source of new synanthropic species in Poland and Europe. Information on the presence of *Ch. mildei* in orchards and vineyards (12, 40, 66, 67, 68, 105), repeatedly emphasized in the literature suggests that more cases of the introduction *of Ch. mildei* to Poland or Central and North European countries can be expected. However, it is unlikely that this species can enter the stable composition of the Polish araneofauna, due to much higher thermal requirements (68).

Sparassidae

***Heteropoda venatoria* (Linnaeus, 1767)**

Lipno [UTM: CD 75], 3-Maja Str. 3, discount store, 18.–23.08.2012 – 1 ♀, leg. unknown, det. R. Rozwałka.

Wrocław-Gądów Mały [UTM: XS 36], fruit and vegetable market, between cardboard boxes, 21.08.2009 – 1 juv., leg. P. Grajewski, det. P. Bielak-Bielecki, ver. R. Rozwałka.

Presented data are the first official information on the occurrence of *Heteropoda venatoria* in Poland, but in the late 50's and 60's of the 20th century, this

[1] The container in which presence of *L. mactans* was detected, has undergone sterilization and quarantine treatment, in order to eliminate any further specimens of this species.

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species occurred in buildings in the Zoo in Łódź (oral inf. H. Jakubowski, oral inf. W. Staręga). This population of *H. venatoria*, intentionally introduced to control cockroaches, is omitted in the lists by Prószyński and Staręga (82, 83) or Staręga (103) (oral inf. W. Staręga). Today, in the Zoo in Łódź, *H. venatoria* has not been observed for many years, what indicates that this population is extinct (oral inf. W. Stanisławski). Apart from listed specimens, authors also received some other information[2] about *H. venatoria*, occasionally imported with packages of exotic fruits or ornamental accessories (coconut, palm leaves, etc.). Similar cases are reported from Western Europe, while regular populations of this species usually occur in zoological and botanical gardens (42, 43, 98). Further specimens of *H. venatoria* may appear as refugees from the amateur breeding (very agile, arboreal spider, with good climbing abilities, and strongly flattened body what makes easy squeezing through the smallest gap (45). Currently, there is no stable population of *H. venatoria* on the Polish territory, but its occurrence in zoo or storage port is likely.

Salticidae

***Heliophanus* cf. *apiatus* Simon, 1868**

Świdnik [UTM: FB 17], Krępiecka Str. 3, large hypermarket, on exotic fruits, 20.10.2010 – 1 ♀, leg. P. Bielak-Bielecki, det. R. Rozwałka.

The structure of epigyne and vulva (Figs 1–2) of collected specimen suggested that it is *Heliophanus apiatus* (Simon) – very rare species distributed from Spain to Italy (81, 114), but general body coloration (Fig. 3) differs from the descriptions of this species (55, 114). Due to some differences, determination is not entirely certain, but *H. apiatus* is very poorly known and not too precisely described (20, 55, 114). Therefore it is possible that observed difference in body coloration is only individual variation. Below there is the description and drawings documentation.

Description ♀ (all measurements in mm): total length 3.9; cephalothorax length 1.6 x 1.3 width and height of the PE – 0.85; eye field black with metallic sheen, posterior part and lateral sides of cephalothorax slightly lighter, brown. Entire cephalothorax abundantly covered with bright opalescent scales. Ocular area with numerous long, thin, dark hair (Fig. 1c) EFL – 0.34; AEW – 0.53; PEW – 0.58; diameter FME 0.32. Scales around the eyes the same colour and size as those covering cephalothorax. Chelicerae brown, length 0.45. Gnathocoxae pale brown, with much brighter (milky white) medioapical part, covered with a few

[2] Descriptions of spider body shape, colour pattern and way of moving, suggest that informants could actually see *H. venatoria*. However, because of lack of any documentation in the form of specimens or photos, and often very vague information on the circumstances and location of observation they were found to be insufficiently documented.

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long black hair. Labium and sternum grey-brown, profusely covered with bright (whitish) hair. Sternum length 0.68 x 0.53 width. Pedipalps in live specimen bright lemon yellow, after conservation pale yellow. Hair on pedipalps abundant, composed of light (the same colour as segments), only on the medial surface $Ta_{pedipalp}$ with long, rigid, dark (dark grey) hair. Length of pedipalps segments: Fe – 0.45; Pa – 0.23; Ti – 0.27; Ta – 0.40. Legs yellowish, coxa, trochanter and femur pale yellow, other segments yellow. Tarsus terminated with very heavy tufts of black hair, claws almost invisible. Leg spination: Fe I: d. 1-1-1, pla. 1; Ti I: pla. 1; v. 2-2; Mt I: v. 2-2. Fe II: d. 1-1-1, pla. 1; Ti II: pla. 1; v. 1-1; Mt II: v. 2-2 Fe III: d. 1-1-1, pla. 1; Ti III: pla. 1, rl. 2; Mt III: d. 2+2, v. 2+2, pla. 1, rla. 1; Fe IV: d. 1-1-1; Ti IV (various): pla. 1-1 (1-0); rla. 1-1-1; va. 1-0 (1-1); Mt IV (various): d. 2-2 (1-2); v. (or va.) 2-2 (1-2); pla. 1(2); rla. 1(2). The dimensions of legs segments are shown in Table 1. Abdomen: length 2.4 x 1.5 width. The basic colour of abdomen greyish, faintly visible from heavy scales and hair densely covering its surface. In the middle part of abdomen a pair of diffuse rhomboid brighter light brown spots, limited by margin. In the back of the abdomen two transverse bright chevrons (Fig. 3). Abdomen ventrally greyish, covered with scales and hair slightly less

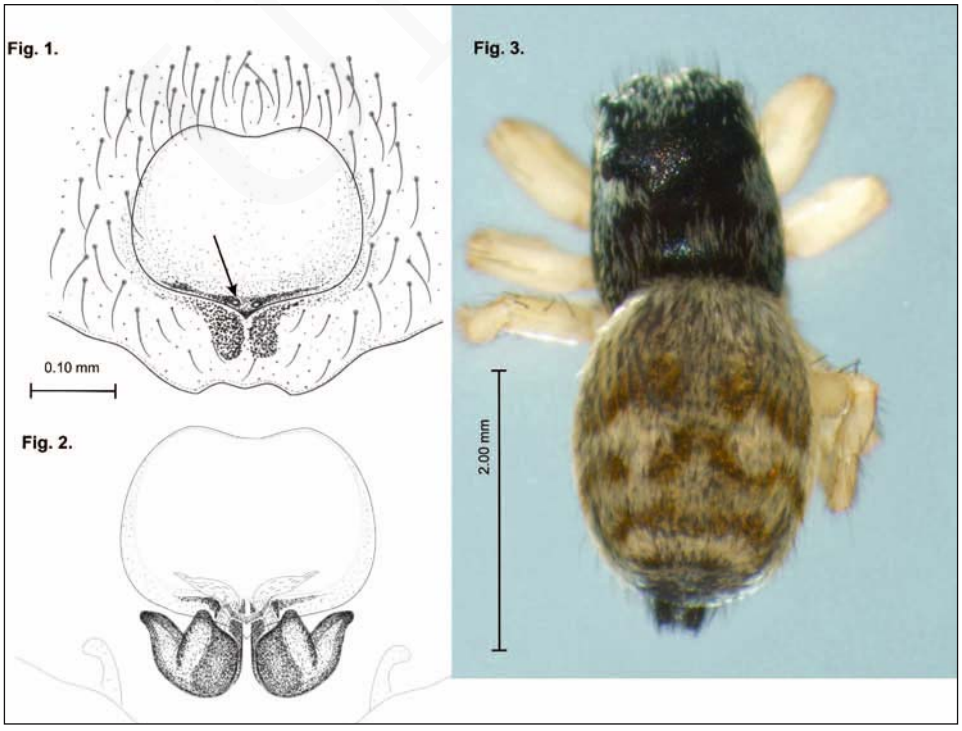

Fig. 1–3. *Heliophanus* cf. *apiatus*: 1 – epigyne, 2 – vulva dorsal, 3 – total view; copulatory openings marked by an arrow.

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spaced than on the sides and on the dorsal side of the body. At the base of spinnerets pair of bright (whitish) spots. Spinnerets grey-black, length 0.28–0.30.

Genital morphology: epigyne strongly concave, oval-heart shaped, highly sclerotised on the edges, especially at the rear part (Fig. 1). Copulatory openings located medially, very difficult to see (Fig. 1). Copulatory ducts very short, "u-shaped" almost invisible in the dorsal view, because they are masked by strong sclerotised spermathecae. Spermathecae clearly bipartite (Fig. 2).

Circumstances in which a specimen of *Heliophanus* cf. *apiatus* was collected indicate that this species has been imported with fruit from the Mediterranean Region. Together with mentioned in this paper *Cheiracanthium mildei* and recently reported from Poland *Icius hamatus* (C. L. Koch) [107], this is another species confirming possibility of importation of alien species with exotic fruits.

Table 1. Length of the individual segments of legs of *Heliophanus* cf. *apiatus* (in mm).

Segments / Legs	Co	Tr	Fe	Pa	Ti	Mt	Ta	**Total**
L-I	0.32	0.21	0.45	0.53	0.55	0.48	0.33	**2.9**
L-II	0.31	0.21	0.40	0.45	0.45	0.45	0.32	**2.6**
L-III	0.29	0.21	0.46	0.40	0.52	0.54	0.31	**2.7**
L-IV	0.39	0.25	0.61	0.45	0.80	0.85	0.49	**3.8**

Glossary: d – dorsal, pla – prolateraloapical, rl – retrolateral, rla – retrolateraloapical, v – ventral, va – ventroapical, vpl – ventroprolateral, AEW – anterior eye width, EFL – eye field length, FME – frontal median eye, PE – posterior eye, PEW – posterior eye width, Co – coxa, Tr – trochanter, Pa – patella, Ti – tibia, Mt – metatarsus, Ta – tarsus.

NEW DATA ON SOME RARE SYNANTHROPIC SPIDERS SPECIES IN POLAND

Scytodidae

***Scytodes thoracica* (Latreille, 1802)**

Wrocław-Gądów Mały [UTM: XS 36], Lotnicza Str. 11, on external wall near the entrance to the staircase, 25.07.2009 – 1 ♀, leg. et det. P. Bielak-Bielecki.

Holarctic species (81), widespread in Europe both in natural and in synanthropic biotopes in the southern part of the continent (2, 76, 117). Northwards gradually rarer and strictly synanthropic (38, 117).

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In Polish territory *Scytodes thoracica* was generally mentioned in the 19th century from Silesia, but without closer location (5). Also Wiehle (117) wrote about the occurrence of this species in Silesia, referring to the study of Bertkau (5). Both sources of this information were probably overlooked by Polish authors, and in lists of Polish spiders *S. thoracica* have not occurred (82, 83, 103) until Mizera and Woźny published "the first information" about occurrence of *S. thoracica* in Poland, reporting this species from Legnica (72). Presented finding from Wrocław supplements these data with other, precise locality. Although further research of *S. thoracica* in Wrocław was negative (obs. P. Bielak-Bielecki), the distribution of this species in Germany, where it is fairly common (104) indicates that this species is likely to be more widely distributed in the south-western part of Poland. Moreover, in recent years this species is clearly spreading its range to the North and East (e.g. 8, 39, 104).

Nesticidae

***Nesticella mogera* (Yaginuma, 1972)**

Lublin-Węglin Południowy [UTM: FB 07], Zwycięska Str. 1, large garden-building hypermarket, between flowerpots, 4.03.2012 – 1 ♀ with cocoon, leg. et det. R. Rozwałka.

South-East Asian species, most recently introduced to Europe (50). In Europe, so far known from one locality in Germany, and two localities in Poland (7). It lives in warm, humid spaces under stones and pieces of wood, in thick forest litter (50), sometimes was also observed in the caves (36).

In Poland so far, a large population of *N. mogera* in the Butterfly House in Zoological Garden in Wrocław, and a single specimen in Lublin (7) has been found. Presented data of another locality in large garden center in Lublin, suggests that this species is probably much more widespread than it arises from existing data (7, 50). The occurrence of *N. mogera* in large garden centers suggests that apart from zoos (7, 50), it can also inhabit greenhouses.

Pholcidae

***Psilochorus simoni* (Berland, 1911)**

Chalin distr. Międzychód [UTM: WU 82], on the wall near entrance, 06.2012 – 1 ex., obs. T. Rutkowski.

Dąbrówka distr. Poznań [UTM: XU 10], in the kitchen and bathroom, 21.10.2012 – 1 ♂, 2 ♀♀ and obs. ca 20 next specimens, leg. et det. and obs. T. Rutkowski.

Lublin-Felin [UTM: FA 17], Zygmunta Augusta Str. 6, in the kitchen under the sink, 17.11.2007 – 2 ♂♂, 1 ♀; in the bathroom; 17.11.2007 – 1 ♀; in the cellar, under the cardboard packaging, under the boxes, between the jars, etc., 17-18.11.2007 – 5 ♂♂, 12 ♀♀, 4 juv., leg. et det. R. Rozwałka, and many ex. observed in the years 2007–2013.

Mikołajew distr. Łomża [UTM: ED 68], in the toilet, 06.2011 – 1 ex., obs. T. Rutkowski.

Świdnik [UTM: FB 17], Kościuszki Str. 8, in the cellar, 15.10.2009 – 1 ♀, 1 juv., leg. P. Bielak-Bielecki, det. R. Rozwałka.

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Rare synanthropic species known from few localities in Western and Central Europe, south-east Turkey and northern Iran (1, 3, 4, 33, 19). Listed in California and Oregon in the US (100). This troglophilic spider species occurs most often under boards, boxes, cartons, and similar objects in dark, relatively warm (10–18°C) cellars, warehouses (ripening depots) of wine and cheese, etc., sometimes in caves (19, 31, 33, 38, 41, 100). In places of occurrence often creates large populations (4, 6, 31, 26, 41).

In Poland, previously known from six localities only: the cellars of Adam Mickiewicz University in Poznań and Czerniejewo near Gniezno (26, 27, 30, 31], Wrocław (13) and recently discovered in three places in Świdnik (6). In the Świdnik area *P. simoni* is probably a common species (6), while in Lublin, despite years of searching, was detected only in one locality. Likely, this spider occurs very locally, even within large cities inhabits only a few specific microhabitats (6, 26, 31).

Uloboridae

Uloborus plumipes Lucas, 1846

Dębówka 17a distr. Lublin [UTM: FB 08]; Lublin-Węglin Południowy [UTM: FB 07], Zwycięska Str. 1; Lublin-Bronowice [UTM: FB 17], Chemiczna Str. 2; Elizówka 65 distr. Lublin [UTM: FB 18] – small populations composed of a few or several specimens observed in the period 2007–2012; obs. R. Rozwałka; material partially published (Rozwałka 2007a).

Komorniki distr. Poznań [UTM: XU 20], Głogowska Str. 436, on the ornamental plants in large building-garden hypermarket, 8.10.2011 – 4 juv., leg. T. Rutkowski, det. R. Rozwałka.

Stężyca distr. Ryki [UTM: EC 51], Zielona Str. 48, on the plants in glasshouses of large ornamental plant farm, 07.04.2011 – 5 ♀♀; 1 sub ♂, 1 juv. and obs. many specimens and several dozen of cocoons, leg. et det. et obs. R. Rozwałka.

Swadzim distr. Poznań [UTM: XU 11], on the ornamental plants in large garden-building hypermarket, 28.10.2012 – 3 juv. and many ex. obs. leg. et det. et obs. T. Rutkowski.

Świdnik [UTM: FB 17], Krępiecka Str. 3, large hypermarket, on the ornamental plants imported from Holland, 22.10.2010 – 2 ♀♀; 2 juv., 26.10.2010 – 1 sub♀; 12.06.2011 – 1 ♀ with cocoon, leg. et det. P. Bielak-Bielecki, ver. R. Rozwałka.

Warszawa-Janki [UTM: DC 97], Plac Szwedzki 1, flower shop in large shopping center, 3.01.2013 – 1 juv, and 2 cocoons, leg. et det. R. Rozwałka.

Warszawa-Śródmieście [UTM: DC 98], Jana Pawła Str., large shopping center, on the ornamental plants in flower shop, 22.10.2011 – 1♀ (with cocoon), leg. et det. R. Rozwałka and 2 juv. obs. R. Rozwałka.

Warszawa-Targówek [UTM: EC 09], Radzymińska Str. 166, on the ornamental plants of large building-garden hypermarket, 26.09.2010 – 1 ♀ and 2 juv. obs., leg. et det. R. Rozwałka et W. Staręga.

Wrocław-Krzyki [UTM XC 46], Krakowska Str. 63, large market, on the plants; 03.11.2011 – 2 juv., leg. et det. P. Bielak-Bielecki.

Wrocław-Szczepin [UTM: XS 46], Długa Str. 29/35, large garden-building hypermarket; on the plants and on the construction elements, 13.10-02.11.2011 – 24 ex. (obs.); 01.09.2011-27.01.2012 – some specimens and some egg sac (obs); obs. P. Bielak-Bielecki; Długa Str. 37/47, large garden--building hypermarket; on the plants; 23.12-30.12.2011 – 5 ♀♀ with cocoons and over 30 specimens (obs.); 20.01.2012 – 1 ♀ (with cocoon); 1 juv.; all obs. P. Bielak-Bielecki.

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Central and West African species, currently widespread almost throughout all pantropical and partially moderate zone (81). In Southern Europe common in natural conditions. In Central and Western Europe, due to high thermal and moisture requirements mentioned mainly from greenhouses of botanical gardens, horticultural glasshouses, flower shops and similar locations (38, 52, 78, 87].

First time recorded from Poland in 2001 from Białystok (101). Since 2002, this species was collected and observed in a number of localities in Lublin, and in several other Polish cities (87). Bigger populations which occur in large garden centers in Lublin may be described as semiautochthonic. They are formed by individuals reproducing partially in place, but these populations are still supplied with a number of specimens coming from almost every transportation of ornamental



Fig. 4. Distribution of *Uloborus plumipes* in Poland.

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plants (87). *Uloborus plumipes* is an example of introduced species, which is very expansive and has become common within a decade from the first finding in Poland. Already in 2004, *U. plumipes* was observed in Poland on flowers originating from Polish producers of ornamental plants (87). However, these observations were only indirect evidence for the existence of big Polish population like this, reported here, in glasshouses of a big ornamental plant farm in Stężyca. Previously published data from the Polish territory reported on single specimens, introduced sporadically, often from unknown sources (country of origin) (87, 101, 107], or small, low stable populations (87). A very large population of *U. plumipes* (probably a few thousand specimens) recorded in Stężyca, provides evidence that this species is a permanent element in synanthropic araneofauna of Poland. Probably similar populations of *U. plumipes* occur in greenhouses of other Polish producers of ornamental plants, and this species is much more common.

Theridiidae

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

Bóbrka distr. Lesko [UTM: FV 07], old stone-pit, on the rocks, and on the ruins, 7.06.12 – 1 ♂, 3 ♀♀, 4 sub ♀, leg. et det. R. Rozwałka.

Dąbrówka distr. Poznań [UTM: XU 10], on an outer wall of discount, 18.10.2012 – 1 ♀, leg. et det. T. Rutkowski.

Jeleniewo distr. Suwałki [UTM: FF 20], on an outer wall of church, 28.06.2009 – 2 ♀♀, leg. P. Bielak-Bielecki, det. R. Rozwałka,

Myczkowce distr. Lesko [UTM: FV 07], on the rocks near road, 7.06.2012 – 1 sub ♀, leg. et det. R. Rozwałka.

Obrzycko distr. Szamotuły [UTM: XU 04], on an outer wall of church, 18.10.2012 – 2 ♀♀, leg. et det. T. Rutkowski.

Podlesice distr. Zawiercie [UTM: CB 90], car park near Góra Zborów Reserve, 19.05.2011 – 1 ♂, leg. et det. R. Rozwałka.

Pustynia Błędowska (Błędowska Desert) [UTM: CA 98], in the ruins of the WW II bunker, 19.05.2011 – 2 juv., leg. et det. R. Rozwałka.

Sanok [UTM: EV 89], Schody Franciszkańskie, on the walls, 10.06.2011 – 2 juv. leg. et det. R. Rozwałka.

Szklarka Przygodzicka distr. Ostrzeszów [UTM:XT 90], an outer wall of the cellar, concrete, 25.07.1998 – 1 ♀, leg. et det. T. Rutkowski.

Wrocław-Gądów Mały [UTM: XS 36], on an outer wall of a building, 25.08.2009 – 1 ♀, leg. P. Bielak-Bielecki, det. R. Rozwałka.

Wujskie distr. Sanok [UTM: EV 99], trash on the car park, 10.06.2011 – 1 sub ♀, leg. et det. R. Rozwałka.

Zagórz distr. Sanok [UTM: EV 98], ruins of the old monastery, 10.06.2011 – 1 ♂, 2 sub ♀♀; 13.08.2011 – 3 ♀♀; 7.06.2012 – 1 ♂, 2 ♀♀, 2 sub ♀, leg. et det. R. Rozwałka.

Invasive hemisynanthropic species, with Holarctic range (81). In Europe for the first time reported from Germany (73), followed by many other countries in Central and Southern Europe (53, 21, 37). By now recorded from most European countries (9, 22, 99, 110).

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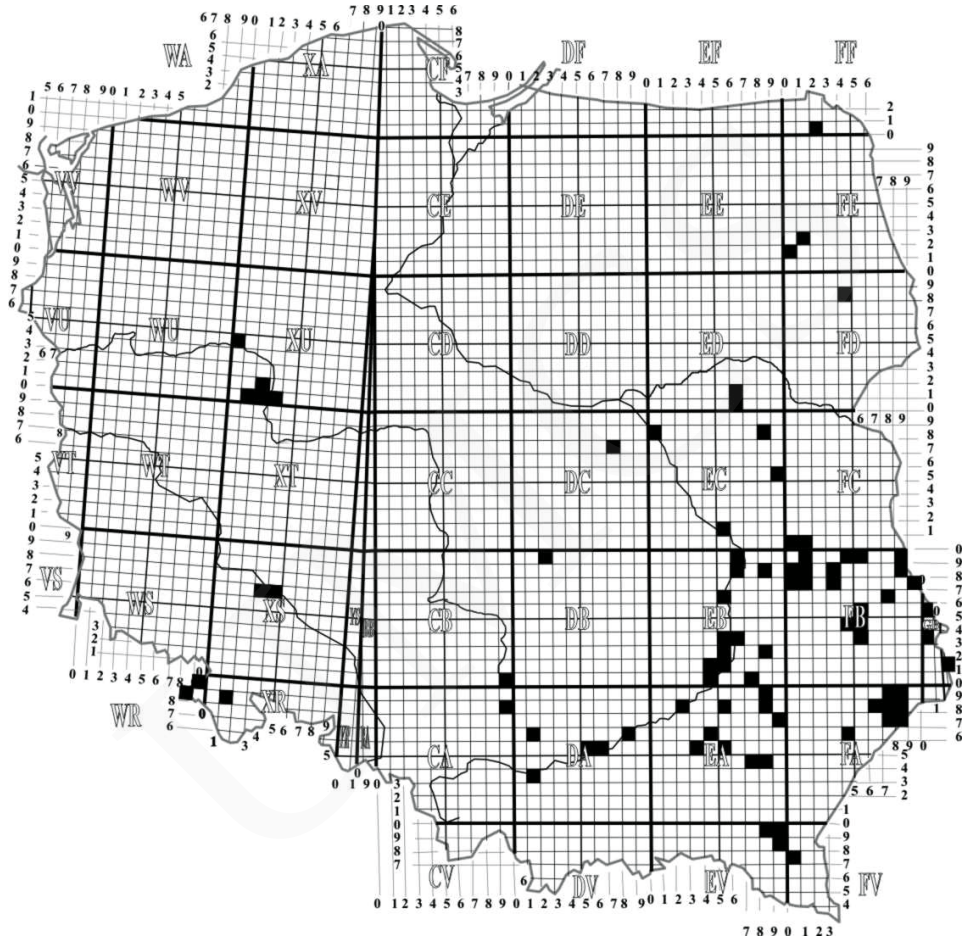

Fig. 5. Distribution of *Parasteatoda tabulata* in Poland.

Parasteatoda tabulata is common in big cities and in towns, inhabiting outer walls of buildings, parks, fences, gardens etc. (86, 89). It could be met in natural biotopes as well, but usually not far from sites heavily transformed by human activity, e.g. in quarries, on escarps and roadside trees, car parks in forests, rubbish dumps (89). Big number of localities reported from Poland (Fig. 5), comparing to neighboring countries (22, 99, 104) is the result of intensive fieldworks on distribution of this species (89).

***Steatoda triangulosa* (Walckenaer, 1802)**

Lublin-Bronowice [UTM: FB 17], Chemiczna Str. 2, large garden-building hypermarket, 14.02.2012 – 1 juv., leg. et det. R. Rozwałka (location published in Rozwałka 2011b, with another specimen reported).

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Sady distr. Poznań [UTM: XU 11], Rolna Str. 10, import from Holland, on the packaging, 27.11.2004 – 1♂, leg. et det. T. Rutkowski.

Mediterranean species, currently almost cosmopolitan (61, 62, 80, 81]. In southern Europe occurs mostly in natural habitats – under stones in warm open biotopes (2, 14, 76), and sometimes in entrance parts of caves (84). In Western and Central Europe, this species is rarer, and inhabits only warm, heated indoor habitats (2, 14, 47, 85, 117).

Recently for the first time reported from Poland, in two large market centers in Lublin (93). Probably wider distributed in Poland, especially in big market centers, stores and wholesalers, where it may be imported e.g. with packages (T. Rutkowski obs.).

Linyphiidae

Mermessus trilobatus (Emerton, 1882)

Grężawa distr. Żary [UTM: VT 82], sandy grasslands, pitfall traps, 06-21.08.2011 – 2 ♂♂, leg. et det. T. Rutkowski.

Grężawa distr. Żary [UTM: VT 83], ecotone between the pine forest and damp alder forest, pitfall traps, 23.07–06.08.2011 – 1 ♂, leg. et det. T. Rutkowski.

Ługi Górzyckie distr. Słubice [VU 71], dry grassland meadow, pitfall traps, 28.04-10.05.2012 – 1 ♂, leg. et det. T. Rutkowski.

Osiek distr. Żary [UTM: VT 94], small peat bogs in forest, 17.04-01.05.2011 – 1 ♂; 28.05–11.06.2011 – 1♂, leg. et det. T. Rutkowski.

Mermessus trilobatus (Emerton) is a species of North American origin [71, 79], which was introduced to Europe (76). First European localities of *M. trilobatus* were reported from Germany, in the vicinity of Karlsruhe (25). Soon rapid expansion has started, mainly in south-western Germany, where it is currently known from over 250 sites (104). Apart from Germany, *M. trilobatus* has been noted in Holland (111), Belgium (58), North of France (Alsace) (111), Czech Republic (23), Switzerland [69,], Austria (15) and Northern Italy (120). Expansion of *M. trilobatus* in natural biotopes of Europe was easier because of similarity of climates in Europe and North America, from where it originated (71, 76, 79).

M. trilobatus for the first time was reported from Lublin in Poland, with a single female, imported with potted plants (92). New localities presented herein indicate its colonization of natural habitats in Poland as it happened in Germany in the past decades (104).

Ostearius melanopygius (O. P.-Cambridge, 1879)

Dębówka 17a distr. Lublin [UTM: FB 08], large floristic hypermarket, on pots with seedlings of ornamental shrubs and trees, under stones, 30.09.2009 – 1 ♂, 2 ♀♀, 2 juv. (and some ex. obs.), leg. et det. R. Rozwałka.

Gozdowice distr. Gryfino [UTM: VU 54], xerothermic grasslands (*Stipetum capillataei*), pitfall traps, 29.07-30.08.2010 – 1 ♀, leg. P. Sienkiewicz, det. R. Rozwałka.

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Gręzawa distr. Żary [UTM: VT 82], sandy grasslands, entomological scoop, 06.08.2011 – 1 juv., leg. et det. T. Rutkowski.

Lublin-Bronowice [UTM: FB 17], Chemiczna Str. 2, large garden-building hypermarket, on the ornamental plants 29.08.2009 – 1 ♂; 1.09.2009 – 1 ♂, 1 ♀; 16.10.2009 – 1 juv., 24.11.2011 – 1 juv.; 14.02.2012 – 1 ♀; 4.03.2012 – 1 ♂; Męczenników Majdanka Str. 74, shop, on the potted plant (A*nthurium* hybr.); 20.01.2009 – 1 ♀; Zygmunta Augusta Str. 6, on lettuce under refrigeration, 05.05.2010 – 1 juv.; among the potted plants on the windowsill, 13.12.2008 – 1 ♂, leg. et det. R. Rozwałka.

Lublin-Sławin [UTM: FB 08], Botanical Garden, entomological sieve with litter, 16.04.2009 – 1 ♀; glasshouses, between the old flowerpots, 16.04.2009 – 1 ♂; under straw mats and foil in hotbeds with seedlings; 16.04.2009 – 1 ♂, 2 ♀♀, 1 juv., and some ex obs., leg. et det. et obs. R. Rozwałka.

Lublin-Węglin Południowy [UTM: FB 07], Zwycięska Str. 1, large garden-building hypermarket; on the ornamental plants, 30.09.2009 – 1 ♀; 7.08.2010 – 4 ♀♀; 23.09.2009 – 1 juv., leg. et det. R. Rozwałka.

Sady distr. Poznań [UTM: XU 11], Rolna Str. 10 (without precise date (2000-2006)) – 1 ♀, leg. et det. T. Rutkowski.

Skórzewo distr. Poznań [UTM: XU 20], Poznańska Str., 29.06.12 – 1 ♂, leg. et det. T. Rutkowski, and very numerous individuals observed (T. Rutkowski).

Stężyca near Dęblin, distr. Ryki [UTM: EC 51], Zielona Str. 48, big glasshouses of ornamental plants farm, 07.04.2011 – 1♂, 2♀♀ and some specimens obs. leg. et det. et obs. R. Rozwałka.

Świdnik [UTM: FB 17], Lotników Polskich Str., large hypermarket, on the potted plants, 13.08.2011 – 1 juv.; 15.12.2010 – 1 juv.; Krępiecka Str. 3, large hypermarket, on the potted plants, 24.11.2010 – 1 ♀, 2 juv., leg. P. Bielak-Bielecki, det. R. Rozwałka.

Warszawa-Targówek [UTM: EC 09], Radzymińska Str. 166, on decorative plants in big garden and building center, 26.09.2010 – 1 ex. obs. R. Rozwałka et W. Staręga.

Wierzchowiska distr. Świdnik [UTM: FB 27], Horticultural Center, on the potted plants, under ornamental stones, etc, 10.03.2012 – 1 ♀ and some ex. obs. leg. et obs. R. Rozwałka.

Species originated from New Zealand, currently cosmopolitan (81). At the beginning of the 20th century, introduced into Great Britain, and in the second half of the 40s of the 20th century spreading in western and south-western Europe at the rate of about 30 km per decade (96). It occurs mainly in the dumps, compost piles, garbage, in city parks and gardens, but also penetrates into natural biotopes (18, 38, 76, 96).

In Poland, for a long time the only stand of *O. melanopygius* was Poznań (28, 29, 30]. Only recently this spider species has been reported from natural biotopes near Szamotuły (119), in agroecosystems near Turew (78) and synanthropic environments in Lublin (95).

Presented results indicate that *O. melanopygius* spreads rapidly in Poland, and is probably much more widespread than it stems from existing literature data (Fig. 6). This hypothesis is supported by the fact that in Germany, there is nearly 200 known locations of this species, some of them are situated on the left bank of the Neisse (Nysa Łużycka) and Oder (Odra) (104). Presented material also indicates that one of the main sources of its expansion is horticultural industry,

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Fig. 6. Distribution of *Ostearius melanopygius* in Poland.

which enables *O. melanopygius* to disperse and create new populations almost everywhere (potted plants, pots, packaging, etc.). Apart from anthropogenic dispersion, an additional factor facilitating the expansion of *O. melanopygius* are its large aeronautical capabilities (30, 96). Early spring finding of gravid female in the litter in Lublin may also suggest accommodation of *O. melanopygius* to wintering in natural biotopes.

Salticidae

***Hasarius adansoni* (Audouin, 1826)**

Dębówka 17a distr. Lublin [UTM: FB 08], large floristic hypermarket, on the ornamental plants, 29.08.2010 – 1 juv., leg. et det. R. Rozwałka.

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Lublin-Bronowice [UTM: FB 17], Chemiczna Str. 2, large garden-building hypermarket, on the ornamental plants, 29.08.2009 – 1 juv.; 1.09.2009 – 1 juv.; 23.09.2009 – 1 juv.; 16.10.2009 – 1 juv.; 24.11.2011 – 1 juv.; 4.03.2012 – 1 juv., leg. et det. R. Rozwałka.

Lublin-Węglin Południowy [UTM: FB 07], Zwycięska Str. 1, large garden-building hypermarket, on the ornamental plants, 7.08.2010 – 2 juv.; 23.09.2009 – 1 juv., leg. et det. R. Rozwałka.

Stężyca distr. Ryki [UTM: EC 51], Zielona Str. 48, big glasshouses of ornamental plants farm, 07.04.2011 – 1 ♀, 1 juv. and some ex. obs, leg. et det. et obs. R. Rozwałka.

Świdnik [UTM: FB 17], Krępiecka Str. 3, large hypermarket, on the *Tillandsia* hybr. and *Guzmania* hybr. plants, 05.11.2011 – 2 exuvia, leg. P. Bielak Bielecki, det R. Rozwałka.

Wrocław-Szczepin [UTM: XS 46], Długa Str. 29/35, large garden-building hypermarket, on the ornamental plants, 20.01.2012 – 1 ♀ (with cocoon), 2 exuvia, leg. P. Bielak-Bielecki, det. R. Rozwałka.

Pantropical species (81), uncommonly recorded in Europe, mainly in botanical gardens or greenhouses of large horticultural farms (9, 42, 43, 48, 49, 51).

In Poland, found several years ago in the Palm House in Poznań (27), but in cited location is extinct (30, 31). Recently recorded again in large garden centers in Lublin, represented by some specimens occasionally imported on ornamental plants from Western Europe (88). Further observations confirmed that single, imported specimens of *Hasarius adansoni* still appear in large garden centers. However, it is worth emphasizing the particular occurrence of this species in large greenhouses of a horticultural farm in Stężyca. Collected specimens and observations of several more individuals suggest existence of a large autochthonous reproducing population of this species.

***Leptorchestes berolinensis* (C. L. Koch, 1846)**

Kazimierz Dolny [UTM: EB 68], Lubelska Str. 32, on a brick wall; 02.06.2008 – 1 ♂, leg. P. Bielak-Bielecki, det. R. Rozwałka.

Łęczna-Podzamcze [UTM: FB 38], municipal park, on the hornbeam trunk (*Carpinus betulus*), 16.05.2009 – 1 ♂, leg. et det. P. Bielak-Bielecki; Jana Pawła Str., on the cemetery wall, 16.05.2009 – 1 ♂, obs. P. Bielak-Bielecki.

Sandomierz [UTM: EB 51], Krakowska Str. 26, on the wall, 17.06.2000 – 1 ♂, leg. et det. R. Rozwałka.

Świdnik [UTM: FB 17], Racławicka Str. 11, inside a building, 04.04.2010 – 1 juv., leg. et det. P. Bielak-Bielecki.

South European species, in Central Europe rare, most frequently seen on the outer walls of buildings, sunny fences, and tree trunks – hemisynanthropic (86, 121). Occasionally recorded indoor (86, present observations), but the circumstances of occurrence show that these are incidental, e.g. wintering specimens.

In Poland *Leptorchestes berolinensis* was reported from seven posts, but only two are current: Lublin (UMCS Campus) (86) and Księżopole near Siedlce (102). In the second half of the 19th century, *L. berolinensis* was also mentioned from Kraków, Warszawa and Ojców (57, 82). These locations have not been confirmed in recent studies (82, 56, 91, R. Rozwałka unpubl. data, W. Staręga unpubl. data).

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Historically, *L. berolinensis* was reported also in Wrocław (32, 59) and Chełm region (102, 103), but these data were wrong. Vague information of Staręga (103), refers to *Synageles venator* (Lucas) (oral inf. W. Staręga), species much more common than *L. berolinensis* [121]. Also information from Wrocław (32, 59), interpreted as referring to the *L. berolinensis* (82, 102, 103) in fact refers to *S. venator*. Lebert (59) did not include original information, only referred to the data from one year later [sic!] paper of Fickert (32). Fickert (32) in the characteristics of "*Leptorchestes formicaeformis* Luc." notes that this species in Wrocław is not rare (*Nicht selten*). Current observations (W. Wesołowska unpubl. data), show clearly that in Wrocław commonly occurs *Synageles venator* only. Observations from Lublin (86, and R. Rozwałka unpubl. data), confirm that *S. venator* is quite common, whereas *L. berolinensis* is very rare. Comparative data from Germany (104) and Czech Republic (17) also indicate that *S. venator* is a quite common species, known from several dozen or even several hundred localities, while *L. berolinensis* is mentioned from very few locations (17, 104). Furthermore, these two species are similar ant-mimic species, what might explain possible misidentification by Fickert (32). Arguments presented above show that the data of Fickert (32) refer to *Synageles venator*, and not to *L. berolinensis* – as implied by the linear interpretation of synonyms.

***Pseudeuophrys lanigera* (Simon, 1871)**

Sady distr. Poznań [UTM: XU 11], Rolna Str. 10, import from Germany, 10.2004 – 2 ♀♀, leg. et det. T. Rutkowski, and some specimens observed during the years 2004–2006 (obs. T. Rutkowski).

Pseudeuophrys lanigera is distributed in Western, Southern and Central Europe, eastward to the Caucasus Mts. (63, 64). In Central and Western Europe this species lives on the walls (and sometimes inside) of buildings (2, 38, 76), in South Europe and Caucasus Mts. in various dry, mainly rocky and stony environments (18, 63). In Britain and Western and Southern Germany this species is relatively common (38, 104). In Eastern Germany (104), Poland (115), Czech (17), and Slovak Republic (34) it is uncommon.

Presented data about occurrence of *P. lanigera* in the vicinity of Poznań, indicate that this species, known previously from Wrocław only (115) is probably much wider distributed in Poland. Occurrence of *P. lanigera* in Poland could be probably connected with observed in past decades expansion of this species in Central Europe (10, 118).

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DISCUSSION

Presented data extend the list of synanthropic spider species in Poland by four: *Latrodectus mactans*, *Cheiracanthium mildei*, *Heteropoda venatoria* and *Heliophanus* cf. *apiatus*. From this list, *Heteropoda venatoria* should be regarded as a species potentially present on Polish territory, because its occurrence in zoological gardens, or for example port storages is very likely. Another reason to put it on the list is the fact, that introduced population of *H. venatoria* existed in the past in zoological gardens in Łódź. However, *Latrodectus mactans*, *Cheiracanthium mildei*, and *Heliophanus* cf. *apiatus* should be considered as sporadically imported species, with very small chances to generate stable synanthropic populations. Similarly, recently reported *Icius hamatus* (107) was recognized as incidentally imported species.

Noteworthy is discovering in Poland of large reproducing populations of *Uloborus plumipes* and *Hasarius adansoni*. This justifies including these spiders in the list of permanently naturalized synanthropic species in Poland. Presented data on the distribution of *U. plumipes* and *H. adansoni* suggest that these species are more common than it stems from few bibliographic records (27, 87, 88, 101). It is very likely, that similar populations of *U. plumipes* and *H. adansoni* like these in Stężyca, may occur in other horticultural greenhouses. Non-direct evidence of that are observations of *U. plumipes* and *H. adansoni* on foiled plants from Polish producers of ornamental plants (87, Rozwałka unpubl. data).

Results of research and observations included in this study, made it possible to track pathways of the spread of *Ostearius melanopygius*. This species, frequently appearing on planting trees and garden shrubs, can easily be moved to considerable distance. It is also shown that *O. melanopygius* occurs and winters in natural or semi-natural conditions in eastern Poland, too.

In the case of other species (*Nesticella mogera, Psilochorus simoni, Scytodes thoracica, Parasteatoda tabulata, Leptorchestes berolinensis*) new data complement the knowledge about the occurrence of these species in Poland. In the case of *S. thoracica* it is demonstrated that this spider occurred on Polish territory in the 19th century. Also information on the occurrence of *L. berolinensis* in Poland is verified.

Results and observations have confirmed that in Poland, as well as in Western Europe, the main source of new species of synanthropic spiders is production and trading of ornamental plants (54, 77). With transports of potted plants recently arrived to Poland the following spider species: *Holocnemus pluchei* (94), *Uloborus plumipes* (101) and *Mermessus trilobatus* (92). Some of them, within a short period after the first introduction, created on Polish territory "home, permanent" populations, entering permanently country list of synanthropic araneofauna (e.g. *U. plumipes, H. adansoni*). Also the transport of fruits from Southern Europe or

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other continents may result in the emergence of new species of spiders, e.g.: *Latrodectus mactans, Cheiracanthium mildei*, *Heteropoda venatoria* (present data) or *Icius hamatus* (107). However, most of imported species have no chances (or very small) to establish permanent synanthropic population in Poland.

In context of emerging and dispersion of alien spider species in Poland, it has to be taken into account the interaction with native species. In case of spiders, presented herein and other reported recently newcomers, e.g. *Holocnemus pluchei* (94), *Pseudeuophrys lanigera* (115) the effect on native araneofauna is very small. Because of specific temperature and humidity requirements, the distribution of newly arrived species is almost restricted to greenhouses, apartments and similar locations. In these environments they can only interfere with old synanthropic fauna (e.g. *Pholcus* spp., *Steatoda* spp., *Tegenaria* spp.), so there is no negative effect on natural (asynanthropic) araneofauna. Only *Mermessus trilobatus* and *Ostearius melanopygius*, as they disperse in natural habitats may compete with native spider species for food resources, places for making web, etc.

Presented herein results of our research, and recently published papers on Polish synanthropic fauna (6, 7, 87, 88, 92, 93, 94, 95, 101, 107, 115) show clearly, that in Poland, the process of globalization and unification of synanthropic araneofauna is in progress, too. The lists of synanthropic species known from Germany (104) and Czech Republic (17, 97), are longer by a few species, but the reason of this lies more in lack of research (and researchers) than in real poverty of Polish synanthropic araneofauna species composition in comparison to Western Europe.

It is worth mentioning that *Latrodectus mactans*, *Cheiracanthium mildei*, and *Heteropoda venatoria* may be considered as dangerous or potentially dangerous to human. Bites of *Ch. mildei* are rare and comparable to wasp bite (74) and *H. venatoria* is generally peaceful and not poisonous, but due to its size it can bite painfully when harassed. Only *L. mactans,* the black widow, is highly venomous and its bite can cause severe symptoms and rarely death (11, 46).

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