

Cardepiia affinis europaea Hacker, 1998 new to the Maltese Islands (Lepidoptera: Noctuidae, Noctuinae)

Jonathan Agius

Abstract

This paper reports the first recorded presence of *Cardepiia affinis europaea* Hacker, 1998 in Malta. *Cardepiia affinis europaea* Hacker, 1998 belongs to the Noctuidae family, subfamily Noctuinae, and is adapted to xeric environments across the Palearctic. The addition of *C. affinis europaea* Hacker, 1998 to the Lepidoptera fauna of the Maltese Islands underscores the biodiversity of the region and the potentially expanding range of this species. This paper provides background on the species, including distribution, ecological role, possible larval foodplants and voltinism. A Maltese name is being proposed as well.

Keywords: Lepidoptera, Noctuoidea, Noctuidae, *Cardepiia affinis europaea*, new record, Maltese Islands.

Cardepiia affinis europaea Hacker, 1998 nuevo en Malta
(Lepidoptera: Noctuidae, Noctuinae)

Resumen

Este artículo informa de la primera presencia registrada de *Cardepiia affinis europaea* Hacker, 1998 en Malta. *Cardepiia affinis europaea* Hacker, 1998 pertenece a la familia Noctuidae, subfamilia Noctuinae y está adaptada a los entornos xéricos del Paleártico. La incorporación de *C. affinis europaea* Hacker, 1998 a la fauna de lepidópteros de las islas maltesas subraya la biodiversidad de la región y la posible expansión del área de distribución de esta especie. Este artículo proporciona información sobre la especie, incluyendo su distribución, su papel ecológico, las posibles plantas de las que se alimentan las larvas y el voltinismo. También se propone un nombre maltés.

Palabras clave: Lepidoptera, Noctuoidea, Noctuidae, *Cardepiia affinis europaea*, nuevo registro, Malta.

Introduction

The Maltese Islands, nestled in the heart of the Mediterranean Sea, are renowned for their rich biodiversity despite the very small size. This paper unveils the discovery of *Cardepiia affinis europaea* Hacker, 1998 in the Maltese Islands, marking a further addition to the Maltese fauna.

The family Noctuidae is one of the most extensive families of Lepidoptera, encompassing over 11,000 species worldwide (Lafontaine et al. 2010). Within Europe, approximately 1,623 Noctuidae species are recorded (Top et al. 2022), with 178 species recorded from the Maltese islands until recently (Agius, 2024). The Noctuinae subfamily comprises around 280 European species (Witt et al. 2011) including *Euxoa capsensis* Chrétien, 1911 recently documented as new to both the Maltese Islands and Europe (Agius, 2024; Witt et al. 2011). Known for their adaptability, Noctuinae inhabit diverse ecosystems and play a vital role in ecological research due to their widespread distribution.

Taxonomy and Distribution

Originally identified as *Discestra deserticola* by Rothschild in 1913 from specimens captured in Algeria (“Western Central Sahara: Kef-el-Dor”), *Cardepija affinis* (Rothschild, 1913) has seen various taxonomic revisions, ultimately being classified under the genus *Cardepija*. The species has three recognized subspecies across its range. These include *Cardepija affinis antinea* Rungs, 1972 which is restricted to Morocco and the Canary Islands; *Cardepija affinis iatnana* Hacker, 1998 that seems to be endemic to Cyprus (Van Nieuwerkerke, 2011); and *Cardepija affinis europaea* Hacker, 1998 which has been recorded from Southern Spain, Sardinia and Sicily (Grassi et al. 2007).

Cardepija affinis europaea Hacker, 1998, described as darker than the pale nominate form *C. affinis*, features a well-defined orbicular stigma, a contrasting subterminal line, and a reniform stigma partly shaded with blackish-greyish-brown. This darker form aligns perfectly with the two specimens documented in the islands of Malta, suggesting they are likely *Cardepija affinis europaea* Hacker, 1998. The species inhabits dry coastal and semi-desert areas (Hacker et al. 2002).

The discovery of this species in Malta represents a novel addition to local biodiversity records and may indicate an expanded habitat range. The Mgġebah area where the species was recorded from, is situated close to the sea, with rugged cliffs, blue clay formations, garigue (low-lying Mediterranean vegetation), and terraced fields nearby. The clay deposits found here contribute to the lush vegetation in the area, as it retains moisture well, creating a unique habitat for plant species. However, the blue clay formations are sensitive to erosion, so they are gradually changing over time due to exposure to rainfall and wave action.

Larval Food Plants

While the specific food plants of *Cardepija affinis europaea* Hacker, 1998 in Malta remain unconfirmed, it is suggested that the larvae may feed on *Atriplex* and other halophilous herbs, like other species within the *Cardepija* genus (Witt et al., 2011). Among the *Atriplex* species in the Maltese Islands, *Atriplex halimus* is the most prevalent and is often used as a wind-resistant, low-growing hedge.

Notably, the Maltese Islands are also home to the endemic *Atriplex lanfrancoi* (Brullo & Pavone) G. Kadereit & Sukhor, a critically endangered perennial woody shrub that primarily grows on cliff sides, particularly in the northwestern region of Gozo, Fungus Rock, and a few other locations. The IUCN Red List classifies *A. lanfrancoi* as critically endangered (2024). Although there is no direct evidence that *Cardepija affinis europaea* utilizes *A. lanfrancoi* as a larval food plant, its inclusion is relevant due to the genus-level association with *Atriplex* species and the ecological sensitivity of this rare plant. Investigating whether this moth interacts with *A. lanfrancoi* could provide valuable insights into both species’ conservation biology and the moth’s ecological adaptability.

Voltinism and Climate Adaptation

The species of the subfamily Noctuidae that occur in temperate climates are generally univoltine (completing one generation per year) or bivoltine (completing two generations per year). Species that are univoltine often overwinter in a dormant state in the larval or pupal stage (Leather et al. 1993). However, in warmer regions, *Cardepija affinis europaea* Hacker, 1998 may be multivoltine, producing multiple generations per year. This adaptability is reflected in its activity patterns, as it is most frequently observed from April to May and again in September and October (Top et al. 2022).

Global climate changes are known to impact voltinism in Noctuidae, leading some species to increase their generational cycles in response to warmer conditions (Macgregor et al. 2019). Investigating the voltinism of *Cardepija affinis europaea* Hacker, 1998 in Malta may reveal the degree of its climate adaptability and resilience.

In addition to influencing voltinism, global warming could also facilitate a broader geographical expansion of *Cardepija affinis europaea* Hacker, 1998. Warmer average temperatures may allow this xerophilic species to colonize new areas with formerly unsuitable climates, as seen with other Noctuidae (Macgregor et al. 2019). The new record from Malta may be indicative of such a range shift, highlighting the importance of continued monitoring to detect distributional responses to climate change.

Material

MALTA, Mġiebah, limits of Mellieha 2 ♀, 7-X-2024 at 250W frosted Mercury Vapour lamp, coll. & leg. J. Agius.



Conclusion

The discovery of *CardepiA affinis europaea* Hacker, 1998 in Malta marks a significant addition to the species' known distribution and underscores the importance of ongoing biodiversity research in the area. With its inclusion in the checklist of Noctuoidea species from the Maltese Islands, which previously totalled 178 species (Agius, 2024), the total now rises to 179 Noctuoidea species. Investigating the habitat, dietary preferences, and life cycle patterns of species like *CardepiA affinis europaea* Hacker, 1998 enhances ecological research and biodiversity assessments. Future studies concentrating on local voltinism, food sources, and climatic adaptations will provide deeper insights into the ecological role of this species and its potential responses to environmental shifts in the Mediterranean region. This species represents a new addition to the lepidoptera fauna of the Maltese Islands, with the Maltese name “Kardepja” proposed as a transliteration of its genus.

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Conflict of Interest

The author declares that he has no financial interest or personal relationship that could influence the work presented in this article.

References

- Agius, J. (2024). *Agrotis endogaea punica* Pinker, 1980 a new Noctuidae for the Malta, including an updated Noctuoidea checklist for the Maltese Islands (Lepidoptera: Noctuidae). *SHILAP Revista de lepidopterologia*, 52(207), 567-573. <https://doi.org/10.57065/shilap.959>
- Agius, J. (2024). *Euxoa capsensis* Chrétien, 1911: A new Noctuidae species for Europe and the Maltese Islands, including an updated Noctuoidea checklist for the Maltese Islands (Lepidoptera: Noctuidae, Noctuinae). *SHILAP Revista de lepidopterologia*, 52(205), 93-99. <https://doi.org/10.57065/shilap.848>

- Grassi, A., Pimpinelli, I., Pinzari, M., & Zilli, A. (2007). Some noteworthy records of macromoths from central Italy (Lepidoptera). *Bollettino Dell'Associazione Romana Di Entomologia*, 62(1-4), 131-144.
- Hacker, H., Ronkay, L., & Hreblay, M. (2002). *Hadeninae I. Noctuidae Europaeae* (Vol. 4). Entomological Press.
- IUCN. (2023). *The IUCN Red List of Threatened Species*. <https://www.iucnredlist.org>
- Kadereit, G., Mavrodiev, E. V., Zacharias, E. H., & Sukhorukov, A. P. (2010). Molecular phylogeny of *Atripliceae* (Chenopodiaceae, Chenopodiaceae): Implications for systematics, biogeography, flower and fruit evolution, and the origin of C4 photosynthesis. *American Journal of Botany*, 97(10), 1664-1687. <https://doi.org/10.3732/ajb.1000169>
- Lafontaine, J. D., & Schmidt, B. C. (2010). Noctuoidea. *Annotated check list of the Noctuoidea (Insecta, Lepidoptera) of North America north of Mexico* (Vol. 1). Wedge Entomological Research Foundation. <https://doi.org/10.3897/zookeys.40.414>
- Leather, S. R., Walters, K. F. A., & Bale, J. S. (1993). *The ecology of insect overwintering*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511525834>
- Macgregor, C. J., Thomas, C. D., Roy, D. B., Beaumont, M. A., Bell, J. R., Brereton, T., Bridle, J. R., Dytham, C., Fox, R., Gotthard, K., & Hoffmann, A. A. (2019). Climate-induced phenology shifts linked to range expansions in species with multiple reproductive cycles per year. *Nature Communications*, 10(1), 1-10. <https://www.nature.com/articles/s41467-019-12479-w> PMID:31649267 PMCID:PMC6813360
- Top, M., Fritsch, D., & Kononenko, V. (2022). *Noctuidae Europaea essential*. Oestermarie, Bornholm.
- Van Nieuwerkerken, E. (2011). <https://www.eu-nomen.eu/portal/taxon.php?GUID=urn:lsid:faunaeur.org:taxname:448298>
- Witt, T. J., & Ronkay, L. (2011). Lymantriinae - Arctiinae, including Phylogeny and Check List of the Quadrid Noctuoidea of Europe. *Noctuidae Europaeae* (Vol. 13). Entomological Press.

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