

Crossopriza lyoni new to Germany (Araneae: Pholcidae)

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Abstract. The first record of *Crossopriza lyoni* (Blackwall, 1867) from Germany is presented. The species seems to be established at two localities in Stuttgart, Germany. Some information about the biology of the populations is given. The cosmopolitan distribution pattern and a possible route of introduction are discussed.

Keywords: alien, introduced species, new record, spider, synanthropic

Zusammenfassung. Erster Nachweis von *Crossopriza lyoni* in Deutschland (Araneae: Pholcidae). Der erste Nachweis von *Crossopriza lyoni* (Blackwall, 1867) aus Deutschland wird präsentiert. Die Art scheint an den beiden Nachweisorten in Stuttgart inzwischen fest etabliert. Des Weiteren werden Details zur Lebensweise an diesen Fundorten und die kosmopolitische Verbreitung der Art zusammen mit Möglichkeiten der Einschleppung besprochen und diskutiert.

Nearly all members of the spider family Pholcidae recorded in Central Europe are alien species, and their populations are normally associated with buildings (Blick et al. 2004, Heimer & Nentwig 1991, Huber et al. 2015, Nentwig & Kolb 2010). *Crossopriza lyoni* (Blackwall, 1867), which has only been recorded once in Europe by Van Keer & Van Keer (2001) in the port area of Antwerp, Belgium, was recently (2010) found in Stuttgart, Germany, in a reptile supply shop and a feeder insect breeding room of the Wilhelma, the Zoological-Botanical Garden of Stuttgart. This species has so far been recorded from every continent (except Antarctica), e.g. from the United States (Edwards 1993), several countries of South America (Colmenares-García 2008, Huber et al. 1999), Africa (Huber et al. 1999, Huber & Warui 2012, Millot 1946), Asia (Beatty et al. 2008, Huber et al. 1999, Irie 2001, Kim 1988, Strickman et al. 1997, Yaginuma 1986) and from Australia (Huber et al. 1999). Consequently, *C. lyoni* is listed in the WSC as cosmopolitan (World Spider Catalog 2015). *C. lyoni* was repeatedly described under several junior synonyms, mainly in South America (Huber 2009).

Together with *Pholcus phalangioides* (Fuesslin, 1775), *Pholcus opilionoides* (Schrank, 1781), *Holocnemus plucei* (Scopoli, 1763), *Psilochorus simoni* (Berland, 1911), *Spermophora kerinci* (Hentz, 1841) and two yet undescribed *Quamtana*-species (Huber et al. 2015), *C. lyoni* is the ninth species of Pholcidae recorded in Germany (Nentwig et al. 2015).

Material and methods***Crossopriza lyoni* (Blackwall, 1867)**

2♂♂ 2♀♀ (private collection G. Gabriel), 5.III.2010, 2♀♀, 21.IV.2010, 1♂, 24.I.2014 (private collection T. Bauer), 1♂ 2♀♀, 10.XII.2015 (ZFMK), GERMANY, Baden-Württemberg, Stuttgart-Untertürkheim, Lindenfelsstraße, saleroom of a specialized reptile supply shop, 234 m a.s.l., 48°47'9.0"N, 9°14'58.5"E (WGS 84), MTB 7221, T. Bauer leg., T. Bauer & G. Gabriel det., partly vid. B. A. Huber.

4♂♂ 6♀♀ (SMNS 1103–1108), 28.II.2014, 2♂♂ 4♀♀ (SMNS 1205–1206), 18.II.2016, GERMANY, Baden-Württemberg,

Stuttgart-Bad Cannstatt, Wilhelma Zoological and Botanical Garden Stuttgart, Greenhouse, 224 m a.s.l., 48°48'17.8"N, 09°12'22.8"E (WGS 84), MTB 7121, I. Wendt leg., J. Holstein det.

Photographs of the epigyne and vulva were taken with a Canon 60D connected to a Novex RZ stereomicroscope, habitus pictures were taken with a Canon 5D and 100 mm macro lens. Micro photographs of the palpus were taken with a Canon 5D SR, 65 mm macro lens and stacked with Zerene Stacker software. Specimens were preserved in 70–80 % ethanol. Systematics and nomenclature follow the World Spider Catalog (2015).

All specimens were identified using Beatty et al. (2008), Irie (2001), Kim (1988), Huber in Nentwig et al. (2015) and Song et al. (1999). Three specimens (1♂ 2♀♀) from Stuttgart-Untertürkheim were deposited in the collection of the Zoological Research Museum Alexander Koenig (ZFMK, Bernhard A. Huber). The specimens from the Wilhelma Zoological-Botanical Garden Stuttgart are deposited at the Stuttgart State Museum of Natural History (SMNS).

Biology

C. lyoni (Figs. 1–7) has been observed at its two Stuttgart localities (a specialized reptile supply shop and a greenhouse of the Zoological-Botanical Garden Stuttgart) for over five years. The average room temperature at the first location is 25–28 °C, exceeding 30 °C on hot summer days only. Due to water spraying in the terraria, the humidity of the air is raised compared to the outside. The spiders build their webs between or in terraria, among natural materials like roots or bamboo and in shelves filled with electrical equipment for sale. Some specimens have even been observed living directly on the ceiling or next to fluorescent tubes. Juveniles and adults can be found in high densities throughout the year. Often spiders live close to each other, without any sign of aggression or cannibalistic behaviour. The species builds a large, irregular tangle web with a vertical diameter of up to 90 cm. Our observations have shown that the spiders prey on different species of dipterans like members of Culicidae or Muscidae (especially in the summer) and small live food (e.g., larvae of the house cricket *Acheta domestica*), which has escaped from the display terraria. The prey is captured as described in Strickman et al. (1997).

Sporadically, the webs and inhabiting spiders were removed by the shop owner with a vacuum cleaner. In all cases, the

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Figs 1-3: *Crossopriza lyoni* (Blackwall, 1867) from Wilhelma (SMNS 1205), Zoological-Botanical Garden Stuttgart. **1.** Female with egg-sac **2.** Female, ventral side (scale line = 5 mm). **3.** Male (SMNS 1103)

spider population recovered after some months. Other spider species which have been collected together with *C. lyoni* are *Steatoda triangulosa* (Walckenaer, 1802) and *S. bipunctata* (Linnaeus, 1758). In only one case, a single female of *Pholcus phalangioides* was found.

The second locality is a greenhouse in the Wilhelma, the Zoological-Botanical Garden of Stuttgart, which is used to breed insects for feeding the zoo animals. Average room temperature usually is at almost 40 °C but can reach 50 °C on hot summer days. The spiders predominantly prey on snout moths (Pylalidae) and occasionally on dipterans (Muscidae and Phoridae) and crickets (*Acheta domesticus* and *Gryllus assimilis*).

Currently there is a stable population of *C. lyoni* with some hundred specimens on average. The population was originally discovered by the staff in 2010 due to its high abundance and its strikingly angled opisthosoma. The greenhouse is furthermore inhabited by *Thanatus vulgaris* Simon, 1870, another introduced spider species (Jäger 2002).

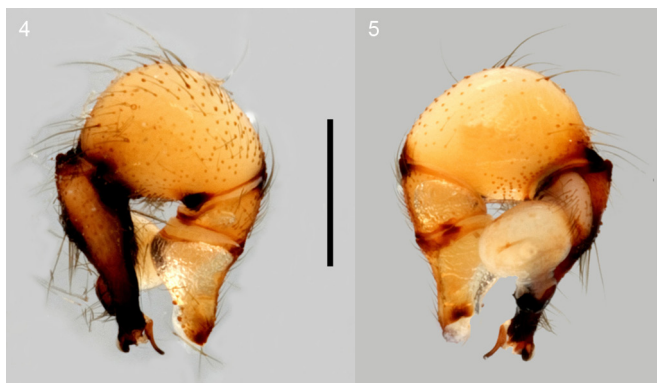
Discussion

A possible carrier for the inadvertent introduction of *C. lyoni* to the location in Stuttgart-Untertürkheim could have been bamboo, which, according to the shop owner, was imported from tropical parts of Asia. It is used for decoration in terrariums and is stored loosely in the salesroom for sale to customers. *C. lyoni* is widespread in Asia (Chikuni 1989, Chrysanthus 1967, Huber et al. 1999, Kim 1988, Strickman et al. 1997, Yaginuma 1986) and many spiders in general are known for

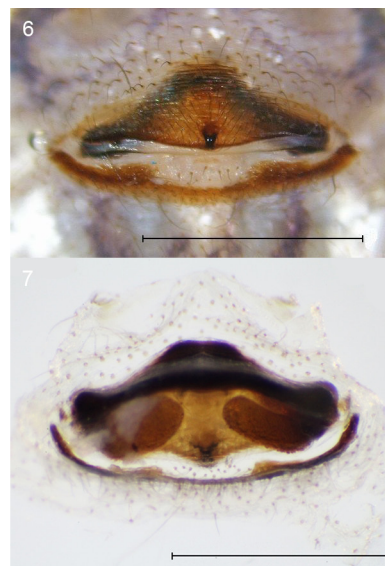
their ability to survive long transports even in shipping containers (Kobelt & Nentwig 2008). Thus, it seems possible that some juveniles or even adults were imported together with bamboo and could establish themselves in the permanently heated and regularly moistened salesroom and other heated rooms of the building. Bamboo is also used for decoration in terraria at the second location.

Interestingly, there is another, more conspicuous connection between both locations. Some years ago, both received feeder insects from the same breeder (Meining pers. comm.). If *C. lyoni* could establish itself in a small breeding room of a zoological garden or the salesroom of a reptile supply shop, it seems very possible that the species builds larger populations in industrial breeding stations, from which it could easily spread to new locations with deliveries of feeder insects.

However, populations of this species seem to be extremely resilient, since recovery after clean up only takes a few months. This is in accordance with Strickman et al. (1997), who described a development time of only 80 days for spiderlings from leaving the mother until creating their first egg sac, when fed ad libitum. Although the data represent laboratory results, the ability of the species to mature in less than three months seems to enable the population to compensate for heavy losses in a short time.



Figs 4-5: *Crossopriza lyoni* (Blackwall, 1867) (SMNS 1205); **4.** Pedipalpus retrolateral; **5.** Pedipalpus prolateral. Scale line = 1 mm



Figs 6-7: *Crossopriza lyoni* (Blackwall, 1867) (in coll. Gabriel); **6.** Epigyne; **7.** Cleared vulva/epigyne dorsal. Scale line = 1 mm

It is possible that *C. lyoni* is more widespread in similar habitats in Central Europe (e.g. greenhouses of other zoological gardens, tropical plant nurseries), but was overlooked in the past. However, at the moment *C. lyoni* cannot be considered established in Germany in the sense of Ludwig et al. (2006), because besides the populations in Stuttgart no further localities have been reported until now.

The type material of *C. lyoni* originates from India (Blackwall 1867), where it was found in synanthropic habitats. Nearly all other records where habitat data were mentioned by the authors (e.g., Beatty et al. 2008, Edwards 1993, Colmenares-García 2008, Huber & Warui 2012) come from buildings and their surroundings. However, the putatively closest relatives of *C. lyoni*, *C. maculipes* (Spassky, 1934), *C. johncloudsleyi* Deeleman-Reinhold & van Harten, 2001 and six yet undescribed species, come from Central Asia and the Middle East, so a tentative assumption about a possible origin of *C. lyoni* from an area ranging from east Africa and the Middle East to north-western India can be made (Huber pers. comm.).

The remaining species currently included in the genus *Crossopriza* are restricted to Africa north of the Equator, the Arabian Peninsula and Central Asia (Huber 2009, Huber et al. 2014, World Spider Catalog 2015). The Malagasy *Crossopriza nigrescens* Millot, 1946, described from a juvenile specimen, is most probably a synonym of *C. lyoni*, since there are no other species known from Madagascar (Huber pers. comm.). In conclusion, *Crossopriza* is clearly a subtropical Old World genus and only *C. lyoni* has spread into the New World and Europe due to human activities in the last centuries and/or decades.

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