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Three alien spider species (Araneae: Theridiidae) newly found in Poland

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Abstract: Global warming and intensive transport favor the spreading of species. In 2015, three theridiid spider species were found in Poland for the first time: *Kochiura aulica*, *Latrodectus geometricus* and *Theridion melanostictum*. *Kochiura auilica* was transported in pomegranates from Turkey and *T. melanostictum* in pomegranates from Chile. One female of *Latrodectus geometricus* hung, with three egg sacs, on a web in a car imported from the USA (2015), and also in grapes imported from Chile, Morocco and RPA (2017). Effect of non-native spider species in Poland is discussed.

Key words: first record, introduced species, identification, *Kochiura aulica*, *Latrodectus geometricus*, *Theridion melanostictum*

INTRODUCTION

Over the last few decades an increasing number of non-native spider species have been observed in Europe (Nentwig 2015). This increase is favored by international and intercontinental transport (Kobelt & Nentwig 2008, Rozwałka 2008, Nentwig & Kobelt 2010, Nentwig 2015) and also by climate change (Kobelt & Nentwig 2008). Alien species may set up stable populations. For example *Uloborus plumipes* Lucas, 1846, *Nesticella mogera* (Yaginuma, 1972) and *Hasarius adansoni* (Audouin, 1826) are the persistent elements of synanthropic spider communities in Central Europe. In the greenhouses of botanic gardens and farms, in zoological gardens spiders found suitable conditions for the development and establishment of a population (Kielhorn 2009, Rozwałka et al. 2013, 2016, Nentwig et al. 2017). For species that can reproduce parthenogenetically as spiders from Ochyroceratidae or Oonopidae, just one female is enough to inhabit an area (Kielhorn 2008). In Europe, the number of unintentionally introduced spider species may be higher than official data indicates, because many of them are small in size, and thus some of them can be overlooked; moreover, determination of the spider species is rather difficult (Kobelt & Nentwig 2008). In the present study we provide information about three spider species from Theridiidae noted for the first time in Poland: *Kochiura aulica*, *Latrodectus geometricus* and *Theridion melanostictum*.

MATERIAL AND METHODS

The specimens were collected by hand during the visit in hypermarkets. The material from the USA was passed by worker of the Zoological Garden in Warsaw. All specimens and egg sacs are stored in 70% ethanol in collection of R. Rozwałka (Lublin). The main literature used for identification was Levi (1980), Levy (1998), Paquin et al. (2008), Le Peru (2011), Simó et al. (2013), Bodkhe et al. (2015), and Nentwig et al. (2017). Drawings were made by R. Rozwałka.

RESULTS

Kochiura aulica (C.L. Koch, 1838)
(Figs 1 & 2)

Material: Lublin-Bronowice, Witosa Str. [UTM coordinates: FB 17]; hypermarket, in pomegranates imported from Turkey; 15 Nov 2015; 1 juv. (cult. as adult ♂ in January 2015); leg. Ł. Dawidowicz, det. R. Rozwałka.

Distribution: This species was originally described from Madeira (Blackwall, 1862). It occurs in the Cape Verde Island and the Canary Islands, through the Mediterranean countries, up to Azerbaijan (WSC 2017). In Western Europe, it is known from the southern part as well as Great Britain (Harvey et al. 2002), Belgium (Bosmans 2009) and west Germany (Arachnologische Gesellschaft 2017). In Central Europe, sites of *K. aulica* occur in the southern Czech Republic (Buchar & Růžička 2002) and Hungary (Samu & Szinetár 1999), and also in Ukraine (Mikhailov 2013, Nentwig et al. 2017). But it was not found in Switzerland, Austria or Slovakia (Nentwig et al. 2017). It lives on citrus orchards and olives, vineyards, dry scrubs, bright forests, moors etc. (Harvey et al. 2002, Pantini et al. 2013, Nentwig et al. 2017). It can be easily moved to the colder regions of Europe with fruits.

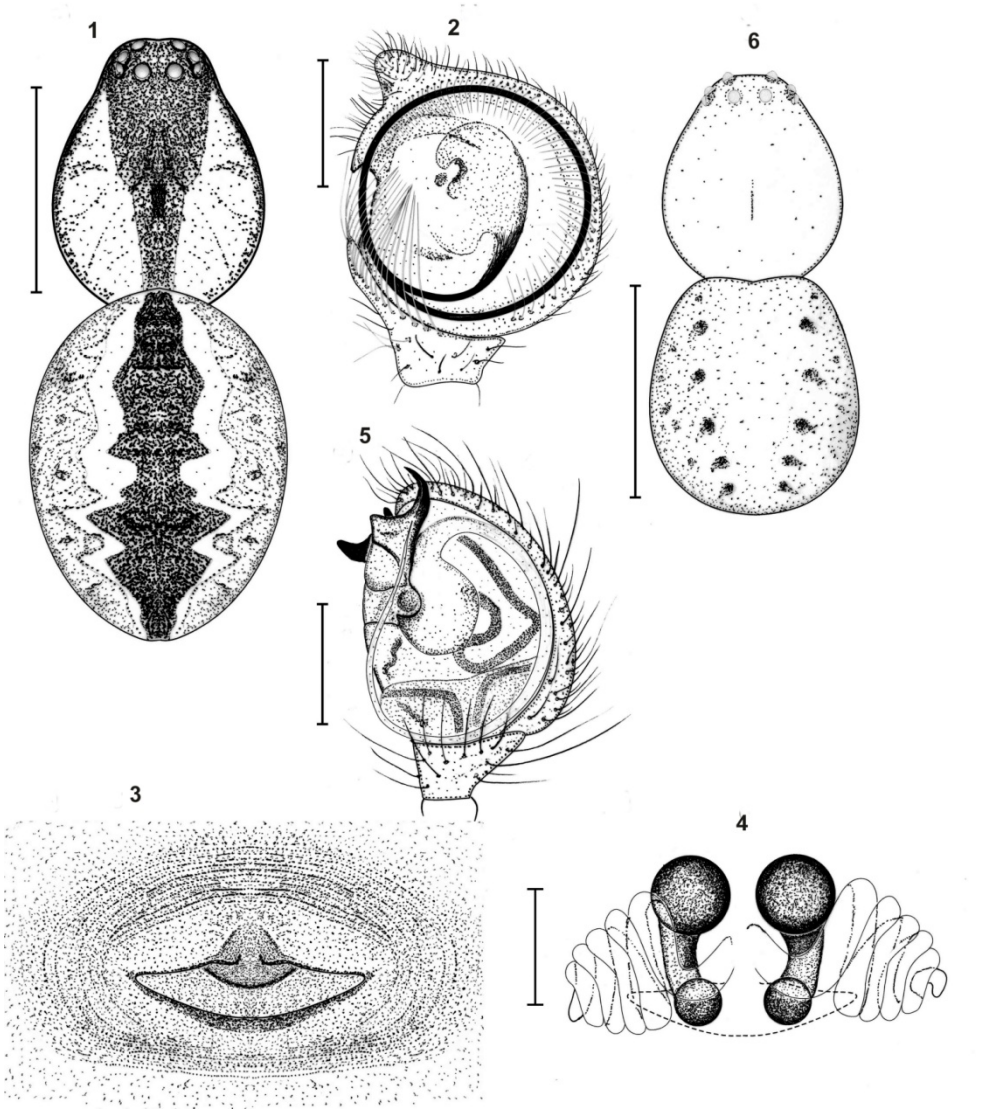
Latrodectus geometricus C.L. Koch, 1841
(Figs 3 & 4)

Material: Warszawa-Targówek [EC 09]; in a car imported from the USA; Nov 2015; 1♀ and 3 egg sacs; leg. unknown, det. R. Rozwałka; Puławy [EB 69]; hypermarket, in grapes imported from Chile; 6 Mar 2017; 1♀, and remains of cephalothorax and the legs of 2♀♀, 3 egg sacs; leg. unknown, det. R. Rozwałka; Lublin-Bronowice Grabskiego Str. [FB 17]; hypermarket, in grapes imported from RPA/Maroko; 10 Mar 2017; remains of 1 egg sac; leg. et det. R. Rozwałka; Lublin-Felin Witosa Str. [FB 17]; hypermarket, in grapes imported from RPA; 17 Mar 2017; remains of 1 egg sac; leg. et det. R. Rozwałka.

The diameter of egg cocoons collected in Warszawa was 8, 9 and 11 mm; collected in Puławy was 6 and 7 mm.

Distribution: Meanwhile a cosmopolitan species, common in warmer regions and originating from South America (Nentwig et al. 2017, WSC 2017). In Europe recorded only in Ireland (Nolan 2012) and Belgium (van Keer 2007, 2011), but as single individuals, accidentally transferred from North America, this does not refer to established populations (van Keer 2007, 2011, Nolan 2012). Due to proximity to Asia Minor and the Middle East (Levy 1998, Bayram et al. 2008), some populations of *L. geometricus* may occur in south-eastern Europe, e.g. Turkey (Nentwig et al. 2017).

Remarks: This species is characterized by high fertility; during its lifetime it can build an average of 22 egg sacs (Bouillon & Lekie 1961). It occurs in urban areas, around homes, in parks and garden nurseries and occasionally in garages. *Latrodectus geometricus* is numerous in some regions, but its bites are rare (Vetter et al. 2012). The venom of *L. geometricus* causes searing pain at the place of biting, abdominal pain, weakness of the legs and sometimes an increase in body temperature. In addition, children may experience sweating and anxiety (Müller 1993). Due to the high polymorphism in coloration (from yellow to dark brown), *L. geometricus* can be mistaken for the related *L. mactans*.



Figs 1–6. Morphological details of Theridiidae found in Poland. Figs 1 & 2. *Kochiura aulica*: 1 – male total view, 2 – male palp ventral view; Figs 3 & 4. *Latrodectus geometricus*: 3 – epigynum, 4 – vulva dorsal view. Figs 4 & 5. *Theridion melanostictum*: 5 – male total view, 6 – male palp lateral view. Scale bars: 1 & 6 = 1.0 mm; 2 & 3–5 = 0.2 mm.

***Theridion melanostictum* O.P.-Cambridge, 1876**
(Figs 5 & 6)

Material: Lublin-Bronowice Witosa Str. [FB 17]; hypermarket, in pomegranates imported from Chile; 20 Nov 2015; 1♂; leg. Ł. Dawidowicz, det. R. Rozwałka.

Distribution: A rare species, noted in Europe from Spain and Portugal (Le Peru 2011, Nentwig et al. 2017), France (Déjean 2015), Crete and Greece (Bosmans et al. 2013). Outside

Europe, noted in Canada, Japan, China, India, Egypt and Israel (Levy 1998), and also on Pacific and Indian islands (WSC 2017). It is also known from Haiti (WSC 2017) and the south of the United States (Levi 1980), and from Galapagos (Baert at al. 2016). *Theridion melanostictum* has not been mentioned from South America mainland so far. It is also probable that collected specimens could have wandered from other fruits originating from the Mediterranean area (Spain, Israel) sold in the vicinity of the Chilean pomegranates. *Theridion melanostictum* live on woody plants and fruit trees like coconut palms (Howard & Edwards 1984) and mangrove trees (Dixon & Anderson 2014).

DISCUSSION

Among the introduced spider species, most are Theridiidae (Kobelt & Nentwig 2008). In Poland, exist 66 theridiid species, and three newly arrived species from the Theridiidae family were found over the last decade. These are: *Parasteatoda tabulata* (Levi, 1980) (Gromov 1997, Rozwałka 2007), *Steatoda triangulosa* (Walckenaer, 1802) (Rozwałka 2011), both established in the wild, and *Latrodectus mactans* (Fabricius, 1775) (Rozwałka et al. 2013) not yet established. Generally, unintentionally introduced species can be a threat to human life or health, e.g., *Latrodectus mactans* (Jäger 2009, Rozwałka et al. 2013) and *Phoneutria boliviensis* (F. O. Pickard-Cambridge, 1897) (Jäger & Blick 2009). Species of the genus *Latrodectus* have highly toxic venom, thus they are considered as one of the most dangerous spiders (Vetter & Isbister 2008). However, they are rather skittish (Russel et al. 2013), and the bite occurs as an extreme necessity, during accidental contact (Offerman et al. 2011).

Thermophilic species of spiders, dragged to places with a colder climate, in Poland rarely form a stable population in the wild. Usually they live in semi-natural conditions, e.g. greenhouses or plantations (Rozwałka et al. 2013, Pfliegler 2014). *Latrodectus geometricus* has specific environmental requirements and usually single individuals are transported, thus durable colonization is rather unlikely (Jäger 2009, Rozwałka et al. 2013). In the case of *Theridion melanostictum*, which lives in Canada in a tropical environment in a theme park (Paquin et al. 2008), settlement in greenhouses or "tropical environments" in Central and Northern Europe is probable, under favorable conditions. In turn, *Kochiura aulica* lives in natural environments in many parts of Europe; and although it was found in a hypermarket, it is possible that over time this species will settle in natural habitats. But so far, no known viable population of any of the three species mentioned here as new to Poland.

The presence of non-native species may be destructive to an ecosystem (Hänggi & Straub 2016), but colonization does not always mean a negative impact on the other species (Burger et al. 2001). For Europe, list of alien spider species is long: 184 species were introduced and 51 could establish (Nentwig 2015). So far, no negative effect of non-native spiders has been observed, because most of them live in unnatural conditions (Nentwig & Kobelt 2010).

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STRESZCZENIE

[**Trzy nowe dla Polski gatunki pająków z rodziny Theridiidae**]

W pracy scharakteryzowano trzy obce, nowe dla fauny Polski gatunki pająków z rodziny Theridiidae. Obecność samic *Latrodectus geometricus* wraz z kokonami stwierdzono w samochodzie sprowadzonym z USA, oraz w winogronach importowanych z Chile, Maroka i RPA. W owocach granatów (*Punica granatum*) odnotowano *Kochiura aulica* (z Turcji) i *Theridion melanostictum* (z Chile). *Latrodectus geometricus* jest gatunkiem często spotykanym w sąsiedztwie człowieka (hemisynantropijnym), w Ameryce Południowej, w cieplejszych rejonach Ameryki Północnej czy w Południowej Afryce skąd sporadycznie bywa zawlekany do Europy Środkowej, a na Bliskim Wschodzie jest już pająkiem zaaklimatyzowanym. Dwa pozostałe gatunki (*K. aulica*, *T. melanostictum*) związane są ze środowiskiem naturalnym, gdzie zamieszkują głównie gałęzie drzew i krzewów. Oba gatunki spotykane są w Basenie Morza Śródziemnego, a *T. melanostictum* także w cieplejszych rejonach obu Ameryk. Pojedyncze przypadki zawleczeń oraz wysokie wymagania termiczne wszystkich w/w gatunków pająków, uniemożliwiają ich trwałą aklimatyzację w środowisku naturalnym w Polsce. Nie można jednak wykluczyć, że w przypadku sprzyjających warunków, mogą wytworzyć trwałe populacje np. w ogrodach botanicznych czy zoologicznych.

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