Short Communication

Phaiogramma faustinata (Millière 1868) (Lepidoptera: Geometridae) and *Mythimna umbrigera* (Saalmüller 1891) (Lepidoptera: Noctuidae): first records for mainland Italy

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Abstract - Knowledge about South Italian fauna of Lepidoptera is constantly increasing as result of ongoing faunistic surveys in different environments. In this study we reported the main faunal novelties found during the survey of macromoth fauna in the Regional Nature Reserve "Foce del fiume Mesima" using UV LED light traps. In detail, *Phaiogramma faustinata* (Millière 1868) and *Mythimna umbrigera* (Saalmüller 1891) are recorded for the first time for mainland Italy, marking an important expansion of its known distribution, which were previously recorded in Italy only for Sicily. Identification was carried out by analysing wing patterns and morphology of genitalia. Both findings highlight the critical role of scientific exploration in bridging knowledge gaps which is essential for effective ecosystem management. They also stress the need of continuous monitoring in sites devoted to nature conservation like the mouth of the Mesima River, a strategical site in the Mediterranean Basin for the detection of climate induced ecosystem changes.

Key words: biodiversity monitoring, Calabria, moth fauna, protected areas, wetlands.

Riassunto - *Phaiogramma faustinata* (Millière 1868) (Lepidoptera: Geometridae) e *Mythimna umbrigera* (Saalmüller 1891) (Lepidoptera: Noctuidae): prime segnalazioni per l'Italia continentale.

La conoscenza sulla lepidotterofauna del Sud Italia è in continua espansione grazie all'intensificazione delle indagini faunistiche. In questo studio presentiamo i principali risultati del monitoraggio dei macrolepidotteri nella Riserva Naturale Regionale "Foce del Fiume Mesima", effettuato con trappole luminose UV-LED. Segnaliamo per la prima volta in Italia continentale *Phaiogramma faustinata* (Millière 1868) e *Mythimna umbrigera* (Saalmüller 1891), finora note in Italia solo per la Sicilia. L'identificazione è stata confermata mediante l'analisi del pattern alare e della morfologia dei genitali. Questi ritrovamenti evidenziano l'importanza del monitoraggio continuo in aree protette, fondamentali per rilevare cambiamenti ecosistemici e per colmare le lacune nella conoscenza della biodiversità.

Parole chiave: aree protette, Calabria, falene, monitoraggio della biodiversità, zone umide.

INTRODUCTION

In recent decades, advances in faunal knowledge have been driven by increased research aimed at exploring several environments and describing the natural dynamics of animal communities. Many species previously unrecorded have been detected either because they were historically overlooked or due to actual distributional shifts linked to environmental and climatic factors (Parmesan & Yohe, 2003). These changes are especially evident in the Mediterranean, where recent studies have highlighted the arrival of species from more southern regions (Gil-Tapetado *et al*., 2023; Albano *et al*., 2024). Saharan wind systems, for example, can transport insects from sub-Saharan Africa to southern Italy within short timeframes, as demonstrated by *Condica capensis* (Guenée 1852) (Rijllo *et al*., 2024).

At the same time, some species appear to be expanding northward, likely in response to ecological niches opening up due to climate change (Shoo *et al*., 2006; Melles *et al*., 2011). The present study contributes to this broader framework by presenting new records of species belonging to two moth genera: *Mythimna* Ochsenheimer 1816 (Noctuidae), widely distributed in the Palearctic, and *Phaiogramma* Gumppenberg 1887 (Geometridae), a genus typical of Mediterranean ecosystems.

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The genus *Mythimna* includes around 270 species found on most continents. These moths are generally associated with grasslands (Fibiger & Lafontaine, 2005), and many species are cryptic, requiring genitalia examination for reliable identification. The larvae, commonly known as "armyworms," are known for their mass movements and potential to cause severe crop damage (Hadimani *et al*., 2024). In Italy, 17 species are currently known (Rodeland, 2009).

Phaiogramma, by contrast, is a smaller genus with a limited number of species across the Palearctic, Afrotropical, and Indo-Pacific regions, and is closely related to the African genus *Neromia* (Hausmann 2001).

This research documents for the first time the presence of *Mythimna umbrigera* (Saalmüller 1891) (Noctuidae: Hadeninae: Leucaninii) and *Phaiogramma faustinata* (Millière 1868) (Geometridae: Geometrinae: Hemitheini) in mainland Italy, both species being previously known only from islands.

The findings come from a study carried out in Calabria, at the mouth of the Mesima River, within a recently designated Regional Nature Reserve (Regional Law No. 47/2022). The site comprises a mosaic of wetlands, riparian zones, and coastal vegetation that support diverse invertebrate communities, including moths. Although still under-studied, the area is emerging as ecologically important, with recent reports of previously unreported avian species (Martino *et al*., 2023), a nematode new to mainland Italy (Milazzo *et al*., 2025), and the micro-moth *Morophaga morella* (Duponchel 1838), also new for the Italian mainland fauna (Bonelli *et al*., 2021). A nocturnal Lepidoptera survey was carried out to assess local moth diversity and document faunal novelties.

MATERIALS AND METHODS

The study area is located at the mouth of the Mesima River in the Calabria region of southern Italy, in the province of Reggio Calabria. The Mesima River is about 50 km long and flows from Mount Mazzuccolo to the Tyrrhenian Sea (Protano *et al*., 2014). The surroundings of the mouth are predominantly agricultural, with crops including citrus orchards, olive groves and vineyards, but there are also forest remnants. The pretty degraded coastal area around the mouth hosts a variety of plants, many of which are commonly found in wet environments: for example, *Arundo donax* L., *Typha latifolia* L., *Salix alba* L., and *Phragmites australis* Cav.. Vegetation also shows a halophilous component, characterised by the presence of *Cakile maritima* Scop., *Agropyron junceum* (L.) P. Beauv., *Otanthus maritimus* (L.) Hoffmanns. & Link, *Eryngium maritimum* L. and *Pancratium maritimum* L. Three monitoring sites representatives of the main environments were chosen near the riverbed and within retrodunal vegetation.

Three traps were positioned at intervals of approximately 500 m apart on both banks of the river (Fig. 1). Sampling was carried out by setting up one UV LED light trap per site (Infusino *et al*., 2017), simultaneously activated one night per month. The monitoring lasted from May 2023 to April 2024, under optimal weather conditions for both moth activity and trap efficiency. Traps were activated before sunset and deactivated the following morning.

Collected specimens of both species were identified primarily based on wing patterns and the morphology of genitalia.

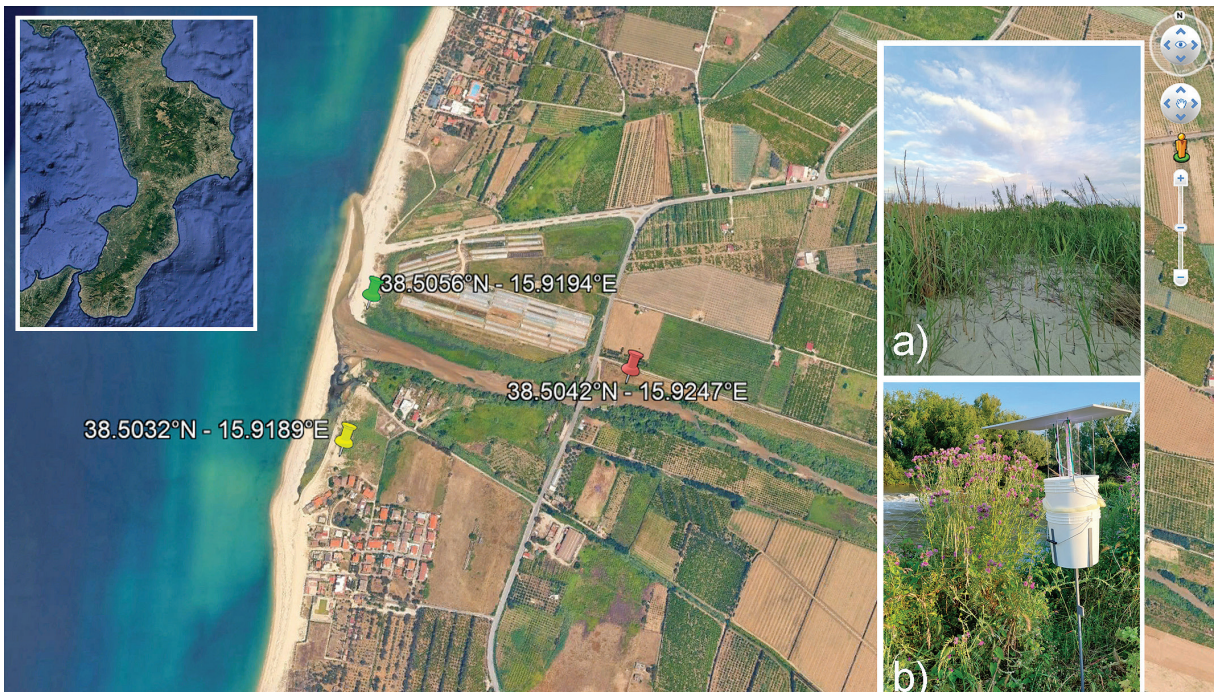

Fig. 1 - Location of study area and monitoring sites. a) Habitat of *Mythimna umbrigera* and *Phaiogramma faustinata* in the study area; b) UV-LED light trap at one of the sampling sites. / Localizzazione dell'area di studio e dei siti di monitoraggio. a) Habitat di *Mythimna umbrigera* e *Phaiogramma faustinata* nell'area di studio; b) Trappola luminosa UV-LED in uno dei siti di campionamento.

The abdomens were removed, treated with 10% KOH to soften tissues, then cleaned and dissected on a slide. Genitalia were coloured with Chlorazol Black 1% diluted in ethyl alcohol, passed in 95% ethyl alcohol and mounted in Euparal under a coverslip to dry for 24-48 hours (Parenti, 2000; Padwal *et al*., 2018).

Tissue samples were DNA barcoded following the protocols of the Canadian Centre for DNA Barcoding (CCDB). The obtained sequences were compared with those available in the BOLD data systems. Specimens collected were preserved in the Lepidoptera research collection of the Wildlife Management and Forest Biodiversity Laboratory, Research Centre for Forestry and Wood.

RESULTS

Four specimens of *Mythimna umbrigera* and a single specimen of *Phaiogramma faustinata* resulted from the trapping sessions (Fig. 2).

Mythimna umbrigera (Saalmüller 1891)

Material: 4 males. Contrada Foce, Rosarno (Reggio Calabria Province) Calabria, 38.5056°N, 15.9194°E, 25.VIII.23. First record for mainland Italy.

Notes: Three of the four specimens were barcoded, identified as LEP-SS-06013, LEP-SS-06014, and LEP-SS-06015 on BOLD, all belonging to the BIN BOLD:ABU7350. These sequences are the first obtained from specimens collected in Europe outside Spain. The closest sequence was from a Spanish specimen (BOLD process ID: IBLAO371-12), with a genetic distance of 0.46%.

Phaiogramma faustinata (Millière 1868)

Material: 1 male. Contrada Foce, Rosarno (Reggio Calabria Province) Calabria, 38.5056°N, 15.9194°E, 20.X.2023. First record for mainland Italy.

Notes: This specimen was barcoded, identified as LEP-SS-07132 on BOLD, belonging to the BIN BOLD:AAB4914. The genetic sequence exactly matched

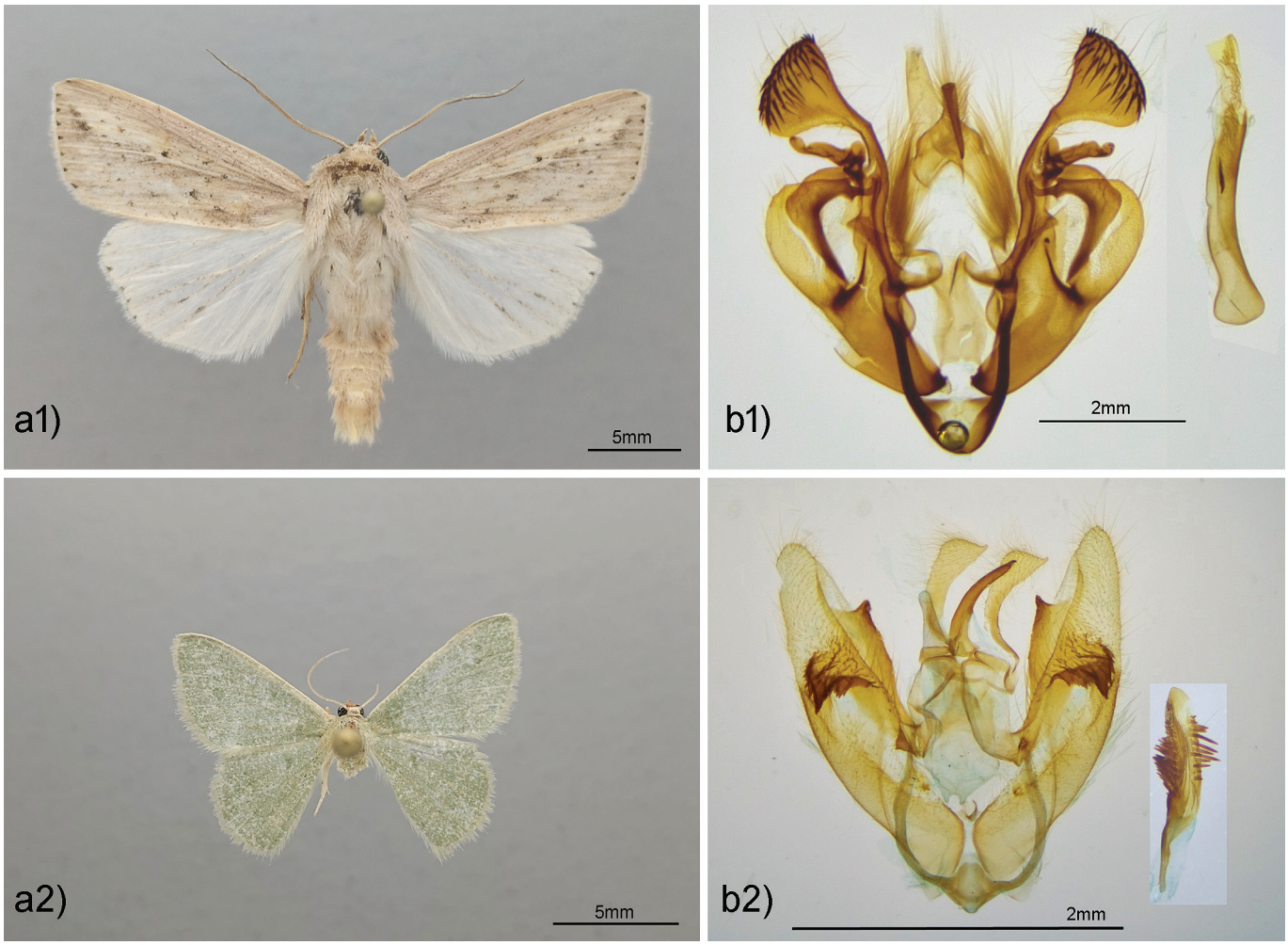

Fig. 2 - Adults and genitalia of treated species. a1) adult and b1) male genitalia (microscope slide CREA-0282) of *Mythimna umbrigera*; a2) adult and b2) male genitalia (microscope slide CREA-0281) of *Phaiogramma faustinata*. / Adulti e genitali delle specie analizzate. a1) Adulto e b1) genitale maschile (vetrino CREA-0282) di *Mythimna umbrigera*; a2) Adulto e b2) genitale maschile (vetrino CREA-0281) di *Phaiogramma faustinata.*

that of a specimen collected in Ghana (BOLD process ID: TMGHA20419-22).

DISCUSSION AND CONCLUSION

The sampling of the monitoring sites in this study resulted in two important new findings within the same collecting site where the dominant vegetation is represented by *Arundo donax* L. (Fig. 1a). These discoveries not only enrich our faunal knowledge, highlighting possible changes in the geographical distribution of certain species, but can also raise awareness of the importance of these areas and the need to preserve their integrity by eliminating practices such as waste dumping and excessive use of pesticides in nearby cropland.

The discovery of *Mythimna umbrigera* in mainland Italy is particularly noteworthy. Although some progress has been made in the study of the habits of this insect, particularly regarding the number of generations with at least three broods observed (Agius, 2021), there is still limited knowledge of its biology and early developmental stages. It is suggested that the larvae, known to feed on sugarcane (*Saccharum officinarum* L.), may have switched to grasses of related genera such as *Phragmites*, *Arundo* and *Typha*, present in our monitoring area, but also in the monitoring areas of Sicily and Malta where the species were recently recorded (Cabella & Maioglio, 2013; Agius, 2021). *Mythimna umbrigera* is an Afrotropical species, and in Europe, prior to these reports, it had only been recorded from southern Spain and Greece (Hacker *et al*., 2002).

Similarly, the finding of *Phaiogramma faustinata* represents a key update to our knowledge of its geographical distribution. Despite extensive monitoring of several areas believed to be suitable for the species, it had never been recorded in mainland Italy until now. This xerothermophilous species is plurivoltine and polyphagous, feeding primarily in the herb layer. It is specialized in warm and dry environments, such as the hot coastlands of southern Europe and is characterized by a strong white scaling, which is more pronounced than in the similar *P. etruscaria* (Hausmann 2001). In Europe, the larvae feed on the fruits of *Ferula loscossi* (Lange) Willk., while in the Canary Islands, it has been found on *Schinus molle* L. (Garcia *et al*., 2016). In Tenerife, larvae were found on *Lotus glaucus* Aiton, and in La Gomera, according to Wagner (2005-2025), on *Lotus glinoides* Delile. In Europe, *P. faustinata* has a patchy distribution, including coastal areas of southern Portugal, Spain and southern France, and is also found on some islands such as the Balearic Islands, Malta, Crete, and southern Sicily. Outside of Europe, it was found in North Africa, Ethiopia, Cyprus, Armenia, the Levant, southern Oman, Palestine, Iraq, and Iran (Hausmann, 2001; Hausmann, 2009; Dardona *et al*., 2015). In the Canary Islands, it is present in Tenerife, Fuerteventura, and La Palma (Garcia *et al*., 2016).

The limited number of specimens in our sample calls for the implementation of an *ad-hoc* monitoring programme to investigate the role of specific habitats in relation to the presence of these species and to assess their population size within the Mesima River estuary. Additionally, despite the similarity between the monitoring sites, these Lepidoptera were only detected in one of three traps, suggesting that further studies are needed to assess whether this pattern reflects micro-environmental preferences, species behaviour, or an uneven distribution of these moths.

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