New records of *Steatoda nobilis* (Thorell, 1875) (Araneae, Theridiidae), an introduced species on the Italian mainland and in Sardinia

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Summary

In this work we present new records of *Steatoda nobilis* (Thorell, 1875), a species originally from Madeira and the Canary Islands, for the Italian mainland and Sardinia. We discuss local ecology and ethology and provide brief genital and morphological descriptions of both sexes.

Introduction

The family Theridiidae is widespread on all continents except Antarctica, and presently includes 119 genera and 2324 species (Platnick 2012). Of these, 50 genera and 224 species are known to occur in Europe (van Helsdingen 2011). Among the Theridiidae, the cosmopolitan genus *Steatoda* Sundevall, 1833 is surely one of the most familiar genera. It includes more than 120 species, 14 of which are found in Europe; six are recorded for the Italian mainland, and three for Sardinia. *Steatoda* species are small to medium-sized (2–14 mm) araneomorph spiders characterized by the presence of a well developed colulus with 6–8 setae, and the lack of a spur on the mesal side of the cymbium of the male palpus. The sternum tapers posteriorly and the abdomen, typically globose, is generally dark and often with a light band around the anterior margin.

Steatoda nobilis (Thorell, 1875) was originally described as *Lithyphantes nobilis* from a specimen from Madeira. In 1879, Pickard-Cambridge described as *Steatoda clarkii* (O. P.-Cambridge, 1879) a subadult female of this species found in Torquay, England. Several years later, Jackson (1907) reported the presence of *Teutana nobilis* (= *Lithyphantes nobilis*) in England after collecting a large female from the coastal area around Hastings. The following year, Pickard-Cambridge confirmed Jackson's find and reported the presence of a few other specimens found inside banana shipments imported from the Canary Islands to England (Pickard-Cambridge 1908). This species was placed in its current genus by Levi (1957) when he synonymized *Teutana* Simon, 1881 with *Steatoda*.

Steatoda nobilis is an arboreal spider native to Madeira and the Canary Islands. As typical for many alien species, it could have a certain degree of influence on the ecosystems where it is introduced. Additionally, according to the single bite report discussed by Warrel *et al*. (1991), this species might also be of moderate medical relevance. Recent records for this species show how its presence in Europe is becoming increasingly more important and how its European range is currently expanding. *S. nobilis* can be considered euryoecious due to its exceptional level of ecological plasticity and adaptability. This feature, together with the combination of increasing global warming and the warmer local climate of the larger urban areas, have allowed this species to reach and settle in colder northern European countries.

In Great Britain and Ireland, *S. nobilis* was introduced mainly through shipments of fruit (Jackson 1907; Pickard-Cambridge 1908; Nolan 1999) and what used to be sporadic reports are now confirmations of large, established populations (Jones 1987; Snazell & Jones 1993). In recent years, it has been extensively recorded also for the Mediterranean Basin, where the more optimal climatic conditions have facilitated its introduction and allowed a quicker naturalization. Recent records are for Spain (Melic 1994), Portugal (Cardoso 2000; Crespo *et al*. 2009), southern France (Kovoor & Muñoz-Cuevas 2000) and Corsica (Snazell & Jones 1993).

Here we report numerous specimens of *Steatoda nobilis* found and collected on the Italian Peninsula and in Sardinia (see Fig. 4 for distribution map)

Material and Methods

ITALY: *Abruzzo*: 1♀, 1♂, Pescara, 42°28'6"N 14°11'44"E, September 2004, P. Di Pompeo leg.; 2♀♀, 1♂, Pescara, 42°28'20"N 14°11'56"E, October 2010, P. Di Pompeo leg.; 3♀♀, Pescara, 42°28'7"N 14°11'31"E, December 2010, P. Di Pompeo leg.; 2♂♂, Pescara, 42°28'7"N 14°11'31"E, April 2011, P. Di Pompeo leg.; 2♀♀, Francavilla al Mare (Chieti), 42°25'11"N 14°17'30"E, May 2011, P. Di Pompeo leg.; *Lazio*: 2♀♀, Fregene, Fiumicino (Roma), 41°51'27"N 12°12'22"E, October 2009, A. Kulczycki leg.; 5♀♀, 2♂♂, Roma, Villa Doria Pamphilj, 41°53'6"N 12°25'59"E, February 2011, A. Kulczycki leg.; 1♂, Roma, 41°55'29"N 12°26'29"E, June 2011, A. Kulczycki leg.; *Liguria*: 3♀♀, 2♂♂, Terzorio (Imperia), 43°51'11"N 7°53'53"E, August 2011, A. Galimberti leg.; *Sardinia*: 1♂, Suaredda-Traversa, San Teodoro (Olbia-Tempio), 40°46'50"N 9°39'29"E, August 2004, M. Grotto leg.; 2 ♀, Cagliari, 39°13'00"N 9°07'00"E, July 2011, A. Kulczycki leg.; 2♂♂, Usini (Sassari), 40°39'43"N 8°32'44"E, Febraury 2012, S. Canu leg.

The specimens are preserved in 75% alcohol in the authors' private collections. Specimens were examined using a Leica MZ16 stereomicroscope.

Fig. 1. *Steatoda nobilis*, ♀ habitus.

Results

The collected females measure from 8.5 to 12 mm in body length. Overall appearance is highly distinctive with brownish-ochre legs and, generally, dark brown cephalothorax and abdomen. The latter, typically ovoid, presents the characteristic dorsal pattern (Fig. 1), which is white and very noticeable in young individuals, but may be strongly reduced or even absent in older, mature females. The epigyne, although variable in terms of vertical height, has several diagnostic features: it is wider than long, medially hollowed and with rounded borders. Furthermore, the two genital openings are separated by a distinctive broad septum which can vary from being tear shaped to having more parallel sides. (Fig. 2).

Males are smaller, measuring from 5.9 to 9 mm, and are sexually dimorphic with the females. Even though overall appearance between the sexes is similar, males are distinctively less stout and much more slender. The cephalothorax is more streamlined and the abdomen is both smaller and more clearly marked. The legs are relatively longer, and the tibial segments are distally darker than the remaining leg, a feature less noticeable in females. Palps are elongated and have a relatively long median apophysis (Fig. 3). Additionally, as in all *Steatoda* species, males are able to stridulate during courtship, scraping abdominal cuticular teeth against a file on the rear of the cephalothorax.

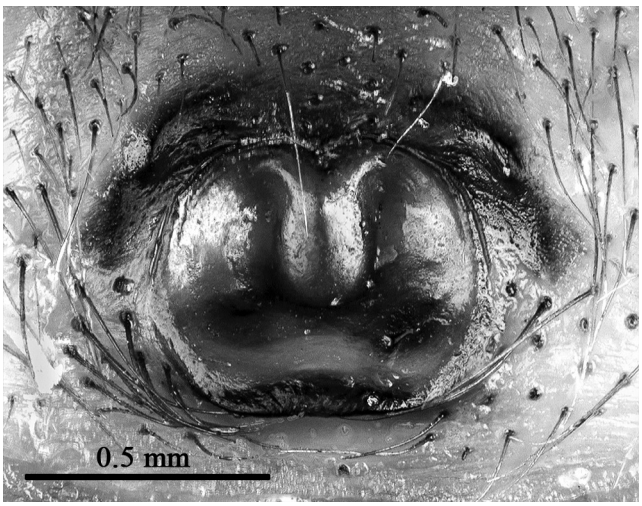

Fig. 2. *Steatoda nobilis*, ♀ epigynum, ventral view.

Discussion

Steatoda nobilis is a relatively large and striking spider, easily distinguishable from most of the congeneric Italian species by just its size. *Steatoda grossa* (C. L. Koch, 1838) and *Steatoda paykulliana* (Walckenaer, 1805) have overlapping body lengths (typically 7–10 mm in the former and 8–13 mm in the latter) but may be easily identified by the differences in both the pattern and in the genital structure. In Italy these three larger species, despite possibly occurring in the same habitat, also show a certain degree of differentiation in ecology and seasonal activity patterns. *S. grossa* prefers damper situations and occurs mainly at ground level under logs and stones, other than being a very frequent encounter inside human inhabitations throughout the whole year. *S. paykulliana*, though occasionally encountered under the bark of trees, is primarily a ground dweller, being commonly found under stones and beneath grass tussocks in the xerophitic Mediterranean shrubland. It shows a greater degree of seasonality, reaching peaks of activity during winter and early spring, when mature males and females are commonly found together.

Throughout its large, heterogeneous, modern range, both the life cycle of *S. nobilis* and the number of annual generations are strongly influenced and defined by temperature and its oscillations. In Italy, during the harsh season and depending on its intensity, *S. nobilis* overwinters, slowing down or completely stopping its development. Adult females are present throughout all the year while mature males can usually be found from spring up until the start of the following winter. Subadult males which have not reached maturity in autumn will overwinter and become sexually mature in spring. Due to the particular longevity of females and their ability to store sperm for numerous months (Locket 1979), egg deposition is not seasonal and can occur more or less throughout the whole year, except for the periods of strict winter rest. Additionally, a single mature female may lay numerous consecutive egg sacs over a long period of time. Generally, each egg sac contains approximately one hundred eggs, and from one laid in captivity 109 spiderlings hatched. Though this number may vary according to both external conditions and the mother's food supply, it is

Fig. 3. *Steatoda nobilis*, ♂ left palp, ventral view.

Fig. 4. Distribution map showing records of *Steatoda nobilis* in Italy. ■ = preserved specimens, ▲ = photographed specimens.

generally higher than the number of eggs laid by the other local *Steatoda* species. The spiderlings that emerge measure 1 mm in body length and disperse by ballooning.

These observations on its local ecology and biology, combined with its role as a very generalist predator of a wide range of insects and other arthropods, can be useful to determine the nature of the impact of this species on our local ecosystems. As will be stated subsequently, in some urban areas, *S. nobilis* appears to be disturbing local populations of other indigenous spiders with its sufficiently overlapping ecological niche. As opposed to the cold weather of the northern countries, the favourable Mediterranean climate of Italy, besides having an easier naturalization process, will definitely allow this species to colonize natural habitats away from human inhabiations. Therefore, even though presently occurring mainly in urban areas and their immediate rural surroundings, we are led to presume that this species could possibly have negative local ecological impacts which might require a more careful evaluation.

In the Lazio region, *S. nobilis* is successfully established in the city of Rome and its surroundings. Large and healthy populations can be readily spotted throughout various parts of the city, but they are especially abundant in the large public parks. Inside these, this species can be found in a wide range of different habitats, from urban pine forests, *Eucalyptus* forests, to the innermost areas of mesophytic forests. In these habitats, *S. nobilis* typically occupies the natural cavities found on tree trunks or spaces in bark. Outside large public parks, *S. nobilis* is fairly common around buildings, along urban walls and fences, and on street signs. In addition, particularly large and dense populations were observed in some plant nurseries. Along the coastal areas of Lazio, the presence of *S. nobilis* is confirmed for Fregene in the municipality of Fiumicino, Rome Province. Here, this species is common both around human habitations and in more distant rural areas, such as pine woods and eucalypt forests. The climate of these areas is Mediterranean, with warm summers, mild winters, and very infrequent frosts.

In Abruzzo, the presence of large naturalized populations of *S. nobilis* is recorded for the coastal areas of Pescara and Francavilla al Mare (Chieti), where this species appears to be strictly synanthropic. Specimens are common in and around urban areas: along walls, fences and balconies, on gates, and street lights, and, in public gardens, on vines and *Dracaena* plant species. Though the overall climatic conditions are fairly similar to those found in Lazio, these areas present a higher level of humidity and of winter rainfall. Nevertheless, comparable to what occurs in Rome, it is not uncommon to find active specimens during winter. In this area the authors have directly observed how, over the course of approximately seven years, and without any other notable and possibly influencing effect, *S. nobilis* has thrived at the expense of other native spider species. Both the congeneric *S. grossa* and *S. paykulliana*, as well as *Segestria florentina* (Rossi, 1790), while previously very abundant in cracks and crevices along urban walls, are now present in much lower densities in the same areas where populations of *S. nobilis* have flourished. While still present in great numbers in more

distant rural areas, in the urban environment these species have definitely suffered from the ever growing presence of *S. nobilis*. Similarly, populations of *Zygiella* spp., though still fairly abundant throughout the city, appear to have been largely substituted by those of *S. nobilis* on gates, lamp posts, and along railings.

Another naturalized and established population was recorded for Terzorio, in the province of Imperia, Liguria. This small town lies at 185 m a.s.l., 1.5 km from the coastline and is surrounded by vast cultivations of olive trees and grape vines. The orographic conformation typical of the region, with mountains that protect the adjacent coastline from the colder northern winds, allows for a milder climate during winter and a relatively warm but breezeless summer. Adult specimens with cocoons were collected in urban areas, outside human habitations and buildings. At the present time, this is Italy's northernmost record.

S. nobilis has also been introduced in Sardinia, as we record the presence of synanthropic coastal populations both in the southern (Cagliari) and in the northern (San Teodoro, Usini) areas of the island. Here, the climate is markedly Mediterranean, with warmer winters and a less pronounced seasonality compared to the other areas on the peninsula.

Therefore, in accordance with favoured climatic and environmental conditions of this species, we record *S. nobilis* in the mild and coastal areas of Abruzzo, Lazio, Liguria and Sardinia. Due to the presence of numerous climatically and environmentally similar areas in southern Italy and along the Tyrrhenian coastline, and considering notable ecological adaptability of this species, we believe its present local range to be incomplete and definitely wider. Based on photographic reports coming from some of these areas, such as Calabria (Catanzaro) and Tuscany (Isle of Elba), with future targeted samplings we are willing to further expand the known local distribution of this large, introduced species.

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