Volume 1, Part 2 October 2025 ISSN 3051-6781

ARTIMELIA

LEPIDOPTERA IBÉRICA

Biannual Scientific Journal dedicated to research and scientific studies on the Lepidoptera of the Iberian Peninsula.



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Lepidoptera Ibérica

Volume 1, Part 2, October 2025
ISSN 3051-6781

Biannual scientific journal dedicated to research and scientific studies on the Lepidoptera of the Iberian Peninsula.

Published on-line by Rede de Estações de Borboletas Noturnas.

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Front page photo: *Trisateles emortualis* (Denis & Schiffermüller, 1775), Castro Laboreiro, Rio Laboreiro, 2.vii.2025 (© A. Valadares).

Contents

Editorial 77

Valadares, A. e Cardoso, H. Primeiros registos de *Idaea trigeminata* (Haworth, 1809) e *Trisateles emortualis* (Denis & Schiffermüller, 1775) para Portugal e outros registos notáveis de Lepidópteros noturnos em Montalegre e Castro Laboreiro 78

Nunes, J. *Earias roseifera Butler*, 1881 (Nolidae: Chloephorinae), a new adventive species in mainland Portugal 85

Corley, M. Preliminary studies on the genus *Apatema* Walsingham, 1900 (Autostichidae) in Portugal 88

Cardoso, H. First confirmed record of *Niphonympha dealbatella* (Zeller, 1847) (Lepidoptera: Yponomeutidae) in Portugal: a new genus and species for the national fauna 98

Corley, M., Nunes, J. and Yela, J. The status of some Arctiinae (Erebidae) in Portugal 102

Corley, M. How it all started. My first visit to Portugal in March 1989..... 114

Book Review. Pyraloidea de la España Peninsular e Islas Baleares. Tx. Revilla. 2025..... 119

Guidance for authors 121

Editorial

The articles in this issue of *Artimelia* add new species to the Portuguese Lepidoptera list: two from the northernmost parts of the country, one new micro from the east, and another originally from Japan. It also includes a partial revision of the genus *Apatema* and a review of the status of some Arctiinae species, resulting in the addition of one species and one subspecies and the removal of another from the Portuguese list.

This issue also contains a book review and a personal account of a first entomological visit to Portugal in 1989. Personal recollections of this kind, as well as short notes and observations, are welcome in future issues.

Following the publication of the first issue in April, *Artimelia* now maintains its six-monthly schedule, continuing its aim to provide an open platform for the dissemination of studies on the moths of the Iberian Peninsula. As mentioned in the first editorial, the online-only format allows flexibility and free access while maintaining a commitment to editorial quality and regular publication.

This issue focuses entirely on Portuguese moths, but we would be very pleased to receive contributions from Spain.

Primeiros registos de *Idaea trigeminata* (Haworth, 1809) e *Trisateles emortualis* (Denis & Schiffermüller, 1775) para Portugal e outros registos notáveis de Lepidópteros noturnos em Montalegre e Castro Laboreiro

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Resumo

Entre 29 de junho e 5 de julho de 2025, foram realizadas várias observações de Lepidoptera noturnos em Montalegre e Castro Laboreiro, no norte de Portugal, utilizando uma armadilha luminosa do tipo Skinner equipada com uma lâmpada mista de 160 W. Os registos obtidos incluem as primeiras ocorrências confirmadas em território português de *Idaea trigeminata* (Haworth, 1809) e *Trisateles emortualis* (Denis & Schiffermüller, 1775). Outras contribuições relevantes dizem respeito à ampliação da área de distribuição de *Electrophaes corylata*, *Brachylomia viminalis* e *Apamea crenata*. Estes resultados evidenciam a importância de observações ocasionais em áreas de elevado valor ecológico no norte de Portugal, contribuindo para o aprofundamento do conhecimento sobre a distribuição dos Lepidoptera noturnos na Península Ibérica.
Palavras chave: Lepidoptera, primeiros registos, Montalegre, Castro Labreiro, Portugal.

Abstract

Between 29 June and 5 July 2025, several nocturnal Lepidoptera surveys were carried out in Montalegre and Castro Laboreiro (northern Portugal), using a Skinner light trap fitted with a 160 W blended bulb. Records obtained include the first confirmed Portuguese records of *Idaea trigeminata* (Haworth, 1809) and *Trisateles emortualis* (Denis & Schiffermüller, 1775). Additional noteworthy findings include range extensions of *Electrophaes corylata*, *Brachylomia viminalis* and *Apamea crenata*. These results highlight the importance of opportunistic surveys in ecologically valuable areas of northern Portugal for improving knowledge of Iberian nocturnal Lepidoptera distribution.
Key words: Lepidoptera, first records, Montalegre, Castro Labreiro, Portugal.

Introdução

O conhecimento sobre os Lepidópteros noturnos em Portugal tem-se expandido significativamente nas últimas décadas, mas muitos táxons continuam pouco documentados, e os dados sobre a sua distribuição permanecem incompletos. Levantamentos pontuais com armadilhas de luz, especialmente em áreas montanhosas do norte, têm revelado frequentemente novos registos nacionais e importantes ampliações da distribuição de espécies conhecidas.

As regiões de Montalegre e Castro Laboreiro são pouco amostradas e caracterizam-se por habitats montanhosos de elevada qualidade ecológica, incluindo vales húmidos com vegetação ripícola diversificada e mosaicos de matos e bosques. Estas condições tornam-nas áreas privilegiadas para a detecção de Lepidópteros raros ou pouco documentados em Portugal.

Neste trabalho apresentamos os resultados de um levantamento de curta duração realizado por A. Valadares nestas regiões, que permitiu registar pela primeira vez em Portugal duas espécies e fornecer novos dados sobre táxons raramente observados.

Material e Métodos

Período de amostragem

O trabalho de campo decorreu entre 29 de junho e 5 de julho de 2025.

Método de amostragem

Foi utilizada uma armadilha do tipo Skinner equipada com lâmpada mista de 160 W em todos os locais. A armadilha esteve em funcionamento desde o anoitecer até ao amanhecer.

Localidades

Montalegre (Trás-os-Montes: TM), Travessa de Brião, Ribeira de Santa Ana, (41.76862 N, 7.80439 W, 891 m). Habitat ripícola na região do Barroso, caracterizado por *Betula pubescens* Ehrh., *Salix atrocinerea* Brot. e *Fraxinus angustifolia* Vahl.

Castro Laboreiro (Minho: M), Lugar da Vila, Rio Laboreiro, (42.03505 N, 8.15674 W, 939 m). Inserido no Parque Nacional da Peneda-Gerês, numa paisagem de matos de urze, lameiros e bosques ribeirinhos dominados por *Quercus pyrenaica* Willd., *Betula pubescens* Ehrh. e *Salix atrocinerea* Brot. (Figuras 1–3).

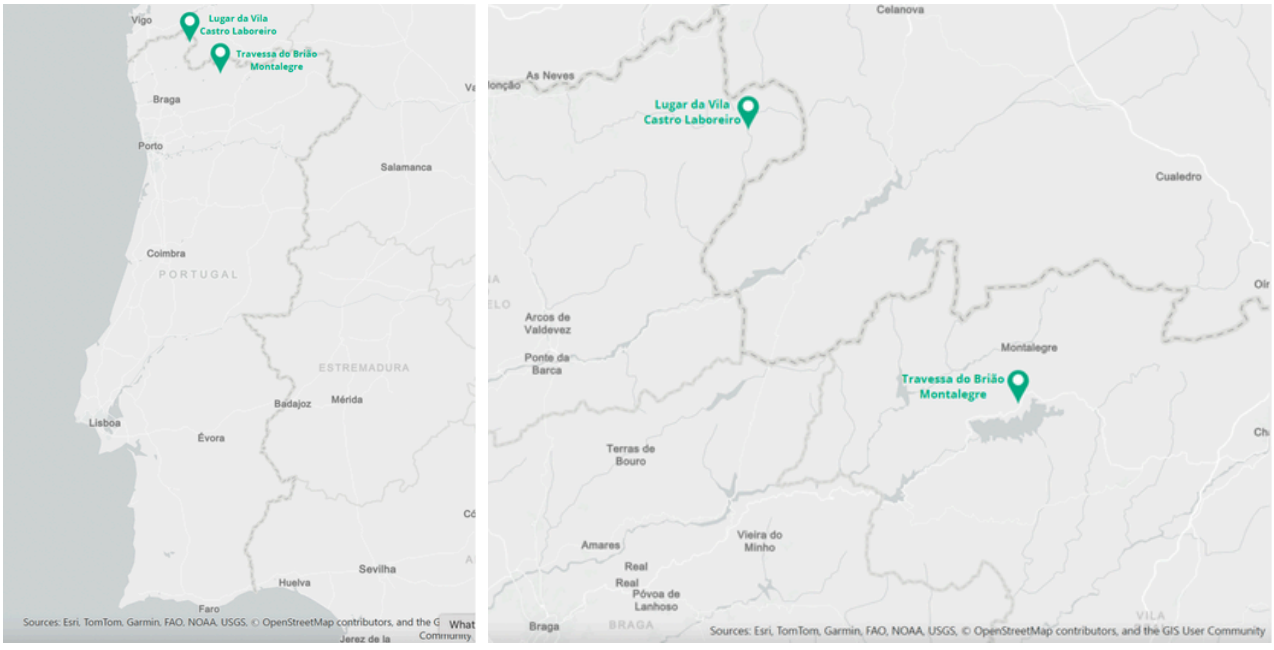


Figura 1. Localização dos pontos de amostragem em Castro Laboreiro e Montalegre, representados no mapa do país (à esquerda) e ampliados na região norte (à direita), evidenciando os locais específicos de estudo.



Figura 2. Ribeira de Santa Ana, Montalegre (foto © Ana Valadares).



Figura 3. Rio Laboreiro, Castro Laboreiro (foto © Ana Valadares).

Resultados

Electrophaes corylata (Thunberg, 1792) (Geometridae)

TM: Montalegre, Ribeira de Santa Ana, 3 ex., 29.vi.2025, A. Valadares.

Terceiro registo para Portugal e primeiro para Trás-os-Montes. Os dois primeiros registos foram em Laceiras (Minho), a 13.vi.2011 e 30.v.2012 T. Merckx (Corley et al., 2013). Espécie amplamente distribuída na Europa setentrional e central, alcançando o sul até Espanha, embora rara na Península Ibérica.

Hydrelia flammeolaria (Hufnagel, 1767) (Geometridae)

M: Castro Laboreiro, Rio Laboreiro, 2 ex., 3.vii.2025, A. Valadares.

Constitui o segundo registo conhecido para o Minho e um dos poucos para Portugal.

O primeiro registo foi também no Minho, em 2014 (Corley et al., 2016), existindo ainda dois registos em Vinhais (Trás-os-Montes), a 23.vi.2016, F. Barros & TAGIS.

Distribui-se do oeste e centro da Europa até à Rússia, geralmente associada a habitats húmidos.

Idaea trigeminata (Haworth, 1809) (Geometridae) - Fig. 4

TM: Montalegre, Ribeira de Santa Ana, 1 ex., 29.vi.2025, A. Valadares.

Primeiro registo para Portugal.

Espécie conhecida da Europa ocidental e central, estendendo-se até ao sul da Escandinávia; penetra no sul da Europa, norte de Espanha, mas não era até agora conhecida em Portugal. Larva polífaga, referida na literatura a alimentar-se de *Betula* spp. (Betulaceae), *Acer campestre* L. (Aceraceae), *Taraxacum officinale* F.H. Wigg. (Asteraceae), *Polygonum aviculare* L. (Polygonaceae) e *Hedera helix* L. (Araliaceae), (Hausmann, 2004).



Figura 4. *Idaea trigeminata* (Haworth, 1809), Trás-os-Montes, Montalegre, 29.vi.2025, Ana Valadares.

Ochropacha duplaris (Linnaeus, 1761) (Drepanidae)

M: Castro Laboreiro, Rio Laboreiro, 3 ex., 3.vii.2025, A. Valadares.

Segundo registo para Portugal. O primeiro registo ocorreu no mesmo local a 9.vii.2019, A. Valadares (Corley et al., 2021).

Espécie de ampla distribuição euro-siberiana, presente em grande parte da Europa temperada.

Apamea crenata (Hufnagel, 1766) (Noctuidae)

M: Castro Laboreiro, Rio Laboreiro, 1 ex., 3.vii.2025, A. Valadares.

Terceiro registo para Portugal continental. O primeiro foi em Trás-os-Montes, a 22.v.2011, E. Marabuto & P. Pires, (Corley et al., 2011) e o segundo no Minho, a 17.vi.2012 (Corley et al., 2013).

Espécie amplamente distribuída na Europa, mas escassa e localizada na Península Ibérica.

Brachylomia viminalis (Fabricius, 1777) (Noctuidae)

TM: Montalegre, Ribeira de Santa Ana, 2 ex., 29.vi.2025, A. Valadares. O primeiro registo para Portugal ocorreu no Minho a 21.vii.2011 (T. Merckx), seguido pelo segundo em Trás-os-Montes, Lama Grande, a 31.vii.2011 (M. Corley), (Corley et al., 2012). Outros registos subsequentes são conhecidos para Castro Laboreiro, sendo que o registo aqui apresentado contribui para completar a distribuição, até agora restrita ao extremo norte do país. Distribui-se pela maior parte da Europa, chegando até ao norte de Espanha; rara e localizada em Portugal.

Trisateles emortualis (Denis & Schiffermüller, 1775) (Erebidae) - Fig. 5

M: Castro Laboreiro, Rio Laboreiro, 1 ex., 2.vii.2025, A. Valadares.

Primeiro registo para Portugal.

Espécie amplamente distribuída na Europa e geralmente pouco frequente, associada a habitats florestais húmidos, com uma distribuição contínua no norte de Espanha, desde Girona até à Galiza. A lagarta alimenta-se de folhas em degradação de espécies de Fagaceae, incluíndo *Quercus* spp. e *Fagus* spp. (Leraut, 2019).

O exemplar citado encontra-se na coleção de João Nunes (código JN0872).



Figura 5. *Trisateles emortualis* (Denis & Schiffermüller, 1775), Minho, Castro Laboreiro, 2.vii.2025, Ana Valadares.

Discussão

Os resultados obtidos destacam a importância dos habitats montanhosos do norte de Portugal para a diversidade de Lepidópteros noturnos. As primeiras citações para Portugal de *Idaea trigeminata* (Haworth, 1809) e *Trisateles emortualis* (Denis & Schiffermüller, 1775) acrescentam novos elementos à fauna nacional, salientando o valor de levantamentos pontuais em regiões pouco amostradas.

Os registos adicionais de *Electrophaes corylata*, *Brachylomia viminalis* e *Apamea crenata* constituem ampliações significativas da sua distribuição conhecida em Portugal. A escassez de *Apamea crenata* torna cada registo relevante para a compreensão da sua distribuição no território continental.

A confirmação de *Hydrelia flammeolaria* em Castro Laboreiro, associada ao registo independente em Vinhais (Barros, 2016), sugere que esta espécie pode ter uma distribuição mais ampla no norte do país, embora ainda restrita localmente.

Estes resultados evidenciam a relevância ecológica das áreas amostradas e reforçam a necessidade de monitorizações regulares e complementares a levantamentos sistemáticos para o conhecimento da fauna de Lepidópteros nocturnos em Portugal.

Conclusão

As sessões de amostragem de curta duração em Montalegre e Castro Laboreiro permitiram registar duas espécies novas para a fauna portuguesa, *Idaea trigeminata* (Haworth, 1809) e *Trisateles emortualis* (Denis & Schiffermüller, 1775), e importantes ampliações de distribuição de vários táxons raros. Levantamentos pontuais com armadilhas de luz em habitats de elevado valor ecológico constituem um complemento essencial às monitorizações sistemáticas, contribuindo significativamente para a documentação da diversidade de Lepidópteros noturnos em Portugal.

Agradecimentos

Agradecemos a Francisco Barros pela partilha dos registos de *Hydrelia flammeolaria*, e a Martin Corley pela disponibilização de informação que contribuiu para este trabalho.

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Earias roseifera Butler, 1881 (Nolidae: Chloephorinae), a new adventive species in mainland Portugal

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Abstract

Following the first report of *Earias roseifera* Butler, 1881 on the Iberian Peninsula in 2024, in Galicia, Spain, the first confirmed records of *Earias roseifera* Butler, 1881 in Portugal were obtained in 2025, in Minho and Douro Litoral, in the northern part of the country.
Key-words: Lepidoptera, Iberian Peninsula, Exotic, Rhododendron.

Resumo

Após o primeiro registo de *Earias roseifera* Butler, 1881 na Península Ibérica em 2024, na Galiza, Espanha, os primeiros registos confirmados de *Earias roseifera* Butler, 1881 em Portugal foram obtidos em 2025, no Minho e Douro Litoral, no norte do país.
Palavras-chave: Lepidoptera, Península Ibérica, Exótico, Rhododendron.

Introduction

Earias roseifera Butler, 1881 was first recorded for Europe in 2018, based on specimens recorded in Switzerland and Italy (Rezbanyai-Reser & Thiebaud, 2018; Taddei et al., 2019). Further records from Switzerland from 2021 and 2022 were reported in Bryner & Kopp (2023). In 2024, it was first reported for the Iberian Peninsula based on specimens recorded in Pontevedra, Galicia, Spain in Martínez-Fernández et al. (2024). This species was described from material from Tokyo and until recently it was found only in East Asia. The larvae of *E. roseifera* feed on flower and leaf buds of Rhododendron species causing a reduction and, in some cases, the complete loss of flowers (Taddei et al., 2019). This note reports the first confirmed records from Portugal.

Results and Discussion

Examined material:

São Vicente de Penso, Carcavelos, Braga, Minho, 41.49232N 8.4378W, 29TNF4793, 195 m, 1 ex. 10.iv.2025 (Fig. 1), 1 ex. 18.v.2025 and 1 ex. 23.v.2025, Pedro Gomes, attracted to light, all deposited in the personal collection of João Nunes.

Additional records:

Cambeses, Barcelos, Minho, 41.49032N 8.53079W, 29TNF3993, 139 m, 1 ex. 8.viii.2024, Alda Senra and José Grosso-Silva, attracted to light (iNaturalist – 234593013 and 234597496); Barroselas, Viana do Castelo, Minho, 41.64788N 8.68889W, 29T NG2510, 66 m, 2 ex. 6.iv.2025, Pedro Correia, resting by daylight on *Lavandula* sp. (iNaturalist – 268829416); São Vicente de

Penso, Carcavelos, Braga, Minho, 41.49232N 8.4378W, 29T NF4793, 195 m, 1 ex. 27.iv.2025 and 1 ex. 23.vi.2025, Pedro Gomes, attracted to light; Aldoar, Porto, Douro Litoral, 41.17103N 8.66671W, 29TNF2757, 50 m, 1 ex. 10.viii.2025, João Lima, attracted to light.

The potentially first record of *E. roseifera* in Portugal, from Barcelos in August 2024, is based on a specimen lacking the characteristic pink patch in the centre of the forewings, a known form of this species, as illustrated in Taddei et al. (2019), but which can be confused with forms of other *Earias* species. Since the specimen was not retained, the identification could not be confirmed. As a result, the publication of this species as new to the Portuguese checklist was postponed until additional records – ideally with retained specimens - were obtained. In April 2025, a new observation of well-marked individuals was made in Viana do Castelo. A few days later, additional specimens were collected in Braga, attracted to light in a moth monitoring site under the Portuguese Moth Recording Scheme - Rede de Estações de Borboletas Noturnas (REBN). Further records soon followed from the same locality and from another REBN monitoring site further south, in Porto. The available records indicate bivoltinism, a characteristic reported from its native range (Kishida, 2011).

With the new adventive species, four species of genus *Earias* Hübner, 1825 are now known from Portugal: *Earias clorana* (Linnaeus, 1761), *Earias albovenosana* Oberthür, 1917, *Earias insulana* (Boisduval, 1833) and *Earias roseifera* Butler, 1881. Of the species occurring in Spain, only *Earias vernana* (Fabricius, 1787) is not recorded for Portugal, as it presents a north-eastern distribution in the Iberian Peninsula (Triviño et al., 2010).



Fig. 1. *Earias roseifera* Butler, 1881, São Vicente de Penso, Carcavelos, Braga, Minho, 10.iv.2025, Pedro Gomes.

Acknowledgments

The author is grateful to Alda Senra, João Lima, Pedro Correia, José Grosso-Silva and Pedro Gomes for sharing record details, and to the latter two for also providing comments on the manuscript.

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Preliminary studies on the genus *Apatema* Walsingham, 1900 (Autostichidae) in Portugal

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Abstract

The genus *Apatema* Walsingham, 1900 has been inadequately studied in Portugal. In addition to *A. mediopallidum* Walsingham, 1900, two other species, *A. proteroclina* (Meyrick, 1938) and *A. albifasciella* Nel, Huemer & Varenne, 2024 are present. Previously published records of *A. parodia* Gozmány, 1988 and *A. apolausticum* Gozmány, 1996 are considered to be misidentifications.
Key Words: Partial revision, *Apatema*, Portugal.

Resumo

O género *Apatema* Walsingham, 1900 tem sido pouco estudado em Portugal. Para além de *A. mediopallidum* Walsingham, 1900, estão presentes outras duas espécies: *A. proteroclina* (Meyrick, 1938) e *A. albifasciella* Nel, Huemer & Varenne, 2024. Os registos anteriormente publicados de *A. parodia* Gozmány, 1988 e *A. apolausticum* Gozmány, 1996 são atualmente considerados erros de identificação.
Palavras-chave: Revisão parcial, *Apatema*, Portugal.

Introduction

Apatema Walsingham, 1900 is a genus of microlepidoptera in family Autostichidae. The moths are essentially blackish with off white markings and a wingspan between 8 and 13 mm. In habitus they are very similar to *Oegoconia* Stainton, 1854, although usually smaller, but they show important differences in wing venation and other microscopic features (Gozmány, 2008: 52). They are distributed in warmer parts of the West Palaearctic region. Gozmány & Riedl (1996) listed just three species in Europe. Several new species were described in the following years. Gozmány (2008) included seven European species (two of these from Cyprus) and three species from the Canary Islands. Falck et al. (2021) found the genus to be species-rich in the Canary Islands, recognising 19 species. Larvae are almost unknown, but it is probable that like *Oegoconia* larvae they feed on plant detritus. Falck reared *A. lapalmae* Falk & Karsholt, 2021 from dead wood overgrown with fungi (Falck et al., 2021).

In Corley (2015) two species of *Apatema* Walsingham, 1900 were recognised as present in continental Portugal: *A. mediopallidum* Walsingham, 1900, recorded from 10 of the 11 Portuguese provinces and *A. parodia* (Gozmány, 1988) from Algarve and Trás-os-Montes. The 11th province (Ribatejo) was added for *A. mediopallidum* in Rosete et al. (2019). A third species, *A. apolausticum* Gozmány, 1996 was added from Algarve in Corley et al. (2020).

It was however already known to the author before 2015 that this treatment was unsatisfactory because external characters (head colour, thorax colour, wing markings) indicated additional species. The problem was that the treatment of *A. mediopallidum* in Gozmány's (2008) monograph on the family Symmocidae (now part of Autostichidae) was inadequate. In that work

(plate 4: fig. 8) figures of male genitalia of this species showed four clearly different examples of the aedeagus, all supposedly belonging to the same species. These figures were taken from two specimens from Morocco and one each from Croatia and Sardinia. Furthermore the colour paintings of moths (plates 114 fig. 8 and 115, figs 8a and 8b) show at least two different species under the name *mediopallidum*, probably none of them being true *mediopallidum*. These were from Spain (Almeria), Sardinia and Greece. Synonyms of *A. mediopallidum* listed by Gozmány (2008) include *Apatema bifasciatum* Chrétien, 1922 from Morocco, *Oegoconia phanerodoxa* Meyrick, 1926 from Cuenca, Spain and *O. proteroclina* Meyrick, 1938 from Lozère, France. As none of the figured aedeagi were from Corsica, the type locality of *A. mediopallidum*, it was not possible to establish which, if any, of the four figures represented the true *A. mediopallidum*.

Falck et al. (2021) in their work on *Apatema* in the Canary Islands figured male genitalia of the holotype of *A. mediopallidum*, thus providing a starting point for the unravelling of this taxonomic tangle.

Nel et al. (2024) distinguished the *Apatema* species of France and northern Italy. This has provided additional information enabling recognition of further species in the Portuguese *Apatema* fauna.

As almost all earlier Portuguese records were assigned to *A. mediopallidum*, all such records must be validated, or if this is not possible they should be disregarded. Only new and re-examined specimens can provide acceptable records. There are three species which can safely be accepted as Portuguese. The remaining taxa remain unconfirmed. In addition there are species which require further research, therefore a full revision of all Portuguese *Apatema* is not yet possible and must be delayed until such time as sufficient material has accumulated to allow clear understanding of the remaining taxa. This paper is therefore not a full revision but brings up to date what is known about the genus in Portugal.

Methods

This investigation mainly relies on examination of genitalia and external features, particularly forewing markings. Some information has also been obtained by DNA barcoding and also from the results of DNA metabarcoding.

Evaluation of characters and techniques

In the male genitalia, the majority of *Apatema* species are remarkably similar in most characters. Only the aedeagus, particularly the group of small cornuti, and the shape of the saccus provide useful distinguishing characters in most species, although the shape of the valva is occasionally important. Nel et al. (2024) also used the shape of the uncus as a distinguishing character. It is not used here because differences are small, there is variation within some species and in most genitalia preparations the uncus is seen laterally.

Separation of species based on female genitalia is difficult: characters of the ductus bursae are potentially useful but this is subject to variation within species. The signum might be expected to provide good characters, but also shows much variation within species. For these reasons identification of females is for the most part too uncertain for records to be reliable.

Rather few Portuguese *Apatema* have been DNA barcoded. Theoretically DNA barcodes should provide clear distinctions between species, but this fails if misidentified material has been included, in which case safe identification by DNA barcode is lost. This appears to have happened in some cases within *Apatema*.

DNA metabarcoding allows the identification of species from traces of DNA collected by indirect means, using DNA barcodes even when the relevant DNA has been partially fragmented. It has multiple applications. In the context of Portuguese *Apatema*, species were identified from bat droppings and to a greater extent from bulk sampling of material collected from light traps as described by Mata et al. (2021), but those results are now unconfirmed due to the problem of misidentified records in databases.

Accepted species

***Apatema mediopallidum* Walsingham, 1900**

Brief description (figs 1, 4): Wingspan 8–12 mm. Face whitish-buff, vertex blackish Thorax blackish, often partly whitish. Forewing blackish to dark grey-brown with irregularly shaped yellowish white median fascia containing a black dot adjacent to or touching outer edge of fascia, additional irregular whitish markings in basal part of wing and two spots at three-quarters wing length, all the white areas variable in shape and extent, frequently partly dusted with blackish scales.

Male genitalia (fig. 5): Saccus longer than wide, slightly tapering to rounded apex. Aedeagus with small cornuti very numerous in a long narrow band.

Female genitalia: Ductus bursae parallel-sided towards corpus bursae; base of ductus seminalis sclerotised.

Confirmed Portuguese records: **Algarve**, Loulé, Fonte de Apra, 20.x.1990, M. Corley, GP 54 male; Loulé, Boliqueime, 20.v.2009, M. Dale, GP MD01185 male; **Alto Alentejo**, Évora, Herdade da Mitra, 14.ix.2024, J. Rosete, GP JR842 male; **Estremadura**, Almada, Trafaria, 8.viii.2025, J. Fabião, GP 101-4627m; **Beira Litoral**, Condeixa-a-Nova, Casmilo, 8.ix.2006, M. Corley; Pombal, Louriçal, 11.vii.2014, J. Rosete, Corley GP4313 male; Penela, Castelo de Germanelo, 4.viii.2022, J. Rosete, GP JR345 male.

Thorax and forewing markings very variable, but the black discal dot in the median fascia appears to be a constant feature, although sometimes touching outer margin of fascia.

DNA barcoded *A. mediopallidum* is placed in BIN BOLD:AAV4815, but this BIN also includes misidentified *A. baixerasi* Vives, 2001.

The species occurs in Spain, France including Corsica, and Italy. Current evidence suggests that it can be safely identified by the dark head and thorax and the central fascia with a black dot on or near its outer margin. Such specimens are very common in Algarve. In the female genitalia the base of the ductus seminalis is sclerotised. According to Nel et al. (2024) this character is shared by *A. confusella* Nel, Huemer & Varenne, 2024, only known from the south of France and *A. apolausticum* Gozmány, 1996, now considered not to be present in Portugal, see below. While it might appear to be safe to identify females showing this character as *A. mediopallidum* there are at least two other species present in Portugal with females not known.

***Apatema albifasciella* Nel, Huemer & Varenne, 2024**

Brief description (figs 2, 4): Wingspan 12–12.5 mm. Head with frons pale cream, vertex white, collar blackish. Thorax white, narrowly edged blackish anteriorly. Forewing white with blackish markings: a basal fascia, a pair of large spots, sometimes joined, at two-fifths, the dorsal beyond the costal, an irregularly shaped broad fascia at three-fifths, sometimes interrupted in middle, whole of terminal area; fringes light grey.

Male genitalia (fig. 6): Saccus an equilateral triangle with rounded apex; aedeagus with small cornuti rather few, up to about 20, forming an oval or elliptic group.

Female apparently unknown (Nel et al., 2024).

Algarve, Olhão, Serra de Monte Figo, 19.v.2002, M. Corley, GP 1715 male. Two specimens in Corley collection. This record was published as *A. apolausticum* in Corley et al. (2020).

DNA barcoded *A. albifasciella* is placed in BIN BOLD:AAV7598 (Nel et al., 2024).

According to Nel et al. (2024) the species occurs in France, Spain and Italy. The location of the only Portuguese record is a steep south-facing limestone slope.

The habitus of *albifasciella* is quite different from other *Apatema* species with nearly 50% of the forewing white. Male genitalia similar to *A. apolausticum*, but saccus broader. This specimen was recorded as *apolausticum* in Corley et al. (2020) based on the aedeagus characters. At the time *albifasciella* was still undescribed.

***Apatema proteroclina* (Meyrick, 1939)**

Brief description (figs 3, 4): Wingspan 8–13 mm. Head with frons whitish, vertex blackish. Thorax whitish posteriorly. Forewings blackish with whitish markings: a small spot near base, a fascia in middle, not always reaching dorsum and a pair of small marks at three-quarters, the costal larger than the dorsal.

Male genitalia (fig. 7): Saccus from broad base abruptly narrowed to almost parallel-sided apical half. Aedeagus with about 40 small cornuti (larger than in *mediopallidum*) forming an oval patch.

Female genitalia: Ductus bursae expanding towards corpus bursae; base of ductus seminalis not sclerotised. Signum usually with one or more teeth on plate, in addition to those on margins.

Portuguese records from **Estremadura**, Almada, Trafaria, 26.vii.2025, J. Fabião, GP 101-4358m; Marinha Grande, Praia do Samouco, 16.vii.2021, J. Rosete, GP JR165 male; **Beira Litoral**, Pombal, Carriço, Lagoa de São José, 13.vii.2024, J. Rosete, GP JR789 male; **Beira Alta**, Castro Daire, Picão, 1.viii.2020, J. Nunes, Corley GP 6004 male; Praia fluvial de São Roque, Castelo Bom, 16.vii.2023, Rosete GP JR592; **Douro Litoral**, Santo Tirso, Monte Córdova, Valinhas, 28.vii.2006, M. Corley, GP 2600 male; **Minho**, Melgaço, Castro Laboreiro, Podre, 26.vii.2011, M. Corley, GP 3617 male; **Trás-os-Montes**, Alijó, Rio Tinhela, Alto do Coro do Carlão, 13.vii.2023, M. Corley, GP 6117 male. This list of records is incomplete as there are many records from Beira Litoral and Douro Litoral.

The species occurs in Spain, France including Corsica, Italy including Sardinia, Malta (Nel et al., 2024).

DNA barcoded *A. proteroclina* is placed in BIN BOLD:AAP6345.

Apatema proteroclina is clearly distinct in habitus from *A. mediopallidum* and *A. albifasciella* but it is probably not so clearly distinct from the unresolved taxa discussed below.

Excluded species

Based on current knowledge, the two following species have been recorded erroneously from Portugal and must be removed from the Portuguese list. The third species has been mistakenly recorded from Portugal by means of DNA barcodes, but never overtly published.

Apatema apolausticum Gozmány, 1996

The species occurs in France, Italy, Austria, Slovakia and Greece. (Nel et al., 2024). The Algarve record, published as new for the Iberian Peninsula in Corley et al. (2020) has proved to be *A. albifasciella*, see below.

DNA metabarcoding results from bulk sampling of moths collected with light traps in the Tua valley, Trás-os-Montes (Mata et al., 2021), produced records believed to belong to *A. apolausticum* from Trás-os-Montes. In BOLD *apolausticum* is included in BIN BOLD:AAP6345 together with *proteroclina*, while BIN BOLD:ABW5923 also contains *apolausticum*. At that time *proteroclina* was entirely overlooked, presumably because of the synonymy provided by Gozmány (2008). It is clear from Nel et al. (2024) that *apolausticum* does not belong in the same BIN as *proteroclina*.

Apatema parodia (Gozmány, 1988)

Gozmány (1988) described this species from Morocco (type locality) and Spain. He assured me (pers. comm.) that it belonged in *Oegoconia*, which does have a number of differences from *Apatema*, most notably in the wing venation. He gives a wingspan of 15 mm, significantly larger than any Portuguese *Apatema* specimens. Later Sutter (2007) transferred it to *Apatema*. Males are unknown. It was included in the Portuguese list (Corley, 2015) based on records from Algarve and Trás-os-Montes. In Annotation 15 it was suggested that it might be parthenogenetic or perhaps the female of some species for which only males were known.

The characteristic oblique fold of the ductus bursae occasionally occurs to some extent in some other *Apatemas*. I am increasingly sceptical about the status of this species and suspect that it is a variation that appears from time to time in various species, possibly even a preparation artifact. This would explain the absence of males. However, one Algarve specimen has been DNA barcoded (Ludo, 6.v.1995, M. Corley. GP1504 female). It is placed in BOLD BIN AAU3743 with three unnamed specimens from Spain with 2.3% divergence. Until there is greater clarity, *A. parodia* should not be considered to be part of the Portuguese fauna. This idea does not affect Gozmány's original *Oegoconia parodia*, which would merit further investigation, although that was also described from females only.

Apatema baixerasi Vives, 2001

Brief description based on Vives (2001): head whitish yellow. Thorax blackish. Forewing with irregularly shaped yellowish white median fascia containing a black dot on outer margin, another whitish yellow fascia at three-quarters.

Male genitalia distinguished by valva with a protrusion towards middle of costal margin, and with ventral margin curving round at apex meeting costal margin in a point. Saccus triangular, longer than wide. Aedeagus rather short, with a field of about 40 small cornuti.

Female genitalia: from original drawing ductus slightly expanding towards corpus bursae but without obvious distinguishing features. The description mentions little tooth-like structures on corpus bursae and adjacent part of ductus.

Elsewhere recorded from Spain (Valencia). Nel et al. (2024) mention records from Corsica and Malta based solely on DNA barcodes, but they refer these to *A. mediopallidum*. In their view the species is endemic to Spain.

Although this species has been identified as present in Portugal by DNA barcode, it has not been published as present in Portugal. Putative records from Portugal include one barcoded specimen (INV07682) from **Algarve**, Aljezur, Carrapateira, 8.x.2018, M. Corley, GP 5906 female, now considered to belong to *A. mediopallidum*, and four collected in Lisbon by Malaise trap. The samples from the Malaise traps were sent to the Canadian Barcoding Centre, University of Guelph, Canada, where these four specimens were determined by barcode as *A. baixerasi*. These have now been reclassified as *Apatema* sp.

The BOLD DNA barcode BIN BOLD:AAV4815 includes specimens named as both *baixerasi* and *mediopallidum*. While this could be a case of genuine barcode-sharing, it is more probably a case of one or other species being misidentified. Here it is worth mentioning that forewing markings of these two species are similar but they differ in head colour.

This species cannot be accepted as present in Portugal on present evidence. Male genitalia of this species are very distinctive, therefore males are required for positive identification.

Unresolved taxa

There are undoubtedly more *Apatema* species present in Portugal, that do not have the characters of any of the three accepted species above. At present we are still lacking sufficient information to be able to name these with certainty, indeed it is quite possible that they are undescribed.

They include a male and female from Algarve with very reduced white forewing markings. This might possibly be *A. phanerodoxa* (Meyrick, 1926) which was described from Cuenca, Spain, but there are small differences in male genitalia and habitus from that species that may or may not be significant. A single DNA barcoded female from north-east Portugal has DNA barcode 6.5% divergent from other available DNA barcodes in the genus, but this could possibly also be *A. phanerodoxa* for which no barcode is available. This DNA barcode has also appeared in metabarcoding results from the north-east of the country (Vanessa Mata, pers. comm.) and from Spain (Jan Šumpich, pers. comm.).

In Beira Litoral three males have been found with genitalia close to *A. acutivalva* Gozmány, 2008, known only from Cyprus. It would seem improbable that these are *acutivalva*, but that should be resolved when the Portuguese material has been DNA barcoded.

Remarks

Gozmány's (2008) monograph on Symmocidae (now Autostichidae, Symmocinae) is the standard work on this group. Since its publication few new species have been added to the fauna of mainland Europe, but there are many additions of *Apatema* species from the Canary Islands

(Falck et al., 2021). However, his treatment of *Apatema* is very unsatisfactory. It is extraordinary that he illustrated four clearly different aedeagi for *A. mediopallidum*, at the same time listing four synonyms of *mediopallidum*, yet apparently did not investigate the possibility that some of the synonyms might represent good species.

Conclusions

This preliminary study of Portuguese *Apatema* brings some clarity to knowledge of the genus but still leaves much confusion. Since there are still unanswered questions a full understanding of the genus will require good specimens from many localities from which DNA barcodes and genitalia preparations should be obtained.

Acknowledgements

Without the work by Jacques Nel, Peter Huemer and Thierry Varenne, this preliminary study of Portuguese *Apatema* would not have been possible. Vanessa Mata and Sónia Ferreira have provided essential information on DNA barcoding and DNA metabarcoding results from Portugal; Mike Dale, Jorge Rosete, João Nunes, José Fabião and Helder Cardoso have sent me photos of their *Apatema* genitalia preparations. Mike Dale also provided enhanced photographs of my preparations of genitalia. Jan Šumpich kindly shared information on *Apatema* in Spain. I thank all these friends for their assistance.

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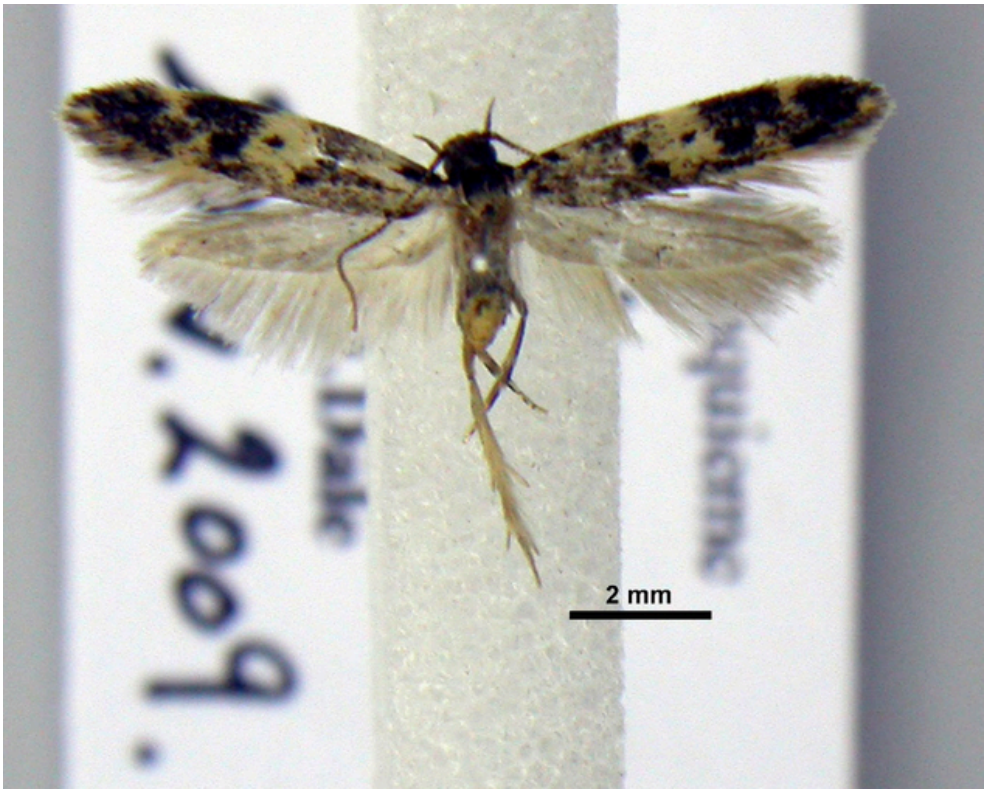


Fig. 1. *Apatema mediopallidum* (Walsingham, 1901). Algarve, Boliqueime, 20.v.2009, M. Dale.

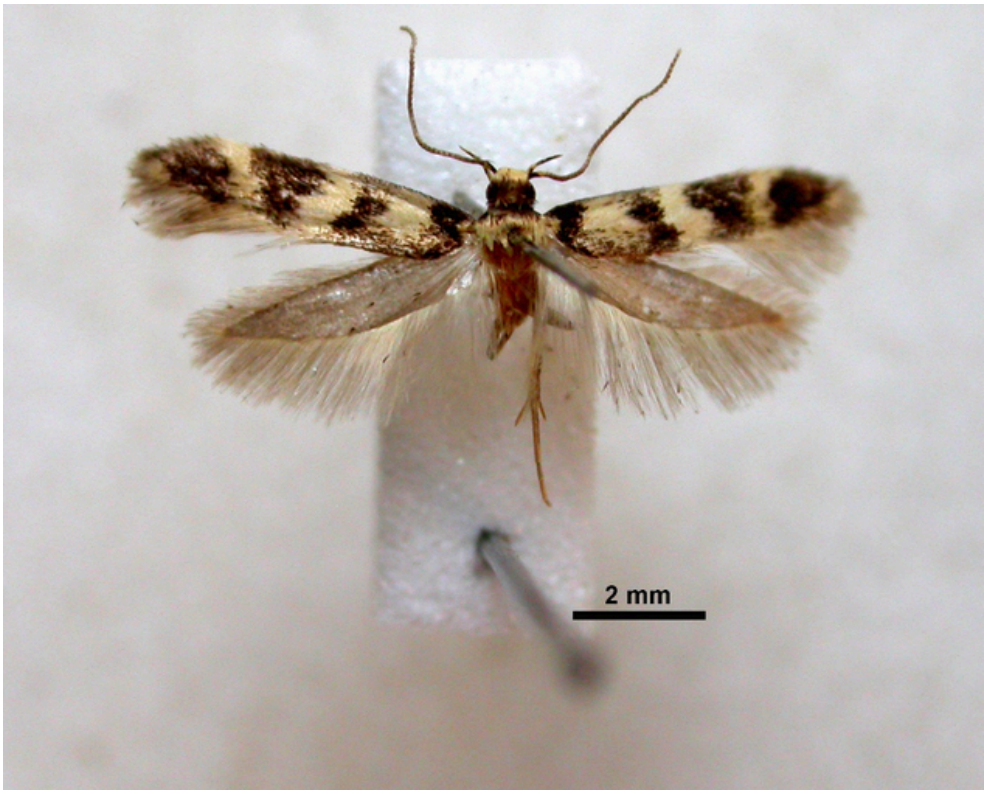


Fig. 2. *Apatema albifasciella* Nel, Huemer & Varenne, 2024. Algarve, Olhão, Serra de Monte Figo, 19.v.2002, M. Corley.

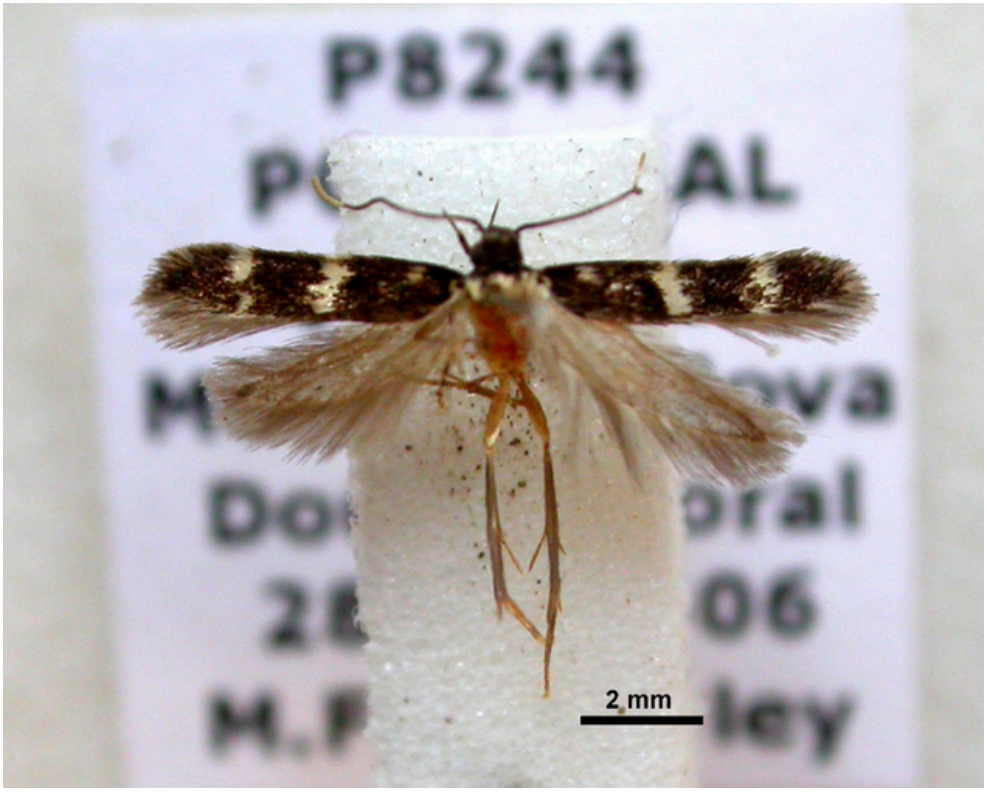


Fig. 3. *Apatema proteroclina* (Meyrick, 1939). Douro Litoral, Santo Tirso, Monte Córdova, Valinhas, 28.vii.2006, M. Corley.



Fig. 4. *Apatema* compared. Left to right: *A. mediopallidum*, *A. albifasciella*, *A. proteroclina*.



Fig. 5. *Apatema mediopallidum* (Walsingham , 1900). Male genitalia. Algarve, Boliqueime, 20.v.2009, M. Dale. MD01185.



Fig. 6. *Apatema albifasciella* Nel, Huemer & Varenne, 2024. Male genitalia. Algarve, Olhão, Serra de Monte Figo, 19.v.2002, M. Corley, GP1715.



Fig. 7. *Apatema proteroclina* (Meyrick, 1939). Male genitalia. Beira Alta, Castro Daire, Picão, 1.viii.2020, J. Nunes, Corley GP 6004.

First confirmed record of *Niphonympha dealbatella* (Zeller, 1847) (Lepidoptera: Yponomeutidae) in Portugal: a new genus and species for the national fauna

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Abstract

Niphonympha dealbatella (Zeller, 1847), a moth of the family Yponomeutidae, is confirmed from Portugal for the first time. A single female was collected on 6.vii.2024 at Monte Barata (Castelo Branco) using a light trap, representing the first morphologically verified record in the country and extending the known range to the western Iberian Peninsula. Previously, its presence had only been suggested via DNA metabarcoding. Identification was confirmed by genitalia dissection.
Key words: Lepidoptera, Yponomeutidae, *Niphonympha*, faunistic record, Portugal.

Resumo

Niphonympha dealbatella (Zeller, 1847), uma borboleta da família Yponomeutidae, é confirmada pela primeira vez em Portugal. Um único indivíduo fêmea foi recolhido a 6.vii.2024 em Monte Barata (Castelo Branco) através de armadilha luminosa, representando o primeiro registo morfologicamente verificado no país e expandindo a distribuição conhecida para a Península Ibérica ocidental. Anteriormente, a sua presença apenas havia sido sugerida através de metabarcoding de DNA. A identificação foi confirmada mediante dissecação de genitalia.
Palavras-chave: Lepidoptera, Yponomeutidae, *Niphonympha*, registo faunístico, Portugal.

Introduction

The Iberian Peninsula hosts a high diversity of microlepidoptera, yet the Portuguese fauna remains insufficiently documented. Within this context, the family Yponomeutidae is underrepresented in national faunistic records, with several genera still unrecorded.

Niphonympha dealbatella (Zeller, 1847) is a rarely recorded micro-moth with a patchy distribution across Europe, having been reported from: Germany, Austria, Slovakia, France, Hungary, Italy, Czech Republic, Sicily, Switzerland and Turkey (Vives & Gastón, 2017; Lantz et al., 2021). Adults are small, with a white, silky appearance and forewings that bear faint dark markings. The flight period extends from late June to early August, with peak activity typically in July. The species is nocturnal and attracted to artificial light.

Its biology remains poorly understood, but several authors have suggested that the larvae feed on oaks (*Quercus*) (Vives & Gastón, 2017; Laštůvka et al., 2018; Leraut, 2023). Adults are inconspicuous and rarely collected, likely owing to their cryptic behaviour and weak flight.

Although *N. dealbatella* had previously been recorded in neighbouring Spain, there were no documented records from Portugal until now. This short note reports the first confirmed occurrence of the species and genus in the country.

Material and Methods

On the night of 6.vii.2024, a single female specimen of *Niphonympha dealbatella* was collected at Monte Barata, Castelo Branco, central Portugal (39.701405, -7.315563, 229 m), using a 125W mixed mercury vapour lamp over a white sheet. The specimen was subsequently dissected following standard genitalia preparation techniques. The genitalia were mounted on slide. Gen. Prep. no. 7367-2212 HC (Figure 2).

Discussion

This record represents the first confirmed occurrence of *Niphonympha dealbatella* in Portugal, thereby extending the known range of both the genus and species to the western part of the Iberian Peninsula. While the species was already known from Ávila, Spain (Vives & Gastón, 2017), its presence in Portugal had not yet been morphologically verified. The collected specimen showed slight wing wear, which obscured some of the characteristic black markings, but the typical resting posture of the species provided an additional diagnostic feature supporting the identification. Community-level trophic studies of bats in north-east Portugal had previously observed DNA barcodes of this species in a faecal sample of a common pipistrelle (*Pipistrellus pipistrellus* (Schreber, 1774)) captured at Serra do Reboredo, Torre de Moncorvo (41.18, -7.02, 593 m), on the night of 29.vi.2016 (V. Mata, personal communication), but the record was considered uncertain due to the lack of visual observations of the species in Portugal. This finding highlights the importance of targeted nocturnal surveys using light traps in uncovering and validating the presence of under-recorded groups such as micro-moths.

Acknowledgements

I would like to thank Vanessa Mata (CIBIO/InBIO, University of Porto), and Martin Corley, for sharing unpublished data regarding the detection of *Niphonympha dealbatella* in DNA metabarcoding studies of bat diets in Portugal. Their contributions provided valuable context for the interpretation of this record.

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Fig. 1. *Niphonympha dealbatella* ♀ — dorsal habitus of the specimen collected at Monte Barata.



Fig. 2. Genitalia of *Niphonympha dealbatella*, slide no. 7367-2212 HC.

The status of some Arctiinae (Erebidae) in Portugal

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Abstract

The status of three taxa of Arctiinae (Erebidae) in Portugal is re-examined. *Coscinia cribraria* f. *benderi* (Marten, 1957) is recognised as present in Portugal. *Arctia villica angelica* (Boisduval, 1829) is treated as a species separate from *A. villica* (Linnaeus, 1758); both species occur in the country. *Eilema predotae* (Schawerda, 1927) is deleted from the Portuguese list as all published records belong to *E. marcida* (Mann, 1859).
Key words: *Coscinia*, *Arctia*, *Eilema*, Iberian Peninsula.

Resumo

O estatuto de três táxones de Arctiinae (Erebidae) em Portugal é reavaliado. *Coscinia cribraria* f. *benderi* (Marten, 1957) é reconhecida como presente em Portugal. *Arctia villica angelica* (Boisduval, 1829) é tratada como uma espécie distinta de *A. villica* (Linnaeus, 1758); ambas ocorrem no país. *Eilema predotae* (Schawerda, 1927) é removida da lista portuguesa, uma vez que todos os registos publicados correspondem a *E. marcida* (Mann, 1859).
Palavras-chave: *Coscinia*, *Arctia*, *Eilema*, Península Ibérica.

Introduction

Recently various questions have arisen leading to the reconsideration of the status of some taxa in the Portuguese checklist (Corley, 2015). Questions relating to three taxa of Arctiinae (Erebidae), *Coscinia benderi* (Marten, 1957), *Arctia villica* (Linnaeus, 1758) and *Eilema predotae* (Schawerda, 1927) are discussed in detail below.

Methods

The assessment of status in Portugal of each discussed taxon considered the relevant literature and the re-examination of available specimens and records accessible to the authors. For the genera *Arctia* and *Eilema*, DNA barcode evidence was also considered. Details of the methods used to obtain barcodes of Portuguese material are given in Ferreira et al. (2024).

Acronyms: Alto Alentejo (AAL), Algarve (ALG), Beira Alta (BA), Baixo Alentejo (BAL), Beira Baixa (BB), Beira Litoral (BL), Douro Litoral (DL), Estremadura (E), Minho (M), Ribatejo (R), Trás-os-Montes (TM).

Taxa with change of status in Portuguese Checklist

***Coscinia cribraria* f. *benderi* (Marten, 1957)**
***Coscinia cribraria* f. *guidoi* (Cruz, 1978)**

Coscinia benderi was excluded from the Portuguese Lepidoptera list by Corley (2015) on the grounds that there was no convincing evidence of its presence in Portugal. Earlier Cruz (1978) had described and illustrated *Coscinia cribraria* subsp. *guidoi* Cruz, 1978, a form very similar to *benderi*, from Ribatejo. This was synonymised with *Coscinia benderi* by Gómez Bustillo & Arroyo Varela (1981) without any real basis. Even though her specimens were not located, the rejection of *benderi* was therefore not well justified. Disagreement among various authors regarding the taxonomic status of this form was also cited as a reason for its exclusion. The status problem remains unresolved.

The *Coscinia cribraria* complex includes a range of forms, many of them named, often showing marked differences in habitus, but not always clearly separable and mostly with similar genitalia. In the most recent treatment of the complex, Macià et al. (2019) recognised *C. mariaerosae* Expósito, 1991 from Mallorca and *C. chrysocephala* (Hübner, 1810) from the southern part of the Iberian Peninsula and North Africa at species level. They also treated three forms as subspecies: *C. cribraria benderi* (Marten, 1957) from south-west Spain, *C. cribraria rippertii* (Boisduval, 1834) from the Pyrenees and *C. cribraria ibicenca* Kobes, 1991 from Ibiza and Formentera. Even after these taxa are separated from *Coscinia cribraria cribraria* it remains polymorphic with several named forms. Among synonyms of *Coscinia cribraria cribraria* listed by Macià et al. (2019) is subspecies *guidoi* Cruz, 1978, described from Abrantes in Ribatejo. The subspecies is illustrated (Cruz, 1978) with black and white photos of male and female and with drawings of genitalia of each gender prepared by Teodoro Monteiro.

In Portugal forms of *cribraria* that can be assigned to *benderi* and *guidoi* occur in Algarve and *guidoi* has also been found in Ribatejo and Estremadura. There is much that remains unclear about the status of these forms, including whether they should be treated as a single taxon or separated. Because there is such a lack of clarity and consensus as to what taxonomic status they should be given, we prefer to treat them as forms, not subspecies.

In *Coscinia cribraria cribraria* and its other forms the forewings are white with grey to blackish markings, nearly always including some transverse markings, sometimes as a row of dots. In contrast forms *guidoi* and *benderi* are light brown, grey-brown or grey with two off-white streaks, one along the costa and the other in mid-wing, usually branching shortly along the veins; there may be one or two dark spots near the wing base or at the end of the cell. Figures 3–7 show some examples. These cannot all be ascribed to one form or the other, because the differences between *guidoi* and *benderi* are only clear in typical forms.

Further understanding of these forms can only come from study of more specimens. Collection of specimens is strongly encouraged. There is no available DNA barcode for f. *guidoi* and none from f. *benderi* in Portugal. Macià et al. (2019) mention differences in larval and pupal morphology between *cribraria cribraria* and *benderi*. It would be desirable to rear Portuguese examples to discover if such differences also occur in Portuguese populations.

Material examined:

Coscinia cribraria cribraria (Linnaeus, 1758)

In Corley (2015), *C. cribraria* was reported from all 11 provinces of mainland Portugal. Since then, the recognition of *C. chrysocephala* (Hübner, 1804) as a distinct species (Macià et al., 2019), has left several provinces without confirmed records of *C. cribraria cribraria*. There are reported confirmed records from ALG, E, BL, BA, DL, M, and TM:

ALG: Carrapateira, Aljezur, 6.x.1993, M. Corley, P1996.
ALG: Perna da Negra, Monchique, 11.x.2020, A. Valadares.
ALG: Rocha da Pena, Loulé, 11.x.2024, J. Nunes, J. Fabião & T. Valkenburg (Fig. 1).
E: Praia da Fincha Grande, Óbidos, 13.vii.2023, H. Cardoso (5949-1836) (Fig. 2).
BL: Vila Nova, Miranda do Corvo, 30.viii.2015, J. Rosete.
BA: Caldas de Manteigas, Manteigas, 3.ix.2001, M. Corley.
DL: Panchorra, Serra de Montemuro, Resende, 4.viii.2024, J. Rosete.
M: Vidoeiro, Gerês, 16.vi.2002, ex larva, ix.2001, M. Corley, P7284.
TM: Guadramil, Bragança, 17.viii.2019, J. Nunes, C. Silva and E. Jesus.



Figure 1. *Coscinia cribraria cribraria* (Linnaeus, 1758), Rocha da Pena, Loulé, 11.x.2024, J. Nunes, J.L. Fabião & T. Valkenburg.



Figure 2. *Coscinia cribraria cribraria* (Linnaeus, 1758), Praia da Fincha Grande, Óbidos, 13.vii.2023, H. Cardoso (5949-1836).

Coscinia cribraria f. *benderi* (Marten, 1957)

ALG: Praia de Monte Gordo, Vila Real de Santo António, 1.x.1995, J.L. Yela (Fig. 3).
Spain, Huelva: Laguna de las Madres, Moguer, 1.x.1979, M. Huertas (Fig. 4).



Figure 3. *Coscinia cribraria* f. *benderi* (Marten, 1957), ALG: Praia de Monte Gordo, Vila Real de Santo António, 1.x.1995, J.L. Yela.



Figure 4. *Coscinia cribraria* f. *benderi* (Marten, 1957), Laguna de las Madres, Moguer, Huelva, Spain, 1.x.1979, M. Huertas.

Coscinia cribraria f. *guidoi* (Cruz, 1978)

ALG: N. of Alportel, 11.ix.1996, M. Corley, P4180.
ALG: Praia da Amoreira, Aljezur, 15.vi.2021, A. Valadares. (Fig. 5.)
ALG: Fonte Benémola, Loulé, 6.vi.2024, J. Nunes (JN0370) (Fig. 6).
ALG: Fonte Benémola, Loulé, 11.x.2024, J. Nunes (JN0418).
R: Abrantes,v.1949, M.A. da Silva Cruz, gen prep. 1.075 male (Cruz, 1978).
E: Lagoa Pequena, Sesimbra, 14.x.2024, H. Batista.
E: Berlengas, Peniche, 15.vii.2021, H. Cardoso (3281-896) (Fig. 7).
E: Berlengas, Peniche, 9.viii.2023, H. Cardoso (6683-2014).



Figure 5. *Coscinia cribraria* f. *guidoi* (Cruz, 1978), Algarve, Aljezur, 15.vi.2021, A. Valadares.



Figure 6. *Coscinia cribraria* f. *guidoi* (Cruz, 1978), Fonte Benémola, Loulé, 6.vi.2024, J. Nunes (JN0370).



Figure 7. *Coscinia cribraria* f. *guidoi* Cruz, 1874, Berlengas, Peniche, 15.vii.2021, H. Cardoso (3281-896).

Arctia villica (Linnaeus, 1758) and *Arctia angelica* (Boisduval, 1828)

Corley (2015) treated all records of *A. villica* (Linnaeus, 1758) from mainland Portugal as belonging to the subspecies *angelica* (Boisduval, 1829), which was reported from all provinces. Ortiz et al. (2023) expanded on the earlier work of Freina & Nardelli (2007) concerning the *Arctia villica* species complex in the Iberian Peninsula. They recognised *A. villica* (Linnaeus, 1758) and *A. angelica* (Boisduval, 1828) as separate species, although they found no consistent differences in external genitalia. Their separation was based instead on wing pattern and a 2.4% divergence in DNA barcodes. Differences in internal genitalia remain to be tested.

In *A. villica* (Fig. 8), the forewing is black with seven or eight white or pale cream spots (sometimes accompanied by one or more small dots): a basal spot; a pair (pair 1) before mid-wing; a smaller pair (pair 2) just beyond mid-wing (occasionally with one spot absent); and a larger pair (pair 3), with one spot at three-quarters and the other in the tornus; plus a final spot near the termen. Freina & Witt (1987) illustrate a range of variation in both species (as subspecies).

In *A. angelica* (Fig. 9), the pale markings are cream to pale yellow, of more irregular shape: the basal spot is present; pair 1 is fused; pair 2 is small; pair 3 is highly variable, with the tornal spot often fused with the dorsal spot of pair 2, and frequently also fused with the three-quarters spot and sometimes even the terminal spot. The total number of pale areas on the wing therefore ranges from four to six, although very small additional pale markings may occur on or near the costa and tornus.



Figure 8. *Arctia villica* (Linnaeus, 1758), Berganzo, Álava, Spain, 12.vi.1999, Tx. Revilla.



Figure 9. *Arctia angelica* (Boisduval, 1828), North of Bensafrim, Algarve, Portugal, 11.iv.1994, M. Corley.

Ortiz et al. (2023) reported *A. villica* from northern Spain. DNA-barcoded specimens from northern Portugal confirm that *A. villica* sensu stricto is also present in this country (see below). In contrast, material from southern Portugal, attributed to *A. angelica*, has not yet been barcoded.

Specimens showing the habitus of *A. villica* from BL, BA, and TM are illustrated in Fig. 10. This species is also known from DL and M. Specimens showing the habitus of *A. angelica* from AAL, E, BL, R, BB and BA are figured in Fig. 11. This species is also known from ALG and BAL.

Preliminary evidence suggests that *A. villica* is largely restricted to northern Portugal, extending southwards perhaps as far as Coimbra, while *A. angelica* occurs mainly in the southern half of the country and possibly also in parts of the northern interior. Whether their distributions overlap remains uncertain. In Spain Ortiz et al. (2023) found some overlap of distribution areas and evidence from DNA barcodes of introgression, where moths of *A. angelica* phenotype had DNA barcode of *A. villica*. This indicates past hybridisation with persistence of the maternally inherited barcode fragment of DNA.

Material of *Arctia villica* (Linnaeus, 1758) confirmed by DNA barcode:
BA: Rio Agueda, Quinta da Chegão, Figueira de Castelo Rodrigo, 16.v.2018, M. Corley, S. Ferreira, L. Silva, D. Oliveira and R. Mateus (INV06303).
M: South of Salamonde, Serra da Cabreira, 31.v.2010, E.J. van Nieukerken (RMNH.INS27759).
TM: Sambade, Alfândega da Fé, 31.v.2016, M. Corley, V. Mata, R. Andrade and S. Ferreira (INV02428).

Additional material of *A. villica* examined:
DL: Ansiães, Amarante, 15.vi.2019, J. Nunes.
Records from BA, BL and TM in caption to figure 10, below.

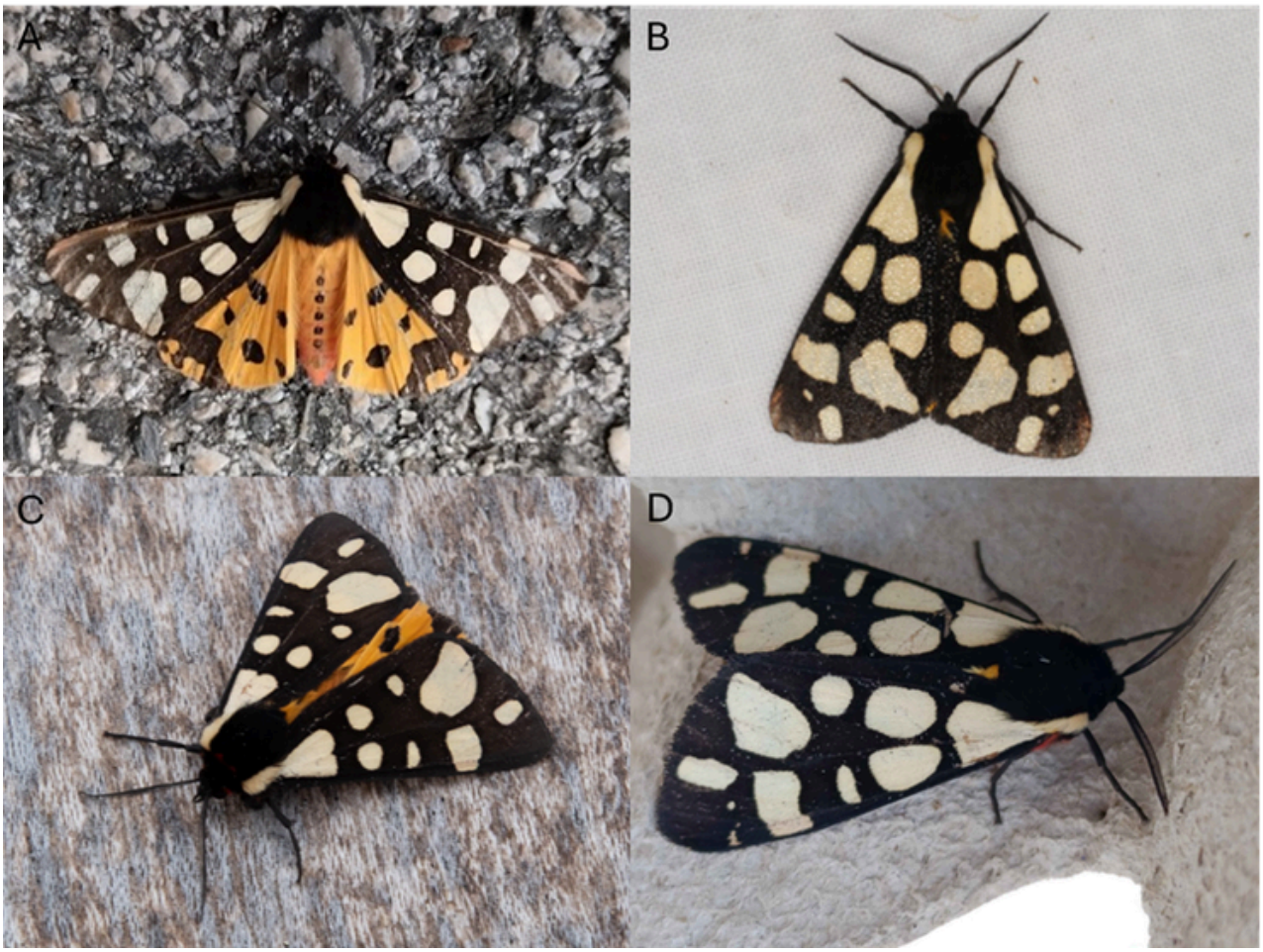


Figure 11. *Arctia villica* (Linnaeus, 1758) records from the Portuguese Moth Recording Scheme (Nunes et al., 2025). **A.** BL: Mata da Margaraça, Arganil, 5.vi.2025, P. Tenreiro. **B.** BA: Quinta dos Calhastros, Gouveia, 7.vi.2025, S. Duarte. **C.** BL: Podentes, Penela, 1.vi.2025, L. Cardoso. **D.** TM: Pedras Salgadas, Vila Pouca de Aguiar, 8.vi.2025, H. Magalhães.

Material of *A. angelica* (Boisduval, 1828) examined:
ALG: Vale da Fonte, W. of Bordeira, Aljezur, Algarve, 11.iv.1994, M. Corley specimen P2138.
AAL: South of Estremoz, Alto Alentejo, 11.iv.1997, M. Corley specimen P4211.
Records from AAL, R, E, BL, BB and BA in caption to figure 11, below.

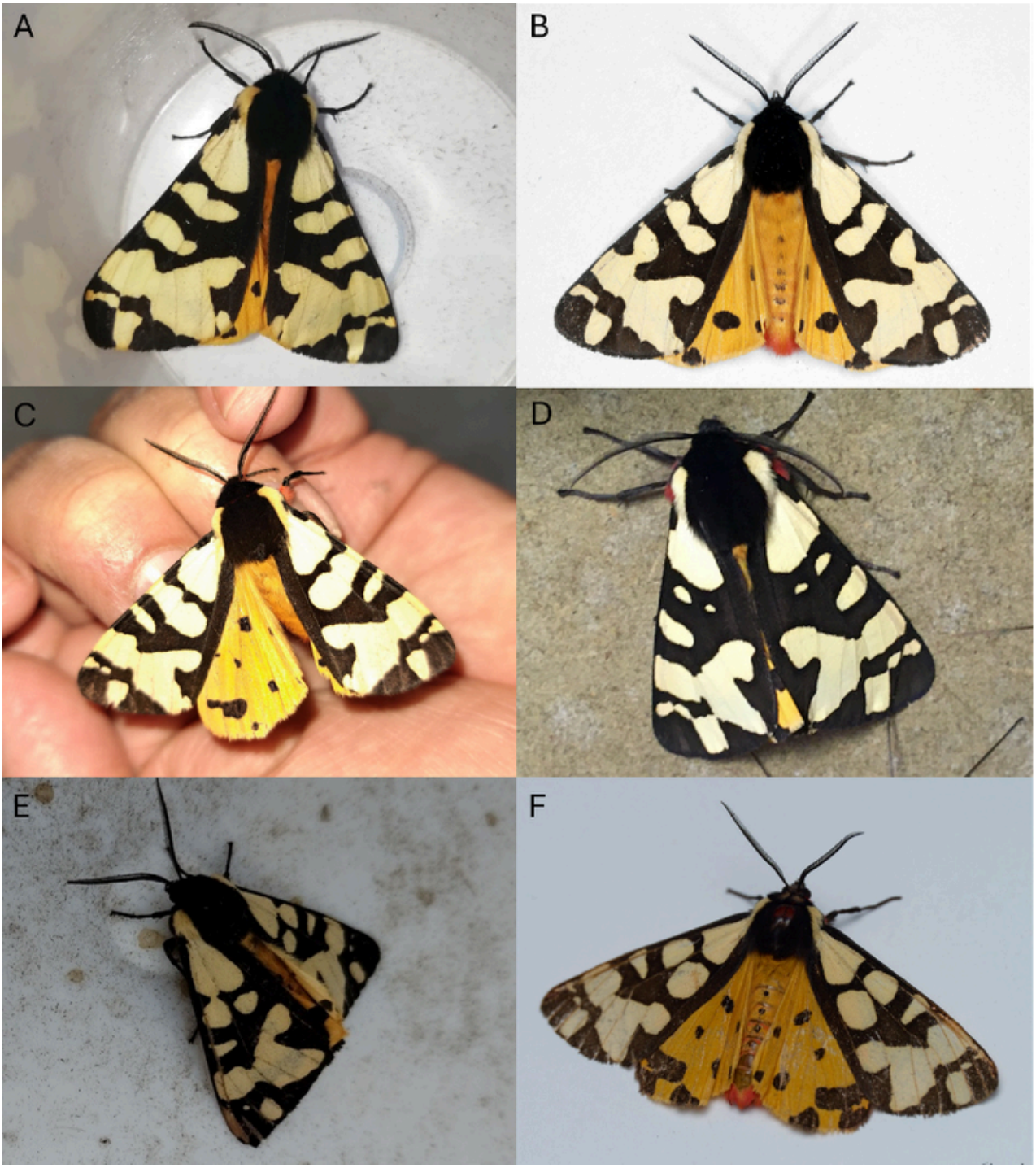


Figure 11. *Arctia angelica* (Boisduval, 1828) records from the Portuguese Moth Recording Scheme (Nunes et al., 2025). **A.** R: Areia de Cima, Alvega, Abrantes, 7.iv.2023, A. Santos. **B.** E: Trafaria, Almada, 23.iv.2025, J.L. Fabião. **C.** AAL: Évora, 13.iv.2024, S. Mateus. **D.** BL: Rio Seco, Batalha, 22.iii.2024, S. Mourão. **E.** BB: Castelo Novo, Fundão, 23.v.2025, P. Tenreiro. **F.** BA: Guarda, 6.ix.2023, E. Flor.

***Eilema predotae* (Schawerda, 1927)**

Eilema predotae was described by Schawerda from Albarracín in eastern Spain. The species was first recorded in Portugal by Teodoro Monteiro, who collected three specimens at Santana, Sesimbra (west of Setúbal) in August 1964. On 7 September 1969, he obtained two further specimens near Ribeira de Torgal, Vila Nova de Milfontes, Baixo Alentejo (Monteiro, 1975). His paper includes a drawing of the male genitalia. Monteiro reported that he had offered a specimen to Hervé de Toulgoët in Paris and had also shown him the drawing. De Toulgoët, at that time and for many years thereafter, was the leading authority on the Arctiidae.

In the Corley collection, there is a specimen of *E. predotae* collected by Barry Goater at Santiago de Cacém, Baixo Alentejo, in 1996. Other specimens in the same collection, confirmed by Goater, include one from Rio Maior, Ribatejo and another from Sesimbra, Estremadura (Fig. 12). These specimens appeared distinctive in habitus, with smoky-grey fore- and hindwings, a dull pale yellow forewing costa and usually slightly smaller than most *Eilema*, about the size of *E. uniola* (Rambur, 1866) but distinctly larger than *E. rungsi* Toulgoët, 1960. As further records accumulated, the species seemed to show a characteristic distribution, restricted to the western side of Portugal from Algarve to the Rio Mondego. Although not exclusively coastal, all records were from within 40 km of the shore, many from limestone sites.

More recently, questions have arisen concerning the occurrence of *E. predotae* in Portugal, suggesting that all records may in fact belong to *E. marcida* (Mann, 1859). This latter species was recorded from Barro, Torres Vedras, by Mendes (1910), although the identification cannot be confirmed because Mendes' collection lacks specimen labels. Gastón et al. (2007) recognised *E. marcida* as present in Spain, where it had previously been confused with *E. pygmaeola* (Doubleday, 1847). This led to confirmation of its occurrence in Portugal (Corley et al., 2009), with records from Algarve (Fig. 13) and Baixo Alentejo. At the time, these specimens were not confused with "E. predotae", being paler grey, without evident pale costa and slightly larger than the west coast form attributed to *predotae*.

A specimen collected at Chão de Couce, Pombal, Beira Litoral was originally identified as *E. predotae*, but DNA barcoding places it under *E. marcida* (INV03703). Examination of genitalia from several Portuguese specimens previously identified as either *predotae* or *marcida* indicates that only one species is present. However, the male external genitalia of these two taxa are very similar (e.g. Witt et al., 2011; Ylla et al., 2020.), which may explain the early misidentifications by de Toulgoët and Monteiro. *E. predotae* should therefore be removed from the Portuguese list, as there is currently no evidence of its occurrence in the country. All records are presumed to belong to *E. marcida*, although additional barcoding of specimens would be desirable to confirm this. *Eilema marcida* (Mann, 1859) is reported from all the southern provinces of Portugal, extending northwards to Beira Litoral and Beira Baixa.

Material examined:
ALG: São Romão, São Brás de Alportel, 11.ix.1991, M. Corley, P862.
AAL: Besteiros, Serra de São Mamede, Arronches, 1.ix.2001, M. Corley.
R: Marmeleira, Rio Maior, 12.ix.2002, M. Corley, P6730.
E: Sesimbra, 1.ix.2002, M. Corley, P6563.
BL: Chão de Couce, Pombal, 3.ix.2016, M. Corley and J. Rosete (INV03703).

Additional records:
BAL: Vila Nova de Milfontes, 7.ix.1969, T. Monteiro (Monteiro, 1975).
E: Santana, Sesimbra, viii.1964, T. Monteiro (Monteiro, 1975).
R: Areia de Baixo, Casa Branca, Abrantes, 5.vi.2023, P. Alves (Corley et al., 2024).
BB: Monte Barata, Idanha-a-Nova, 13.ix.2010, E. Marabuto (Marabuto et al., 2013).



Figure 12. *Eilema marcida* (Mann, 1859) previously determined as *E. predotae*, Sesimbra, Estremadura, 1.ix.2002, M. Corley, P6563.



Figure 13. *Eilema marcida* (Mann, 1859). São Romão, São Brás de Alportel, Algarve, 11.ix.1991, M. Corley, P862.

Acknowledgements

We are most grateful to all those who have provided records, photos, dissections, information and advice, including Helder Cardoso, José Fabião, Sónia Ferreira, Ramón Macià, Jorge Rosete, Ana Valadares and Txema Revilla. We also thank all the contributors to the Portuguese Moth Recording Scheme who provided records included in this paper.

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How it all started. My first visit to Portugal in March 1989

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My interest in Lepidoptera began in 1955, when I was 11, and continued throughout my school years. In 1963, I bought my first moth trap – a Robinson trap with a 125 MV bulb. There was a six-year interruption while I studied botany at Oxford, focusing on plants, particularly bryophytes. In 1969, I returned to work full time on the family farm. For two years, my wife Alison and I lived in a nearby village, but in 1971 we moved into our present home, allowing me to resume regular moth trapping on the farm.

During my schooldays, I had attempted to identify some microlepidoptera, but with very little literature available – apart from Beirne (1954) on Pyraloidea and Pterophoridae – identification was difficult. The naming of specimens such as *Agonopterix* had to wait several more years. In 1975, the entomological bookseller E.W. Classey moved his business from West London to my local town, Faringdon. He introduced me to a few books and papers that provided a foothold into microlepidoptera, the most useful being Meyrick (1929), which covered all British Lepidoptera, with illustrations limited to a few drawings of heads and wing venation.

Over the following years, Eric Classey became a close friend, and I acquired many books from him, usually in exchange for firewood rather than cash.

At the start of the 1980s, I began visiting interesting localities in Oxfordshire in search of a wider range of moths than were present on my farm. Once I acquired a generator, I could carry out night work in many places, mostly within about 40 km of home. During these years, my knowledge of microlepidoptera grew considerably. I also managed a little collecting on family holidays in Scotland, including three botanical trips with friends from Edinburgh, which allowed daytime collecting in remote parts of the Highlands, followed by one primarily entomological trip.

By the late 1980s, I wanted to widen my experience with a visit to the European continent. In autumn 1988, my friend from Oxford days, Roy Perry, asked if my family would be interested in sharing a villa in the Algarve the following March. He was organising a visit of the British Bryological Society and had booked a villa for two weeks. The villa, Casa Jack, east of Loulé, was divided into two halves. One half would be empty during the first week – would we like to take it? I jumped at the chance. Before the trip, I contacted the villa's owner, Jack Wilding, to see if he could provide a generator for my use.

Living and working on a farm with cattle and sheep requires careful planning before any holiday. In this case, we delayed the start of lambing by putting the rams out with the ewes two weeks later than usual, in early November rather than late October. In March, there was a rush to finish winter work before the Algarve trip, as the sheep would lamb as soon as we returned.

At the airport departure lounge on 16 March 1989, I recognised a man with a collecting bag just like mine: Gerry Tremewan from the Natural History Museum, London. He was also travelling to Faro to spend a week looking for *Zygaena*, eventually describing *Zygaena rhadamanthus* subspecies *guichardi* Tremewan, 1991.

Arriving at the villa, we learned that daytime temperatures had been in the upper 20s the previous week, but the wind from central Spain made it much cooler when we arrived. My moth light – a 125 W MV bulb on a stand with a few egg boxes – was not very successful on several nights, compounded by a nearly full moon during Easter week. Nevertheless, some of these cool nights produced attractive moths, such as *Neognopharmia stevenaria* (Boisduval, 1840) (fig.1) and *Horisme scorteata* (Staudinger, 1901). Most days were sunny and breezy, sometimes with showers or even hail. When the sun was out, it was warm, and the children (two teenage Corleys, three Perrys) spent much time in and around the swimming pool. In the mornings, Alison and I explored the neighbourhood and tried to identify the flowers. Alison is a keen gardener, and we were both delighted by the richness of the limestone flora of the Algarve Barrocal. Most mornings, I pinned moths from the previous night, as I had decided to keep one specimen of every species, even if it was familiar from Britain (fig.2). On my first night, I recorded 24 species, 12 of which I had never seen in Britain.



Fig. 1. *Neognopharmia stevenaria* (Boisduval, 1840). (Photo: © Ana Valadares)



Fig. 2. The author (Martin) on a track north of Casa Jack during the Algarve trip, March 1989.

Afternoons were spent visiting nearby sites by car. Roy, familiar with the Algarve, guided us to locations with interesting flora, which often yielded moths, butterflies, or larvae I could attempt to rear. Late afternoons were for returning to the villa, setting out the moth light, and then going to dinner. During the week, we visited Lagoa da Nave near Salir, Balaia on the coast east of Albufeira, Quinta do Freixo near Benafim Grande, Serra de Monte Figo near Moncarapacho, and the *Quercus suber* L. woodland between Alportel and Barranco Velho.

The most productive afternoon was at Balaia, where we observed a chameleon, the rare orchid *Gennaria diphylla* (Link) Parl., and numerous micro species, including *Arnia nervosalis* Guenée, 1849 and *Thiodiodes seeboldi* (Rössler, 1877), flying in the late afternoon at the cliff base, sheltered from the north wind. Serra de Monte Figo yielded tiny micros such as *Heliozela sericiella* (Haworth, 1828) and *Micropterix ibericella* Caradja, 1920 (fig. 3) around *Quercus coccifera* L., and a larva of *Marasmarcha oxydactylus* (Staudinger, 1859) on an *Ononis* species – the latter found nowhere else in Portugal. A brief stop in Alportel–Barranco Velho woodland focused on the rare insectivorous plant *Drosophyllum lusitanicum* (L.) Link, though I also collected seed-heads of *Cistus populifolius* L. from the previous year, from which *Coccidiphila danilevskyi* Sinev, 1997 later emerged.



Fig. 3. *Micropterix ibericella* Caradja, 1920. (Photo: © Ana Valadares)

Our longest trip was to Serra de Monchique, where we walked to the top of Picota on a particularly cold day. Although we saw no adult Lepidoptera, I collected larvae of *Parafomoria cistivora* (Peyerimhoff, 1871), *Aproaerema larseniella* (Gozmány, 1957), *Mirificarma mulinella* (Zeller, 1839) (fig.4), and *Clepsis unicolorana* (Duponchel, 1836), all subsequently reared. That evening, five teenagers insisted on eating separately from their parents, as compensation for having been dragged up a mountain in an arctic wind. That night, the moth light produced only two moths.



Fig. 4. *Mirificarma mulinella* (Zeller, 1839). (Photo: © Ana Valadares)

Roy suggested a trip to Cabo de São Vicente, which I declined; Monchique had been far enough. At the time, the A22 motorway did not exist, and east–west travel was along the N125, notorious for accidents. Driving on the "wrong" side and understanding local driving customs – including the unwritten overtaking conventions – was a steep learning curve. We were fortunate to complete the week safely.

On Saturday morning, we visited Loulé's covered market and bought a traditional Easter cake, surprisingly containing a hard-boiled egg still in its shell.

The last two nights brought warmer weather. On the penultimate night, the light at Casa Jack attracted 48 species, 19 entirely new to me, including *Zebeeba falsalis* (Herrich-Schäffer, 1839) (fig.5) and *Toulgoetia cauteriata* (Staudinger, 1859). On the final night, I used the borrowed generator, heavy and designed for construction use, which just fitted into the hire car boot. At Lagoa da Nave, the light produced 60 species, 23 new to me, including *Dyscia distinctaria* (Bang-Haas, 1910), *Nola subchlamydula* Staudinger, 1871, *Recoropha canteneri* (Duponchel, 1833), and *Eutelia adulatrix* (Hübner, 1813). Back at the villa, I ran the light again at 23:00, adding three more species to the week's total.



Fig. 5. *Zebeeba falsalis* (Herrich-Schäffer, 1839). (Photo: © Ana Valadares)

Fueling the hire car was a minor challenge; I later realised I had confused gasóleo and gasolina, explaining the car's poor performance on our return to the airport.

During the week I recorded 128 species of Lepidoptera, 22 butterflies, 48 macros and 58 micros. I also took home a number of larvae, which eventually added another 10 species to the weeks total. Of the final total of 138 species, exactly two-thirds were species entirely new to me. A few of these were species known to be in Britain which I had never seen, such as *Idaea degeneraria* (Hübner, 1799), limited to one small area in Dorset.

Apart from butterflies and moths, we also saw other animals that were new to us, such as Carpenter Bees (*Xylocopa*) which were nesting in the roof of the veranda, and several birds including Bee-eaters (*Merops apiaster*) and Sardinian Warblers (*Curruca melanocephala*).

Following our return to England the problem of identifying moths from a largely unfamiliar fauna with limited literature was challenging. Barry Goater, visiting France and Spain since the early 1980s, assisted with macrolepidoptera and "mesolepidoptera" identifications, but not microlepidoptera. Some early identifications were later corrected; for example, *Heterogynis 'penella*', collected as larvae on Serra de Monte Figo, was described as *H. cynetis* de Freina et al., 2020. I had also found species previously unrecorded in Portugal, such as *Eupithecia dodoneata* Guenée, 1858 (fig.6).

It was a busy and highly enjoyable week, with diverse habitats, fascinating plants, butterflies, and moths, friendly people, and excellent cuisine. We would return.

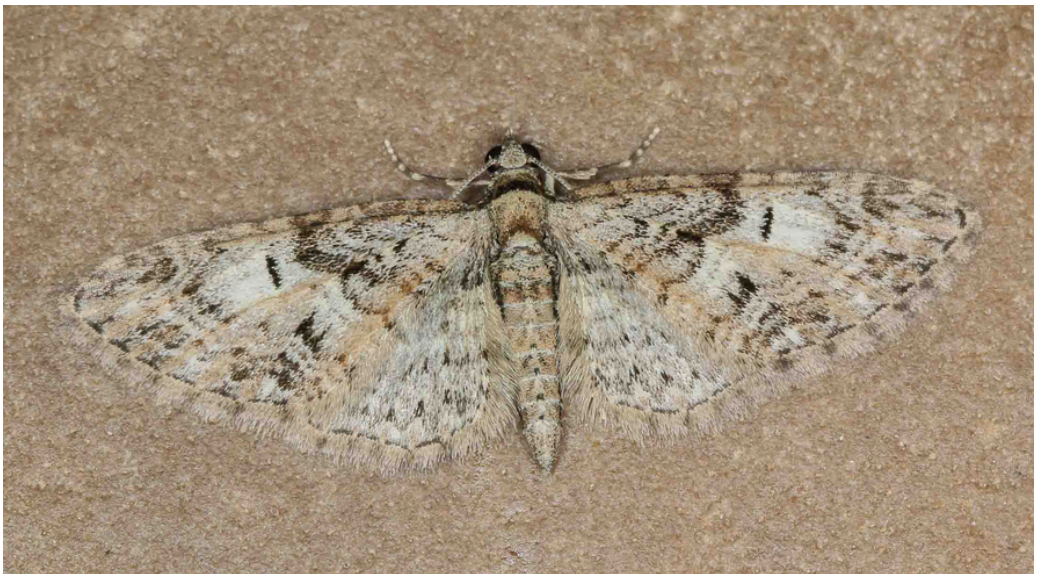


Fig. 6. *Eupithecia dodoneata* Guenée, 1858. (Photo: © Ana Valadares)

Acknowledgement

I am most grateful to Ana Valadares for the photos of moths.

References

Beirne, B.P. 1954. British Pyralid and Plume moths. Frederick Warne, London. 208 pp.
Meyrick, E. 1928. A revised handbook of British Lepidoptera. 914 pp. 1968 reprint E.W. Classey, Hampton.

Book Review

Pyraloidea de la España Peninsular e Islas Baleares. Tx. Revilla. 2025. 225 pp. ISBN: 978-84-19966-62-9. Published by the author. Hardcover, A4 size. Obtainable from the author (txema.revilla@gmail.com) for €85 plus post and packing.

This book covers more than 500 species of the superfamily Pyraloidea that have been recorded in Peninsular Spain and the Balearic Islands. The text is in Spanish, with Forward and Acknowledgements also in English. A short introduction covers the biology of the group and the characters distinguishing the two families, Pyralidae and Crambidae. Three pages show the diversity of Pyraloidea in particular habitats with small pictures of mounted specimens scattered over habitat photos. A chapter on Systematics indicates that 14 of the 20 subfamilies of Pyraloidea are known in the Iberian Peninsula. All 20 subfamilies (5 Pyralidae, 15 Crambidae) are illustrated with one or two examples, including a number of non-European species.

In the main part of the book each species receives a few lines, including the type locality, known host-plants and distribution on world scale and in Spain. Sometimes there is more information, such as a relevant reference. Species with questionable occurrence in the area are mentioned in notes inserted between related accepted species, sometimes accompanied by a picture. In this section there are additional figures of some species not figured on the plates and comparison figures usually showing right forewings of closely related or difficult species such as *Acrobasis* and *Scoparia*/*Eudonia*. A short chapter of rejected species follows.

There are 28 plates showing all the accepted species in mounted position, enlarged, but not always to the same scale. Most species have a single example, occasionally there are two where there is sexual or other dimorphism. Plates 29 to 60 show male genitalia, 61 to 73 female genitalia.

Finally there is an extensive bibliography including references up to 2024.

The quality of the photos of whole moths is excellent but additional figures of more variable species such as *Ancylosis arenosella* would have been useful. The lack of any indication of scale, especially as the scale varies between photos on the same plate is a disadvantage but I found it did not detract from the value of the book.

The genitalia figures are of high quality and reproduced at a good size. The majority are from Victor Redondo. There are 192 males figured and 76 females. These have mostly been chosen to illustrate differences between species that are not reliably separated by external characters but some species that could usefully have been figured are not. For example there are figures of male genitalia of only four *Ephestias*.

The book does not claim to cover Portugal, indeed Portugal is rarely mentioned, however almost all of the 296 species currently recognised from Portugal are present in Spain. One Portuguese species apparently not yet found in Spain is *Pyralis regalis*.

This is the only book illustrating all the Iberian Pyraloidea in a single volume. Of course there will be occasions when further research is needed to secure a positive identification, but I strongly recommend it to anyone studying Pyraloidea anywhere in the Iberian Peninsula or Balearic Islands.

Martin Corley

Cover and three sample pages



Dioryctria aulloi Barbey, 1930 (lam.: 8, 37, 65)

Descrita de España (Andalucía, Sierra de las Nieves).
Planta nutricia en España, pinsapo (*Abies pinsapo)*, probablemente otras pináceas en el norte de África (Leraut, 2014). El adulto de aspecto similar a otras *Dioryctria*, vuela de junio a septiembre.
Knölke, S. (2007) ha publicado un extenso trabajo sobre este género en Europa.

Distribución: Norte de África y España en las provincias de Málaga y Cádiz (Sierra de las Nieves, Sierra Bermeja, Sierra de Grazalema).

Dioryctria sylvestrella Ratzeburg, 1840) (lam.: 8, 37)

Descrita de Alemania (Ratisbona).
Planta nutricia pináceas *Pinus sylvestris, P. pinaster, P. halepensis, P. strobus* (Leraut, 2014).
El adulto vuela de junio a septiembre.

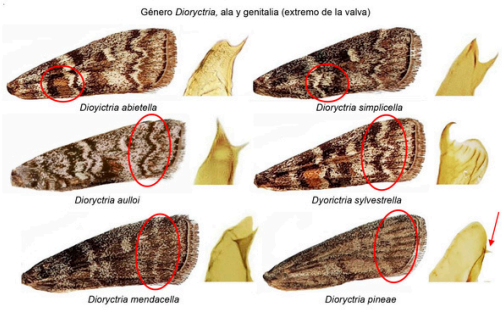
Distribución: Desde Europa hasta Rusia. Extendida por la Península.

Dioryctria mendacella (Staudinger, 1859) (lam.: 8, 38, 65)

Descrita de España (Chiclana).
Planta nutricia pináceas *Pinus pinea, P. pinaster, P. halepensis,* (Leraut, 2014). El adulto vuela de julio a septiembre.

Distribución: Norte de África y desde Portugal a Turquía. Extendida por la Península.

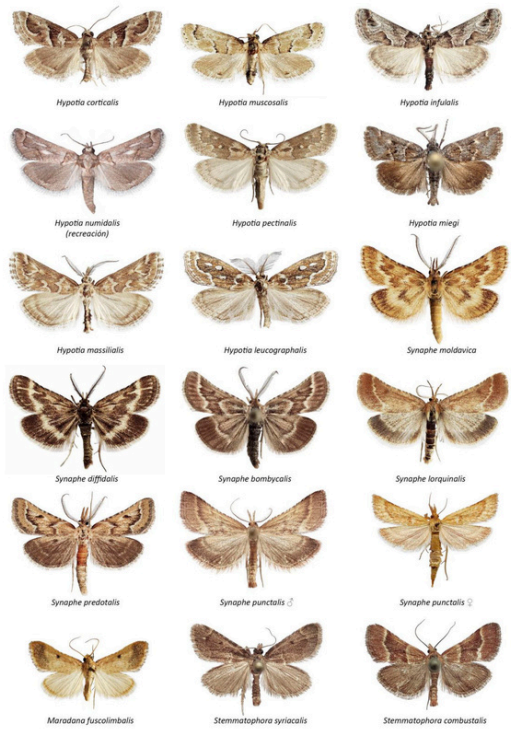
Género *Dioryctria*, ala y genitalia (extremo de la valva)



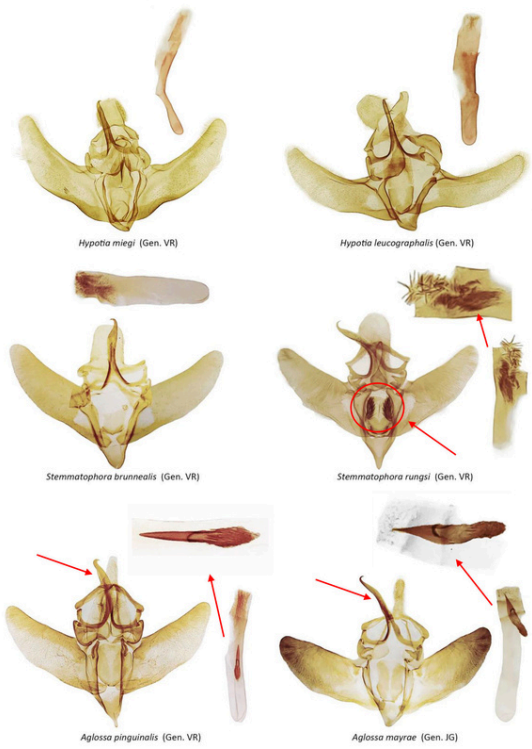
Dioryctria robiniella (Millière, 1865) (lam.: 8)

Descrita de Francia (Ardèche).
Planta nutricia ciprés *Cupressus sempervirens* (Leraut, 2014). El adulto vuela de junio a agosto.

LAMINA 01



LAMINA 29



Guidance for authors

Articles should be submitted to the editor as Word files. They must be original work not published elsewhere.

Longer articles should be written in English, with a Portuguese or Spanish abstract. These papers will be peer-reviewed by one or more referees.

Short articles may be in English, Spanish or Portuguese, but English is preferred. They may be reviewed by a referee or not at the discretion of the editor.

Longer articles should have this format:

- Title
- Author(s)
- Address and e-mail address of author(s)
- Orcid number of author(s) (if available not obligatory).
- Abstract
- Key words
- Resumo or Resumen
- Key words
- Introduction
- Materials and Methods
- Abbreviations
- Results
- Discussion
- Acknowledgements
- References

Dates should appear in the format 6.vii.2024 (day.month.year).
The date of a record should be the actual date for daytime records, but records from overnight work should be the date on which the light was set, not the date when trap contents were examined.

References in the text should be given in the form (Vivaldi, 2014), or for two authors (Vivaldi & Beethoven, 2024), for more than two authors (Vivaldi *et al*., 2024).

In the References papers should be cited in the form:
Vivaldi, A. 2024. A quartet of new moths from eastern Portugal. *Lepidoptera fantastica*, **25** (2): 100–105.

Vivaldi, A. & Beethoven, L. 2024. Moonlight moth records. *Lepidoptera fantastica*, **25** (3): 180–197.

Vivaldi, A., Liszt, F. & Boccherini, L. 2024. Evidence that moths respond to classical music. *Lepidoptera fantastica*, **25** (3): 200–206.

Books should be cited:
Corley, M.F.V. 2015. *Lepidoptera of Continental Portugal. A fully revised list*. 288 pp. Martin Corley, Faringdon.

Book that is part of a series:
Huemer, P. & Karsholt, O. 1999. Gelechiidae I (Gelechiinae: Teleiodini. Gelechiini). In P. Huemer, O. Karsholt & L. Lyneborg (eds): *Microlepidoptera of Europe* **3**: 1–356.

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Lepiforum e.V. 2006–2024.
https://lepiforum.org/wiki/page/Lymantria_dispar

If available doi numbers should be included at the end of the reference:
Zlatkov, B., & Huemer, P. 2023. *Eucosma subvittana* (Staudinger 1892) stat. rev., a Mediterranean species resurrected by DNA barcodes and morphology (Lepidoptera, Tortricidae), *Zootaxa*, **5361**(4): 451-462.
https://doi.org/10.11646/zootaxa.5361.4.1