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Author(s): John P. Dunbar, Collie Ennis, Robert Gandola and Michel M. Dugon

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BITING OFF MORE THAN ONE CAN CHEW: FIRST RECORD OF THE NON-NATIVE NOBLE FALSE WIDOW SPIDER *STEATODA NOBILIS* (THORELL, 1875) FEEDING ON THE NATIVE VIVIPAROUS LIZARD *ZOOTOCA VIVIPARA* (LICHTENSTEIN, 1823) IN IRELAND

John P. Dunbar
(corresponding author;
email: j.dunbar2@
nuigalway.ie), Venom
Systems and Proteomics
Lab, The Ryan Institute,
National University
of Ireland Galway
and Herpetological
Society of Ireland, 10
Homelawn Gardens,
Tallaght, Dublin
25; Collie Ennis,
Department of Zoology,
School of Natural
Sciences, Trinity College
Dublin, Dublin, and
Herpetological Society
of Ireland; Robert
Gandola, Earth Institute,
School of Biology
and Environmental
Science, UCD, and
Herpetological Society
of Ireland; and Michel
M. Dugon, Venom
Systems and Proteomics
Lab, National University
of Ireland Galway.

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John P. Dunbar, Collie Ennis, Robert Gandola and Michel M. Dugon

ABSTRACT

As the Noble false widow spider *Steatoda nobilis* (Thorell 1875) continues to expand its range across Europe, Asia and the Americas, its potential as an invasive species has not yet been fully assessed. Latrodectinae spiders are remarkably adaptable and possess fast-acting neurotoxic venom that can cause neuromuscular paralysis in vertebrates and occasionally feed on small reptiles. We describe here a predation event by a mature female *Steatoda nobilis* on a juvenile *Zootoca vivipara* lizard in suburban Dublin. This is the first report of *Steatoda nobilis* preying on a vertebrate, and the first report of a terrestrial vertebrate organism falling prey to an arachnid in Ireland. *Zootoca vivipara* is a protected species in both the Republic of Ireland and Northern Ireland and may increasingly fall prey to *Steatoda nobilis* as urbanisation encroaches on lizard habitat. Therefore, *Steatoda nobilis* should be closely monitored outside of its original native range to assess its status as an invasive species.

INTRODUCTION

The Noble false widow *Steatoda nobilis* (Thorell, 1875) is a medium sized araneomorph spider of the family Theridiidae, measuring up to 13.7mm (prosoma + opisthosoma) in length (Dugon *et al.* 2017). It is characterised by conspicuous dorsal markings and produces a three-dimensional tangled web. *Steatoda nobilis* is thought to originate from the Atlantic archipelagos of Madeira (Thorell, 1875) and the Canaries (Bristowe 1929) but the species is now distributed throughout Western Europe, Western Asia and parts of the American Pacific coast (Dugon *et al.* 2017). In the Republic of Ireland, *Steatoda nobilis* was first recorded in 1998 in Bray, Co Wicklow (Nolan 1999). By 2017 the species occurred in at least seventeen counties and appeared to be spreading rapidly in urban and suburban habitats throughout the country (Dugon *et al.* 2017; Dunbar *et al.* in press).

Outside of its native range, *Steatoda nobilis* is proving to be a remarkably adaptable species with distinct synanthropic affinities (Kulczycki 2012; Vetter *et al.* 2015). *Steatoda nobilis* is cold tolerant,

active year-round, has a high reproductive rate, an exceptional longevity and possesses a fast-acting neurotoxic venom (Dugon *et al.* 2017; Dunbar *et al.* 2017; Isbister and Gray 2003; Warrell *et al.* 1991). In Ireland, *Steatoda nobilis* has been observed preying on a range of comparatively large native arthropods including beetles, hymenopterans and spiders (Dugon *et al.* 2017). Previous studies suggest that *Steatoda nobilis* may have a detrimental impact on arthropod fauna (Kulczycki 2012), although this has not been confirmed for native Irish fauna.

The viviparous or common lizard, *Zootoca vivipara* (Lichtenstein, 1823), is the only native terrestrial reptile in Ireland. This species has a widespread distribution on the island and is present in all 32 counties (data held by National Biodiversity Data Centre, Herpetological Society of Ireland, Centre for Environmental Data and Recording (CEDaR) Northern Ireland and National Biodiversity Network (NBN) Gateway, UK). It is protected under the Wildlife Act (1976, and amendments 2000, 2012) in the Republic of Ireland and the Wildlife Order (1985) in Northern Ireland. Predators of common lizards in Ireland comprise raptors

and other avifauna, small carnivores (e.g. stoats), and domestic animals (cats). However, it is likely that juvenile individuals may also be predated upon by predatory invertebrates.

A comprehensive review by O’Shea and Kelly (2017), indicates that reptiles occasionally fall prey to *Latrodectus* species and although less frequently reported, they are also preyed upon by *Steatoda* species (Petrov and Lazarov 2000; Zamani 2016). In this report we describe a predation event by a mature female *Steatoda nobilis* on a juvenile *Zootoca vivipara* in suburban Dublin. This is the first report of *Steatoda nobilis* preying on a vertebrate, and the first report of a terrestrial vertebrate organism falling prey to an arachnid in Ireland.

CASE REPORT

On 18 May 2017 in Killiney, Co Dublin, a member of the public discovered a spider alongside a small

dead lizard entangled on a thick, three-dimensional web between a garden wall and a contiguous wooden crate. Upon closer inspection, it appeared that the spider had covered the anterior half of the lizard with silk, positioned itself on the antero-dorsal aspect of the lizard and was seemingly feeding on it. Once disturbed, the spider fled to its retreat. Both the spider and the lizard were later photographed *in situ* using a camera phone (Fig 1), subsequently captured and sent to the authors for identification. Body lengths and weights of both the spider and the lizard as well as the spiders legspan were recorded using an analogue Vernier calliper and a precision digital scale. Both specimens were observed and photographed using a Nikon AF-S DX Micro Nikkor 40mm f 2.8G lense mounted on a Nikon D5200 DSLR camera. Detailed micrographs were taken using an Olympus DP25 camera mounted to an Olympus SZX 16 stereomicroscope and using the Olympus Cell D software package (Fig 2).

The spider was identified by the authors (JD and MD) as a mature female *Steatoda nobilis*,

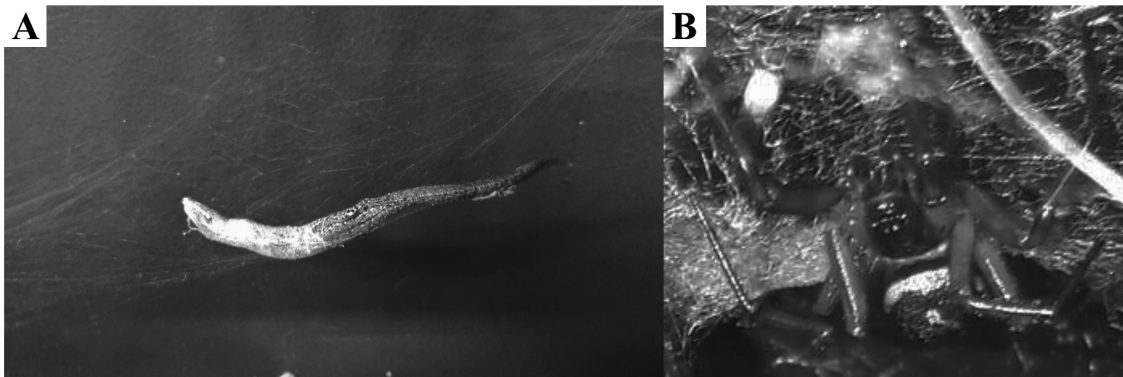


Fig. 1—In-situ smartphone images of (A) juvenile *Zootoca vivipara* entangled on web with the anterior half densely wrapped in silk, and (B) mature female *Steatoda nobilis* in its retreat.

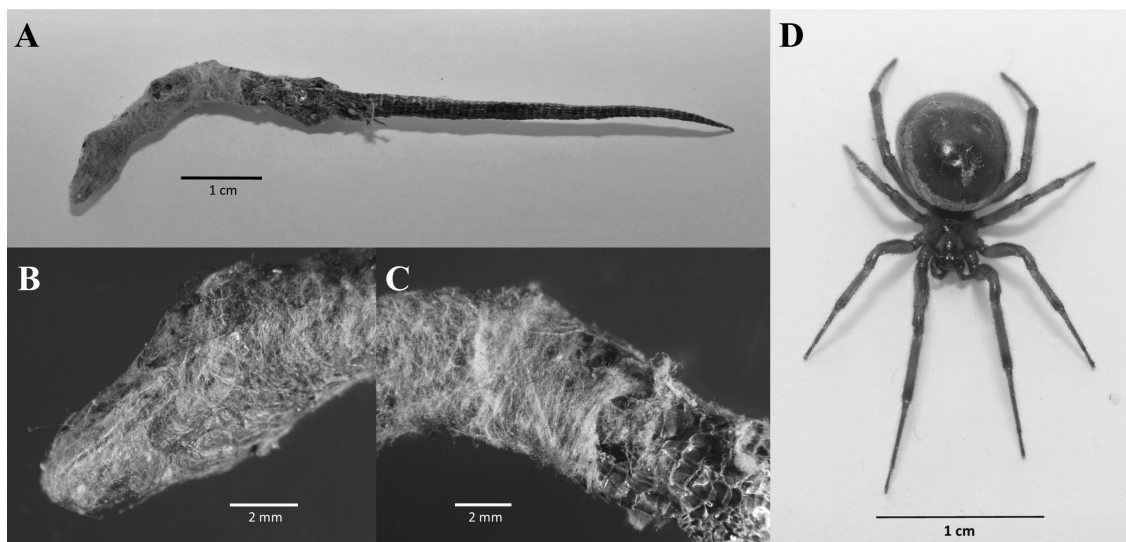


Fig. 2—Detailed micrographs of the (A - C) *Zootoca vivipara* and (D) *Steatoda nobilis* specimens.

based on typical opisthosomal dorsal patterns (Dugon *et al.* 2017). Body length was 11mm, leg span was 33.8mm and body weight was 0.3g.

The lizard was identified by the authors (CE and RG) as a juvenile *Zootoca vivipara*. Total body length was 8.5cm, and the weight of the desiccated specimen was 0.4g.

The lizard was densely wrapped in silk with the limbs aligned along the anterior to posterior axis of the body, suggesting that the spider actively wrapped the lizard in silk with the intent to trap it. When discovered, the spider was positioned over the lizard's head, where soft tissues can be accessed (Petrov and Lazarov 2000). This suggests that the spider was actively feeding on the lizard rather than just defending against a potential predator. As the event was not witnessed, we cannot definitively conclude that the spider hunted down and envenomed a healthy lizard or whether the spider fed opportunistically on an already weakened, possibly dead lizard.

DISCUSSION

The diet of Latrodectinae (*Latrodectus* and *Steatoda*) spiders typically consist of arthropods, however, they have been documented capturing and feeding on snakes and lizards (O'Shea and Kelly 2017; Petrov and Lazarov 2000; Zamani 2016). Latrodectinae of the genera *Latrodectus* and *Steatoda* produce the vertebrate-specific neurotoxin ' α -latrotoxin' which facilitates the release of neurotransmitters leading to neuromuscular paralysis (Isbister and Gray 2003; Warrell *et al.* 1991). While predation events by Latrodectinae on small vertebrates have only been observed on rare occasions, the presence of α -latrotoxin may suggest that small vertebrates are preyed upon more frequently than previously thought.

Zootoca vivipara is a ground-dwelling species that occupies bogs, rocky outcrops, old stone walls, sand dunes and are frequently found around man-made structures and close to human dwellings (Marnell 2002; Farren *et al.* 2010). In much of its northerly range including Ireland, *Steatoda nobilis* are exclusively synanthropic, building webs around man-made objects from roof tops down to ground level. Considering the continuous range expansion by *Steatoda nobilis* in Ireland and Great Britain, encounters with *Zootoca vivipara* are likely to become more frequent in the future. This is likely to be exacerbated in Dublin and other urban areas with increasing urbanisation and encroachment into lizard habitat. *Steatoda nobilis* should be closely monitored outside of its original native range to assess its status as an invasive species.

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