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.
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 increase and may improve 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 borne in mind, we cannot rule out the possibility of this interaction been a mere random event in nature.

**Acknowledgments**

I would like to thank Dr. Guillem Xavier Pons for confirming the identification of the *Steatoda nobilis* specimen, and to Joan Díaz Calafat for making constructive comments about the manuscript and revising the English.

**References**

Canard, M., 2001. Natural food and feeding habits of lacewings. En: Mcewen, P.K., T.R. New & A.E. Whittington (Eds.). *Lacewings in the Crop Environment*. Cambridge University Press. Cambridge: 116-129. https://doi.org/10.1017/CBO9780511666117.007

Desouhant, E., Debouzie, D., Ploye, H. & Menu, F., 2000. Clutch size manipulations in the chestnut weevil, *Curculio elephas*: fitness of oviposition strategies. *Oecologia*, 122(4): 493-499. https://doi.org/10.1007/s004420050971

Duell, P., 1986. A “missing link” in the evolution on the egg pedicel in lacewings. *Experientia*, 42: 624.

Fréchette, B. & Coderre, D., 2000. Oviposition strategy of the green lacewing *Chrysoperla rufilabris* (Neuroptera: Chrysopidae) in response to extraguild prey availability. *European Journal of Entomology*, 97(4): 507-510.

Gepp, J., 1989. Zur ökologischen Differenzierung der präimaginaln Stadien baumbewohnender Chrysopiden im Alperaum (Planipennia: Chrysopidae). *Sitzungsberichte-Österreichische Akademie der Wissenschaften. Mathematisch- naturwissenschaftliche Klasse*, 197: 1-73.

Monserrat, V. J., 2016. Los crisópidos de la Península Ibérica y Baleares (Insecta, Neuroptera, Neur- optera: Chrysopidae). *Graellsia*, 72(1): 037. https://doi.org/10.3989/graeilssa.2016.v72.143

Monserrat, V. J. & Díaz-Aranda, L. M., 2012. Los estadios larvarios de los crisópidos ibéricos (Insecta, Neuroptera, Chrysopidae), nuevos elementos sobre la morfología larvaria aplicables a la sistemática de la familia.

---

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.
Nafus, D. & Schreiner, I., 1991. Oviposition by herbivorous insects on spider webs as an anti-predation defence. *Ecological Entomology*, 16(4): 513-517. https://doi.org/10.1111/j.1365-2311.1991.tb00244.x

Parejo-Pulido, D. & Mora-Rubio, C., 2019. Use of spider webs as an oviposition substrate by chrysopids (Neuroptera, Chrysopidae). *Boletín de la Asociación Española de Entomología*, 43(3-4): 309-312.

Redborg, K. E., 1998. Biology of the Mantispidae. *Annual Review of Entomology*, 43:175–194. https://doi.org/10.1146/annurev.ento.43.1.175

Skinner, S. W., 1985. Clutch size as an optimal foraging problem for insects. *Behavioral Ecology and Sociobiology*, 17(3): 231-238.