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Notas / *Notes*

Worth the risk? A case of Chrysopidae (Insecta: Neuroptera) oviposition on an occupied web of *Steatoda nobilis* (Thorell, 1875) (Araneae: Theridiidae)

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ABSTRACT

Recently, the use of abandoned spider webs as oviposition substrate for Chrysopidae has been reported, yet so far this behaviour had never been observed on an active (i.e. non-abandoned) spider web. In July 2020, a stalked-cluster of Chrysopidae eggs was found glued to the outermost of an active *Steatoda nobilis* web in Inca, Mallorca (Balearic Islands, Spain). This spider species is different from those reported so far in literature with Chrysopidae eggs on their webs. Biological implications of this understudied behaviour are discussed.

Keywords: *Steatoda nobilis*, web, spider, Chrysopidae, oviposition.

RESUMEN

¿Merece la pena el riesgo? Un caso de ovoposición de Chrysopidae (Insecta: Neuroptera) sobre una telaraña ocupada de *Steatoda nobilis* (Thorell, 1875) (Araneae: Theridiidae)

Recientemente se ha notificado el uso de telarañas abandonadas como sustrato de ovoposición para Chrysopidae, sin embargo, hasta ahora este comportamiento nunca se había observado en una telaraña activa (es decir, no abandonada). En julio de 2020, se encontró un racimo de huevos de Chrysopidae pegados al exterior de una red activa de *Steatoda nobilis* en Inca, Mallorca (Islas Baleares, España). Esta especie de araña es diferente de las citadas hasta ahora en la literatura con huevos de Chrysopidae en sus redes. Se discuten las implicaciones biológicas de este comportamiento poco estudiado.

Palabras clave: *Steatoda nobilis*, telaraña, araña, Chrysopidae, ovoposición.

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Species continuity largely depends on the fitness of the offspring. In insects, for instance, the number, shape and place where eggs are laid are key factors for its protection and survival (Skinner, 1985; Desouhant *et al.,* 2000; Fréchette & Coderre, 2000). Chrysopids are active nocturnal predators during their larval stage (Canard, 2001). For this reason, chrysopids lay their eggs in different substrates near feeding resources, so once larvae hatch, they can easily find prey (Monserrat & Díaz-Aranda, 2012; Monserrat, 2016). Eggs can be found in natural or artificial substrates including leaves, branches, trunks or spines of plants, as well as in human wooden or metal constructions (Duelli, 1986; Gepp, 1989; Monserrat, 2016). Recently, Parejo-Pulido & Mora-Rubio (2019) reported for the first time the use of abandoned spider webs as a new substrate for the oviposition of chrysopid species. They found close-by egg groups on six abandoned webs, one on a web of *Argiope lobata* (Pallas, 1775) and five on webs of *Cyrtophora citricola* (Forsskål, 1775). Here, the use of a non-abandoned spider web as an oviposi-

tion substrate for Chrysopidae is reported for the first time.

On July 1st of 2020, a stalked-cluster of 16 eggs was found glued to the edge of an active (i.e. non-abandoned) web of *Steatoda nobilis* (Thorell, 1875) (Fig. 1). The spider was identified by the author and further confirmation of the species was endorsed by an expert (Dr. Guillem Xavier Pons). The web was located at approximately 2 meters of height, on a pile of stacked rocks that formed an ornamental waterfall in a private pool in the outskirts of Inca, Mallorca (Balearic Islands, Spain) (MGRS coordinate: 31SDD9393, alt. 92 m). Up to six occupied *S. nobilis* webs were found in the rocky waterfall, but only one of them had Chrysopidae eggs. No trapped adults were found in any web.

These findings raise several intriguing questions, for instance, whether such ovipositioning behaviour gives an adaptive advantage and may increase the fitness of the chrysopid's offspring, as it has been shown in other insect groups (e.g. in moths; Nafus & Schreiner, 1991). If so, this behaviour takes place at the expense of a huge risk to the chrysopid female of entanglement or predation. However, it is still unclear whether chrysopids can discriminate occupied or abandoned spider webs. Moreover, whether future larvae are able to freely move on the web without getting glued or whether they could be able to prey on the spider eggs (as it has been described in other insects, e.g. Mantispidae; Redborg, 1998) should be evaluated. Given that Chrysopidae species differ in their aggregation of egg-clutches (Gepp, 1989), and that the eggs reported by Parejo-Pulido & Mora-Rubio (2019) were laid separately, while the ones found in this note were laid in a cluster (Fig. 1A), it seems that there are at least two different species with such ovipositioning behaviour. Therefore, these findings suggest that oviposition of Chrysopidae on spider webs may have been overlooked.

This previously unreported behaviour calls for future studies, in order to clarify whether: 1) this behaviour happens on all chrysopid species, 2) the spider webs chosen are specific to any chrysopid species, 3) female Chrysopidae are able to distinguish between occupied and abandoned spider webs, 4) webs as oviposition substrates are effective against egg-predators, 5) this behaviour depends upon the female's past experiences with spiders or webs, 6) this behaviour is linked to local egg-predator density, 7) this behaviour is a result of competition for oviposition substrate. The answers to these questions will contribute to increase the fundamental knowledge on Chrysopidae on unknown aspects of their ecology. Systematic samplings or laboratory studies could be a starting point to better understand these interactions. Nevertheless, even though the relationship between the Chrysopidae oviposition and occupied spider webs should be bore in mind, we cannot rule out the possibility of this interaction been a mere random event in nature.

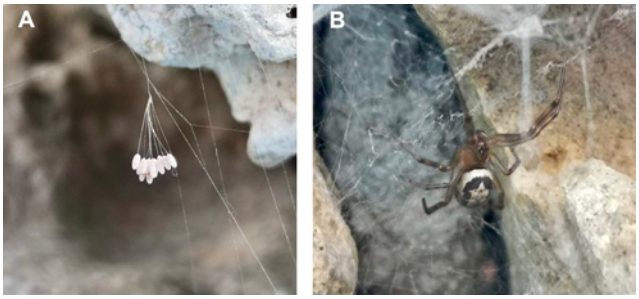

Fig. 1.— Chrysopidae eggs laid on an occupied *Steatoda nobilis* web. A, cluster of Chrysopidae eggs; B, *S. nobilis* in the web where eggs were found.

Fig. 1.— Huevos de Chrysopidae en una telaraña ocupada de *Steatoda nobilis*. A, racimo de huevos de Chrysopidae; B, *S. nobilis* en la telaraña donde los huevos fueron encontrados.

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