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MEDICAL IMPORTANCE OF INTRODUCED SPIDERS

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Abstract Spiders which arrive with fruits from other continents are a challenge for pest management and for super markets in Central Europe. A survey is presented on spiders which were sent to the author for identification beginning 2012 through to 2019. All specimens arrived from supermarkets. 37 specimens of eight exotic species (mainly Latin America), 1 Mediterranean and 13 specimens of 4 Central European species of spiders were collected from fruit displays in supermarkets. Most exotic species belong to the huntsman or giant crab spiders (Sparassidae), which rarely harm people. Armed spiders which all belonged to the species *Phoneutria boliviensis* (Cambridge, 1897) and are of medical importance due to their venom were submitted 5 times from banana displays. Three young specimens of tarantulas (Theraphosidae) were detected 2016 and 2019 in banana boxes. Nearly 28% of the spiders which were found in supermarkets on fruit displays belong to the European fauna e.g. the Central European house spider *Eratigena atrica* Koch, 1843 which is harmless to people. Nearly all of the introduced species are active hunters which may cover large distances and also hide during daytime in buildings at least during the colder periods.

Key words *Phoneutria*, Sparassidae, *Eratigena*, *Zoropsis* sp.

INTRODUCTION

Most spiders can be regarded as beneficial arthropods. As a rule, they only attack people if they have no way to escape. Species that produce a venom often only use this in small dosis for defense. However, the presence of spiders triggers psychological reactions in many people (Knoflach and Horack 2010, Vetter 2011). Spiders in supermarkets always cause panic, especially when they are found in fruit displays, particularly between bananas. The name "banana spiders" does not refer to a specific species but only to the location where they are found. They belong to different species and families depending on the origin of the bananas which are produced in (sub)tropical areas of Africa and Latin America (Schmidt 1954, 1971).

MATERIAL AND METHODS

51 specimens of spiders which were found in supermarkets were included in this review (Table 1). Most of them were submitted for identification from Pest management professionals. Some individuals were sampled by the author or identified from pictures which were sent per e-mail. Reports of spiders from the internet were only included in the survey, if the source was trustworthy. Young spiders which could not be identified immediately were cultured until reaching adulthood. Photos were taken of the specimens to save the entries for further studies. Dead specimens were preserved for later examinations.

RESULTS AND DISCUSSION

Since 2012 we have received 7 exotic species and 1 species from the Mediterranean area. 4 species belong to die Central European fauna. Giant crab spiders or huntsman spiders Heteropoda venatoria (Linnaeus, 1767) and Olios sp. Walckenaer, 1837 (Sparassidae) seem to be the most prominent exotic species which arrive in Central Europe with bananas and vegetables. The family Sparassidae is distributed worldwide with more than 1000 species, especially in the tropics and subtropics. This family is only distantly related to our native (small) crab spiders (Thomisidae). Giant crab spiders are active hunters and often stay in houses, sheds, warehouses and garages in their natural range. Outside of buildings, they live in crevices of the bark, under dead wood or between parts of plants. The species do not produce nets. The individuals climb well and also find hold on smooth surfaces. They run quickly and move around on walls

and ceilings. Giant crab spiders are generally not dangerous to humans. The individuals usually react to threats by escaping. If a giant crab spider does bite, the puncture of the chelicerae is painful, but there is only local swelling that subsides after a day or two. Giant crab spiders are usually inconspicuously colored brown to gray. Due to slightly twisted hip joints, all 8 legs are oriented forward. The rear pairs of legs are considerably shorter than the two front legs. This distinguishes giant crab spiders from other spider families. The legs are hairy and have striking thorns. The eyes are arranged in 2 rows. Heteropoda venatoria was found 22 times, making them the most common introduced species. This species was released in some Central European greenhouses with a tropical climate to control harmful arthropods (Jäger 2000). Another light-brown species of Sparassidae with dark chelicerae of the genus Olios, which has not yet been determined to the species, was found 6 times.

Table 1. Spiders found in fruit displays between 2012 and 2019

Species	Family	Origin	Year discovered / number	Total
Phoneutria boliviensis	Ctenidae	Latin America	2012/1 2014/2 2015/1 2016/1 (+ Egg cocoon)	5
Heteropoda venatoria	Sparassidae	Latin America	2014/11 2015/2 2016/2 2017/5 2019/2	22
***Olios* sp.**	Sparassidae	Latin America	2014/2 2016/1 2017/2 2020/1	6
Hapalopus triseriatus	Theraphosidae	Latin America	2016/1	1
***Phormictopus* sp.**	Theraphosidae	Latin America	2016/1	1
***Avicularia* sp.**	Theraphosidae	Latin America	2019/1	1
Achaearanea tepidariorum	Theridiidae	Latin America?	2013/1	1
Zoropsis spinimana	Zoropsidae	Mediterranean	2016/1 2019/1	2
Eratigena atrica	Agelenidae	Central Europe	2013/1 2014/1 2015/2 2016/3 2017/1 2019/1	9
Salticus scenicus	Salticidae	Central Europe	2012/1	1
Dysdera crocata	Dysderidae	Central Europe	2014/1	1
Trochosa terricola	Lycosidae	Central Europe	2013/1	1

The armed spiders of the genus *Phoneutria* (Ctenidae), which consists of 8 species, are widespread in Latin America. Armed spiders actively hunt at night and can cover long distances. During the day they hide in dark, damp places (Gasnier et al. 2002, Reeves and Gillett-Kaufmann 2018). They also migrate into houses, barns or sheds, especially in the cold season. The poison of the *Phoneutria* species is considered very toxic and painful. However, deaths in humans are very rare, even if no antidote is available, since the individuals usually inject only small amounts of poison into the wound for defense (Knoflach and Horack 2010). The species found appears to be *Phoneutria boliviensis*, the poison of which is weaker than that of the two Brazilian relatives, and only causes a toxic reaction for a short time. One female of *P.boliviensis* arrived at the author together with an egg-cocoon. This female did not behave aggressively either. The eggs which are more sensitive than the adult spider, were dead. The identification was carried out according to Jäger and Blick (2009).

Three species of mygalomorph spiders arrived with bananas from the northern Latin America, probably from Venezuela. Two tarantulas (*Hapalopus triseriatus* and *Phormictopus* sp.) (Family: Theraphosidae) were found January and March 2016 in banana deliveries from northern South America and another species of the genus *Avicularia* (Theraphosidae) in March 2019. These three spiders arrived as young individuals in Germany. The lemon patch tarantula *Hapalopus triseriatus* Lodovico di Caporiacco, 1955 was found on bananas in a supermarket in North Rhine Westfalia in January 2016, and was killed by PMP immediately with a knock-down spray. This species has three longitudinal rows of yellow spots on the abdomen. Adult individuals reach a body length of 2 to 3 centimeters.

Phormictopus sp. Pocock, 1901 was caught alive as a young male and kept in a terrarium by the author for further observation. It developed to the adult stage and lived 3 years until April 2019. The species defends itself by releasing irritating hairs which are located on the abdomen (Schmidt 2003, Knoflach and Horack 2010, Klaas 2013).

Achaearanea tepidariorum (Koch, 1841) (Theridiidae) originally comes from South America and established in Central Europe in heated buildings and storage rooms, from where it can also get into retail premises. It was once found in the fruit display of a super market near Cologne. This species is harmless to humans. *Zoropsis spinimana* (Dufour, 1820) (Zoropsidae) originally comes from southern Europe and is currently spreading in the Upper Rhine area to North Rhine-Westphalia, where it is so far only found within buildings (Bellmann, 2010). This looks similar to wolf spiders, but is taller with a body length of 22 millimeters and their eyes are arranged in two transverse rows. Bites of this species can generally be compared to a slight sting of a bee. However, adverse reactions of sensitive individuals are also mentioned in literature.

Giant house spiders *Eratigena atrica* Koch, 1843 (Agelenidae) are widespread in Central Europe and are often found in buildings. Eight *Eratigena atrica* were discovered in fruit and vegetable displays. In one case first instar larvae were found which seem to belong to this genus because of their eye position. The females are up to 18 millimeters long, the males to 15 millimeters. Together with its long legs, individuals can reach a diameter of up to 6 cm. The body is colored brown. Three light brown lines are visible on a brown carapace. The abdomen is marked by angular spots arranged in a row, which laterally merge into an indistinct spot pattern. The giant house spiders build their funnel-shaped caves especially in basements, unused areas of buildings, barns, sheds and garages, mostly in dark and well-protected areas. In front of the funnel-like living cave there is a woven carpet on which there are trip threads. Outside of buildings they live on walls and in piles of stones. This species is nocturnal and defends itself with the help of the chelicerae, but is harmless to humans. Further native species are *Salticus scenicus* (Clerck, 1757) (Salticidae) and *Dysdera crocata* (Walckenaer, 1802) (Dysderidae), which are common in sunny and warm locations and also occur in buildings. Both species are fast acting active hunters, *D. crocata* feeds on woodlice and other spiders and has strikingly long chelicerae which easily penetrate the human skin but emit no venom (Bellmann, 2010). Both individuals happened to get to the fruit counter.

Accidents caused by exotic spiders have not been reported in the past few decades. The author was only informed of one bite from a native wolf spider (*Trochosa terricola* Thorell, 1856, Lycosidae), which in the banana display of a supermarket was hidden between bananas. The bite caused a skin irritation which disappeared about three hours later.

CONCLUSION

Frequently exotic spiders arrive in Central Europe with bananas from other continents. The species found in this survey are all active hunters which cover large distances. Species of the genus Heteropoda are also described as ambushers (Jäger 2000). Some Ctenidae and Sparassidae may enter buildings in the cooler season. The clusters with the green bananas are divided into small hands with few "fingers", washed and then packed in boxes in the country of production. These cartons are used for transport to Europe and also the ripening process in the banana ripening plants. The boxes are only opened again in the supermarket warehouse or on the fruit shelves. The spiders survive the transport at 12°C and the ripening process and arrive unnoticed at the fruit display. Bananas that arrive in larger containers in Germany are most often opened in the supermarket warehouse and repacked into smaller containers. This might be a reason for the increasing appearance of exotic spiders at the fruit-counters of supermarkets together with increasing global trade and short transport times. 26 exotic spiders (of 38 at all) were discovered between February and May in the banana displays. The remaining 12 individuals were spread over the months of June to January. The majority of European species were caught from June to November.

The genus Phoneutria consists of 8 species with different distribution patterns in Latin America Gasnier et al. 2002. The most toxic species live in Brasil (*P. fera* Perty, 1833 and *P. nigriventer* (Keyserling, 1891)). However, bananas from Brasil are seldom shipped to Central Europe. Imports of bananas mainly come from Ecuador, Colombia, Peru, Suriname, Panama, Dominican Republic, Guatemala or Costa Rica. The 5 individuals of armed spiders were all identified as *Phoneutria boliviensis* according to Jäger and Blick (2009). This species is much less dangerous then the two Brasilian species. Its bite is like the sting of a wasp or a bee (Klaas, unpublished).

Native species made up 27% of the spiders which were sent or reported. These individuals were mostly brought into the sales rooms with cardboard boxes, fruits or vegetables. In one case the pallet storage room was identified as infestation source. The author is not aware of bites caused by exotic spiders in supermarkets in Germany. The only accidental bite was caused by a native wolf spider and healed within a few hours. Spiders are very cautious when it

comes to defense and usually only release their poison in small quantities. Their medical significance is therefore less than that of other poisonous animals. Also, only a few of the approximately 40,000 spider species can cause fatal poisoning in humans.

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