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First record of the exotic spitting spider *Scytodes fusca* (Araneae, Scytodidae) in Central Europe from Germany and Slovakia

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Abstract. The spitting spider *Scytodes fusca* Walckenaer, 1837 is recorded for the first time in Central Europe from both Germany and Slovakia. The species was found in two localities, within the Botanical Garden in Bratislava (Slovakia), specifically from a heated greenhouse with high humidity, and the "Tropical Islands", a tropical holiday resort in Krausnick (Germany). It seems that this Pantropical species has probably been introduced here along with imported plants. A description of diagnostic characters, as well as figures, is given.

Keywords: artificial tropical ecosystem, botanical garden, first record, introduced species

Zusammenfassung. Neunachweis der exotischen Speispinne *Scytodes fusca* (Araneae, Scytodidae) in Mitteleuropa aus Deutschland und der Slowakei. Die Speispinne *Scytodes fusca* Walckenaer, 1837 konnte erstmals für Mitteleuropa in Deutschland und der Slowakei nachgewiesen werden. Die Funde stammen aus dem Botanischen Garten in Bratislava (Slowakei) sowie aus dem Freizeitbad „Tropical Islands" in Krausnick (Deutschland). Es wird vermutet, dass die pantropische Art durch Zierpflanzen eingeschleppt wurde. Die charakteristischen Merkmale der Art werden beschrieben und abgebildet.

The genus *Scytodes* consists of 215 species and 4 subspecies distributed worldwide with the largest diversity (>100 species) in the Neotropical region. The majority of them are found in Brazil (76 species) (Rheims & Brescovit 2009, Platnick 2013). Spitting spiders are well known for their unusual hunting technique which involves spitting a sticky mass. They attack other arthropods by ejecting a mixture of silk and glue at them, immobilizing the prey long enough to allow safe envenomation (Suter & Stratton 2013).

Previously, only one species of the genus, *Scytodes thoracica* (Latreille, 1802), was known from Central Europe. In Europe nine species of *Scytodes* have been recorded, plus three species occurring only in the Canary Islands. Most of them are only known from the Mediterranean region, but four Pantropical species have been imported into Europe: *Scytodes fusca* Walckenaer, 1837, *S. longipes* Lucas, 1844, *S. lugubris* (Thorell, 1887) and *S. venusta* (Thorell, 1890) (Brignoli 1976, van Helsdingen 2012, Nentwig et al. 2013, Platnick 2013). The new spider for the Central European arachnofauna reported here, *S. fusca*, is known from the Americas, tropical Africa, Asia (from Indomalaya to Japan) (for more details see Brignoli 1976) and southern Europe (Cardoso 2011).

The spitting spider *S. fusca* is known to be synanthropic, having adapted to life inside houses in Brazil (Brescovit & Rheims 2000, Araujo et al. 2008). In Australia, it seems to be communal-territorial, living in large colonies and practicing a primitive form of maternal care (Bowden & Jackson 1988, Bowden 1991, Yap et al. 2011).

Methods

Three Botanical Gardens were sampled: two in Slovakia (Bratislava, Košice) and one in the Czech Republic (Brno). Specimens were found in only one of them, in Bratislava (Slovakia); and only in one of three tropical rooms of the greenhouse. Specimens were collected from their webs found beneath stones. In Germany all specimens were found in the tropical holiday resort "Tropical Islands" in Krausnick (near Berlin). Most of the spiders were also discovered beneath objects, as in Slovakia.

Specimens were identified using Nentwig et al. (2013). The vulva was macerated in 4 % hydroxide solution and dyed in a water solution of Amido Black. Photographs were taken using EOS Utility software

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Fig. 1: Female of *Scytodes fusca* with egg sack. – Photo: A. Šestáková

and a Canon EOS 1100D digital camera connected to a Zeiss Stemi 2000-C stereomicroscope. Digital images were montaged and edited using Photoshop CS6. The material is preserved in 70 % ethanol and deposited in the The Western Slovakian Museum in Trnava and in the private collections of Nils Reiser and Jonathan Neumann. One female was sent to Arno Grabolle (Weimar) and one to Tobias Bauer (Stuttgart).

Results and discussion

Material examined

Females with egg sacks (Fig. 1) and numerous juveniles were observed in both countries. In Germany several adult males were found, but in Slovakia only one subadult male was collected; which matured under laboratory conditions.

GERMANY: 2 ♀♀, 2 juv (19 January 2013); 1 ♂, 7 ♀♀, 2 juv (5 March 2013); 2 ♂♂, 4 juv (7 March 2013): heated hall of "Tropical Islands", Krausnick, 50°2'20.48"N; 13°44'54.75"E, 78 m a.s.l., leg. J. Neumann & N. Reiser.

SLOVAKIA: 1 juv (12 December 2012); 2 ♀♀, 1 juv (25 April 2013), 1 ♂ (collected as subadult 31 July 2013): in one of three heated greenhouses in the Botanical Garden of Comenius University, Bratislava, 48°8'49.2"N; 17°4'20.97"E, 148 m a.s.l., leg. M. Holecová & A. Šestáková.

Diagnosis

This species could be confused with *Scytodes velutina* Heineken & Lowe, 1832 in Europe. Females of *S. fusca* have an epigynal fovea as wide as high, not narrow as in *S. velutina*, and the spermathecae have long, recurved stalks; very short in *S. velutina*. The carapace is usually much darker so the pattern is hardly visible, in comparison to *S. velutina* with a visible pattern. Males and juveniles can be distinguished by distinct patterns of the carapace and abdomen. Male bulbus with long, narrow terminal portion in comparison to the broad one in *S. velutina* (Brignoli 1976, Saaristo 1997).

Description

Medium sized and short-legged species (Valerio 1981). Females (ca. 6 mm, carapace 2.5 – 3.0 mm) are dark, without distinct pattern on habitus; legs are uniformly brown with darker femora (Figs 2a, b). Vulva with reduced atrium, one pair of small spermathecae with recurved stalks and – under epigastrium – more or less triangular foveae (Fig. 2c).

Males (4.0 – 5.5 mm, carapace ca. 2.5 mm) with distinct pattern on carapace and transverse pale and dark stripes on abdomen (Figs 3a, b). Legs uniformly yellowish. Bulbus has a slender terminal portion (Figs 3c, d). Juveniles with distinct patterns as in males (Fig. 4).

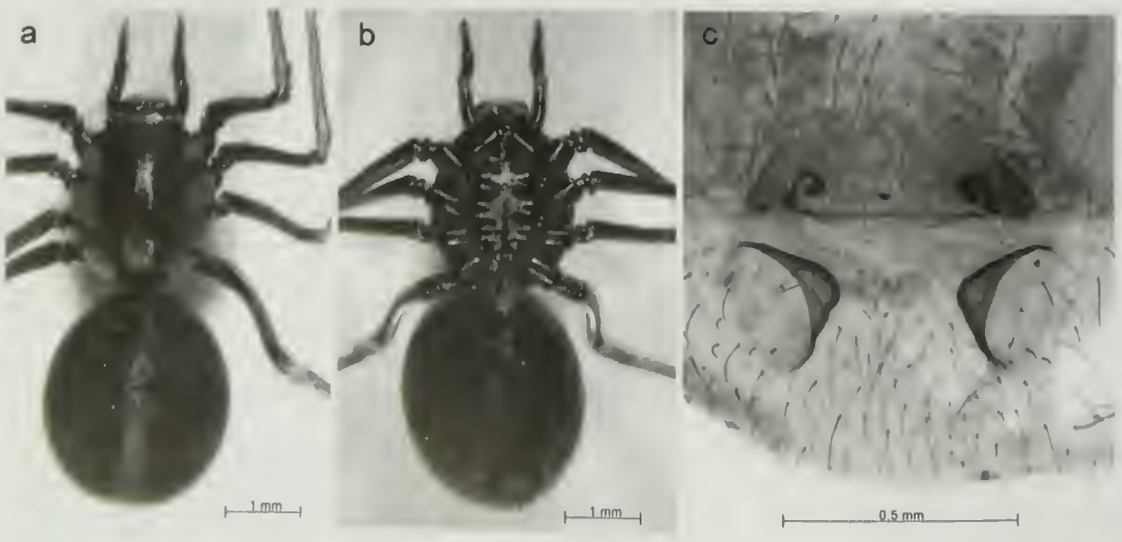

Fig. 2: Female habitus of *Scytodes fusca*. a) dorsal view; b) ventral view; c) vulva, macerated. – Photo: A. Šestáková

Fig. 3: Male habitus of *Scytodes fusca*. a) dorsal view; b) ventral view; c – d) left male palp, c) prolateral, d) retrolateral. – Photo: A. Šestáková

Distribution and natural history

The spitting spider *Scytodes fusca* was originally described from Cayenne, French Guiana (Walckenaer 1837). Other historical records have been reported from the Afrotropics (e.g. Lessert 1939, Millot 1941), Australasia (e.g. Chrysanthus 1967), Indomalaya (e.g. Doleschall 1859, Kulczyński 1911) and the Neotropics (e.g. Taczanowski 1872, Simon 1891, Cambridge 1899, Banks 1903, 1909, Mello-Leitão 1918). Besides the tropics, it was also introduced to less suitable regions like the Nearctic (Paquin et al. 2008) and Palaearctic (Wang et al. 1985, Ono 2009, Cardoso 2011), although it appears restricted here to Botanical Gardens (Singapore: Brignoli 1976; Slovakia: present paper) and similar artificial tropical ecosystems (Canada: Paquin et al. 2008; Germany: present paper). Van der Hammen (1949) found a single specimen of a

Fig. 4: Juvenile habitus of *Scytodes fusca*. a) dorsal view; b) ventral view. – Photo: A. Šestáková

Fig. 5: Underside of a stone showing one female of *Scytodes fusca* (circle) with two webs (arrows) belonging to female and juvenile. – Photo: A. Šestáková

Scytodes species, identified as *S. fusca*, in the greenhouse of the Botanical Garden in Leiden (the Netherlands). According to van Helsdingen (1999) it was misidentified with *S. venusta*. This species has never been found again in the Netherlands (van Helsdingen pers. comm.).

Although it was described as native to French Guiana, it is commonly associated with human habitations throughout Central and South America (Valerio 1981, Brescovit & Rheims 2000). In its natural habitat, it can be found in dark, dry places, such as the underside of rocks, under loose tree bark, in the nests of small mammals (Valerio 1981, Brescovit & Rheims 2000) and also in caves (Yap et al. 2011). It is a slow-moving, nocturnal spider that prefers crevices and cavities, and is thus not easy to find. We presume it was imported into Central Europe together with plants, as was the case in Quebec, Canada, where this species was found on foliage of palm trees in interior landscaping that mimicked Neotropical rainforests (Paquin et al. 2008). "Tropical Islands" in Germany is quite new (opened in 2004) and plants were imported directly from Thailand and Costa Rica (Green pers. comm.).

The populations in both locations in Germany and Slovakia seem to be large. Our observations recorded this species mainly on the underside of stones (Figs 5, 6a) and in "Tropical Islands" also under the bark of rotten trunks infested with termites. Specimens were observed in small webs consisting of a loose tangle of silk with a funnel retreat (Fig. 5). No specimens were found on walls – which would be typical for specimens living synanthropically – but in Germany several specimens occupied the crevices of the stone sculpture (Fig. 6b). Bowden & Jackson (1988) found some Australian populations of *S. fusca* to be communal-territorial, building web-complexes on tree trunks. We found no other mention of the sociality of this species in the published literature. During our observations, adult and subadult specimens were found living alone and, although small juveniles were in high abundance, they lacked web-complexes.

Scytodes fusca is a tropical species; therefore its occurrence in Central Europe is most likely restricted to artificial tropical ecosystems such as heated greenhouses or water-based theme parks. The only previously published record of this species in Europe is from Portugal (Cardoso 2011). Although informa-

Fig. 6: The specific habitat in the artificial tropical ecosystems of "Tropical Islands", Krausnick (Germany). a) stones; b) stone sculpture. – Photo: J. Neumann

tion about the habitat preferences of the Portuguese specimen were not published, we found that it was collected living in low garrigue vegetation near Monte Gordo in the Algarve during April, 1982 (Murphy pers. comm.). Moreover, Murphy mentioned he collected this species in many countries with a similar habitat to that in Portugal in the Mediterranean region, but never published these records. Thus a revision of the records of the similar-looking species *S. velutina* should be undertaken. Specimens from Slovakia were found numerously in only one of the three tropical rooms of the greenhouse. The primary reason for this could be the presence of stones around the paths, as these were missing in the other rooms. Brief observations in other Botanical Gardens in Košice and Brno suggested an absence of this species. Although both gardens had a factor in common – too few stones – the real reason could be simpler: the species *S. fusca* was never introduced there.

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References

Araujo D, Rheims CA, Brescovit AD & Cella DM 2008 Extreme degree of chromosome number variability in species of the spider genus *Scytodes* (Araneae, Haplogynae, Scytodidae). – Journal of Zoological Systematics and Evolutionary Research 46: 89-95 – doi: 10.1111/j.1439-0469.2007.00457.x

Banks N 1903 A list of arachnida from Hayti, with descriptions of new species. – Proceedings of the Academy of Natural Sciences of Philadelphia 55: 340-345

Banks N 1909 Arachnida from Costa Rica. – Proceedings of the Academy of Natural Sciences of Philadelphia 61: 194-234

Bowden K 1991 The evolution of sociality in the spitting spider, *Scytodes fusca* (Araneae: Scytodidae) – evidence from observations of intraspecific interactions. – Journal of Zoology 223: 161-172 – doi: 10.1111/j.1469-7998.1991.tb04757.x

Bowden K & Jackson RR 1988 Social organisation of *Scytodes fusca*, a communal web-building spitting spider (Araneae, Scytodidae) from Queensland. – New Zealand Journal of Zoology 15: 365-368 – doi: 10.1080/03014223.1988.10422961

Brescovit AD & Rheims CA 2000 On the synanthropic species of the genus *Scytodes* Latreille (Araneae, Scytodidae) of Brazil, with synonymies and records of these species in other Neotropical countries. – Bulletin of the British arachnological Society 11: 320-330

Brignoli PM 1976 Beiträge zur Kenntnis der Scytodidae. – Revue suisse de zoologie 83: 125-191

Cambridge FOP 1899 Arachnida – Araneida and Opiliones. – Biologia Centrali-Americana, Zoology 2: 41-88

Cardoso P 2011. Portugal spider catalogue (v3.0). – Internet: http://www.ennor.org/catalogue.php (24 July 2013)

Chrysanthus OFM 1967 Spiders from South New Guinea IX. – Tijdschrift voor Entomologie 110: 89-105

Doleschall CL 1859 Tweede Bijdrage tot de Kenntis der Arachniden van den Indischen Archipel. – Verhandelingen der Natuurkundige Vereeniging in Nederlandsch Indië 5: 1-60

Hammen L van der 1949 Over levend naar Nederland getransporteerde exotische spinnen. – Entomologische Berichten, Amsterdam 12: 374

Helsdingen PJ van 1999 Catalogus van de Nederlandse Spinnen (Araneae). – Nederlandse Faunistische Mededelingen 10: 1-191

Helsdingen PJ van 2012 Catalogus van de Nederlandse spinnen. Versie 2012.1. Last updated: 10 January 2012. pp. 3-210. – Internet: http://www.eis-nederland.nl/pdfs/vanHelsdingen_2012.pdf (24 July 2013)

Kulczyński W 1911 Symbola ad faunam Aranearum Javae et Sumatrae cognoscendam. II. Sicariidae, Dysderidae, Drassodidae, Zodariidae. – Bulletin International de l'Académie des Sciences de Cracovie 1911: 451-496

Lessert R 1939 Araignées du Congo belge (Deuxieme partie). – Revue de zoologie et de botanique africaines 32: 1-13

Mello-Leitão CF 1918 Scytodidas e pholcidas do Brasil. – Revista do Museu Paulista 10: 83-144

Millot J 1941 Les araignées de l'Afrique Occidentale Française – sicariides et pholcides. – Mémoires de l'Académie des sciences de l'Institut de France 64: 1-53

Nentwig W, Blick T, Gloor D, Hänggi A & Kropf C 2013 Spiders of Europe. Version 07.2013. – Internet: http://www.araneae.unibe.ch (25 July 2013)

Ono H 2009 The Spiders of Japan with keys to the families and genera and illustrations of the species. Tokai University Press, Kanagawa. 739 pp.

Paquin PN, Dupérré A & Labelle S 2008 Introduced spiders (Arachnida: Araneae) in an artificial ecosystem in eastern Canada. – Entomological News 119: 217-226 – doi: 10.3157/0013-872-X(2008)119[217:ISAAIA]2.0.CO;2

Platnick NI 2013 The word spider catalog. Version 14.0 American Museum of Natural History, New York. – Internet: http://research.amnh.org/iz/spiders/catalog (24 July 2013)

Rheims CA & Brescovit AD 2009. New additions to the Brazilian fauna of the genus *Scytodes* Latreille (Araneae: Scytodidae) with emphasis on the Atlantic Forest species. – Zootaxa 2116: 1-45

Saaristo MI 1997. Scytotids (Arachnida, Araneae, Scytodidae) of the granitic islands of Seychelles. – Phelsuma 5: 49-57

Simon E 1891 On the spiders of the island of St. Vincent. Part 1. – Proceedings of the Zoological Society of London 1891: 549-575

Suter RB & Stratton GE 2013 Predation by spitting spiders: elaborate venom gland, intricate delivery system. In: Nentwig W (ed.) Spider ecophysiology. Springer, Berlin. pp. 241-251 – doi: 10.1007/978-3-642-33989-9_18

Taczanowski L 1872 Les aranéides de la Guyane française. – Horae Societatis Entomologicae Rossicae 9: 64-112

Valerio CE 1981 Spitting spiders (Araneae, Scytodidae, *Scytodes*) from Central America. – The Bulletin of the American Museum of Natural History 170: 80-89

Walckenaer CA 1837 Histoire naturelle des insectes. Aptères. Paris, 1: 1-682

Wang JF, Zhang YJ & Li FJ 1985 New report of some spiders from southern China. – Journal of Natural Science of Hunan Normal University 1985 (2): 66-69

Yap L-M YL, Norma-Rashid Y, Liu F, Liu J & Li D 2011 Comparative biology of cave-dwelling spitting spiders (Araneae: Scytodidae): Parental care, cooperative prey-capture, cannibalism, natal dispersal and reproductive behaviour. – The Raffles Bulletin of Zoology 59: 269-284