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Gelechiidae of the Canary Islands (Spain). Part 1. Anacampsinae (Insecta: Lepidoptera)

Per Falck & Ole Karsholt

Abstract

The Gelechiidae subfamily Anacampsinae in the Canary Islands is revised. We recognize 20 species and one subspecies of Anacampsini and three species of Chelariini. Seven species and two subspecies are described as new: *Stomopteryx palmella* Falck & Karsholt, sp. nov. (Spain: La Palma), *Stomopteryx cuestaella* Falck & Karsholt, sp. nov. (Spain: Gran Canaria and Tenerife), *Stomopteryx minimella* Falck & Karsholt, sp. nov. (Spain: Gran Canaria), *Stomopteryx variabilis* Falck & Karsholt, sp. nov. (Spain: Gran Canaria, Tenerife, La Gomera, La Palma and El Hierro), *Aproaerema ayacatella* Falck & Karsholt, sp. nov. (Spain: Gran Canaria), *Aproaerema pseudomercedella* Falck & Karsholt, sp. nov. (Spain: La Gomera and El Hierro), *Aproaerema angustumella* Falck & Karsholt, sp. nov. (Spain: Tenerife and La Palma), *Stomopteryx schizogynae grancanariella* Falck & Karsholt, ssp. nov. (Spain: Gran Canaria) and *Nothris congressariella tenerifensis* Falck & Karsholt, ssp. nov. (Spain: Tenerife). The status of *Gelechia elachistella* (Stainton, 1859) is changed into a synonym of the nominotypical subspecies of *Aproaerema anthyllidella* (Hübner, [1813]), stat. nov. The use of subspecies in the Gelechiidae is discussed. *Mesophleps silacella* (Hübner, 1796), *Mesophleps ochracella* (Turati, 1926) and *Anarsia lineatella* Zeller, 1839 are recorded as new to the Canary Islands. We also present several records of species new to single Canary Islands. The paper is illustrated with photographs of adults and genitalia of the new species as well as of other species when relevant. Analyses of DNA barcodes show that the identifications and distinctiveness of each species as well-supported and genetically isolated.
Keywords: Insecta, Lepidoptera, Anacampsini, Chelariini, new species, new records, subspecies, endemic, DNA barcodes, Canary Islands, Spain.

Gelechiidae de las Islas Canarias (España). Parte 1. Anacampsinae (Insecta: Lepidoptera)

Resumen

Se revisa la subfamilia Gelechiidae Anacampsinae en las Islas Canarias. Se reconocen 20 especies y una subespecie de Anacampsini y tres especies de Chelariini. Siete especies y dos subespecies se describen como nuevas: *Stomopteryx palmella* Falck & Karsholt, sp. nov. (España: La Palma), *Stomopteryx cuestaella* Falck & Karsholt, sp. nov. (España: Gran Canaria y Tenerife), *Stomopteryx minimella* Falck & Karsholt, sp. nov. (España: Gran Canaria), *Stomopteryx variabilis* Falck & Karsholt, sp. nov. (España: Gran Canaria, Tenerife, La Gomera, La Palma y El Hierro), *Aproaerema ayacatella* Falck & Karsholt, sp. nov. (España: Gran Canaria), *Aproaerema pseudomercedella* Falck & Karsholt, sp. nov. (España: La Gomera y El Hierro), *Aproaerema angustumella* Falck & Karsholt, sp. nov.

(España: Tenerife y La Palma), *Stomopteryx schizogynae grancanariella* Falck & Karsholt, ssp. nov. (España: Gran Canaria) y *Nothris congressariella tenerifensis* Falck & Karsholt, ssp. nov. (España: Tenerife). El estatus de *Gelechia elachistella* (Stainton, 1859) pasa a ser sinónimo de la subespecie nominotípica de *Aproaerema anthyllidella* (Hübner, [1813]), stat. nov. Se discute el uso de subespecies en los Gelechiidae. *Mesophleps silacella* (Hübner, 1796), *Mesophleps ochracella* (Turati, 1926) y *Anarsia lineatella* Zeller, 1839 se registran como nuevas para las Islas Canarias. También se presentan varios registros de especies nuevas para las Islas Canarias. El artículo está ilustrado con fotografías de adultos y genitalia de las nuevas especies, así como de otras especies cuando es pertinente. Los análisis de los códigos de barras de ADN muestran que las identificaciones y los caracteres distintivos de cada especie están bien fundamentados y aislados genéticamente.
Palabras clave: Insecta, Lepidoptera, Anacampsini, Chelariini, nuevas especies, nuevos registros, subespecies, endemismo, códigos de barras de ADN, Islas Canarias, España.

Introduction

Gelechiidae is a diverse family of very small to medium sized Microlepidoptera comprising worldwide about 5000 described species in about 500 genera, and with numerous species - probably at least equally as many - still awaiting description. They are distributed in all continents except Antarctica.

Whereas there is general agreement about which taxa belong to the Gelechiidae, the higher-level taxonomy of the family has undergone many changes, but a review of these is outside the scope of the present paper. A genetic study by Karsholt et al. (2013) has won general acceptance, although subsequent studies (e.g. Sohn et al. 2016; Wang & Li, 2020), based on more restricted taxon samplings, have suggested alternative relationships between the subfamilies. One can probably expect further changes in the higher-level taxonomy of the Gelechiidae when more southern hemisphere genera are analysed.

This is the first part of a planned series of papers on the Gelechiidae of the Canary Islands (Spain). It follows Karsholt et al. (2013) for the higher systematics and the European checklist of Gelechiidae (Huemer & Karsholt, 2020) for the sequence of genera and species. We here deal with the subfamily Anacampsinae, which is a medium-sized group of about 60 genera falling into two almost equal-sized tribes: Anacampsini and Chelariini, both of which are distributed over a larger part of the world. In the Canary Islands the former is by far the largest and especially the genera *Stomopteryx* Heinemann, 1870 and *Aproaerema* Durrant, 1897 have diversified into a number of endemic species, most of which we describe below.

The first three species of Gelechiidae from the Canary Islands were reported by Rebel (1892). In 1908 Walsingham recorded 28 species of Gelechiidae (a few of them now synonyms) mostly from Tenerife, including descriptions of several new species, mainly based on his own field work. Walsingham (1908) also gave host-plant records and other biological details for some of the species, and presented small, but accurate paintings of several of the species. During most of the 20th century the number of Gelechiidae grew very slowly, until 1984 when Klimesch publish a paper devoted to the Gelechiidae of the Canary Islands. This paper (Klimesch, 1984) listed 49 species (four of them identified only to genus) and had illustrations of the adults and genitalia of a number of species, especially those that are endemic species. During the present century some checklists have been published, enumerating the Gelechiidae of the Canary Islands. Baéz & Martín (2001) listed 53 species, Baéz & Martín (2004) 54 species, and Baéz & Oromi (2010) 57 species of Gelechiidae. The comprehensive catalogue by Vives Moreno (2014) listed also 57 species, and in the online source Fauna Europaea (Karsholt, 2004-2024), with the last update of Gelechiidae in 2011, 63 species of Gelechiidae are listed from the Canary Islands.

Material and methods

Most of the specimens were collected by the first author and attracted to an 8-watt super actinic

light, and some were caught during the day. Specimens from other collectors were mainly attracted to stronger light sources.

Male and female genitalia were dissected and prepared using standard methods (Huemer & Karsholt, 2010). However, male genitalia of Anacampsinae are formed differently from those of Gelechiinae, and therefore the unrolling technique described by, e.g., Pitkin (1986) does not always give the best result for showing differences between closely related species. Instead, we have arranged the male genitalia according to how we can best show diagnostic characters.

For all genera and species synonyms are only listed if they have been used in literature dealing with Gelechiidae of the Canary Islands. Additional synonyms are listed by Vives Moreno (2014) and Huemer & Karsholt (2020).

Details of all examined specimens are listed for newly described species and subspecies. For other species only specimens used for DNA barcoding or for genitalia dissections are listed.

Adults were photographed with a Canon EOS 700D camera equipped with a Canon EF 100 mm objective. The genitalia slides were photographed using a Soptop CX40T Trinocular microscope in conjunction with a Toup Tek P10500AE3 / E3ISPM05000KPA-E3 / 5.0MP USB3 camera.

We examined the morphology of all species and the DNA barcodes from new and cryptic species. DNA samples were prepared as described by Falck & Karsholt (2023: 271). Details of successfully sequenced voucher specimens are publicy available through the dataset DS-ANACAMP at https://www.boldsystems.org. and at https://doi.org/10.5883/DS-ANACAMP.

Plant names are according to World Flora Online (2024).

Abbreviations used

AW Collection of Andreas Werno, Nunkirchen, Germany
MB Collection of Marcos Báez, La Laguna, Tenerife, Spain
PF Collection of Per Falck, Neksø, Denmark
MNCN Collection of Antonio Vives, Museo Nacional de Ciencias Naturales, Madrid, Spain
MZH Finnish Museum of Natural History, Helsinki, Finland
RMNH Naturalis Biodiversity Center, Leiden, The Netherlands
TL Type locality
WS Collection of Willibald Schmitz, Bergisch Gladbach, Germany
ZMUC Zoological Museum, Natural History Museum of Denmark, Copenhagen, Denmark

Checklist

Only synonyms used in literature on Gelechiidae of the Canary Islands are included. For additional synonyms see Vives Moreno (2014).

GELECHIIDAE
ANACAMPSINAE
ANACAMPSINI

Stomopteryx detersella (Zeller, 1847)
Stomopteryx remissella (Zeller, 1847)
Stomopteryx schizogynae schizogynae (Walsingham, 1908)
***Stomopteryx schizogynae grancanariella* Falck & Karsholt, ssp. nov.**
***Stomopteryx palmella* Falck & Karsholt, sp. nov.**
***Stomopteryx cuestaella* Falck & Karsholt, sp. nov.**
***Stomopteryx minimella* Falck & Karsholt, sp. nov.**
***Stomopteryx variabilis,* Falck & Karsholt, sp. nov.**
Aproaerema polychromella (Rebel, 1902)

Aproaerema genistae Walsingham, 1908
adenocarpella Rebel, 1927
Aproaerema thaumalea Walsingham, 1905
Aproaerema anthyllidella (Hübner, [1813])
elachistella (Stainton, 1859), **stat. nov.**
psoralella (Millière, 1865)
infestella (Rebel, 1896)
Aproaerema mercedella Walsingham, 1908
***Aproaerema ayacatella* Falck & Karsholt, sp. nov.**
***Aproaerema pseudomercedella* Falck & Karsholt, sp. nov.**
***Aproaerema angustumella* Falck & Karsholt, sp. nov.**
Mesophleps corsicella Herrich-Schäffer, [1856]
Mesophleps silacella (Hübner, 1796)
Mesophleps oxycedrella (Millière, 1871)
Mesophleps trinotella Herrich-Schäffer, [1856]
Mesophleps ochracella (Turati, 1926)

CHELARIINI

***Nothris congressariella tenerifensis* Falck & Karsholt, ssp. nov.**
Anarsia lineatella Zeller, 1839
Anarsia acaciae Walsingham, 1896

Results

Stomopteryx Heinemann, 1870
Stomopteryx Heinemann, 1870. *Schmett. Dtl. Schweiz,* (2)*2(1),* 324

A genus with more than 60 described, and many undescribed, species, distributed in Africa and Eurasia. Karsholt & Šumpich (2018, p. 237) gave a list of North African species; none of which occurs in the Canary Islands. The adults are very variable in size and colouration, but they have rather similar genitalia. The best diagnostic characters are found in the phallus. In order to examine it, it is necessary to cut it free from the very setose juxta lobes and place it laterally in the genitalia slide.

The larvae live inside stems and roots of various plants. In the Canary Islands only the hostplant of *S. schizogynae* is known.

Stomopteryx detersella (Zeller, 1847)
Gelechia detersella Zeller, 1847. *Isis von Oken, 1847,* 846

Diagnosis: A rather large species with cream-white forewings having more or less distinct brown veins and some brown patches, especially at base, and distinct black spots in fold and at end of cell. The labial palps are upcurved, long and slender. It is not similar to other Gelechiidae in the Canary Islands (Spain). The genitalia resemble those of the other *Stomopteryx* species.

Biology: The biology is imperfectly known, and the larva has not been found in the Canary Islands (Spain). From continental Europe it has been reported to feed in the leafstalk of *Eryngium campestre* L. The few adults are recorded from February to April, at low altitudes.

Distribution in the Canary Islands (Spain): First recorded by Arenberger (1999, p. 13) from Fuerteventura. **New island record**. Lanzarote: Puerto del Carmen, 3-II-1994, leg. J. P. Baungaard (ZMUC).

General distribution: Widely distributed in the Mediterranean countries and southern part of central Europe to Turkey.

Remarks: *S. detersella* is very variable both in size and forewing markings. We have examined

specimens from continental Europe with wingspans from 13 to 25 mm, and some specimens have the forewings plain cream-white.

Stomopteryx remissella (Zeller, 1847)
Gelechia remissella Zeller, 1847. *Isis von Oken, 1847*, 854
Aristotelia remissella rufobasella Rebel, 1916. *Verh. zool.-bot. Ges. Wien, 66,* (10)

Diagnosis: A rather small species with brown head, thorax and basal part of forewing, middle and distal part blackish grey with a couple of black dots and whitish costal and tornal spots. Should not be confused with other gelechiids in the Canary Islands.

DNA barcode: See Remarks below.

Biology: The early stages are unknown, and even the host plant is uncertain.

Distribution in the Canary Islands (Spain): Only recorded from a single specimen from Tenerife, Güímar, 3-X-1966, leg. J. Klimesch (Klimesch, 1984, p. 161).

General distribution: Widely distributed in Europe, especially in the Mediterranean countries and Balkans, northwards to Sweden and eastwards to Russia (Karsholt et al. 2023, p. 103).

Remarks: *S. remissella* seems to represent a species complex. Specimens from continental Europe are variable in size and forewing colour and markings, and also their DNA barcode shows a high degree of variation, falling into eight different BINs (Huemer & Karsholt, 2020, p. 120). We have not had the opportunity to examine the single specimen collected in Tenerife.

Stomopteryx schizogynae schizogynae (Walsingham, 1908) (Figures 1, 41, 41a, 41b, 54, 54a)
Telphusa schizogynae Walsingham, 1908, *Proc. zool. Soc. Lond., 1907,* 936

Material examined: SPAIN, Tenerife, Faro de Rasca, 1 ♂, 17-IV-1998, leg. K. Larsen (ZMUC); Armeñime, 50 m, 1 ♂, 1 ♀, 25-XI-2-XII-2012, leg. P. Falck, genitalia slide 4014PF (PF); El Médano, 20 m, 4 ♂, 1 ♀, 18-XI-8-XII-2018, leg. P. Falck, genitalia slide 4013PF, 4016PF, 4017PF, DNA samples Lepid Phyl 0837PF/CILEP836-21, 0838PF/CILEP837-21, 1428PF/CILEP1427-24, 1429PF/CILEP1428-24 (PF); Puertito de Güímar, 20 m, 3 ♂, 18-XI-8-XII-2018, leg. P. Falck, genitalia slide 4015PF, 4034PF (PF).

Diagnosis: *Stomopteryx schizogynae* is a very characteristic species because of its colour and wing pattern. It resembles no other known *Stomopteryx* species. In the male genitalia the abruptly narrowing, bent and pointed lateral projection of the phallus is characteristic. In the female genitalia the lack of signa is characteristic.

Description Adult (Figure 1): Wingspan 12-15 mm. Labial palp slender, strongly upturned; segment 2 white, with outer surface basally dark grey; segment 3 longer than segment 2, white, lower surface with a black streak, upper surface blackish. Antenna blackish with few scattered white scales, from scapus to about 1/3 a posteriorly white stripe. Head, neck, thorax and tegula as forewing. Forewing whitish grey with a reddish brown tinge, becoming darker grey in apical third; two distinct black plical spots before two distinct black discal spots, one in the middle and one at the end of cell; costa black basally, before apex to tornus a whitish diffuse post-median fascia; fringe grey mottled with few dark grey scales. Hindwing grey; fringe grey.

Variation: The inner plical spot sometimes forming an outwardly oblique streak.

Male genitalia (Figures 41, 41a, 41b): Uncus short, triangular, covered with long setae reaching middle of tegumen. Gnathos laterally broadly rounded, flattened anteriorly. Tegumen elongate, elliptical. Valva narrow, before middle angled and broadened, apex rounded. Vinculum subtriangular with two flaps densely covered with setae covering the phallus. Phallus almost straight, broad and rounded basally, posterior half narrowing towards rounded apex, lateral projection abruptly narrowing, straight, apex bent and pointed.

Female genitalia (Figures 54, 54a): Papillae anales rounded. Posterior apophysis slender, about 1.5 times longer than anterior apophysis. Ostium bursae broadly rounded, weakly sclerotized. Antrum semi-rectangular, rounded anteriorly. Ductus bursae membranous, narrow and relatively short, about the length of segment VII. Corpus bursae oval without signa.

DNA barcodes (Figure 66): We obtained DNA barcode fragments of 500 bp and 473 bp. The intraspecific p-distance is 0%. The barcodes fall within Barcode Index Number (BIN) BOLD: AEI3051. The minimum p-distance between the populations (Tenerife vs. Gran Canaria) is 1.32 %. The minimum p-distance to nearest neighbour, an unnamed Gelechiidae species, is 5.67%.

Biology: The larva lives in galls on stems of *Schizogyne sericea* (L. f.) DC. (Walsingham, 1908, p. 936). The adults were collected at light from the middle of November to the middle of April in coastal areas at low altitudes.

Distribution: Known only from a few coastal locations on the island of Tenerife (Spain). The nominotypical subspecies of *S. schizogynae* is probably endemic to Tenerife.

***Stomopteryx schizogynae grancanariella* Falck & Karsholt, ssp. nov.** (Figure 2)

Holotype ♂: SPAIN, Gran Canaria, Valle de Agaete, 200 m, 1 ♂, 21-III-1979, leg. P. Stadel Nielsen (ZMUC).

Paratypes: SPAIN, Gran Canaria, Puerto Rico, 50 m, 2 ♂, 17-30-IX-2018, leg. P. Falck, genitalia slide 4018PF, DNA sample Lepid Phyl 0834PF/CILEP833-21 (PF); 8 km N Pie de la Cuesta, 895 m, 4 ♂, 17-30-IX-2018, leg. P. Falck, genitalia slide 4019PF, 4041PF, DNA samples Lepid Phyl 0835PF/CILEP834-21, 0836PF/CILEP835-21 (PF).

Diagnosis: *Stomopteryx schizogynae grancanariella* ssp. nov. differs from the nominotypical subspecies in the reduced markings of the forewing, having only a distinct black outwardly oblique streak from near base of dorsum to the cell, while the distinct black plical spots before two distinct black discal spots are missing or only faintly indicated. The genitalia do not differ between these two subspecies.

Description Adult (Figure 2): Wingspan 11.5-15.5 mm. Labial palp slender, strongly upturned; segment 2 white, with outer surface basally dark grey; segment 3 longer than segment 2, white, lower surface with a black streak, upper surface blackish. Antenna blackish with few scattered white scales, from scapus to about 1/3 an anterior white stripe. Head, neck, thorax and tegula as forewing. Forewing whitish grey with a reddish brown tinge, becoming darker grey in apical third; a distinct black outwardly oblique streak from near base of dorsum to the cell; costa black basally, before apex to tornus a whitish diffuse post-median fascia; fringe grey mottled with few dark grey scales. Hindwing grey; fringe grey.

Male genitalia: Identical to those of the nominotypical subspecies.

Female genitalia: Unknown.

DNA barcodes (Figure 66): We obtained full length DNA barcode (658 bp) from one specimen and DNA barcode fragments of 614 bp and 632 bp from two specimens. The intraspecific p-distance is 0%. The barcodes fall within Barcode Index Number (BIN) BOLD: AEI3051. The minimum p-distance to nearest neighbour BIN BOLD: ADZ1582, an unnamed Gelechidae species from South Africa, is 5.67%.

Biology: Early stages unknown. All the specimens were collected at light during March and September at altitudes from 50 m to 895 m.

Distribution: Known from a few locations on the island of Gran Canaria (Spain). Probably endemic to Gran Canaria.

Etymology: The subspecies is named after the island of Gran Canaria (Spain).

Remarks: See also our discussion about subspecies in the discussion chapter at the end of this paper.

***Stomopteryx palmella* Falck & Karsholt, sp. nov.** (Figures 3, 4, 42, 42a, 42b, 55, 55a)

Holotype ♂: SPAIN, La Palma, Barranco del Río, 450 m, 29-VII-11-VIII-2023, leg. P. Falck, genitalia slide 4062PF (ZMUC).

Paratypes: SPAIN, La Palma, 3 km NE El Paso, Pista de Valencia, 800 m, 1 ♂, 7-II-2002, leg. H.

van der Wolf (RMNH); Los Llanos de Aridane, Barranco de las Angustias, 228 m, 1 ♀, 29-V-2016, leg. A. Werno (AW); Tigalate, 670 m, 1 ♂, 1 ♀, 9-30-III-2023, leg. P. Falck, DNA samples Lepid Phyl 1267PF/CILEP1266-23, 1268PF/CILEP1267-24 (PF), same data but, 4 ♂, 4 ♀, 29-VII-11-VIII-2023, leg. P. Falck, genitalia slide 3950PF, 4006PF, 4007PF, 4009PF, DNA sample Lepid Phyl 1393PF/CILEP1392-23 (PF), same data but, 18 ♂, 28 ♀, 10-30-XI-2023, leg. P. Falck, genitalia slide 4058PF, 4060PF (PF, MNCN); Los Cancajos, 10 m, 1 ♂, 1 ♀, 10-30-XI-2023, leg. P. Falck, genitalia slide 4042PF (PF); Barranco del Río, 450 m, 3 ♂, 29-VII-11-VIII-2023, leg. P. Falck (PF); Barranco de la Madera, 500 m, 2 ♂, 29-VII-11-VIII-2023, leg. P. Falck (PF), same data but, 1 ♂, 5 ♀, 10-30-XI-2023, leg. P. Falck (PF); Los Sauces, 200 m, 1 ♀, 10-30-XI-2023, leg. P. Falck; Los Llanos, 750 m, 1 ♀, 5-25-I-2024, leg. P. Falck (PF).

Diagnosis: *Stomopteryx palmella* sp. nov. is characterized by the dark grey colour and the lighter grey, often reddish brown (in fresh specimens) coloration towards the costa, three distinct black spots in the fold, at 1/3 and at end of the cell, basal part of costa black. In the male genitalia the angled valva and the short hook-like lateral projection of the phallus are characteristic. In the female genitalia the long and relatively broad ductus bursae and the small rounded signa are characteristic.

Description Adult (Figures 3, 4): Wingspan 10.5-14 mm. Labial palp slender, strongly upturned; segment 2 dark grey, with whitish inner and upper surface; segment 3 longer than segment 2, white, lower surface with a black streak. Antenna grey and ringed dark brown, scape black. Head, neck and thorax dark grey with lighter tipped scales. Forewing dark grey, lighter grey from the fold towards costa, mottled with black in apical part; an indistinct black spot near base on dorsum; a distinct black plical spot at 1/3; two distinct black discal spots at each end of the cell; costa black basally, at 3/4 an indistinct yellowish spot; fringe grey with few black-tipped scales. Hindwing grey; fringe grey.

Variation: The lighter grey part of the forewing sometimes has a reddish brown tinge, or it may be absent.

Male genitalia (Figures 42, 42a, 42b): Uncus triangular, covered with long strong setae reaching middle of tegumen. Gnathos broadly rounded. Tegumen elongate, elliptical. Valva narrow, angled and broadened before middle, apex rounded. Vinculum subtriangular with two flaps densely covered with setae covering the phallus. Phallus almost straight, posterior half beak-like, distally rounded, lateral projection with small pointed, sclerotized hook.

Female genitalia (Figures 55, 55a): Papillae anales rounded. Posterior apophysis slender, twice as long as anterior apophysis. Antrum small, rectangular and sclerotized. Ductus bursae membranous, about three times longer than corpus bursae and relatively broad, slightly narrowing towards antrum. Corpus bursae oval with two small rounded signa, covered with very small spines.

DNA barcodes (Figure 66): We obtained full length DNA barcodes (658 bp) from two specimens. The barcodes fall within Barcode Index Number (BIN) BOLD: AFG5360. The intraspecific p-distance is 0.16%. The minimum p-distance to nearest neighbour *Stomopteryx* sp. (from Kyrgyzstan) is 7.21%.

Biology: Early stages unknown. All the specimens were collected at light from January to late November, at altitudes from 10 m to 800 m.

Distribution: Known from several scattered locations on the island of La Palma (Spain). Probably endemic to La Palma.

Etymology: The species is named after its place of occurrence, the island of La Palma.

***Stomopteryx cuestaella* Falck & Karsholt, sp. nov.** (Figures 5, 43, 43a, 43b, 56, 56a)

Holotype ♀: SPAIN, Gran Canaria, Pie de la Cuesta, 500 m, 9-22-VI-2021, leg. P. Falck, genitalia slide 4021PF (ZMUC).

Paratypes: Spain, Gran Canaria, Mogán, 5 km E Soria, 800 m, 16 ♂, 3 ♀, 22-30-VII -1995, leg. K. Larsen; 2 km S Andrés, Mogán, El Baranquillo, 3 ♂ 24-VII-1995, leg. K. Larsen; Inagua, Tasarte, 600 m, 8 ♂, 2 ♀, 28-VII-1995, leg. K. Larsen; Cueva de la Ninas, 800 m, 2 ♀, 29-VII-1995, leg. K. Larsen (all ZMUC, MNCN); Pie de la Cuesta, 500 m, 8 ♂, 11-24-VI-2018, leg. P. Falck, genitalia slide 3936PF, DNA sample Lepid Phyl 0074PF/CILEP74-19 (PF), same data but, 15 ♂, 2 ♀, 21-VIII-4-IX-

2020, leg. P. Falck (PF), same data but, 6 ♂, 1 ♀, 9-22-VI-2021, leg. P. Falck (PF); Ayacata, 1400 m, 1 ♂, 9-22-VI-2021, leg. P. Falck (PF); Barranco de Guayadeque, 800 m, 1 ♂, 1 ♀, 9-22-VI-2021, leg. P. Falck, genitalia slide 4040PF (PF); Fontanales, 1100 m, 1 ♂, 1 ♀, 8-20-VIII-2020, leg. P. Falck (PF). TENERIFE, Aguamansa, 1300 m, 1 ♂, 1-VIII-1979, leg. P. Stadel Nielsen (ZMUC); Teide, La Crucita, 2190 m, 1 ♂, 8-VIII-2018, leg. K. Larsen (ZMUC); 4 km S Aguamansa, 1400 m, 1 ♂, 1 ♀, 13-26-VIII-2019, leg. P. Falck, genitalia slide 4022PF, 4023PF, DNA samples Lepid Phyl 0334PF/CILEP333-19, 0335PF/CILEP334-19 (PF).

Diagnosis: *Stomopteryx cuestaella* sp. nov. is characterized by having dark to blackish brown forewings with indistinct black markings and yellowish spots at costa before apex and in the fold. It resembles *S. hungaricella* Gozmány, 1957 from continental Europe, which is without a black spot followed by yellowish in the fold. *S. lusitaniella* Corley & Karsholt, 2014, also from continental Europe, is a more slender-winged species without marking in the forewings. *S. alpinella* Nel & Varrene, 2016 from the European Alps is characterized by more distinct black markings in the forewing and white-tipped scales in the apical part of the wing; the lateral process of the phallus is distinctly larger than in *S. cuestaella* sp. nov. The rather variable North African *S. nigricella* (Chrétien, 1915) is smaller and has more markings in the forewing. In the male genitalia of *S. cuestaella* sp. nov. the short, straight, lateral projection of the phallus with a small tooth-like apex is characteristic. They mostly resemble *S. hungaricella*, which has a shorter posterior part of phallus. In the female genitalia the large signa with longitudinal ridges are characteristic.

Description Adult (Figure 5): Wingspan 9.5-16 mm. Labial palp slender, strongly upturned; segment 2 dark brown, inner surface whitish; segment 3 slightly shorter than segment 2, whitish, lower surface heavily mottled with blackish brown. Antenna blackish; scape black. Head, neck, thorax and tegula dark brown. Forewing dark brown; two black, indistinct discal spots, and two black, very indistinct plical spots; distal plical spot followed by small indistinct orange spot; costal spot yellowish, rather distinct opposite indistinct tornal spot; fringe dark grey with a mixture of black-tipped scales. Hindwing dark grey-brown; fringe dark grey.

Variation: There is slight variation in the colour of the forewings, from dark brown to blackish brown.

Male genitalia (Figures 43, 43a, 43b): Uncus subrectangular, covered with long strong setae reaching beyond middle of tegumen. Gnathos laterally broadly rounded, flattened anteriorly. Tegumen elongate, elliptical. Valva narrow, evenly rounded, slightly broadened before middle, apex rounded. Vinculum subtriangular with two flaps densely covered with setae covering the phallus. Phallus almost straight, posterior half slightly tapering, distally rounded, lateral projection short, straight, apex with a small tooth-like process.

Female genitalia (Figures 56, 56a): Papillae anales rounded. Posterior apophysis slender, as long as anterior apophysis. Antrum small, rounded, cup-shaped and membranous. Ductus bursae membranous, about 1.5 times longer than corpus bursae. Corpus bursae membranous, oval with two long ridged, sclerotized signa, edge irregular.

DNA barcodes (Figure 66): We obtained full length DNA barcodes (658 bp) from two specimens and DNA barcode fragments of 637 from one specimen. The barcodes fall within two Barcode Index Numbers (BIN) BOLD: ADU1068 (one specimen from Gran Canaria) and BOLD: AEC4744 (two specimens Tenerife), the minimum p-distance between the BINs is 2.88%. The maximum intraspecific p-distance is high 3.04%. The nearest neighbour is *Stomopteryx flavipalpella* Jäckh, 1959 with a 4.74% divergence.

Biology: Early stages and hostplant are unknown. Adults have been collected at light from June to the beginning of September, at altitudes from 800 m to 1400 m.

Distribution: Endemic to the Canary Islands (Spain) and only known from the mountain areas on the islands of Gran Canaria and Tenerife.

Etymology: The species is named after the small-town Pie de la Cuesta situated near the type-locality.

***Stomopteryx minimelia* Falck & Karsholt, sp. nov.** (Figures 6, 44, 44a, 57, 57a)

Holotype ♂: SPAIN, Gran Canaria, Cueva de las Niñas, 800 m, 29-VII-1995, leg. K. Larsen (ZMUC).

Paratypes: SPAIN, Gran Canaria, San Bartolomé de Tirajana, 1000 m, 1 ♂, 5-VIII-1979, leg. P. Stadel Nielsen; Mogán 5 km E Soria, 800 m, 1 ♂, 1 ♀, 22-30-VII. 1995, leg. K. Larsen (ZMUC); 2 km S Andrés, Mogán El Baranquillo, 1 ♀ 24-VII-1995, leg. K. Larsen, genitalia slide ZM4081PF; Inagua, Tasarte, 600 m, 2 ♂, 28-VII-1995, leg. K. Larsen; Cueva de las Niñas, 800 m, 3 ♂, 11 ♀, 29-VII-1995, leg. K. Larsen (ZMUC, MNCN); Ayacata, 1400 m, 1 ♂, 9-22-VI-2021, leg. P. Falck, genitalia slide 4055PF, DNA sample Lepid Phyl 0924PF/CILEP923-21 (PF).

Diagnosis: *Stomopteryx minimella* sp. nov. is characterized by its small wingspan and having grey, towards apex blackish, mottled forewings with two rather distinct and large black discal spots and a cream-white post-median fascia. It may resemble very small specimens of *S. remissella*, but that species has brownish (not greyish) forewings. In the male genitalia the triangular juxta lobes and the medial tooth-like projection of the slightly bent, pointed lateral projection of the phallus are characteristic. In the female genitalia the signa are characteristic.

Description Adult (Figure 6): Wingspan 8 mm. Labial palp slender, strongly upturned; segment 2 dark whitish, outer surface basally dark grey; segment 3 slightly longer than segment 2, white, lower surface with a black streak. Antenna blackish, distinctly white ringed. Head and neck lead grey. Thorax grey. Forewing grey, mottled with dark-tipped scales, blackish apically; two black discal spots, one small spot at 1/4 and one large spot at 1/2; from costa to tornus a rather distinct, cream-white post-median fascia edged by black; fringe grey, fringe-line with black-tipped scales. Hindwing grey; fringe grey.

Male genitalia (Figures 44, 44a): Uncus subrectangular, covered with long strong setae reaching more than middle of tegumen. Gnathos laterally broadly rounded, flattened anteriorly. Tegumen elongate, elliptical. Valva narrow, evenly rounded, slightly broadened before middle, apex rounded. Vinculum subtriangular with two, setae covered, triangular flaps covering the phallus. Phallus almost straight, posterior half slightly tapering, distally rounded, lateral projection slightly bent, near apex a medial tooth-like process, apex pointed.

Female genitalia (Figures 57, 57a): Papillae anales slightly elongate. Posterior apophysis slender, 1/5 longer than anterior apophysis. Antrum membranous, laterally with two small, sclerotized areas. Ductus bursae membranous. Corpus bursae membranous, oval; signa rounded with a tooth-like projection.

DNA barcode (Figure 66): We obtained full length DNA barcode (658 bp) from one specimen. The barcode falls within Barcode Index Number (BIN) BOLD: AEM8857. The minimum p-distance to nearest neighbour, an unnamed Gelechiidae from Pakistan, with BIN BOLD: ACW9764 is 4.79%.

Biology: Early stages and hostplant are unknown. Adults have been collected at light from late June to the beginning of August, at altitudes from 600 m to 1400 m.

Distribution: Known from several scattered locations on the island of Gran Canaria (Spain). Probably endemic to Gran Canaria.

Etymology: The species is named because of its small size, from the Latin adjective *minimus* meaning smallest.

Remarks: *S. minimella* sp. nov. is probably related to the similar small *S. biangulata* Meyrick, 1921 from Mozambique, but differs in details of wing markings and genitalia (see Janse, 1951: 244-245, pls CVIII-CVIX).

***Stomopteryx variabilis* Falck & Karsholt, sp. nov.** (Figures 7-12, 45, 45a, 45b, 58, 58a)

Holotype ♀: SPAIN, Tenerife, Aguamansa, 1300 m, 1-VIII-1979, leg. P. Stadel Nielsen, genitalia slide 4160OK (ZMUC).

Paratypes: SPAIN, Gran Canaria, Barranco de la Virgen, Moya, 400 m, 5 ♂, 20-VII-1984, leg. P. Olsen, B. Skule & P. Stadel Nielsen; Mogán, Barranco de Arguineguín, 1 ♂, 1 ♀, 21-VII-1-VIII-1995,

leg. K. Larsen (all ZMUC); Barranco de Guayadeque, 1 ♂, 17-IV-2000, leg. M. Baéz (MB); Ayagaure, Alto Stausse, 1000 m, 1 ♀, 6-IX-2012, leg. A. Werno (AW); Pie de la Cuesta, 500 m, 15 ♂, 13 ♀, 11-24-VI-2018, leg. P. Falck, genitalia slide 3937PF, 3942PF, 3947PF, 3949PF, 3951PF, 4008PF, 4035PF (PF), same data but, 1 ♀, 17-30-IX-2018, P. Falck (PF, MNCN); Barranquillo Andrés, 700 m, 1 ♂, 2 ♀, 11-24-VI-2018, leg. P. Falck, genitalia slide 4004PF, 4005PF (PF); Los Tilos de Moya, 500 m, 1 ♂, 17-30-IX-2018, leg. P. Falck (PF); Carreteria, 455 m, 9 ♂, 2 ♀, 8-20-VIII-2020, leg. P. Falck, genitalia slide 4050PF (PF); Barranco de Azuaje, 270 m, 4 ♂, 5 ♀, 8-20-VIII-2020, leg. P. Falck, DNA samples Lepid Phyl 0840PF/CILEP839-21, 0841PF/CILEP840-21, 0843PF/CILEP842-21 (PF); Barranco Moya, 80 m, 1 ♂, 3 ♀, 8-20-VIII-2020, leg. P. Falck (PF). Tenerife; Aguamansa, 1300 m, 3 ♂, 5 ♀, 29-VII-1979, leg. P. Stadel Nielsen; Las Cañadas, 2100 m, 4 ♂, 23-VII-1984, leg. P. Olsen, B. Skule & P. Stadel Nielsen; Barranco de Badajoz, 1♂ 11-VII-1994, leg. M. Baéz (MB); Bco. Harques, 2 ♂, 20-VII-1995, leg. M. Baéz (MB); Güímar, Barranco de Badajoz, 700 m, 1 ♀, 1-VII-2003, leg. O. Czadek (ZMUC); 3 km N San Andrés, 2 ♀, 10-IX-2014, leg. A. Werno (AW); Anaga, Roque Negro, 615 m, 1 ♂, 7-9-VIII-2018, leg. K. Larsen (ZMUC); Teide, La Crucita, 2190 m, 1 ♀, 8-VIII-2018, leg. K. Larsen (ZMUC); Aguamansa, 1050 m, 20 ♂, 10 ♀, 13-26-VIII-2019, leg. P. Falck, genitalia slides, 4038PF, 4051PF, 4053PF, DNA samples Lepid Phyl 0844PF/CILEP843-21, 0845PF/CILEP844-21, 0845PF/CILEP844-21 (PF, MNCN); Arona, 670 m, 23 ♂, 9 ♀, 21-V-3-VI-2019, leg. P. Falck (PF), same data but, 1 ♂, 1 ♀, 3-16-VIII-2021, leg. P. Falck, genitalia slide 3933PF (PF); Las Manchas, 1050 m, 2 ♂, 21-V-3-VI-2019, leg. P. Falck (PF), same data but, 1 ♂, 1 ♀, 3-16-VIII-2021, leg. P. Falck, genitalia slide 3932PF (PF); Güímar, 500 m, 2 ♂, 5 ♀, 3-16-VIII-2021, leg. P. Falck (PF); El Caletón, 160 m, 2 ♂, 3 ♀, 1-13-VI-2022, leg. P. Falck, genitalia slide 3943PF (PF). La Gomera; El Cedro, 1000 m, 1 ♂, 1 ♀, 24-25-VII-1984, leg. P. Olsen, B. Skule & P. Stael Nielsen; El Cedro, 870 m, 3 ♂, 1 ♀, 17-20-VIII-2018, K. Larsen; 2 km S Hermigua, 520 m, 2 ♀, 18-19-VIII-2018, K. Larsen (all ZMUC); Hermigua, 250 m, 19 ♂, 11 ♀, 9-12-VIII-2021, leg. P. Falck, genitalia slide 3940PF, 3948PF, 4037PF, 4049PF, DNA samples Lepid Phyl 0912PF/CILEP911-21, 0913PF/CILEP912-21, 0914PF/CILEP913-21 (PF); La Palma; Barranco de las Nieves, 250 m, 7 ♂, 13-16-VIII-2018, leg. K. Larsen (ZMUC); Tigalate, 670 m, 1 ♂, 9 ♀, 29-VII-11-VIII-2023, leg. P. Falck, genitalia slide 3945PF, DNA sample Lepid Phyl 1396PF/CILEP1395-23 (PF); Barranco de la Madera, 500 m, 3 ♂, 1 ♀, 29-VII-11-VIII-2023, leg. P. Falck, genitalia slide 3935PF, 4011PF, DNA sample Lepid Phyl 1395PF/CILEP1394-23 (PF); Barranco del Rio, 450 m, 3 ♂, 12 ♀, 29-VII-11-VIII-2023, leg. P. Falck, genitalia slide 3939PF, 3952PF, 4010PF (PF, MNCN); Las Toscas, 150 m, 1 ♂, 3 ♀, 29-VII-11-VIII-2023, leg. P. Falck, genitalia slide 4039PF (all PF); El Hierro; Frontera, El Sitio, 340 m, 4 ♂, 10-12-VIII-2018, leg. K. Larsen (ZMUC); Erese, 700 m, 14 ♂, 16 ♀, 22-VII-3-VIII-2022, leg. P. Falck, genitalia slide 3938PF, 3946PF, 4036PF, 4048PF (PF, MNCN); Sabinosa, 100 m, 1 ♂, 3 ♀, 22-VII-3-VIII-2022, leg. P. Falck (PF); Tacorón, 170 m, 2 ♂, 8 ♀, 22-VII-3-VIII-2022, leg. P. Falck, genitalia slide 3934PF, 4059PF, DNA sample Lepid Phyl 1228PF/CILEP1227-23 (PF); Cruz de los Reyes, 1360 m, 1 ♂, 1 ♀, 22-VII-3-VIII-2022, leg. P. Falck (PF); Jinama, 1250 m, 2 ♂, 3 ♀, 22-VII-3-VIII-2022, leg. P. Falck, DNA sample Lepid Phyl 1229PF/CILEP1228-23 (PF); Frontera, 280 m, 1 ♂, 22-VII-3-VIII-2022, leg. P. Falck, genitalia slide 3941PF (PF).

Diagnosis: The species is characterized by its high variability. However, all forms are characterized by the yellowish-brown colour along the dorsum and the meadian longitudinal black streak and they resemble no other known *Stomopteryx* species. In the male genitalia the relatively long pointed lateral projection of the phallus is characteristic. In the female genitalia the triangular signa are characteristic.

Description Adult (Figures 7-12): Wingspan 10-16 mm. Labial palp slender, strongly upturned; segment 2 cream white, with outer surface basally dark brown; segment 3 slightly longer than segment 2, white, lower surface with a black streak and black tip. Antenna blackish; scape black. Head, neck and thorax yellowish white. Tegula yellowish white, basally dark brown. Forewing yellowish brown, grey along costa and mottled with grey and brown scales in apical part; from the base to the distal end of cell a median, broad, black streak; fringe grey with some black-tipped scales, sometimes forming an outer fringe-line. Hindwing grey; fringe grey.

Variation: *S.variabilis* exhibits considerable geographical variation. The above description applies to specimens from Tenerife and La Palma. Specimens from El Hierro and Gran Canaria have the forewings dark brown, yellowish brown along the dorsum and an indistinct yellowish white post-median fascia, and the black median streak is narrower and more irregular. The black streak is shorter in specimens from the Gran Canaria. Specimens from La Gomera are very similar to specimens from El Hierro, but the costal half of the forewing is greyish.

Male genitalia (Figures 45, 45a, 45b): Uncus triangular, covered with long strong setae reaching beyond middle of tegumen. Gnathos broadly rounded. Tegumen elongate, elliptical. Valva narrow, evenly rounded, before middle slightly broadened, apex rounded. Vinculum subtriangular with two flaps densely covered with setae covering the phallus. Phallus almost straight, posterior half tapering, distally rounded, lateral projection half the length of phallus, slightly bent, apex pointed.

Female genitalia (Figures 58, 58a): Papillae anales rounded. Posterior apophysis slender, longer than anterior apophysis. Antrum small, rounded and membranous. Ductus bursae membranous, about 1.5 times longer than corpus bursae. Corpus bursae oval with two rounded signa, in lateral view triangular. The signa may vary in size.

DNA barcodes (Figure 66): We obtained full length DNA barcodes (658 bp) from ten specimens and DNA barcode fragments of 621 bp, 622bp 632 bp and 584bp from four specimens. The barcodes fall within three Barcode Index Numbers (BIN) BOLD: AEI4402 (four specimens from Tenerife), BOLD: AEI0944 (three specimens from Gran Canaria) and BOLD: AEN4981 (seven specimens from La Gomera (3), La Palma (2) and El Hierro (2)). The minimum p-distance between the BIN´s is 1.86% (AEN4981 vs. AEI4402), 3.09% (AEI0944 vs. AEI4981) and 3.49% (AEN4981 vs. AEI4402). The maximum intraspecific p-distance is very high 4.28%. The minimum p-distance to nearest neighbour, an unnamed Gelechiidae species from South Africa, is 5.68% .

Biology: Early stages and hostplant are unknown. Adults have been collected at light from the middle of April to the end of September, at altitudes from 150 m to 2190 m.

Distribution: Known from several locations on the islands of Gran Canaria, Tenerife, La Gomera, La Palma and El Hierro. Endemic to the Canary Islands, Spain.

Etymology: The species is named after the variable adults.

Remarks: Despite the high intraspecific divergence in COI and the very high variation in adult appearance between the island populations, we were not able to find morphological differences in the genitalia. Further, the DNA barcodes suggests that only one species is involved. The maximum intraspecific p-distance in BIN BOLD: AEN4981 is only 1.28%, which includes very different looking specimens e.g., between populations from El Hierro and La Palma. Single specimens from Tenerife are similar to specimens from both La Gomera and Gran Canaria. There is also no correlation in size of the signa between the different populations.

The species is figured by Klimesch (1984: 181) as *Stomopteryx* sp.

Aproaerema Durrant, 1897
Aproaerema Durrant, 1897, *Ent. Month. Mag., 33*, 221

In its current concept this genus includes more than 90 described species, distributed in all continents except Antartica, but with most species in Europe and South Africa. The larvae of most species feed on Fabaceae.

A. mercedella Walsingham, 1908 and the three closely related species described as new below form a separate group within the genus *Aproaerema*, differing especially in the uncus-gnathos complex: the rounded uncus is without pecten, and the gnathos is subtriangular. Other parts of the genitalia are similar to those of other *Aproaerema* species. Such differences may indicate that these species could belong in a separate genus. However, we refrain from introducing a new genus until there is a better overview of the genera of Anacampsini. This group of species seems to be endemic to the Canary Islands. According to Huemer et al. (2020, Suppl. material 2, NJ tree 10) *A. mercedella* is nested within the genus *Aproaerema*.

Aproaerema polychromella (Rebel, 1902) (Figures 13, 14)
Anacampsis polychromella Rebel, 1902. *Dt. ent. Z. Iris, 15, 109*

Material examined: SPAIN, Gran Canaria, Pie de la Cuesta, 500 m, 1 ♂, 17-30-IX-2018, leg. P. Falck, DNA sample Lepid Phyl 0076PF/CILEP76-18. La Gomera, Hermigua, 170 m, 1 ♀, 1-8-I-2023, leg. P. Falck, DNA sample Lepid Phyl 1548PF/CILEP1547-24 (PF).

Diagnosis: A rather small species (wingspan 9-11 mm), with basally brownish shining forewings becoming blackish in apical half and characterized by a broad white, apically irregular post-median fascia. The genitalia are similar to those of *A. genistae*.

Biology: The biology is imperfectly known, but the larva probably feeds on Fabaceae. (Klimesch, 1984: 162) found adults amongst *Lotus sessilifolius* DC. Adults are recorded during almost all months of the year, mostly in late autumn, at lower altitudes.

Distribution in the Canary Islands (Spain): First record by Klimesch (1984, p. 162) from Gran Canaria, Tenerife, La Gomera and La Palma. Also, on Fuerteventura (Báez, 1998, p. 188). **New island record**. El Hierro, Sabinosa, 100 m, 22-VII-3-VIII-2022, leg. P. Falck (PF).

General distribution: A sub-tropical and tropical species occurring in the Mediterranean countries, northwards to SW France; Africa, Near East and India. In recent years mostly as singletons in several areas in NW Europe, probably due to migration (Gregersen & Karsholt, 2022, p. 90).

Remarks: It is surprising that the early stages of this common and widespread species are imperfectly known.

A. polychromella is a rather variable species through its distribution area. The population in the Canary Islands varies in the colour basally of the forewing from dark brown to shining golden, and the post-median fascia varies in width (Figures 13, 14).

Aproaerema genistae Walsingham, 1908 (Figures 15-18, 46, 59)
Aproaerema genistae Walsingham, 1908. *Proc. zool. Soc. Lond., 1907,* 933, pl. 51, fig. 8.
Aproaerema adenocarpella Rebel, 1927 in Hering. *Zool. Jb. (Syst.) 53,* 425

Material examined: SPAIN, Gran Canaria, Pinos de Galdar, 1200 m, 1 ♂, 1 ♀, 22-VII-1984, leg. P. Olsen. P. Stadel Nielsen & B. Skule, DNA sample TLMF Lep.25523, genitalia slide 1708 Hendriksen (ZMUC); Pie de la Cuesta, 500 m, 1 ♀, 11-24-VI-2019, DNA sample Lepid Phyl 0069PF/CILEP69-19, same data but 2 ♀, 17-30-IX-2019, leg. P. Falck, DNA samples Lepid Phyl 0071PF/CILEP71-19, 0072PF/CILEP72-19; Ayacata, 1400 m, 1 ♂, 3 ♀, 17-30-IX-2019, leg. P. Falck, genitalia slide GP3982PF, GP3984PF, GP3986PF, GP4030PF. Tenerife, Las Manchas, 1050 m, 2 ♂, 5 ♀, 17-30-IX-2019, leg. P. Falck, DNA samples Lepid Phyl 0067PF/CILEP67-19, 0068PF/CILEP68-19, genitalia slide GP3980PF, GP3987PF, GP3989PF, GP4039PF, GP4070PF; Arona, 600 m, 1 ♀, 1-20-III-2017, leg. P. Falck, genitalia slide GP4075PF; Barranquillo Andrés, 700 m, 1 ♀, 11-24-VI-2019, leg. P. Falck, DNA sample Lepid Phyl 0070PF/CILEP70-19. La Palma, Tigalate, 670 m, 1 ♂, 6 ♀, 29-VII-11-VIII-2023, leg. P. Falck, DNA sample Lepid Phyl 1430PF/CILEP1429-24, genitalia slide GP3981PF, GP3985PF, GP4042PF, GP4044PF, GP4045PF, GP4067PF (all PF).

Diagnosis: A rather small species (wingspan 7-11 mm) having black forewings with a more or less light brownish basal half, a slender whitish, oblique post-median fascia, and apical part of wing with grey, black-tipped scales. The genitalia (Figures 46, 59) are similar to those of *A. polychromella*, but distinctly different from those of *A. anthyllidella*.

DNA barcode (Figure 66): We obtained full length DNA barcodes (658 bp) from five specimens and DNA barcode fragments of 624 bp, 639bp from two specimens. The barcodes fall within two Barcode Index Numbers (BIN) BOLD: ADL6169 (six specimens from Gran Canaria (4) and Tenerife (2) and BOLD: AEI0944 (one specimen from La Palma). The minimum p-distance between the BINs is 3.38%. The maximum intraspecific p-distance is very high 3.84%. The minimum p-distance to nearest neighbour, *Aproaerema polychromella*, is 5.64%.

Biology: The larva feeds during May among shoots of *Genista canariensis* L. (Walsingham, 1908: 934) and *Adenocarpus foliolosus* DC. (Hering 1927).

Distribution in the Canary Islands (Spain): First record by Walsingham (1908, p. 933) from

Tenerife. Additionaly from Lanzarote (Báez, 1998, p. 188), Gran Canaria (Hering, 1927, p. 426) and La Palma (Klimesch, 1984: 163). **New island record**: La Gomera, Arure, 820 m, 1 ♀, 9-16-III-2024, leg. P. Falck (PF).

General distribution: Endemic to the Canary Islands (Spain).

Remarks: *Aproaerema adenocarpella* was synonymized with *A. genistae* by Klimesch (1984, p. 163).

A. genistae varies in the colour basally of the forewing from almost dark brown to reddish brown, and the post-median fascia varies in width (Figures 15-18). There is no correlation between the different forms and the populations. Despite the divergence in the barcodes between the populations from Gran Canaria/Tenerife and La Palma, we found no morphological differences either in the adults or in the genitalia.

Aproaerema thaumalea Walsingham, 1905 (Figures 19, 20)

Aproaerema thaumalea Walsingham, 1905, *Ent. mon. Mag., 41,* 41

Material examined: SPAIN, Fuerteventura, Lajares, 50 m, 1 ♂, 1-27-XI-2017, leg. P. Falck, DNA sample Lepid Phyl 0077PF/CILEP77-19, same data but, 1 ♂, 6-26-I-2020, leg. P. Falck, genitalia slide GP3990PF. Tenerife, El Médano, 20 m, 1 ♂, 1 ♀, 1-20-III-2017, leg. P. Falck genitalia slides GP3991PF, GP3993PF (all PF).

Diagnosis: A very characteristic species. The pattern of the forewings resembles those of *A. polychromella*, but differs by the large, triangular white spot from base to 1/3 of costa. The genitalia are similar to those of *A. polychromella*.

DNA barcode (Figure 66): Barcode index number (BIN) BOLD: ADO5854.

Biology: The larva feeds on *Lotus sessilifolius* DC., forming sand-galleries beneath the trailing shoots (Walsingham, 1908, p. 934).

Distribution in the Canary Islands (Spain): First record by Walsingham (1908, p. 934) from Tenerife. Also, on La Gomera (Báez, 1998, p. 188). **New island records**. Fuerteventura, Jandia, Barranco de Esquinzo, 20-IV-3-V.2000, leg. R. Pass (WS) and Lanzarote, Caleta de Famara, 21-X-10-XI-2019, leg. P. Falck (PF).

General distribution: Canary Islands (Spain), Morocco, Algeria, Libya.

Aproaerema anthyllidella (Hübner, [1813]) (Figures 21-24)

Tinea anthyllidella Hübner, [1813], *Samml. eur. Schmett*., 8, pl. 48, fig.330

Gelechia elachistella Stainton, 1859, *Ann. Mag. nat. Hist.* (3)*3,* 213, stat. nov.

Gelechia psoralella Millière, 1865, *Iconogr. Descr. Chenilles Lépid. inédits 2,* 83, 99, pl. 61, figs 1-6

*Anacampsis infestella R*ebel, 1896, *Annln naturhist. Mus. Wien, 11,* 128

Material examined: SPAIN, Fuerteventura, Corralejo, 10 m, 1 ♂, 7-27-XI-2017, leg. P. Falck, genitalia slide GP3979PF. Gran Canaria, Degollada de Tasartico, 150 m, 1 ♂, 28-VII-1995, leg. K. Larsen, genitalia slide ZM4079PF (ZMUC); Pie de la Cuesta, 500 m, 1 ♀, 4-23-III-2019, leg. P. Falck, genitalia slide GP3988PF. Tenerife, Buenavista del Norte, 1 ♂, 18-IV-1998, leg. K. Larsen, genitalia slide ZM4078PF (ZMUC); El Médano, 10 m, 1 ♀, leg. P. Falck, DNA sample Lepid Phyl 0075PF/CILEP75-18; La Palma, Barranco de la Madera, 500 m, 1 ♀, leg. P. Falck, DNA sample Lepid Phyl 1558PF/CILEP1557-24, genitalia slide GP4043PF; Tigalate, 670 m, 1 ♂, 29-VII-11-VIII-2023, leg. P. Falck, genitalia slide GP3983PF; Los Llanos, 150 m, 1 ♂, 9-30-III-2023, leg. P. Falck, genitalia slide GP3978PF. El Hierro, Sabinosa, 100 m, 1 ♀, 22-VII-3-VIII-2022, leg. P. Falck, DNA sample Lepid Phyl 1561PF/CILEP1560-24, genitalia slide GP3992PF (all PF).

Diagnosis: A rather small species of variable wingspan (7-13 mm), having black forewings with more or less distinct costal and tornal spots and a small but characteristic whitish spot in the fold. The very characteristic genitalia are figured by, e.g., Gregersen & Karsholt (2022).

Variation (Figures 21-24): *A. anthyllidella* is a variable species, both in size, colour and wing markings. Females are generally stronger marked than males, with distinct white or yellowish white

costal and tornal spots which in some specimens can be fused to a transverse fascia. Some specimens, especially males, are almost black.

DNA barcodes (Figure 66): We obtained full length DNA barcodes (658 bp) from three specimens. The barcodes fall within Barcode Index Number (BIN) BOLD: AAD2266. The maximum intraspecific p-distance is 4.41%. The minimum p-distance to nearest neighbour BOLD: AAD2267, also *Aproaerema anthyllidella*, is 2.17%.

Biology: The larva is known to feed on a number of different Fabaceae. In the Canary Islands it has been recorded from *Lotus glaucus* Aiton and *Bituminaria bituminosa* (L.) C.H. Stirt. (= *Psoralea bituminosa*), feeding between spun together shoots and leaves which are mined (Walsingham, 1908, p. 932; Klimesch 1984, p. 160-164), and from *Medicago sativa* L. (label data). Adults are recorded during almost all months of the year, at altitudes from sea level to 1050 m.

Distribution in the Canary Islands (Spain): First recorded from Tenerife by Rebel (1896, p. 127). Additionally, from Fuerteventura (Arenberger, 1999, p. 13), Gran Canaria (Walsingham, 1908, p. 933), La Gomera (Klimesch, 1984, p. 160), La Palma (Rebel, 1938, p. 89) and El Hierro (Báez & Martín, 2001, p. 238). **New island record**: Lanzarote, Puerto del Carmen, 1-5-II-1994, leg. J. P. Baungaard (ZMUC). A widespread and common species.

General distribution: Widely distributed throughout the Palaearctic region; North America.

Remarks: *Gelechia elachistella* was described from the small island of Ilhéu Chão in the Madeira archipelago. Similar to most other specimens of *A. anthyllidella* from Madeira it is characterized by having more distinct whitish costal and tornal spots when compared with most female specimens from continental Europe. Similar female forms were described by Rebel (1896) as *Anacampsis infestella* from Tenerife (lectotype figured by Ungureanu & Murariu, 2024), and by Millière (1865) as *Gelechia psoralella* from southern France.

Walsingham (1908, pp. 932-933) treated specimens from the Canary Islands as *Aproaerema psoralella* and specimens from Madeira as *A. elachistella*, separating the latter from *A. anthyllidella* on the lighter white colour of the head and labial palpi.

Klimesch (1984, pp. 160-161, 164) listed two species in this complex from the Canary Islands: *Aproaerema anthyllidella elachistella* and *Iwaruna psoralella*. He figured the male genitalia of both, in dorso-ventral and lateral view, respectively, and the female genitalia of the latter. He stated that he could not see any difference between those of *A. anthyllidella elachistella*, and specimens of *A. anthyllidella* from continental Europe, but treated *A. elachistella* as a subspecies of *A. anthyllidella*.

Gelechia psoralella is currently considered as a synonym of *Aproaerema anthyllidella* (Leraut, 1997, p. 125; Huemer & Karsholt, 2020, p. 73). It is unclear why Klimesch (1984) placed *A. psoralella* in the genus *Iwaruna* Gozmány, 1957.

We have not been able to find differences in the genitalia between specimens with more or less distinct costal and tornal spots or other forms of *A. anthyllidella* from the Canary Islands, Madeira and continental Europe.

The DNA barcode of *A. anthyllidella* is referred in BOLD to three BINs: AAD2266, AAD2267 and ADR9287, the latter from only one specimen from Spain (Huemer et al. 2020, suppl. material 2). AAD2266 and 2267 cover many specimens from all over Europe, with specimens from Madeira belonging to AAD2266 (P. Huemer, in litt.). As we are not able to separate *A. anthyllidella elachistella* from the nominotypical subspecies, neither on the genitalia nor in the DNA barcode, and because the alleged differences in size, colour and wing markings fall within the variation found in continental Europe we find no support for treating the populations of *A. anthyllidella* in the Macaronesian Islands as separate species or subspecies.

Aproaerema mercedella Walsingham, 1908 (Figures 25, 26, 47, 60)

Aproaerema mercedella Walsingham, 1908, *Proc. zool. Soc. Lond., 1907, 934*

Material examined: SPAIN, Tenerife, Aguamansa, 1050 m, 9 ♂, 10 ♀, 13-26-VIII-2019, leg. P. Falck, genitalia slide 3963PF, GP4068PF, DNA sample Lepid Phyl 0731PF/CILEP730-20 (PF); Las

Mercedes, 750 m, 8 ♂, 9 ♀, 13-26-VIII-2019, leg. P. Falck, genitalia slide 3972PF, 3963PF, DNA sample Lepid Phyl 0730PF/CILEP729-20 (PF).

Diagnosis: *A. mercedella* resembles *A. ayacatella* sp. nov. and *A. pseudomercedella* sp. nov. It is not possible to distinguish the species without examination of the genitalia or by barcoding. In the male genitalia the relatively shorter phallus and the spinule covered vesica are characteristic. It differs from *A. ayacatella* and *A. pseudomercedella* by the shorter phallus and by the spinule covered vesica. In the female genitalia the relatively broad ductus bursae and the oval, distinctively granulated corpus bursae are characteristic. It differs from *A. ayacatella* by the straight relatively broad ductus bursae (twisted in *ayacatella*) and the granulated corpus bursae. It differs from *A. pseudomercedella* by the longer and broader ductus bursae and the granulated corpus bursae.

Description. Adult (Figures 25, 26): Wingspan 10-11.5 mm. Labial palp slender, upturned, segment 2 dark brown posteriorly and medially yellowish white, segment 3 slightly shorter than segment 2, yellowish white, apex blackish brown. Antenna dark grey with yellowish rings. Head, neck and thorax yellowish to greyish brown. Tegula dark brown, yellowish at base. Forewing blackish brown; basally an indistinct yellowish brown spot between costa and dorsum; from costa near the base to the middle a rhomboid yellowish mark; at the end of cell a distinct black spot, edged white; apically at costa and from near tornus two outwardly, distinct, yellowish lines, almost forming a postmedian fascia. Fringe yellowish with two parallel, grey fringe-lines. Hindwing grey, with grey fringe. Abdomen grey, with yellowish anal tufts.

Variation: There is often an admixture of rust-brown spots, especially apically and sometimes forming a rust-brown streak from the costal mark to beyond the postmedian fascia.

Male genitalia (Figure 47): Tegumen oblong, lateral margins convex, anterior margin almost without emargination; uncus slender, apex rounded; gnathos subtriangular, shorter than uncus, lateral arms well developed, apex slender with a small hook; valva simple, narrow, digitate, setose, longer than tegumen process; vinculum subtriangular, posteriorly flatly rounded, anteriorly with lateral arms; juxta small, rounded, covered with small spines; phallus straight, tapering towards apex, slightly longer than vinculum; vesica covered with spinules.

Female genitalia (Figure 60): Papillae anales elongate, distally pointed; posterior apophysis long, 2.5 times longer than anterior apophysis; segment VIII cylindrical, as long as anterior apophysis, medially membranous; antrum membranous; ductus bursa relatively broad slightly widening just before colliculum, anterior third evenly widening towards corpus bursae; corpus bursae oval, distinctively granulated.

DNA barcodes (Figure 66): We obtained full length DNA barcodes (658 bp) from two specimens. The barcodes fall within Barcode Index Number (BIN) BOLD: AEG7879. The maximum intraspecific p-distance is 1.12%. The minimum p-distance to nearest neighbour, *A. angustumella*, is 5.44%.

Biology: One specimen reared from moss-grown dead bark of *Prunus lusitanica* L. (as *Laurocerasus lusitanica* L.) from 7-III-1904 and emerged 24-VIII same year (Eaton) (Walsingham, 1908, p. 935). It is unclear if the larva was still feeding, or if it had just entered the bark to pupate. Adults are attracted to light and fly actively in the late afternoon in laurisilva forests during August.

Distribution: Known only from a few locations on the north-eastern part of Tenerife (Spain). Probably endemic to Tenerife.

Aproaerema ayacatella Falck & Karsholt, sp. nov. (Figures 27, 28, 48, 61)

Holotype ♀: SPAIN, Gran Canaria, Ayacata, 1400 m, 17-30-IX-2018, leg. P. Falck, genitalia slide 3965PF (ZMUC).

Paratypes: SPAIN, Gran Canaria, Ayacata, 1400 m, 2 ♀, 17-30-IX-2018, leg. P. Falck, genitalia slide 3971PF, 3973PF (PF); Pie de la Cuesta, 500 m, 1 ♂, 21-VIII-4-IX-2020, leg. P. Falck, genitalia slide 3967PF (PF); Los Tilos de Moya, 500 m, 1 ♀, 17-30-IX-2018, leg. P. Falck, genitalia slide 3975PF, DNA sample Lepid Phyl 0733PF/CILEP732-20 (PF); Barranco de Guayadeque, 700 m, 1 ♂,

21-VIII-4-IX-2020, leg. P. Falck, genitalia slide 3974PF, DNA sample Lepid Phyl 0732PF/CILEP431-20 (PF, MNCN).

Diagnosis: *A. ayacatella* is similar to *A. pseudomercedella* and *A. mercedella* q.v. In the male genitalia the almost rectangular vinculum, the relatively longer phallus and the vesica without or only with very few spinules are characteristic. It is not possible to distinguish *A. ayacatella* and *A. pseudomercedella* by the male genitalia. In the female genitalia the broad and twisted ductus bursae and the small rounded, weakly granulated corpus bursae are characteristic. It is distinguished from *A. mercedella*, q.v., and from *A. pseudomercedella* by the broad and twisted ductus bursae.

Description Adult (Figures 27, 28): Wingspan 9-10 mm. Labial palp slender, upturned, segment 2 dark brown posteriorly white, segment 3 slightly shorter than segment 2, white, anteriorly black ringed, apex blackish brown. Antenna dark grey with yellowish rings. Head, neck and thorax greyish brown. Tegula dark brown, yellowish at base. Forewing blackish brown; basally an indistinct yellowish brown spot between costa and dorsum; from costa near the base to the middle a yellowish spot, continuing as an indistinct median streak to beyond the postmedian fascia; at the end of cell a distinct black spot, edged white; apically at costa and from near tornus two outwardly, distinct, yellowish lines, almost forming a postmedian fascia. Fringe yellowish with two parallel grey fringe-lines. Hindwing grey, with grey fringe. Abdomen grey, with yellowish anal tufts.

Male genitalia (Figure 48): Tegumen oblong, lateral margins convex, anterior margin almost without emargination; uncus slender, apex rounded; gnathos subtriangular, shorter than uncus, lateral arms well developed, apex slender with a small hook; valva simple, narrow, digitate, setose, longer than tegumen process; vinculum subrectangular, posteriorly flatly rounded, anteriorly with lateral arms; juxta small, rounded, covered with small spines; phallus straight, tapering towards apex, longer than vinculum; vesica without or with very few spinules.

Female genitalia (Figure 61): Papillae anales elongate, distally pointed; posterior apophysis long, twice as long as anterior apophysis; segment VIII cylindrical, slightly shorter than anterior apophysis, medially membranous; antrum membranous; ductus bursae broad, distinctively widening towards colliculum, just before corpus bursae twisted; corpus bursae small, rounded, weakly granulated.

DNA barcodes (Figure 66): We obtained full length DNA barcodes (658 bp) from two specimens. The barcodes fall within Barcode Index Number (BIN) BOLD: AEG7878. The maximum intraspecific p-distance is high 1.93%. The minimum p-distance to nearest neighbour, *A. angustumella*, is 7.14%.

Biology: Early stages unknown. The specimens were attracted to light during August and September at altitudes between 500 and 1400 m.

Distribution in the Canary Islands (Spain): Known from a few locations in the central parts of Gran Canaria. Probably endemic to Gran Canaria.

Etymology: The species is named after the small town Ayacata situated near the type-locality.

Aproaerema pseudomercedella **Falck & Karsholt, sp. nov.** (Figures 29, 30, 49, 62)

Holotype ♀: SPAIN, La Gomera, El Cedro, 1000 m, 25-VII-1984, leg. P. Olsen, B. Skule & P. Stadel Nielsen, DNA sample TLMF Lep.25524 (ZMUC).

Paratypes: SPAIN, La Gomera, El Cedro, 870 m, 3 ♂, 1 ♀, 25-VII-1984, leg. P. Olsen, B. Skule & P. Stadel Nielsen, genitalia slide 5064OK, same data but 1 ♂, 1 ♀, 17-20-VIII-2018, K. Larsen (all ZMUC), same data but 1 ♂, 2 ♀, 9-12-VIII-2021, leg. P. Falck, genitalia slide 3966PF, 3970PF, 3977PF, DNA samples Lepid Phyl 1433PF/CILEP1432-24, 1434PF/CILEP1433-24 (PF). El Hierro, Cruz de los Reyes, 1250 m, 4 ♂, 8 ♀, 22-VII-3-VIII-2022, leg. P. Falck, genitalia slide 3964PF, 3969PF, 3976PF, GP4071PF, DNA samples Lepid Phyl 1435PF/CILEP1434-24, 1436PF/CILEP1435-24; Jinama, 1250 m, 3 ♂, 4 ♀, 22-VII-3-VIII-2022, leg. P. Falck; Frontera, 280 m, 1 ♂, 22-VII-3-VIII-2022, leg. P. Falck (PF, MNCN).

Diagnosis: *A. pseudomercedella* is similar to *A. ayacatella* and *A. mercedella* q.v. In the male genitalia the relatively long phallus and the vesica without or with very few spinules are characteristic.

In the female genitalia the short narrow ductus bursae and the very long, narrow, weakly granulated corpus bursae are characteristic and that distinguishes it from *A. ayacatella* and *A. mercedella.*

Description Adult (Figures 29, 30): Wingspan 10-12,5 mm. Labial palp slender, upturned, segment 2 dark brown posteriorly and medially yellowish white, segment 3 slightly shorter than segment 2, yellowish white, apical half blackish brown. Antenna dark grey with yellowish rings. Head, neck and thorax yellowish. Tegula dark brown, yellowish at base. Forewing blackish brown; basally an indistinct yellowish brown spot between costa and dorsum; from costa near the base to the middle a yellowish, irregular-shaped spot often fused with the basal spot to near dorsum, continuing as an indistinct median streak to beyond the postmedian fascia; at the end of cell a distinct black spot, edged white; apically at costa and from near tornus two outwardly, distinct, yellowish lines, almost forming a postmedian fascia. Fringe yellowish apically, grey basally, forming two parallel grey fringe-lines. Hindwing grey, with grey fringe. Abdomen grey, with yellowish anal tufts.

Variation: Specimens from La Gomera are on average slightly smaller, have a darker colouration of the forewings and segment 3 of the labial palp is blackish brown in apical third.

Male genitalia (Figure 49): Tegumen oblong, lateral margins convex, anterior margin almost without emargination; uncus slender, apex rounded; gnathos subtriangular, shorter than uncus, lateral arms well developed, apex slender with a small hook; valva simple, narrow, digitate, setose, longer than tegumen process; vinculum subtriangular, posteriorly rounded, anteriorly with lateral arms; juxta small, rounded, covered with small spines; phallus straight, tapering towards apex, longer than vinculum; vesica without or with very few spinules.

Female genitalia (Figure 62): Papillae anales elongate, distally pointed; posterior apophysis long, twice as long as anterior apophysis; segment VIII cylindrical, shorter than anterior apophysis, medially membranous; antrum membranous; ductus bursae relatively narrow and short; corpus bursae very long, narrow, anteriorly slightly widening, weakly granulated.

DNA barcodes (Figure 66): We obtained full length DNA barcodes (658 bp) from three specimens and DNA barcode fragments of 595 bp and 608 pb from two specimens. The barcodes fall within three Barcode Index Numbers (BIN) BOLD: ADM9690 (1 specimen from La Gomera), BOLD: AFS8444 (2 specimens from La Gomera) and BOLD AFS8444 (two specimens from El Hierro). The maximum intraspecific p-distance is very high 6.81%. The distance between BINs is 3.85% (ADM9690, La Gomera vs.AFS8229, El Hierro), 5.92% (AFS8444, La Gomera vs. AFS8229, El Hierro) and 6.81% (ADM9690, La Gomera vs. AFS8444, La Gomera). The minimum p-distance to nearest neighbour, *Aproaerema angustumella* sp. nov., is 6.01%.

Biology: Early stages and hostplant are unknown. Adults have been collected at light in July and August at altitudes from 250 m to 1250 m.

Distribution: Known only from the islands of La Gomera and El Hierro (Spain) and only from few locations. Probably endemic to La Gomera and El Hierro.

Etymology: The species name is derived from combining the Greek word *ψευδο* (pseudo = false) and *mercedella*, referring to its similarity to *A. mercedella*.

Aproaerema angustumella **Falck & Karsholt, sp. nov.** (Figures 31, 32, 50, 50a, 63)

Holotype ♀: SPAIN, Tenerife, El Caletón, 35 m, 19-IX-2-X-2023, leg. P. Falck (ZMUC).

Paratypes: SPAIN, Tenerife, Las Mercedes, 750 m, 1 ♂, 4 ♀, 13-26-VIII-2019, leg. P. Falck, genitalia slide 4002PF, 4003PF, DNA sample Lepid Phyl 0666PF/CILEP665-20 (PF, MNCN); Aguamansa, 1050 m, 1 ♂, 13-26-VIII-2019, leg. P. Falck (PF); El Caletón, 35 m, 2 ♂, 3 ♀, 19-IX-2-X-2023, leg. P. Falck, genitalia slide 4012PF, DNA samples Lepid Phyl 1557PF/CILEP1556-24, 1559PF/CILEP1558-24 (PF); La Tierra del Trigo, 500 m, 1 ♂, 1 ♀, 19-IX-2-X-2023, leg. P. Falck (PF), DNA sample Lepid Phyl 1560PF/CILEP1559-24 (PF). La Palma, La Galga, 400 m, 1 ♂, 29-VII-11-VIII-2023, leg. P. Falck, genitalia slide 4052PF, DNA sample Lepid Phyl 1394PF/CILEP1393-23 (PF).

Diagnosis: *A. angustumella* is very distinctive because of its small size and black forewing with two distinct white fasciae. It may resemble females of *Scrobipalpa feralella* (Zeller, 1872), but in

Scrobipalpa segment 2 of the palp is much more rough-scaled. In the male genitalia the posteriorly slender gnathos and the 5-7 very small cornuti are characteristic. In the female genitalia the long posterior apophysis, the relatively narrow ductus bursae and the rounded corpus bursae are characteristic.

Description Adult (Figures 31, 32): Wingspan 6.5-9 mm. Labial palp slender, upturned, segment 2 dark grey, distally white, segment 3 slightly shorter than segment 2, black, anteriorly white. Antenna black with whitish rings. Head and neck dark grey. Thorax and tegula blackish brown. Forewing blackish; basally an indistinct white spot; from costa 1⁄4 an oblique, white fascia almost reaching dorsum, at 2/3 a post-median white fascia from costa to tornus; just below apex a very small white spot. Fringe blackish grey. Hindwing dark grey. Fringe grey.

Male genitalia (Figures 50, 50a): Tegumen oblong, lateral margins convex, anterior margin almost without emargination; uncus slender, slightly spatulate, apex rounded; gnathos subtriangular, shorter than uncus, lateral arms well developed, apex slender with a small hook; valva simple, narrow, digitate, setose, longer than tegumen process; vinculum subtriangular, posteriorly rounded, anteriorly with lateral arms; juxta small, rounded, covered with small spines; phallus straight, tapering towards apex, slightly longer than vinculum, 5-7 very small cornuti (n=2).

Female genitalia (Figure 63): Papillae anales elongate, distally pointed; posterior apophysis long, twice as long as anterior apophysis; segment VIII cylindrical, same length as anterior apophysis, medially membranous; antrum membranous; ductus bursae relatively narrow, anteriorly slightly broadening; corpus bursae rounded.

DNA barcodes (Figure 66): We obtained full length DNA barcodes (658 bp) from four specimens and DNA barcode fragments of 601 bp from one specmen. The barcodes fall within Barcode Index Number (BIN) BOLD: AEE3180 (Tenerife) and BOLD: AFM9356 (La Palma). The minimum divergence between BINs is 2.88%. The maximum intraspecific p-distance is high 3.63%. The minimum p-distance to nearest neighbour, *A. pseudomercedella*, is 4.92%.

Biology: Early stages and hostplant are unknown. Adults have been collected at light from late July to the beginning of October at altitudes from 35 m to 1050 m.

Distribution: Known only from the islands of Tenerife and La Palma (Spain). Endemic to the Canary Islands.

Etymology: The species is named after the Latin word *angustum* (= the narrow one) referring to the narrow wings.

Remarks: The specimen from La Palma differs slightly in the shape of gnathos from specimens from Tenerife, but we consider it is due to variation.

Mesophleps Hübner, [1825]. *Verz. bek. Schmett.,* 406

A genus of 39 species distributed through the temperate to tropical parts of the old world, with a single species known from the Americas (Li & Sattler, 2012). All five European species occur in the Canary Islands (Spain).

Segment 2 of labial palp with dorsal scale brush, more or less hiding short segment 3, and yellowish forewings with blackish brown markings.

The genitalia of all species are figured by Li & Sattler (2012).

Mesophleps corsicella Herrich-Schäffer, [1856]

Mesophleps corsicella Herrich-Schäffer, [1856]. *Neue Schmett. Eur.*, (1), 7, fig.47

Material examined: SPAIN, Gran Canaria, Ayacata, 1400 m, 1 ♀, 17-30-IX-2018, leg. P. Falck, DNA sample Lepid Phyl 1554PF/CILEP1553-24. La Palma, Barranco del Río, 450 m,1 ♀, 29-VII-11-VIII-2023, leg. P. Falck, DNA sample Lepid Phyl 1556PF/CILEP1555-24. Tenerife, 5 km S Aguamansa, 1600 m, 1 ♀, 1-13-VI-2022, leg. P. Falck, DNA sample Lepid Phyl 1555PF/CILEP1554-24; Ifonche, 1040 m, 1 ♂, 21-V-3-VI-2019, leg. P. Falck, genitalia slide GP4030PF (all PF).

Diagnosis: A medium-sized species (wingspan 9-18 mm) having relatively wide, pale-yellow forewings more or less overlaid with blackish brown. The characteristic labial palps have segment 2

keel-shaped, with upturned brush and segment 3 tiny. Similar to *M. silacella*, which is warmer yellow and has less blackish brown on the forewings.

DNA barcodes (Figure 66): We obtained full length DNA barcodes (658 bp) from three specimens all from La Palma. The barcodes fall within Barcode Index Number (BIN) BOLD: AFR9724. The intraspecific p-distance is 0%. The minimum p-distance to nearest neighbour, *M. corsicella* from Greece, is 1.28% with BIN BOLD: AFR9723.

Biology: The larva feeds in seed capsules of *Cistus* L. and *Helianthemum* Mill. species (Li & Sattler, 2012, p. 35). It has not been found in the Canary Islands (Spain).

Distribution in the Canary Islands (Spain): First recorded by Klimesch (1984, p. 166) from Tenerife. **New island records**: Gran Canaria, San Bartolome de Tirajana, 7-IX-2012, leg. A. Werno (AW); La Palma, Barranco del Río, 29-VII-11-VIII-2023, leg. P. Falck (PF).

General distribution: Canary Island (Spain), Southern Europe from Portugal to Croatia and Greece; Morocco, Lebanon (Karsholt et al. 2023, p. 105).

Mesophleps silacella (Hübner, 1796)
Tinea silacella Hübner, 1796. *Samml. eur. Schmett., 8*, 63, pl. 17, fig. 117

Diagnosis: A medium sized (wingspan 9-18 mm) species having yellow forewings, with violet brownish scales in the terminal area. The characteristic labial palps have segment 2 keel-shaped, with upturned brush and segment 3 tiny.

Biology: The larva feeds in seed capsule of *Helianthemum* Mill. It has not been found in the Canary Islands (Spain).

Distribution in the Canary Islands (Spain): Lanzarote: Puerto del Carmen, 1-II-1994, leg. J. P. Baungaard (ZMUC); Fuerteventura, Jandia, Cofete, 460 m, 1-V-1987, leg. W. Schmitz (ZMUC). *M. silacella* is widely distributed on Lanzarote and Fuerteventura. **New to the Canary Islands.**

General distribution: Canary Islands (Spain); widely distributed in Central and South Europe to Russia, more disjunctive in North Europe; North Africa, Turkey (Gregersen & Karsholt, 2022, p. 109).

Mesophleps oxycedrella (Millière, 1871)
Gelechia oxycedrella Millière, 1871. *Icon. Desc. Chenilles Lépid., 3,* 177, 193, pl. 118, figs 1-6

Diagnosis: The yellowish forewings with 4-5 large blackish brown spots make this species unmistakably. The species is variable in size (7-12 mm).

Biology: In the Canary Islands the larva feeds in berries/cones of *Juniperus canariensis* Guyot (= *J. turbinata* ssp. *canariensis* Guyot), and overwinters therein, before pupating on the ground (Klimesch, 1984, p. 166; Guido & Roques, 1996).

Distribution in the Canary Islands (Spain): First recorded by Klimesch (1984, p. 166) from La Gomera. Subsequently from Gran Canaria and La Palma (Báez & Martín, 2001, p. 238) and from Tenerife and El Hierro (Li & Sattler, 2012, p. 36).

General distribution: Canary Islands (Spain), western part of southern Europe and North Africa; Croatia.

Mesophleps trinotella Herrich-Schäffer, [1856]
Mesophleps trinotella Herrich-Schäffer,[1856].*Neue Schmett. Eur.,* (1), 6, fig. 46

Diagnosis: A rather small species (wingspan 8-14 mm). Segment 2 of labial palp with sub-triangular scale tuft, about twice length of segment 3; forewing slender, ochre, costal and dorsal margin and apex blackish brown. May be confused with yellowish specimens of the more broad-winged *M. ochracella*, which has longer segment 3 of the labial palp.

Biology: The larva feeds in seeds of *Erysimum* L. and *Moricandia* DC. (Cruciferae). It has not been found in the Canary Islands (Spain).

Distribution in the Canary Islands (Spain): First recorded by Arenberger (1999, p. 13) from Fuerteventura. **New island records**: Gran Canaria, Fataga, 21-VIII-4-IX-2020, leg. P. Falck (PF); Lanzarote, Urb. Famara, 55 m, 2-8-XI-2018, leg. C. Hviid & B. Skule (ZMUC).

General distribution. Canary Islands (Spain), southern Europe, Croatia, Czech Republic, Hungary, Cyprus, Turkey, North Africa.

Mesophleps ochracella (Turati, 1926) (Figures 33-36, 51, 64)
Nothris ochracella Turati, 1926, *Atti Soc. ital. Sci. nat., 65,* 69, fig. 32

Material examined: SPAIN, Fuerteventura, Caldereta, 120 m, 1 ♂, 1 ♀, 27-II-19-III-2018, leg. P. Falck, DNA sample Lepid Phyl 0066PF/CILEP66-18, genitalia slide GP4000PF; Betancuria, 400 m, 1♀, 7-27-XI-2017, leg. P. Falck, DNA sample Lepid Phyl 0065PF/CILEP65-18. Lanzarote, Caleta de Famara, 20 m, 1 ♂, 1♀, 1-13-II-2022, leg. P. Falck, DNA sample Lepid Phyl 1549PF/CILEP1548-24, genitalia slide GP3999PF; El Golfo, 95 m, 1 ♀, 1-13-II-2022, leg. P. Falck, DNA sample Lepid Phyl 1550PF/CILEP1549-24; Femes, 340 m, 1 ♂, 1-13-II-2022, leg. P. Falck, genitalia slide GP3997PF. Tenerife, Arona, 600 m, 1 ♂, 2 ♀, 3-16-VIII-2021, leg. P. Falck, DNA sample Lepid Phyl 1553PF/CILEP1552-24, genitalia slide GP3994PF, GP3996PF. El Hierro, Erese, 700 m, 1 ♂, 2 ♀, 22-VII-3-VIII-2022, leg. P. Falck, DNA sample Lepid Phyl 1551PF/CILEP1550-24, genitalia slide GP3998PF, GP4001PF; Tacorón, 170 m, 2 ♀, 22-VII-3-VIII-2022, leg. P. Falck, DNA sample Lepid Phyl 1552PF/CILEP1551-24, genitalia slide GP3995PF (all PF).

Diagnosis: A medium-sized species (wingspan 9-16 mm). Segment 2 of labial palp with sub-triangular scale tuft, segment 3 almost as long as segment 2; forewing variable, from light yellowish brown to almost black, often with an orange streak before termen (Figure 33-36).

DNA barcodes (Figure 66): We obtained full length DNA barcodes (658 bp) from seven specimens from El Hierro (2), Tenerife (1), Fuerteventura (2) and Lanzarote (2). The barcodes fall within Barcode Index Number (BIN) BOLD: AAV4323. The maximum intraspecific p-distance is 0.48% (n = 41). The minimum p-distance to nearest neighbour (a Pyraustinae) is 8.33%.

Biology: Hostplant unknown.

Distribution in the Canary Islands (Spain): Lanzarote, 0.8 km S Coril, 1.4 km N Tias, 240 m, 2-8-XI-2018, leg. C. Hviid & B. Skule (ZMUC). Fuerteventura, Corralejo, 14-20-XII-1996, leg. K. Larsen (ZMUC). La Palma, El Paso, 400 m, 16-II-2004, leg. H. van der Wolf (RMNH). El Hierro, Erese, 22-VII-2-VIII-2022, leg. P. Falck (PF). *M. ochracella* is common on Lanzarote, Fuerteventura and El Hierro more locally on Tenerife. **New to the Canary Islands**.

General distribution: Canary Islands (Spain), Mediterranean countries from Portugal and France to Cyprus.

Chelariini

Nothris Hübner, [1825], *Verz. bek. Schmett.,* (23-27), 411
Nothris congressariella (Bruand, 1858) (Figure 37, 38)

Ypsolopha congressariella Bruand, 1858. *Ann. Soc. ent. Fr.,* (3) *6*, 471, pl. 11, fig. 7, 7a
Nothris declaratella Staudinger, 1859. *Stett. ent. Ztg., 20*(7-9), 238

Remarks: This species is in the Canary Islands (Spain) restricted to the mountains of Tenerife. The population there differs in colour and forewing markings from the nominotypical subspecies occurring from the southernmost parts of the British Isles across Europe to North Africa, Turkey and Iran. It is described below as a new subspecies.

***Nothris congressariella tenerifensis* Falck & Karsholt, ssp. nov.** (Figure 37, 38)

Holotype ♀: SPAIN, Tenerife, Las Cañadas del Teide, 2200 m, e. l. 16-VII-1965, *Scrophularia glabrata* Aiton. L., leg. J. Klimesch (ZMUC).

Paratypes: SPAIN, Tenerife, Las Cañadas del Teide, 2200 m, 1 ♀ e. l. 26-IX-1966, *Scrophularia glabrata*, leg. J. Klimesch (ZMUC); Las Cañadas, 2000 m, 1 ♀, 30-VII-1979, leg. P. Stadel Nielsen (ZMUC); Las Cañadas, Liano de Ucanca, 2200 m, 1 ♀, 1 ♂, e. l. 7-1-1998, leg. K. Larsen (ZMUC);

Villaflor, Las Lajas, 1800 m, 1 ♀, 1 ♂, 24-IV-1998, leg. K. Larsen (ZMUC); 5 km N San Andrés, 2 ♀, 2 ♂, 25-IV-1998, leg. K. Larsen (ZMUC); 8 km N Vilaflor, 1700 m, 23 ♂, 19 ♀, 21-V-3-VI-2019, leg. P. Falck, DNA samples Lepid Phyl 0336PF/CILEP335-19, Lepid Phyl 0337PF/CILEP336-19, genitalia slide GP4028PF; 5 km S Aguamansa, 1400 m, 4 ♂, 1 ♀, 21-V-3-VI-2019, leg. P. Falck, genitalia slide GP4027PF (PF, MNCN).

Diagnosis: A rather large gelechiid (wingspan 16-21 mm) with brown forewings with two black spots in the middle of the wing and sometimes a black patch near base. It differs from the nominotypical subspecies by its darker brown forewings, by having less (or no) whitish at the basal half of costa, and by being almost without black on the veins in the apical part of the forewing. Segment 2 of the labial palp with a large projecting tuft, laterally compressed with scales projecting forward and downwards separates it from similar looking species in the Canary Islands (Spain).

The male and female genitalia are similar to those of the nominotypical subspecies. They are figured by Klimesch (1984, p. 179) and Karsholt & Šumpich (2015, pp. 480, 494-495).

DNA barcodes (Figure 66): We obtained full length DNA barcode (658 bp) from one specimens and DNA barcode fragments of 602 bp from one specimen. The barcodes fall within Barcode Index Number (BIN) BOLD: AAE5563. The maximum intraspecific p-distance is 1.44% (n = 11). The minimum divergence between populations from Europe and The Canary Islands is 1.02%. The minimum p-distance to nearest neighbour, *Nothris verbascella* ([Denis & Schiffermüller], 1775), is 4.52%.

Biology: The larva feeds on *Scrophularia glabrata*, at first mining the leaves and later among leaves spun together (Klimesch, 1984, pp. 160, 180, fig. 64). *N. congressariella tenerifensis* is commonly found in the pine-forest zone (700-2400 m) as a larva among spun leaves of its hostplant, occasionally adults are attracted to light.

Distribution: First recorded by Klimesch (1984, p. 159). Only known from the mountains of Tenerife, at altitudes between 1400 and 2200 m.

Etymology. The subspecies is named after the island of Tenerife.

Remarks: Klimesch (1984, p. 169) noted that the Canary Islands population may deserve status as a subspecies. However, he refrained from naming it. We have examined material of *N. congressariella* from its total distribution area in order to evaluate the distinctiveness of the population occurring in Tenerife. See also our discussion about subspecies in the discussion chapter at the end of this paper.

Anarsia Zeller, 1839, *Isis von Oken*, *1839*, 190

A large genus which in its current concept includes more than 100 described species distributed throughout the Old World. Males have segment 3 of the labial palp reduced, and often asymmetric genitalia.

Anarsia lineatella Zeller, 1839 (Figures 52, 52a)

Anarsia lineatella Zeller, 1839. *Isis von Oken, 1839,* 190

Material examined: SPAIN, Gran Canaria, Barranco de Guayadeque, 460 m, 2 ♂, 1 ♀, 4-23-III-2019, leg. P. Falck, DNA samples Lepid Phyl 1455PF/CILEP1454-24, Lepid Phyl 1456PF/CILEP1455-24, genitalia slide GP3959PF, GP3962PF; Ayacata, 1400 m, 1 ♂, 1♀, 4-23-III-2019, leg. P. Falck, genitalia slide GP3954PF, GP3955PF (all PF).

Diagnosis: Wingspan 11-15 mm. Similar to *A. acaciae* Walsingham, 1896 (see that species). The genitalia are figured by, e.g., Karsholt & Gregersen (2017).

DNA barcodes (Figure 66): We obtained DNA barcode fragments of 621bp and 603pb from two specimens. The barcodes fall within Barcode Index Number (BIN) BOLD: AAD7849. The maximum intraspecific p-distance is 0.48% (n = 21). The minimum p-distance to nearest neighbour, *A. innoxiella* Gregersen & Karsholt, 2017 is 1.75%.

Biology: The larvae feed in fruits of different Rosaceae, especially *Prunus* L. to which they may be harmful. To our knowledge it has not been found in the Canary Islands.

Distribution in the Canary Islands (Spain): *A. lineatella* is common in several locations on the island of Gran Canaria. **New to the Canary Islands**. Perhaps recently introduced.

General distribution: Central and southern Europe and North Africa, eastwards through the Middle East and Turkey to Central Asia and China; introduced to North America.

Anarsia acaciae Walsingham, 1896 (Figures 39, 40, 53, 53a, 65, 65a)

Anarsia acaciae Walsingham, 1896. *Proc. zool. Soc. Lond., 1896,* 278

Material examined: SPAIN, Fuerteventura, Corralejo, 10 m, 1 ♀, 7-27-XI-2017, leg. P. Falck, genitalia slide GP3957PF; Caldereta, 120 m, 7-27-XI-2017, leg. P. Falck, genitalia slide GP3953PF. Lanzarote, Mojón Blanco, Orzola, 1 ♂, 1 ♀, 20 m, 21-X-10-XI-2019, leg. P. Falck, DNA sample Lepid Phyl 1454PF/CILEP1453-24, genitalia slide GP3961PF; Femes, 340 m, 1 ♀, 1-13-II-2022, leg. P. Falck, DNA sample Lepid Phyl 1452PF/CILEP1451-24. Gran Canaria, El Sao, 110 m, 3 ♂, 1 ♀, 4-23-III-2019, leg. P. Falck, DNA samples Lepid Phyl 1451PF/CILEP1450-24, Lepid Phyl 1453PF/CILEP1452-24, genitalia slide GP3956PF, GP4031PF (all PF).

Diagnosis: Wingspan 13-16 mm. Colour and wing markings resemble *A. lineatella* but differ in the lighter basal part of costa. Males are easily recognised by a characteristic black hair pencil from the base of costa in the hindwings (figure 39). Such a hair pencil is absent in *A. lineatella.* The male genitalia (figures 53, 53a) are less asymmetric than those of *A. lineatella* (figure 52, 52a). The female genitalia (figures 65, 65a) differ from those of *A. lineatella* in having longer anterior apophyses.

DNA barcodes (Figure 66): We obtained DNA barcode fragments of 624bp, 621bp, 602bp and 589pb from four specimens. The barcodes fall within Barcode Index Number (BIN) BOLD: ADA2395. The maximum intraspecific p-distance is 1.36% (n = 24). The minimum p-distance to nearest neighbour, *Anarsia* sp., is 3.01%.

Biology: The larva feeds on *Acacia* Mill. and related Fabaceae. In the Canary Islands it has been found on *Vachellia farnesiana* (L.) Wight. & Arn. (Klimesch, 1984, p. 165, as *Acacia farnesiana*).

Distribution in the Canary Islands (Spain): First recorded by Klimesch (1984, p. 165) from La Gomera. **New island records**: Fuerteventura, Corralejo, 27-II-19-III-2018, leg. P. Falck (PF); Lanzarote, Mojón Blanco, Orzola, 21-X-10-XI-2019, leg. P. Falck (PF); Gran Canaria, Maspalomas, 6-XI-1991, leg. P. Grotenfelt (MZH); Tenerife, Arona, 1-20-III-2017, leg. P. Falck (PF).

General distribution: Canary Islands (Spain), North Africa, Middle East, Yemen, East Africa.

Discussion

When we started this series of papers dealing with Lepidoptera of the Canary Islands, we stated that the Lepidoptera of the islands are considered to be well-known (Falck et al. 2019, p. 34). This is not the case, especially for the Microlepidoptera. The most recent checklist of Canary Island Lepidoptera (Vives Moreno, 2014) lists 11 species of Anacampsinae. Here we record 23 species. We still do not have the exact number of species occurring in these islands for the remaining subfamilies of Gelechiidae which we plan to publish in three forthcoming papers, but they include also many species which are either new for the islands or new to science.

Among the Anacampsinae of the Canary Islands the tribe Anacampsini is the largest with 20 species, whereas the Chelariini includes only three species. The species of Anacampsini are placed in three genera with seven species of *Stomopteryx*, eight species of *Aproaerema* and five species of *Mesophleps*. Whereas all species of *Mesophleps* occur also in continental Europe, the two other genera have diversified in the Canary Islands with respectively five and four endemic species. In particular the *Aproaerema mercedella* group is specialized, and their closest relatives are currently unknown.

In this paper we describe two new subspecies and synonymise one. Whereas the category of subspecies is widely used for Papilionoidea and Macroheterocera it is little used in the Gelechiidae. This is partly because many Gelechiidae are rather uniformly, dull coloured with more or less indistinct markings, but probably also because taxonomists of this family have been busy in describing new

species and thus paid less attention to geographical variation. It may therefore be relevant to deal briefly with the term subspecies.

Geographic variation is often termed as a subspecies. This category is below species level and covers populations which differ from the main (nominotypical) population of a species. Whereas there is overall agreement on what constitutes a species within Lepidoptera this is not the case for subspecies. That is much more up to individual researchers' preferences and decisions. Often subspecies are populations with different colour or wing markings, but with similar genitalia. Most authors would agree that a subspecies must be geographically separated from the main population of the species (= the nominotypical subspecies), but not all insist that there should be no overlap in distribution or appearance of the adult. It may also influence the opinion if the population in question has a different bionomy (e.g. another hostplant) and also the size of the adults may be considered.

One may consider subspecies as a stage in the evolutionary process where a species is in a process of splitting into two or more species due, e.g., to geographical separation, changes in climatic conditions or adaptations to new niches. In such cases we find it relevant to name subspecies, thereby making both the scientific community and local authorities aware of the presence of populations which need taxonomic or conservation attention.

We give status as subspecies to populations which differ from the nominotypical subspecies both in the DNA barcode and in the colour and markings of the forewing, but where we could not find morphological differences in the genitalia. This is not the case with *Aproaerema anthyllidella elachistella* (Klimesch, 1984). Here specimens with the characters of the forewings (strongly marked females) are also found among populations in continental Europe, there are only slight/unclear differences in the DNA barcode, and we could not find differences in the genitalia and so treat *elachistella* as a junior synonym of *A. anthyllidella*.

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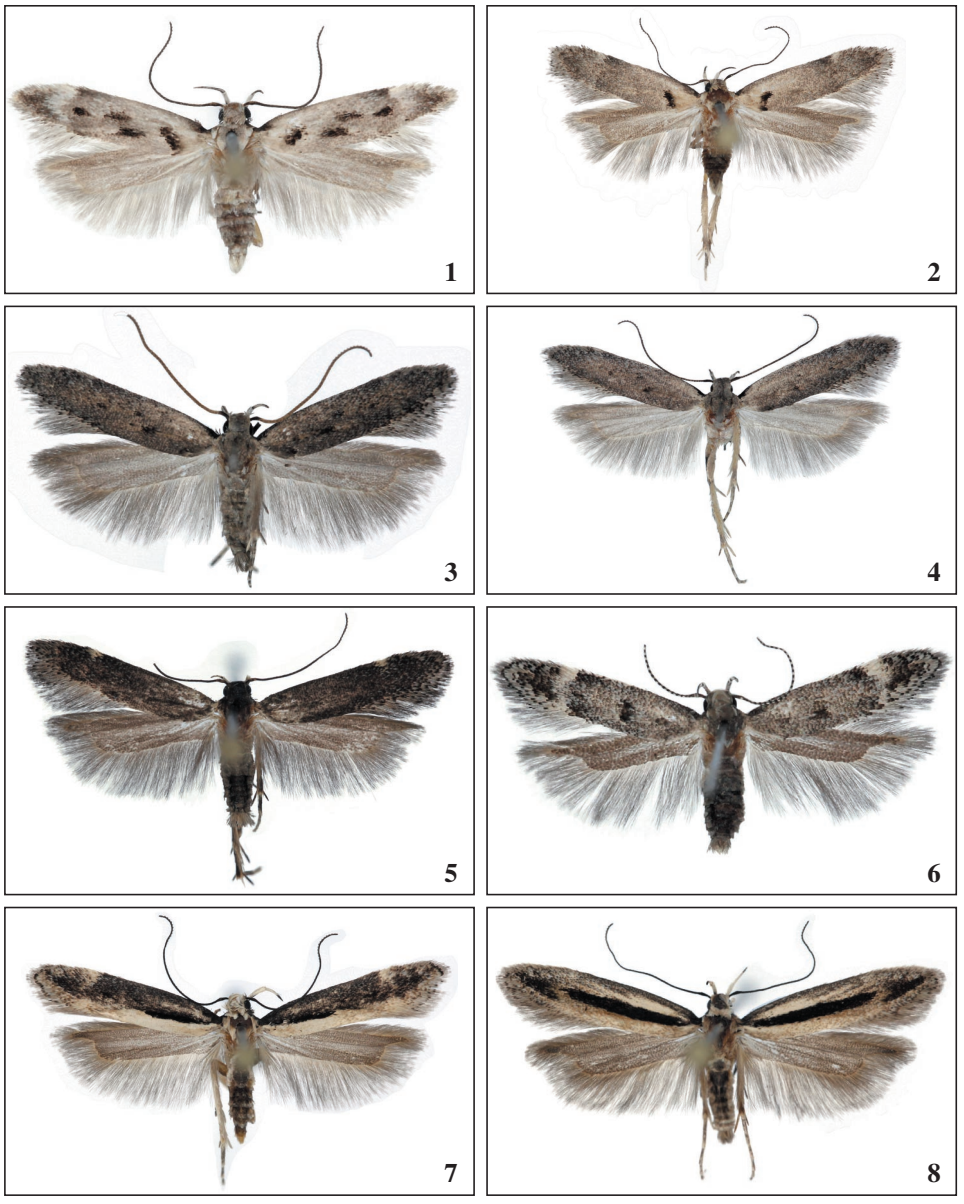

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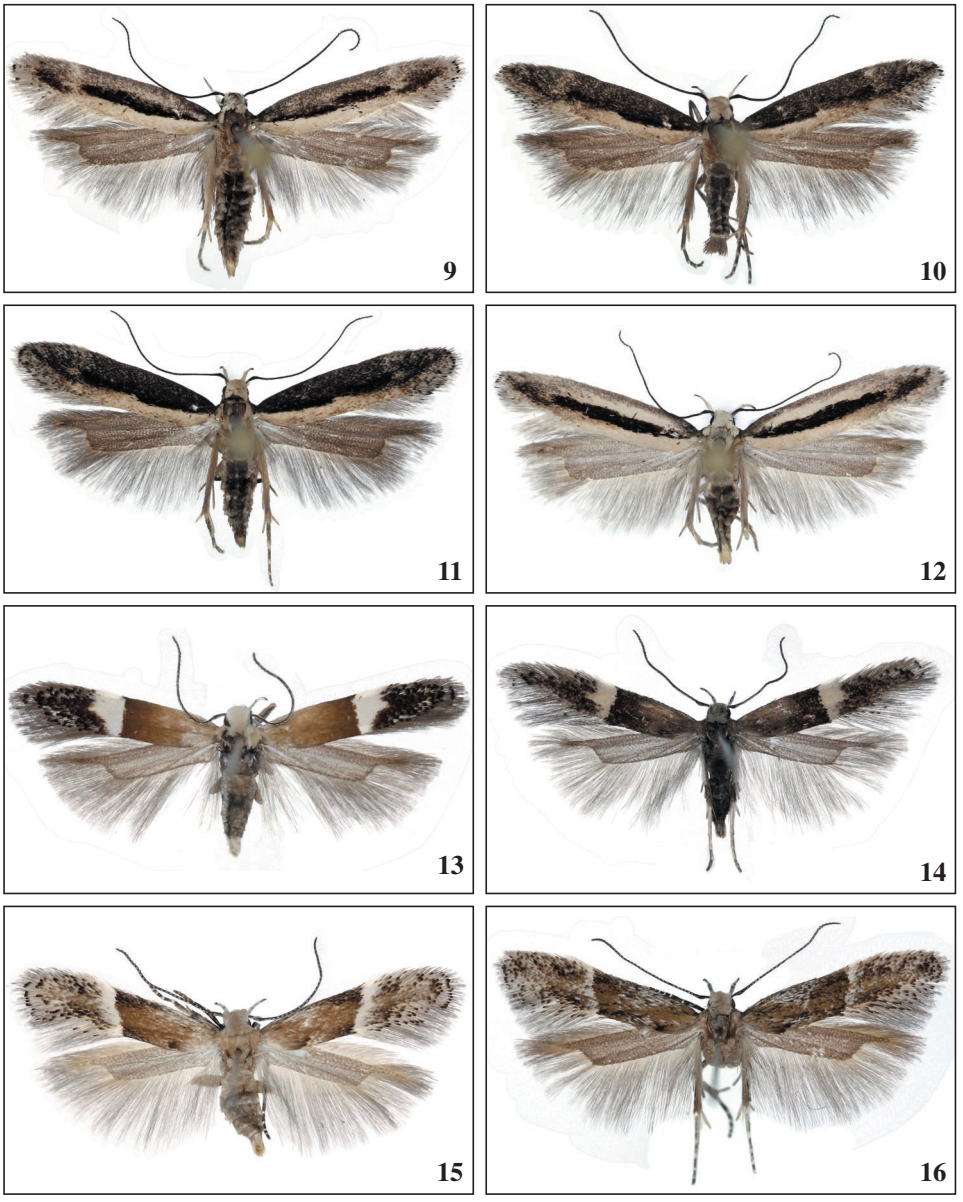

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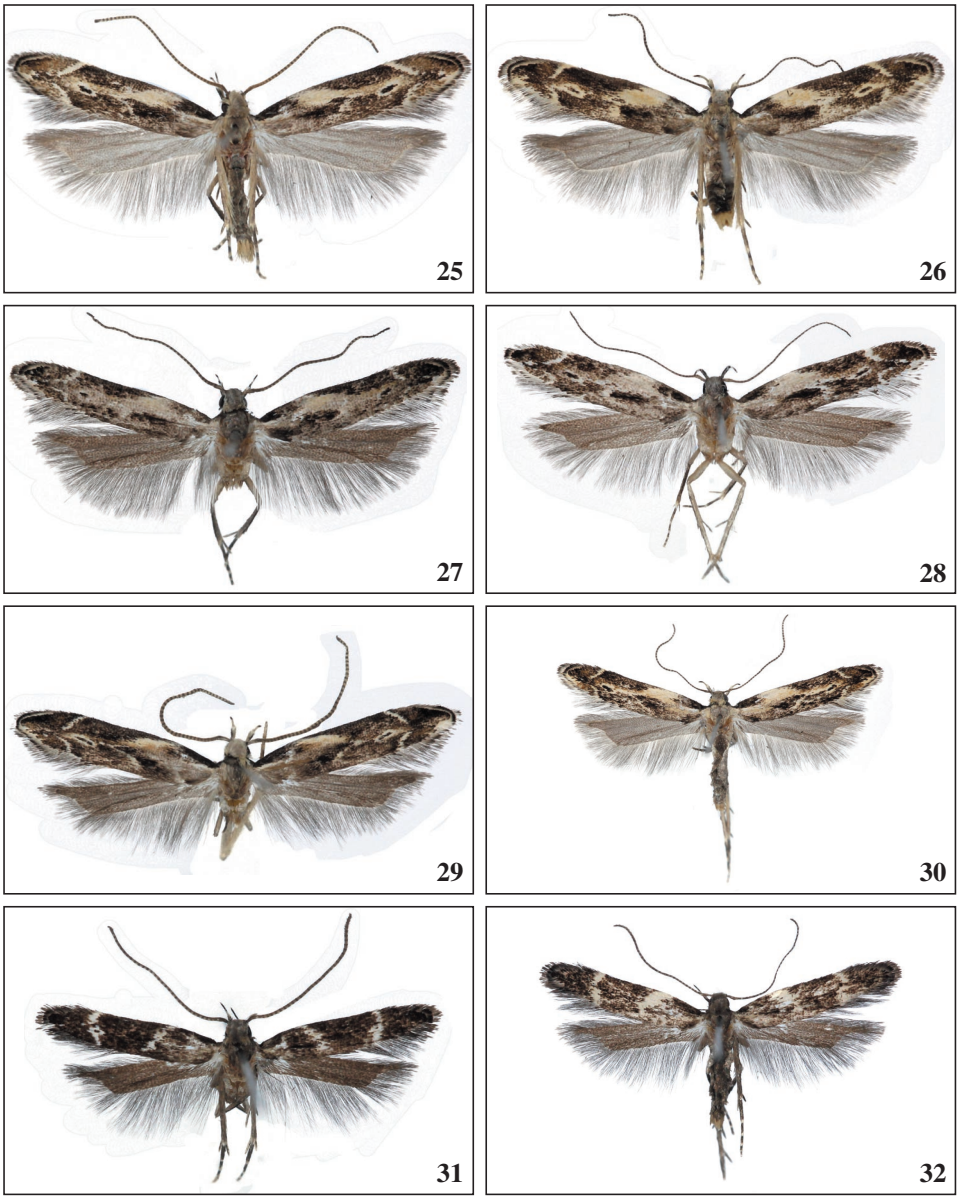

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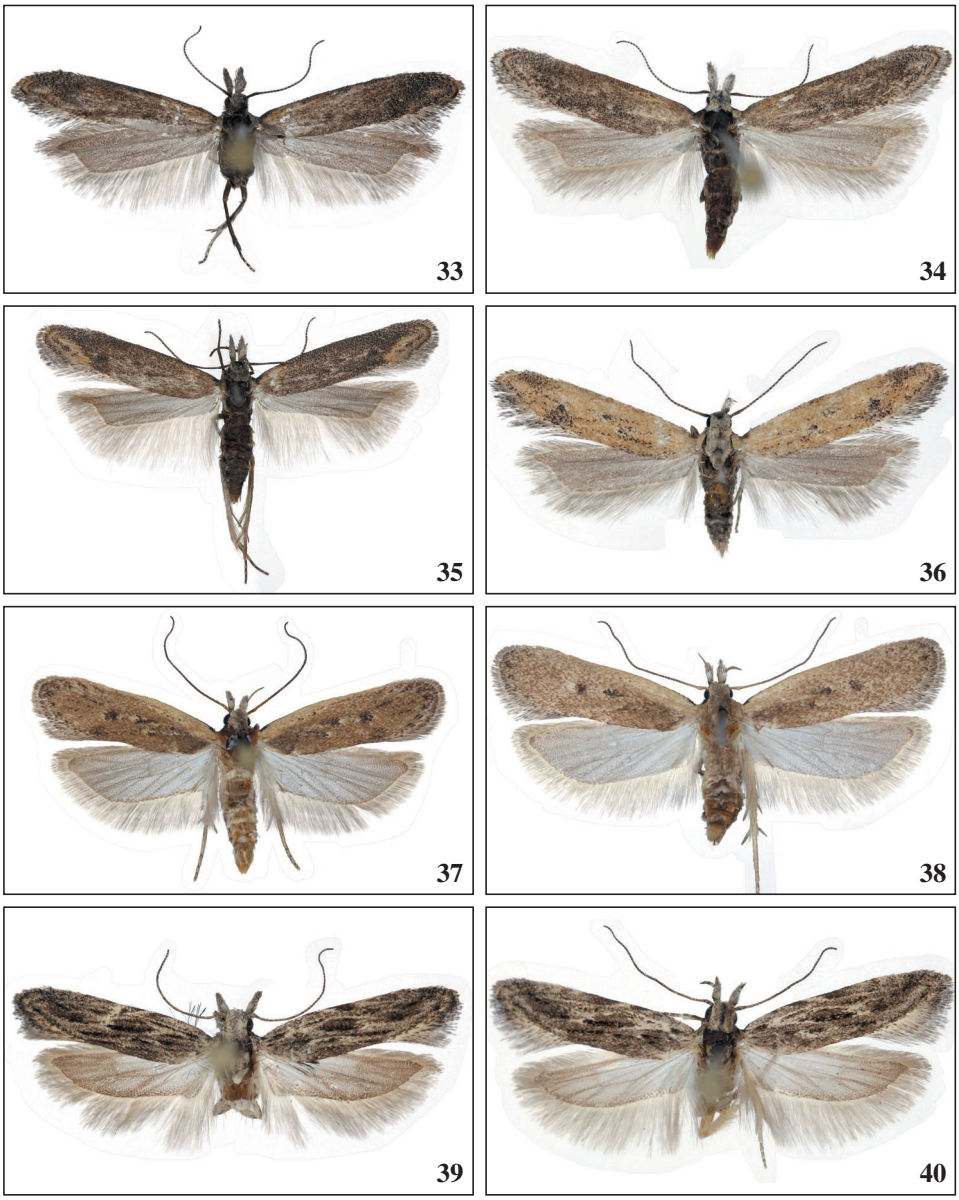

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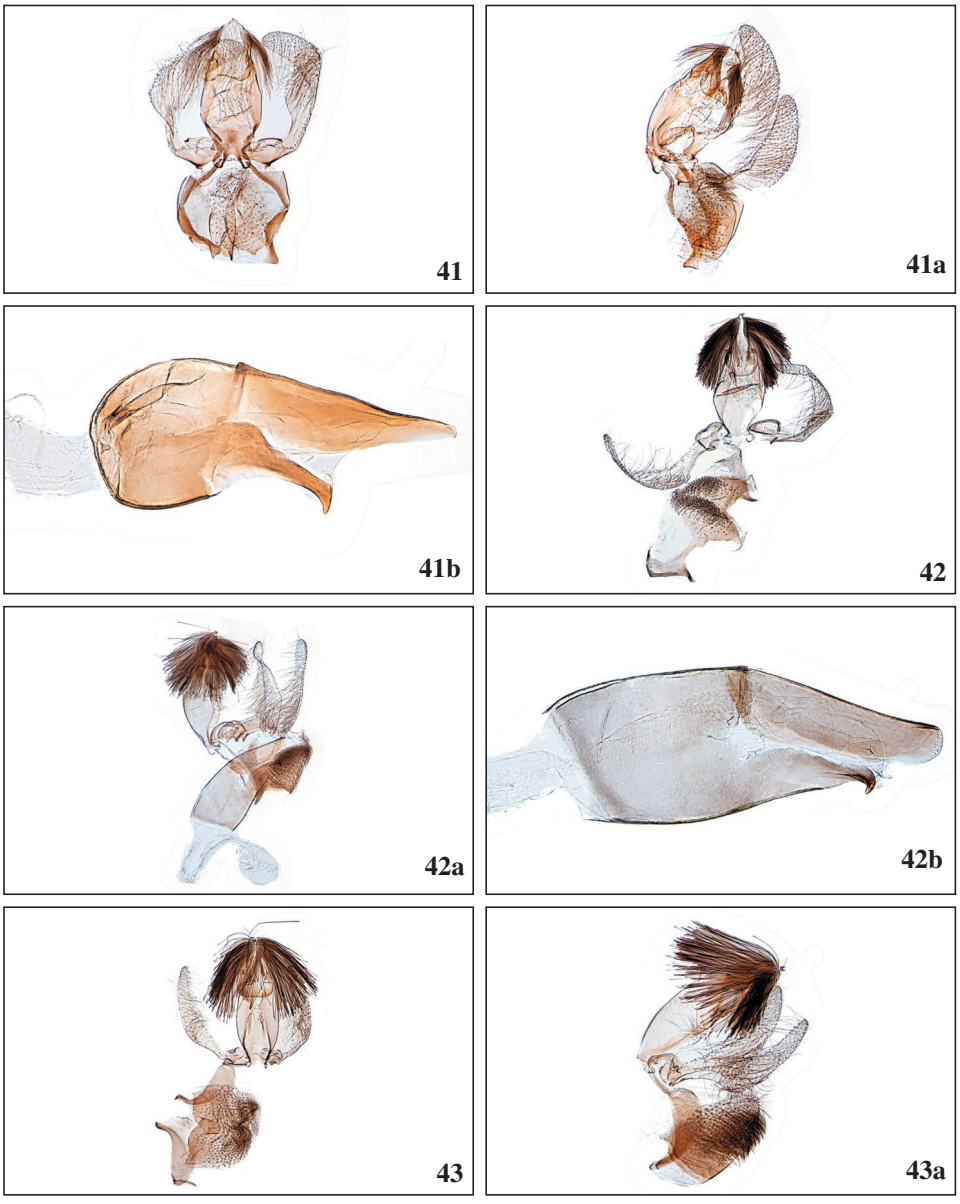

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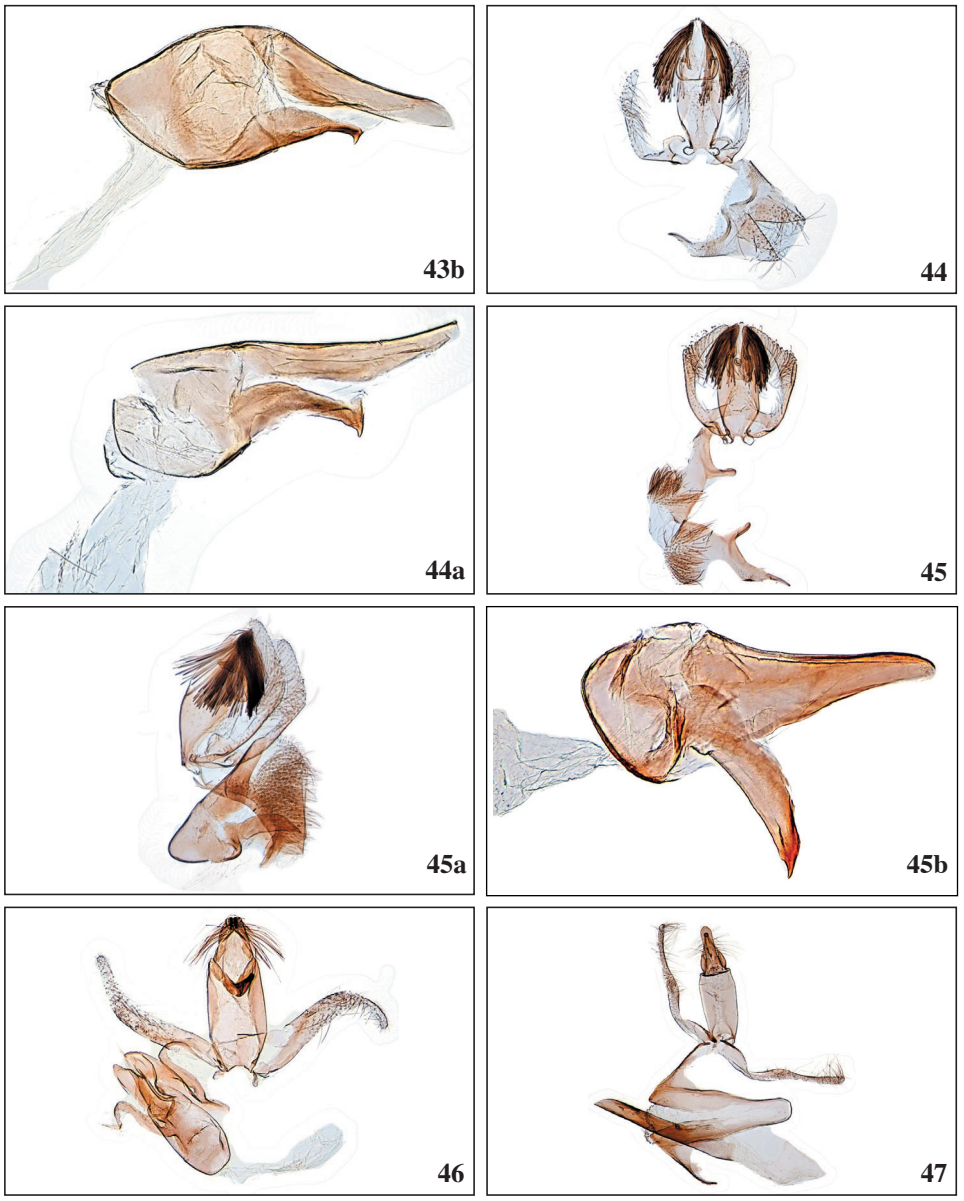

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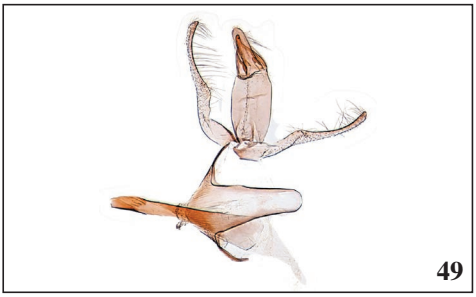

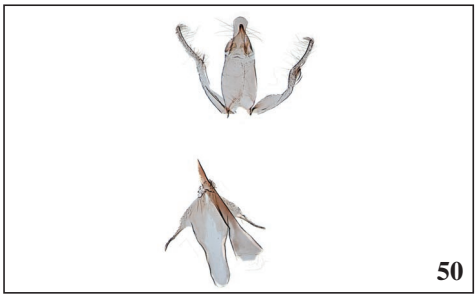

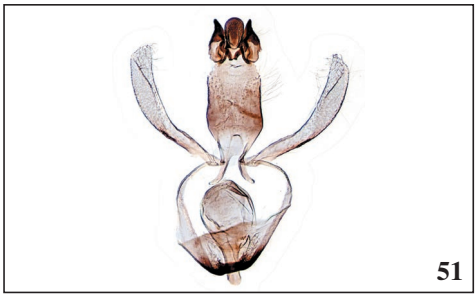

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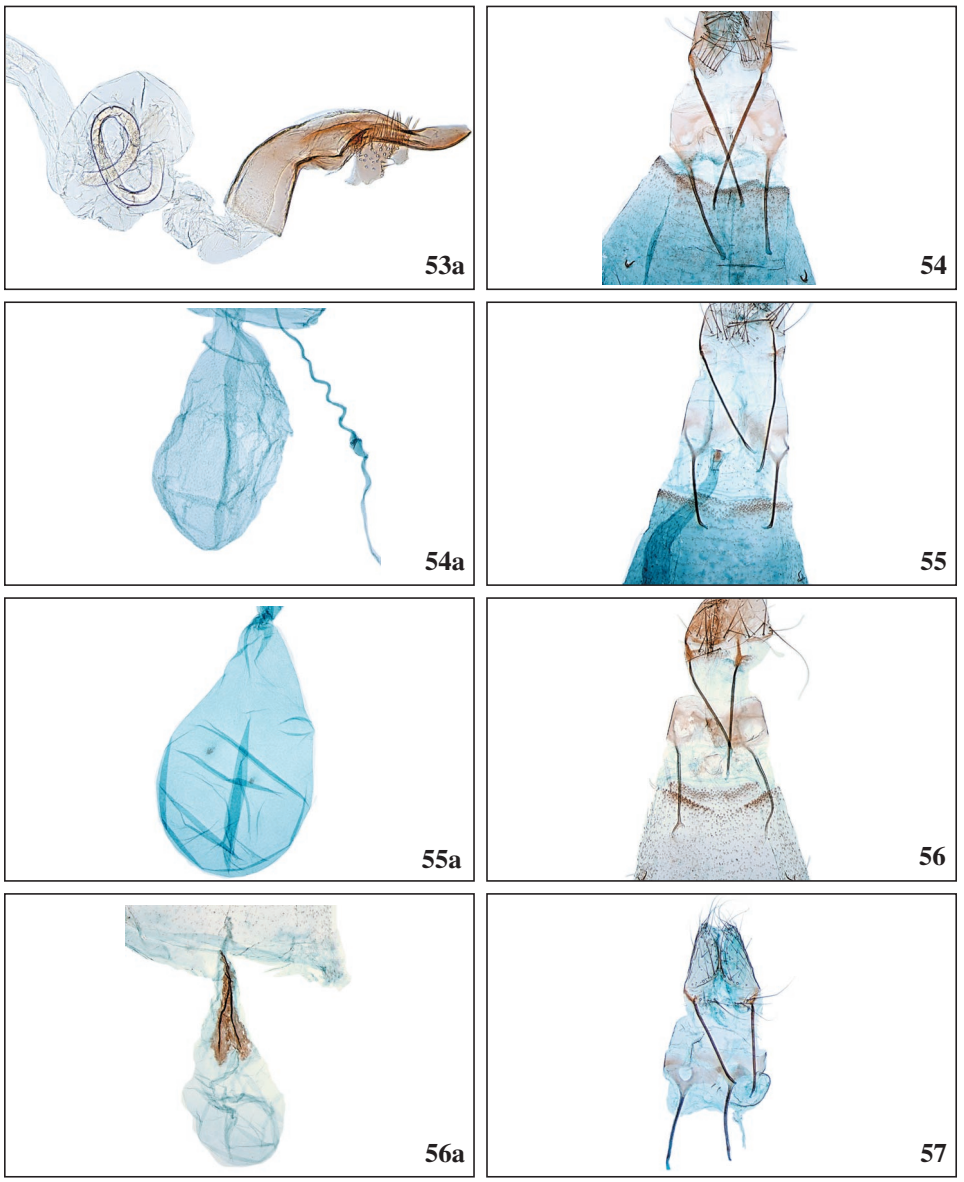

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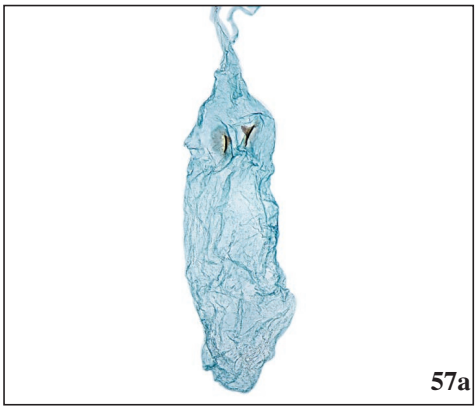

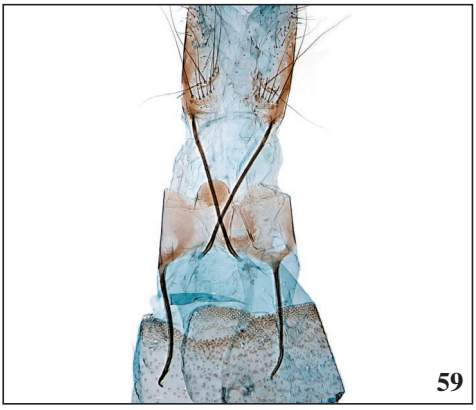

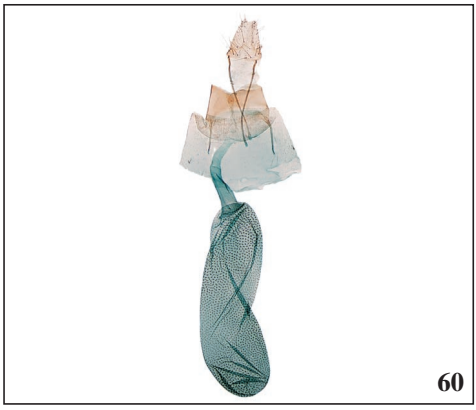

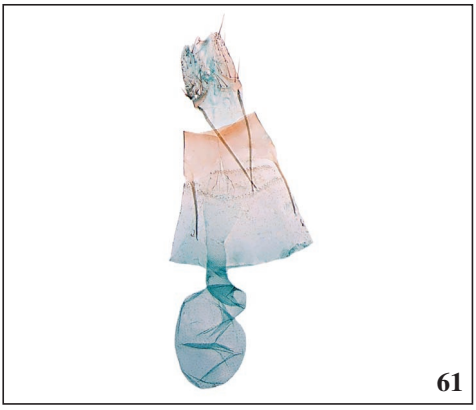

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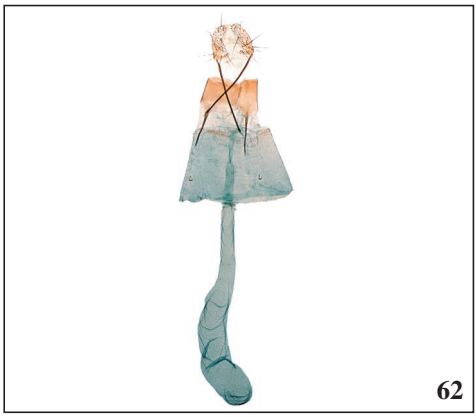

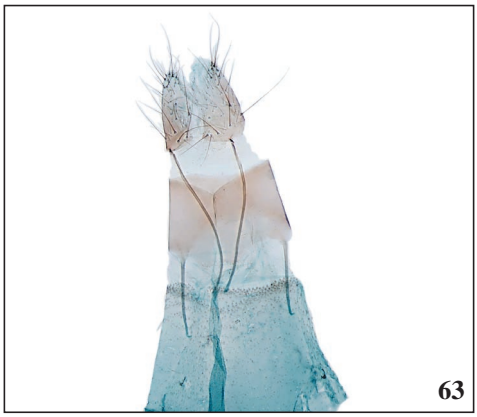

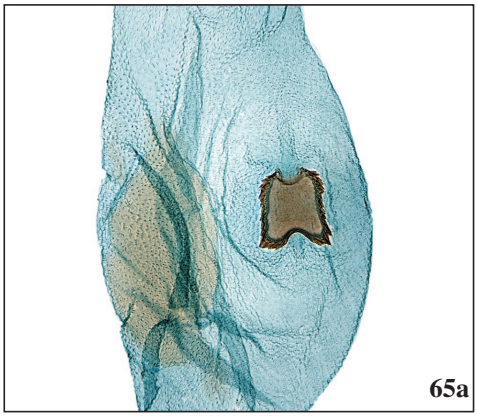

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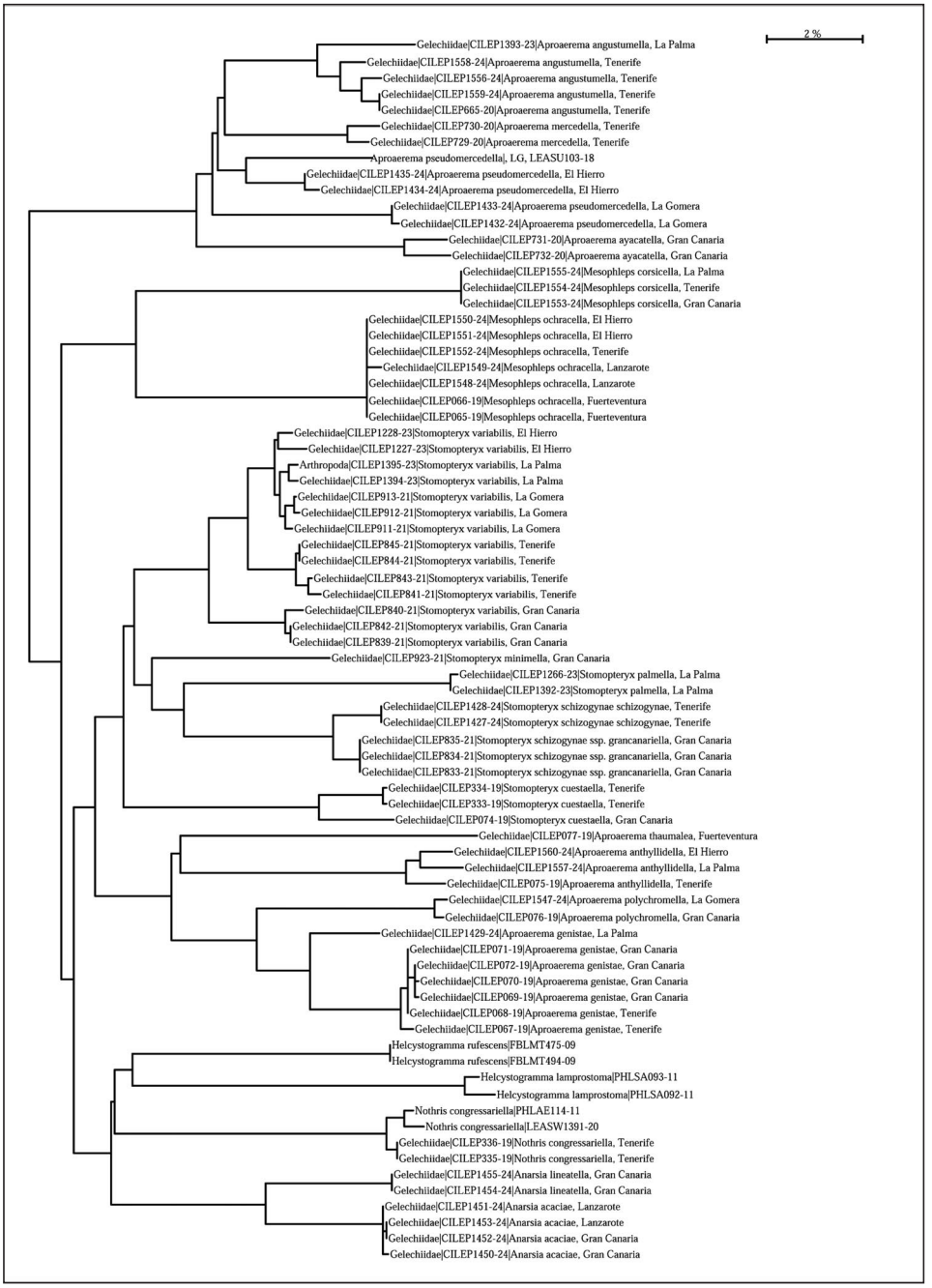

Figure 66. Neighbor-joining tree of DNA barcodes of twenty species of Anacampsinae.

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Libro:

Vives Moreno, A. (2014). *Catálogo sistemático y sinonímico de los Lepidoptera de la Península Ibérica, de Ceuta, de Melilla y de las Islas Azores, Baleares, Canarias, Madeira y Salvajes (Insecta: Lepidoptera)*. Improitalia.

Internet:

De Prins, J., & De Prins, W. (2011). *Global taxonomic database of Gracillariidae (Lepidoptera).* http://www.gracillariidae.net

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New and poorly known *Pleurota* Hübner, [1825] species from peninsular Spain, the Balearic Islands, and the Canary Islands (Lepidoptera: Oecophoridae, Pleurotinae)

Jukka Tabell, Martin Honey, Théo Leger, Marko Mutanen, Timo Nupponen & Pasi Sihvonen

Abstract

Four new *Pleurota* Hübner, [1825] species from peninsular Spain, one species from the Balearic Islands and one species from the Canary Islands are described: *P. rondaensis* Tabell & Nupponen, sp. nov., *P. pyrenaella* Tabell, sp. nov., *P. balearica* Tabell & Honey, sp. nov., *P. malagaensis* Tabell & Nupponen, sp. nov., *P. grancanariella* Tabell, sp. nov. and *P. subnobilella* Tabell, sp. nov. In addition, adults, and genitalia of seven poorly known Spanish *Pleurota* species are illustrated, most of them for the first time, and photos of several type specimens are presented. Lectotypes for *P. protasella* Staudinger, 1883, *P. glitzella* (Staudinger, 1883), *P. pleurotella* (Staudinger, 1871), *P. sobriella* (Staudinger, 1859) and *P. nobilella* Rebel, 1901 are designated. DNA barcodes of the aforementioned species are compared with those of all other Pleurotinae available to us in the BOLD database. Each of the species studied herein has a unique BIN (Barcode Index Number).
Keywords: Lepidoptera, Oecophoridae, Pleurotinae, *Pleurota*, new species, Spain.

Especies nuevas y poco conocidas de *Pleurota* Hübner, [1825] de España peninsular, Islas Baleares e IslasCanarias (Lepidoptera: Oecophoridae, Pleurotinae)

Resumen

Se describen cuatro nuevas especies de *Pleurota* Hübner, [1825] de España peninsular, una especie de las Islas Baleares y una especie de las Islas Canarias: *P. rondaensis* Tabell & Nupponen, sp. nov., *P. pyrenaella* Tabell, sp. nov., *P. balearica* Tabell & Honey, sp. nov., *P. malagaensis* Tabell & Nupponen, sp. nov., *P. grancanariella* Tabell, sp. nov. y *P. subnobilella* Tabell, sp. nov. Además, se ilustran los adultos y la genitalia de siete especies españolas de *Pleurota* poco conocidas, la mayoría de ellas por primera vez y se presentan fotos de varios especímenes tipo. Se designan los lectotipos de *P. protasella* Staudinger, 1883, *P. glitzella* (Staudinger, 1883), *P. pleurotella* (Staudinger, 1871), *P. sobriella* (Staudinger, 1859) y *P. nobilella* Rebel, 1901. Los códigos de barras de ADN de las especies mencionadas se comparan con los de todos los demás Pleurotinae de que disponemos en la base de datos BOLD. Cada una de las especies aquí estudiadas tiene un BIN (Barcode Index Number) único.
Palabras clave: Lepidoptera, Oecophoridae, Pleurotinae, *Pleurota*, nuevas especies, España.

Introduction

This article is the fourth contribution in a series of revisionary studies on the Palearctic Pleurotinae (Oecophoridae) (see Kaila et al. 2019, Tabell et al. 2019, 2021). The aim of this study is to present poorly known Spanish *Pleurota* Hübner, [1825] species and provide photos on both type and

recently collected specimens, as well as to describe new species. In the Spanish mainland the Pleurotinae fauna is diverse with 26 known taxa (Vives Moreno, 2014), and a remarkable portion of them are considered endemic to the Iberian Peninsula. Recent collecting excursions to Spain, carried out by Timo and Kari Nupponen and Jukka Tabell, have produced many *Pleurota* specimens, and some of the research findings are presented below. More results will be released in forthcoming articles.

When checking the Pleurotinae specimens collected by Paul Grotenfelt in the early 1980s and 1990s, currently housed in MZH in University of Helsinki (Finland), the first author detected a series of *Pleurota* originating from the Canary Islands: Gran Canaria, Maspalomas. The examination of the genitalia indicated that the species may be new for science. Two samples were sent for DNA-studies, but both of them failed to yield DNA sequences. In order to get fresh material for genetic study, an excursion to Maspalomas and surrounding slopes was conducted by J. Tabell in 2019. The excursion was successful in the sense that aforementioned *Pleurota* species was found again. Simultaneously Per Falck, during his field work also succeeded in finding several specimens from two different areas. The species is described below as new to science. Previously only one member of the family Oecophoridae, namely *Epicallima mikkolai* (Lvovsky, 1995) was known to inhabit the Canary Islands (Falck et al. 2019), and therefore we report genus *Pleurota* here for the first time from the Canary Islands.

When visiting the NHMUK in London in 2018, P. Sihvonen received a box with a series of small *Pleurota* species for study, collected by Martin Honey from three Balearic Islands. Small size and wing patterns indicated these may represent an unknown species, and this was confirmed later by morphological and molecular evidence. The genus *Pleurota* is reported here for the first time from the Balearic Islands.

Material and methods

Abbreviations

MFNB = Museum für Naturkunde Berlin, Germany
MNCN = Museo Nacional de Ciencias Naturales, Madrid, Spain
MNHN = National Museum of Natural History, Paris, France
MZH = Finnish Museum of Natural History, Helsinki, Finland
NHMUK = Natural History Museum, London, United Kingdom
HON = research collection of Martin Honey, London, United Kingdom
JUJ = research collection of Jari Junnilainen, Vantaa, Finland
NUP = research collection of Timo & Kari Nupponen, Espoo, Finland
TAB = research collection of Jukka Tabell, Hartola, Finland
bp = base-pair

The holotype specimens and a part of the paratype specimens of newly described species are deposited in the public collections of MZH and NHMUK, and private collections of JUJ and NUP. Furthermore, a part of the paratype specimens is deposited in the private collection of TAB. The holotypes that are deposited in MZH have been digitized and have a unique graphical QR code and web identifier, following the open access policy of that museum. URL links for these holotype records are provided in the article. Tissues (legs) of at least of two samples of each species, when available, were sent to the Canadian Centre for DNA Barcoding (CCDB) to obtain molecular data of the 658 bp fragment of the mitochondrial COI gene (DNA barcode). The DNA barcodes of the species presented here were compared with those of all Pleurotinae available to us in BOLD, altogether clustering in 135 different BINs (Barcode Index Numbers). The results are discussed under the Molecular data section of each species. The barcodes used in this study are publicly available through the BOLD dataset DS-PLEESP at dx.doi.org/10.5883/DS-PLEESP.

Terminology for forewing markings and male and female genitalia, as well as methods and equipment used for dissecting and photographing adult specimens, are explained by Kaila et al. (2019)

and Tabell et al. (2019) and are not repeated here. Pleurotinae species are generally characterized by long and porrect labial palpi that are densely covered by long, piliform scales, with a straight, upward pointing 3rd segment. Morphological traits characterizing and delimiting Pleurotinae (Oecophoridae) are provided in Kaila et al. (2019).

Taxonomy

A review of seven Spanish *Pleurota* species

Pleurota hebetella Ragonot, 1889 (Figures 1, 27, 51)
Barcode Index Number: BOLD:ADA2839
Pleurota hebetella Ragonot, 1889. *Bull. Soc. ent. Fr.,* (6)*9*, 130
Type locality: SPAIN: Albarracín and Cuenca. Paratype ♂, coll. E. L. Ragonot (MNHN [not found)], designated by Back (1973), Albarracín, Cotype, male genitalia illustrated by Back (1973).

Material studied: SPAIN, Aragón, prov. TERUEL, 3.5 km ENE Monteagudo del Castillo vill., 1530-1600 m, 2 ♂ (DNA sample 24684 Lepid Phyl; DNA sample 24685 Lepid Phyl), 24-VI-2012, T. Nupponen leg.; same collecting data, 1 ♂ (GP 5574 J. Tabell, DNA sample 24683 Lepid Phyl) but 25-VI-2012; same collecting data, but 1500 m, N40.46847 W0.77984, 4 ♂ (GP 5769 J. Tabell), 6-VII-2016, J. Tabell leg. (coll. TAB).

Diagnosis: *P. hebetella* is characterized by unicolorous ochreous brown forewing with dark grey costal and dorsal fringes. In the male genitalia, the large area of scobination of gnathos and the long posterior lobe of juxta are diagnostic. The female is unknown.

Molecular data: Three specimens of *P. hebetella* were sequenced successfully, resulting in 658 bp (n=2) and 567 bp (n=1) DNA barcodes. The nearest neighbour to *P. hebetella* is *P. rondaensis* sp. nov., with a 3.13 % divergence. The barcodes of *P. hebetella* exhibit 0.36 % intraspecific variation.

Description: Adult. Wingspan 13.5-15 mm. Labial palpus pale ochreous brown, ventrally mixed with off-white scales, apical half dark brown, about 6.5x as long as diameter of the eye (1st and 2nd palpomeres), 3rd palpomere 0.25x length of 1st and 2nd palpomeres. Antenna brown, hairy, 0.75x length of forewing. Tegula and thorax ochreous brown, frontal tuft, and neck slightly paler. Forewing narrow, ochreous brown, without longitudinal pale lines and dark spots, except for narrow pale ochre costal line from near base to $^{3}/_{4}$. Cilia dark grey. Hindwing and cilia dark grey. Abdomen slightly lustrous, blackish grey, each segment with a transverse row of ochre scales.

Male genitalia: Uncus thimble-shaped from ventral view, elongate, lined with several bristles of different length, distal margin concave. Gnathos 1.65x as long as uncus, funnel-shaped from ventral view, apex broadly rounded, with a shallow medial longitudinal crest, apical $^{2}/_{3}$ surfaced by transverse ridges and small nodules, apex with sharp spines. Valva upwards oblique, thimble-shaped, ventral margin concave; sacculus covered with long bristles. Anterior extension of juxta straight, robust; posterior lobe exceeding the apex of uncus, apex with a small tooth; valval lobe elongate, parallel-sided, upwards oblique, apex evenly rounded, broadly covered with long bristles. Phallus arched, parallel-sided, with one weakly sclerotized cornutus and a group of numerous tiny spines, apical $^{1}/_{4}$ dorsally covered with small spines and nodules.

Female genitalia: Unknown.

Biology: Unknown. The habitat in Teruel is a calcareous meadow.

Distribution: Spain. Records from Portugal and France should be re-examined.

Remarks: Back (1973) states that one paratype is housed in MNHN, but it has not been found there despite searching efforts (Sylvain Delmas, pers. comm.). The location of other type specimens is not known. The male genitalia of the paratype are illustrated and described by Back (1973), the female is unknown. The original description corresponds well with the specimens presented here, except for the different size (17 mm). It is possible that the original type series enclosed two or more different species, as was the case with *P. amaurodoxa* (see Remarks section of *P. amaurodoxa*). Back (1973)

points out that specimens determined as *P. hebetella* in different collections are mostly misidentifications.

Pleurota amaurodoxa Meyrick, 1935 (Figures 2-3, 28-29, 42, 51)
Barcode Index Number: BOLD:AED0185
Pleurota amaurodoxa Meyrick, 1935. *Exotic Microlep., 4*(18-19), 593
Type locality: SPAIN: Burgos, Estepar. Lectotype ♂, designated by Vives Moreno (2014) (NHMUK; examined from photographs).

Material studied: Spain, Castilla y León, Burgos, 8 km SE, 42.28170 -3.64025, 980 m, 4 ♂ (GP 6124 J. Tabell; DNA sample 26327 Lepid Phyl; DNA sample 26329 Lepid Phyl), 1 ♀ (GP 6349 J. Tabell, DNA sample 26328 Lepid Phyl), 4-VII-2019, J. Tabell leg.; same collecting data, 1 ♂, but 5-VII-2019 (coll. TAB).

Diagnosis: *P. amaurodoxa* is a small species which externally resembles the Spanish species *P. hebetella* and *P. pyrenaella* sp. nov. The male genitalia can be distinguished by shorter uncus and posterior lobe of juxta, and broader valval lobe. The female genitalia are similar to those of *P. pyrenaella*, but both apophyses are longer, the posterior signa are markedly longer, and the spines of anterior signum are longer. The female of *P. hebetella* is unknown.

Molecular diagnosis: Three specimens of *P. amaurodoxa* were sequenced, resulting in 655, 654 and 651 bp DNA barcodes. The nearest neighbour to *P. amaurodoxa* is *P. hebetella*, with a 3.13 % divergence. The barcodes of *P. amaurodoxa* exhibit no intraspecific variation.

Description: Adult. Wingspan 12-15.5 mm. Labial palpus mixed with off-white, brown and blackish brown scales, ventrally darker, about 5x as long as diameter of eye (1st and 2nd palpomeres), 3rd palpomere 0.3x length of 1st and 2nd palpomeres. Antenna brown, mixed with off-white scales, 0.85x length of forewing. Frontal tuft and neck brown, mixed with off-white, tegula and thorax ochre, mixed with off-white. Forewing narrow, covered by pale ochre, ochre-tipped and brown scales, without longitudinal lines and dark spots, except for a narrow off-white costal line from base to $^{2}/_{3}$. Cilia brownish grey. Hindwing and cilia dark brownish grey. Abdomen slightly lustrous, dark brownish grey, each segment with a transverse row of ochre scales.

Male genitalia: Uncus thimble-shaped from ventral view, elongate, lined with several bristles of different length, distal margin concave. Gnathos 1.75x as long as uncus, funnel-shaped from ventral view, tapered towards apex, with a shallow, long longitudinal median crest, medially surfaced by small nodules. Valva elongate, upwards oblique, thimble-shaped, ventral margin evenly curved. Anterior extension of juxta straight, well sclerotized; median part rounded; posterior lobe not reaching apex of uncus, apex with a small tooth; valval lobe club-shaped, moderately broad, apex evenly rounded, lined with several bristles. Phallus curved, parallel-sided, moderately narrow, with a narrow chain of small spines.

Female genitalia: Papilla analis ovoid, narrow, covered with bristles of different length. Apophyses long; posterior apophysis 6x as long as papilla analis and 1.05x as long as anterior apophysis, which is 2.4x as long as segment 8. Segment 8 longitudinally elongated, rectangular, membranous, quadrate, distally sparsely covered with bristles, dorsolaterally reinforced by sclerotized band; branch of anterior apophysis apically fused, U-shaped; ventral longitudinal sclerotization narrow, shorter than segment 8. Antrum tubular, parallel-sided, anterior half sclerotized, colliculum short. Ductus bursae slightly expanded towards corpus bursae. Corpus bursae ovoid; anterior signum strongly arched, broad, protuberances long, thornlike; two leaf-shaped posterior signa with thornlike protuberance and strongly elongated base.

Biology: Unknown. The specimens collected by the first author were netted around *Genista* sp.

Distribution. Known only from northern Spain, near Burgos.

Remarks: The species description by Meyrick was based on three specimens collected from Estepar, Burgos, in northern Spain. According to Vives Moreno (2014) the type series embraces three different species: *P. pyropella* ([Denis & Schiffermüller], 1775) (= *P. iberica*?), *P. ericella* (Duponchel, 1839) and *P. amaurodoxa*. The last specimen was selected as a lectotype by Vives Moreno (2014).

Pleurota protasella Staudinger, 1883 (Figures 4-5, 30, 43, 51)

Barcode Index Number: BOLD:ACY6183

Pleurota protasella Staudinger, 1883, *Stettin Ent. Ztg., 44*(4-6), 184-185

Type locality: SPAIN: Granada, Sierra de Alfacar. Lectotype [here designated]: "Origin." [pink label],"Sierra de Alfacar m[ich] 80." [pale blue label], "Paralectotypus" [red label], "ex coll. Staudinger" (MFNB, examined from photographs and barcode: DNA sample MFNLEP252, 658 bp[89n]).

Material studied: SPAIN, Prov. GRANADA, Sierra Nevada, 1490 m, 4 km SW Güejar-Sierra, N37.135 W3.473, 3 ♂, 2 ♀ (GP 5500 J. Tabell, DNA sample 24575 Lepid. Phyl; GP 5956 J. Tabell, DNA sample 24927 Lepid. Phyl), 2-VII-2015, J. Tabell leg.; Prov. Granada, Sierra Nevada 1620 m, 2 km NW Bayárcal, N37.040 W3.014, 4 ♂, 1 ♀ (DNA sample 24574 Lepid. Phyl), 4-VII-2015, J. Tabell leg.; Granada, Sierra Nevada 2030 m, 1 km S Puerto de la Ragua, N37.104 W3.027, 3 ♂ (GP 5471 J. Tabell, DNA sample 24572 Lepid. Phyl), 5-VII-2015, J. Tabell leg.; ALMERÍA, Sierra de los Filabres, Calar Alto 2130 m, N37.222 W2.545, 4 ♂ (DNA sample 24573 Lepid. Phyl; DNA sample 24926 Lepid. Phyl), 5-VII-2015, J. Tabell leg.; ALICANTE, 9 km NNW Albatera, 460 m, N38.254 W0.913, 1 ♂ (DNA sample 25603 Lepid. Phyl), 21-V-2016, J. Tabell leg.; Alicante, 9.4 km NNW Albatera, 500 m, N38.256 W0.919, 2 ♂ (GP 5694 J. Tabell), 22-V-2016, J. Tabell leg. (all coll. TAB). The species was not treated by Back (1973).

Diagnosis: Characterized by broad white costal line, dark discal and discocellular spots and short 3rd palpomere of labial palpus. Very long posterior lobe of juxta and long chain of cornuti in the male genitalia, and the combination of long apophyses, long and broad antrum and long corpus bursae in the female genitalia distinguish *P. protasella* from other species.

Molecular diagnosis: Seven specimens of *P. protasella* were sequenced, resulting in 658 bp DNA barcode sequences for all specimens. The nearest neighbour to *P. protasella* is the Moroccan species *P. ternaria* Tabell, 2019, with a 5.74 % divergence. The barcodes of *P. protasella* exhibit 1.71 % intraspecific variation, which may indicate cryptic diversity.

Description: Adult. Wingspan 12.5-15.5 mm. Labial palpus 5.6x as long as diameter of eye (1st and 2nd palpomeres), 3rd palpomere 0.25x length of 1st and 2nd palpomeres, white, below broadly dark brown. Antenna hairy, pale brown, 0.65x length of forewing. Head, thorax and tegula off-white. Forewing white, scattered with pale fuscous, brown-tipped scales, blackish brown discal and discocellular spots distinct, between them a faint streak, another streak from base to plical spot, fringe line formed of several dark to blackish brown scales; costal line white, from base to $^{2}/_{3}$, widest at middle; subcostal line greyish brown, mixed with white, apically scattered with a few blackish brown scales, gradually widened from near base to apex; cilia long, pale brown, basally and apically white. Hindwing pale grey, cilia pale grey, apically paler. Abdomen slightly lustrous, pale grey, each segment with a transverse row of ochre scales.

Male genitalia: Uncus bell-shaped from ventral view, markedly shorter than gnathos, lined with few long bristles, apical half narrow. Gnathos funnel-shaped from ventral view, 1.55x length of uncus, gradually tapered towards apex, surfaced with small nodules medially, apex rounded, moderately broad. Valva upwards oblique; cucullus narrow, ventral margin medially concave, costa slightly concave; valval lobe narrow, finger-shaped, basally bulged, surfaced with a few long bristles apically. Anterior extension of juxta straight, median part rounded, posterior lobe narrow, very long, with a small apical tooth. Vinculum V-shaped. Phallus curved, slightly tapered towards apex, with an elongate plate-shaped cornutus and a narrow chain of several spiniform cornuti, apical $^{1}/_{5}$ with small nodules dorsally.

Female genitalia: Papilla analis ovoid, narrow, covered with bristles of different length. Apophyses long; posterior apophysis about 5x as long as papilla analis and 1.5x as long as anterior apophysis, which is 2x as long as segment 8. Segment 8 longitudinally elongated, rectangular, membranous, quadrate, distally very sparsely covered with bristles, dorsolaterally reinforced by sclerotized band; branch of anterior apophysis apically fused, U-shaped. Antrum tubular, long, posterior half densely covered by small spinules, anterior half more sclerotized. Ductus bursae

membranous, short. Corpus bursae ovoid, long, with a large arched signum with two sclerotized wedge-shaped protuberances, and two leaf-shaped signa of equal size.

Biology: Unknown.

Distribution: Spain. Records from France should be re-examined.

Remarks: The species description by Staudinger was based on four male specimens, but only three specimens labelled as paralectotypes were found in MFNB. These designations are unpublished, and according to the International Code of Zoological Nomenclature (ICZN 1999, Article 74.7) they are not valid. Consequently, one original specimen is designated herein as a lectotype.

Pleurota glitzella (Staudinger, 1883) (Figures 6-7, 31, 51)

Barcode Index Number:-

Protasis glitzella Staudinger, 1883. *Stettin Ent. Ztg., 44*(4-6), 185

Type locality: SPAIN: Granada. Lectotype [here designated]: "Lectotypus ♂" [red label], "Lectotypus n 9. ♂ *Pleurota glitzella* Stgr. Lvovsky det.", "Granada m[ich] 80" [pale blue label], "Origin." [pink label] (MFNB, examined from photographs and barcode: DNA sample MFNLEP246, 658 bp [250n]).

Material studied: Spain, Almería, Sierra de los Filabres, route Purchena-Senés, 1600 m, 1 ♂ (GP 5637 J. Tabell, DNA sample 25437 Lepid Phyl [barcoding failed]), 16-VI-2007, Jan Šumpich leg. & coll. The species was not treated by Back (1973).

Diagnosis: A small species, characterized by very short 3rd palpomere of labial palpus, which is concealed by hairy scales, and long cilia in the forewing with two distinct dark, broad, and slightly concave fringe lines. In the male genitalia, the shape of gnathos, valval lobe and strongly concave outer margin of cucullus distinguish *P. glitzella* from other species. The female is unknown.

Molecular diagnosis: An old lectotype was sequenced successfully, resulting in a 658 bp DNA sequence [250n]. It exhibits 97.26 % similarity with the sequence of a Spanish still undetermined *Pleurota* species (n=3, private records).

Description: Adult (faded to brown, originally greyer). Wingspan 11-13 mm (original description). Labial palpus white to pale brownish white above, 3rd palpomere not visible. Antenna pale brown. Head, thorax and tegula white. Forewing white, dorsal third covered with pale brown scales, blackish brown discal, discocellular and plical spots distinct; no costal line; subcostal line broad, brown, mixed with white. Fringe line V-shaped, formed of blackish brown scales, cilia long, white, with two distinct brown lines, lines slightly concave at dorsal area. Hindwing and cilia pale brown. Abdomen slightly lustrous, pale grey, each segment with a transverse row of ochre scales.

Male genitalia: Uncus triangular from ventral view, lined with several long bristles. Gnathos fluke-shaped from ventral view, tapered towards apex, moderately short, 1.3x length of uncus, surfaced with small nodules medially. Valva upwards oblique; cucullus narrow, ventral margin medially concave, costa slightly bulged basally; valval lobe club-shaped, basally slightly bulged, apical half surfaced with several nodules and short bristles. Anterior extension of juxta straight and narrow, posterior lobe very long, with a small apical tooth. Vinculum U-shaped. Phallus curved, parallel-sided, with a robust plate-shaped cornutus and a long loose bundle of numerous spiniform cornuti.

Female genitalia: Unknown.

Biology: Unknown.

Distribution: Southern Spain.

Remarks: The designation by Lvovsky is unpublished, and according to the ICZN (1999, Article 74.7) it is not valid. Consequently, one original specimen is designated herein as a lectotype.

Pleurota pleurotella (Staudinger, 1871) (Figures 8-10, 32, 44, 51)

Barcode Index Number: BOLD:ACW2024

Protasis pleurotella Staudinger, 1871. *Berl. Ent. Z., 14*(3/4), 317

Type locality: SPAIN: Andalusia. Lectotype [here designated]: "Origin" [pink label], "ex Coll. Staudinger", "Andalucia Kal.[isch]" [pale blue label], "Zool. Mus. Berlin" [pale brown label],

"Lectotypus *Pleurota pleurotella* Stgr. design. Lvovsky" [red label] (MFNB; examined from photographs).

Material studied: SPAIN, GRANADA, Sierra Nevada 700 m, 2 km N Cherin, 1 ♀, 28-III-1998, T. Nupponen leg.; ALICANTE, 3 km E San Miguel de Salinas, 1 ♀ (GP 5951 J. Tabell), 16-IV-2009, J. Tabell leg.; Alicante, 6 km NW San Miguel de Salinas, 2 ♀ (GP 5298 J. Tabell), 22-IV-2009, J. Tabell leg.; ALMERÍA, 1 km SW Tabernas, 370 m, 1 ♂ (GP 5460 J. Tabell, DNA sample 23688 Lepid. Phyl), 7-IV-2014, J. Tabell leg.; GRANADA, 10 km NE Baza, 700 m, N37.563 W2.709, 2 ♂ (DNA sample 23701 Lepid. Phyl), 1 ♀, 8-IV-2014, J. Tabell leg.; 1 ♂, same collecting data, but 10-IV-2014; same collecting data, 1 ♂ (GP 5308, DNA sample 23687 Lepid. Phyl), but 13-IV-2014; Granada, 7.5 km N Motril, 100 m, N36.811 W3.546, 1 ♂ (GP 5409 J. Tabell), 10-IV-2014, J. Tabell leg.; Granada, 5.5 km N Cüllar, 870 m, N37.632 W2.571, 1 ♂, 12-IV-2014, J. Tabell leg. (all coll. TAB). The species was not treated by Back (1973).

Diagnosis: From the outer appearance, *P. pleurotella* is similar to *P. gallicella* Huemer & Luquet, 1995, but the dark spots on the forewing are larger, and the 3rd palpomere of the labial palpus is not visible. The combination of a narrow cucullus, long valval lobe and long posterior lobe of juxta distinguish *P. pleurotella* from other species. In the female genitalia, the long segment 8 and the shape of signa are characteristic.

Molecular diagnosis: Three specimens of *P. pleurotella* were sequenced successfully, resulting in 658 bp barcodes for all specimens. The nearest neighbour to *P. pleurotella* is the morphologically distinct *P. candia* Back, 1973, with a 7.77 % divergence. The barcodes of *P. pleurotella* exhibit no intraspecific variation.

Description: Adult. Wingspan 13.5-16 mm. Labial palpus 5.8x as long as diameter of eye (1st and 2nd palpomeres), 3rd palpomere very short, entirely concealed by scales, greyish white, mixed with pale brown, below broadly dark brown. Antenna hairy in male, brown, 0.65x length of forewing. Head off-white, thorax and tegula mixed with brown and grey. Forewing off-white, scattered with brownish grey scales, blackish brown discal, discocellular and plical spots large, fringe line formed of several blackish brown scales; costal line absent; subcostal line brownish grey, mixed with white, gradually widened from base to near apex, apically indistinctly edged; cilia long, off-white, with two grey lines. Hindwing pale grey, cilia pale grey with yellow tinge, apically white. Abdomen slightly lustrous, grey, each segment with a transverse row of ochre scales.

Male genitalia: Uncus triangular from ventral view, lined with few long bristles. Gnathos basally fluke-shaped, distally finger-shaped from ventral view, 1.6x length of uncus, surfaced with small nodules medially, apex broadly rounded. Valva upwards oblique; cucullus narrow, ventral margin medially concave, costa slightly bulged basally; valval lobe narrow and long, club-shaped, basally slightly bulged, apical half more sclerotized, surfaced with few short bristles apically. Anterior extension of juxta straight, posterior lobe very long, with a small apical tooth. Vinculum trapezoid. Phallus curved, parallel-sided, with a robust plate-shaped cornutus and a loose bundle of several spiniform cornuti.

Female genitalia: Papilla analis ovoid, narrow, apical half covered with bristles. Apophyses long; posterior apophysis 6.8x as long as papilla analis and 1.5x as long as anterior apophysis, which is 1.7x as long as segment 8. Segment 8 longitudinally elongated, membranous, quadrate, dorsolaterally reinforced by sclerotized band; branch of anterior apophysis apically fused, U-shaped, weekly sclerotized; ventral longitudinal sclerotization narrow, as long as segment 8. Antrum tubular, long, parallel-sided. Ductus bursae narrow. Corpus bursae ovoid, narrow, with one arched signum with two serrated protuberances, and two leaf-shaped signa with long, straight spine.

Biology: Unknown.

Distribution: Known from southern Spain.

Remarks: The designation by Lvovsky is unpublished, and according to the ICZN (1999, Article 74.7) it is not valid. Consequently, one original specimen is designated herein as a lectotype.

Pleurota sobriella (Staudinger, 1859) (Figures 11-13, 33, 45, 51)
Barcode Index Number: BOLD:ADB3164
Anchinia sobriella Staudinger, 1859. *Stettin ent. Ztg., 20*(7-9), 245-246
Type locality: SPAIN: Granada. Lectotype [here designated]: "21/6" [pale brown label], "Origin" [pink label], "Lectotypus Pleurota sobriella Stgr. ♂ Lvovsky det.", "Granada. m[ich] [pale blue label], "Lectotypus ♂" [red label], "ex Coll. Staudinger", "19" [pale brown label] (MFNB; examined from photographs).

Material studied: SPAIN, JAÉN, Albánchez, 1 ♂ (DNA sample 24672 Lepid Phyl), 8-VI-1994, F. Schepler leg. (coll. TAB); Aragón, TERUEL, Albarracín, 3 km N, 1 ♂ (DNA sample 24812 Lepid Phyl [barcoding failed]), 12-VI-2004, T. Nupponen leg.; Aragón, Teruel, Albarracín, 1 ♂ (GP 5338 J. Tabell, DNA sample 23657 [barcoding failed]), 17-VI-2004, J. Junnilainen leg.; Prov. Soria, SORIA, 30 [km] SW, El Temeroso, 1080 m, 1 ♀ (DNA sample 24814 Lepid Phyl), 26-VI-2012, T. Nupponen leg.; Aragón, prov. TERUEL, Monteagudo del Castillo vill. 3.5 km ENE, 1 ♂ (DNA sample 24811 Lepid Phyl), 14-VI-2008, K. Nupponen leg.; ibidem, 1530-1610 m, 1 ♀ (DNA sample 24813 Lepid Phyl), 16-VII-2012, T. Nupponen leg.; Aragón, Teruel, Monteagudo del Castillo 3.5 km ENE, 1550 m, N40.46847 W0.77984, 3 ♂ (GP 6035 J. Tabell; GP 6036 J. Tabell; DNA sample 25577 Lepid Phyl), 3 ♀ (GP 5756 J. Tabell; GP 5768 J. Tabell), 6-VII-2016, J. Tabell leg. (all coll. TAB).

Diagnosis: *P. sobriella* is characterized by olive-brown forewing with narrow white lines. The shape of gnathos and valval lobe in the male genitalia, and thick and long apophyses in the female genitalia are distinguishing details.

Molecular diagnosis: Five specimens of *P. sobriella* were sequenced successfully, resulting in 658 bp (n=3), 611 bp (n=1) and 572 bp (n=1) sequences. The nearest neighbour to *P. sobriella* is *P. subnobilella* with a 1.66 % divergence. The barcodes of *P. sobriella* exhibit 0.56 % intraspecific variation.

Description: Adult. Wingspan 22-24 mm. Labial palpus ochre, ventrally mixed white and brown, dorsolaterally with a dark brown apical spot, about 7.3x as long as diameter of the eye (1st and 2nd palpomeres), 3rd palpomere 0.35x length of 1st and 2nd palpomeres. Antenna brown, basally mixed with white scales. Frontal tuft and neck ochre, tegula and thorax yellowish olive-brown. Costal line narrow, indistinctly edged, from near base to $^{2}/_{3}$; subcostal line yellowish olive-brown, parallel-sided; median line white, narrow, not connected to dent of median line, which forms a separate narrow line from base to tornus; fringe line off-white; dorsal line narrow and short; median area yellowish olive-brown, in female paler. Cilia grey, apically off-white. Hindwing and cilia dark grey. Abdomen slightly lustrous, dark grey, each segment with a transverse row of ochre scales.

Male genitalia: Uncus thimble-shaped from ventral view, lined with several bristles of different length, apex blunt. Gnathos 1.9x as long as uncus, from ventral view elongate, funnel-shaped, medially covered with small nodules, apical half narrow, parallel-sided, apex blunt. Valva elongate, upwards oblique; cucullus thimble-shaped. Anterior extension of juxta straight, short, median part rounded, posterior lobe extended to uncus, apex armed with a small tooth. Valval lobe well sclerotized, very broad, rounded apically, covered with several small nodules and short bristles apically. Phallus curved, tapered towards apex, apex pointed, with one robust plate-shaped cornutus surrounded by numerous tiny spines.

Female genitalia: Papilla analis ovoid, covered with bristles of different length. Apophyses very long; posterior apophysis 10x as long as papilla analis and 1.6x as long as anterior apophysis. Segment 8 elongated longitudinally, rectangular, membranous, dorsolaterally reinforced by sclerotized band, lined with a few bristles distally, ventral longitudinal sclerotization narrow, as long as segment 8, branch of anterior apophysis narrow. Antrum tubular, short, membranous, anterior $^{1}/_{3}$ tapered and sclerotized. Ductus bursae membranous, moderately broad, parallel-sided. Corpus bursae ovoid, with one robust arched signum bearing two serrated, thorn-like protuberances, and two leaf-shaped signa.

Biology: Unknown.

Distribution: Spain.

Remarks: The designation by Lvovsky is unpublished, and according to the ICZN (1999, Article 74.7) it is not valid. Consequently, one original specimen is designated herein as a lectotype.

Pleurota nobilella Rebel, 1901 (Figures 14-15, 34, 51)

Barcode Index Number: BOLD:ADI2705

Pleurota honorella Hb. v. *nobilella* Rebel, 1901. *Dt. ent. Z. Iris, 13*(2), 169

Type locality: SPAIN: Murcia. Lectotype [here designated] ♀ [abdomen missing] "Type" [red ink], "Origin." [pink label], "ex coll. Staudinger" (MFNB, examined from photographs and barcode: DNA sample MFNLEP252, 658 bp[89n]).

Material studied: SPAIN, ALICANTE, 9 km NNW Albatera, 460 m, N38.25317 W0.91450, 5 ♂ (GP 5856 J. Tabell, DNA sample 25562 Lepid Phyl; GP 5901 J. Tabell, DNA sample 25563 Lepid Phyl; DNA sample 26200 Lepid Phyl), 21-V-2016, J. Tabell leg. (coll. TAB).

Diagnosis: Brown subcostal line, which is markedly darker than the rest of the wing, distinguishes *P. nobilella* from *P. honorella* and *P. subnobilella* sp. nov. In the male genitalia, the broad posterior lobe of juxta is characteristic. The female genitalia are unknown.

Molecular diagnosis: Three fresh specimens of *P. nobilella* were sequenced, resulting in 658 bp (n=2) and 652 bp (n=1) barcodes. In addition, two old type specimens were sequenced (see Remarks). The nearest neighbor to *P. nobilella* is the Corsican *P. cyrniella* Mann, 1855, with a 6.53 % divergence. Minimum and maximum genetic divergences between the lectotype and three *P. nobilella* specimens are 0.72 % and 0.9 %, respectively.

Description: Adult. Wingspan 18-23.5 mm, ♀ lectotype 29 mm. Labial palpus pale grey, ventrally mixed white and brown, dorsolaterally with a dark brown apical spot, about 6.3x as long as diameter of the eye (1st and 2nd palpomeres), 3rd palpomere 0.25x length of 1st and 2nd palpomeres. Antenna dark brown. Frontal tuft and neck off-white, mixed with pale beige, tegula white, mixed with pale ochre, thorax white, medially mixed with pale ochre. Costal line white, from near base to $^{4}/_{5}$, evenly tapered towards apex; subcostal line brown, evenly expanded towards apex; median line from base to apex, white, at junction of dent of median line narrow, then expanded, apical $^{1}/_{3}$ tapered, dent wedge-shaped, not reaching termen; fringe line indistinct, only slightly paler than median area; dorsal line parallel-sided, white, from base to $^{1}/_{3}$; median area pale ochreous yellow. Cilia pale brown. Hindwing and cilia brownish grey. Abdomen slightly lustrous, grey, each segment with a row of ochre scales.

Male genitalia: Uncus thimble-shaped from ventral view, lined with several bristles of different length, apex blunt. Gnathos 1.7x as long as uncus, from ventral view elongate, funnel-shaped, medially covered with small nodules, gradually tapered towards apex, apex weakly beak-shaped. Valva elongate, upwards oblique, ventral margin evenly curved; cucullus narrow, apex slightly expanded. Juxta robust; anterior extension straight, short, median part rounded, posterior lobe broad, not extended to uncus, apex armed with a small tooth. Valval lobe broad, rounded apically, covered with several short bristles apically. Vinculum U-shaped. Phallus curved, parallel-sided, with one robust plate-shaped cornutus surrounded by numerous tiny spines.

Female genitalia: Unknown. The female lectotype lacks the abdomen. The description by Back (1973) is not based on type material and is thus dubious.

Biology: Unknown.

Distribution: Known from south-eastern Spain, provinces of Murcia and Alicante.

Remarks: *P. nobilella* was originally described as a variation of *P. honorella* (Hübner, [1813]), based on two specimens. Back (1973) upgraded it to a valid species, stating "Verbleib nicht nachgewiesen" [location is not known]. Two specimens found in MFNB bear "Origin", "Type" and "ex coll. Staudinger" labels, and they indisputably are the original type specimens. The male genitalia are illustrated and described by Back (1973), the female genitalia are shortly described but not illustrated (from the specimen collected from Sierra de Espuña, province of Murcia).

Based on the external appearance, the male and female type specimens are not conspecific. Also,

the DNA analysis supports our interpretation, the genetic distance between them is 8.4 %. We have designated the female specimen as a lectotype because Rebel (1901) emphasizes the importance of the dark subcostal stripe as a distinguishing character, and in the female specimen it is strikingly dark. The identity of the male specimen (Figure 16) remains undefined, it has a unique BIN (BOLD:AER7277) and its genetic divergence to the nearest neighbour *P. subnobilella* is 1.28 %.

Descriptions of new species

***Pleurota rondaensis* Tabell & Nupponen, sp. nov.** (Figures 17, 35, 46, 51)
Barcode Index Number: BOLD:ADA1289

Type material: Holotype ♂ (DNA sample 24689 Lepid Phyl [barcoding failed]): SPAIN, Málaga, 20 km NE Ronda, 10-IV-2002, T. & K. Nupponen leg. (coll. NUP).

Paratypes: 25 ♂ (GP 5581 J. Tabell, DNA sample 24688 Lepid Phyl), 3 ♀, same collecting data as holotype; 5 ♂, same collecting data, but 2-IV-1998, T. Nupponen leg.; 18 ♂, 2 ♀ (GP 5990 J. Tabell; DNA sample 24690 Lepid Phyl), same collecting data, but 9-IV-2002, T. & K. Nupponen leg. (colls. NUP and TAB, 2 exx. coll. MNCN); 1 ♂, Spain, Málaga, Ronda, 24-V-1989, H. Holmberg leg. (coll. NUP).

Diagnosis: *Pleurota rondaensis* is characterized by unicolorous brown forewing. It can be distinguished from similarly coloured *P. hebetella*, *P. amaurodoxa* and *P. pyrenaella* sp. n. by larger size. In the male genitalia, distinguishing features are the uncus (longer in *P. hebetella* and *P. pyrenaella*), the gnathos (longer in *P. hebetella*), the posterior lobe of juxta (shorter in *P. amaurodoxa*, longer in *P. hebetella* and *P. pyrenaella*), and the valval lobe (narrower in other related species). In the female genitalia, the narrow ductus bursae and the shape of posterior signa are characteristic.

Molecular data: Two specimens of *P. rondaensis* were sequenced successfully, resulting in 599 and 614 bp barcode fragments. The nearest neighbours to *P. rondaensis* are *P. pyrenaella*, *P. hebetella* and *P. amaurodoxa*, with 3.49 %, 4.15 % and 4.57 % divergences, respectively. The barcodes of *P. rondaensis* exhibit no intraspecific variation.

Description: Adult. Wingspan 18-20.5 mm. Labial palpus pale yellowish brown, mixed brown, ventrally darker, 7x as long as diameter of the eye (1st and 2nd segments), 3rd segment 0.35x length of 1st and 2nd segments. Antenna brown, hairy, 0.55x length of forewing. Head, tegula and thorax mixed yellowish brown and brown. Forewing covered with long brown, yellow-tipped scales; costal line pale yellow, from near base to $^{4}/_{5}$, slightly bulged medially; subcostal line slightly darker than rest of forewing. Cilia brownish grey. Hindwing dark grey, cilia paler, with a distinct fringe line. Abdomen slightly lustrous, blackish grey, each segment with a transverse row of ochre scales.

Male genitalia: Uncus jingle bell-shaped from ventral view, lined with several bristles of different length, distal margin concave. Gnathos 1.45x as long as uncus, funnel-shaped from ventral view, evenly tapered towards apex, largely and densely surfaced by transverse ridges and small nodules, with a medial longitudinal crest. Valva upwards oblique, thimble-shaped, ventral margin concave; sacculus covered with long bristles. Anterior extension of juxta straight, robust; median part a roundish plate; posterior lobe not exceeding the apex of uncus, apex with a small tooth; valval lobe large, parallel-sided, upwards oblique, apex evenly rounded, broadly covered with long bristles. Phallus arched, slightly tapered towards apex, cornutus indistinct, apical $^{1}/_{5}$ covered with small spines and nodules.

Female genitalia: Papilla analis ovoid, narrow, apical half covered with bristles. Posterior apophysis 5.6x as long as papilla analis and 2.3x as long as anterior apophysis, which is as long as segment 8. Segment 8 longitudinally elongated, membranous, quadrate, dorsolaterally reinforced by sclerotized band; branch of anterior apophysis apically fused, deeply U-shaped, weekly sclerotized; ventral longitudinal sclerotization narrow, shorter than segment 8. Antrum tubular, narrow, anterior half sclerotized, colliculum short. Ductus bursae very narrow, expanded towards corpus bursae. Corpus bursae ovoid; anterior signum arched, broad, both apices broad, protuberances thornlike; two leaf-shaped posterior signa, spike needle-shaped, base strongly elongated.

Biology: Unknown. The type locality in Ronda was a roadside meadow, subsequently the roadworks has destroyed the habitat. Most specimens were netted from *Ononis* sp.

Distribution: Known only in southern Spain.

Derivation of name: The specific name refers to the collecting locality of the holotype.

***Pleurota pyrenaella* Tabell, sp. nov.** (Figures 18-19, 36, 47, 51)
Barcode Index Number: BOLD:ADI2982

Type material: Holotype ♂ (GP 5710 J. Tabell, DNA sample 25823 Lepid Phyl): SPAIN, Aragón, Huesca, 5.5 km SW Sabiñánigo, 740 m, N42.47143 W0.38573, 8-VII-2016, J. Tabell leg. (coll. MZH), BOLD sample ID: MM25823, http://id.luomus.fi/GBT.25

Paratypes: 23 ♂ (GP 5713 J. Tabell; GP 5869 J. Tabell, DNA sample 25825 Lepid Phyl; GP 5870 J. Tabell, DNA sample 25592 Lepid Phyl; DNA sample 25593 Lepid Phyl; GP 5872 J. Tabell), 2 ♀ (DNA sample 25590 Lepid Phyl, DNA sample 25591 Lepid Phyl), same collecting data as holotype; 1 ♂, same collecting data, but 6-VII-2019; 6 ♂ (DNA sample 26330 Lepid Phyl), Spain, Aragón, Huesca, 2 km N Jaca, 800 m, 42.59453 -0.54540, 6-VII-2019, J. Tabell leg. (all coll. TAB, 2 exx. Coll. MNCN).

Diagnosis: *P. pyrenaella* is a small species which externally resembles the Spanish species *P. hebetella* and *P. amaurodoxa*, but the forewing is paler. The male genitalia can be distinguished from those of *P. hebetella* by narrower uncus, the shape of gnathos (smaller area with scobination, apex less rounded) and narrower valval lobe. Compared to *P. amaurodoxa*, the uncus is shorter, the gnathos narrower, and the posterior lobe of juxta shorter. In the female genitalia of *P. pyrenaella*, both apophyses are shorter, and the posterior signa and the spines of anterior signum are shorter.

Molecular data: Seven specimens of *P. pyrenaella* were sequenced, resulting in 658 bp (n=6) and 654 bp (n=1) barcodes. The nearest neighbour to *P. pyrenaella* is *P. amaurodoxa*, with a 3.49 % divergence. The barcodes of *P. pyrenaella* exhibit 0.15 % intraspecific variation.

Description: Adult. Wingspan 10.5-14 mm, one male 15.5 mm. Labial palpus mixed with off-white, brown and pale brown scales, ventrally darker, in female paler, about 5.1x as long as diameter of eye (1st and 2nd palpomeres), 3rd palpomere 0.4x length of 1st and 2nd palpomeres. Antenna brown, 0.75x length of forewing. Frontal tuft, neck, tegula and thorax off-white, mixed with pale brown. Forewing densely covered by off-white, pale brown-tipped scales, without longitudinal lines and dark spots, except for off-white costal line from base to $^1/_2$, in female forewing is more ochre. Fringe off-white with brown median line. Hindwing and fringe dark grey. Abdomen slightly lustrous, dark grey, each segment with a transverse row of ochre scales.

Male genitalia: Uncus thimble-shaped from ventral view, elongate, lined with several bristles of different length, distal margin concave. Gnathos 1.5x as long as uncus, funnel-shaped from ventral view, evenly tapered towards apex, largely smooth, with shallow medial and apical crests, medially surfaced by small nodules. Valva elongate, upwards oblique, thimble-shaped; sacculus long, covered with long bristles. Anterior extension of juxta straight, narrow and long; median part with a broad plate; posterior lobe almost reaching the apex of uncus, apex with a small tooth; valval lobe elongate, upwards oblique, apex evenly rounded, lined with several long bristles, apical half parallel-sided, basal part bulged. Phallus curved, parallel-sided, apex acute, with one weakly sclerotized cornutus and a group of numerous tiny spines, apical $^1/_4$ with a wedge-shaped sclerotization.

Female genitalia: Papilla analis ovoid, narrow, apical half covered with bristles. Posterior apophysis 3.75x as long as papilla analis and 1.5x as long as anterior apophysis, which is 1.5x as long as segment 8. Segment 8 longitudinally elongated, membranous, quadrate, dorsolaterally reinforced by sclerotized band; branch of anterior apophysis apically fused, U-shaped, weekly sclerotized; ventral longitudinal sclerotization narrow, shorter than segment 8. Antrum tubular, sclerotized, parallel-sided. Ductus bursae slightly expanded towards corpus bursae. Corpus bursae rounded, with one arched broad signum with two protuberances, and two leaf-shaped signa.

Biology: Unknown. The specimens were netted in the afternoon around *Genista* sp., females were swept from white-flowering chrysanthemums.

Distribution: Known only from northern Spain.

Derivation of name. The specific epithet refers to the collecting area.

***Pleurota balearica* Tabell & Honey, sp. nov.** (Figures 20-21, 37, 48, 51)
Barcode Index Number: BOLD:ADY6686

Type material: Holotype ♂ (GP 5989 J. Tabell, DNA sample 26270 Lepid Phyl [barcoding failed]): SPAIN, Mallorca, Boquer valley - by day, 13-V-2007, M. R. Honey leg. (coll. NHMUK). Paratypes: 2 ♂ (DNA sample 26268 Lepid Phyl [barcoding failed]), same collecting data as holotype; 1 ex. [abdomen missing], Mallorca, Cuber reservoir by day, 3-VI-2000, M. R. Honey leg.; 2 ♂, Mallorca, Bocquer valley, 25-V-2001, M. R. Honey leg.; 1 ♂, Mallorca, Puig de Sant Marti - by day, 19-V-2007, M. R. Honey leg.; 1 ♂ ibidem, Cova Sant Marti; 3 ♂ (DNA sample 26269 Lepid Phyl [barcoding failed], Mallorca, Son Carbata Sa Calobra road - by day, 21-V-2007, M. R. Honey leg.; 3 ♀ (DNA sample 26266 Lepid Phyl [barcoding failed]; DNA sample 26267 Lepid Phyl), Cabrera, beach - by day, 18-IV-2012, M. R. Honey leg.; 1 ♂, Eivissa, Cap d'Es Falcó, Pinar no fum, 30-IV-2006, I. Ferris & M. R. Honey leg.; 2 ♀ (GP 6471 J. Tabell), Eivissa, Can Savi, Sant Llorenç de Balàfia, 5-V-2006 swept at dusk, I. Ferris & M. R. Honey leg. (all colls. NHMUK and TAB).

Diagnosis: A small species. Externally *P. balearica* is somewhat similar to *P. pleurotella*, but smaller size and beige colour (grey in *P. pleurotella*) are separating characters. In the male genitalia, the combination of the gnathos, the valval lobe and the posterior lobe of juxta distinguish *P. balearica* from other species. In the female genitalia, the shape of posterior signa is characteristic.

Molecular diagnosis: Of five samples sent for barcoding, four failed and one resulted in a 651 bp DNA barcode. The nearest neighbour to *P. balearica* is morphologically divergent *P. candia* Back, 1973, with a 7.13 % divergence.

Description: Adult. Wingspan 8-10.5 mm. Labial palpus 3-3.5x as long as diameter of eye (1st and 2nd palpomeres), 3rd palpomere short, mostly concealed by scales, off-white, mixed with pale beige. Antenna setose in male, naked in female, brown, annulated with beige. Head and tegula pale beige, thorax mixed with beige. Forewing pale beige: subcostal line pale brown, from base to apex, gradually expanding towards apex, costal line absent; medial area white, with distinct blackish brown discal, discocellular and plical spots. Fringe line indistinct, formed of a few blackish brown scales; cilia long, pale grey, basally pale beige. Hindwing pale brown, cilia pale greyish brown. Abdomen slightly lustrous, pale brown or beige, each segment with a transverse row of ochre scales.

Male genitalia: Uncus triangular from ventral view, lined with few long bristles, apex blunt. Gnathos 1.5x as long as uncus, funnel-shaped from ventral view, medially covered with small nodules. Valva upwards oblique, ventral margin convex; cucullus narrow, thimble-shaped. Median part of juxta narrow, funnel-shaped, posterior lobe very long, narrow, exceeding markedly apex of uncus. Valval lobe long, finger-shaped, parallel-sided, covered apically with few long bristles. Phallus curved, tapered towards apex, with elongated bundle of small needle-shaped cornutus and slightly curved plate-shaped cornutus.

Female genitalia: Papilla analis ovoid, short, covered with bristles. Posterior apophysis 9.4x as long as papilla analis and 1.5x as long as anterior apophysis, which is 1.6x as long as segment 8. Segment 8 longitudinally elongated, membranous, quadrate, dorsolaterally reinforced by sclerotized band; branch of anterior apophysis U-shaped, weekly sclerotized; ventral longitudinal sclerotization narrow, slightly shorter than segment 8. Antrum tubular, anterior $^2/_3$ sclerotized. Ductus bursae slightly expanded towards corpus bursae. Corpus bursae rounded; anterior signum strongly arched, narrow, protuberances long, thornlike; two leaf-shaped posterior signa, spike curved, long, base small.

Biology: Unknown.

Distribution: Known from three Balearic Islands (Spain): Mallorca, Ibiza and Cabrera.

Derivation of name: The specific epithet refers to the collecting area of the specimens.

***Pleurota malagaensis* Tabell & Nupponen, sp. nov.** (Figures 22, 38)
Barcode Index Number: BOLD:-

Type material. Holotype ♂ (GP 5589 J. Tabell): SPAIN, Málaga, Fuengirola, 22-V-1989, H. Holmberg leg., Coll. T. & K. Nupponen. Paratypes: 2 ♂, same collecting data as holotype (colls. NUP and TAB).

Diagnosis: Externally *P. malagaensis* can be distinguished by a small size, pale brown forewing with scattered brown scales and a narrow white costal stripe, and a short 3rd segment of labial palpus. In the male genitalia, the characteristic shape of uncus and gnathos are diagnostic. The female is unknown.

Molecular diagnosis: Barcodes not available.

Description: Adult. Wing 5.5-6.5 mm (not spread). Labial palpus mixed with white, pale brown and brown, about 5x as long as diameter of the eye (1st and 2nd segments), 3rd segment 0.15x length of 1st and 2nd segments. Antenna annulated with dark brown and pale brown, apex dark brown. Frontal tuft, neck, tegula and thorax mixed with white and pale brown. Forewing pale brown with faint white streaks, scattered with brown and dark brown scales; costal line white, from base to near apex; subcostal line pale brown, darker at basal half, slightly expanded towards apex. Fringe white, fringe line pale brown. Hindwing not visible.

Male genitalia: Uncus inverted funnel-shaped from ventral view, lined with few long bristles, apex sharp. Gnathos 1.7x as long as uncus, broad, arm long, fluke-shaped from ventral view, medially and apically covered with small nodules, apical part triangular, apex blunt. Valva upwards oblique, ventral margin convex; cucullus club-shaped. Median part of juxta rounded, posterior lobe narrow, exceeding apex of uncus, apex armed with small tooth. Valval lobe small, club-shaped, covered with several long bristles. Phallus curved, tapered towards apex, apex sharp, with elongated bundle of small cornuti, apical 1/7 with small spines dorsally.

Female genitalia: Unknown.

Biology: Unknown.

Distribution: Known only from the southernmost Spain in the province of Andalusia.

Derivation of name: The specific epithet refers to the collecting area of the specimens.

***Pleurota grancanariella* Tabell, sp. nov.** (Figures 23, 39, 49, 51)
Barcode Index Number: BOLD:ADY6687

Type material. Holotype ♂ (GP 5563 J. Tabell, DNA sample 24934 Lepid Phyl [barcoding failed]): Hispana [SPAIN], Gran Canaria, Maspalomas, 19-III-1992, P. Grotenfelt [leg.] (coll. MZH), http://id.luomus.fi/GBT.26. Paratypes: 1 ex, same collecting data as holotype; 1 ♀ (GP 5567 J. Tabell, DNA sample 24935 Lepid Phyl [barcoding failed], same collecting data, but 14-III-1992 (coll. TAB); 1 ♀, same collecting data, but 23-III-1981; 3 ♀, same collecting data, but 24-III-1981; 2 ♂, same collecting data, but 15-III-1983; 3 ♀, same collecting data, but 17-III-1983 (coll. MZH, 1 ex. coll MNCN); 2 ♂ (DNA sample 26272 Lepid Phyl; DNA sample 26273 Lepid Phyl), Canary Islands, Gran Canaria, 6 km N Maspalomas, 400 m, 27.813347-15.581433, 23-III-2019, J. Tabell leg. (coll. TAB); 1 ♂, Spain, Gran Canaria, Maspalomas, 17-III-1996, K. Nupponen & J. Junnilainen leg. (coll. JUJ); 2 ♂, 5 ♀, Spain, Gran Canaria, El Sao, 110 m, 4-23-III-2019, leg. P. Falck; 1 ♂, same collecting data, but 1-13-IV-2022; 1 ♂, 2 ♀, Spain, Gran Canaria, Degollada de la Yegua, 415 m, leg. P. Falck (coll. Falck).

Diagnosis: Externally somewhat similar to *P. tricolor* Tabell, 2019, known from Morocco, but the forewing is more elongated and greyer, and the cilia of antenna is longer.

Molecular diagnosis: Two specimens were sequenced successfully, resulting in 654 and 653 bp barcode fragments. The nearest neighbour to *P. grancanariella* is *P. algeriella* Baker, 1885 from Algeria, with a 6.44 % divergence. The barcodes of *P. grancanariella* exhibit 0.15 % intraspecific variation.

Description: Adult. Wingspan 19-20 mm. Labial palpus greyish white, ventrally dark brown,

dorsolaterally with a blackish brown apical spot, about 6.4x as long as diameter of the eye (1st and 2nd segments), 3rd segment 0.3x length of 1st and 2nd segments. Antenna setose, greyish brown. Frontal tuft, neck, tegula and thorax mixed with white and pale greyish brown. Forewing pale greyish brown mixed with white and scattered by brown scales; costal line white, indistinct; subcostal line brown, parallel-sided, at base narrower; median line from base to $^{2}/_{3}$, white, moderately broad, dorsal margin indistinctly edged, dent narrow, from near base to $^{1}/_{3}$; dorsal line absent. Fringe line brown. Fringe cilia basally white, apically brown. Hindwing and fringe cilia brown.

Male genitalia: Uncus thimble-shaped from ventral view, elongated, lined with several bristles of different length, apex blunt. Gnathos 1.5x as long as uncus, from ventral view elongate, fluke-shaped, medially expanded and surfaced by small scales, apex with a small rectangular protuberance. Valva elongate, upwards oblique; cucullus thimble-shaped. Anterior extension of juxta straight, short, median part rounded, posterior lobe almost extended to apex of uncus, apex armed with a small tooth. Valval lobe gutter-shaped, upcurved, covered with several small nodules and short bristles distally. Phallus curved, slightly tapered towards apex, with one small plate-shaped cornutus surrounded by a few tiny spines.

Female genitalia: Papilla analis ovoid. Posterior apophysis 10x as long as papilla analis and 1.7x as long as anterior apophysis. Segment 8 elongated longitudinally, rectangular, membranous, dorsolaterally reinforced by sclerotized band, lined with a few long bristles distally, ventral longitudinal sclerotization narrow, as long as segment 8, branch of anterior apophysis narrow. Antrum tubular, as long as segment 8, membranous, anterior $^{1}/_{4}$ slightly tapered and sclerotized. Ductus bursae membranous, parallel-sided. Corpus bursae ovoid, with one robust arched signum bearing two short, thorn-like protuberances, and two leaf-shaped signa.

Biology: Unknown.

Distribution: Endemic to Gran Canaria, where it is known in Maspalomas and surrounding slopes and in El Sao.

Derivation of name: The specific epithet refers to the island of Gran Canaria, where the moths were collected.

***Pleurota subnobilella* Tabell, sp. nov.** (Figures 24-26, 40-41, 50-51)
Barcode Index Number: BOLD:ACW1897

Type material. Holotype ♂ (GP 5900 J. Tabell, DNA sample 26130 Lepid Phyl): SPAIN, Alicante, Albatera 9 km NNW, 460 m, N38.25317 W0.91450, 21-V-2016, J. Tabell leg. (coll. MZH), http://id.luomus.fi/GBT.27, BOLD sample ID:MM26130. Paratypes: 1 ♀ (GP 6348 J. Tabell, DNA sample 26199 Lepid Phyl), same collecting data as holotype; 2 ♂♀ (GP 5303 J. Tabell, DNA sample 23663 Lepid Phyl; GP 5399 J. Tabell, DNA sample 23658 Lepid Phyl), Spain, Alicante, San Miguel de Salinas 6 km NW, 22-IV-2009, J. Tabell leg. (coll. TAB, 1 ex. coll MNCN).

Diagnosis: Externally *P. subnobilella* resembles *P. nobilella* and *P. honorella*. *P. subnobilella* can be distinguished from these species by the narrower median line, which may be interrupted at the junction of longitudinal median dent, and by white fringe line. *P. subnobilella* can be distinguished from *P. nobilella* also by a lighter subcostal line. The male genitalia are similar to those of *P. nobilella*, but the basal half of gnathos is broader, the valval lobe longer and the posterior lobe of juxta more robust. The female genitalia are characterized by long apophyses, short antrum and broad ductus bursae.

Molecular diagnosis: All four type specimens were sequenced successfully, resulting in 658 (n=3) and 653 bp DNA barcodes. The nearest named neighbour to *P. subnobilella* is *P. sobriella*, with a 1.66 % divergence. The barcodes of *P. subnobilella* exhibit no intraspecific variation. See also *Remarks* for *P. nobilella*.

Description: Adult. Wingspan 21.5-22 mm. Labial palpus brownish white, ventrally mixed brown and white, inner side dark brown, dorsolaterally with a dark brown apical spot, about 6.6x as long as diameter of the eye (1st and 2nd segments), 3rd segment 0.25x length of 1st and 2nd segments. Antenna brown. Frontal tuft and neck brownish white, tegula ochre, thorax laterally white, medially mixed ochre

and pale grey. Costal line white, from near base to apex, basally broader; subcostal line ochre, evenly expanded towards apex; median line from base to near apex, white, at junction of dent of median line interrupted, then slightly expanded, apical $^1/_5$ tapered, dent long, narrow, not reaching termen; fringe line off- white; dorsal line parallel-sided, white, from base to $^1/_4$; median area yellowish ochre. Fringe pale brown, apically off-white. Hindwing grey, fringe concolorous, apically white to off-white.

Male genitalia: Uncus thimble-shaped from ventral view, lined with several bristles of different length, apex blunt. Gnathos 1.6x as long as uncus, from ventral view elongate, funnel-shaped, medially bulged and covered with small nodules, gradually tapered towards apex, apex beak-shaped. Valva elongate, upwards oblique, ventral margin slightly curved. Anterior extension of juxta straight, median part rounded, posterior lobe broad, not extended to uncus, apex armed with a small tooth. Valval lobe fusiform, covered with several short bristles apically, membranous basally. Phallus curved, slightly tapered towards apex, with one robust plate-shaped cornutus surrounded by numerous tiny spines, apical $^1/_4$ dorsally covered with small spines.

Female genitalia: Papilla analis oval, covered with bristles of different length. Apophyses long; posterior apophysis 7.25x as long as papilla analis and 1.6x as long as anterior apophysis, which is 1.6x as long as segment 8. Segment 8 longitudinally elongated, rectangular, membranous, dorsolaterally reinforced by sclerotized band, distal margin ventrally sparsely covered with bristles, ventral longitudinal sclerotization narrow, shorter than segment 8, branch of anterior apophysis long, not fused medially. Antrum tubular, short, membranous, colliculum sclerotized. Ductus bursae membranous, parallel-sided, broad, posterior $^1/_5$ narrow. Corpus bursae roundish, with an arched broad anterior signum with two narrow and long sclerotized thorn-like protuberances, and two small leaf-shaped posterior signa.

Biology: Unknown. Most specimens were collected together with a series of *P. nobilella* under a wire line at an elevation of 460 m.

Distribution: Known only from two type localities in the province of Alicante in south-eastern Spain.

Derivation of name: The specific epithet refers to close affinity with *P. nobilella*.

Acknowledgements

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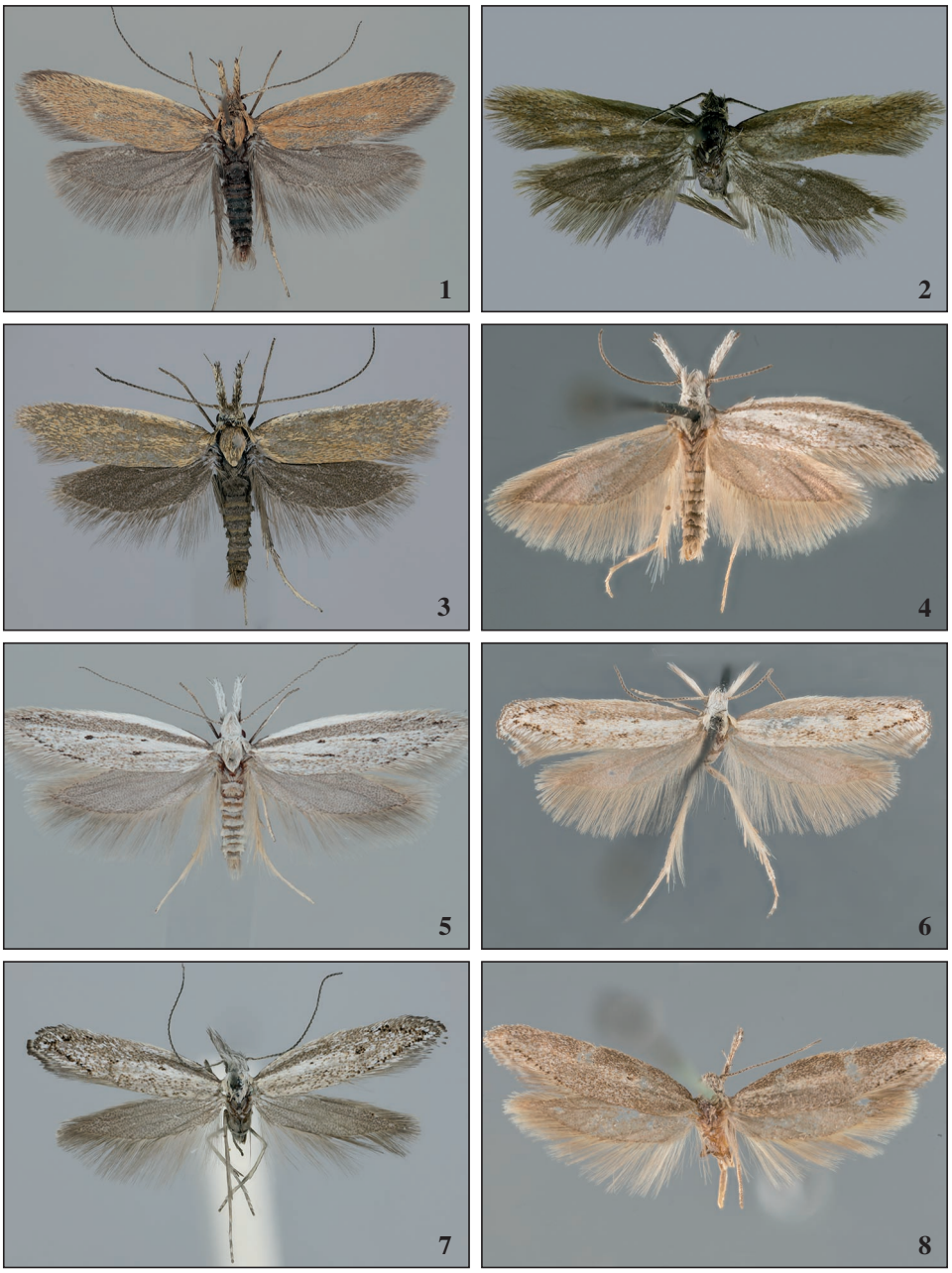
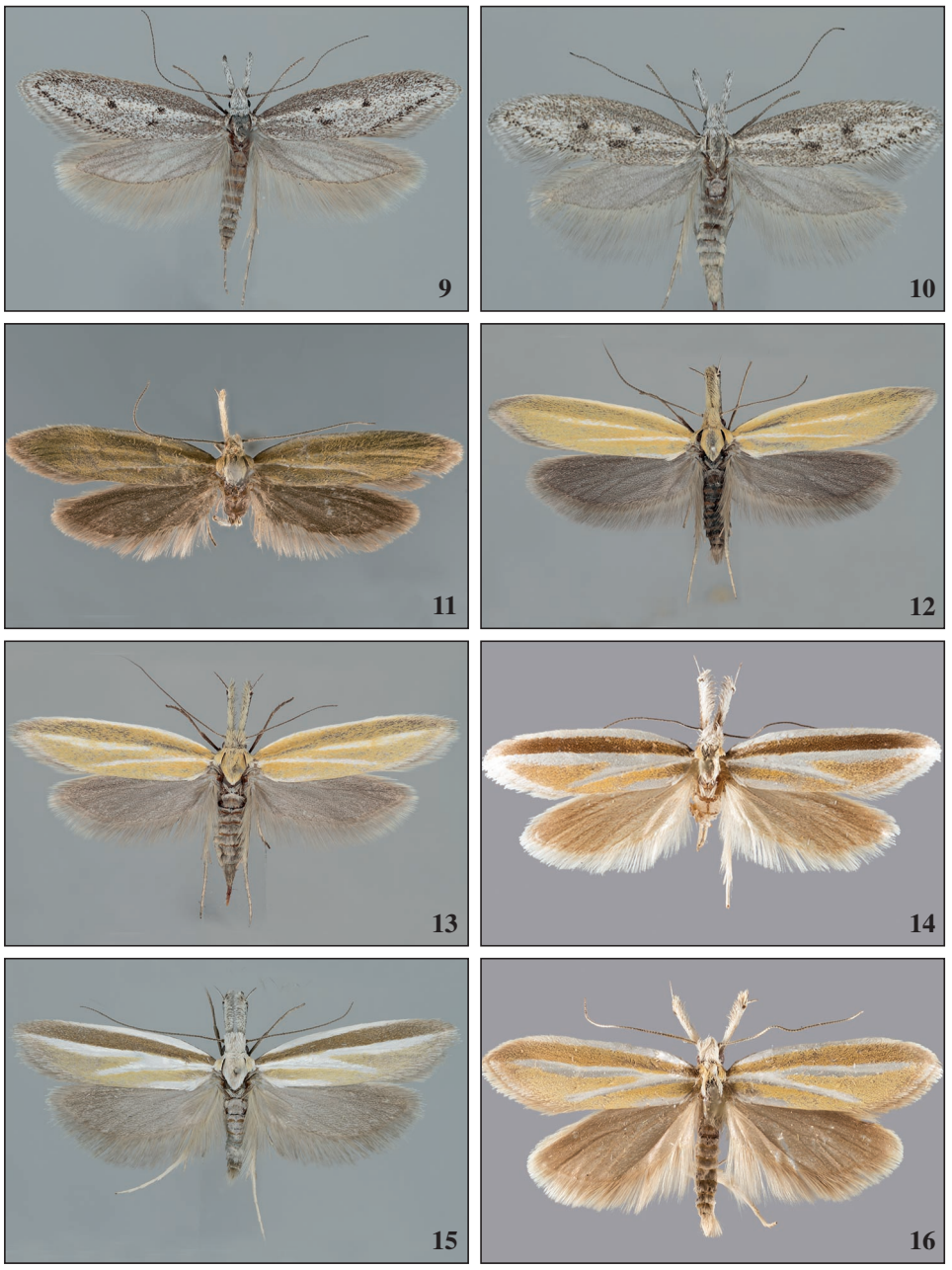
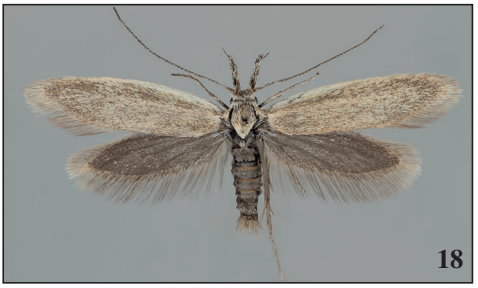


Figures 1-8. Adults of *Pleurota* spp. **1.** *P. hebetella* Ragonot, ♂. **2-3.** *P. amaurodoxa* Meyrick. **2.** ♂ lectotype. **3.** ♂. **4-5.** *P. protasella* Staudinger. **4.** ♂ lectotype. **5.** ♂. **6.-7.** *P. glitzella* (Staudinger). **6.** ♂ lectotype. **7.** ♂. **8.** *P. pleurotella* (Staudinger), ♂ lectotype.

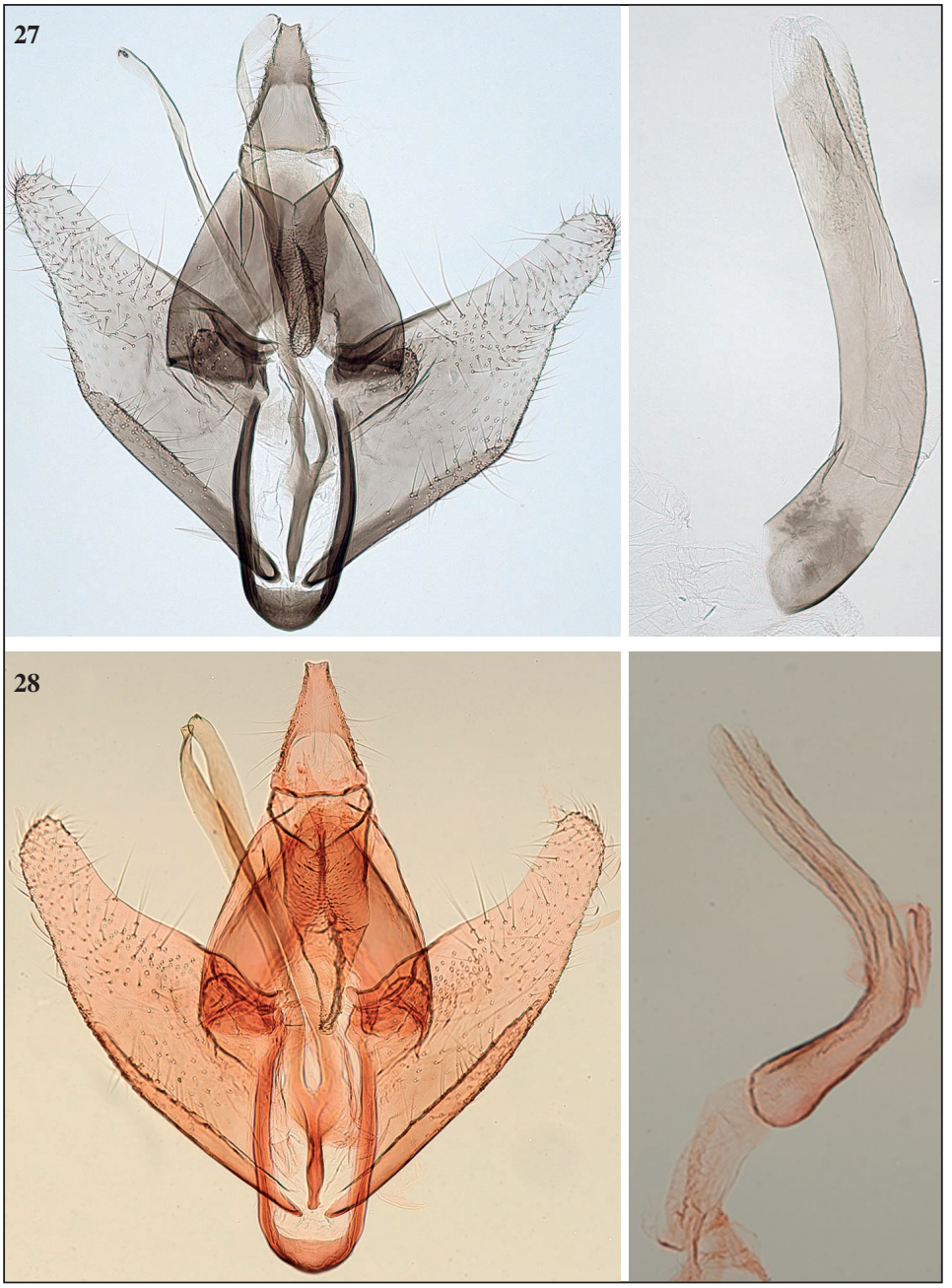


Figures 9-16. Adults of *Pleurota* spp. **9-10.** *P. pleurotella* (Staudinger). **9.** ♂. **10.** ♀. **11-13.** *P. sobriella* (Staudinger). **11.** ♂ lectotype. **12.** ♂. **13.** ♀. **14-15.** *P. nobilella* Rebel. **14.** ♀ lectotype. **15.** ♂. **16.** *P. sp.*, ♂ syntype of *P. nobilella.*

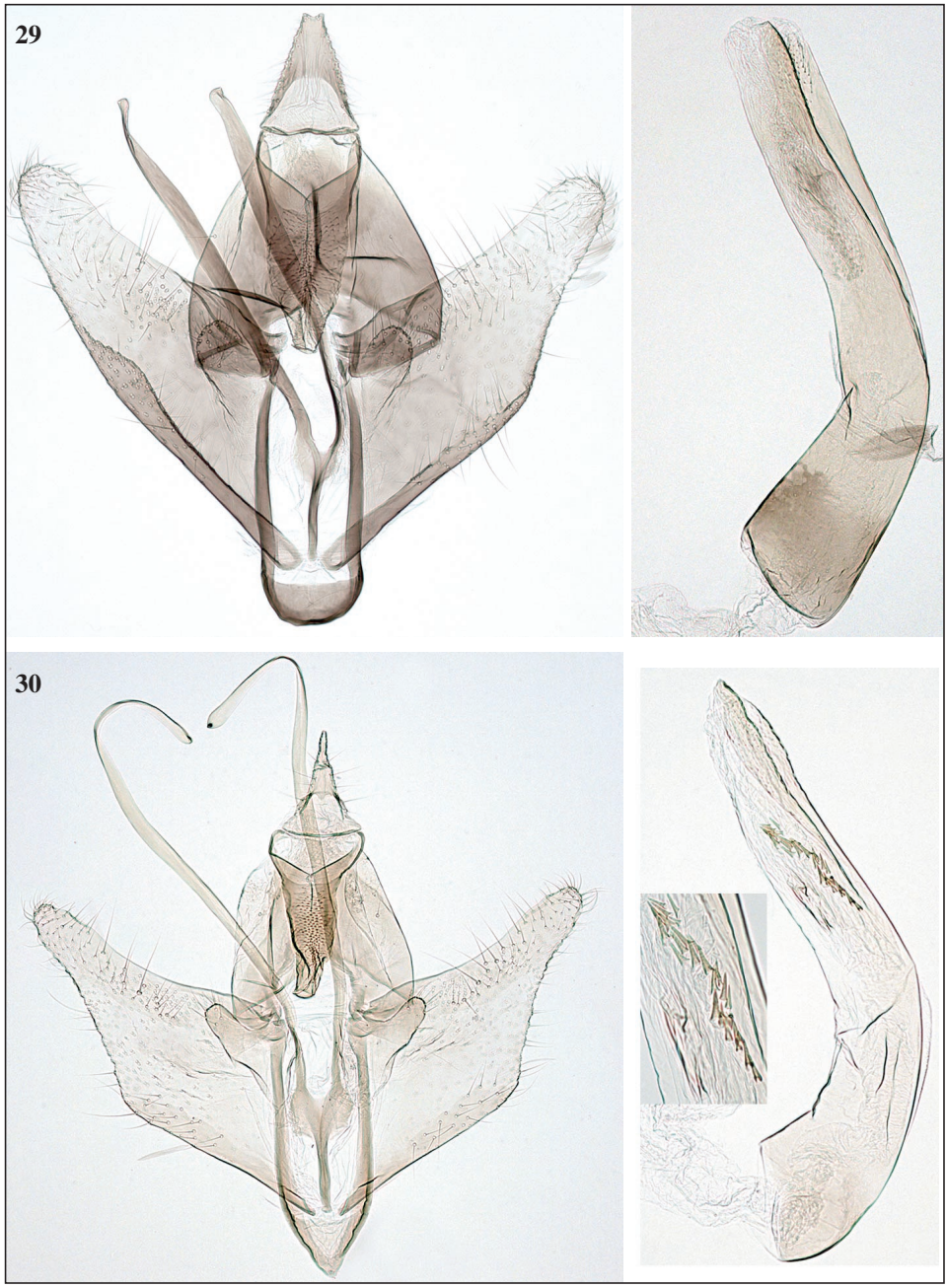


Figures 17-21. Adults of *Pleurota* spp. **17.** *P. rondaensis* sp. nov., ♂ holotype. **18-19.** *P. pyrenaella* sp. nov. **18.** ♂ holotype. **19.** ♀ paratype. **20-21.** *P. balearica* sp. nov. **20.** ♂ holotype. **21.** ♀ paratype.

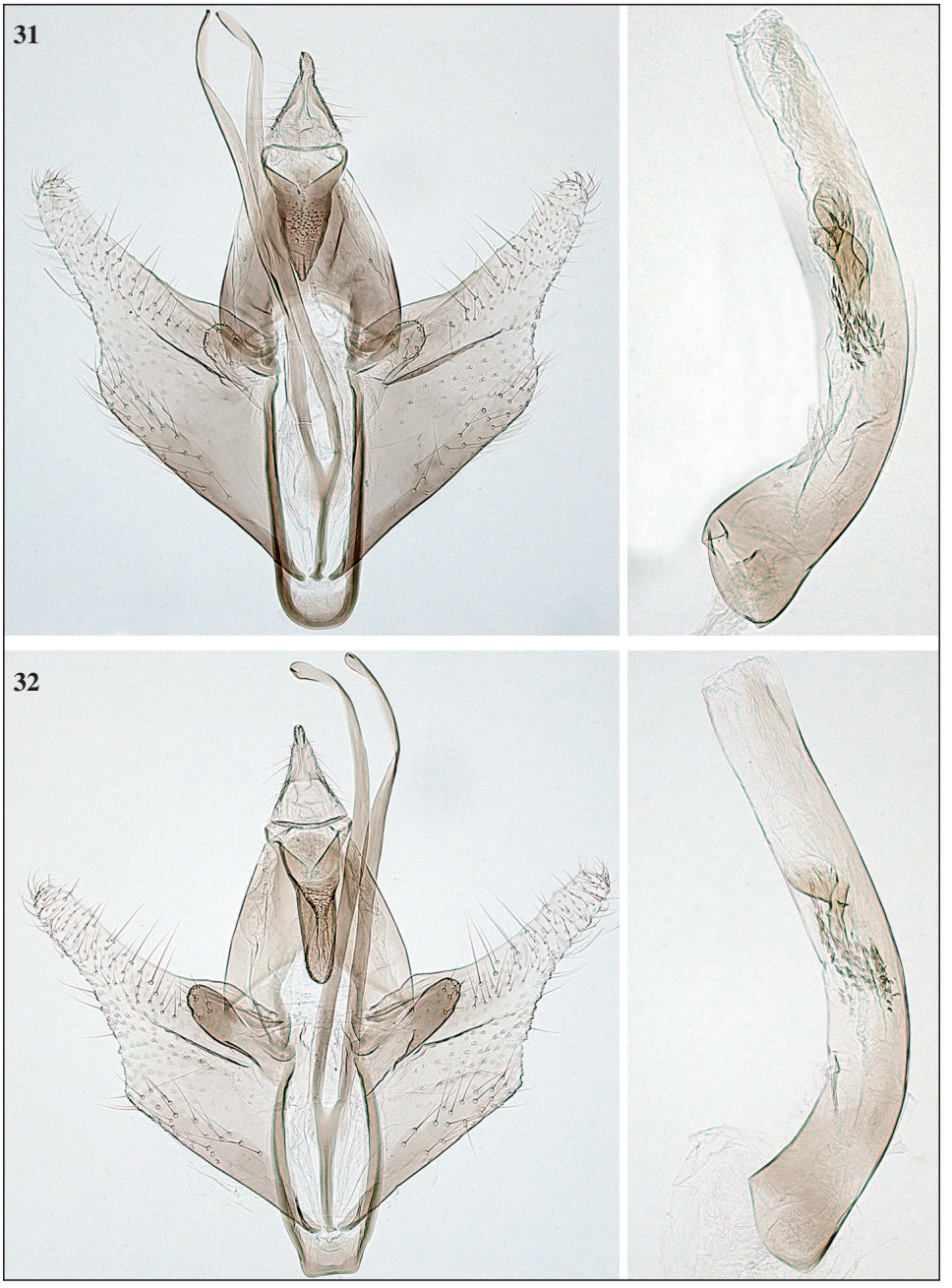
Figures 22-26. Adults of *Pleurota* spp. **22.** *P. malagaensis* sp. nov., ♂ holotype. **23.** *P. grancanariella* sp. nov., ♂ holotype. **24-26.** *P. subnobilella* sp. nov. **24.** ♂ holotype. **25.** ♂ paratype. **26.** ♀ paratype.



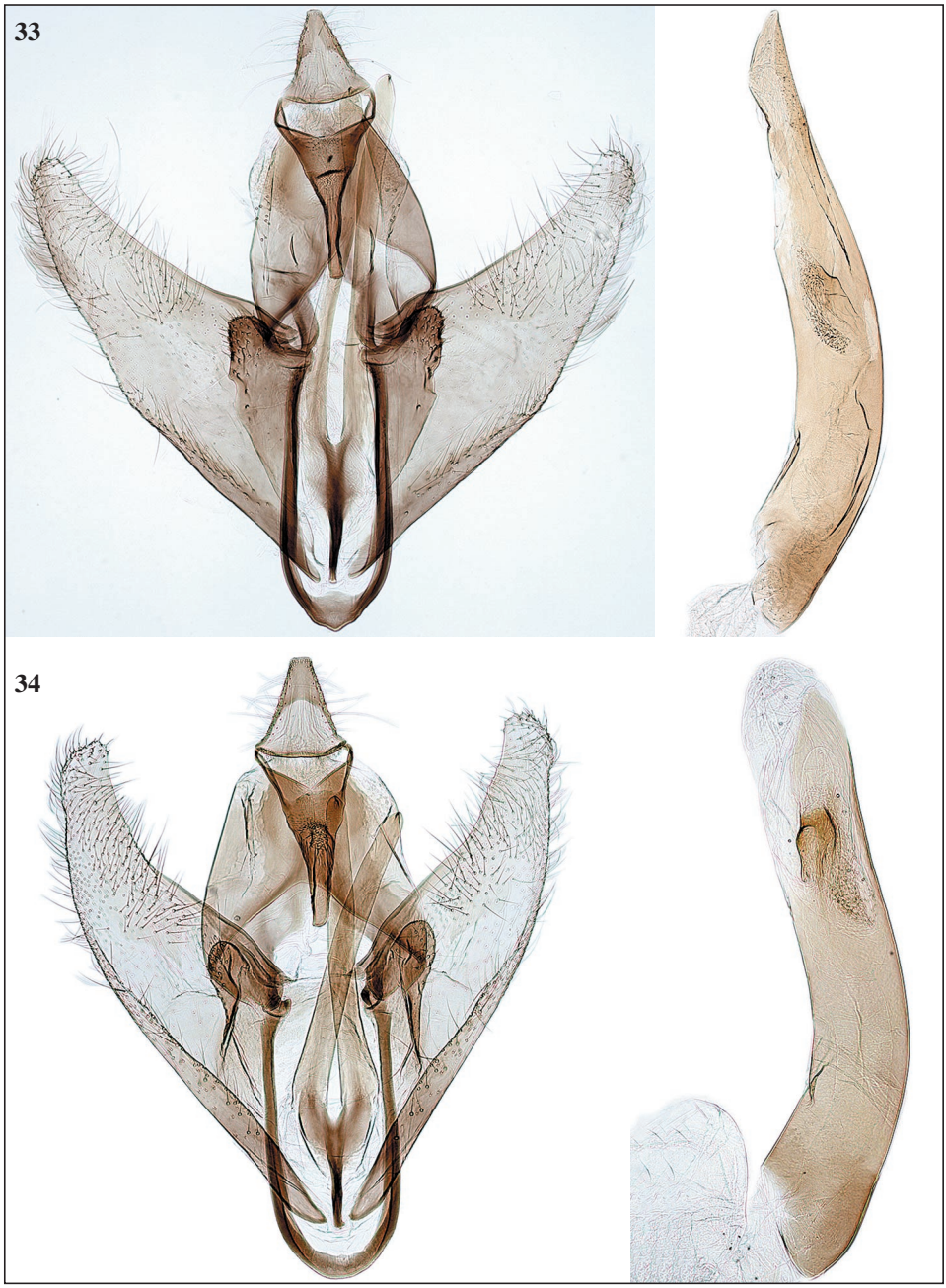
Figures 27-28. Male genitalia of *Pleurota* spp. **27.** *P. hebetella* Ragonot, GP 5769 J. Tabell. **28.** *P. amaurodoxa* Meyrick. lectotype.



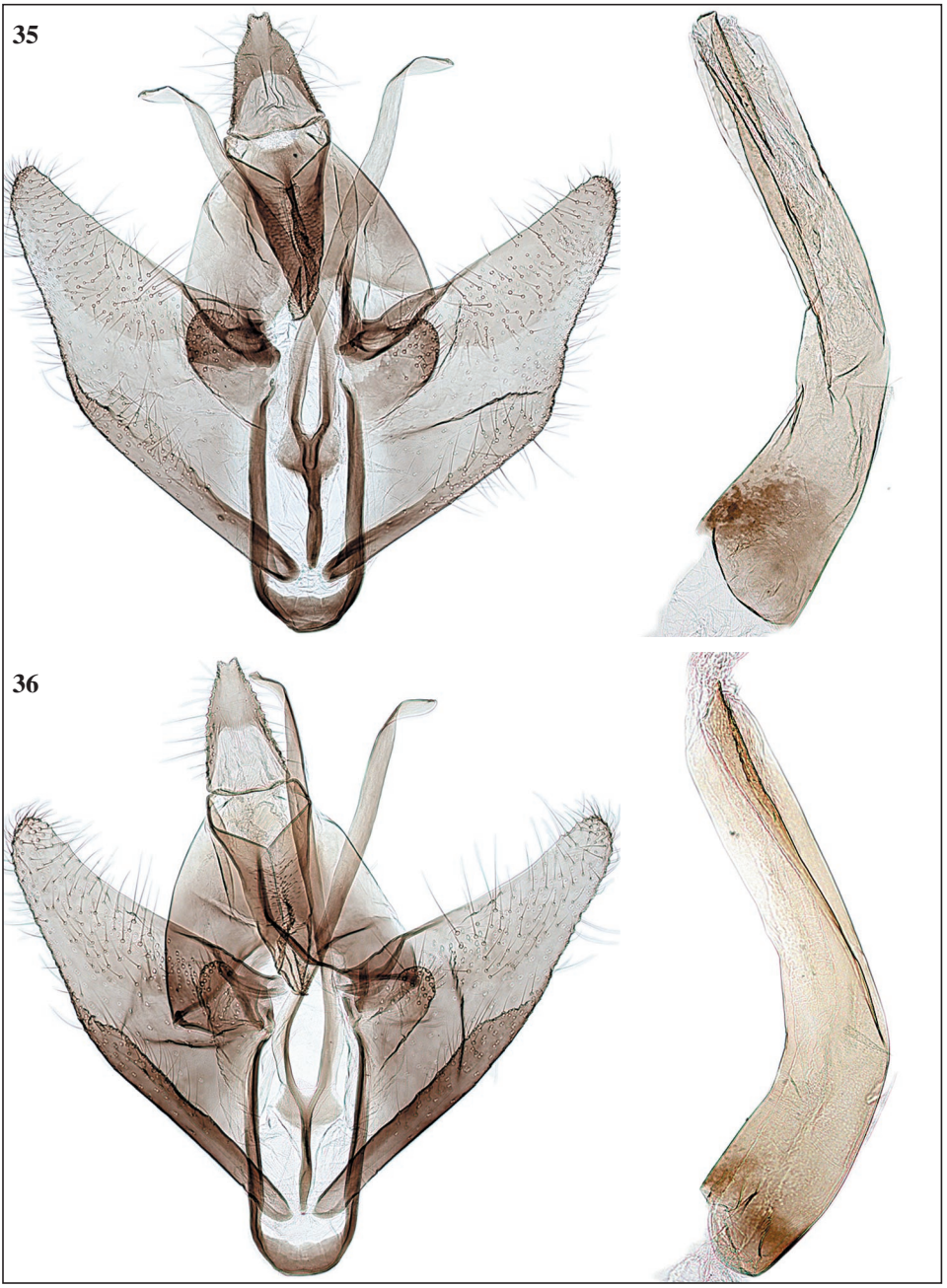
Figures 29-30. Male genitalia of *Pleurota* spp. **29.** *P. amaurodoxa* Meyrick GP 6124 J. Tabell. **30.** *P. protasella* Staudinger, GP 5694 J. Tabell.



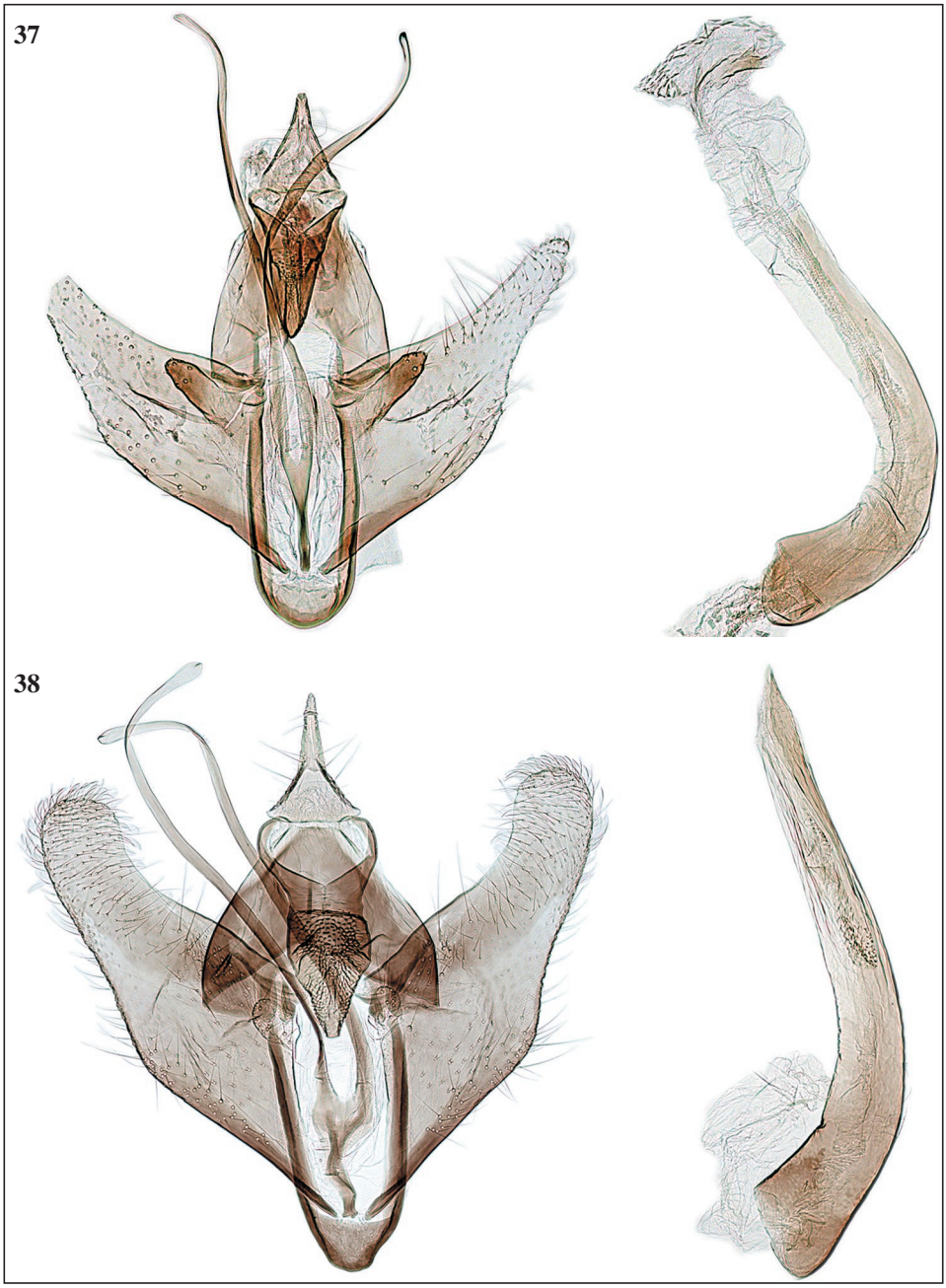
Figures 31-32. Male genitalia of *Pleurota* spp. **31.** *P. glitzella* (Staudinger), GP 5537 J. Tabell. **32.** *P. pleurotella* (Staudinger), GP 5460 J. Tabell.



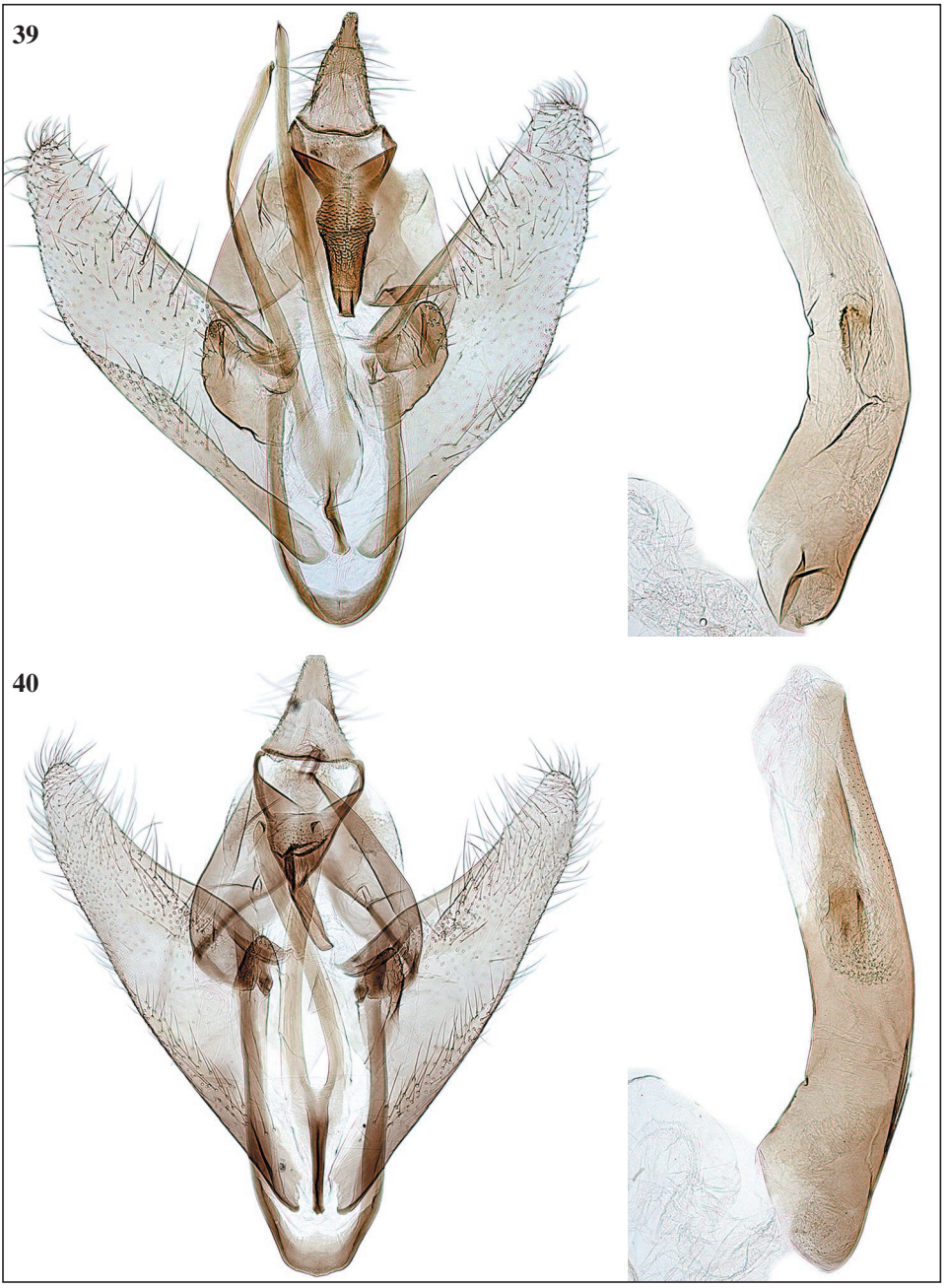
Figures 33-34. Male genitalia of *Pleurota* spp. **33.** *P. sobriella* (Staudinger), GP 5338 J. Tabell. **34.** *P. nobilella* Rebel, GP 5901 J. Tabell.



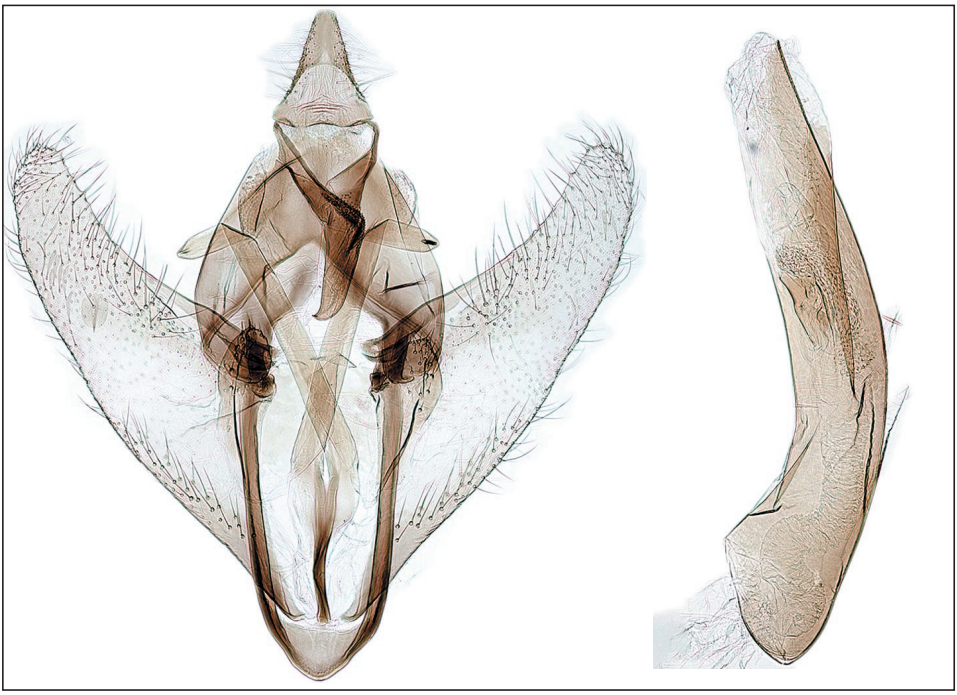
Figures 35-36. Male genitalia of *Pleurota* spp. **35.** *P. rondaensis* sp. nov., paratype, GP 5705 J. Tabell. **36.** *P. pyrenaella* sp. nov., holotype, GP 5710 J. Tabell.



Figures 37-38. Male genitalia of *Pleurota* spp. **37.** *P. balearica* sp. nov., holotype, GP 5989 J. Tabell. **38.** *P. malagaensis* sp. nov., holotype, GP 5589 J. Tabell.

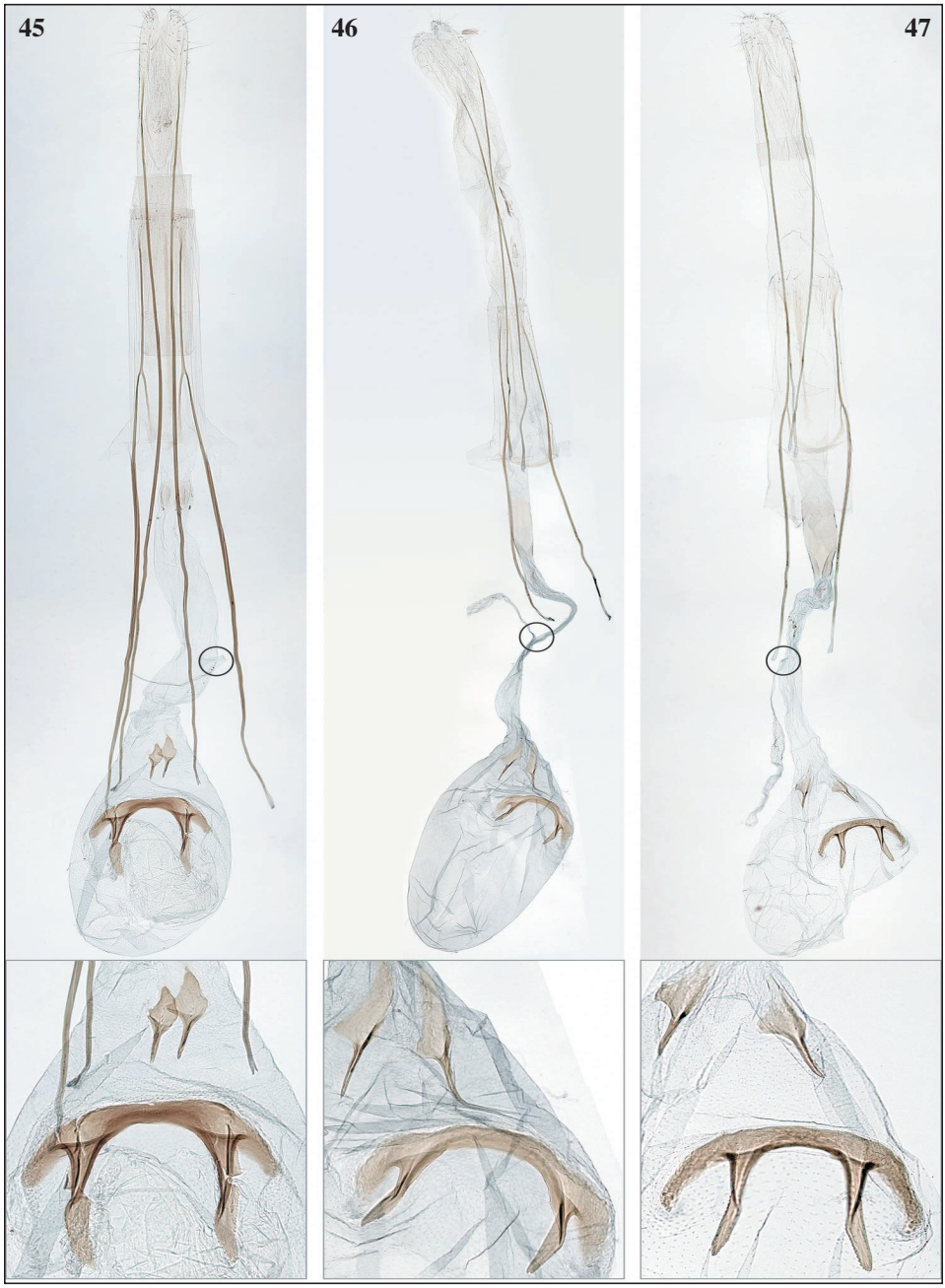


Figures 39-40. Male genitalia of *Pleurota* spp. **39.** *P. grancanariella* sp. nov., paratype, GP 5563 J. Tabell. **40.** *P. subnobilella* sp. nov. holotype, GP 5303 J. Tabell.



Figures 41. Male genitalia of *Pleurota* spp. *P. subnobilella* sp. nov, holotype, GP 5900 J. Tabell.

Figures 42-44. Female genitalia of *Pleurota* spp. **42.** *P. amaurodoxa* Meyrick, GP 6349 J. Tabell. **43.** *P. protasella* Staudinger, GP 5694 J. Tabell. **44.** *P. pleurotella* (Staudinger), GP 5951 J. Tabell.



Figures 45-47. Female genitalia of *Pleurota* spp. **45.** *P. sobriella* (Staudinger), GP 5768 J. Tabell. **46.** *P. rondaensis* sp. nov., paratype, GP 5990 J. Tabell. **47.** *P. pyrenaella* sp. nov., paratype, GP 5955 J. Tabell.

Figures 48-50. Female genitalia of *Pleurota* spp. **48.** *P. balearica* sp. nov., paratype, GP 6471 J. Tabell. **49.** *P. grancanariella* sp. nov., paratype, GP 5567 J. Tabell. **50.** *P. subnobilella* sp. nov., paratype, GP 6348 J. Tabell.

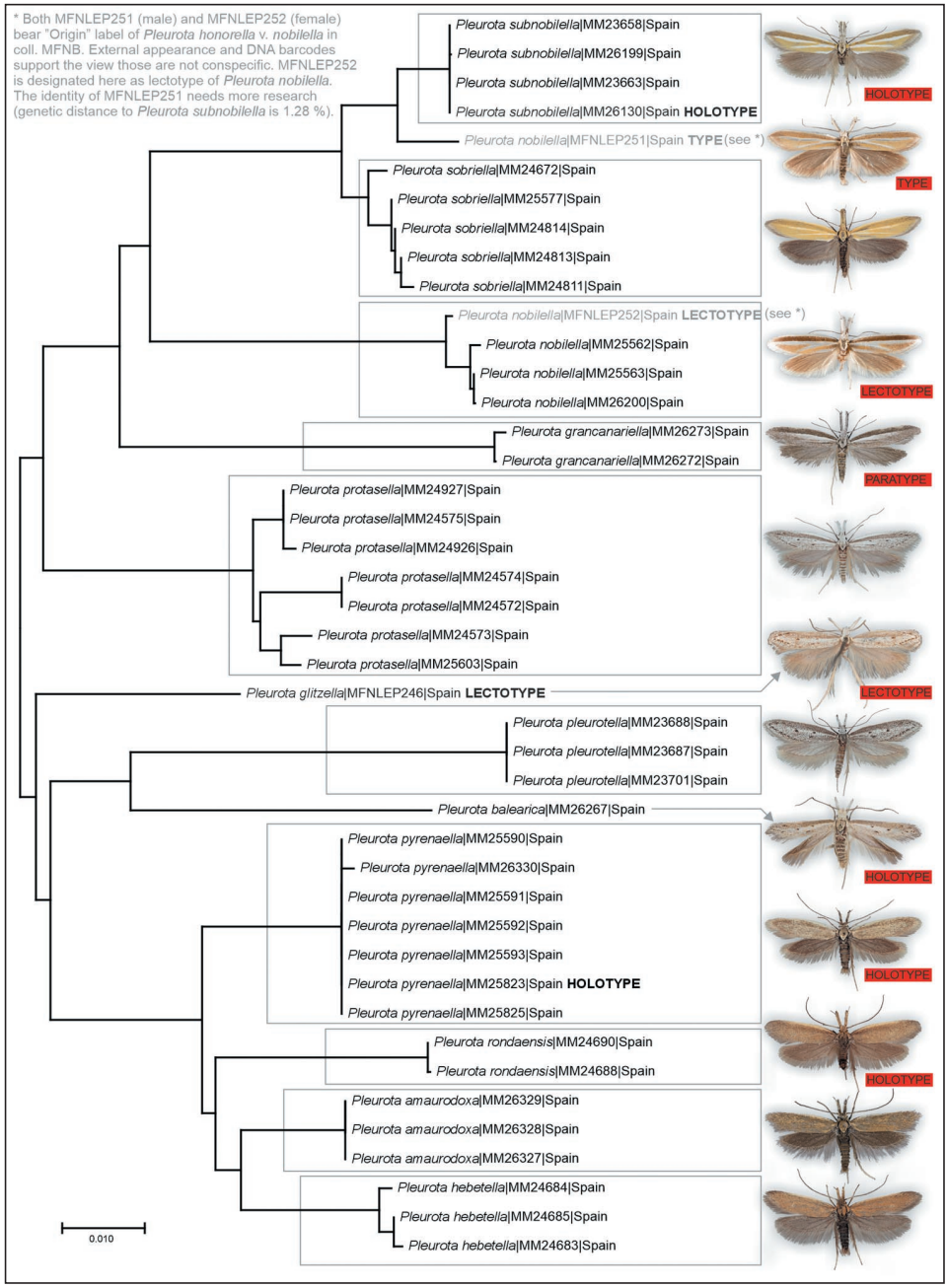


Figure 51. Neighbor-joining tree based on the barcoding fragment of the COI gene (p-distance model) of Spanish *Pleurota* species. "MM25823" etc. are BOLD sample IDs.

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Nuevas contribuciones a la subfamilia Sterrhinae, del Monte Apo en la isla de Mindanao, Filipinas, describiendo tres nuevas especies (Lepidoptera: Geometridae, Sterrhinae, Cosymbiini, Scopulini, Rhodostrophiini)

Andrés Expósito-Hermosa

Resumen

Chrysocraspeda cobosi Expósito, sp. nov. *Scopula viejoi* Expósito, sp. nov. *Craspediosis aizpuruai* Expósito, sp. nov. del Monte Apo en Mindanao, Filipinas. Se incluyen imágenes de los adultos, así como de la genitalia de estas.
Palabras clave: Lepidoptera, Geometridae, Sterrhinae, Cosymbiini, Scopulini, Rhodostrophiini, especie nueva, Monte Apo, Isla de Mindanao, Filipinas.

New contributions to the subfamily Sterrhinae, from Mount Apo on the Mindanao Islands in Philippines, describing three new species (Lepidoptera: Geometridae, Sterrhinae, Cosymbiini, Scopulini, Rhodostrophiini)

Abstract

Chrysocraspeda cobosi Expósito, sp. nov. *Scopula viejoi* Exposito, sp. nov. *Craspediosis aizpuruai* Expósito, sp. nov. of Mount Apo in the Mindanao Islands, Philippines. Images of the adults are included, as well as their genitalia.
Keywords: Lepidoptera, Geometridae, Sterrhinae, Cosymbiini, Scopulini, Rhodostrophiini, new species, Mount Apo, Mindanao Islands, Philippines.

Introducción

Un nuevo estudio realizado con ejemplares de la subfamilia Sterrhinae, depositados en la colección AEH, ha permitido descubrir tres nuevas especies que se describen a continuación.

Las nuevas especies forman parte de las tribus Cosymbiini, Scopulini y Rhodostrophiini respectivamente.

Para este trabajo se ha tomado como referencia a Scoble (in Parsons et al. 1999) y Holloway (1997).

Abreviaturas utilizadas

AEH: Colección Andrés Expósito Hermosa. Móstoles (Madrid), ESPAÑA.

Sistemática

Chrysocraspeda cobosi Expósito, sp. nov. (Figuras 1-2, 7)

Holotipo ♂. FILIPINAS, Monte Apo, a 2.954 m, Isla de Mindanao, IV-2005, colector local. Genitalia AEH 3487. 1 ♂. Paratipo Monte Apo, a 2.954 m, Isla de Mindanao, IV-2005, colector local. El holotipo y paratipo son depositados en la colección del autor AEH en Móstoles, Madrid (España).

Descripción: El macho tiene envergadura alar de 19 mm y antenas bipectinadas con los flagelos extremadamente largos. Fondo de alas color rojo-vináceo que en determinadas áreas se atenúa bastante. Ápice de las alas anteriores del mismo color, el termen en alas anteriores y posteriores es ligeramente convexo, con pequeños puntos negros que coinciden con la parte terminal de las venas. En las alas anteriores el punto discal es negro dilatado. En las alas posteriores el punto es más reducido, color blanco lácteo y rodeado de una pequeña corona circular negra. Borde del termen de 3 mm banda estrecha cerca del termen separada de esta, por una banda amarilla que va disminuyendo hasta llegar al área caudal. En las posteriores la franja amarilla es más estrecha y paralela al termen. Reverso más claro, las bandas amarillas más extendidas y los puntos discales de las posteriores solo son vestigiales.

Genitalia ♂ (Figura 7): Uncus reducido y corto, con forma de lengua plana y hendidura central. Valvas simples alargadas y estrechas, con procesos pilosos oscuros en la zona del sacculus. Con largos apéndices que se curvan en su zona distal y nacen del centro de la valva. Aedeagus alargado, vesica globular y varios cornuti con aspecto astillado.

Distribución: Sólo se la conoce de la isla de Mindanao, Filipinas.

Etimología: Se dedica esta especie nueva al Dr. Ing. José María Cobos Suárez (Madrid, España) y se la denomina, por este motivo, como *cobosi*.

Scopula viejoi Expósito, sp. nov. (Figuras 3-4, 8)

Holotipo ♂. FILIPINAS, Monte Apo, a 2.954 m, Isla de Mindanao, IV-2005, colector local. Genitalia AEH 3491. El holotipo depositado en la colección del autor AEH en Móstoles, Madrid (España).

Descripción: El macho tiene envergadura alar de 16 mm; el fondo de alas es de color blanco lechoso, salpicado de escamas pardas, al igual que su delgado termen. Las fimbrias de tono blanco y numerosas escamas pardas. En la costa de las alas anteriores existe un punto oscuro; principio de una línea discontinua que corre paralela al termen. Alas posteriores con al menos tres líneas semejantes a las de las alas anteriores y presencia de punto discal. Reverso similar, pero más claro y marcas menos acentuadas.

Genitalia ♂ (Figura 8): La cápsula tiene los socii robustos y pilosos, las valvulas son redondeadas, fibula derecha acabada en una uña puntiaguda, mientras que, la izquierda es redondeada y más robusta. El 8º esternito con mappa redondeado, la ceras derecha es algo más aguda, aunque en la imagen aparece girada, y la izquierda es más ancha. La proyección basal es puntiaguda. La vesica del aedeagus es bífida.

La hembra es desconocida.

Distribución: Sólo se la conoce de la isla de Mindanao, Filipinas.

Etimología: Se dedica esta especie nueva al Profesor Dr. José Luis Viejo Montesinos (Universidad Autónoma de Madrid, España) y se la denomina, por este motivo, como *viejoi*.

Craspediosis aizpuruai Expósito, sp. nov. (Figures 5-6, 9)

Holotipo ♀. FILIPINAS, Monte Apo, Isla de Mindanao, IV-2005, colector local. Genitalia AEH 3489. El holotipo depositado en la colección del autor AEH en Móstoles, Madrid (España).

Descripción: La hembra tiene envergadura alar de 40 mm, el fondo de alas es marrón claro con

escamas blancas. El ápice de las alas anteriores es falcatado, con una línea de pequeños puntos negros alargados que discurre desde cerca del ápice hasta el centro del dorsum, termen con pequeños puntos negros. Modelo alar de las alas posteriores semejante, pero la línea de pequeños puntos es más externa y va desde la costa hasta el dorsum; interiormente se aprecia otra línea paralela sin puntos de tono más oscuro que el fondo de alas. Reverso con las marcas bastante más acentuadas, con una línea negra en el termen que discurre por ambas alas.

Genitalia ♀ (Figura 9): Apófisis posteriores más largas que las anteriores, ostium busae redondeado y antrum con forma de tronco de cono, ductus bursae y bursa copulatrix con marcado relieve y canales verticales.

El macho es desconocido.

Distribución: Sólo se la conoce de la isla de Mindanao, Filipinas.

Etimología: Se dedica esta especie nueva a Carlos Gómez de Aizupúrua (Madrid, España) y se la denomina, por este motivo, como *aizpuruai*.

Agradecimientos

Se agradece la colaboración prestada por el Dr. Antonio Vives Moreno (Madrid, España).

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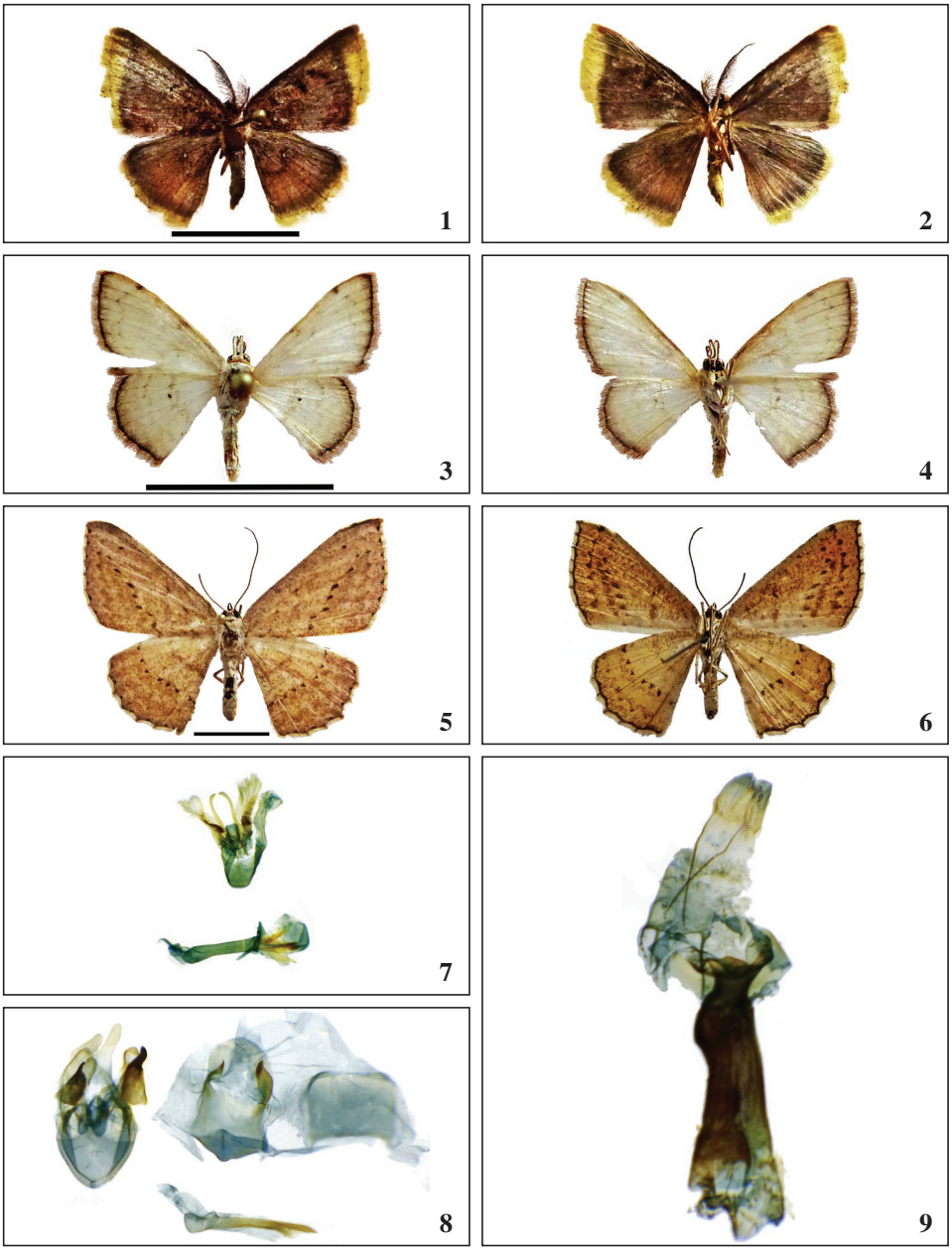

Figuras. 1-9. 1-2, 7. *Chrysocraspeda cobosi* Expósito, sp. nov. Holotipo ♂. **1.** Anverso. **2.** Reverso **7.** Genitalia ♂. Holotipo preparación AEH 3487. **3-4, 8.** *Scopula viejoi* Expósito, sp. nov. Holotipo ♂. **3.** Anverso. **4.** Reverso **8.** Genitalia ♂. Holotipo preparación AEH 3491. **5-6, 9.** *Craspediosis aizpuruai* Expósito, sp. nov. Holotipo ♀. **5.** Anverso. **6.** Reverso **9.** Genitalia ♀. Holotipo preparación AEH 3489.

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First records of *Pyralis cardinalis* Kaila, Huemer, Mutanen, Tyllinen & Wikström, 2020 in the Romanian fauna (Lepidoptera: Pyralidae)

Constantin Corduneanu, Ioan Surugiu, László Rákosy & Vlad Dincă

Abstract

Pyralis cardinalis Kaila, Huemer, Mutanen, Tyllinen & Wikström, 2020, was recently described based on material originating from northern Europe to South Korea and Japan. Here this species is reported for the first time from various localities in north-eastern Romania, where it can occur in sympatry and synchrony with the morphologically similar *P. regalis* ([Denis & Schiffermüller], 1775). Adult external morphology, male genitalia and DNA barcodes of Romanian specimens are examined. To the best of our knowledge, the Romanian specimens represent the southernmost confirmed records of *P. cardinalis* in Europe and highlight the need to better document the distribution of this taxon.
Keywords: Lepidoptera, Pyralidae, distribution, DNA barcoding, haplotypes, scientific collections, sympatry, Romania.

Primeros registros de *Pyralis cardinalis* Kaila, Huemer, Mutanen, Tyllinen & Wikström, 2020 en la fauna rumana (Lepidoptera: Pyralidae)

Resumen

Pyralis cardinalis Kaila, Huemer, Mutanen, Tyllinen & Wikström, 2020, ha sido descrita recientemente basado en material procedente del norte de Europa hasta Corea del Sur y Japón. Aquí esta especie se reporta por primera vez en varias localidades del noreste de Rumanía, donde puede ocurrir en simpatría y sincronía con *P. regalis* ([Denis & Schiffermüller], 1775), una especie morfológicamente similar. Se examinan la morfología externa de adultos, los genitales masculinos y los códigos de barras de ADN de especímenes rumanos. Hasta donde sabemos, los especímenes rumanos representan los registros confirmados de *P. cardinalis* más al sur de Europa y resaltan la necesidad de documentar mejor la distribución de este taxón.
Palabras clave: Lepidoptera, Pyralidae, distribución, códigos de barras de ADN, haplotipos, colecciones científicas, simpatría, Rumanía.

Introduction

Until recently, the genus *Pyralis* Linnaeus, 1758 included seven recognized species in Europe: *P. farinalis* Linnaeus, 1758, *P. regalis* [Denis & Schiffermüller], 1775, *P. perversalis* (Herrich-Schäffer, 1849), *P. lienigialis* (Zeller, 1843), *P. kacheticalis* (Christoph, 1893), *P. manihotalis* (Guenée, 1854) and

P. pictalis (Curtis, 1834) (Slamka, 2006). However, a recent revision (Wikström et al. 2020) based on morphology and mitochondrial DNA (DNA barcodes) added two species to the European fauna, namely *Pyralis sagarrai* Leraut, 2005 (previously regarded as a subspecies of *P. regalis*) and *Pyralis cardinalis* Kaila, Huemer, Mutanen, Tyllinen & Wikström, 2020.

While *P. sagarrai* appears restricted to south-western Europe (Iberia and the French Pyrenees) (Slamka, 2006), *P. cardinalis* is transpalearctic, ranging from northern Europe to South Korea and Japan (Wikström et al. 2020). *Pyralis cardinalis* appears to be expanding at least in northern Europe (Wikström et al. 2020), but its recent discovery and similarity to the widespread *P. regalis* mean that its distribution is still poorly known.

Material and methods

Specimens: We examined 86 specimens from Romania with phenotypes corresponding to *P. regalis* or *P. cardinalis*. Identifications based on external morphology were done using the identification keys provided by Wikström et al. (2020) and Larysz (2020). Specimens were collected during the night using 160W mercury vapour lamps (230V) and/or 8W actinic or black light tubes (12V).

Genitalia examination: Male genitalia of three specimens (two *P. cardinalis*, one *P. regalis*) were prepared largely following the protocol outlined by Robinson (1976). The abdomen was detached from the thorax and was softened in 10% potassium hydroxide. The dissection was flushed with water, the genitalia structures were cleaned in Euparal essence and then embedded in Euparal resin. Male genitalia were mounted in a standard dorso-ventral position. The drawings were made from printed photographs. The genitalia were photographed with a BTC BIM 105B microscope coupled with a Canon EOS 1300D DSLR camera.

DNA barcoding: DNA barcodes (i.e. a 658 base-pair long fragment of the 5' end of the mitochondrial cytochrome c oxidase subunit 1 (COI) gene) were obtained from six Romanian *Pyralis* specimens, out of 15 analysed. Genomic DNA was extracted from one or two legs using the DNeasy Blood and Tissue Kit (Qiagen). DNA barcodes were amplified by polymerase chain reaction using the primers HybLCO (5'-TAATACGACTCACTATAGGGGGTCAACAAATCATAAAGATATTGG-3') and HybHCO (5'-ATTAACCCTCACTAAAGTAAACTTCAGGGTGACCAAAAAATCA-3') (Wahlberg & Wheat, 2008). Double-stranded DNA was amplified in 10-L reactions containing 5.7 µL autoclaved Milli-Q water, 1 µL 10X buffer, 1 µL 25 mM MgCl2, 0.2 µL, 10 mM dNTPs, 0.5 µL of each primer (10 M), 0.1 µL Ampli Taq Gold DNA polymerase (Applied Biosystems), and 1 µL of extracted DNA. The typical thermal cycling profile was: first denaturation at 95 ºC for 300 s, followed by 39 cycles of 95 ºC for 30 s, 50 ºC for 30 s, and 72 ºC for 120 s, with a final extension at 72 ºC for 120 s.

Laboratory work and DNA sequencing were carried out at the University of Oulu, Finland. DNA barcodes and associated information are publicly available in DS-PYRECA (https://doi.org/10.5883/DS-PYRECA) in the Barcode of Life Data Systems (BOLD; Ratnasingham & Hebert, 2007).

The six Romanian sequences were aligned with *Pyralis* DNA barcodes published by Wikström et al. (2020), resulting in a dataset of 94 COI sequences. A neighbor-joining (NJ) tree was generated using MEGA version X (Kumar et al. 2018), using pairwise deletion and 1,000 bootstrap replicates.

Results

Romanian records: Among the 86 specimens of *Pyralis* from Romania examined we identified 27 individuals belonging to *P. cardinalis* and 59 belonging to *P. regalis* (Figure 1a-e).

P. cardinalis Kaila, Huemer, Mutanen, Tyllinen & Wikström, 2020

Botoşani county, Cătămăreşti (oak forest), 215 m, 47.748 N, 26.558 E, 24-VI-1994, 3 spec., C. Corduneanu leg. and coll.; Botoşani county, Ionăşeni (deciduous forest edge), 175 m, 47.696 N, 26.994

E, 04-VI-2016, 1 spec., C. Corduneanu leg. and coll., 22-VII-2017, 1 spec. (DNA barcode amplification failed), C. Corduneanu leg., V. Dincă coll.; Botoşani county, Leorda (oak forest), 245 m, 47.826 N, 26.405 E, 13-VII-2007, 1 spec., C. Corduneanu leg. and coll.; Botoşani county, Orăşeni Vale (riparian forest), 160 m, 47.645 N, 26.649 E, 26-VI-1998, 1 spec., C. Corduneanu leg. and coll., 01-VII-2005, 2 spec., C. Corduneanu leg. and coll., 15-VI-2007, 1 spec., C. Corduneanu leg. and coll., 21-VI-2007, 1 spec. (DNA barcode amplification failed), C. Corduneanu leg., V. Dincă coll., 02-VII-2008, 1 spec., C. Corduneanu leg., MINGA coll., 02-VII-2008, 1 spec., C. Corduneanu leg., L. Rákosy coll., 02-VII-2008, 1 spec. (DNA barcode amplification failed), C. Corduneanu leg., V. Dincă coll., 03-VII-2010, 1 spec. (DNA barcode amplification failed), C. Corduneanu leg., V. Dincă coll., 05-VII-2013, 1 spec., C. Corduneanu leg. and coll., 01-VII-2022, 1 spec. (BOLD process ID VEDS004-23), C. Corduneanu leg. and coll., 01-VII-2022, 1 spec. (BOLD process ID VEDS005-23), C. Corduneanu leg. and coll., 01-VII-2022, 1 spec. (BOLD process ID VEDS006-23), C. Corduneanu leg. and coll.; Botoşani county, Schit Orăşeni (garden), 185 m, 47.642 N, 26.685 E, 05-VII-1993, 1 spec. (genit. prep. 2879/Rákosy), C. Corduneanu leg., L. Rákosy coll., 15-VI-1995, 1 spec. (DNA barcode amplification failed), C. Corduneanu leg., V. Dincă coll., 12-VII-2023, 1 spec., C. Corduneanu leg. and coll.; Botoşani county, Schit Orăşeni (oak forest), 260 m, 47.632 N, 26.660 E, 17-VII-1995, 1 spec., C. Corduneanu leg. and coll., 12-VII-1999, 1 spec., C. Corduneanu leg. and coll.; Botoşani county, Şupitca (garden), 165 m, 47.606 N, 26.782 E, 20-VII-2015, 1 spec., I. Surugiu leg. and coll.; Botoşani county, Vorona (oak forest), 275 m, 47.607 E, 26.660 E, 28-VI-1997, 1 spec., C. Corduneanu leg. and coll.; Suceava county, Rădăuţi (wet meadow), 375 m, 47.854 N, 25.885 E, 30-VII-2005, 1 spec. (genit. prep. 2878/Rákosy), C. Corduneanu leg., L. Rákosy coll.

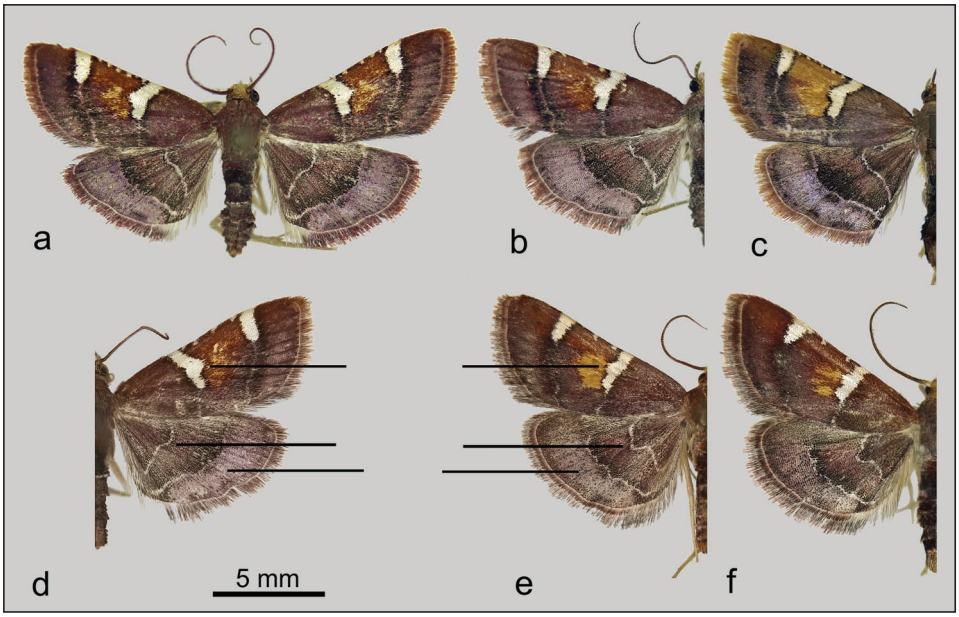

Figure 1. Specimens of *P. cardinalis* and *P. regalis* from north-eastern Romania (Botoşani county). Black lines in d and e indicate characters useful for the identification of the two species. **a.** *P. cardinalis*, Ionăşeni, 4-VI-2016. **b.** *P. cardinalis*, Orăşeni Vale, 26-VI-1998. **c.** *P. cardinalis*, Vorona, 28-VI-1997. **d.** *P. cardinalis*, Orăşeni Vale, 1-VII-2022, BOLD process ID VEDS005-23. **e.** *P. regalis*, Schit Orăşeni, 12-VII-2023. **f.** *P. regalis*, Schit Orăşeni, 24-VII-2023. Photos: C. Corduneanu.

P. regalis ([Denis & Schiffermüller], 1775)

Bihor county, Groşi (beech forest), 320 m, 47.068 N, 22.468 E, 07-VIII-2019, 1 spec., C. Corduneanu leg. and coll., 1 spec. (DNA barcode amplification failed), C. Corduneanu leg., V. Dincă coll.; Botoşani county, Ionăşeni (deciduous forest edge), 190 m, 47.701 N, 26.993 E, 31-VII-2014, 2 spec., C. Corduneanu leg. and coll., 22-VII-2015, 1 spec. (BOLD process ID VEDS001-23), C. Corduneanu leg., V. Dincă coll.; Botoşani county, Ionăşeni (deciduous forest edge), 175 m, 47.696 N, 26.994 E, 23-VIII-2015, 1 spec. (DNA barcode amplification failed), C. Corduneanu leg., V. Dincă coll., 04-VI-2016, 1 spec., C. Corduneanu leg. and coll., 30-VI-2016, 2 spec., I. Surugiu leg. and coll., 30-VI-2016, 1 spec. (DNA barcode amplification failed), C. Corduneanu leg., V. Dincă coll., 21-VIII-2016, 1 spec., C. Corduneanu leg. and coll., 21-VIII-2016, 1 spec. (BOLD process ID VEDS003-23), C. Corduneanu leg., V. Dincă coll., 06-IX-2016, 1 spec. (DNA barcode amplification failed), C. Corduneanu leg., V. Dincă coll.; Botoşani county, Orăşeni Vale (riparian forest), 160 m, 47.645 N, 26.649 E, 15-VI-2018, 1 spec. (BOLD process ID VEDS002-23), C. Corduneanu leg., V. Dincă coll.; Botoşani county, Schit Orăşeni (garden), 185 m, 47.642 N, 26.685 E, 12-VII-2023, 2 spec., C. Corduneanu leg. and coll., 24-VII-2023, 1 spec., C. Corduneanu leg. and coll.; Botoşani county, Şupitca (garden), 165 m, 47.606 N, 26.782 E, 08-IX-2014, 1 spec., I. Surugiu leg. and coll., 05-VII-2023, 1 spec., I. Surugiu leg. and coll.; Iaşi county, Breazu, comuna Rediu (meadow), 95 m, 47.238 N, 27.479 E, 26-VIII-2011, 1 spec., C. Balan leg., C. Corduneanu coll.; Botoşani county, Suliţa (deciduous forest edge), 130 m, 47.683 N, 26.992 E, 29-VIII-2011, 1 spec., C. Corduneanu leg. and coll.; Iaşi county, Stânca, comuna Comarna (garden), 50 m, 47.070 N, 27.804 E, 18-IX-2014, 1 spec., C.-O. Manci and C. Balan leg., C. Corduneanu coll.; Alba county, Cheile Runcului, 46.51 N, 23.44 E, 23-VII-1992, 1 spec., L. Rákosy leg. and coll.; Alba county, Ciuguzel, 46.28 N, 23.86 E, 06-VIII-2006, 1 spec., L. Rákosy leg. and coll.; Alba county, Rimetea, Piatra Secuiului, 950 m, 46.448 N, 23.586 E, 01-VII-1999, 1 spec., L. Rákosy leg. and coll.; Caraş-Severin county, Băile Herculane, 44.87 N, 22.41 E, 14-VII-1997, 1 spec., L. Rákosy leg. and coll., 15-VII-1997, 3 spec., L. Rákosy leg. and coll., 25-VII-1992, 1 spec., L. Rákosy leg. and coll.; Caraş-Severin county, Băile Herculane, Vârful Şuşcu, 44.89 N, 22.46 E, 15-VII-1997, 1 spec. (genit. prep. 2880/Rákosy), L. Rákosy leg. and coll.; Caraş-Severin county, Cheile Nerei, 44.86 N, 21.82 E, 30-VI-1994, 1 spec., L. Rákosy leg. and coll.; Caraş-Severin county, Cheile Nerei, Sasca Montană, 44.86 N, 21.82 E, 30-VI-1994, 1 spec., L. Rákosy leg. and coll.; Cluj county, Cheile Tureni, 46.61 N, 23.71 E, 05-VII-1980, 1 spec., L. Rákosy leg. and coll.; Cluj county, Cheile Turzii, 46.56 N, 23.68 E, 29-VII-1994, 1 spec., L. Rákosy leg. and coll., 02-VII-1990, 1 spec., L. Rákosy leg. and coll.; Cluj county, Mărişel-Colonie, 790 m, 46.69 N, 23.17 E, 28-VIII-1978, 1 spec., L. Rákosy leg. and coll.; Mehedinţi county, Dubova, 44.62 N, 22.25 E, 09-VI-1993, 4 spec., L. Rákosy leg. and coll.; Mehedinţi county, Dubova, Cazanele Mici, 44.62 N, 22.25 E, 16-VII-1997, 1 spec., L. Rákosy leg. and coll.; Mureş county, Criş, 46.14 N, 24.69 E, 17-VIII-2005, 1 spec., L. Rákosy leg. and coll.; Mureş county, Mihai Viteazul, 46.15 N, 25.02 E, 27-VII-2005, 1 spec., L. Rákosy leg. and coll.; Mureş county, Şaeş, 46.15 N, 24.77 E, 18-VIII-2007, 1 spec., L. Rákosy leg. and coll.; Mureş county, Sighişoara, 46.21 N, 24.79 E, 20-VIII-1977, 1 spec., L. Rákosy leg. and coll.; Tulcea county, Babadag, 44.85 N, 28.69 E, 07-VIII-1991, 2 spec., L. Rákosy leg. and coll.; Tulcea county, Greci, 45.20 N, 28.25 E, 15-VI-2006, 1 spec., L. Rákosy leg. and coll.; Tulcea county, Pădurea Horia, 230 m, 44.99 N, 28.45 E, 24-VII-1998, 1 spec., L. Rákosy leg. and coll.; Vâlcea county, Mt. Cozia, Mănăstirea Stânişoara, 680 m, 45.299 N, 24.338 E, 08-VI-2000, 1 spec., L. Rákosy leg. and coll.; Buzău county, Breaza, 335 m, 45.094 N, 26.537 E, 30-VIII-2022, 1 spec., V. Dincă leg. and coll., 20-IX-2023, 2 spec., V. Dincă leg. and coll.; Buzău county, Pietroasa Mică, 510 m, 45.116 N, 26.577 E, 27-VI-2023, 1 spec., V. Dincă leg. and coll.; Constanţa county, Negureni, 93 m, 44.088 N, 27.746 E, 29-IX-2023, 2 spec., V. Dincă leg. and coll.

The two species can usually be identified based on external morphology. In particular, the centrally widened outer edge of the white median fascia of the forewing, the distinct purple shade of the hindwing (Wikström et al. 2020) and the medially slightly bent whitish basal line of the hindwing (Larysz, 2020) distinguish *P. cardinalis* from other European congeneric taxa, including *P. regalis* (Figure 1a-e). However, due to intraspecific variability (e.g. fascia centrally slightly widened in certain specimens of *P. regalis*, worn specimens losing some of the purple shade etc.), it is advisable that the above mentioned characters are considered together (e.g. Figures 1d and 1e, where differences in fascia and purple shade are relatively subtle). Based on the specimens examined and in line with reports by Larysz (2020), we found that the shape of the whitish basal line of the hindwings is a useful diagnostic character, since in *P. regalis* this line is much more bent medially, having a more dentate appearance (Figure 1a-e).

Examination of male genitalia (Figure 2) confirmed identifications of *P. cardinalis* initially based on external morphology. In this species, some of the most obvious diagnostic characters are found in the phallus vesica, which has one large, spine-shaped and strongly sclerotized cornutus, as well as a smaller, slightly curved one, formed by a number of partially fused smaller spines. In *P. regalis*, the phallus vesica usually lacks clearly differentiated cornuti or spines (Wikström et al. 2020).

Additionally, the uncus in *P. cardinalis* is overall more or less triangular and sharper towards the apex, while in *P. regalis* it is that shaped and more rounded apically. The valvae in *P. cardinalis* are slightly longer and narrower than those of *P. regalis* (Figure 2) (Wikström et al. 2020).

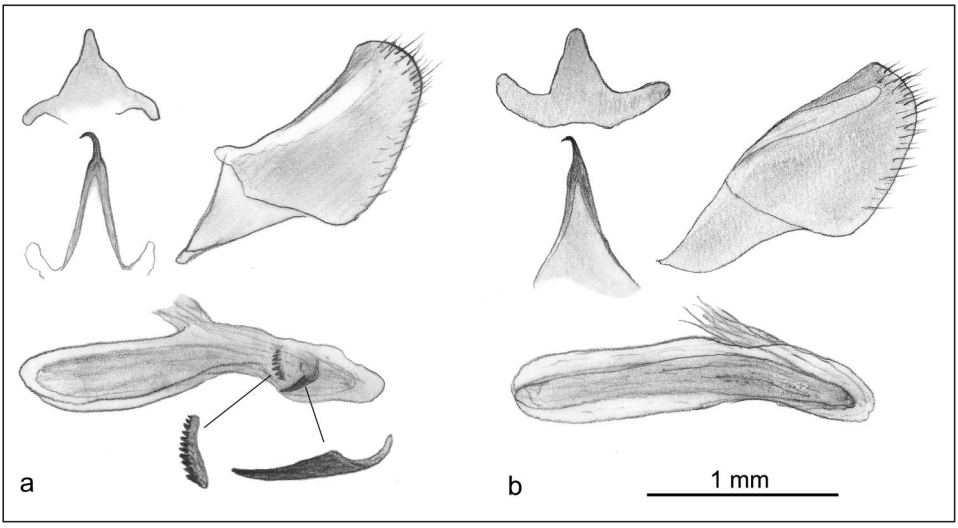

Figure 2. Elements of *Pyralis* male genitalia (uncus, gnathos, valva and phallus) from Romania. **a.** *P. cardinalis*, Schit Orăşeni (Botoşani county), 5-VII-1993, genit. prep. 2879/Rákosy. **b.** *P. regalis*, Băile Herculane, Vârful Şuşcu (Caraş-Severin county), 15-VII-1997, genit. prep. 2880/Rákosy.

All specimens of *P. cardinalis* were detected in north-eastern Romania, while *P. regalis* was much more widespread (Figure 3). We found *P. cardinalis* in various types of habitats, such as edges of deciduous forests, riparian forests or gardens. The maximum distance between sites is of approximately 85 km (Figure 3). The *P. cardinalis* specimens were collected between 1993 and 2023, with most records approximately between the last decade of June and mid-July, the earliest date being 4th of June and the latest 30th of July (Figure 4).

In four of the investigated sites, we identified both *P. cardinalis* and *P. regalis* (Figure 3), and synchrony was detected in two of these locations.

DNA barcoding

Of the six Romanian *Pyralis* specimens successfully barcoded, three belonged to *P. cardinalis* and three to *P. regalis* (Figure 5). Specimen assignment to species was unambiguous given the strong differentiation among taxa: minimum p-distance over 7% for *P. cardinalis* and almost 4% for *P. regalis* with respect to their nearest European neighbour (*P. sagarrai* in both cases) (Wikström et al. 2020). In contrast, intraspecific divergence in *P. cardinalis* was reported as low (maximum 0.7%) (Wikström et al. 2020) and the three Romanian specimens did not change this pattern. They represent two COI haplotypes that differ by a single mutation and are shared with other specimens of *P. cardinalis* (Figure 5).

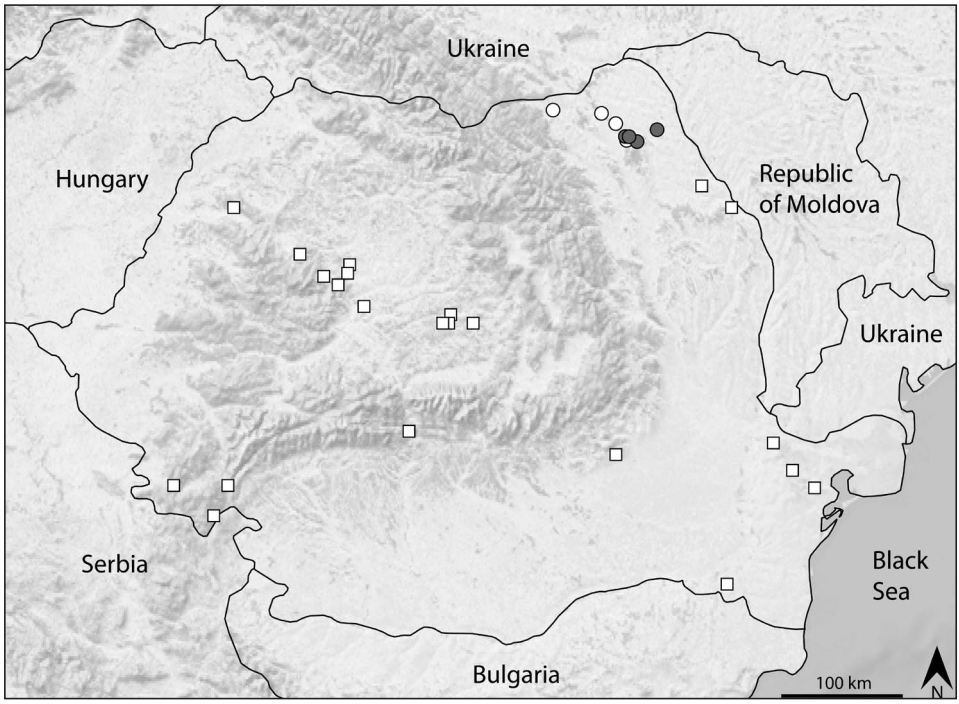

Figure 3. Distribution of *P. cardinalis* and *P. regalis* in Romania based on examined material. White dots, records of *P. cardinalis*; grey dots, detected sympatry between *P. cardinalis* and *P. regalis*; white squares, records of *P. regalis*.

Discussion

In Europe, the original description (Wikström et al. 2020) reported *P. cardinalis* from northern regions (Denmark, Sweden, Finland, Estonia, Latvia and Russia), but subsequent records from other countries have been relatively rapidly accumulating. This is the case of Poland (Larysz, 2020), Germany (Haslberger et al. 2021; Kormannshaus, 2022), Slovakia (Tokár et al. 2021) and Ukraine (Yepishin et al. 2021).

The examination of *Pyralis* specimens from Romania revealed the presence of *P. cardinalis* in the north-east, the findings representing the first records of this species in the country. The nearest reports

of *P. cardinalis* originate from Slovakia (Tokár et al. 2021) and Ukraine (Yepishin et al. 2021). To the best of our knowledge, the Romanian specimens represent the southernmost records of this species in Europe. Moreover, in north-eastern Romania the species was found in sympatry with *P. regalis*, phenomenon still rarely reported in Europe (Wikström et al. 2020). However, since *P. regalis* is widespread in southern regions, but also reaches at least some parts of central Europe, it is possible that re-evaluation of material present in collections combined with new field data will reveal more cases of sympatry. This likelihood probably increases also because *P. cardinalis* is apparently expanding at least in northern Europe (Wikström et al. 2020) and it is still unclear how far this species extends into southern Europe. The fact that *P. cardinalis* can, in addition to genitalia and DNA barcodes, also be identified based on external morphology should greatly facilitate the clarification of its distribution. In Romania for example, it is only similar to *P. regalis*, the other *Pyralis* species reported from the country (Rákosy & Goia, 2021) having clearly different morphology. Further investigations in this country may further extend the known distribution of this species.

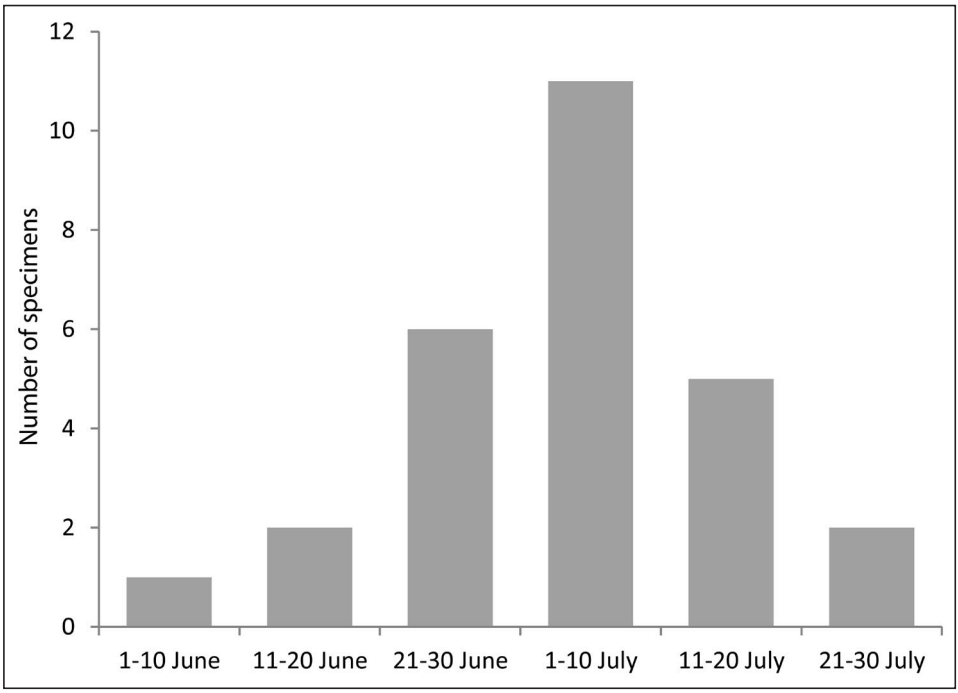

Figure 4. Phenology of *Pyralis cardinalis* adults inferred from 27 specimens originating from north-eastern Romania.

It is not clear what factors shape the range dynamics of *P. cardinalis*. The early stages and the biology of the species have been described recently (Buszko, 2022), the larvae feeding on dead leaves from the litter. Therefore, they do not appear to be strongly limited in terms of food availability. Using DNA to infer the origin of the contemporary distribution will likely require genomics, since DNA barcodes alone display very little variability in this species (Wikström et al. 2020).

The species is probably single brooded with a peak of the flight period during end June-July

(Wikström et al. 2020; Buszko, 2022), aspect supported by our preliminary data from Romania. It should be noted that, based on flight time data from Poland, Buszko (2022) hypothesized that a partial second brood may occur in August.

Conclusion

We documented the presence of *P. cardinalis* in north-eastern Romania, which currently represents the southern distribution limit of this species in Europe. We also detected *P. cardinalis* in sympatry and synchrony with *P. regalis*. Considering the apparent expansion of *P. cardinalis* at least in northern Europe, our findings reinforce the need to gather new field data and to revise material present in collections that will improve knowledge on the distribution dynamics of *P. cardinalis* and the potential causes behind its expansion.

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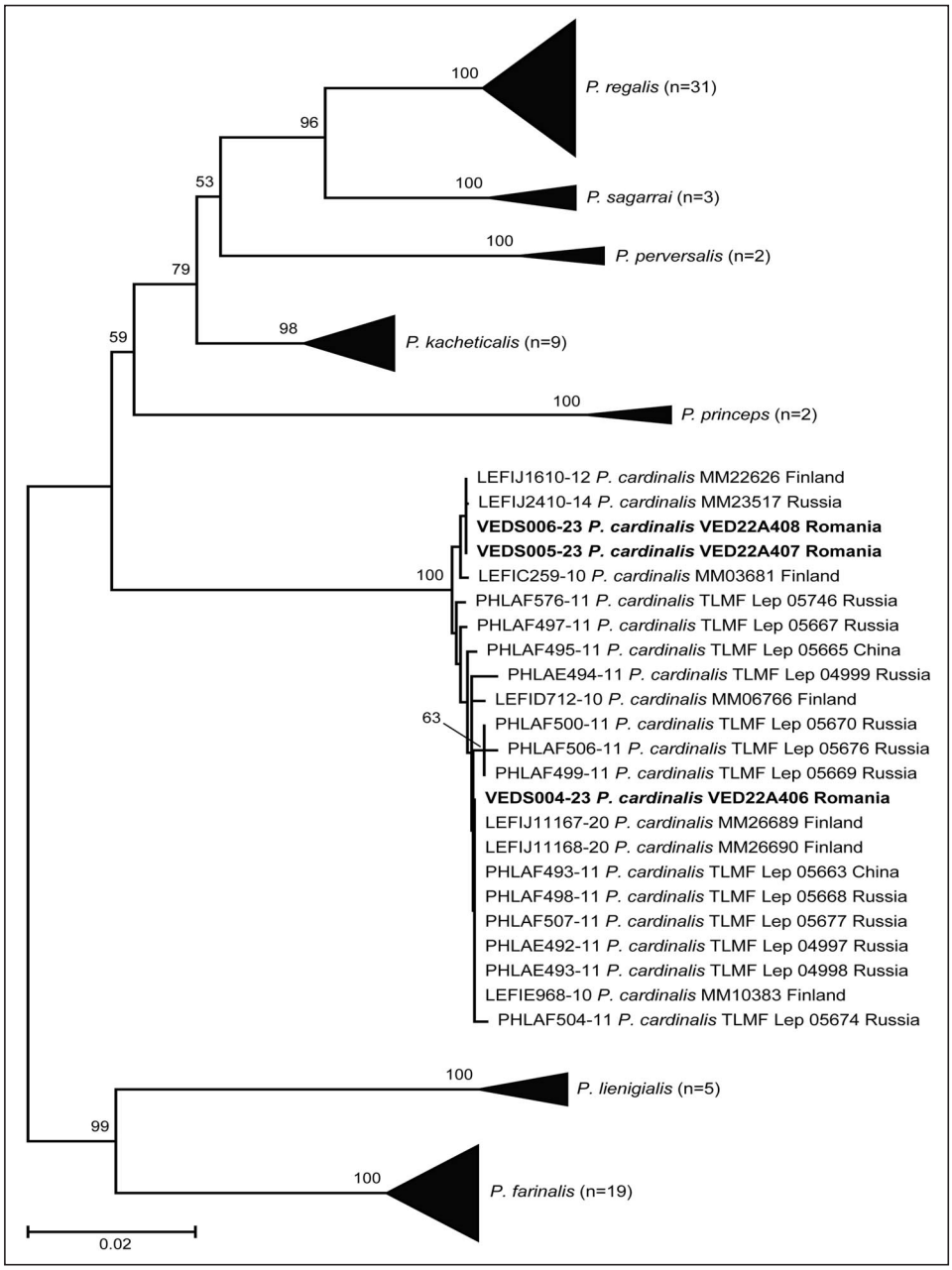

Figure 5. Neighbor-joining tree based on DNA barcodes of European *Pyralis*. Romanian specimens of *P. cardinalis* are bolded. Bootstrap supports (1,000 replicates, >50) are included above the recovered nodes.

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Verification and photographic documentation of two species of the genus *Graphium* Scopoli, 1777 from Uttar Pradesh, India, supplementing the updated Checklist of *Graphium* species in the Indian Subcontinent (Lepidoptera: Papilionidae)

Ratindra Pandey, Rupak De, Abu Arshad Khan & Taslima Sheikh

Abstract

Two species of the genus *Graphium* Scopoli, 1777, are rediscovered and documented from Uttar Pardesh in this paper. This research presents the first record of *G. agamemnon* (Linnaeus, 1758) and *G. nomius* (Esper, 1799) within Uttar Pradesh based on photographic evidence and field observations. The paper also supplements with updated checklist on *Graphium* species in Indian subcontinent. The discovery highlights the importance of continuous monitoring and documentation of Papilionoidea species, especially within protected areas, to enhance our understanding of their distribution and contribute to their conservation.
Keywords: Lepidoptera, Papilionidae, field observations, photography, documentation, habitat, conservation, India.

Verificación y documentación fotográfica de dos especies del género *Graphium* Scopoli, 1777 de Uttar Pradesh, India, que complementan la lista actualizada de especies de *Graphium* del subcontinente indio (Lepidoptera: Papilionidae)

Resumen

En este trabajo se redescubren y documentan dos especies del género *Graphium* Scopoli, 1777, de Uttar Pardesh. Esta investigación presenta el primer registro de *G. agamemnon* (Linnaeus, 1758) y *G. nomius* (Esper, 1799) en Uttar Pradesh basado en pruebas fotográficas y observaciones de campo. El artículo también complementa la lista actualizada de especies de *Graphium* en el subcontinente indio. El descubrimiento pone de relieve la importancia de la vigilancia y documentación continuas de las especies de Papilionoidea, especialmente dentro de las zonas protegidas, para mejorar nuestra comprensión de su distribución y contribuir a su conservación.
Palabras clave: Lepidoptera, Papilionidae, observaciones de campo, fotografía, documentación, hábitat, conservación, India.

Introducción

Papilionoidea are essential components of ecosystems, contributing to pollination and serving as indicators of environmental health. Documenting their distribution is crucial for biodiversity

conservation efforts. In India, five subspecies of the *Graphium agamemnon* species are found. The first, *G. agamemnon menides,* is widespread in Sri Lanka and also present in Peninsular India, particularly in the Western Ghats, where it inhabits both lowland areas and elevations up to 1200 meters. The second subspecies, *G. agamamnon agamemnon,* is commonly sighted in the northeastern Ghats of northern Orissa, Jharkhand, and southern West Bengal, as well as in the Himalayas, adapting to altitudes reaching 1800 meters. Its habitat spans from southeastern Himachal Pradesh (Sirmaur) across Uttarakhand, Nepal, northern Bihar (Champaran), Sikkim, northern West Bengal, and Bhutan to Arunachal Pradesh and the rest of northeastern India, including all of Bangladesh. This subspecies, previously known as *rufescens* (Oberthür, 1879) and *rufoplenus* (Fruhstorfer, 1898), exhibits a broad distribution across various landscapes within the Indian subcontinent. Previously classified as *Zetides agamemnon,* the Tailed Jay, in Evans (1932). Third is *G. agamamnon andamana* (Lathy, 1907)*:* Fairly common in the Andaman Islands. Fourth is *G. agamamnon decorates* (Rothschild, 1895). This subspecies is common in the Car and Central Nicobar Islands. Fifth is *G. agamamnon pulo* (Evans, 1932)*:* Rare in the Southern Nicobar Islands, meanwhile *Graphium nomius* (Esper, 1799) also exhibits two subspecies. *G. nomius nomius* is commonly found in Sri Lanka and widely distributed across India, particularly in the Western Ghats, reaching elevations of up to 900m. Its range extends from Himachal Pradesh to Bhutan, encompassing various states except for certain areas in Gujarat, Rajasthan, Haryana, Punjab, and Kashmir. On the other hand, *G. nomius swinhoei* (Moore*,* 1878) previously known as *pernomius* (Moore, [1903]), is rare in northeastern India, primarily in western Assam, Meghalaya, Manipur, and southeastern Arunachal Pradesh, with occasional sightings in Bangladesh. Initially classified as *Pathysa nomius,* it was later reclassified in Evans (1932). This research aims to document the first sighting of *G. agamemnon* and *G. nomius* within Uttar Pradesh, specifically within the confines of the Pilibhit Tiger Reserve. Genus *Graphium* has 21 known species from India and the Indian subcontinent Gasse (2018), Kunte et al (2024) (Appendix I).

Materials ad methods

Study Area

The Pilibhit Tiger Reserve encompasses the Pilibhit, Lakhimpur Kheri, and Bahraich Districts within Uttar Pradesh, India (Figure 1). Positioned adjacent to the India-Nepal border, it spans the foothills of the Himalayas and the plains of Uttar Pradesh, known as the 'terai'. As one of India's 50 Project Tiger reserves, it stands as a testament to biodiversity and conservation efforts. Notably, the Pilibhit district is celebrated for its dense forest cover, with over 800 km^2 (310 sq mi) of forests, accounting for nearly 23% of the district's total area as of 2004.

Methods

On 27-VIII-2023, a field survey was conducted within the Pilibhit Tiger Reserve in Uttar Pradesh, India, focusing on Rhopalocera diversity and these two species mentioned above were seen and photographed. Again, after a week four more individuals of *Graphium nomius* and two individuals of *G. agamemnon* were seen and photographed in the same locality. Visual observations and photographic documentation were employed to record Rhopalocera species encountered during the surveys. GPS coordinates were collected for sighting to accurately document the location of observations. It's important to note that no Rhopalocera were collected or harmed during this process. A distribution map was prepared using ArcGIS 10.5 software, utilizing the original base map of India as a reference (Figure 1).

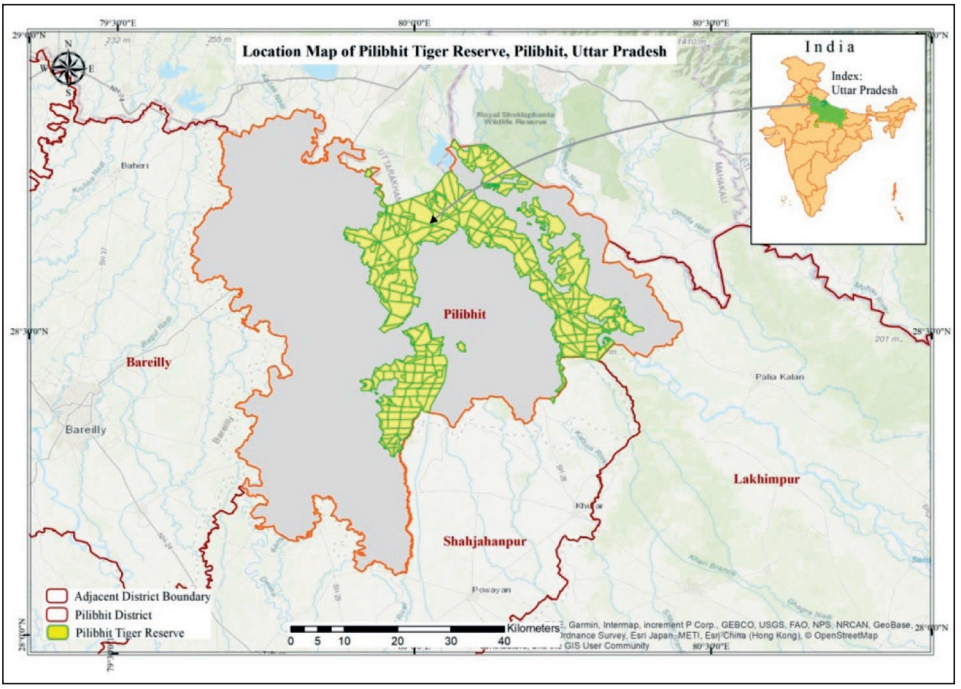

Figure 1. Map showing the location of *Graphium* species.

Identification

Identification was conducted using available literature, including references such as Kehimkar (2016) and Evans (1932), which provided valuable guidance and information on this species (Figures 2-3).

Results: In this study, two *Graphium* species were seen and photographed viz., *G. agamemnon* (Linnaeus, 1758) and *G. nomius* (Esper, 1799), belonging to the family Papilionidae.

Graphium agamemnon (Linnaeus, 1758) (Figure 2)

Diagnosis: A species with black wings adorned with green spots and streaks. On the underside, the wings are pale brown with black markings, suffused with lilac or green spots. Additionally, it features a tail.

Material examined: INDIA.Uttar Pradesh: Pilibhit Tiger Reserve, 28.693ºN 79.854ºE, 170 m, 27-VIII-2023, observed more than four individuals by Rupak De, Ratindra Pandey & Abu Arshad Khan.

Graphium nomius (Esper, 1799) (Figure 3)

Diagnosis: A Papilionidae displaying a whitish hue with broad, brown margins accented by white spots on the undersides of both wings, accompanied by various bands. Notably, the hindwing boasts a row of distinct red spots at its centre, while also featuring elongated, sword-like tails.

Material examined: INDIA, Uttar Pradesh: Pilibhit Tiger Reserve, 28.693ºN 79.853ºE, 170 m, 27-VIII-2023, observed more than five individuals by Rupak De, Ratindra Pandey & Abu Arshad Khan.

Discussion

The verification and documentation of *Graphium agamemnon* and *Graphium nomius* within Uttar Pradesh, particularly within the Pilibhit Tiger Reserve, expands the accurate known distribution range of these species in this region of India. Indian Rhopalocera updated checklist by Gasse (2018) have not documented its occurrence in this region, Previous literature available on region regarding these two species Kumar et al. (2016), Kumar & Rana (2018), do not have shown any photographic evidence which can confirm the presence of these two species accurately in the area. It's worth noting that records published in predatory journals are not consulted in this article, ensuring the reliability and credibility of the findings. The present study is in line with previous research conducted within the same state, as demonstrated by articles authored by Behera (2016), Bura et al. (2016), De Rye Phillipe (1902), Director (2015), Sarkar & Mandal (2018), Sharma (2007), Champion & Seth (1968), Kumari & Sheikh (2021), Sheikh et al. (2023), and De et al. (2023). Furthermore, this study is correlated with research conducted in other states, and the current article follows a similar format to those articles. Examples of similar work from other states include Sheikh & Parey (2019a, 2019b), Sheikh & Malik (2020), Parey & Sheikh (2021), Riyaz et al. (2021), Sheikh (2022), Sheikh & Parey (2022), Gupta & Sheikh (2021), Khan & Sheikh (2022), Sheikh & Mishra (2022), Sheikh & Hassan (2023), Pandey et al. (2023), De et al. (2024), Khan et al. (2024) and Sheikh et al. (2024). The presence of *G. agamemnon* and *G. nomius* within a protected area underscores the importance of such areas for conserving biodiversity and highlights the need for continued monitoring and documentation efforts. The discovery emphasizes the importance of ongoing monitoring and documentation efforts to enhance our understanding of Papilionidae distribution and contribute to their conservation in India. Further research is warranted to investigate the habitat preferences, population dynamics, and conservation status of *G. agamemnon* & *G. nomius* within Uttar Pradesh.

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Appendix I

1. *Graphium cloanthus* (Westwood, 1841)
   G. cloanthus: This species is commonly found in the Himalayas, typically inhabiting altitudes of up to 2700 meters. Its range extends from northeastern NWFP (Hazara) and northwestern Punjab (Murree) in Pakistan, across Kashmir, Himachal Pradesh, Uttarakhand, Nepal, Sikkim, northwestern West Bengal, and Bhutan, reaching Arunachal Pradesh and other northeastern regions of India (with no recorded sightings in Tripura). The species was previously identified as *Zetides cloanthus* and referred to as the Glassy Bluebottle in Evans' 1932 publication.

2. *Graphium sarpedon* (Linnaeus, 1758)
   G. sarpedon sirkari: This species is commonly found in the Himalayas, typically inhabiting areas up to 2800 m in altitude. Its distribution extends from northern NWFP (Hazara) and northwestern Punjab (Murree) in Pakistan, across Kashmir, Himachal Pradesh, northern Punjab (Siwaliks), Uttarakhand, Nepal, northern Bihar (Champaran), Sikkim, northern West Bengal, and Bhutan, reaching Arunachal Pradesh and other northeastern regions of India, as well as most of Bangladesh (excluding the southwest), including adjacent southern and central West Bengal. There have been sporadic sightings reported in southern Haryana (Delhi region). The subspecies sirkari, which was described by Page and Treadaway in 2013, was merged into the nominate subspecies of *Zetides sarpedon,* known as the Common Bluebottle, as per Evans' 1932 publication.

3. *Graphium teredon* (C. & R. Felder, [1865])
   This species is widespread in Sri Lanka, inhabiting altitudes of up to 1800 m, particularly abundant in the southwest and absent from the northern regions. In Peninsular India, it is common, reaching the highest peaks of the Western Ghats. Its distribution spans from Kerala and Tamil Nadu in the south, extending northward through all states to southeastern Gujarat, southeastern Rajasthan (Aravalli Range), Madhya Pradesh, southern Chhattisgarh, and Orissa. Previously classified as the subspecies teredon of *Zetides sarpedon,* known as the Common Bluebottle, in Evans' 1932 publication.

4. *Graphium adonarensis* (Rothschild, 1896)
   G. adonarensis septentrionicolus: This species is rare and likely found at relatively low elevations in northeastern India, specifically south of the Brahmaputra in Assam (Nagaon) and Meghalaya (Khasi Hills). The Indian subspecies was described by Page and Treadaway in 2013.

5. *Graphium doson* (C. & R. Felder, 1864)
   G. doson doson: This species is commonly found in Sri Lanka, inhabiting areas from the lowlands up to 700 m, except in the extreme north. It was previously referred to as *jason* in certain sources.
   G. doson eleius: Common in Peninsular India, with a habitat range extending up to 1800m in the Western Ghats. It is observed from Kerala and Tamil Nadu in the south, northward through all states to eastern Gujarat, southeastern Rajasthan (Aravalli Range), Madhya Pradesh, Chhattisgarh, Jharkhand, and southern West Bengal, with a single record from Lucknow in Uttar Pradesh.
   G. doson axionides: This subspecies is widespread in the Himalayas and adjacent plains, reaching altitudes of up to 1500 m. Its distribution spans from Kashmir (Jammu) in the west, eastward through Himachal Pradesh (with an old record from Kangra), northern Punjab (south to Amritsar and Patiala), northern Haryana (Siwaliks, occasionally south to Delhi), Uttarakhand, northern Uttar Pradesh (Dudhwa National Park), Nepal, Sikkim, northern West Bengal, and Bhutan, reaching Arunachal Pradesh and other northeastern regions of India (with no recorded sightings in Mizoram), as well as throughout Bangladesh. It was previously identified as *axion* in Evans' 1932 publication, with the subspecies *axionides* being referred to as *axion*; however, the latter term is preoccupied, according to Page and Treadaway in 2014.

6. *Graphium evemon* (Boisduval, 1836)
   G. evemon albociliatis: This species is exceptionally rare, typically found at relatively low elevations in

northeastern India, specifically south of the Brahmaputra River, including central Assam, and extending into eastern Arunachal Pradesh, particularly the Mishmi Hills. It was previously classified as *Zetides evemon,* the Lesser Jay, in Evans' 1932 publication. However, Smetacek and Varshney consider *albociliatis* as a distinct species, *Graphium albociliatis,* the Scarce Jay, in accordance with Page and Treadaway's classification in 2014.

7. *Graphium eurypylus* (Linnaeus, 1758)
G. eurypylus acheron: This species is uncommon in the Himalayas, typically observed at elevations up to 1600 m. Its range spans from Sikkim and northern West Bengal, extending eastward through Bhutan to Arunachal Pradesh and the remaining northeastern regions of India (including Assam, Meghalaya, Manipur, and Mizoram), as well as central and northeastern Bangladesh. Previously identified as *cheronus* and *petina. G. eurypylus macronius:* This subspecies is rare and found in the Andaman Islands. It was previously classified as *Zetides eurypylus,* the Great Jay, in Evans' 1932 publication.

8. *Graphium chironides* (Honrath, 1884)
G. chironides: This species is fairly common in the Himalayas, typically found at elevations up to 1650 m. Its distribution ranges from central Nepal and adjacent northern Bihar (Darbhanga district) eastward through Sikkim, northern West Bengal, and Bhutan to Arunachal Pradesh and the remaining northeastern regions of India (excluding Tripura or Mizoram), as well as northeastern Bangladesh. It was previously referred to as *chiron* and *ligyra.* Given as *Zetides bathycles,* the Veined Jay, in Evans' 1932 publication, and classified as *Graphium bathycles* in Talbot's 1939 work.

9. *Graphium agamemnon* (Linnaeus, 1758)
G. agamemnon menides: This species is common throughout Sri Lanka, inhabiting all lowlands and reaching elevations of up to 1200 m. In Peninsular India, it is also common, reaching altitudes of up to 2100 m in the Western Ghats. Its distribution spans from Kerala and Tamil Nadu in the south, extending northward through all states to Gujarat (excluding Kutch), central Rajasthan, Madhya Pradesh, Chhattisgarh, and southern Orissa.
G. agamemnon agamemnon: This subspecies is common in the northeastern Ghats in northern Orissa, Jharkhand, and southern West Bengal, as well as in the Himalayas, reaching elevations of up to 1800 m. Its habitat extends from southeastern Himachal Pradesh (Sirmaur) eastward through Uttarakhand, Nepal, northern Bihar (Champaran), Sikkim, northern West Bengal, and Bhutan to Arunachal Pradesh and the remaining northeastern regions of India, including all of Bangladesh. It was previously referred to as *rufescens* and *rufoplenus.*
G. agamemnon andamana: Fairly common in the Andaman Islands.
G. agamemnon decoratus: This subspecies is common in the Car and Central Nicobar Islands.
G. agamemnon pulo: Rare in the Southern Nicobar Islands. Previously classified as *Zetides agamemnon,* the Tailed Jay, in Evans' 1932 publication.

10. *Graphium arycles* (Boisduval, 1836)
G. arcyles occidentalis: This species is exceedingly rare, likely found at relatively low elevations in northeastern India, specifically south of the Brahmaputra in Manipur. Only one specimen has been recorded from Manipur. Initially identified as *Zetides arycles,* the Spotted Jay, in Evans' 1932 publication, and later classified as *Graphium arycles arycles.* The subspecies *occidentalis* was described by Page and Treadaway in 2014.

11. *Graphium macareus* (Godart, 1819)
G. macareus indicus: This subspecies is fairly common in the Himalayas, typically observed at elevations up to 1600 m. Its range extends from eastern Nepal eastward through Sikkim, northern West Bengal, and Bhutan to Arunachal Pradesh and northern Assam, specifically north of the Brahmaputra River. Previously referred to as polynices.
G. macareus lioneli: This subspecies is fairly common at relatively low elevations in northeastern India, specifically south of the Brahmaputra in Assam, Meghalaya, and Manipur, as well as in northeastern Bangladesh. It was previously classified as *Paranticopsis macareus,* the Lesser Zebra, in Evans' 1932 publication.

12. *Graphium xenocles* (Doubleday, 1842)
G. xenocles phrontis: This subspecies is uncommon in the Himalayas, typically found at elevations up to 1000 m. Its range extends from eastern Uttarakhand (Eastern Kumaon) eastward through Nepal (only recorded in the eastern region), Sikkim, northern West Bengal, and Bhutan to Arunachal Pradesh.
G. xenocles xenocles: This subspecies is also uncommon, reaching elevations of up to 1000 m, in northeastern India south of the Brahmaputra (excluding Tripura or Mizoram), including southeastern Arunachal Pradesh, as well as in northeastern and southeastern Bangladesh. Previously identified as theronus. Initially classified as Paranticopsis xenocles, the Great Zebra, in Evans' 1932 publication and in Varshney's 2010 work.
13. *Graphium megarus* (Westwood, 1844)
G. megarus: This species is uncommon, usually encountered at lower elevations in the eastern Himalayas, particularly in eastern Bhutan and western Arunachal Pradesh. It is also spotted in the western region of northeastern India, south of the Brahmaputra, especially in central Assam and Meghalaya, as well as in northeastern Bangladesh. Initially designated as *Paranticopsis megarus,* commonly known as the Spotted Zebra, in Evans' 1932 publication.

14. *Graphium eurous* (Leech, [1893])
G. eurous caschmirensis: This subspecies is uncommon in the western Himalayas, typically found at elevations ranging from 1200 to 2100m. Its distribution extends from Kashmir eastward through Himachal Pradesh to Uttarakhand.
G. eurous sikkimica: This subspecies is also uncommon in the Himalayas, inhabiting elevations ranging from 600 to 2900m. Its range spans from the extreme eastern part of Uttarakhand (Eastern Kumaon) eastward through Nepal, Sikkim, northern West Bengal, and Bhutan to Arunachal Pradesh, as well as the hills of northeastern India south of the Brahmaputra, including Meghalaya and Nagaland. Initially classified as *Pathysa eurous,* the Sixbar Swordtail, in Evans' 1932 publication.

15. *Graphium garhwalica* (Katayama, 1988)
This species is rare in the western Himalayas in Uttarakhand. It is known from both Garhwal (Auli, 2200 m) and Kumaon (Sikhar Hill in Bageshwar).

16. *Graphium paphus* (de Nicéville, 1886)
This species is also rare in the Himalayas, with an altitude range of 900 to 2700 m. It is found across Nepal, extending eastward through Sikkim, northern West Bengal, and Bhutan to Arunachal Pradesh, as well as the hills of northeastern India south of the Brahmaputra, including Meghalaya and Nagaland. Previously identified as glycerion. Initially classified as *Pathysa glycerion*, the Spectacled Swordtail, in Evans' 1932 publication, and as *Graphium glycerion* in Talbot's 1939 work.

17. *Graphium agetes* (Westwood, 1843)
G. agetes: This species is uncommon in the Himalayas, typically found at elevations up to 1200 m. Its distribution extends from Sikkim and northern West Bengal eastward through Bhutan to Arunachal Pradesh and the remaining northeastern regions of India (including Assam and Meghalaya), as well as northeastern Bangladesh. Initially classified as *Pathysa agetes,* the Fourbar Swallowtail, in Evans' 1932 publication.

18. *Graphium nomius* (Esper, 1799)
G. nomius nomius: This particular species is frequently found in Sri Lanka, especially in its eastern half, and can be spotted at elevations of up to 900 meters. In India, it has a broad distribution, commonly observed up to 900 meters in the Western Ghats. It is present in Kerala and Tamil Nadu, extending northward through all states except Kutch in Gujarat, western Rajasthan, western Haryana, southern Punjab, and Kashmir, all the way to the Himalayas, where it can be found at elevations of up to 1200 meters. Its range extends from Himachal Pradesh, reaching as far west as Kangra, and stretches eastwards through Uttarakhand, Nepal, Sikkim, northern West Bengal, and into Bhutan.
G. nomius swinhoei: This subspecies is seldom found at lower elevations in northeastern India, specifically north of the Brahmaputra in western Assam and south of it in Meghalaya and Manipur, as well as in southeastern Arunachal Pradesh (Namdapha National Park), and occasionally in northeastern and southeastern, and sometimes in central and southwestern Bangladesh. Previously referred to as *pernomius,* it was originally classified as *Pathysa nomius,* also known as the Spot Swordtail, in Evans' 1932 publication.

19. *Graphium aristeus* (Stoll, [1780])
G. aristeus anticrates: This subspecies is uncommon at relatively low elevations in the Himalayas, particularly in Sikkim, northern West Bengal, and Bhutan. It can also be found in northwest Assam near the Bhutan border, specifically in the Manas Biosphere Reserve. Additionally, it is observed in northeastern India south of the Brahmaputra (excluding Tripura or Mizoram) and northeastern Bangladesh. Initially classified as *Pathysa aristeus,* the Chain Swordtail, in Evans' 1932 publication.

20. *Graphium antiphates* (Cramer, [1775])
G. antiphates ceylonicus: This subspecies is rare and localized in Sri Lanka, inhabiting areas from the lowlands up to 900 m. It is also known as antiphanes.
G. antiphates naira: This subspecies is uncommon in the Western Ghats, reaching elevations of up to 900 m. Its distribution extends from Kerala and western Tamil Nadu northward through western Karnataka to Goa.
G. antiphates pompilius: This subspecies is common in the northern Eastern Ghats, ranging from southeastern Chhattisgarh northward through Orissa to Jharkhand and southern West Bengal. It is also found in the Himalayas, reaching elevations of up to 1400 m. Its habitat spans from eastern Nepal eastward through Sikkim, northern West Bengal, and Bhutan to Arunachal Pradesh and the remaining northeastern regions of India, as well as in northeastern and southeastern Bangladesh. It was previously known as *alcibiades, itamputi, nebulosus,* and *continentalis.*
Originally labelled as *Pathysa antiphates,* the Fivebar Swordtail, in Evans' 1932 publication. Smetacek and Varshney, in line with Larsen's perspective, consider *alcibiades* as the southwestern Indian subspecies rather than the *javan,* consequently establishing *naira* as a synonym.

21. *Graphium epaminondas* (Oberthür, 1879)
The species in question is commonly found in the Andaman Islands. Initially, it was considered a subspecies of *Pathysa antiphates,* known as the Fivebar Swordtail, according to Evans' publication in 1932. Talbot's work in 1939 classified it as a subspecies of *Graphium antiphates.* Varshney later reclassified *macareus, xenocles,* and *megarus* under *Paranticopsis; eurous* and *glycerion* under *Pazala;* and *agetes, nomius, aristeus, antiphates,* and epaminondas under *Pathysa.*

Figures 2-3. 2. *Graphium agamemnon* (Linnaeus) (Underwing). **3.** *Graphium nomius* (Esper) (Underwing).

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Article in collective volume:

Rebel, H. (1901). Famil. Pyralidae-Micropterygidae. 2 Theil.- In O. Staudinger & H. Rebel. *Catalog der Lepidopteren des palaeartischen Faunengebietes* (pp. 1-265). R. Friedlander & Sohn.

Book:

Vives Moreno, A. (2014). *Catálogo sistemático y sinonímico de los Lepidoptera de la Península Ibérica, de Ceuta, de Melilla y de las Islas Azores, Baleares, Canarias, Madeira y Salvajes (Insecta: Lepidoptera)*. Improitalia.

Internet:

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The Heterocera of Mértola (Alentejo, Portugal) (Insecta: Lepidoptera)

João Nunes, Martin F. V. Corley, David Grundy & Sónia Ferreira

Abstract

The Alentejo region includes more than a third of the entire Portuguese territory. Nevertheless, it is the least studied area in entomology and specifically in lepidopterology. Likewise, little is known about Mértola's insect fauna. In this municipality of the south-east of Alentejo, studies are being conducted to fill this knowledge gap. In this work, we present data regarding Heterocera research as a result of fieldwork using light traps in different habitats and different seasons. A total of 438 species were identified, including four new additions to the Portuguese fauna: *Symmoca sultan* Gozmány, 1962, *Eteobalea sumptuosella* (Lederer, 1855), *Coleophora arefactella* Staudinger, 1859 and *Idaea deitanaria* (Reisser & Weisert, 1977). A compilation of bibliographic records and new data is made. This study includes the first checklist of the area's Heterocera fauna.
Keywords: Insecta, Lepidoptera, Heterocera, faunistics, Alentejo, Mértola, Portugal.

Los Heterocera de Mértola (Alentejo, Portugal) (Insecta: Lepidoptera)

Resumen

La región del Alentejo comprende más de un tercio de todo el territorio portugués. Sin embargo, es el área menos estudiada en entomología y específicamente en lepidopterología. Asimismo, se sabe poco sobre la fauna de insectos de Mértola. En este municipio del sureste del Alentejo se están realizando estudios para colmar esta laguna de conocimiento. En este trabajo, presentamos datos sobre la investigación de Heterocera como resultado del trabajo de campo utilizando trampas de luz en diferentes hábitats y diferentes estaciones. Se identificaron un total de 438 especies, incluyendo cuatro nuevas adiciones a la fauna portuguesa: *Symmoca sultan* Gozmány, 1962, *Eteobalea sumptuosella* (Lederer, 1855), *Coleophora arefactella* Staudinger, 1859 y *Idaea deitanaria* (Reisser & Weisert, 1977). Se hace una recopilación de registros bibliográficos y nuevos datos. Este estudio incluye el primero listado faunístico de los Heterocera del área.
Palabras clave: Insecta, Lepidoptera, Heterocera, faunística, Alentejo, Mértola, Portugal.

Heterocera de Mértola (Alentejo, Portugal) (Insecta: Lepidoptera)

Resumo

A região do Alentejo compreende mais de um terço de todo o território português. Porém, é a área menos estudada em entomologia e especificamente em lepidopterologia. Da mesma forma, pouco se sabe sobre a fauna de insetos de Mértola. Neste concelho do sudeste alentejano estão a ser realizados estudos para colmatar esta lacuna de conhecimento. Neste trabalho, apresentamos dados da pesquisa de Heterocera como resultado de trabalho de campo utilizando armadilhas luminosas em diferentes habitats e diferentes estações do ano. Um total de 438 espécies foram identificadas, incluindo quatro novas adições à fauna de Portugal: *Symmoca sultan* Gozmány, 1962, *Eteobalea*

sumptuosella (Lederer, 1855), *Coleophora arefactella* Staudinger, 1859 e *Idaea deitanaria* (Reisser & Weisert, 1977). É feita uma compilação de registos bibliográficos e novos dados. Este estudo inclui a primeira lista faunística dos Heterocera da área.
Palavras-chave: Insecta, Lepidoptera, Heterocera, faunística, Alentejo, Mértola, Portugal.

Introduction

The Alentejo region, historically composed of two provinces, Alto Alentejo (AAL) and Baixo Alentejo (BAL), occupies about one third of mainland Portugal. Nevertheless, it is the least studied Portuguese area in entomology generally and specifically in lepidopterology. The short history of the study of Alentejo Heterocera shows that only a few places have been sampled and limited information is available regarding local inventories. Nevertheless, recent studies have revealed new species for science such as *Depressaria cinderella* Corley, 2002 described from Serra de São Mamede (Corley, 2002), *Ekboarmia miniaria* Skou, Stüning & Sihvonen, 2017 from Lagoa de Santo André and Grândola (Skou et al. 2017) and *Ypsolopha milfontensis* Corley & Ferreira, 2021 from Costa Vicentina (Corley & Ferreira, 2021), unveiling the relevance of the region and the need for further studies.

In addition to the scarce and dispersed records produced by earlier lepidopterists, as by the Reverend Alfred Edwin Eaton in Almodôvar (Corley & Goodey, 2014) and Teodoro Monteiro in Ribeira do Torgal (Monteiro & Passos de Carvalho, 1984), two recent works stand out, where 440 and 357 species were recorded for Lagoa de Santo André (Corley, 2004) and in the Serpa municipality (Marabuto, 2018), respectively, both located in Baixo Alentejo. The book published by Corley (2015), which consists of a checklist of Lepidoptera of Continental Portugal and includes the known distribution to date for each species, lists a total of 1177 species for the Alentejo region, out of the 2588 present in the country, 944 in AAL and 715 in BAL. New and interesting records for the Portuguese fauna have been published in an annual publication, adding 182 species to the Alentejo region, 58 to AAL and 168 to BAL (Corley et al. 2016, 2018a, 2018b, 2019, 2020, 2021, 2022, 2023). Marabuto (2018) added a further 65 species to BAL. To date, 1321 are listed for Alentejo, of which 1002 and 948 species are listed for AAL and BAL, respectively.

The municipality of Mértola, located in BAL, is a lowland municipality, ranging from 8 m above sea level by the Guadiana River at Pomarão in the south-east to 370 m above sea level at Alcaria Ruiva, west of Mértola town. Climatically, it is a severe Mediterranean region, with very hot and dry summers and the land use is mostly extensive agriculture. A significant area of the municipality is recognized as having particular relevance for nature conservation and is classified as Parque Natural do Vale do Guadiana and as Guadiana Natura 2000 site (PTCON0036). Despite being known for its high biodiversity and the presence of emblematic species such as the Iberian Lynx (*Lynx pardinus* (Temminck, 1827)) and the Great Bustard (*Otis tarda* Linnaeus, 1758), Mértola is not an exception to the regional lack of entomological works. To fill this gap, in the last years, studies have been conducted in the municipality to improve the knowledge on invertebrates and to create an inventory of the insect fauna of Mértola. In this paper, we present data regarding moth research as a result of fieldwork using light traps in different habitats and different seasons between 2017 and 2022. Moreover, a compilation of relevant literature is made. This work includes the first comprehensive list of the area's moth fauna.

Material and Methods

All the material examined comes from nine sampling sites in Mértola municipality (Table 1 and Figure 1). Seven field campaigns were carried out from 2017 to 2022, totaling 25 nocturnal trapping sessions. In March 2017, Martin Corley (MC) and Sonia Ferreira (SF) visited Moinho de Alferes and Corte Gafo. In May 2017, David Grundy (DG) visited Bombeira do Guadiana, Corte Sines and Pulo do Lobo. In October 2018, MC and SF returned to Mértola to visit Bombeira do Guadiana. João Nunes (JN) and SF made four field trips in April, July and September 2021 and August 2022.

Table 1. Sampling sites with visit dates, recorders, and precise location.

Code	Locality	Date	Latitude	Longitude	Recorders
B1	Bombeira do Guadiana	06-IV-2021	37.6247	-7.6667	JN, SF
B2	Bombeira do Guadiana	09-V-2017	37.6247	-7.6667	DG
B3	Bombeira do Guadiana	10-V-2017	37.6247	-7.6667	DG
B4	Bombeira do Guadiana	10-VII-2021	37.6247	-7.6667	JN, SF
B5	Bombeira do Guadiana	01-VIII-2022	37.6247	-7.6667	JN, SF
B6	Bombeira do Guadiana	11-IX-2021	37.6247	-7.6667	JN, SF
B7	Bombeira do Guadiana	01-X-2018	37.6247	-7.6667	MC, SF
RO	Ribeira de Oeiras	07-IV-2021	37.6423	-7.6810	JN, SF
M1	Moinho de Alferes	27-III-2017	37.5057	-7.6766	MC, SF
M2	Moinho de Alferes	08-IV-2021	37.5057	-7.6766	JN, SF
M3	Moinho de Alferes	06-VII-2021	37.5057	-7.6766	JN, SF
M4	Moinho de Alferes	03-VIII-2022	37.5057	-7.6766	JN, SF
M5	Moinho de Alferes	12-IX-2021	37.5057	-7.6766	JN, SF
CG1	Corte Gafo	28-III-2017	37.6942	-7.6929	MC, SF
CG2	Corte Gafo	09-IV-2021	37.6955	-7.6926	JN, SF
HA1	Herdade de Alagães	10-IV-2021	37.6742	-7.8474	JN, SF
HA2	Herdade de Alagães	09-VII-2021	37.6742	-7.8474	JN, SF
HA3	Herdade de Alagães	02-VIII-2022	37.6742	-7.8474	JN, SF
HA4	Herdade de Alagães	13-IX-2021	37.6742	-7.8474	JN, SF
PL1	Pulo do Lobo	11-V-2017	37.8036	-7.6347	DG
PL2	Pulo do Lobo	07-VII-2021	37.8036	-7.6347	JN, SF
SC	Santana de Cambas	08-VII-2021	37.6232	-7.5630	JN, SF
J1	João Serra	04-VIII-2022	37.6622	-7.8335	JN, SF
J2	João Serra	14-IX-2021	37.6622	-7.8335	JN, SF
CS	Corte Sines	08-V-2017	37.7225	-7.6175	DG

All specimens were recorded at night using light traps (160 W mixed light, 125 W mercury vapor light, and Skinner and Heath-type traps equipped with UV light). Most specimens were identified in the field and released. The specimens where identification through external morphology was not possible were collected and later identified through the analysis of the genitalia after dissection. Identifications by the last method are marked with an asterisk (*) in Table 2, and the respective specimens are retained in the authors' collections.

A compilation of the published records for Mértola was made through bibliographic revision. The order and nomenclature of Lepidoptera families and species follow Corley (2015) and subsequent updates in Corley et al. (2016, 2018a, 2018b, 2019, 2020, 2021, 2022 and 2023). The region designated as Baixo Alentejo (BAL) in Corley (2015) and following works on Lepidoptera of Portugal correspond to what currently is considered Alentejo Litoral and Baixo Alentejo territorial units (Instituto Nacional de Estatística, I. P. 2015).

The sampling sites are briefly described and three are illustrated:

Bombeira do Guadiana (Figures 2-3) - Section of the west bank of the Guadiana River. It is a diverse landscape with planted areas of *Pinus* sp., small patches of *Quercus rotundifolia* Lam., parcels of diverse shrubland of *Rhamnus* spp., *Pistacia* spp., *Phillyrea* ssp., *Retama sphaerocarpa* (L.) Boiss, *Osyris lanceolata* Hochst. & Steud., *Olea europaea* var. *sylvestris* (Mill.) Hegi, *Asparagus* spp., *Lavandula* spp. and *Cistus* spp., and meadows rich in herbaceous plants in the floodplain. Near the river there are patches of *Juniperus turbinata* Guss. and *Tamarix* sp.

Ribeira de Oeiras - Section of the riverside Ribeira de Oeiras. The surroundings are full of *Pinus* sp. plantations, but the river valley is populated with native flora. The river partially dries in spring and summer, losing its lotic characteristics and creating a lentic environment with small ponds or pools. The valley slopes present some diversity of Mediterranean shrubs (e.g. *Rhamnus* spp., *Olea europaea*

var. *sylvestris* (Mill.) Hegi, *Retama sphaerocarpa* (L.) Boiss, *Genista polyanthos* R.Roem. ex Willk). In spring it is particularly rich in herbaceous plants.

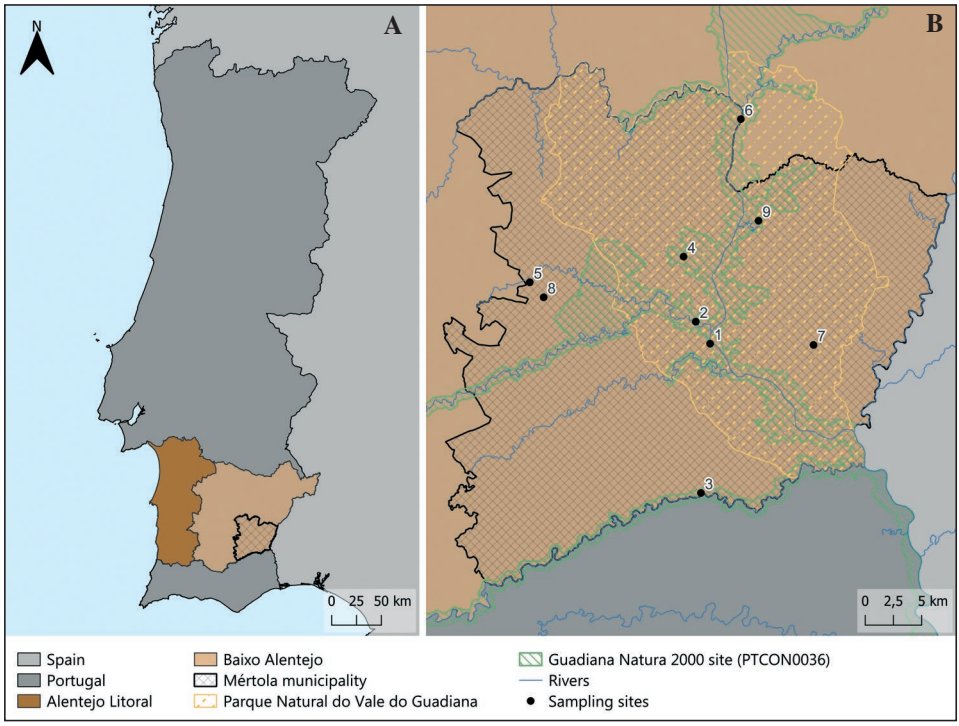

Figure 1. Framework of the study area in the national and regional context (A). Location of the nine trapping sites, with the location of the designated areas for nature conservation and main rivers that cross the territory represented (B). 1 - Bombeira do Guadiana. 2 - Ribeira de Oeiras. 3 - Moinho de Alferes. 4 - Corte Gafo. 5 - Herdade de Alagães. 6 - Pulo do Lobo. 7 - Santana de Cambas. 8 - João Serra. 9 - Corte Sines.

Moinho de Alferes (Figures 4-5) - Section of the north bank of the Vascão River. The shrubby vegetation along the margins and riverbed mostly consists of *Nerium oleander* L. and *Flueggea tinctoria* (L.) G. L. Webster, occasionally with *Tamarix* sp. As the river dries in summer, the riverbed develops a diversity of herbaceous plants, dominated by Cyperaceae species. The valley slopes present some *Quercus rotundifolia* Lam. woodland but are mostly dominated by *Cistus ladanifer* L. There is also a small grove of *Populus alba* L. on the south bank of the river (in Algarve).

Corte Gafo and Corte Sines - Flat land with scattered trees of *Quercus suber* L. and *Quercus rotundifolia* Lam. In winter, some water accumulates at the bottom of small slopes. There is some diversity of shrubs such as *Pyrus bourgaeana* Decne., *Crataegus monogyna* Jacq. and *Phlomis purpurea* L. The surroundings have *Pinus* sp. plantations and shrubland dominated by *Cistus ladanifer* L.

Herdade de Alagães (Figures 6-7) - Property dominated by *Pinus pinea* L. plantations. Under the trees there is a well-developed community of *Cistus* spp. (dominated by *Cistus monspeliensis* L.). There are clearings rich in herbaceous plants that dry out in spring/summer and a small reservoir which allows the presence of some hydrophilic plant species (e.g. *Typha* sp., *Tamarix* sp. and Cyperaceae species).

Pulo do Lobo - Section of the west bank of the Guadiana River. In this section the river is particularly narrow and most of the valley floor is rocky and poor in vegetation. The vegetation of the adjacent slopes is shrubland dominated by a great diversity of Mediterranean shrubs.

Santana de Cambas - Cereal steppe with a small artificial pond which allows the presence of some hydrophilic plant species (e.g. *Typha* sp.). In the proximity there were *Pinus* sp. plantations.

João Serra - Semi-natural steppe with shrub patches dominated by *Cistus ladanifer* L. There are a couple of recently created ponds.

Results and Discussion

In this work, 1796 new records of 436 species, which belong to 42 families, are presented for Mértola municipality (Table 2). For each species the localities and dates in which adults were recorded are given in abbreviated form following the code established in the section Material and Methods - Table 1. The number of individuals recorded is given for fieldwork carried out in 2017 and 2018. In the 2021 and 2022 campaigns the number of specimens was not counted, and the records are given as if based on a single specimen of each species, although in many cases more specimens were observed.

As a result of the bibliographic revision, six scientific papers and a published dataset in Global Biodiversity Information Facility (GBIF) were found to include moth records from Mértola municipality (Corley et al. 2006, 2013, 2018a, 2018b, 2019, 2020; Nunes et al. 2024). The papers include 58 records of 55 species, most of which (45 out of 58) were produced in the 2017 and 2018 campaigns and published in Corley et al. (2018a) and Corley et al. (2019). These are also included in Table 2 and indicated with a plus sign (+) The record of *Anacampsis timidella* (Wocke, 1887) in Corley et al. (2019) is considered doubtful due to the absence of known host plants locally, the repeated recording of *Anacampsis scintillella* (Fischer von Röslerstamm, 1840) at the same locality, and the lack of preservation of the dissection supporting the original identification, leading to its exclusion from the Mértola list in this study. In turn, the dataset contains 40 moth records of 33 species, all from the same sampling spot, in Mértola town (Nunes et al. 2024). This dataset includes all the 2021 and 2022 records from the Portuguese moth recording scheme named Rede de Estações de Borboletas Noturnas. In total, 83 species from 20 families were previously known to occur in the municipality from the referred bibliographic sources.

With the present work, the number of species recorded for Mértola has risen to 447, which belong to 43 families (Table 2). This result reflects that at least 17.1% of moth species (Lepidoptera species that do not belong to the superfamily Papilionoidea) recorded for mainland Portugal are present in Mértola municipality. However, although these numbers indicate a considerable diversity, they still underrepresent the total number of moth species present in the municipality. The lack of fieldwork carried out in June, which is an important period in terms of moth flight activity (Yela, 1992), as well as the absence of fieldwork in most of autumn and winter, suggests that a considerable number of species remains to be recorded. Moreover, some groups are apparently overlooked, as can be concluded from the Figure 8, where the species distribution within the recorded families for Mértola is presented and compared to the national known diversity. This is particularly evident in Nepticulidae, but also in Elachistidae and Coleophoridae. These families are mainly composed by small species difficult to identify in the field, usually with leaf-mining larvae. The early evening flight period of some of these species makes its detection with light traps inefficient. Gracillariidae, a family with 90 species cited for Portugal, is another group of leaf-miners that is certainly overlooked in the region since none of the species is recorded for Mértola so far. An effective inventory of these families requires specific fieldwork for these groups, including direct search for larvae and empty mines on host-plants.

Among all the species detected in this study, four represent new additions to the Portuguese moth fauna: *Symmoca sultan* Gozmány, 1962 (Figure 9), *Eteobalea sumptuosella* (Lederer, 1855) (Figure 10), *Coleophora arefactella* Staudinger, 1859 (Figure 11) and *Idaea deitanaria* (Reisser & Weisert, 1977) (Figure 12). The four are already known for mainland Spain and two of them, *Idaea deitanaria* and *Symmoca sultan*, until this work, were only known from that country (de Jong *et al*., 2014). Their

biology is mostly unknown and further investigations are required. This work also includes the second Portuguese record of *Coleophora zernyi* Toll, 1944 (Figure 13), previously only known from Loulé, Algarve (Corley et al. 2022). In addition, two of the recorded species, *Ecleora solieraria* (Rambur, 1834) and *Afriberina tenietaria* (Staudinger, 1900) (Figure 14), are only known in Portugal from localities in Mértola municipality (Corley et al. 2018a, 2019). Several others are only known from one other locality in Portugal: *Anatrachyntis simplex* (Walsingham, 1891), known from Aljezur (Algarve), *Mesophleps ochracella* (Turati, 1926) and *Merulempista azrouella* (Lucas, 1933), both known from Portimão, also in Algarve (Corley, 2015), *Sciota elegiella* (Zerny, 1928), already known from Serpa in BAL (Marabuto, 2018), *Sciota rhenella* (Zincken, 1818), known from Mirandela (Trás-os-Montes) and *Eupithecia ultimaria* Boisduval, 1840, known from Ria Formosa area in Algarve (Corley, 2015; Nunes et al. 2024). In total, this work adds 71 species for BAL, which are highlighted in Table 2, and 31 new species for Alentejo (sensu Corley, 2015).

Future inventory efforts in Mértola should focus both on new sampling sites and on different seasons that were not explored in this work. These additional sampling works should also include daylight prospections, particularly during spring, to detect species of day-flying micro-Heterocera, and in other seasons to detect leaf-mining species in their early stages. These should considerably increase the moth checklist of Mértola. The finding of four new species for Portugal, new species for the region and scarce species, along with the diversity of Lepidoptera found throughout this work, demonstrates the high biodiversity of the region and pinpoints the potential for new discoveries in this territory with continued reserch, as well as its importance for nature conservation. This work is the first step to realize the fascinating moth diversity of Mértola.

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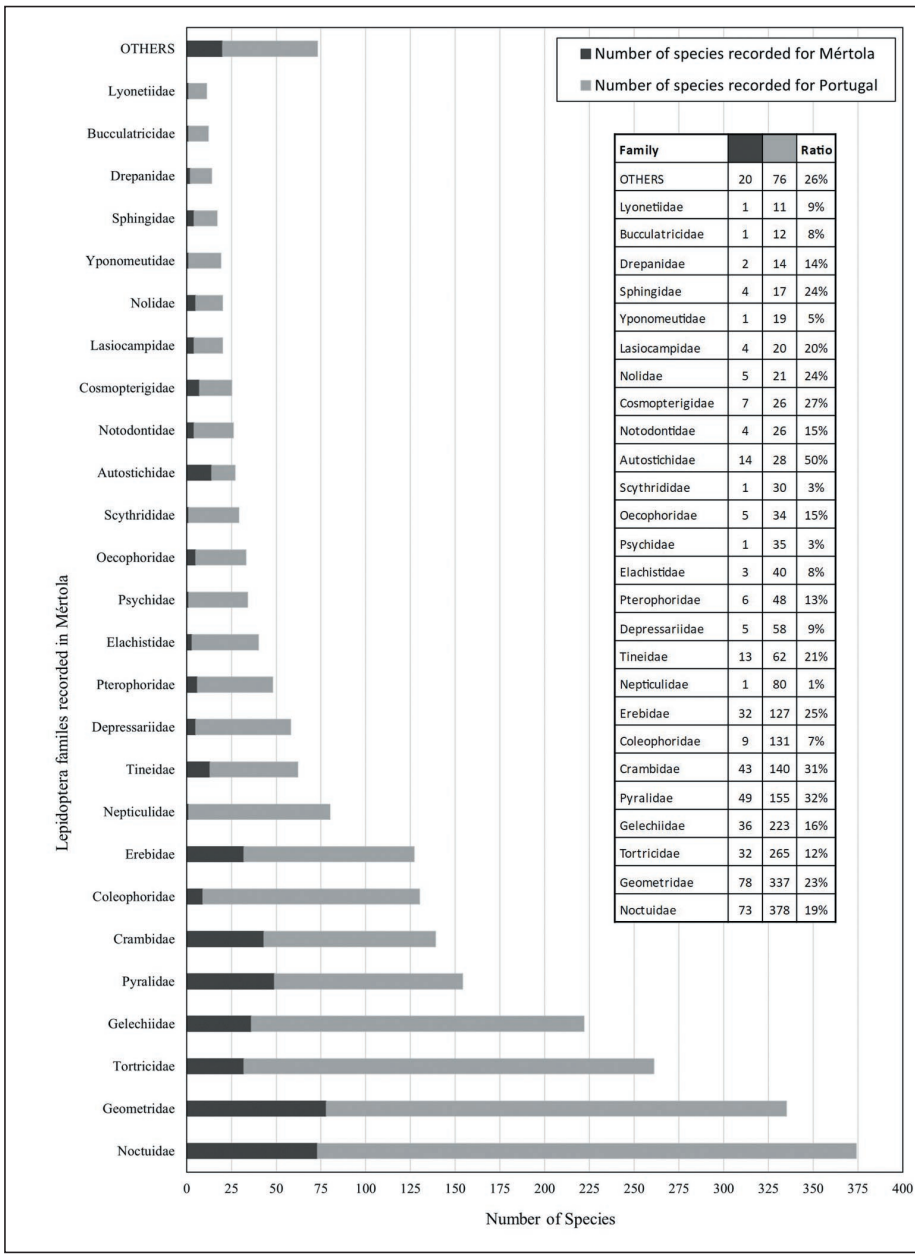
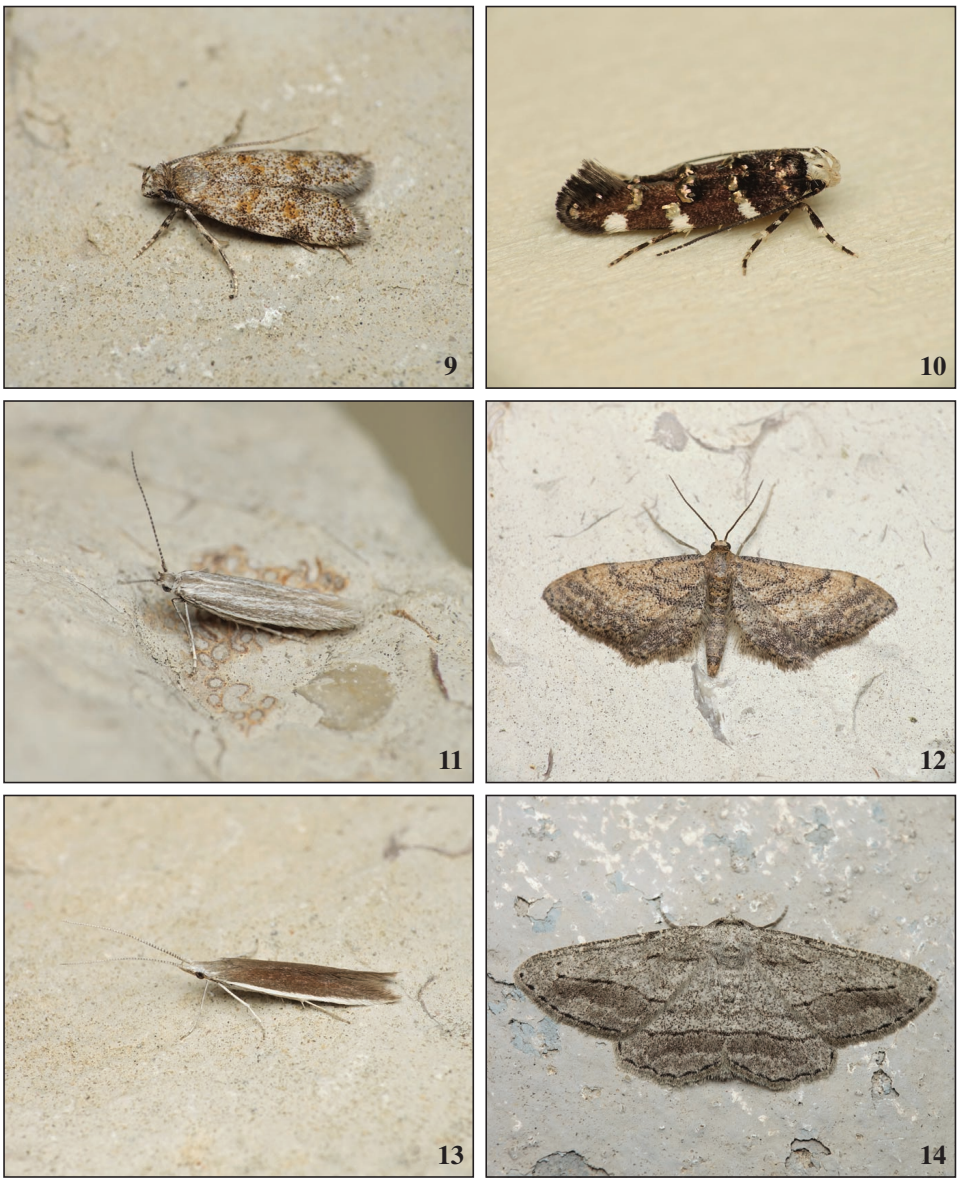
Figures 2-7. 2-3. Bombeira do Guadiana sampling site (April, 2021). **2.** Mosaic of planted pine trees with native shrubs. **3.** Floodplain meadows (April, 2021) (Photos: Rui Andrade). **4-5.** Moinho de Alferes sampling site. **4.** Vascão River bed (July, 2021) **5.** Vascão River (April, 2021) (Photos: Rui Andrade). **6-7.** Herdade de Alagães sampling site. **6.** Pine tree plantation with a shrub community dominated by *Cistus monspeliensis* L. (July 2021) **7.** Reservoir margin at full capacity (April 2021) (Photos: Rui Andrade).



Family			Ratio
OTHERS	20	76	26%
Lyonetiidae	1	11	9%
Bucculatricidae	1	12	8%
Drepanidae	2	14	14%
Sphingidae	4	17	24%
Yponomeutidae	1	19	5%
Lasiocampidae	4	20	20%
Nolidae	5	21	24%
Cosmopterigidae	7	26	27%
Notodontidae	4	26	15%
Autostichidae	14	28	50%
Scythrididae	1	30	3%
Oecophoridae	5	34	15%
Psychidae	1	35	3%
Elachistidae	3	40	8%
Pterophoridae	6	48	13%
Depressariidae	5	58	9%
Tineidae	13	62	21%
Nepticulidae	1	80	1%
Erebidae	32	127	25%
Coleophoridae	9	131	7%
Crambidae	43	140	31%
Pyralidae	49	155	32%
Gelechiidae	36	223	16%
Tortricidae	32	265	12%
Geometridae	78	337	23%
Noctuidae	73	378	19%

Figure 8. Number of species per family recorded for Mértola municipality and comparison with the national known diversity. The families with less than 10 species recorded for Portugal were grouped in OTHERS category. The given numbers of species recorded for Portugal per family follows Corley (2015) and subsequent updates in Corley et al. (2016, 2018a, 2018b, 2019, 2020, 2021, 2022 and 2023).



Figures 9-14. Examples of moth species recorded and of special interest in Mértola municipality. New species for Portugal: **9.** *Symmoca sultan* Gozmány, 1962, Pulo do Lobo 07-VII-2021. **10.** *Eteobalea sumptuosella* (Lederer, 1855), Moinho de Alferes 03-VIII-2022. **11.** *Coleophora arefactella* Staudinger, 1859, Corte Gafo 09-IV-2021. **12.** *Idaea deitanaria* (Reisser & Weisert, 1977), Ribeira de Oeiras 07-IV-2021. Second record for Portugal: **13.** *Coleophora zernyi* Toll, 1944, Bombeira do Guadiana 06-IV-2021. Species only known from Mértola in Portugal: **14.** *Afriberina tenietaria* (Staudinger, 1900), Pulo do Lobo 07-VII-2021 (Photos: João Nunes).

Table 2. Mértola moth checklist with the records from the seven field campaigns performed during this work. The columns are organized per nigh trapping sessions and respective months to better infer the phenology of the recorded species. The order and nomenclature of Lepidoptera families and species follows Corley (2015). The records from 2017 and 2018 already published are indicated with "+". The absence of records is indicated with "-". Mar: March; Apr: April; May: May; Jul: July; Aug: August; Sep: September; Oct: October; *: identification based on the analysis of the genitalia of at least one individual; •: new species for BAL (sensu Corley, 2015); M1: Moinho de Alferes 27-III-2017; CG1: Corte Gafo 28- III-2017; B1: Bombeira do Guadiana 06-IV-2021; RO: Ribeira de Oeiras 07-IV-2021; M2: Moinho de Alferes 08-IV-2021; CG2: Corte Gafo 09-IV-2021; HA1: Herdade de Alagães 10-IV-2021; CS: Corte Sines 08-V-2017; B2: Bombeira do Guadiana 09-V-2017; B3: Bombeira do Guadiana 10-V-2017; PL1: Pulo do Lobo 11-V-2017; M3: Moinho de Alferes 06-VII-2021; PL2: Pulo do Lobo 07-VII-2021; SC: Santana de Cambas 08-VII-2021; HA2: Herdade de Alagães 09-VII-2021; B4 Bombeira do Guadiana 10- VII-2021; B5: Bombeira do Guadiana 01-VIII-2022; HA3: Herdade de Alagães 02-VIII-2022; M4: Moinho de Alferes 03-VIII-2022; J1: João Serra 04-VIII-2022; B6: Bombeira do Guadiana 11-IX-2021; M5: Moinho de Alferes 12-IX-2021; HA4: Herdade de Alagães 13-IX-2021; J2: João Serra 14-IX-2021 and B7: Bombeira do Guadiana 01-X-2018.

Species list	Mar		Apr					May					Jul					Aug				Sep				Oct
	M1	CG1	B1	RO	M2	CG2	HA1	CS	B2	B3	PL1	M3	PL2	SC	HA2	B4	B5	HA3	M4	J1	B6	M5	HA4	J2	B7
MICROPTERIGIDAE																									
Micropterix ibericella Caradja, 1920	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Micropterix granatensis* Heath, 1981	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPTICULIDAE																									
• *Zimmermannia hispanica* (Van Nieukerken, 1985)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
OPOSTEGIDAE																									
Opostega salaciella (Treitschke, 1833)	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ERIOCOTTIDAE																									
• *Eriocottis hispanica* Zagulajev, 1988	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PSYCHIDAE																									
• *Dissoctena granigerella* Staudinger, 1859	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
TINEIDAE																									
Myrmecozela ataxella (Chrétien, 1905)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Infurcitinea atrifasciella (Staudinger, 1871)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	2
• *Nemapogon nevadella* (Caradja, 1920)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Neurothaumasia ragusaella (Wocke, 1889)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	1	1	-	-	1	-	1	-	+
• *Anomalotinea liguriella* (Millière, 1879)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-	-	-
• *Cephimallota crassiflavella* Bruand, 1851	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-
Reisserita zernyi Petersen, 1957	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	1	-	1	-	-	-	-	-
Reisserita chrysopterella (Herrich-Schäffer, 1854)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Reisserita flavofimbriella* (Chrétien, 1925)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-
Trichophaga bipartitella (Ragonot, 1892)	-	-	1	-	1	-	1	-	-	-	-	-	1	-	1	1	1	-	-	-	1	1	1	-	1
• *Tinea basifasciella* Ragonot, 1895	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
• *Monopis nigricantella* (Millière, 1872)	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crassicornella agenjoi Petersen, 1957	-	-	-	-	1	-	-	-	1	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	3
BUCCULATRICIDAE																									
Bucculatrix alaternella Constant, 1890	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
YPONOMEUTIDAE																									
Zelleria oleastrella (Millière, 1864)	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-
PLUTELLIDAE																									
Plutella xylostella (Linnaeus, 1758)	-	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-
Eidophasia syenitella Herrich-Schäffer, 1854	-	-	1	1	1	1	-	1	-	-		1	1	1	1-	-	-	-	-	-	-	-	-	-	-
LYONETIIDAE																									
• *Phyllobrostis daphneella* Staudinger, 1859	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
PRAYDIDAE																									
Prays oleae (Bernard, 1788)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	1	-	-	-
DOUGLASIIDAE																									
• *Klimeschia thymetella* (Staudinger, 1859)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AUTOSTICHIDAE																									
Arragonia punctivittella (Zerny, 1927)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
Holcopogon adseclella (Eversmann, 1844)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-	-	-
• *Oegoconia caradjai* Popescu-Gorj & Căpuşe, 1965	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-
Symmoca signatella Herrich-Schäffer, 1854	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-

Symmoca tofosella Rebel, 1893	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Symmoca revoluta Gozmány, 1985	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	1*	1	-	-	-
Symmoca sultan Gozmány, 1962	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-
Symmoca uniformella Rebel, 1900	+	+	1*	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Symmoca perobscurata Gozmány, 1957	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Symmoca alhambrella Walsingham, 1911	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1*	-	-	-	-	-
Symmocoides oxybiella (Millière, 1872)	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	1	1	1	-	1*	1	1	1	+
• *Symmocoides don* (Gozmány, 1963)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	1	-	-
Dysspastus fallax (Gozmány, 1961)	-	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stibaromacha ratella (Herrich-Schäffer, 1854)	-	-	-	-	-	-	-	2	2	-	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-
LECITHOCERIDAE																									
Eurodachtha canigella (Caradja, 1920)	-	-	-	-	-	-	-	26	10	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-
OECOPHORIDAE																									
• *Batia lambdella* (Donovan, 1793)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Epicallima mercedella* (Staudinger, 1859)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Esperia sulphurella (Fabricius, 1775)	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pleurota ericella (Duponchel, 1839)	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pleurota andalusica Back, 1973	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
DEPRESSARIIDAE																									
Agonopterix rutana (Fabricius, 1794)	+	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Agonopterix yeatiana (Fabricius, 1781)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Exaeretia lutosella (Herrich-Schäffer, 1854)	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethmia terminella Fletcher, 1938	+	1	1	1	1	1	1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethmia bipunctella (Fabricius, 1775)	1	-	1	1	1	1	1	-	2	-	-	-	1	-	1	1	-	-	-	-	1	1	1	1	5
COSMOPTERIGIDAE																									
Limnaecia phragmitella Stainton, 1851	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	-	-	-
Pyroderces argyrogrammos (Zeller, 1847)	3	-	1	1	1	1	1	-	-	-	-	1	-	-	1	1	1	1	1	-	1	1	-	-	1
• *Anatrachyntis simplex* (Walsingham, 1891)	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Coccidiphila danilevskyi* Sinev, 1997	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eteobalea intermediella (Riedl, 1966)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eteobalea sumptuosella (Lederer, 1855)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	1*	-	-
Vulcaniella fiordalisa (Petry, 1904)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GELECHIIDAE																									
• *Stomopteryx detersella* (Zeller, 1847)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	1	-	1	1	-
• *Stomopteryx basalis* Staudinger, 1876	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-
Stomopteryx remissella (Zeller, 1847)	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	1	-	-	-	-	-	-	-	-	-
Stomopteryx flavipalpella Jäckh, 1959	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Syncopacma polychromella (Rebel, 1902)	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aproaerema anthyllidella (Hübner, 1813)	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Anacampsis scintillella* (Fischer von Röslerstamm, 1841)		-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-	-	1	1	1	-	-
Mesophleps corsicella Herrich-Schäffer, 1856	-	-	1	1	1	1	1	1	-	-	-	-	1	-	1	-	-	-	-	-	-	1	1	1	3
• *Mesophleps trinotella* Herrich-Schäffer, 1856	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
• *Mesophleps ochracella* (Turati, 1926)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-
Pseudosophronia exustellus (Zeller, 1847)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-
• *Anarsia lineatella* Zeller, 1839	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-
Nothris verbascella (Denis & Schiffermüller, 1775)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nothris congressariella (Bruand, 1858)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Neofaculta ericetella (Geyer, 1832)	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Helcystogramma lamprostoma (Zeller, 1847)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Dichomeris limbipunctellus (Staudinger, 1859)	-	-	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epidola stigma Staudinger, 1859	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	1	1	1	-	-	-	+
• *Bryotropha plebejella* (Zeller, 1847)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-	-	-
• *Aristotelia decoratella* (Staudinger, 1879)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	1	-	-	-	-
Aristotelia ericinella (Zeller, 1839)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Isophrictis lineatellus (Zeller, 1850)	1	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metzneria aestivella (Zeller, 1839)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1*	1	-	-	-	-	-
Metzneria torosulella (Rebel, 1893)	-	+	1	1	1	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Metzneria campicolella* (Mann, 1857)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ptocheuusa paupella (Zeller, 1847)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-
Oxypteryx helotella (Staudinger, 1859)	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Deltophora gielisia Hull, 1995	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	-	-	1	-	-	-
• *Gladiovalva badidorsella* (Rebel, 1935)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
• *Mirificarma denotata* Pitkin, 1984	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirificarma eburnella (Denis & Schiffermüller, 1775)	1	-	1	1	1	1	1	1	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Scrobipalpa vasconiella* (Rössler, 1877)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-	-	-
Tuta absoluta (Meyrick, 1917)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Teleiopsis diffinis (Haworth, 1828)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Schistophila laurocistella Chrétien, 1899	-	-	-	1	-	1	1	-	-	-	-	1	-	-	1	-	1	1	1	1	1	1	1	1	+
ELACHISTIDAE																									
Perittia echiella Joannis, 1902	-	3	-	-	1	-	-	-	-	-	1		1	-	-	-	-	-	-	-	1	1	-	-	-
Perittia piperatella (Staudinger, 1859)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Elachista nuraghella Amsel, 1951	-	-	1		1	1	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
COLEOPHORIDAE																									
• *Coleophora hieronella* Zeller, 1849	-	-	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coleophora helianthemella Millière, 1870	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	+
Coleophora arefactella Staudinger, 1859	-	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Coleophora zernyi* Toll, 1944	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Coleophora afrohispana* Baldizzone, 1982	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coleophora semicinerea Staudinger, 1859	-	+	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coleophora pennella (Denis & Schiffermüller, 1775)	+	-	1*	-	-	-	-	-	-	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Coleophora saxicolella* (Duponchel, 1843)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-
• *Coleophora crepidinella* Zeller, 1847	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SCYTHRIDIDAE																									
Enolmis acanthella (Godart, 1824)	3	2	1*	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BLASTOBASIDAE																									
Blastobasis phycidella (Zeller, 1839)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	2
MOMPHIDAE																									
• *Urodeta hibernella* (Staudinger, 1859)	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PTEROLONCHIDAE																									
Pterolonche albescens Zeller, 1847	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1	-	-	-
ALUCITIDAE																									
• *Alucita palodactyla* Zeller, 1847	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	1	-	-	-	-	-	-	-	-	-
PTEROPHORIDAE																									
Agdistis heydeni (Zeller, 1852)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	1*	-	-
Crombrugghia laetus (Zeller, 1847)	-	-	-	1	1	1	1	-	-	-	-	1	-	-	1	-	1	-	-	-	-	1*	-	-	2
Stangeia siceliota (Zeller, 1847)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	1	1	1	1	-
Wheeleria spilodactylus (Curtis, 1827)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puerphorus olbiadactylus (Millière, 1859)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hellinsia inulae (Zeller, 1852)	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EPERMENIIDAE																									
Epermenia aequidentellus (E. Hofmann, 1867)	-	-	-	-	-	-	-	-	5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CHOREUTIDAE																									
Tebenna micalis (Mann, 1857)	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	1	-	1
TORTRICIDAE																									
Lozotaenia cupidinana (Staudinger, 1859)	1	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clepsis eatoniana (Ragonot, 1881)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Clepsis siciliana (Ragonot, 1894)	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Clepsis peritana (Clemens, 1860)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Cnephasia delnoyana Groenen & Schreurs, 2012	+	5	1	1	1	-		1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cnephasia longana (Haworth, 1811)	-	-	-	-	-	-	-	4		15	20	5	-	-	-	-	-	-	-	-	-	-	-	-	-
Acleris variegana (Denis & Schiffermüller, 1775)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cochylimorpha elongana (Fischer von Röslerstamm, 1839)	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cochylimorpha decolorella (Zeller, 1839)	1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Aethes margarotana* (Duponchel, 1836)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Aethes moribundana (Staudinger, 1859)	1	4	-	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aethes languidana (Mann, 1855)	-	+	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aethes bilbaensis (Rössler, 1877)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	1	-	1	-	-	1*	-	-	-
• *Longicornutia epilinana* (Duponchel, 1842)	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lobesia botrana (Denis & Schiffermüller, 1775)	-	-	-	-	1	-	-	-	-	-	-	1	1	-	-	1	1	-	-	-	1	1	1	-	1
• *Lobesia porrectana* (Zeller, 1847)	-	-	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

• *Bactra furfurana* (Haworth, 1811)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
Bactra venosana (Zeller, 1847)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1*	-	-	-
• *Ancylis sparulana* (Staudinger, 1859)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acroclita subsequana (Herrich-Schäffer, 1851)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Epinotia thapsiana (Zeller, 1847)	-	-	-	-	1	-	-	-	1	2	1	1	-	-	1	-	-	1	1	-	1	1	-	-	-
Crocidosema plebejana Zeller, 1847	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eucosma cana (Haworth, 1811)	+	2	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Notocelia cynosbatella* (Linnaeus, 1758)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pseudococcyx tessulatana (Staudinger, 1871)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Cydia ulicetana (Haworth, 1811)	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cydia adenocarpi (Ragonot, 1875)	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	1	1	-	-	-	-	-	-	-	-
Cydia strigulatana (Kennel, 1899)	8	12	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cydia pomonella (Linnaeus, 1758)	-	-	-	-	1	-	-	-	1	-	-	1	-	1	-	-	-	-	-	-	1	1	-	-	-
Cydia splendana (Hübner, 1799)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Cydia fagiglandana* (Zeller, 1841)	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	-	1	-	1	1	1	1	1
• *Grapholita lunulana* (Denis & Schiffermüller, 1775)	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BRACHODIDAE																									
Brachodes gaditana (Rambur, 1866)	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	1	-	-	-	-	-	-
COSSIDAE																									
Cossus cossus (Linnaeus, 1758)	-	-	1		1	1	1	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dyspessa ulula (Borkhausen, 1790)	1	-	1	-	1	1	-	2	-	1	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LIMACODIDAE																									
Hoyosia codeti (Oberthür, 1883)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
PYRALIDAE																									
Galleria mellonella (Linnaeus, 1758)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-
Lamoria anella (Denis & Schiffermüller, 1775)	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	-	1	1	-	8
Endotricha flammealis (Denis & Schiffermüller, 1775)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	1
Bostra obsoletalis (Mann, 1864)	-	-	-	-	-	-	-	-	3	1	-	1	1	1	1	1	1	1	1	1	-	1	-	-	-
Stemmatophora syriacalis Ragonot, 1895	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-
Stemmatophora combustalis (Fischer von Rösslerstamm, 1842)	-	-	-	-	-	-	-	+	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stemmatophora brunnealis (Treitschke, 1829)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	1	1	1	1
Stemmatophora borgialis (Duponchel, 1832)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-
Loryma egregialis (Herrich-Schäffer, 1838)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	1	1	1	-	-
• *Aglossa caprealis* (Hübner, 1809)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
• *Aglossa brabantii* Ragonot, 1884-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	-	-	-	-	-	
Synaphe lorquinalis (Guenée, 1854)	-	-	1	1	1	1	-	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hypotia muscosalis (Rebel, 1917)	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-
Hypsotropa vazquezi Gastón, Macià, Ylla & Huertas-Dionisio, 2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	-	-	1	-	-
• *Polyocha strigosa* (Staudinger, 1879)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	1	-	-	-	-
Ematheudes punctella (Treitschke, 1833)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-
Cryptoblabes gnidiella (Millière, 1867)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Bradyrrhoa cantenerella (Duponchel, 1837)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	1	-
Alophia combustella (Herrich-Schäffer, 1855)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	1	-	-	-	-
• *Sciota rhenella* (Zincken, 1818)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-
Sciota elegiella (Zerny, 1928)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-
Pempelia palumbella (Denis & Schiffermüller, 1775)	-	1	-	1	1	1	1	-	1	1	-	1	-	-	1	1	1	-	-	-	-	-	-	-	2
Pempelia genistella (Duponchel, 1836)	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Asalebria florella (Mann, 1862)	-	-	1	1	-	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asalebria geminella (Eversmann, 1844)	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phycita diaphana (Staudinger, 1870)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1*	1	-	-	-
• *Merulempista azrouella* (D. Lucas, 1933)	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epischnia illotella Zeller, 1839	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epischnia asteris Staudinger, 1870	1	-	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	1*	1	1	-	-	-	-	-	-
Elegia fallax (Staudinger, 1881)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-
Melathrix coenulentella (Zeller, 1846)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1	-	-
Pempeliella ardosiella (Ragonot, 1887)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-
Oxybia transversella (Duponchel, 1836)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Acrobasis bithynella Zeller, 1848	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
Acrobasis obliqua (Zeller, 1847)	18	3	1	1	1	1	1	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Acrobasis romanella (Millière, 1870)	-	+	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	1	1	-	-	-
• *Acrobasis glaucella* Staudinger, 1859	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*
• *Acrobasis fallouella* (Ragonot, 1871)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	1	-	-	1	1	-	-	-
Myelois circumvoluta (Fourcroy, 1785)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Myelois fuscicostella Mann, 1861	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metallostichodes nigrocyanella (Constant, 1865)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Ancylosis oblitella (Zeller, 1848)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Homoeosoma capsitanella (Chrétien, 1911)	-	-	1*	1*	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phycitodes saxicola (Vaughan, 1870)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-
Phycitodes albatella (Ragonot, 1887)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*
Ephestia welseriella (Zeller, 1848)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	1	-	1	-	-	-
Ephestia disparella Hampson, 1901	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1*	1	-	-	-	-	-
Cadra furcatella (Herrich-Schäffer, 1849)	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-	1	-	-	-	-	-
Cadra figulilella (Gregson, 1871)	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	1	-	-	-	-	-	-	-	1
CRAMBIDAE																								
• *Loxostege sticticalis* (Linnaeus, 1761)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-
Pyrausta sanguinalis (Linnaeus, 1767)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	-	-
Pyrausta despicata (Scopoli, 1763)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Pyrausta aurata (Scopoli, 1763)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	1	-	1	-
Uresiphita gilvata (Fabricius, 1794)	-	-	1	-	-	-	1	-	-	-	-	1	1	-	1	1	1	-	1	-	1	1	-	-
Udea ferrugalis (Hübner, 1796)	-	1	1	-	1	-	-	-	-	-	2	1	-	-	1	-	-	-	-	-	-	1	-	-
Udea numeralis (Hübner, 1796)	-	-	1	1	1	1	1	-	-	-	1	-	-	-	1	-	-	-	-	-	1	-	-	-
Mecyna asinalis (Hübner, 1819)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Diasemiopsis ramburialis (Duponchel, 1834)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	1	-
Duponchelia fovealis Zeller, 1847	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	1	1	-
Spoladea recurvalis (Fabricius, 1775)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Palpita vitrealis (Rossi, 1794)	1	-	1	1	1	1	-	1	-	-	-	-	1	-	1	1	1	-	-	-	1	1	-	-
Dolicharthria aetmaealis (Duponchel, 1833)	+	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dolicharthria punctalis (Denis & Schiffermüller, 1775)	-	-	1	1	1	-	1	1	-	2	-	1	1	1	1	1	-	-	-	1	-	-	1	-
Antigastra catalaunalis (Duponchel, 1833)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Metasia suppandalis (Hübner, 1823)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	1	-	1	-	1	-
Metasia ibericalis Ragonot, 1894	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Metasia cuencalis Ragonot, 1894	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1	-	-	1	-	1	-
Nomophila noctuella (Denis & Schiffermüller, 1775)	-	-	-	-	-	1	-	2	-	-	-	-	-	-	1	1	-	-	-	-	-	1	-	1
Aporodes floralis (Hübner, 1809)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-
Hellula undalis (Fabricius, 1781)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	1	-
Scoparia staudingeralis (Mabille, 1869)	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eudonia angustea (Curtis, 1827)	6	15	1	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eudonia delunella (Stainton, 1849)	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Eudonia mercurella (Linnaeus, 1758)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Euchromius ocellea (Haworth, 1811)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Euchromius vinculellus (Zeller, 1847)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	1*	1	-	+
Euchromius gozmanyi Beszyski, 1961	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-	-	-	-	-
Euchromius ramburiellus (Duponchel, 1836)	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calamotropha paludella (Hübner, 1824)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	1	-	-	-	-	-
Agriphila trabeatellus (Herrich-Schäffer, 1848)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
Agriphila cyrenaicellus (Ragonot, 1887)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Agriphila geniculea (Haworth, 1811)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1
Catoptria staudingeri (Zeller, 1863)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Mesocrambus tamsi Beszyski, 1960	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	-	-
• *Mesocrambus marabut* (Beszyski, 1965)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	1	1	-	-	-	1	1	-
Mesocrambus pallidellus (Duponchel, 1836)	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	1	-	1	1	1	1	1*	1*	-
• *Xanthocrambus delicatellus* (Zeller, 1863)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1	-	-
Chrysocrambus dentuellus (Pierce & Metcalfe, 1938)	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ancylolomia tentaculella (Hübner, 1796)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	1	1*	1	-
Ancylolomia disparalis (Hübner, 1825)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Acentria ephemerella (Denis & Schiffermüller, 1775)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	1	-	1	-	1	-	-	3
Parapoynx stratiotata (Linnaeus, 1758)	-	-	-	-	1	-	-	-	-	-	-	1	1	-	1	1	1	1	1	-	1	1*	1	-	1

DREPANIDAE																									
Watsonalla uncinula (Borkhausen, 1790)	2	1	1	-	1	1	1	1	1	2	3	1	1	1	1	1	-	-	-	-	-	-	1	-	-
Tethea ocularis (Linnaeus, 1767)	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LASIOCAMPIDAE																									
Lasiocampa trifolii (Denis & Schiffermüller, 1775)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3
Psilogaster loti (Ochsenheimer, 1810)	-	-	1	-	1	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	1	1	1	-	-
Phyllodesma kermesifolia (Lajonquière, 1960)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phyllodesma suberifolia (Duponchel, 1842)	3	-	-	-	-	1	-	2	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPHINGIDAE																									
Smerinthus ocellata (Linnaeus, 1758)	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Macroglossum stellatarum (Linnaeus, 1758)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hyles livornica (Esper, 1780)	-	-	1	1	1	1	1	-	-	1	-	1	-	-	1	1	1	-	-	-	-	-	-	-	-
Hippotion celerio (Linnaeus, 1758)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
GEOMETRIDAE																									
Idaea lusohispanica Herbulot, 1991	-	-	-	-	-	-	-	-	-	+	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaea macilentaria (Herrich-Schäffer, 1847)	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaea mustelata (Gumppenberg, 1892)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
Idaea circuitaria (Hübner, 1819)	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaea incisaria (Staudinger, 1892)	-	-	-	-	-	1	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	-	-	-
Idaea calunetaria (Staudinger, 1859)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Idaea belemiata* (Millière, 1868)	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1	1	-	1	-	-	-	-	-	-
Idaea elongaria (Rambur, 1833)	-	-	-	-	-	-	-	-	2	2	2	-	1	-	1	1	-	-	1	-	1	1	1	-	3
• *Idaea obsoletaria* (Rambur, 1833)	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-
Idaea bigladiata Herbulot, 1975	-	-	-	-	-	-	-	7	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaea longaria (Herrich-Schäffer, 1852)	-	-	1	1	1	1	1	6	1	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-
Idaea nexata (Hübner, 1813)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brachyglossina manicaria (Herrich-Schäffer, 1851)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Idaea minuscularia (Ribbe, 1912)	-	2	1	-	-	1	-	-	-	-	-	1	1	-	1	1	-	-	-	-	1	1	1	-	1
Idaea subsericeata (Haworth, 1809)	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Idaea cervantaria (Millière, 1869)	-	-	1	-	-	1	-	-	2	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Idaea deitanaria (Reisser & Weisert, 1977)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaea rhodogrammaria (Püngeler, 1913)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Idaea infirmaria (Rambur, 1833)	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1*	1	-	-	1	1	-	2
Idaea eugeniata (Dardoin & Millière, 1870)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
• *Brachyglossina exilaria* (Guenée, 1858)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1	-	1	-	-
Idaea ostrinaria (Hübner, 1813)	-	-	1	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaea degeneraria (Hübner, 1799)	-	-	1	-	1	-	-	2	1	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	3
Scopula ornata (Scopoli, 1763)	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	1	-	-
Scopula submutata (Treitschke, 1828)	-	-	1	1	-	-	-	-	-	-	-	1	-	-	-	1	1	-	-	-	-	-	-	-	-
Scopula decorata (Denis & Schiffermüller, 1775)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-
• *Scopula turbidaria* (Hübner, 1819)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	1	-	-	-	-	-	-	-
Scopula imitaria (Hübner, 1799)	-	1	1	1	1	-	-	-	2	1	2	-	1	-	1	1	-	-	-	-	-	-	-	-	-
Scopula minorata (Boisduval, 1833)	1	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-	-	-
Cyclophora puppillaria (Hübner, 1799)	-	-	-	-	1	1	-	-	-	-	4	-	1	-	1	1	-	-	-	-	1	-	-	-	3
Rhodometra sacraria (Linnaeus, 1767)	1	-	-	-	1	-	-	-	-	-	2	1	1	-	1	1	1	-	-	-	1	1	1	-	28
Scotopteryx peribolata (Hübner, 1817)	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orthonama obstipata (Fabricius, 1794)	-	1	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Xanthorhoe fluctuata (Linnaeus, 1758))	-	1	1	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Catarhoe basochesiata (Duponchel, 1831)	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Costaconvexa polygrammata (Borkhausen, 1794)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-	-	-	-
• *Camptogramma bilineata* (Linnaeus, 1758)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
Nebula ibericata (Staudinger, 1871)	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gymnoscelis rufifasciata (Haworth, 1809)	1	-	1	1	1	1	1	-	1	1	1	1	1	-	1	1	-	-	-	-	1	1	1	-	3
Eupithecia laquaearia Herrich-Schäffer, 1848	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Eupithecia ultimaria* Boisduval, 1840	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Eupithecia pantellata Millière, 1875	-	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eupithecia massiliata Millière, 1865	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eupithecia breviculata (Donzel, 1837)	-	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eupithecia irriguata (Hübner, 1813)	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eupithecia centaureata (Denis & Schiffermüller, 1775)	-	-	1	1	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-

• *Eupithecia gratiosata* Herrich-Schäffer, 1861	-	-	1	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Chesias isabella Schawerda,* 1915	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stegania trimaculata (de Villers, 1789)	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	1	-	-	-	-	-
Rhoptria asperaria (Hübner, 1817)	6	9	1	1	1	1	1	20	25	15	25	-	1	-	1	1	1	1	1	1	1	1	1	28
Isturgia deerraria (Walker, 1861)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-
Itame vincularia (Hübner, 1813)	-	-	1	1	1	1	-	-	+	3	8	1	1	-	-	1	1	-	1	-	1	1	-	3
Neognopharmia stevenaria (Boisduval, 1840)	-	-	1	1	1	1	1	-	-	-	-	-	-	-	-	1	1	-	1	-	1	-	-	-
Perigune narbonea (Linnaeus, 1767)	+	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pachycnemia hippocastanaria (Hübner, 1799)	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Ennomos fuscantaria (Haworth, 1809)	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-	-	-	-	-	-
Ennomos quercaria (Hübner, 1813)	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	-	-
Menophra abruptaria (Thunberg, 1792)	1	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-
Menophra japygiaria (Costa, 1849)	2	2	1	1	1	-	-	1	1	2	3	-	1	-	1	1	1	-	1	-	1	1	-	-
Ecleora solieraria (Rambur, 1834)	-	-	1	1	-	-	-	-	+	3	-	-	-	-	-	-	1	-	-	-	-	-	-	15
Afriberina tenietaria (Staudinger, 1900)	-	1	-	-	-	-	-	-	+	4	-	-	1	-	-	1	-	-	-	-	1	-	-	4
Peribatodes rhomboidaria (Denis & Schiffermüller, 1775)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Peribatodes ilicaria (Geyer, 1833)	-	-	1	1	1	1	1	2	10	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Selidosema taeniolaria (Hübner, 1813)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Ekboarmia atlanticaria (Staudinger, 1859)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Adactylotis gesticularia (Hübner, 1817)	6	5	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Tephronia lhommaria Cleu, 1928	-	-	1	1	1	1	-	8	8	2	5	-	-	-	-	-	-	-	-	-	-	-	-	3
Ortaliella perspersata (Treitschke, 1827)	-	-	1	1	-	-	-	3	6	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-
Charissa mucidaria (Hübner, 1799)	2	6	1	1	1	1	-	1	2	2	6	-	-	-	-	-	-	-	-	-	-	1	1	+
Dyscia penulataria (Hübner, 1819)	-	4	1	1	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Dyscia distinctaria (Bang-Haas, 1910)	4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aspitates ochreraria (Rossi, 1794)	5	2	1	1	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	4
Aplasta ononaria (Fuessly, 1783)	-	-	-	-	1	-	-	3	1	-	-	-	-	-	-	1	-	-	-	1	-	1	-	-
Phaiogramma etruscaria (Zeller, 1849)	-	-	1	1	1	-	-	-	-	1	-	1	1	-	1	1	-	-	1	-	1	1	-	-
Phaiogramma faustinata (Millière, 1868)	-	-	-	-	1	1	-	-	-	-	1	-	-	-	1	-	-	-	-	-	1	1	-	-
Microloxia herbaria (Hübner, 1813)	-	-	1	-	-	-	-	-	-	-	-	1	-	1	1	1	1	1	1	1	1	1	-	-
NOTODONTIDAE																								
Thaumetopoea pityocampa (Denis & Schiffermüller, 1775)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-
Furcula bifida (Brahm, 1787)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Harpyia milhauseri (Fabricius, 1775)	2	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-
Peridea anceps (Goeze, 1781)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EUTELIIDAE																								
Eutelia adulatrix (Hübner, 1813)	-	-	1	1	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	1	-	-	-
EREBIDAE																								
Zebeeba falsalis (Herrich-Schäffer, 1839)	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-
Hypena obsitalis (Hübner, 1813)	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ocneria atlantica (Rambur, 1837)	-	-	1	-	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Phragmatobia fuliginosa (Linnaeus, 1758)	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cymbalophora pudica (Esper, 1785)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	3
Coscinia chrysocephala (Hübner, 1804)	4	1	1	1	1	1	1	1	1	2	-	-	-	-	1	-	-	-	-	1	1	1	1	-
Utetheisa pulchella (Linnaeus, 1758)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Paidia rica (Freyer, 1858)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Apaidia mesogona (Godart, 1824)	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Eilema caniola (Hübner, 1808) 7	-	1	1	1	1	1	2	4	2	3	1	1	-	1	1	-	1	-	-	1	1	1	-	4
Eilema marcida (Mann, 1859)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Nodaria nodosalis (Herrich-Schäffer, 1851)	5	-	1	-	1	1	1	-	-	-	-	-	1	-	1	1	-	-	-	1	1	1	-	2
Lygephila craccae (Denis & Schiffermüller, 1775)	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Tathorhynchus exsiccata (Lederer, 1855)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parascotia nisseni Turati, 1905	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Odice pergrata (Rambur, 1858)	-	-	-	-	-	-	-	-	1	-	-	1	1	1	1	1	1	1	-	1	1	-	1	3
Odice jucunda (Hübner, 1813)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Eublemma candidana (Fabricius, 1794)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Eublemma parva (Hübner, 1808)	-	-	-	-	-	-	-	1	2	1	3	-	1	1	1	-	1	-	1	1	1	1	1	-	1
Eublemma ostrina (Hübner, 1808)	1	1	-	1	1	1	-	1	-	2	3	1	-	1	1	1	-	1	-	1	1	-	1	-	2
Eublemma pura (Hübner, 1813)	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	1	1	-	-
Eublemma scitula (Rambur, 1833)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-

Metachrostis velox (Hübner, 1813)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	1	-	-	-	-
Catephia alchymista (Denis & Schiffermüller, 1775)	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zethes insularis Rambur, 1833	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	1	1	-	-	-	-	-	-	-	-
• *Drasteria cailino* (Lefèbvre, 1827)	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Catocala nymphagoga (Esper, 1787)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Catocala coniuncta (Esper, 1787)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Ophiusa tirhaca (Cramer, 1773)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Clytie illunaris (Hübner, 1813)	-	-	-	1	1	-	-	-	-	-	+	-	1	-	1	1	1	-	1	-	1	1	-	-	-
Dysgonia algira (Linnaeus, 1767)	-	-	1	1	1	-	-	-	4	2	-	1	1	-	-	1	1	-	-	-	1	-	-	-	1
Grammodes bifasciata (Petagna, 1787)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
NOCTUIDAE																									
Trichoplusia ni (Hübner, 1803)	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Autographa gamma (Linnaeus, 1758)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Pseudozarba bipartita (Herrich-Schäffer, 1850)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	-	1	-	1	1	14
Recoropha canteneri (Duponchel, 1833)	-	1	1	1	1	1	1	2	5	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metopoceras felicina (Donzel, 1844)	2	8	1	1	1	1	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acontia lucida (Hufnagel, 1766)	-	-	1	-	-	-	1	-	-	1	1	-	1	-	-	1	-	-	-	-	1	-	1	-	-
Acontia trabealis (Scopoli, 1763)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
Aedia leucomelas (Linnaeus, 1758)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Tyta luctuosa (Denis & Schiffermüller, 1775)	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
Raphia hybris (Hübner, 1813)	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Acronicta psi (Linnaeus, 1758)	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Craniophora pontica (Staudinger, 1878)	-	-	-	-	1	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-	1	1	-	-	-
Aegle vespertinalis (Rambur, 1858)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-
Synthymia fixa (Fabricius, 1787)	-	1	-	1	1	1	1	2	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cucullia calendulae Treitschke, 1835	-	-	-	-	1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calophasia platyptera (Esper, 1788)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Calophasia almoravida* Graslin, 1863	-	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Omphalophana serrata (Treitschke, 1835)	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lophoterges millierei (Staudinger, 1871)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Cleonymia baetica (Rambur, 1837)	1	17	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cleonymia yvanii (Duponchel, 1833)	4	25	1	1	1	1	1	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cleonymia diffluens (Staudinger, 1870)	-	3	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bryonycta pineti (Staudinger, 1859)	-	-	1	1	-	-	1	+	2	1	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
Heliothis peltigera (Denis & Schiffermüller, 1775)	-	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heliothis incarnata Freyer, 1838	2	2	1	1	1	1	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Helicoverpa armigera (Hübner, 1808)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Condica viscosa (Freyer, 1831)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Callopistria latreillei (Duponchel, 1827)	+	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Cryphia pallida (Baker, 1894)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1*	1	-	-	2
• *Bryophila vandalusiae* Duponchel, 1842	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Bryophila ravula (Hübner, 1813)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	-	-	-	-
Bryopsis muralis (Forster, 1771)	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	1	-	-	-	-	-	-	-	-
Spodoptera exigua (Hübner, 1808)	-	-	1	1	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	1	1	1	-	-
Spodoptera cilium Guenée, 1852	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Caradrina proxima Rambur, 1837	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Caradrina germainii (Duponchel, 1835)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-
Caradrina flavirena Guenée, 1852	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	35
Caradrina clavipalpis (Scopoli, 1763)	-	-	1	1	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1
Hoplodrina ambigua (Denis & Schiffermüller, 1775)	-	-	-	1	1	-	-	1	3	5	4	-	-	-	-	-	-	-	-	1	-	-	-	3
Proxenus hospes (Freyer, 1831)	-	-	-	-	1	-	-	1	-	-	-	1	1	-	1	1	-	-	1	-	1	-	1	-	-
Polyphaenis sericata (Esper, 1787)	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thalpophila vitalba Freyer, 1834	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Apamea arabs (Oberthür, 1881)	-	-	1	1	1	1	1	3	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sesamia nonagrioides (Lefèbvre, 1827)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Orthosia incerta (Hufnagel, 1766)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anarta trifolii (Hufnagel, 1766)	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hecatera weissi (Draudt, 1934)	1	2	1	1	1	-	1	1	2	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hadena confusa (Hufnagel, 1766)	-	-	1	1	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hadena perplexa (Denis & Schiffermüller, 1775)	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Hadena sancta (Staudinger, 1859)	3	2	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mythimna vitellina (Hübner, 1808)	-	-	1	1	1	1	1	-	1	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2
Mythimna unipuncta (Haworth, 1809)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Mythimna sicula (Treitschke, 1835)	30	5	1	1	1	1	1	-	1	2	1	-	1	-	1	1	-	-	-	1	1	1	-	-	2
Mythimna albipuncta (Denis & Schiffermüller, 1775)	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2
Mythimna l-album (Linnaeus, 1767)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Leucania zeae (Duponchel, 1827)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Leucania putrescens (Hübner, 1824)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	1	1	1	1	1	-	4
Leucania punctosa (Treitschke, 1825)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	7
Leucania loreyi (Duponchel, 1827)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-
Peridroma saucia (Hübner, 1808)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-
Agrotis bigramma (Esper, 1790)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Agrotis lata Treitschke, 1835	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-
Agrotis segetum (Denis & Schiffermüller, 1775)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Agrotis trux (Hübner, 1824)	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	1	1	-	-	-
Agrotis puta (Hübner, 1803)	1	3	1	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2
Agrotis ipsilon (Hufnagel, 1766)	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Agrotis spinifera (Hübner, 1808)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Ochropleura plecta (Linnaeus, 1761)	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ochropleura leucogaster (Freyer, 1831)	3	1	1	1	1	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-	-	-	-
Noctua pronuba Linnaeus, 1758	-	-	1	1	1	1	1	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Noctua comes Hübner, 1813	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Xestia kermesina (Mabille, 1869)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Xestia c-nigrum (Linnaeus, 1758)	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
NOLIDAE																									
Nola squalida Staudinger, 1871	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Nola infantula Kitt, 1926	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1*	-	-	-	-
Nola subchlamydula Staudinger, 1871	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
• *Nola tutulella* Zerny, 1927	-	-	1	1	1	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Earias insulana (Boisduval, 1833)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-
Number of species recorded	102	97	163	153	165	134	112	89	108	96	97	119	124	60	132	159	116	78	107	69	158	138	129	65	131

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The genus *Megacraspedus* Zeller, 1839 in Portugal with description of four new species (Lepidoptera: Gelechiidae)

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Abstract

Huemer & Karsholt (2018) presented a comprehensive revision of the Palaearctic genus *Megacraspedus* Zeller, 1839, recognising four species as present in Portugal. Prior to this Corley (2015) included only two species of the genus in the Portuguese list, but neither of these species is given for Portugal by Huemer & Karsholt (2018). In this paper these differences are reconciled and four new species (*M. dalei* Corley, sp. nov., *M. transmontanus* Corley, sp. nov., *M. dinensis* Corley, sp. nov., and *M. terryae* Corley, sp. nov.) are described, that were not included in Huemer & Karsholt (2018); we also add additional DNA barcode data and female genitalia illustrations that were not available in their revision. The four new *Megacraspedus* species, together with one newly added to the country and four species from validated bibliographic records, bring the total of Portuguese *Megacraspedus* species to nine.
Keywords: Lepidoptera, Gelechiidae, *Megacraspedus*, new species, endemism, taxonomy, DNA barcoding, cytochrome c oxidase I (COI), Iberian Peninsula.

El género *Megacraspedus* Zeller, 1839 en Portugal con descripción de cuatro nuevas especies (Lepidoptera: Gelechiidae)

Resumen

Huemer & Karsholt (2018) presentaron una revisión exhaustiva del género Paleártico *Megacraspedus* Zeller, 1839, reconociendo cuatro especies presentes en Portugal. Anteriormente, Corley (2015) incluía solo dos especies del género en la lista portuguesa, pero Huemer & Karsholt (2018) no indican ninguna de estas especies para Portugal. En este artículo conciliamos estas discrepancias y describimos cuatro nuevas especies (*M. dalei* Corley, sp. nov., *M. transmontanus* Corley, sp. nov., *M. dinensis* Corley, sp. nov. y *M. terryae* Corley, sp. nov.), que no fueron incluidas en Huemer & Karsholt (2018). También añadimos datos adicionales de códigos de barras de ADN e ilustraciones de genitalias de las hembras que no estaban disponibles en la revisión. Las cuatro nuevas especies de *Megacraspedus*, junto con la recién añadida al país y cuatro especies con registros bibliográficos validados, elevan el total de especies portuguesas de *Megacraspedus* a nueve.
Palabras clave: Lepidoptera, Gelechiidae, *Megacraspedus*, nuevas especies, endemismo, taxonomía, ADN Códigos de barras, citocromo c oxidasa I (COI), Península Ibérica.

O género *Megacraspedus* Zeller, 1839 em Portugal com descrição de quatro novas espécies (Lepidoptera: Gelechiidae)

Resumo

Huemer & Karsholt (2018) apresentaram uma revisão exaustiva do género Paleártico *Megacraspedus* Zeller, 1839, indicando quatro espécies presentes em Portugal. Previamente, Corley (2015) incluiu apenas duas espécies do

género na lista de espécies de Portugal, no entanto Huemer & Karsholt (2018) não indicam nenhuma delas como presentes em Portugal. Neste artigo conciliamos estas discrepâncias e descrevemos quatro novas espécies especies (*M. dalei* Corley, sp. nov., *M. transmontanus* Corley, sp. nov., *M. dinensis* Corley, sp. nov. e *M. terryae* Corley, sp. nov.), que não foram incluídas na revisão de Huemer & Karsholt (2018). Também apresentamos dados adicionais de códigos de barras de ADN e ilustrações de genitálias de fêmeas que não estavam disponíveis na altura da publicação da revisão. As quatro novas espécies de *Megacraspedus*, junto com a espécie recém-adicionada ao país e as quatro espécies com registos bibliográficos validados, elevam o total de espécies portuguesas de *Megacraspedus* a nove.
Palavras-chave: Lepidoptera, Gelechiidae, *Megacraspedus*, novas espécies, endemismo, taxonomia, códigos de barras de ADN, citocromo c oxidase I (COI), Península Ibérica.

Introduction

In this paper the current state of knowledge of the genus *Megacraspedus* Zeller, 1839 in Portugal is set out following the publication of the excellent revision of the genus by Huemer & Karsholt (2018). That work recognised four species as present in Portugal, but females were only described for one of them. Moreover, the authors of the revision disagreed with the identifications of the two species of the genus listed for the country in Corley (2015). Here we clarify these discrepancies, describe the female of one of these species (*Megacraspedus trineae* Huemer & Karsholt, 2018), add one more species that has been recently found, and describe four new species which were only discovered when the revision was in its final stages or after the revision was published.

In Corley (2015) two species of the genus *Megacraspedus* were listed for Portugal: *Megacraspedus subdolellus* Staudinger, 1859 and *Megacraspedus binotella* (Duponchel, 1843) and a third, *Megacraspedus dejectella* (Staudinger, 1859) was mentioned but its presence in Portugal was rejected. The records of *M. subdolellus* and *M. binotella* were referred to other species by Huemer & Karsholt (2018). In this paper more detail is given for their exclusion from Portuguese list.

Huemer & Karsholt (2018) include 85 species in their revision of from *Megacraspedus*. The species are associated into 24 species groups varying from one to 14 species. The four species of *Megacraspedus* given as present in Portugal in this publication (*M. trineae* Huemer & Karsholt, 2018, *M. occidentellus* Huemer & Karsholt, 2018, *M. ibericus* Huemer & Karsholt, 2018 and *M. quadristictus* Lhomme, 1946) fall into four different species groups, and are readily distinguished from one another by male genitalia.

Material and Methods

Specimens of *Megacraspedus* collected in Portugal that were not available to Huemer and Karsholt have been examined and DNA barcodes have been obtained from selected specimens. Genitalia were dissected using standard techniques (Robinson 1976), with preparations mounted in Euparal.

Abbreviations

GP, GU and gen. prep. - Genitalia preparation
INV - Reference number for invertebrate sample in InBIO Barcoding Initiative, Portugal
MFVC - Martin Corley
MNHN - Muséum National d'Histoire Naturelle, Paris, France
NHMUK - Natural History Museum, London, United Kingdom
RCJR - Research collection of Jorge Rosete, Portugal
RCMC - Research collection of Martin Corley, United Kingdom
RCRT - Research collection of Rachel Terry, United Kingdom
ZMCP - Museu de Zoologia, Universidade de Coimbra, Portugal

DNA extraction and sequencing

Specimens of each available taxon were selected for DNA barcoding. Genomic DNA was extracted from leg tissue using QIAamp DNA Micro Kit (Citomed, Lisboa, Portugal) following manufacturer's protocol, except for the lysis period which was extended to enhance extraction success. DNA amplification was performed using two different primer pairs, that amplify partially overlapping fragments (LC + BH) of the 658 bp barcoding region of the COI mitochondrial gene. We used the primers FwhF1 (Vamos et al. 2017) + C_R (Shokralla et al. 2015) for LC and BF3 (Elbrecht et al. 2019) + BR2 (Elbrecht and Leese 2017) for BH amplification, all modified with Illumina adaptors. PCRs were performed in 10 ìl reactions, containing 5 ìl of Multiplex PCR Master Mix (Qiagen, Germany), 0.3 ìl of each 10 mM primer and 1-2 4ìl of DNA, with the remaining volume in water. PCR cycling conditions consisted of an initial denaturation at 95ºC for 15 min, followed by 45 cycles of denaturation at 95ºC for 30 sec, annealing at 45ºC for 45 sec and extension at 72ºC for 45 sec and a final elongation step at 60ºC for 10 min. The partial COI mitochondrial gene (Folmer region) was then sequenced in a MiSeq benchtop system. OBITools (https://git.metabarcoding.org/obitools/obitools) was used to process the initial sequences which were then assembled into a single 658 bp fragment using Geneious 9.1.8. (https://www.geneious.com). The sequence obtained was blasted against GenBank and BOLD databases.

Results

Taxonomic account

Megacraspedus lanceolellus species group

Megacraspedus lanceolellus (Zeller, 1850) (Figures 1-2)

Material examined: Portugal, Beira Alta, Sabugal, Aldeia de Santo António, 1 ♂ (figure 1), 13-VI-2020, leg. J. Nunes, C. Silva, E. Jesus and P. Nunes, M. Dale gen. prep. MD02829, (figure 2) confirmed O. Karsholt, in RCMC.

According to Huemer & Karsholt (2018) *M. lanceolellus* has a distribution extending from Spain to Germany, Italy, Croatia and Montenegro. From Spain they examined specimens from 41 localities in 14 provinces from Granada to Huesca and Gerona, extending westwards to Sierra de Gredos in Avila. It is not therefore surprising that the distribution extends into eastern central Portugal. The species shows considerable diversity in external morphology and remarkable diversity in DNA barcodes, with specimens falling into 19 BINs. Nevertheless, Huemer & Karsholt (2018) were unable to justify further taxonomic division of the species since DNA barcodes do not provide clear support for differences in external appearance and there is rather little variation in genitalia. **New species for Portugal**.

Megacraspedus subdolellus Staudinger, 1859 is given as a synonym of *M. lanceolellus* by Huemer & Karsholt (2018). As there are published Portuguese records under the name *subdolellus* which do not belong to *M. lanceolellus*, it is treated below under excluded species.

Megacraspedus dejectella species group

Megacraspedus dejectella (Staudinger, 1859) is treated below under excluded species.

Megacraspedus binotella species group

Megacraspedus binotella (Duponchel, 1843) is treated below under excluded species.

Megacraspedus cuencellus species group

Huemer & Karsholt (2018) described the new species *M. trineae* from Portugal and Spain, with a Portuguese holotype. Our DNA barcoding results from further specimens indicated the probability of an additional species in *M. cuencellus* species group. Re-examination of the eight available Portuguese

male preparations that had been determined as *M. trineae* either by Huemer and Karsholt or by MFVC revealed a degree of diversity in some features, but sufficient differences exist to separate two species, supported by DNA barcoding, habitat preference and flight season. The second species is described as new here, after the treatment of *M. trineae.*

Megacraspedus trineae Huemer & Karsholt, 2018 (Figures 3-7)

Material examined: PORTUGAL, Beira Alta, Serra da Estrela, Covão do Boi, 1 ♂, 24-VI-2010, leg. M. Corley, Corley gen. prep. 3578; Beira Alta, Serra da Estrela, Poço do Inferno, 1 ♂ paratypes, 12-VII-2009, leg. M. Corley, Corley gen. prep. 3302, both in RCMC; Beira Alta, Serra da Estrela, Vale do Zêzere, 1 ♂, 9-VII-2019, leg. J. Rosete, M. Dale gen. prep. MD02661, DNA barcoded INV09970, 1 ♀ same data, M. Dale gen. prep. MD02687, DNA barcoded INV09969, both in RCJR; Trás-os-Montes, Serra do Marão, 1 ♂, 15-VI-2019, leg. J. Nunes, Corley gen. prep. 5804, in RCMC, DNA barcoded INV09935.

Bibliographic records: The holotype and 12 paratypes are from Torre, Serra da Estrela. Other paratypes (3) are from Poço do Inferno in Serra da Estrela and one from Serra de São Mamede, Alto Alentejo. The type series comes from altitudes from 1100-1900 m. Huemer & Karsholt (2018) obtained one DNA barcode for *M. trineae*. The female was unknown. A single specimen from Avila, Spain shows small differences in male genitalia and a 7.4% difference in DNA barcode (PHLAI461-13; BIN: BOLD:ACZ8654) but was not described yet as a new species for want of further material.

Description Male (figure 3): Described in detail by Huemer & Karsholt (2018).

Female (figure 4): Wingspan 9 mm. Labial palp segment 2 scale brush ochreous buff, white dorsally, segment 3 white, tip not black; antenna whitish, banded deep grey on upper side; forewing smaller than in male, cream-coloured, scales not tipped brown; hindwing extremely reduced, about 1.4 mm long, narrow, whitish grey.

Male genitalia (Figures 5-6): Described in detail by Huemer & Karsholt (2018).

Female genitalia (Figure 7): Papilla analis very slender, acute; posterior apophysis a slender rod, 2.8 mm long; anterior apophysis one-quarter length of posterior apophysis, extended posteriorly as venula bordering 0.5 mm long segment VIII and continuing caudad to a small expansion at base of oviscapt, another branch forming anterior margin of segment VIII, including a subtriangular craniad bulge in middle enclosing narrow ostium bordered by sclerites tapering to slender points posteriorly; colliculum long, sclerotised including a slender sclerite forming one turn of a spiral; ductus bursae as long as anterior apophysis; corpus bursae of similar length, narrowly elliptical, signum spherical with large papillae.

Molecular data: We present three DNA barcodes for this species in addition to the one provided by Huemer & Karsholt (2018). INV09935 (IBILP3011-21), INV09969 (IBILP3014-21) and INV09970 (IBILP3015-21), all in a single BIN BOLD:ADF0469 (n = 4). The distance to the DNA barcode available is 0.46% and the distance to the nearest neighbour *M. bidentatus* is 7.21%.

Diagnosis: *M. trineae* is readily distinguished from other *Megacraspedus* species (apart from *M. gredosensis* Huemer & Karsholt, 2018, *M. dalei* sp. nov. and the above-mentioned Spanish specimen (PHLAI461-13)) by the aedeagus with a near right angle bend, a bulbous base and a single external carina bearing a triangular thorn. *M. gredosensis* has a slenderer aedeagus with thorn close to apex; the unnamed Spanish specimen has shorter aedeagus with apical part slightly expanded in middle then tapering to an apiculus and is without small thorns; differences from *M. dalei* are given under that species.

Biology: Based on the few specimens available, *M. trineae* is a mountain species found at altitudes from 1100 to 1900 metres, as stated by Huemer & Karsholt (2018). They also note that *M. trineae* has been collected in early May and the first half of July. The dates of specimens in the type series are from late June into August, apart from the specimen from Braçais, Serra de São Mamede, from early May, but this specimen is now transferred to *M. dalei* sp. nov. All the Portuguese localities are on acid substrates.

Distribution: Occurs in Portugal and Spain.

***Megacraspedus dalei* Corley sp. nov**. (Figures 8-11)

Material examined: Holotype ♂, "P5173 PORTUGAL, Braçais Castelo de VideAlto Alentejo 9-V-1999 leg. M. Corley" "♂ 2003' TLMF Lep 21300 (pale green label)". "PARATYPE *Megacraspedus trineae* Huemer & Karsholt, 2018" (red label). Holotype will be placed in NHMUK. Paratypes: Beira Litoral, Ceira, 1 ♂, 2006, leg. P. Pires, Corley gen. prep. 2667; Beira Litoral, Penela, Serra de Janeanes, Buracas de Casmilo, 1 ♂, 23-V-2006, leg. M. Corley, Corley gen. prep. 2758; Beira Litoral, Soure, Paúl da Madriz, 1 ♂, 26-VI-2015, leg. J. Rosete, Corley gen. prep. 5758, DNA barcoded INV09134.

Description male (Figures 8-9): Wingspan 14 mm. Head creamy white, side of base below antenna buff; labial palp segment 2 with scale brush slightly longer than segment, light grey-brown on outer side, inner side whitish, segment 3 whitish, ventral edge brownish buff; antenna fuscous. Thorax creamy white. Forewing pale ochreous brown, a blackish brown dot at end of cell, sometimes with a few blackish brown scales in fold at two-fifths; fringes concolorous with forewing colour. Hindwing light greyish buff, fringes concolorous.

Female unknown.

Male genitalia (Figures 10, 11): Uncus less than twice as long as wide, subrectangular with broadly rounded apex; gnathos hook strong, about length of uncus, weakly curved with pointed apex; valva straight, moderately slender, basal part wider than distal part, extending to about apex of uncus, apically rounded; short digitate sacculus at mid-point of valva, less than one-quarter length of valva; saccus massive, suboval, with abruptly tapered apex, ratio maximum width to length approaching 1, posterior margin sclerotised, arched, with shallow medial emargination, without extra thickening in medial part at junction with strongly sclerotised longitudinal ridge extending to anterior third of saccus, lateral sclerites short, about half length of maximum width of saccus; aedeagus slender, medially bent, coecum orbicular, distal three-quarters slender, rod-like, distal half with strongly sclerotised carina bearing a single postmedial thorn, without small subapical thorns, but a few small thorns adjacent to carina.

Molecular data: INV09134 (IBILP3009-21) in BIN BOLD:AEI6609, (n = 1). The distance to the nearest neighbour, a probably undescribed species from Avila, is 5.77%.

Diagnosis: *Megacraspedus dalei* resembles *M. trineae* externally and in genitalia, but there are consistent differences. The forewing of *M. dalei* has a distinct blackish dot at end of cell. Huemer & Karsholt (2018) mention an indistinct black dot at end of cell sometimes present in *M. trineae* but this probably refers to *M. dalei* which was included under *M. trineae* (*e.g*. paratype from Braçais, Portugal). In male genitalia: sacculus less than one-quarter length of valva (more than one-quarter in *M. trineae*, usually one-third in Portuguese material); sclerotisation of posterior margin of saccus not thickened in middle, unlike *M. trineae* which has extra thickening where longitudinal ridge meets posterior margin; aedeagus with large thorn distal to middle of carina and small thorns adjacent to carina, while in *M. trineae* large thorn is proximal to middle of carina and small thorns in apex of aedeagus.

Biology: The species occurs at low altitudes, the highest being at Braçais at 595 m. Habitats are varied, with both acid and limestone substrates. The few specimens known have been collected between 9 May and 26 June.

Etymology: The species is named after Michael Dale in grateful recognition of the considerable help he has given MFVC with many excellent genitalia dissections and enhanced photos of MFVC's own preparations.

Distribution: So far known only from the central part of Portugal in Alto Alentejo and Beira Litoral.

Remarks: Based on the DNA barcode *M. dalei* is more closely related to the specimen from Avila figured by Huemer & Karsholt (2018, fig. 182) than to *M. trineae*. The Avila male has posterior margin of saccus more strongly arched and with deeper emargination and aedeagus distinctly shorter than either *M. dalei* or *M. trineae*, tapering in distal one-third to an apiculus, with the large thorn at middle of carina and apparently no small thorns. In our opinion this is sufficiently distinct to be treated as a separate species, but we refrain from describing it since it is outside the scope of this paper and we have only seen the published figures, not the actual specimen.

Megacraspedus pentheres species group

Megacraspedus quadristictus Lhomme, 1946

Material examined: In addition to Portuguese material listed by Huemer & Karsholt (2018) we have also seen specimens from three localities in Beira Litoral, Coimbra, Santa Clara, 1 ♂, 9-IX-2006, M. Corley, in RCMC; Penela, Buracas de Casmilo, 1 ♂, 22-VII-2015, J. Rosete, Corley gen. prep. 4581, in RCJR, DNA barcoded INV00708; Penela, Castelo de Rabaçal, 2 ♂, 7-IX-2017, J. Rosete in RCJC, DNA barcoded INV05895.

Bibliographic records: Huemer & Karsholt (2018) examined much material from France and Spain and four specimens from Portugal. Their material included females. They obtained DNA barcodes from five specimens from Spain.

Molecular data: INV00708 (IBILP2095-20) and INV05895 (IBILP3007-21) both in a new BIN BOLD:AEC9609 (n = 2). The distance to the Spanish specimens DNA barcoded is between 2.93 and 3.61 and the distance to the nearest neighbour *M. teriolensis* is 9.26%

Diagnosis: *M. quadristictus* can be distinguished from the other Portuguese species by the presence of four black dots on each forewing. The aedeagus gradually tapers from a bulbous base and is without spines, thorns, carina or sclerite.

Biology: Most, probably all, of the localities for this species are on limestone. Moths have been collected from end of July to late September.

Distribution: The species was described from France. Huemer & Karsholt (2018) give the distribution as France and Spain, but their list of examined material includes three Portuguese specimens from Algarve and one from Estremadura.

Remarks: Female genitalia are described by Huemer & Karsholt (2018).

Megacraspedus pusillus species group

Megacraspedus occidentellus Huemer & Karsholt, 2018 (Figure 12)

Material examined: PORTUGAL, Soalheira, 2 ♂, C. Mendes (MNHN), Corley gen. preps 1697, 1974.

Bibliographic records: The species was described from two localities on the Estremadura coast north of Lisbon (holotype and three paratypes from Ericeira, one additional paratype from near Cabo da Roca). There are two males labelled "Soalheira", without date, in the Joannis collection (MNHN), collected by C. Mendes (Corley gen. preps. 1697 and 1974). Soalheira refers to the railway station nearest to Colegio de São Fiel near Fundão, Beira Baixa, which is where Mendes was working. Mendes sent the specimens to Joannis labelled only with a number. Any data associated with these numbers are lost. The "Soalheira" labels were added by Joannis when the specimens reached him, presumably taken from the postmark on the parcel, but the collecting locality is unknown and although most likely to refer to somewhere near São Fiel, there is a possibility that it could refer to the Torres Vedras area in Estremadura, where Mendes was based at Barro during 1906 and 1907 before returning to São Fiel. More details on Mendes and Joannis are given in Corley (2008, 179). There is no indication that Joannis attempted to name the specimens. There are no other specimens of *M. occidentellus* known, so the distribution may be confined to Estremadura or may extend to Beira Baixa.

Diagnosis: Males of *M. occidentellus* (Figure 12) can be recognised by the short stout aedeagus with relatively long basal bulge. The Soalheira specimens have a group of a few stout spines just above the bulge, but these are not clearly illustrated in the figure of the holotype (figure 191) in Huemer & Karsholt (2018), while the text (page 79) expressly excludes them. Ole Karsholt has provided a photo (figure 12) which shows a few such spines.

Distribution: The species is endemic to Portugal

Remarks: According to Huemer & Karsholt (2018) the female is unknown and attempts to obtain a DNA barcode so far failed. We have no new material of this species.

The following three species are all previously undescribed and appear to be endemic to Portugal. They are remarkable in having the basal part of the gnathos more or less clothed in crisped fibrous hairs.

***Megacraspedus transmontanus* Corley, sp. nov.** (Figures 13-15)

Material examined: Holotype ♂, PORTUGAL, Trás-os-Montes, Alijó Carvalho, 20-V-2018 leg. M. Corley & S. Ferreira P11563 Corley gen. prep. 5545 DNA barcoded (INV06432). Holotype will be placed in NHMUK.

Description male (Figure 13): Wingspan 15 mm. Head whitish buff. Labial palp segment 3 as long as segment 2, segment 2 with scale brush slightly longer than segment, greyish brown, upper edge whitish buff, segment 3 whitish, tip and ventral margin black; antenna without pecten, light fuscous, darker ringed in proximal half, dark fuscous in distal half. Thorax ochreous buff, slightly darker than head, tegula similar, darkest anteriorly. Forewing pale ochreous on dorsal side, darker ochreous in middle and towards costa, tinged brown near base, mainly in costal half, most scales shortly tipped light brown; slightly elongate blackish brown dots, one in fold at two-fifths and one in mid-wing at two-thirds; fringes ochreous grey. Hindwing uniform grey, fringes ochreous grey.

Female unknown.

Male genitalia (Figure 14): Uncus digitate, about three times as long as wide, apex rounded; gnathos two-thirds length of uncus, with basal half broad, appearing to be covered with fibres, distal half smooth, slender, finely pointed; anterior edge of tegumen with deep V-shaped excavation; valva slightly curved, digitate, without clearly separated sacculus, but saccular area extending to four-fifths valva length, after which valva is reduced in width; saccus subtriangular but apex obtuse, width about three-fifths of length, posterior margin with emargination between lateral humps, medial part with strongly sclerotised ridge extending from posterior edge towards apex, lateral sclerites about equal to lateral margin of saccus; aedeagus with rounded coecum, distal part two-thirds width and twice length of coecum, with a slight bend at middle of aedeagus length, distal part with strongly sclerotised longitudinal sclerite, a series of about six short stout external spines arising from sclerite around middle of aedeagus length, opposite to a group of about 12 small V-shaped thorns, a second group of similar thorns close to rounded apex.

Molecular data: INV06432 (IBILP3008-21) in BIN BOLD:AEI6610 (n = 1). The distance to the nearest neighbour *M. dinensis* is 7.08%.

Diagnosis: *Megacraspedus transmontanus* differs from all other *Megacraspedus* species except the two following species in the presence of fibres on the basal half of the gnathos. The two small groups of V-shaped thorns on the aedeagus are also an unusual feature and distinguish this species from the other two species described here. *M. spinophallus* Huemer & Karsholt, 2018 and some other species of the *pusillus* group have similar thorns.

Biology: The species is known only from a single specimen taken at light in the second half of May in an area of tall herbs close to a very small stream at an altitude of 700 m (Figure 15). Close to the stream on the south side is a wooded slope. On the north side, beyond a small hay field is an area of fine grasses and *Cytisus* shrubs among granite rocks.

Etymology: The masculine adjective *transmontanus* derives from Latin for “across the mountains” and is a direct translation of the Portuguese Transmontano, “one from Trás-os-Montes region” in which this species was collected.

Distribution: As yet only known from a single locality in Alijó municipality, Trás-os-Montes.

Remarks: According to DNA barcode the closest relative of this species is *M. dinensis* sp. nov., from Vinhais, Portugal.

***Megacraspedus dinensis* Corley, sp. nov.** (Figures 16-17)

Material examined: Holotype ♂, in ethanol PORTUGAL, Trás-os-Montes, Vinhais Dine, 19-VII-2017 leg. M. Corley & S. Ferreira Corley gen. prep. 5368 DNA barcoded (INV05362). Holotype in ethanol in very poor condition, will be placed in NHMUK.

Description (Figure 16): Forewing length 6.5 mm, estimated wingspan about 14 mm. Forewing pale, with light dusting of dark scales on veins towards costa and termen and in fold; a short blackish dash in fold at two-fifths and a longer one at end of cell.

Male genitalia (Figure 17): Similar to those of *M. transmontanus*, but gnathos with basal two-

thirds slightly expanded, covered in crisped fibrous hairs, distal one-third abruptly tapering, smooth; saccus acute; aedeagus with coecum twice as wide as distal part and half as long, distal part slightly curved near middle of aedeagus, a strongly sclerotised sclerite in whole length of distal part, with a few small, stout spines arising from the sclerite just above coecum (not very evident in figure), small external thorns absent.

Molecular data: INV05362 (IBILP3005-21) in BIN BOLD:AEI4370 (n = 1). The distance to the nearest neighbour *M. heckfordi* is 6.3%.

Diagnosis: *Megacraspedus dinensis* is characterised by male genitalia with narrow gnathos with short apical sclerotised part and aedeagus with a long sclerite, but with few small spines and no thorns.

Biology: Known from a single male collected in July in an area of grass, orchard trees and hedges in the valley of the Rio Tuela below the village of Dine. There are lime kilns higher up the hill near the village suggesting that the locality has less acid substrate than most of northern Portugal.

Etymology: The species name is an adjective in genitive case derived from the nearby village of Dine.

Distribution: Known only from the type locality, Dine, Vinhais, Trás-os-Montes.

Remarks: At the time of collection, the only specimen was placed directly into ethanol for barcoding under the InBIO barcoding initiative. Its DNA barcode indicated that it was a distinct species most closely related to *M. heckfordi* Huemer & Karsholt, 2018, so the male genitalia were prepared. Unfortunately, the specimen in ethanol is not in a condition that allows a full description of the external appearance of the moth, but as we have details of genitalia and DNA barcode, we treat the species here for completeness of this revision. It is hoped that further material will become available in the near future.

Megacraspedus terryae **Corley, sp. nov.** (Figures 18-23)

Material examined: Holotype ♂, PORTUGAL, Ribatejo, Rio Maior Alcanede Colos, leg. R. Terry 10-VI-2019 R. Terry gen prep. PT071. Holotype will be placed in NHMUK. Paratypes: 1 ♂ with same data as holotype; further males with same locality but 12-VI-2019 (5) DNA barcoded INV10437, R. Terry gen. preps PT072, PT073; 13-VI-2019 (2), all in RCRT; 1 ♂ from same locality, 14-VI-2019 in RCMC; 1 ♂, Beira Litoral, Alvaiázere, Outeiro do Gamanhos, 26-VI-2019, leg. J. Rosete; 1 ♂, same locality but 4-VII-2019, leg. J. Rosete, M. Dale gen. prep. MD02660, DNA barcoded INV09960; 1 ♀, same locality and date, leg. J. Rosete, M. Dale gen. prep. MD02681, DNA barcoded INV09961, all in RCJR.

Description male (Figure 18): Wingspan 10 mm. Head whitish buff. Labial palp segment 3 three-quarters length of segment 2, segment 2 with scale brush as long as segment, grey-brown, whitish buff above, segment 3 whitish buff, tip and ventral margin black; antenna without pecten, scape whitish buff posteriorly, fuscous anteriorly, flagellum light fuscous, darker beyond middle. Thorax ochreous buff. Forewing ochreous buff, scales mostly tipped light brown, more extensively towards apex, cilia greyish ochreous. Hindwing light grey, cilia concolorous. Abdomen light ochreous.

Female (Figure 19): Resembling male but wings strongly reduced. Wingspan 6 mm. Antenna ochreous buff proximally ringed fuscous, darker fuscous distally.

Male genitalia (Figures 20-21): Uncus digitate, about four times as long as wide, apex rounded; gnathos three-quarters length of uncus, with broadly elliptic basal three-quarters appearing to be covered with fibres, distal one-quarter smooth, slender, curved, finely pointed; anterior edge of tegumen with deep V-shaped excavation; valva short, not reaching base of uncus, twisted in middle, distal part with ventral bulge, without clearly separated sacculus; saccus broad, anterior end broadly rounded with small apiculus, width about equalling length, posterior margin with emargination between lateral humps, medial part with strongly sclerotised ridge extending from posterior edge towards apex, lateral sclerites slightly shorter than lateral margin of saccus; aedeagus with rounded coecum, distal part two-thirds width and twice length of coecum, with a significant bend at middle of aedeagus length, without sclerotised longitudinal sclerite, an untidy group of approximately 12 stout external spines longer than coecum, arising at distal end of coecum.

Female genitalia (Figure 22): Papilla analis small, slender, apically rounded; posterior apophysis

slender, rod-like, 2.2 mm long; an elliptical sclerite in oviscapt at level of posterior margin of 0.4 mm long, quadrate segment VIII; subgenital plate broadly ovate with triangular lateral process extending to join anterior apophysis at mid-point, other limb of apophysis extending beyond segment VIII; ostium broadly ovate, situated in posterior half of subgenital plate; ductus bursae membranous, about twice as long as segment VIII; corpus bursae elliptical, signum an irregularly shaped plate covered with strong papillae.

Molecular data: INV09960 (IBILP3012-21) and INV09961 (IBILP3013-21) both in BIN BOLD:AEI1274, (n = 2); INV10437 (IBILP3016-21) in BIN BOLD:AFR1326. The distance to the nearest neighbour *M. tenuiuncus* 5.5%.

Diagnosis: *Megacraspedus terryae* differs from all other *Megacraspedus* species except *M. transmontanus* and *M. dinensis*, in the presence of crisped fibres on the basal part of the gnathos. The wide basal part of the gnathos and the untidy mass of spines on the aedeagus distinguish this species from these two species.

Biology: The species is known only from two localities 57 km apart on the Jurassic limestone of central Portugal. Specimens have been collected in June and July at the end of the afternoon and also at light. Jorge Rosete (pers. comm.) has described the habitat at Alvaiázere: a small set of terraces at the base of a limestone hill with south-west aspect. The vegetation cover includes clumps of *Quercus faginea* Lam., *Olea europaea* L., *Crataegus monogyna* Jacq. and a shrub layer with *Cistus* species and *Thymus* and a variety of herbaceous plants including several Poaceae. At Colos, the habitat is quite similar (Figure 23).

Figure 23. Habitat of *M. terryae* Corley, sp. nov., at Colos (S. Barnes).

Etymology: The species is named in honour of Rachel Terry who collected the first known specimens during her first visit to Portugal.

Distribution: Jurassic limestone of central Portugal (Beira Litoral).

Remarks: Only discovered in 2019 and not immediately recognised as distinct from *M. transmontanus* because both species have similar conspicuous fibres on the gnathos. However, there are clear differences both externally and in male genitalia and also in DNA barcode.

M. transmontanus sp. nov., *M. dinensis* sp. nov. and *M. terryae* sp. nov., form a natural group which according to DNA barcodes is closest to *M. tenuiuncus* Huemer & Karsholt, 2028 and *M. heckfordi* Huemer & Karsholt, 2018, which both belong to the *pusillus* group of Huemer & Karsholt (2018). Based on most characters this appears to be the appropriate group for these three new species also. Huemer & Karsholt (2018) provide a key to species groups, based on male genitalia. However, the first couplet in the key excludes the new species from the *pusillus* group. Nevertheless, the shape of the

uncus, small thorns on the surface of the aedeagus and DNA barcodes all point to the *pusillus* group being the closest species group. This can be resolved by inserting an extra couplet into the species group key:

1 Gnathos hook straight, massive and bulky, with longitudinal grooves
M. pusillus species group (part)
- Gnathos hook usually curved or bent, of various shape, without longitudinal grooves 1A
1A Gnathos with crisped fibrous hairs on basal part
M. pusillus species group (part)
- Gnathos hook without hairs on basal part

Megacraspedus violacellum species group

Megacraspedus ibericus Huemer & Karsholt, 2018

Material examined: PORTUGAL, Trás-os-Montes, Serra do Alvão, Arnal, 1 ♂, 2-IX-2002, Corley, Corley gen. prep. 1753; Serra da Estrela, Vale Glaciar do Zêzere, Manteigas, Guarda, 1100 m, 2 ♂, 10-IX-2017, J. Rosete (RCJR), of which one is a paratype and both were DNA barcoded (INV05891, INV09135).

Bibliographic records: Huemer & Karsholt (2018) include five males from Serra do Larouco, Trás-os-Montes and one from Vale do Zêzere, Serra da Estrela as paratypes.

Molecular data: INV05891 (IBILP3006-21), and INV09135 (IBILP3010-21), both in BIN BOLD:AEI4590 (n = 2). The distance to the single Spanish specimen DNA barcoded so far is 2.14% and to the nearest neighbour *M. skulei* is 6.8%.

Diagnosis: Males of *M. ibericus* can be recognised by the straight aedeagus with slightly swollen base and a small external tooth near the middle, although in some preparations this tooth is barely discernible.

Distribution: Occurs in Spain and Portugal. The holotype and two paratypes are from Malaga, Spain. In Portugal it is known from Serra da Estrela, Serra do Alvão and Serra do Larouco.

Remarks: Females are unknown.

Key to Portuguese *Megacraspedus* species using male genitalia characters

1 Gnathos without fibrous hairs in basal part 2
Gnathos with fibrous hairs in basal part 7

2 Aedeagus with near right-angle bend 3
Aedeagus straight or only slightly curved 4

3 Sacculus about one-third length of valva; aedeagus with large tooth proximal to middle of external carina and with a group of small triangular spines near apex ..... *M. trineae*
Sacculus about one-quarter length of valva; aedeagus with large tooth at or distal to middle of external carina and with a group of small triangular spines ..... *M. dalei*

4 Uncus slender, hardly wider than gnathos; aedeagus with coecum as long as distal part, with a group of stout spines laterally near middle ..... *M. occidentellus*
Uncus wider than gnathos; aedeagus with longer distal part, without a group of spines 5

5 Uncus at least 1.5 times as long as wide ..... *M. lanceolellus*
Uncus about as long as wide 6

6 Distal part of aedeagus with a long sclerite and a small external tooth near middle .....*M. ibericus*
Aedeagus without sclerite or external tooth.....*M. quadristictus*

7 Aedeagus with an untidy group of long wavy spines, without sclerite.....*M. terryae*
Aedeagus with a longitudinal sclerite, without spines or with a row of straight spines 8

8 Gnathos with slender sclerotised apical part as long as widely expanded fibrous basal part; aedeagus with a row of stout spines and a field of small triangular spines.....*M. transmontanus*
Gnathos with slender sclerotised apical part shorter than slightly expanded fibrous basal part; aedeagus with a few stout spines .....*M. dinensis*

Excluded species

Megacraspedus dejectella (Staudinger, 1859)

Was recorded by Mendes (1904) from Beira Baixa. Corley (2015) found a specimen under this name in the National Collection in ZMCP which was lacking abdomen but could be identified as *Ptocheuusa paupella* (Zeller, 1847) from its quite different wing markings and labial palps. Huemer & Karsholt (2018) only traced three specimens of *M. dejectella*, all from the type series from Granada, Spain.

Megacraspedus binotella (Duponchel, 1843)

Bibliographic records: The earliest Portuguese record was from Singeverga in Douro Litoral, collected by Teodoro Monteiro in May 1953 and identified by Amsel (1959). Corley (2015) mentions the species as also present in Trás-os-Montes, but the identifications were erroneous, see below. Huemer & Karsholt (2018) considered the Iberian listings in Corley (2015) and Vives Moreno (2014) to be misidentifications, possibly of *M. peslieri* Huemer & Karsholt, 2018. This is not the case with Portuguese "*binotella*" named by MFVC which belong to *M. ibericus* Huemer & Karsholt, 2018 and are listed under Material Examined for that species.

Distribution: *M. binotella* has a central European distribution reaching only as far west as Austria and northern Italy

Remarks: The identity of the Singeverga specimen identified as *binotella* by Amsel has not been established but in view of the confusion that was prevalent in the taxonomy of *Megacraspedus* there is no reason to suppose that it was correctly named. If the specimen can be located it should be possible to identify it.

Megacraspedus subdolellus Staudinger, 1859

Bibliographic records: Huemer & Karsholt (2018) place *M. subdolellus* in synonymy with *M. lanceolellus* (Zeller, 1850). The earliest Portuguese record of *M. subdolellus* was from Serra da Arrábida collected by J. Passos de Carvalho on 20-VI-1979 and named by MFVC (Corley et al. 2006). Corley (2015) also mentions the species as present in Alto Alentejo and Beira Litoral based on the specimens now referred to *M. dalei* sp. nov. (see Material examined under that species).

Remarks: Portuguese specimens that had previously been named *subdolellus* by MFVC are referred to *M. trineae* by Huemer & Karsholt (2018) but one of these, the specimen from Braçais, Alto Alentejo belongs to *M. dalei* sp. nov. The Passos de Carvalho specimen from Serra da Arrábida has not been re-examined but is unlikely to be correctly named. However, in 2020 a genuine example of *M. lanceolellus* was found in Portugal, see the entry under that name.

Discussion

The revision of *Megacraspedus* by Huemer & Karsholt (2018) has provided a very sound base for

further work on this genus, but in many cases information on species was incomplete. In particular females were unknown for numerous species and also DNA barcodes were not available for a number of species. Since 2018 further information has become available. Nel & Varenne (2019) described females of five species that were not described in the monograph. Huemer et al. (2020) detected an overlooked species in the Cottian Alps of Italy. Gastón & Vives Moreno (2020) added a new species from Teruel, Spain and another from Burgos, Spain (Vives Moreno & Gastón, 2020). The latter was transferred to a new genus *Paramegacraspedus* Gastón & Vives (Gastón & Vives Moreno, 2021) on the basis of the remarkably different female genitalia however the figured genitalia belong to *Ptocheuusa paupella* (Zeller, 1847).

The four new *Megacraspedus* species recognised in this paper, together with one newly added species, bring the total of Portuguese *Megacraspedus* species to nine. This is far short of the 27 species known from Spain (25 in Huemer & Karsholt (2018) and two further species added by Vives Moreno & Gastón (2020). Some of these species have been recorded close to the Portuguese border, so could also be present in Portugal. The recent discovery of four previously unrecognised species in Portugal, three of which share a character (presence of fibres on the gnathos) that occurs in no other species of the genus, suggests that there could be further species to be found in Portugal, perhaps also belonging to this subgroup of species. Huemer & Karsholt (2018, p. 16) point out that the brachyptery which is prevalent in females of the genus is a significant factor contributing to the evolution of new species with limited distribution.

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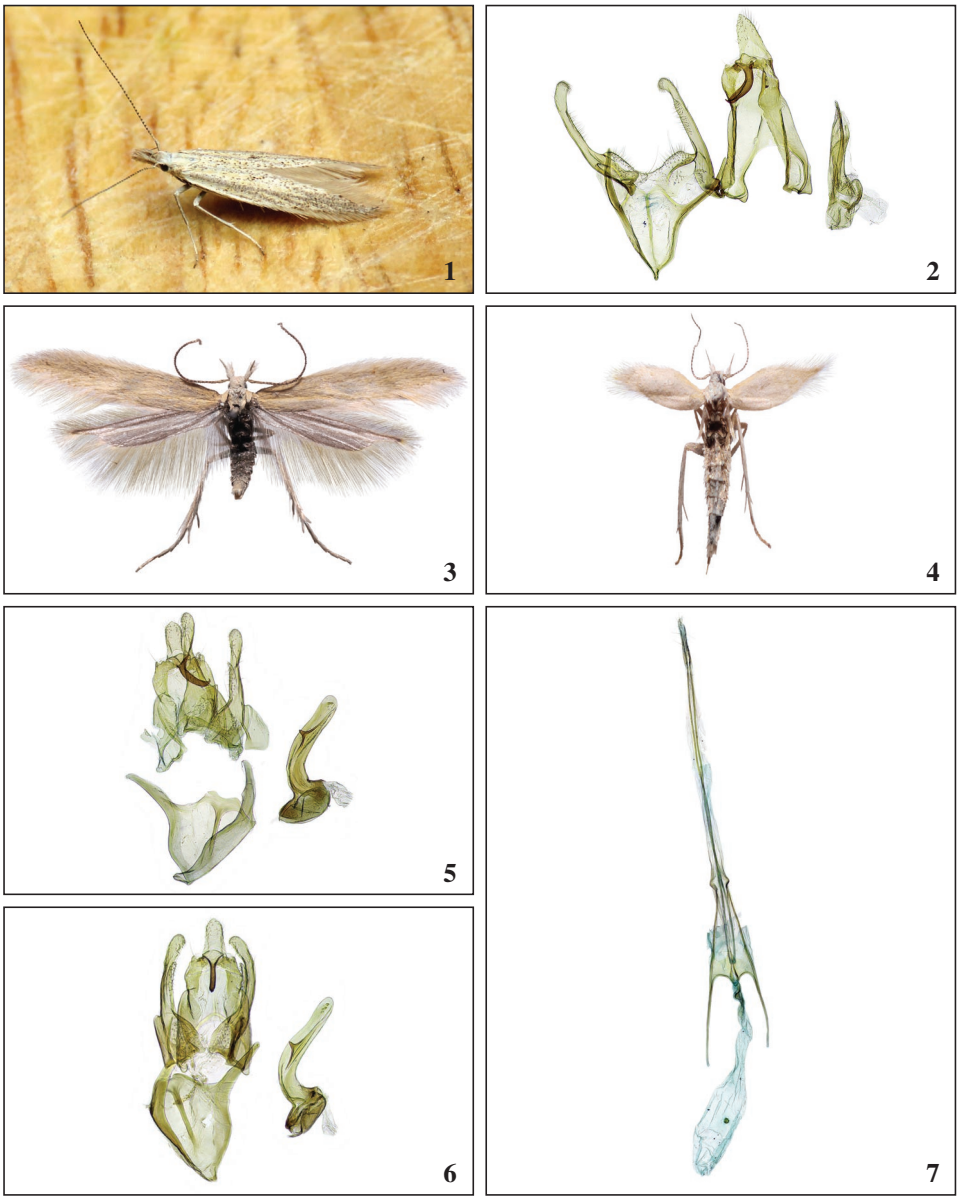
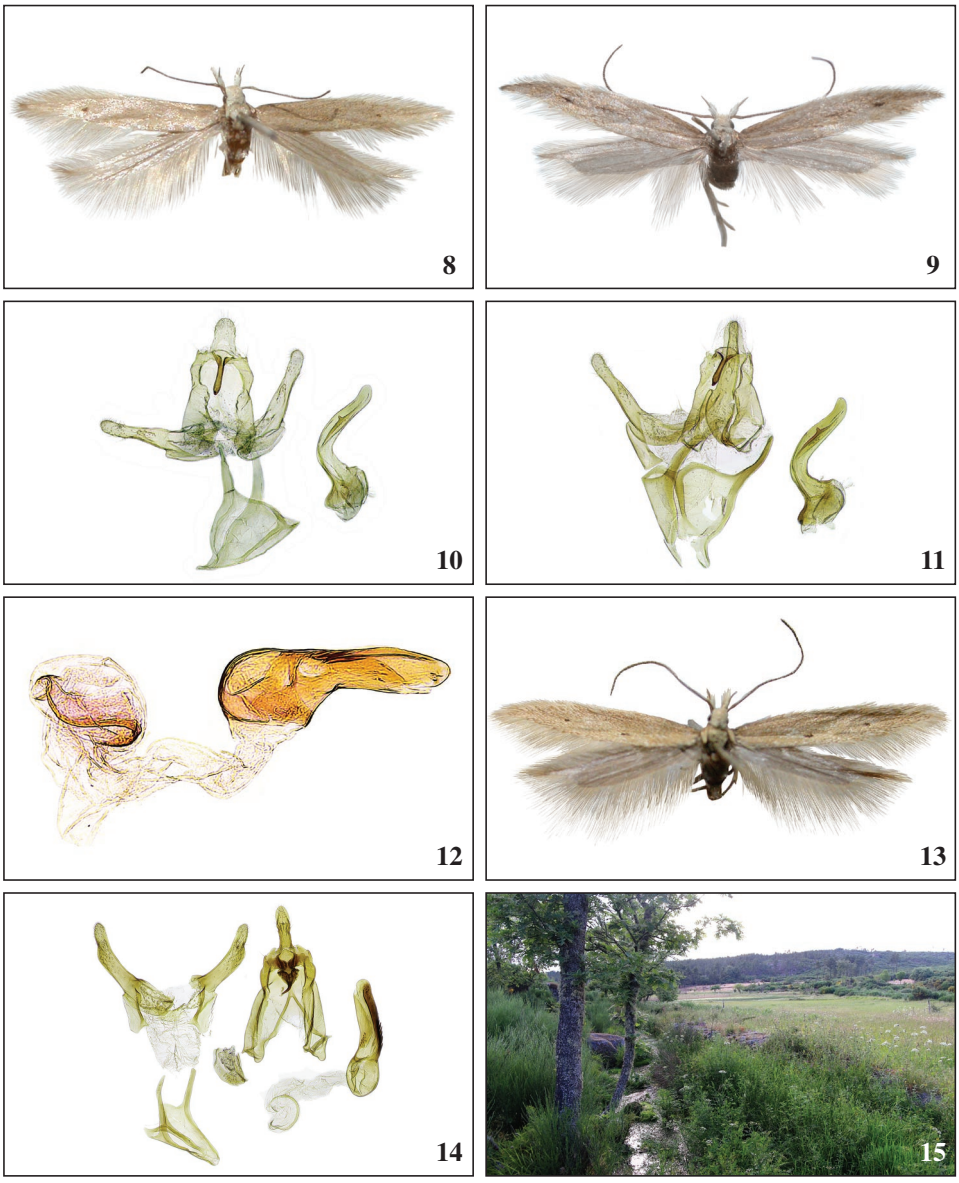


Figures 1-7. 1. *M. lanceolellus* (Zeller, 1850), male, Sabugal (J. Nunes). **2.** *M. lanceolellus* male genitalia, Sabugal (M. Dale MD02829). **3.** *M. trineae* Huemer & Karsholt, 2018, male, Vale do Zêzere (A. Lameirinhas). **4.** *M. trineae* Huemer & Karsholt, 2018, female, Vale do Zêzere (A. Lameirinhas). **5.** *M. trineae* Huemer & Karsholt, 2018, male genitalia, Serra do Marão (Corley GP5804). **6.** *M. trineae* Huemer & Karsholt, 2018, male genitalia, Vale do Zêzere (M. Dale MD02661). **7.** *M. trineae* Huemer & Karsholt, 2018, female genitalia, Vale do Zêzere ((M. Dale MD02687).



Figures 8-15. 8. *M. dalei* Corley, sp. nov., holotype male, Braçais (M. Corley). **9.** *M. dalei* Corley, sp. nov., paratype male, Arzila (A. Lameirinhas). **10.** *M. dalei* Corley, sp. nov., paratype male genitalia, Braçais (M. Corley) (Corley GP2003). **11.** *M. dalei* Corley, sp. nov., paratype male genitalia, Buracos do Casmilo. **12.** *M. occidentellus* Huemer & Karsholt, 2018, aedeagus, Ericeira (P. Huemer GU 13/1352). **13.** *M. transmontanus* Corley, sp. nov., holotype male, Alijó, Carvalho (M. Corley). **14.** *M. transmontanus* Corley, sp. nov., holotype male genitalia, Alijó, Carvalho (M. Corley GP5545). **15.** Habitat of *M. transmontanus* Corley, sp. nov., at Carvalho (José Paulo Pires).

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COMITÉ PARA LA PROTECCIÓN DE LA NATURALEZA, PROYECTO DE INVESTIGACIÓN CIENTÍFICA DE SHILAP / *COMMITTEE FOR THE PROTECTION OF NATURE, SHILAP SCIENTIFIC RESEARCH PROJECT*

Solicitud de autorización para recoger Lepidoptera con fines científicos en España

Las solicitudes cumplirán las siguientes condiciones:

1.– Estar al día en el pago de la cuota anual de la Sociedad, antes de solicitar los permisos.

2.– Enviar un correo electrónico al Secretario General de SHILAP con todos los datos personales, incluyendo nombre, apellidos, dirección, DNI o número de pasaporte, número de teléfono (con código del país y prefijo) y correo electrónico. Estos datos serán enviados al Secretario General con un mínimo de 45 días de antelación al período de captura previsto.

3.– Se detallará el área donde se desea capturar el material (provincia y/o región), el período de tiempo (días, meses o todo el año); método de captura que se desea emplear (manga entomológica, grupo electrógeno, etc.), material que se desea recoger (especies, géneros, familias, y/o superfamilias) y cualquier otro dato que se desee añadir.

4.– Todos los socios de SHILAP que soliciten estos permisos para recoger Lepidoptera en España con fines científicos, serán incluidos en el Proyecto de Investigación Científica creado por la Sociedad y denominado: *"Faúnula Lepidopterológica Ibérica, Baleárica y región Macaronésica"*.

5.– Con el fin de contribuir con este Proyecto Científico, se ruega remitan a SHILAP, **o una copia por correo electrónico (e-mail), con el listado del material recogido en EXCEL,** sólo en este formato, indicando la Familia, Subfamilia, Tribu, nombre de la especie (género, especie, autor y año), localidad, coordenadas UTM (1 X 1) o GPS, provincia, fecha de captura, colector y número de machos y hembras capturados (**sólo 5 ejemplares por taxón y localidad, máximo**). Por favor, utilice sólo el *"Catálogo sistemático y sinonímico de los Lepidoptera de la Península Ibérica, de Ceuta, de Melilla y de las islas Azores, Baleares, Canarias, Madeira y Salvajes (Insecta: Lepidoptera)*" (A. VIVES MORENO, 2014)". Esta lista es necesaria para este Proyecto Científico de SHILAP y para nuevas autorizaciones.

6.– Es obligatorio publicar en *SHILAP Revista de lepidopterología,* las nuevas especies o subespecies que se descubran y remitir a SHILAP **una parte del material TIPO**, para su posterior incorporación a la colección de Lepidoptera del Museo Nacional de Ciencias Naturales en Madrid, España.

7.– Se recuerda a todos los socios de la obligación de estar autorizados para recoger Lepidoptera, con fines científicos, en España y que está prohibida todo tipo de actividad comercial, con el material capturado.

8.– Conocer los fines científicos de SHILAP y comprometerse a pagar los gastos de participación en este Proyecto Científico, que la Junta Directiva considere en cada momento.

Application for permits to collect Lepidoptera in Spain for scientific purposes

Applications must abide by the following conditions:

1.– The Society's annual fee must be paid before applying for the permits.

2.– To send an electronic mail the General Secretary of SHILAP, with all the personal data, including name, surname, address, ID card number or Passport number, telephone number (with country code and prefix) and electronic mail address. These data must reach the General Secretary at least 45 days in advance of the foreseen collecting activity.

3.– The collecting area to be visited by the applicant should also be detailed (province and/or region), expected dates (days, months, or the whole year), collecting method (entomological net, generator, etc.), taxonomical groups of interest to be collected (species, genera, families and/or superfamilies); any other data the applicant wishes to add.

4.– All members of SHILAP who apply for these permits to collect Lepidoptera in Spain with scientific purposes, will be included in the Scientific Research Project created by the Society and called: *"Lepidopterological Fauna of the Iberian Peninsula, Balearic Islands and Macaronesian region"*.

5.– In order to contribute to this Scientific Project, it is requested to send to SHILAP, **either a copy by electronic mail (e-mail), with the listing of materials collected in EXCEL** (- only in this format, please), indicating the Family, Subfamily, Tribe, name of the species (genera, species, author's name and year), town, UTM (1 X 1) or GPS coordinates, province, dates of capture, collector and numbers of males and females captured (**only 5 specimens per taxon and locality, maximum**). Please, use only the *"Catálogo sistemático y sinonímico de los Lepidoptera de la Península Ibérica, de Ceuta, de Melilla y de las islas Azores, Baleares, Canarias, Madeira y Salvajes (Insecta: Lepidoptera)* (A. VIVES MORENO, 2014)". This list is necessary for this Scientific Project of SHILAP and for new authorizations.

6.– It's obligatory to publish in *SHILAP Revista de lepidopterología*, the new species or subspecies that are discovered and to remit to SHILAP **a part of the TYPE material**, for later incorporation into the Lepidoptera Collection of the National Museum Natural Sciences, Madrid, Spain.

7.– All members are kindly reminded of the obligation to be duly authorized for collecting Lepidoptera, with scientific purposes, in Spain and that it is forbidden all type of commercial activity, with the captured material.

8.– To know about the scientific aims of SHILAP and to commit to pay the expenses of participation in this Scientific Project, that the Board of Directors considers at any given moment.

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First records of *Chamaesphecia efetovi* O. Gorbunov, 2019, in Krasnodar Territory (Northern Caucasus, Russia) (Lepidoptera: Sesiidae)

Konstantin A. Efetov, Valeriy I. Shchurov & Oleg G. Gorbunov

Abstract

Chamaesphecia efetovi O. Gorbunov, 2019, is recorded from Krasnodar Territory (Russia) for the first time. The larvae of this species are oligophagous on *Marrubium* spp. (Lamiaceae), from which *M. peregrinum* L. is widely distributed in the studying area. We investigated 14 biotopes during 2021-2023 with the help of sex attractants and found populations of *Ch. efetovi* in four of them. We have clarified the periods of seasonal and daily activity of this species in the region.
Keywords: Lepidoptera, Sesiidae, *Chamaesphecia, Ch. efetovi*, Krasnodar Territory, North-Western Caucasus, Russia.

Primeros registros de *Chamaesphecia efetovi* O. Gorbunov, 2019, en el Territorio de Krasnodar (Cáucaso Septentrional, Rusia) (Lepidoptera: Sesiidae)

Resumen

Chamaesphecia efetovi O. Gorbunov, 2019, se registra por primera vez en el territorio de Krasnodar (Rusia). Las larvas de esta especie son oligofágicas sobre *Marrubium* spp. (Lamiaceae), de las que *M. peregrinum* L. está ampliamente distribuida en la zona de estudio. Investigamos 14 biotopos durante 2021-2023 con ayuda de atrayentes sexuales atrayentes y hallamos poblaciones de *Ch. efetovi* en cuatro de ellos. Hemos aclarado los periodos de estacional y diaria actividad de esta especie en la región.
Palabras clave: Lepidoptera, Sesiidae, *Chamaesphecia*, *Ch. efetovi*, Territorio de Krasnodar, Cáucaso noroccidental, Rusia.

Introduction

By this publication, we continue our series of articles devoted to the study of the family Sesiidae in the Crimean Peninsula and adjacent territories (Efetov et al. 2012a, 2012b; Efetov & Gorbunov, 2021; Gorbunov, 2019a, 2019b; Gorbunov & Efetov, 1990, 2016, 2018).

Chamaesphecia efetovi O. Gorbunov (Figures 1-2) was described in 2019 from the Crimea, Volgograd Region and Stavropol Territory (Russia). Recently it was recorded from Saratov Region (Anikin & Glinskaya, 2023). This species is also known from Romania, Bulgaria, and Serbia (Efetov & Gorbunov, 2021). As it was assumed that this species can also be distributed in adjacent territories, we decided to investigate Krasnodar Territory (north-western part of the Northern Caucasus, Russia),

where the larval hostplant *Marrubium peregrinum* L. (Lamiaceae) is widely distributed. For this purpose, 14 biotopes (Figure 3) with *M. peregrinum* were studied during 2021-2023.

Abbreviations

The material studied is kept in the following collections abbreviated in the text as:

CKAE Collection of Konstantin A. Efetov, V. I. Vernadsky Crimean Federal University, Simferopol, Crimea
CVIS Collection of Valeriy I. Shchurov, Krasnodar, Russia
COGM Collection of the A. N. Severtsov, Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow, Russia

Methods

The specimens of *Ch. efetovi* were attracted to artificial female sex pheromone for sesiid moth *Synanthedon vespiformis* (Linnaeus, 1761), produced by PHEROBANK®, Wijk bij Duurstede, the Netherlands. Besides many pluses, the application of the female sex attractants has a negative aspect: this method allows to collect mainly males (Can et al. 2019; Can Cengiz et al. 2018; Efetov et al. 2011, 2014a, 2014b, 2015, 2016, 2018, 2019; 2022, 2023; Efetov & Gorbunov, 2021; Gorbunov & Efetov, 2018; Razov et al. 2017; Subchev et al. 2016; Vrenozi et al. 2019). The females (Figure 1) are coming to the attractant extremely rare and were mainly collected by net when flying around the larval hostplant.

The parameters of temperature and humidity in the studied localities were determined using automatic calibrated Testo data loggers (Testo 174H). All our searches were accompanied by the determination and recording of the geographical coordinates of the surveyed areas using Garmin devices. Photos were taken by the first author with a SONY RX100 V camera and by the second author with Nikon COOLPIX AW100 and FUJIFILM FinePix SL260 cameras. The pattern of points in Figure 3 is visualized using Garmin BaseCamp Version 4.7.5 and OziExplorer Version 3.95.6f. The numbers of the points in the Figure 3 (map of the region) are placed in the text in square brackets [1-14].

Results

We studied 14 biotopes with *Marrubium peregrinum* L. in Krasnodar Territory (Russia) during 2021-2023 (Figure 3). As *Ch. efetovi* is an univoltine species with flight period in June-July, our investigations were undertaken mainly in these two summer months.

1. Krasnodar Territory, Temryuk District, Taman' Peninsula, western shore of the Tsokur estuary, Lysaya Mountain, Yakhno garden, steppe with bushes, altitude 9 m above sea level, 45º09.480'N, 36º58.198'E, [1] (Figure 4): 23-VI-2022; time of the day 7:30 - 9:35; the air temperature is +23.5…24.9ºC; no specimens attracted, V. I. Shchurov; 09-VII-2022, time of the day 15:50 - 18:15; the air temperature is +32.2…29.0ºC; 8 ♂, 1 ♀ (Figure 1) of *Ch. efetovi* collected (CKAE, CVIS, COGM), V. I. Shchurov, K. A. Efetov & D. A. Govorukha leg. We also observed one specimen ♂ of *Ch. efetovi* caught by the nymph *Hierodula transcaucasica* (Brunner von Wattenwyl, 1878) (Mantidae) on a larval hostplant (Figure 2).

2. Krasnodar Territory, Temryuk District, Taman' Peninsula, southern shore of the Tsokur estuary, dry meadow, altitude 42 m above sea level, 4509.386'N, 3657.277'E, [2], 9-VII-2022, time of the day 12:00 - 12:30; 1 ♂ of *Ch. efetovi* collected (CKAE), K. A. Efetov & D. A. Govorukha leg.

3. Krasnodar Territory, Ust-Labinsk District, near Nekrasovskaya village, Laba River valley, high bank, steppe, 15-VII-2022, [3] (Figure 5), V. I. Shchurov: altitude 74 m above sea level; geographical coordinates 45º07.457'N, 39º 49.027'E; date 2-VII-2022; time of the day 17:45 - 19:20; the air temperature is +31.1…27.9º C; no specimens attracted, V. I. Shchurov, altitude 74 m above sea level;

geographical coordinates 45º07.457'N, 39º49.027'E; date 15-VII-2022; time of the day 17:28 - 17:31, 18:05; the air temperature is +39.8…34.9º C; 3 ♂ of *Ch. efetovi* collected (CVIS), V. I. Shchurov leg., altitude 78 m above sea level; geographical coordinates 45º07.358'N, 39º49.218'E; date 15-VII-2022; time of the day 18:50 - 20:00; the air temperature is +31.6…26.6º C; no specimens attracted, V. I. Shchurov.

4. Krasnodar Territory, Temryuk District, Taman' Peninsula, shore of the Taman' Bay near Sennoy village, steppe, altitude 9 m above sea level, 45º16.568'N, 36º58.195'E, [4], 23-VII-2022, time of the day 17:30 - 18:06; the air temperature is +32.0º C; no specimens attracted, V. I. Shchurov, T. N. Shchurova.

5. Krasnodar Territory, Temryuk District, Taman' Peninsula, shore of the Akhtanizovskiy estuary, Borisoglebskaya Mountain, steppe, altitude 3 m above sea level, 45º16.791'N, 37º06.052'E, [5], 23-VII-2022, time of the day 16:15 - 17:00; the air temperature is +29.7 … 32.5º C; no specimens attracted, V. I. Shchurov, T. N. Shchurova.

6. Krasnodar Territory, Temryuk District, Taman' Peninsula, Temryuk Bay, seaside clay cliffs near Golubitskaya village, steppe, altitude 5 m above sea level, 45º19.744'N, 37º15.826'E, [6], 13-VII-2021, time of the day 15:00 - 15:30, 18:00 - 18:20; no specimens attracted, K. A. Efetov, O. G. Gorbunov, M. S. Efetov.

7. Krasnodar Territory, Yeysk District, southern shore of the Lake Khanskoye, a very large population of *M. peregrinum*, east of Yasenskaya Pereprava village, (Figure 6) altitude 2 m above sea level, 46º14.679'N, 38º18.132'E, [7]: 03-VIII-2022, time of the day 18:00 - 18:20; the air temperature is +29.1º C; no specimens attracted, V. I. Shchurov; 14-VII-2023, time of the day 17:50 - 18:05, strong wind, many males were attracted (more than 15 specimens in the first 5 minutes), 2 ♂ were collected (CVIS), V. I. Shchurov leg.

8. Krasnodar Territory, Yeysk District, northern high shore of the Lake Khanskoye, steppe, altitude 1 m above sea level, 46º18.861'N, 38º19.222'E, [8], 03-VIII-2022, time of the day 16:50 - 17:20; the air temperature is +32.2…30.5º C; no specimens attracted, V. I. Shchurov.

9. Krasnodar Territory, Yeysk District, northern shore of the Beysug estuary, sandy embankment between the Lake Khanskoye and the Beysug estuary, steppe under the crowns of *Styphnolobium japonicum* (L.) Schott forest crops, altitude 3 m above sea level, 46º14.068'N, 38º18.615'E, [9], 04-VIII-2022, time of the day 08:05 - 08:45; the air temperature is +27.6…30.2º C; no specimens attracted, V. I. Shchurov.

10. Krasnodar Territory, Tbilisskaya District, near Tbilisskaya village, Kuban' River valley, steppes on a high bank, altitude 87 m above sea level; geographical coordinates 45º21.204'N, 40º 05.927'E, [10], date 15-VII-2022; time of the day 15:50 - 16:25; the air temperature is +35.2…34.9º C; no specimens attracted, V. I. Shchurov.

11. Krasnodar Territory, Pavlovskaya District, near Nezamayevskaya village, Yeya River valley, Glinyanaya gully, refuge of the steppe in the agricultural landscape, altitude 33 m above sea level; geographical coordinates 46º08.037'N, 40º19.655'E, [11], date 8-VII-2022; time of the day 7:00 - 8:00; the air temperature is +22.6…23.6º C; no specimens attracted, V. I. Shchurov.

12. Krasnodar Territory, Uspenskaya District, Stavropol' upland, near Priozyornyy village, steppe on the eastern shore of the Lake Maloye, altitude 323 m above sea level, 44º58.877'N, 41º21.643'E, [12], 29-VII-2022, time of the day 16:04 - 16:24; the air temperature is +35.8…34.3º C; no specimens attracted, V. I. Shchurov.

13. Krasnodar Territory, Uspenskaya District, Stavropol' upland, Nedryemannyy mountain range, Baba Mountain, steppe on the sources of the Zemzyul'ka 1st gully, rare plants of *M. peregrinum*, altitude 587 m above sea level, 44º 55.350'N, 41º 30.394'E, 22-VII-2023, [13], time of the day 17:30 - 18:10; no specimens attracted, V. I. Shchurov, T. N. Shchurova.

14. Krasnodar Territory, Anapa District, the northern shore of the Vityazevskiy estuary to the east of the village of Blagoveshchenskaya, local area of the steppe with rare plants *M. peregrinum*, altitude 1 m above sea level, 45º03.448'N, 37º12.283'E, [14], 03-VIII-2023, time of the day 17:25 - 18:05; the air temperature is +30.2…28.3º C; no specimens attracted, V. I. Shchurov.

Biology

The larvae of *Ch. efetovi* live in the roots of *M. peregrinum* (Gorbunov, 2019b; Efetov & Gorbunov, 2021). This species is on the wing from the end of June to the end of July. Sometimes males arrive to the pheromone in large numbers in a few minutes. Males come to attractants mainly in the late afternoon (but flight of these moths in the region always stopped before 18:15). That is why our attraction were effective only in the afternoon time and did not give results when we studied biotopes in the morning time. Our observations show that the local abundance of *Ch. efetovi* directly depends on the area and density of the *M. peregrinum* population. Obviously, the number of these moths depends on the frequency of steppe fires.

Range of *Ch. efetovi*

Russia: Saratov Region, Volgograd Region, Stavropol Territory, Krasnodar Territory, Crimea; Romania, Bulgaria, Serbia. *Ch. efetovi* is most probably distributed also in adjacent territories, for example, in the other regions of the Northern Caucasus where *M. peregrinum* is present.

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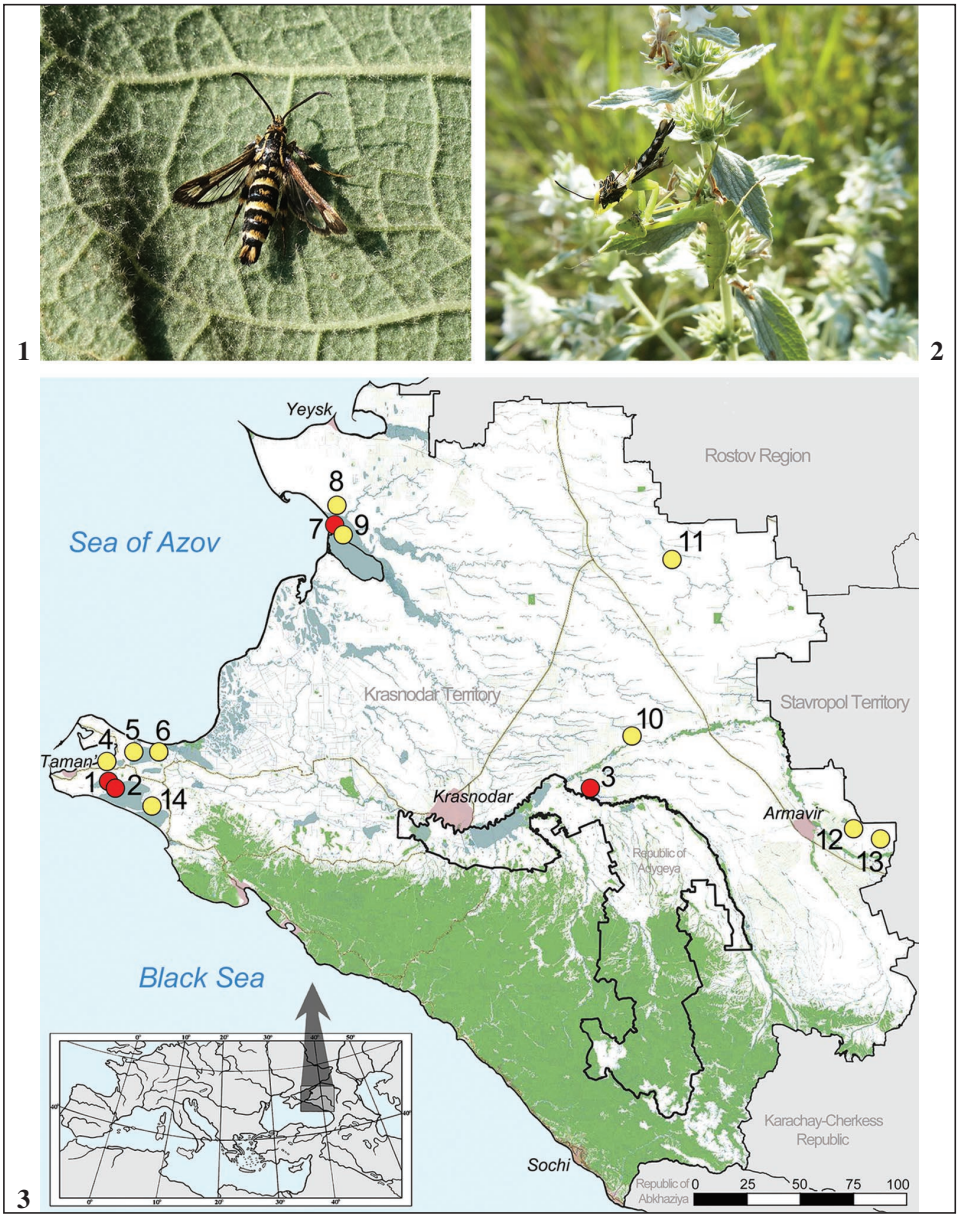

Figures 1-3. 1. Female of *Chamaesphecia efetovi*, Krasnodar Territory, Temryuk District, Taman' Peninsula, western shore of Tsokur estuary, Lysaya Mountain, Yakhno garden, 9-VII-2022 (photo: K. A. Efetov). **2.** The male of *Ch. efetovi* caught by the nymph of *Hierodula transcaucasica* (Brunner von Wattenwyl, 1878) on a larval hostplant. Yakhno garden, 9-VII-2022 (photo: V. I. Shchurov). **3.** Distribution of *Ch. efetovi* in Krasnodar Territory. Dots show studied localities, red dots - localities where this species was found. The numbers of the localities in the Figure 3 are explained in the text and marked with square brackets [1-14].

Figures 4-6. Biotopes in Krasnodar Territory where *Chamaesphecia efetovi* was found. **4.** Temryuk District, Taman' Peninsula, western shore of Tsokur estuary, Lysaya Mountain, Yakhno garden (locality [1]), 2022 (photo: K. A. Efetov). **5.** Ust-Labinsk District, near Nekrasovskaya village, Laba River valley (locality [3]), 2022 (photo: V. I. Shchurov). **6.** Yeysk District, southern shore of Lake Khanskoye, east of Yasenskaya Pereprava village (locality [7]), 2022 (photo: V. I. Shchurov).

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Description of *Scythris quinquepraedia* Garre & Ortiz, sp. nov. from the Iberian Peninsula (Lepidoptera: Scythrididae)

Manuel Garre & Antonio S. Ortiz

Abstract

A new *Scythris* species (Lepidoptera: Scythrididae), *S. quinquepraedia* Garre & Ortiz, sp. nov., is described from the Iberian Peninsula. Male adult and genitalia are illustrated and the genetic distance, based on DNA barcodes are compared against the closely species of *pascuella-, punctivittella*- and *seliniella*-group from the public BOLD database.
Keywords: Lepidoptera, Scythrididae, *Scythris quinquepraedia*, new species, taxonomy, DNA barcoding, Iberian Peninsula.

Descripción de *Scythris quinquepraedia* Garre & Ortiz, sp. nov. de la Península Ibérica (Lepidoptera: Scythrididae)

Resumen

Se describe *Scythris quinquepraedia* Garre & Ortiz, sp. nov. (Lepidoptera: Scythrididae) en la Península Ibérica utilizando la morfología del adulto macho, el andropigio y la distancia genética, basada en códigos de barras de ADN que se compara con las especies cercanas de los grupos *pascuella*, *punctivittella* y *seliniella* disponibles en la base de datos en The Barcode of Life (BOLD).
Palabras clave: Lepidoptera, Scythrididae, *Scythris quinquepraedia*, nueva especie, taxonomía, ADN código de barras, Península Ibérica.

Introducción

The family Scythrididae is a medium-sized family within the Gelechioidea, with approximately 669 species worldwide (Nieukerken et al. 2011) and currently reaching 923 species (Falck 2023). The family have a great diversity in the Mediterranean area with most species belonging to the genus *Scythris* Hübner, [1825] with more than 400 species (Bengtsson, 1997). The checklist of Scythrididae of Spanish mainland comprises 109 species according to Vives Moreno (2014: 102 species) that considers *Scythris flavilaterella* (Fuchs, 1886) and *Scythris lampyrella* (Constant, 1865) as synonyms of *Scythris cuspidella* ([Denis & Schiffermuller], 1775), with later addition of *Enolmis delnoydella* Groenen & Schreurs, 2016 and *Scythris spiniferella* Nupponen & Savenkov, 2019 described based on Spanish material (Groenen & Schreurs, 2016; Nupponen & Savenkov, 2019) and new records for the Iberian Peninsula as *Scythris camelella* Walshingham, 1907 (Richter & Sumpich, 2020), *Scythris larzacensis* Delmas, 2010 (Requena & Pérez De-Gregorio, 2017) and *Scythris sinensis* (Felder & Rogenhofer, 1875) (Corley et al. 2021).

The use of DNA barcoding as an effective tool for species diagnosis in the animal kingdom has

been proposed as the best option to overcome the gap between existing taxonomic information and the need for efficient and reliable species identification, particularly for butterflies (Hebert et al. 2003). DNA barcoding provides a fast and inexpensive alternative strategy for identifying described species and discovering new species (Hebert et al. 2003; Savolainen et al. 2005; Mitchell, 2008). Combining molecular methods with morphological species identification can speed up biodiversity inventories and help elucidate the status of suspect species.

The present investigation was prompted by results obtained during an effort to barcode all Macroheteroceran Lepidoptera species in the Iberian Peninsula, which revealed that new *Scythris* specimens were grouped into unique sequence clusters. The species collected from Spain differs from other *Scythris* species in morphological and molecular traits and is described here as a new species, *Scythris quinquepraedia* Garre & Ortiz, sp. nov.

Material and Methods

The images of the adults (Figure 1A) were taken with a Nikon D70 digital camera. Images were z-stacked using the software Zerene. Morphology of the male genital structures (Figure 1B) were studied using a Zeiss Stemi 508 stereomicroscope with a Zeiss Axiocam ICc5 digital camera and were compared with those published by Bengtsson (1997) and, subsequently, he was asked for his personal opinion on its taxonomic status. Specimens were deposited in the Research Collection of Biología Animal in the Department of Zoology and Physical Anthropology of the University of Murcia (Spain).

Tissue of unique sample was processed and sequenced at the Canadian Centre for DNA Barcoding (CCDB, Guelph) to obtain DNA barcodes using the standard high-throughput protocol described by deWaard et al. (2008) which can be accessed at www.dnabarcoding.ca/pa/ge/research/protocols. Voucher data, GPS coordinates, images, sequences, Genbank Accession, and trace files are publicly available through the public data set (dx.doi.org/10.5883/DS-SCYTHRIS) in BOLD.

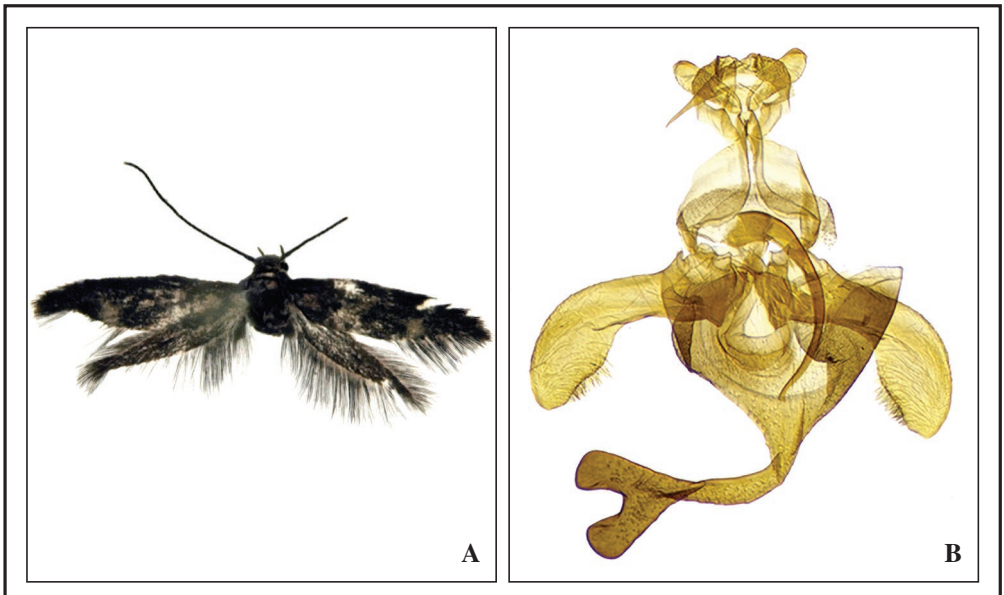

Figure 1. Adult specimen of *Scythris quinquepraedia* sp. n. **A.** Male holotype AOCLep02710. **B.** Male genitalia AOCLep02710.

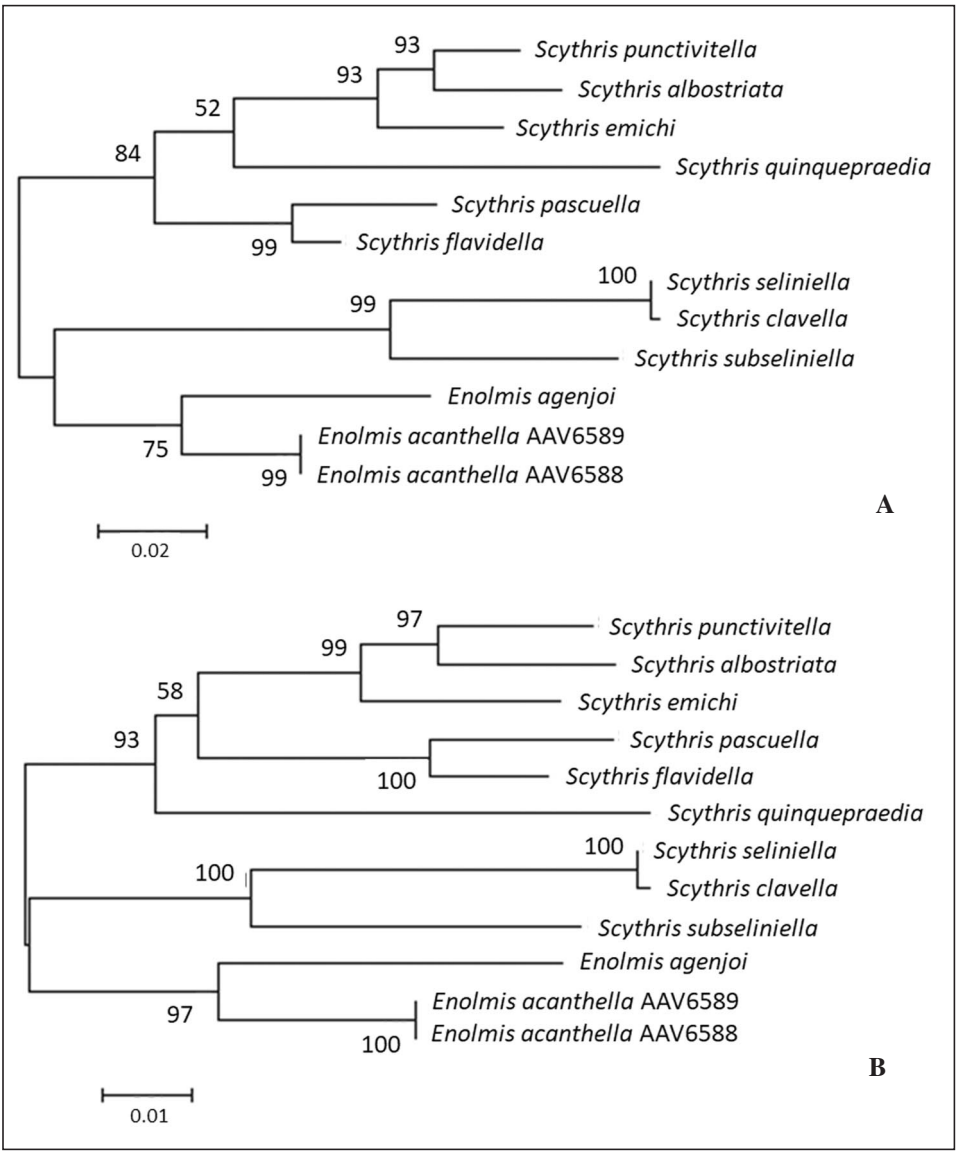

Figure 2. Phylogenetic trees obtained from 46 nucleotide COI sequences. **A.** Maximum Likelihood tree. **B**. Neighbour-Joining tree. The depth of each branch shows divergence within lineages. Bootstrap values are provided at major nodes. The scale bar represents 0.01 genetic difference.

Sequence was compared to a reference library of Lepidoptera barcodes using the identification engine (BOLD-ID). The reference barcode database for Scythrididae used by BOLD-ID is continually validated by specialists to ensure accurate identifications and is particularly well parameterized due to a global campaign to barcode the 618 species of the family (accessed May 20, 2024).

Sequence divergences for the barcode region were calculated using the Kimura 2-parameter (K2P) model (Kimura 1980) and the degrees of interspecific genetic variation were calculated using the analytical tools of BOLD. All the new and public species sequences were downloaded and aligned with the CLUSTAL algorithm of the MEGA6 software (Tamura et al. 2013). Boot-strap values were calculated with 1000 replicates, and initial Neighbor-joining (NJ) and Maximum Likelihood (ML) trees based on distance were constructed with the MEGA6 software. We selected other *Scythris* species as *S. flavidella* Preissecker, 1911 and *S. pascuella* (Zeller, 1855) belonging to *pascuella* species group; *S. albostriata* Hannemann, 1961, *S. punctivittella* (Costa, [1836]) and *S. emichi* (Anker, 1870) belonging to *punctivittella* species group; and *S. clavella* (Zeller, 1855), *S. seliniella* (Zeller, 1839) and *S. subseliniella* (Heinemann, [1876]) belonging to *seliniella* species group for congeneric comparison and, *Enolmis acanthella* (Godart, 1824) and *Enolmis agenjoi* Passerin d'Entrèves, 1988, which are taxonomically related into family Scythrididae (Bengtsson, 1997), as outgroups to root the trees. In order to assess the COI divergences between the taxa, we included all sites with the pairwise deletion option. All trees presented similar topology with some differences in the position of *S. quinquepraedia* and, therefore, both trees (ML and NJ) are presented here (Figures 2A, B). Because one gene is far too little for reasonable phylogenetic analysis (Gatesy et al. 2007), the trees presented here do not reliably illustrate evolutionary relationships among the sequenced taxa.

Results and discussion

Scythris quinquepraedia Garre & Ortiz, sp. nov.

Barcode Index Number. BOLD:AFB2144

Type material: Holotype, Spain, 1 ♂, Murcia, Alquerías [coordinates 38.007, -1.033], 32 m altitude, 28-VIII-2020, leg. M. Garre, Genprep and BOLD sample ID: AOCLep02710.

Diagnosis: *S. quinquepraedia* is easly confused with other dark, small Scythrididae by the external appearance. All characters indicate that belongs to the *S. pascuella* species group, which initially comprised 13 species (Bengtsson, 1997) and actually includes 36 species (Savela, 2024). Externally this group is characterized by unicolorous and dark fuscous forewing, sometimes with greenish lustre and glossy but exceptions can be seen in specimens from North Africa and in the east part of the Mediterranean area. Uncus prominent, bifurcate; gnathos curved, pointed and somewhat hooked. Aedeagus medium-sized, slightly curved, pointed. Valvae longish, bent, with rounded or tapering ends. Sternum 8 subtriangular with a posterior furcation. In female genitalia for species of this group no common feature has been observed (Bengtsson, 1997). Examination of the male genitalia is essential for safe determination of *S. quinquepraedia.*

Description (Figure 1A): Wingspan 9.4 mm. Head and haustellum covered with golden, appressed, slender, parallel-sided scales oriented longitudinally. Labial palp slightly upturned, right, terminal segment brownish pointed and segments 2-3 yellowish white mottled. Antenna blackish brown, approximately the same length as the forewing. Vertex, neck tuft, collar, tegula and thorax dark brown, mottled dorsally with golden scales, especially around the neck and thorax, and ventrally with silver glossy scales. Forewing dark brown mottled with bright white scales. Whitish fringe in the antemedian fascia degradated through submedian interfascia to the base. Hindwing width about 1/2 of the forewing, dark grey. Abdomen greyish mottled with golden scales.

Male genitalia (Figure 1B): Unique and very easy to identify when it is compared with the other species in the family Scythrididae. Uncus with a roundish and minutely warted plate, slightly incurved posteriorly. Gnathos broad at base, then tapering, straight and pointed. Socii rounded at tip, long and setose. Valvae symmetrical, club-shaped, strongly bent in posterior half; at tip furnished with a dense row of short bristles. Tergum 8 as a squarish and warty plate. Sternum 8 subtriangular, posterior extension very long with bifurcated apex; prongs short and thick. Aedeagus long, evenly curved and tapering to the tip.

Distribution and abundance: Probably, an endemism from southeast of the Iberian Peninsula

(known only from one locality in the Murcia Region). Scarce and local in agricultural landscape of Huerta de Murcia.

Biology: Flight period end-August, most likely in a single generation in the Huerta of Alquerías. This characterized by an ancient canal network feeds an agricultural landscape watered by the Segura River through an ancient canal network. The primary crops are citrus groves with natural vegetation in the margins of paths, borders of crops, abandoned fields and banks of irrigation canals. With the exceptions of some hygrophilous plants as *Phragmites australis* (Cav.) Trin. ex Steud., *Arundo donax* L. and *Apium nodiflorum* (L.) Lag., nitrophilous and ruderal species predominate (Figure 3). Early stages unknown.

Genetic remarks: BIN BOLD:AFB2144 (n=1; Table 1; sequence length 658 bp). Based on COI divergence, the new species is separated from the other *Scythris* species compared in our study by genetic distances of 11.4% (mean divergence; n= 43) (Figure 2). This value is high compared to 10.2% mean divergence among all the studied species (Table 2, Figure 2) and belongs to a phylogenetically *S. pascuella* isolated lineage well supported by morphology and genetic data.

Table 1. Interspecific mean K2P (Kimura 2-Parameter) divergences (mean pairwise distances in %) based on the analysis of COI fragments (>500 bp) among *Scythris quinquepraedia* and other *Scythris* species (SPU: *S. punctivittella*; SEM: *S. emichi*; SFL: *S. flavidella*; SPA: *S. pascuella*; SQU: *S. quinquepraedia*; SCL: *S. clavella*; SSE: *S. seliniella;* SSU: *S. subseliniella*).

	SPU	SEM	SFL	SPA	SQU	SCL	SSE	SSU
Scythris albostriata	3.9	5.2	8.8	8.8	10.2	13.0	12.7	11.1
Scythris punctivittella		4.9	8.7	8.8	10.8	13.0	12.7	11.6
Scythris emichi			8.2	8.8	8.8	12.9	12.6	12.2
Scythris flavidella				4.0	9.9	13.1	12.8	12.5
Scythris pascuella					10.9	14.3	14.0	13.0
Scythris quinquepraedia						14.0	13.7	12.8
Scythris clavella							0.3	8.1
Scythris seliniella								7.8

Derivation of name: Lat. *quinque* = five and *praedia* = farm, refers to the original name of the locality of the first studied specimen, in Spanish Cinco Alquerías, actually the locality of Alquerías, a district belonging to the municipality of Murcia (Spain).

Molecular analysis: DNA barcoding data results obtained in our study indicate that *Scythris quinquepraedia* sp. n. is rather isolated from other congeneric species studied and, even, from *Enolmis* species (Figure 2). Interspecific distances of the new species compared to the other *Scythris* species spanned from 8.8% to *S. emichi* and 14.0% to *S. clavella* and differs from the rest of the *Scythris* species with mean values of 10.2% (Table 2). Differences in barcode sequences were higher than 2% and, according to Hausmann et al. (2011), in different groups of invertebrate taxa, a sequence divergence in the barcode region higher than 2% are typical of interspecific variation and recognized as distinct MOTUs, while lower values often correspond to intraspecific differences.

A phylogenetic hypothesis with Neighbour-Joining (NJ) and Maximum Likelihood (ML) trees of COI barcode region were generated using MEGA software and all the species studied could be unequivocally assigned to one of the clades (Figure 2). The monophyly of the genera *Scythris* was recovered by all those methods and the molecular results enable to preliminarily division into four Scythrididae species groups, *punctivittella*-, *seliniella*- and *pascuella*-group, and the *Enolmis* species, as outgroups to root the tree (Figure 2). Nevertheless, *Scythris quinquepraedia* differs from each *punctivittella*- and *pascuella*-group by 10.1% (Mean K2P distance) and the species is placed in a different position depending on ML or NJ trees construction (Table 2, Figure 2). We are trying to capture new specimens for comparisons and confirm all the differences found in male genitalia and barcode.

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Two new species of *Rhodochlora* Warren, 1894 of the Neotropics (Lepidoptera: Geometridae, Geometrinae)

Jaan Viidalepp, Lennart Lennuk & Aare Lindt

Abstract

Rhodochlora Warren, 1894 is a Neotropical genus of the largest and most attractive species of their kind. This article aims to characterize two additional species. *Rhodochlora rufaria* Warren, 1909 is a well-characterized species ranging from Peru to Venezuela. *Rhodochlora elias* Viidalepp, sp. nov. has similar wing markings to *R. rufaria* but differs in the shape of the lateral appendages of the uncus and has an eastern distribution in South America. Another new species, *Rhodochlora ylle* Lindt, sp. nov. from Costa Rica, resembles the western Neotropical *Rhodochlora brunneipalpis* Warren, 1894 in its wing markings, but again, it is morphologically different, and confined to the fauna of Mesoamerica.
Keywords: Lepidoptera, Geometridae, Geometrinae, *Rhodochlora*, vicariant distributions, new species, French Guiana, Costa Rica.

Dos nuevas especies de *Rhodochlora* Warren, 1894 del Neotrópico (Lepidoptera: Geometridae, Geometrinae)

Resumen

Rhodochlora Warren, 1894 es un género Neotropical de las especies más grandes y atractivas de su género. Este artículo pretende caracterizar dos especies adicionales. *Rhodochlora rufaria* Warren, 1909 es una especie bien caracterizada que se extiende desde Perú hasta Venezuela. *Rhodochlora elias* Viidalepp, sp. nov. tiene marcas alares similares a *R. rufaria* pero difiere en la forma de los apéndices laterales del uncus y tiene una distribución oriental en Sudamérica. Otra especie nueva, *Rhodochlora ylle* Lindt, sp. nov. de Costa Rica, se parece a la Neotropical occidental *Rhodochlora brunneipalpis* Warren, 1894 en las marcas alares, pero de nuevo es morfológicamente diferente y está confinada a la fauna de Mesoamérica.
Palabras clave: Lepidoptera, Geometridae, Geometrinae, *Rhodochlora,* distribuciones vicariantes, nueva especie, Guayana Francesa, Costa Rica.

Introduction

Warren (1894) described the genus *Rhodochlora* for a beautiful Neotropical looper moth *Achlora roseipalpis* Felder & Rogenhofer, 1875. Warren (1909) later added descriptions of several other Neotropical species, among them *Rhodochlora brunneipalpis* Warren, 1894 with two forms, f. *minor* Warren, 1909 and f. *rufaria* Warren, 1909. Prout (1932) raised the status of *R. rufaria* to species (based on its reddish tinged wing colour), and Pitkin (1996) showed the morphological differences between *R. rufaria* and other species of the genus but retained this species in the same genus as *Rhodochlora*

rufaria. Here we propose descriptions of two new species related to *Rhodostrophia brunneipalpis* and *R. rufaria*.

Hausmann (2017) added descriptions of more species of *Rhodochlora* and divided the species into five species groups (the *exquisita* species group, the *trifasciata* species group, the *basicostalis* species group, the *albipunctata* species group, and the *roseipalpis* species group) based on DNA analysis and morphological data. *R. rufaria* is grouped with *R. exquisita* Warren, 1905, *R. claushippi* Hausmann, 2017, *R. gaujoniaria* (Dognin, 1892), *R. sordida* Hausmann, 2017 and *R. brechlini* Hausmann, 2017 in the *Rhodochlora exquisita* species group. The species included in this group share a dirty green ground colour on the wings, and some red hue medially on the hindwing. The genitalia of a male *R. rufaria* specimen from Peru is illustrated and one Ecuadorian specimen (EC BOLD:ACL1812) is also used in the analysis by Hausmann (2017). *R. rufaria* seems rare in collections.

Warren (1894) described the "forms" of *Rhodochlora brunneipalpis* as follows: "… ab. *Rufaria* demands a more detailed description. To a certain extent it resembles *R. exquisita* Warren, 1905, but it is not marked so brightly red. The outer line of forewing is redder and thicker than in the type [of *brunneipalpis*], and is followed by red spots between the veins, the lower of which forms a red blotch at anal angle. In the grey-green central band beyond the yellow base is followed by a broad space of dull rufous, which extends to beyond the postmedian line and leaves only a comparatively narrow marginal border of green. On the underside the red-brown blotch at apex of hindwing, which is well developed and conspicuous, and red on forewing shows in several places. In many respects it answers the description of *gaujoniaria* (Dognin). But the face and head are bright red and not deep black…"

Prout (1932) characterized the wing markings of the genus and divided it into two groups: a) twelve species that have a hair pencil, and two pairs of spurs close together on the hindlegs, including *R. rufaria* and *R. brunneipalpis*, and b) two species without a hair pencil and with reduced proximal spurs of the hindtibia (*R. exquisita* Warren, 1905 and *R. trifasciata* Warren, 1909). Hausmann (2017) does not accept such a division, as he has found sister species differing in the build of the male hindlegs.

Pitkin (1996) stressed the different shape of the socii in *R. rufaria* and larger lobes at the distal edge of the eighth abdominal sternite in the male. She found that the number of hindtibial spurs, the presence of a hair pencil, and the apical extension of male hindtibia vary across species of *Rhodochlora*.

Rhodochlora rufaria Warren, 1909 (Figures 1, 7, 8)
Rhodochlora rufaria Warren, 1909. *Novit. zool., 15*, 87
Type locality: Peru.

Material studied: Ecuador, Napo prov., Archidora, 1 ♂, 02-X-1999, T. Kesküla leg.; Loreto, 400 m, 1 ♂, 13-II-2008, 00º36'49"S, 77º18'10"W, gen. prep. 8151, A. Lindt leg., IZBE0121419. Peru, Lagunas, 120 m, 1 ♂, 30-XI-2003, 05º14'14"S, 75º35'44"W, A. Lindt leg., IZBE0122450.

Diagnosis: *Rhodochlora rufaria* Warren belongs to the *Rhipignophos gaujoniaria* species group (Hausmann, 2017). It differs from all described *Rhodochlora* species, except the species *R. elias* sp. n. described below, in having large, broad, flat socii arising from the uncus base beside of uncus process. This character is combined with the specific uncus shape (filiform) and vinculum shape (almost rectangular) in the male genitalia. The specimens of *R. rufaria* from Peru and Ecuador and *R. elias* from French Guiana do not differ in their wing markings.

Characteristics: *Rhodochlora rufaria* has been well characterized previously and we need only to make some additions to this (Figure 1). Male genitalia (Figure 7) relatively large with vinculum almost rectangular shape, shorter than tegumen (see also Pitkin 1996, fig. 124). Uncus long, thin, filiform, about 0.8 mm long in the western Ecuadorian specimen, about 0.6 mm long in the Peruvian specimen. Valva rounded, broad in middle and rounded at apex. Socii flat (Figure 8), saccular part broadly rounded, medially constricted and downcurved at apex; socii provided with a broad, ventrally tooth-edged black sclerite. This sclerite is broader in its distal 2/5 part in the French Guiana than in the Peruvian specimen. Last sternite of male bidentate at posterior edge. Aedeagus thin, tubular, 3 mm

long, distally thicker, dorsally split and provided with two fine dentate ridges differing from those in the Peruvian (Lagunas) specimen: about five denticles on both sides, longer and sharper, and wider apart. In the specimen from Peru, these structures are close to one another and provided with about seven triangular denticles each. The tegumen + vinculum ring is solid, thicker than in the *R. furcata* of the Peruvian specimen, rectangular ventrally. The valvae are simple oval flaps, with the distal fourth of its dorsal edge darker.

Female genitalia with antrum broad and ostium cup-shaped, differing slightly in edge sclerotization.

***Rhodochlora elias* Viidalepp, sp. nov.** (Figures 2, 4, 5, 9, 10)

Material studied: Holotype: 1 ♂, French Guiana, Kaw Mts., Amazone Nature Lodge, 18-X-2006, J. & V. Viidalepp leg., IZBE0120930, (gen. prep. 9127). Paratypes: 21 ♂, 8 ♂, French Guiana, Kaw Mts., Amazone Nature Lodge, 13-20-X-2006, J. & V. Viidalepp leg., IZBE0120928, IZBE0120931, IZBE0120932, IZBE0120933; Camp Caiman, Kaw Mts., 5 ♂, 1-2-II-2005, 04º34'N, 52º11'W, S. Põlme leg., IZBE0120934, IZBE0120935; Belizon Road, 2 ♂, 1 ♀, 4-I-2003, V. Soon leg., IZBE0120936, IZBE0120937; the same locality and collector, 3 ♂, 8-I-2003, IZBE0120938, IZBE0120940, IZBE0120943; Belizon Road, 3 ♂, 6-XI-2002, 4-I-2003, 26-XI-2002, V. Soon leg., IZBE0120945, IZBE0120944, IZBE0120942, (gen. prep. 7038); Amazone Nature Lodge, 300 m, 1 ♂, 2 ♂, 12-16-I-2023, 04º33'35"N, 52º12'25"W, TAMZ0242535, TAMZ0242536; Rd. Roura - Kaw, 235 m, 1 ♂, 1 ♀, 23-I-2023, 04º38'38"N, 52º18'00"W, TAMZ0242537; Amazone Nature Lodge, 300 m, 3 ♂, 1 ♀, 24-28-I-2023, 04º33'35"N, 52º12'25"W, TAMZ0242538, TAMZ0242539 A. Lindt leg.; Rd. Roura - Kaw, 285 m, 1 ♂, 25-I-2023, 04º33'47"N, 52º11'32"W; Rd. Roura - Kaw, 285 m, 1 ♂, 26-I-2023, 04º33'47"N, 52º11'32"W; Rd. Roura - Kaw, 285 m, 1 ♂, 27-I-2023, 04º33'47"N, 52º11'32"W Tasane leg.; Kaw Mts., Camp Caiman, 300 m, 2 ♂, 05-II-2008, 04º34'N, 52º12'W; 30 km E St. Laurent du Maroni, 100 m, 1 ♂, 10-II-2008, 05º27'N, 53º47'W; Mt. Singes 15 km S Kourou, 30 m, 1 ♀, 11-II-2008, 05º03'N, 52º41.6'W Renge leg. The holotype is deposited in the IZBE collection of the Estonian University of Life Sciences (Tartu, Estonia). The paratypes are in the IZBE insect collection (Tartu) and the TAMZ insect collection of the Estonian Museum of Natural History (Tallinn) and in the private collections of A. Lindt, T. Tasane, and I. Renge.

Description: Wing markings grey and suffused on dull light green ground colour (Figure 2), as in the sister species *Rhodochlora rufaria* (Figure 1), differing so from other congeners. Wingspan 31-34 mm (Figure 2) in males, 36-41 mm (Figure 4) in females. Male hind tibia with two pairs of long spurs (Figure 5), which are close together, hind tibia provided with a hair pencil. Male antennae thinly bipectinate in basal half (Figure 5), filiform in female. Male with frenulum present.

Male genitalia (Figure 9) are well chitinized, except the uncus, which is thin filiform, about 0.8 mm long. The tegumen + vinculum ring is solid, thicker than in Peruvian *R. rufaria*, rectangular ventrally. The valvae are simple oval flaps, with a darker distal fourth of the dorsal edge. Socii (Figure 10) are almost parallel-sided flaps, about three times as long as wide, apices downcurved, with a medial ridge reaching the edge of the downcurved apex. In French Guiana moths, the ridge is broader in its distal 2/5 compared to the Peruvian specimen. Aedeagus 3 mm long, filiform, distally thicker, dorsally split and provided with two fine dentate ridges that differ from those in the Peruvian (Lagunas) specimen: about five denticles on both sides longer and sharper, and wider apart. These ridges are close to one another in the specimen from Peru and provided with about seven triangular denticles each.

Female genitalia with antrum broad and ostium cup-shaped, differing slightly from *R. rufaria* female in edge sclerotization.

Diagnosis: *Rhodochlora elias* Viidalepp, sp. nov. belongs to the *Rhipignophos gaujoniaria* species group (Hausmann, 2017). The new species differs from the Western Neotropical sister species *R. rufaria* in the shape of the socii of the male genitalia. The ground colour of the wings is not bright green, but a dull pale green as for *R. brunneipalpis* and *R. rufaria*, and it shares the reddish hue on the wings of *R. rufaria*.

Derivatio nominis. Elias was an internationally recognized prophet in the Kingdom of Judah, about thirty centuries ago. Masculine name in nominative case.

***Rhodochlora ylle* Lindt, sp. nov.** (Figures 3, 6, 11, 12)

Material studied: Holotype: 1 ♂, Costa Rica, Golfito, 50 m, 14-II-2007, 10º38'58"N, 84º01'12"W, A. Lindt leg. TAMZ0131838. Paratypes: Costa Rica, Golfito, 50 m, 2 ♂, 14-II-2007, 10º8'58"N, 84º01'12"W, A. Lindt leg. TAMZ0131839, gen. prep. 749. The holotype is deposited in the TAMZ insect collection of the Estonian Museum of Natural History (Tallinn). The paratypes are in the Estonian Museum of Natural History and in the private collection of A. Lindt.

Description: Wingspan of males 36-38 mm (Figure 3). Male antennae (Figure 6) bipectinate. Frons colour yellowish brown, palpi brown, vertex whitish. Male hind tibia slender, with two pairs of spurs, the distal proximal spur the longest. Wings dull light green without rusty hue. Forewing discal spot dark grey, postmedial line thin, blackish and suffused, ending in lunar white spot at hind margin of wing. Hindwing base shiny yellow, a little blackish shading distally and in the postmedial area. A small black spot at the forewing apex and a thin black line at the hindwing apex.

Male genitalia (Figure 11): Uncus thin, almost linear, shorter than socii; socii (Figure 12) flat, wide at base, elbowed and tapering to a point. Gnathos a broad loop with long, strong, pointed cochlear. Valva about 2 mm long, slender with dorsal edge thicker and apex rounded; juxta a small oval plate behind bases of sacculi. Transtilla a large bicornute plate. Saccus smooth-edged, rounded, aedeagus long (3 mm), with some black spicules on its split apex. The last abdominal sternite of the male is bidentate posteriorly, as in *R. rufaria*.

Female unknown.

Diagnosis: *Rhodochlora ylle* Lindt, sp. nov. belongs to the *Rhodochlora roseipalpis* species group according to Hausmann (2017). The new species has flat socii flaps which are similar to those in *R. brunneipalpis* Warren which was described from Guyana (Warren, 1894) and was mentioned as *R. brunneipalpis minor* Warren from nearby Nicaragua (Viidalepp et al. 2010). The ribbon-like flat socii of the new species are much slenderer than those in *R. rufaria* and *R. elias* described above. The socii are elbowed and tapered towards the apex as in *R. brunneipalpis,* much broader than the filiform socii in other congeneric species. Valva of the new species *R. ylle* is provided with ball shaped basal process while this process is long thumb shaped in R. *brunneipalpis*.

Discussion: The vegetation history of the huge territory of the Amazon tributary is variously interpreted. Barke & Lamb (2006) proposed that the Andean uplift in the Late Cenozoic blocked the path of the ancient Amazon to the Pacific coast. This caused flooding, and the Amazon, at that time, became a lake (Val et al. 2022; Albert et al. 2018). Mega-wetland conditions persisted over millions of years until the river broke through to the Atlantic Ocean. Since then, populations of an ancient fauna have diversified not only between the Guiana region and the Andes, but also between the eastern and western elevated areas of the South American continent. Only some elements of the former fauna have been able to recolonize the tributary.

Derivatio nominis: The species is dedicated to the prematurely deceased wife of A. Lindt, Ülle Jaanimäe.

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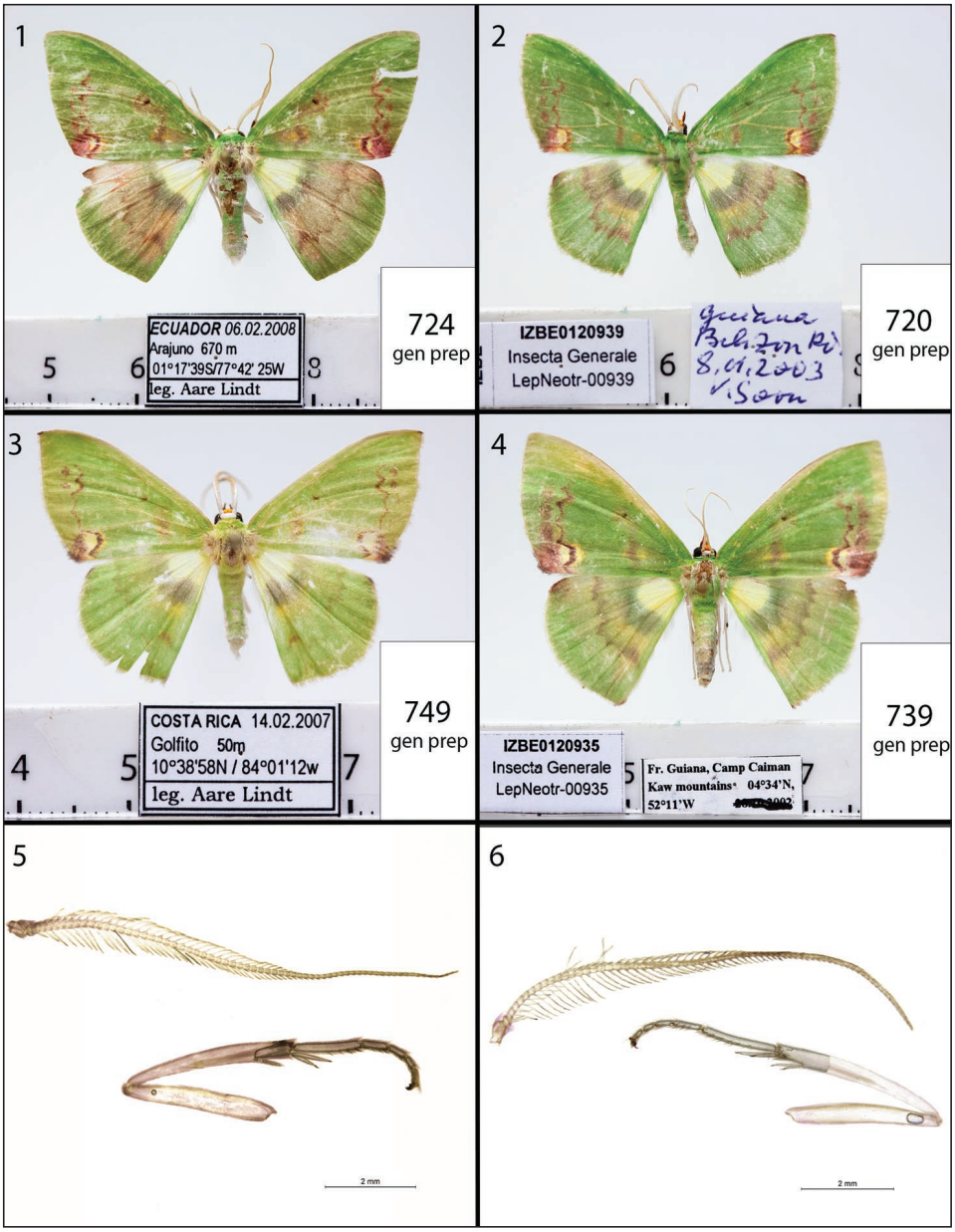
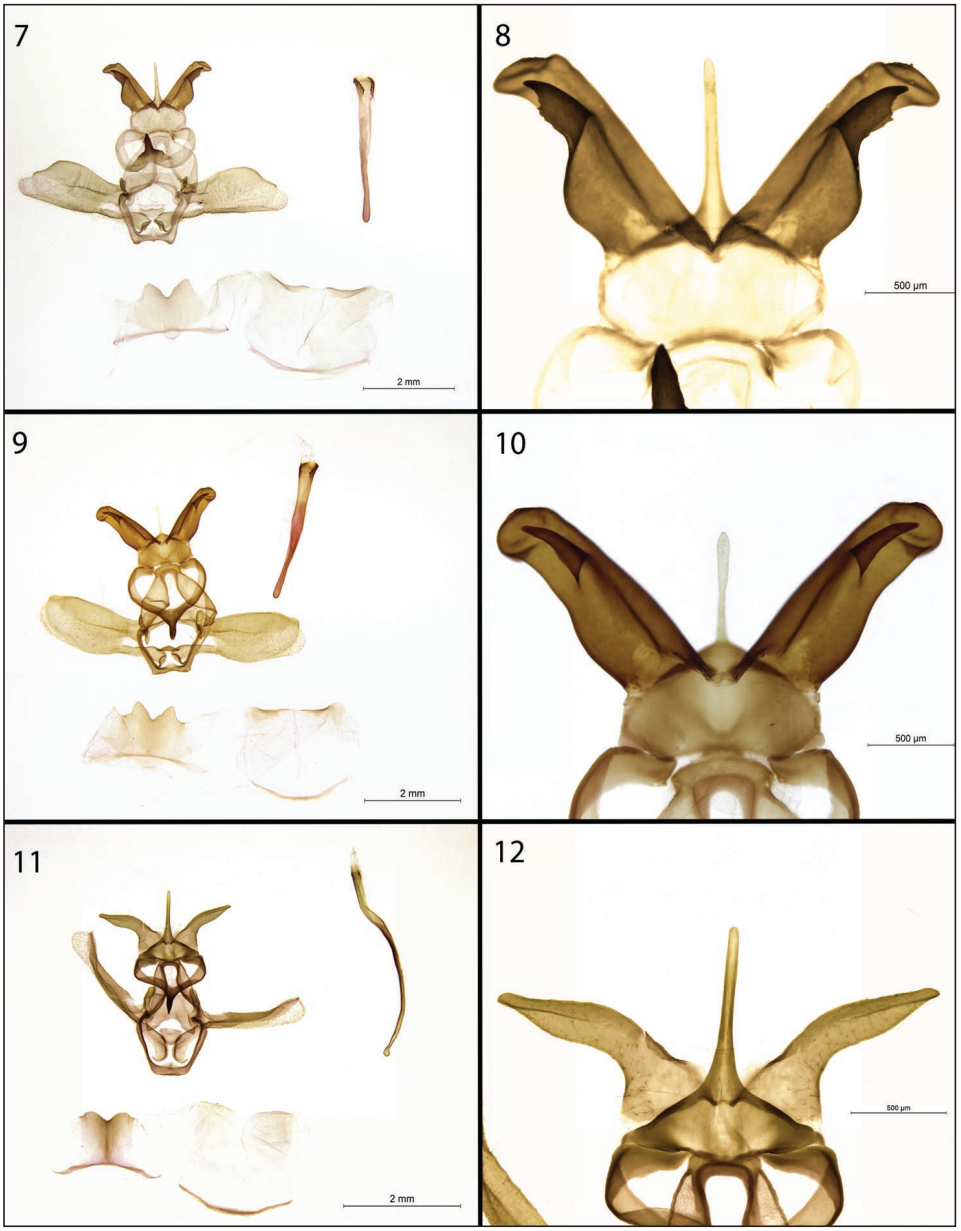


Figures 1-6. *Rhodochlora rufaria* Warren and *Rhodochlora elias* Viidalepp, sp. nov. and *Rhodochlora ylle* Lindt, sp. nov. **1.** *Rhodochlora rufaria* Warren (male, Ecuador). **2.** *R. elias* Viidalepp, sp. nov. (holotype male, Fr. Guiana). **3.** *R. ylle* Lindt, sp. nov. (holotype male, Costa Rica). **4.** *R. elias* Viidalepp, sp. nov. (holotype female, French Guiana). **5.** *R. elias* Viidalepp, sp. nov., male antenna and hindleg. **6.** *R. ylle* Lindt, sp. nov., male antenna and hindleg.



Figures 7-12. *Rhodochlora rufaria* Warren and *Rhodochlora elias* Viidalepp, sp. nov. and *Rhodochlora ylle* Lindt, sp. nov. **7.** *R. rufaria* male genital armature, aedeagus and the last sternite. **8.** *R. rufaria*, socii (enlarged). **9.** *R. elias* Viidalepp, sp. nov., male genital armature, aedeagus and the last sternite. **10.** *R. elisa* Viidalepp, sp. nov., socii (enlarged). **11.** *R. ylle* Lindt, sp. nov., male genital armature, aedeagus and the last sternite. 12. *R. ylle* Lindt, sp. nov., socii (enlarged).

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New Hesperiidae additions to the Papilionoidea fauna of Uttar Pradesh, India (Insecta: Lepidoptera)

Brij Lal, Rupak De, Ratindra Pandey, Abu Arshad Khan, Lalit Kumar Verma & Taslima Sheikh

Abstract

This research article unveils significant additions to the Papilionoidea fauna of Uttar Pradesh, India. Through meticulous observation and documentation, two species belonging to the Hesperiidae family were discovered within the region. The first species, *Caprona ransonnettii* (Felder, 1868), and the second, *Burara oedipodea* (Swainson, 1820), were identified and recorded as novel findings in the area. These discoveries were made through comprehensive field surveys, which included systematic observations and detailed recording of butterfly species in various habitats over an extended period. Such findings contribute valuable insights into the biodiversity of Uttar Pradesh's Papilionoidea fauna. The study sheds light on the distribution and presence of these species, enhancing our understanding of the ecological dynamics within the region. These results underscore the importance of continued research and conservation efforts to preserve the rich diversity of Papilionoidea species in Uttar Pradesh, India.
Keywords: Insecta, Lepidoptera, Papilionoidea, Hesperiidae, *Caprona ransonnettii, Burara oedipodia,* biodiversity, conservation, Uttar Pradesh, India.

Nuevas incorporaciones de Hesperiidae a la fauna de Papilionoidea de Uttar Pradesh, India (Insecta: Lepidoptera)

Resumen

Este artículo de investigación desvela importantes adiciones a la fauna de Papilionoidea de Uttar Pradesh, India. Mediante una meticulosa observación y documentación, se descubrieron en la región dos especies pertenecientes a la familia Hesperiidae. La primera especie, *Caprona ransonnettii* (Felder, 1868) y la segunda, *Burara oedipodea* (Swainson, 1820), fueron identificadas y registradas como hallazgos novedosos en la zona. Estos descubrimientos aportan información valiosa sobre la biodiversidad de la fauna de Papilionoidea de Uttar Pradesh. El estudio arroja luz sobre la distribución y presencia de estas especies, mejorando nuestra comprensión de la dinámica ecológica de la región. Estos hallazgos subrayan la importancia de continuar con los esfuerzos de investigación y conservación para preservar la rica diversidad de especies de Papilionoidea de Uttar Pradesh (India).
Palabras clave: Insecta, Lepidoptera, Papilionoidea, Hesperiidae, *Caprona ransonnettii*, *Burara oedipodia,* biodiversidad, conservación, Uttar Pradesh, India.

Introduction

According to the Editors of Encyclopaedia Britannica (2017), Skippers, part of the Hesperiidae family, comprise roughly 3,500 insect species within the Lepidoptera order, found globally and known

for their swift, darting flight pattern. They are termed an intermediary group between butterflies and moths. While their adult form shares similarities with moths in head and body structure, skippers often rest with their first pair of wings held vertically, akin to butterflies. Unlike many moths, they typically lack wing-coupling structures (frenula). Their antennae, clubbed like butterflies', usually terminate in a slender hooked tip. Despite their small size, skippers possess robust wing muscles allowing them to reach speeds of up to 30 km (20 miles) per hour. Larvae primarily feed on plants such as legumes and grasses, often residing inside folded or rolled leaves, sometimes woven together. Pupation takes place within thin cocoons made of silk or a blend of silk and leaves.

Uttar Pradesh, India, harbours a diverse array of wildlife, including numerous Papilionoidea species. The Hesperiidae family, commonly known as skippers, comprises a significant portion of this biodiversity. In recent years, efforts have been made to document and conserve Papilionoidea diversity in the region, leading to several significant discoveries.

As per Paul Van Gasse, 2018 checklist on Indian subcontinent, *Caprona ransonnetii* (Felder, 1868), has one subspecies present in India: *C. ransonnetii potiphera* (Hewitson, 1873): Commonly sighted in Peninsular India, particularly in the Western Ghats region, this subspecies can be found at elevations reaching up to 2400 meters. Its distribution spans from Kerala and Tamil Nadu northward through various states, including SE Gujarat, Madhya Pradesh, Chhattisgarh, Jharkhand, and S and C West Bengal. Historically, it was also present in NW Bangladesh, and there is a dated record from SE Rajasthan (Mount Abu). As per the Ifoundbutterflies website, this subspecies is seen in Andhra Pradesh, Chhatisgarh, Goa, Gujarat, Jammu and Kashmir, Karnataka, Kerela, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttarakhand & West Bengal (Saji & Churi, 2024), Jammu & Kashmir (Sheikh & Parey, 2019). Genus *Caprona* Wallengren, 1857 has three species in India: *Caprona ransonnetii*, *Caprona alida* (de Nicéville, 1891), and *Caprona agama* (Moore, [1858]). Out of them, two are present in Uttar Pradesh except *Caprona alida.* The observed host plant of this subspecies in India are *Erinocarpus nimmonii* J. Graham*, Helicteres isora* L.*, Triumfetta rhomboidea* Jacq.*, Urena lobata* L. (Malvaceae) (Nitin et al. 2018). And expected host plant in Uttar Pradesh as per the availability of plant species are *Urena lobata* and *Triumfetta rhomboidea.* Another Species in current study is *Burara oedipodea* (Swainson, 1820), only one subspecies is found in India i.e., *B. oedipodea belesis* (Mabille, 1876): Found sparingly in the Himalayan region, this subspecies is primarily located at altitudes up to 300 meters, although occasional sightings extend up to 1500 meters. Its range spans from Himachal Pradesh (west to Kangra) eastward through Uttarakhand, Nepal, Sikkim, N West Bengal, and Bhutan to Arunachal Pradesh and the northeastern states of India (excluding Mizoram) also found in Jammu and Kashmir (Sheikh et al 2021). This subspecies is also known as *aegina* or *athena* in certain sources. (Note: Previously identified as *Ismene oedipodea* in Evans, 1932, and as *Bibasis oedipodea* in Evans, 1949). As per Ifoundbutterflies website, this subspecies is seen in Uttarakhand, Assam, Meghalaya and Arunachal (Anonymous, 2024) *Hiptage benghalensis* (L.) Kurz (Malpighiaceae) is the larval host plant of this Papilionoidea as per found website (Anonymous, 2024) and same plant is expected to be the host plant of this subspecies in Uttar Pradesh also as per its availability in the region.

Materials and methods

Study Area

In 15-VI-2023, the authors embarked on a survey of Dudhwa National Park, located in the Lakhimpur-Kheri district of Uttar Pradesh. The surveyed area, positioned at approximately 150 meters altitude (28º29'24.7"N 80º38'44.5"E), was chosen due to its accessibility. Dudhwa National Park, situated in the district of Lakhimpur-Kheri, Uttar Pradesh, encompasses an area measuring 490.29 square kilometres. It stands as a vestige of the once expansive Terai forests that graced the plains of Uttar Pradesh, running parallel to the foothills of the Himalayas. Characterized by a diverse ecosystem consisting of Sal forests, towering grasslands, and marshes susceptible to yearly inundation, Dudhwa

National Park represents one of India's most imperiled habitats. Functioning as an integral part of the Dudhwa Tiger Reserve, the National Park contributes to India's primary Terai Protected Area Complex. Within the Terai-Bhabhar Biogeographic Subdivision of the Upper Gangetic Plains (7a) Biogeographic Province, Dudhwa National Park and Tiger Reserve serve as the sole representatives, emphasizing their critical importance in conserving this unique ecosystem (Pandey et al. 2024). The primary focus of the survey was on the Papilionoidea species. During the survey, two species of Hesperiidae were encountered and documented: *Caprona ransonnettii* and *Burara oedipodea*.

Methods

Following this initial survey, the researchers returned to the area for an additional week to conduct further observations. All observations were entirely visual. During this period, both previously identified species were consistently observed and photographed. Species identification was aided by consulting relevant literature sources, including works by Kehimkar (2016) and Evans (1932). It's noteworthy that no specimens were collected or harmed during the survey process. To visualize the distribution of the observed species, a distribution map was generated using ArcGIS 10.5 software, utilizing an original base map of India (Figure 1).

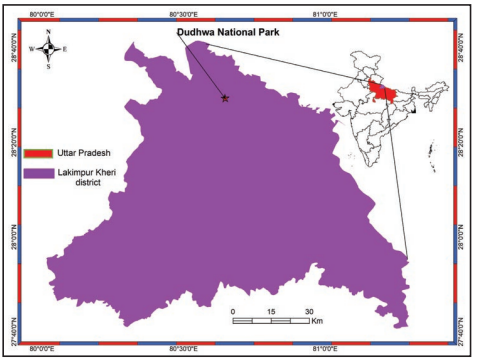

Figure 1. Map showing the location of study area.

Results

During the field surveys, four individuals of *Caprona ransonnettii* and six individuals of *Burara oedipodia* were observed and photographed within Uttar Pradesh, including Dudhwa National Park. External morphological characters confirmed the identity of these specimens, thereby establishing their presence in the region. These findings represent the first documented records of both species in Uttar Pradesh.

Systematic position

Class Insecta Linnaeus, 1758
Order Lepidoptera Linnaeus, 1758
Family Hesperiidae Latreille, 1809
Subfamily Coeliadinae Evans, [1937]

Burara oedipodea (Swainson, 1820) (Figure 2)

Identification features: Paler bands in central area on Under forewing. Under hindwing low tip area suffused with orange. Small black spot at underside hindwing and underside forewing bases.

Material examined: India, Uttar Pradesh: Dudhwa National Park, 28030.5'N 80º40.8'E, 185 m, 24-VIII-2023, observed more than eight individuals by Brij Lal.

Subfamily Pyrginae Burmeister, 1878

Caprona ransonnettii (Felder, 1868) (Figure 3-4)

Identification features: The species has three semi-transparent white spots on the forewing before the apex, two spots within the end of the cell, and additional spots along the veins. The hindwing

features a broad pale ochreous band with brown veins and a spot within the cell, while the outer discal area is suffused with grey-brown. Cilia alternate with white.

Material examined: INDIA, Uttar Pradesh: Dudhwa National Park, 28º30.5'N 80º40.8'E, 185 m, 24-VIII-2023, observed more than eight individuals by Brij Lal.

Figures 2-4. 2. *Burara oedipodea* (Swainson). **3-4.** *Caprona ransonnettii* (Felder).

Discussion

The documentation of *Caprona ransonnettii* and *Burara oedipodia* within Uttar Pradesh, specifically within the Dudhwa National Park, expands our knowledge of the distribution of these species in this region of India. The Indian Rhopalocera updated checklist by Gasse (2018) does not include records of their occurrence in this area. To ensure the reliability and credibility of our findings, we crosschecked all previous literature available on the region regarding these two species, excluding records published in predatory journals.

Current study aligns with previous research conducted within the same state, as evidenced by articles authored by Behera (2016), De Rye Phillipe (1902), Sarkar & Mandal (2018), Sharma (2007), Kumari & Sheikh (2021), Sheikh et al. (2023), De et al. (2023), and Khan et al. (2024a). Additionally, our study correlates with research conducted in other states, following a similar format to those articles. Examples of similar work from this region and other states include Sheikh & Parey (2019), Gupta &

Sheikh (2021), Khan & Sheikh (2022), De et al. (2024), Pandey et al. (2023), Khan et al. (2024b) and Sheikh et al. (2024). The presence of these two Hesperiidae species within a protected area underscores the importance of such areas for conserving biodiversity and emphasizes the need for continued monitoring and documentation efforts. This discovery highlights the importance of ongoing research to enhance our understanding of Rhopalocera distribution and contribute to their conservation in India.

Dudhwa, spread over approximately 811 sq km of marshes, grasslands, and dense forests. Dudhwa National Park plays a crucial role in providing habitat for a wide range of species of conservation concern, is an ideal and protected home for over 38 species of mammals, 16 species of reptiles, and numerous species of birds. Mammals include *Panthera tigris* Linnaeus, 1758*, Rhinoceros unicornis* (Linnaeus, 1758)*, Rucervus duvaucelii* (G. Cuvier, 1823)*, Elephas maximus* Linnaeus, 1758*, Rusa unicolor* Kerr, 1792*, Axis porcinus* Zimmermann, 1780*, Axis axis* Erxleben, 1777*, Muntiacus muntjak* Zimmermann, 1780*, Sus scrofa* Linnaeus, 1758*, Macaca mulatta* Zimmenmann, 1780*, Semnopithecus entellus* (Dufrense, 1797)*, Melursus ursinus* (Shaw, 1791)*, Boselaphus tragocamelus* Pallas, 1766*, Hystrix indica* Kerr, 1792*, Lutra lutra* (Linnaeus, 1758). Reptiles include various species of turtles, *Python molurus* (Linnaeus, 1758)*, Varanus bengalensis* (Daudin, 1802)*, Crocodylus palustris* Lesson, 1831*, Gavialis gangeticus* (Gmelin, 1789). Of the nearly 1300 birds found in the Indian subcontinent, over 450 species can be seen in Dudhwa Reserve. These include *Buceros bicornis* Linnaeus, 1758*, Gallus gallus* (Linnaeus, 1758)*, Pavo cristatus* Linnaeus, 1758*, Houbaropsis bengalensis* (Gmelin, 1789)*, Haliaeetus leucoryphus* (Pallas, 1771)*, Spilornis cheela* Latham, 1790*, Pandion haliaetus* (Linnaeus, 1758)*, Terpsiphone paradisi* (Linnaeus, 1758)*,* Picidae family species*, Copsychus malabaricus* (Scopoli, 1788)*, Pitta brachyura* (Linnaeus, 1766)*, Oriolus oriolus* (Linnaeus, 1758)*, Chalcophaps indica* (Linnaeus, 1758)*,* etc. During winter, the vast and varied water bodies attract a large variety and number of migratory birds, making the reserve a favorite haunt of bird watchers (UPEcoTourism, 2024).

Future suggestions based on the findings of the paper:

1. Long-term Monitoring Programs**:** Establish long-term monitoring programs to track the population dynamics of *Caprona ransonnettii* and *Burara oedipodea* in Uttar Pradesh. Continuously monitoring their populations will help in assessing their conservation status and identifying any potential declines or threats.
2. Habitat Conservation and Restoration**:** Implement habitat conservation and restoration initiatives targeted at preserving the habitats of *Caprona ransonnettii* and *Burara oedipodea.* This may involve restoring degraded habitats, protecting key breeding sites, and creating corridors to connect fragmented habitats.
3. Community Engagement: Engage local communities in Papilionoidea conservation efforts through education and awareness programs. Encourage community participation in habitat restoration activities and promote sustainable land-use practices that benefit of Papilionoidea habitats.
4. Research on Threats: Conduct further research to identify and understand the specific threats facing *Caprona ransonnettii* and *Burara oedipodea* in Uttar Pradesh. Investigate factors such as habitat loss, climate change, pesticide use, and invasive species, and develop mitigation strategies accordingly.
5. Policy Integration: Advocate for the inclusion of Papilionoidea conservation priorities in regional and national biodiversity conservation policies. Work with policymakers to develop and implement measures that safeguard Papilionoidea habitats and address conservation challenges.
6. Collaborative Conservation Efforts**:** Foster collaboration among researchers, conservation organizations, government agencies, and local stakeholders to coordinate conservation efforts

effectively. Establish partnerships to share resources, expertise, and data for more comprehensive conservation initiatives.

7. Capacity Building: Invest in capacity building initiatives to strengthen the skills and knowledge of local communities, researchers, and conservation practitioners involved in Papilionoidea conservation. Provide training opportunities on monitoring techniques, habitat management, and community engagement strategies.
8. Awareness Campaigns: Launch awareness campaigns to educate the public about the importance of Papilionoidea conservation and the role of *Caprona ransonnettii* and *Burara oedipodea* in ecosystem health. Use various communication channels, including social media, workshops, and outreach events, to reach a wide audience.

By focusing on these future suggestions, stakeholders can enhance conservation efforts and contribute to the long-term survival of *Caprona ransonnettii* and *Burara oedipodea* in Uttar Pradesh, India.

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The systematics of *Neolycaena lunara* Zhdanko, 1998 - complex of species (Lepidoptera: Lycaenidae)

Abdulaziz M. Davlatov

Abstract

The status and systematic position of the taxa of the *Neolycaena lunara* Zhdanko, 1998 group are discussed. It is shown that *N. lunara* has large variability in size, shape, and wing pattern parameters even within the same population. The following new synonymy is established: *Neolycaena lunara oksana* Korb, 2015, syn. nov., *Neolycaena lunara karategina* Weidenhoffer, 2000, syn. nov.
Keywords: Lepidoptera, Lycaenidae, morphological features, population level, systematic position, Tajikistan.

Sistemática de *Neolycaena lunara* Zhdanko, 1998 - complejo de especies (Lepidoptera: Lycaenidae)

Resumen

Se discuten el estatus y la posición sistemática de los taxones del grupo *Neolycaena lunara* Zhdanko, 1998. Se demuestra que *N. lunara* presenta una gran variabilidad en los parámetros de tamaño, forma y patrón alar incluso dentro de la misma población. Se establece la siguiente nueva sinonimia: *Neolycaena lunara oksana* Korb, 2015, syn. nov., *Neolycaena lunara karategina* Weidenhoffer, 2000, syn. nov.
Palabras clave: Lepidoptera, Lycaenidae, características morfológicas, nivel de población, posición sistemática, Tayikistán.

Introduction

The genus *Neolycaena* de Nicéville, 1890 consists of two subgenera, *Neolycaena* S.str. and *Rhymnaria* Zhdanko, 1983 (Zhdanko, 1998), distributed in the Palearctic (Weidenhoffer et al. 2004). The genus *Neolycaena* has five species found in Tajikistan: *Neolycaena aeto* Zhdanko, 1994; *Neolycaena tengstroemi* (Erschoff, 1874); *Neolycaena carbonaria* (Grum-Grshimaïlo, 1890); *Neolycaena sinensis* (Alphéraky, 1881) and *Neolycaena lunara* Zhdanko, 1998 (Korb & Bolshakov, 2016). The taxon *Neolycaena lunara* was described by Zhdanko in 1998 from Tajikistan (type locality: Kugiteg ridge, Obikhingou river, Doshtikhasan village, 2000 m). This species is endemic of Central Asia, more precisely, it is known only from the territory of Tajikistan. Later, Korb (2015) described a new subspecies of *N. lunara* (*Neolycaena lunara oksana* Korb), from Tajikistan based on the collection of Sedykh collected in 1962 (type locality: Peter the Great Mountain ridge, the valley of the Surkhob river in the vicinity of the Jirgatal village). Tshikalovets (2003) considers *N. lunara* as a subspecies of *N. sinensis;* although these taxa are close to each other, there are still differences in wing patterns and genitalia structure. According to Korb & Bolshakov (2016), the taxon *N. lunara* currently has three subspecies - nominatypical (Obikhingou River Valley); ssp. *oksana* Korb, 2015 (Peter the Great Mountain ridge) and ssp. *karategina* Weidenhoffer, 2000 (Gissar), that is, these authors accept the previously described taxon *Neolycaena karategina* Weidenhoffer, 2000 as a subspecies of *N. lunara.*

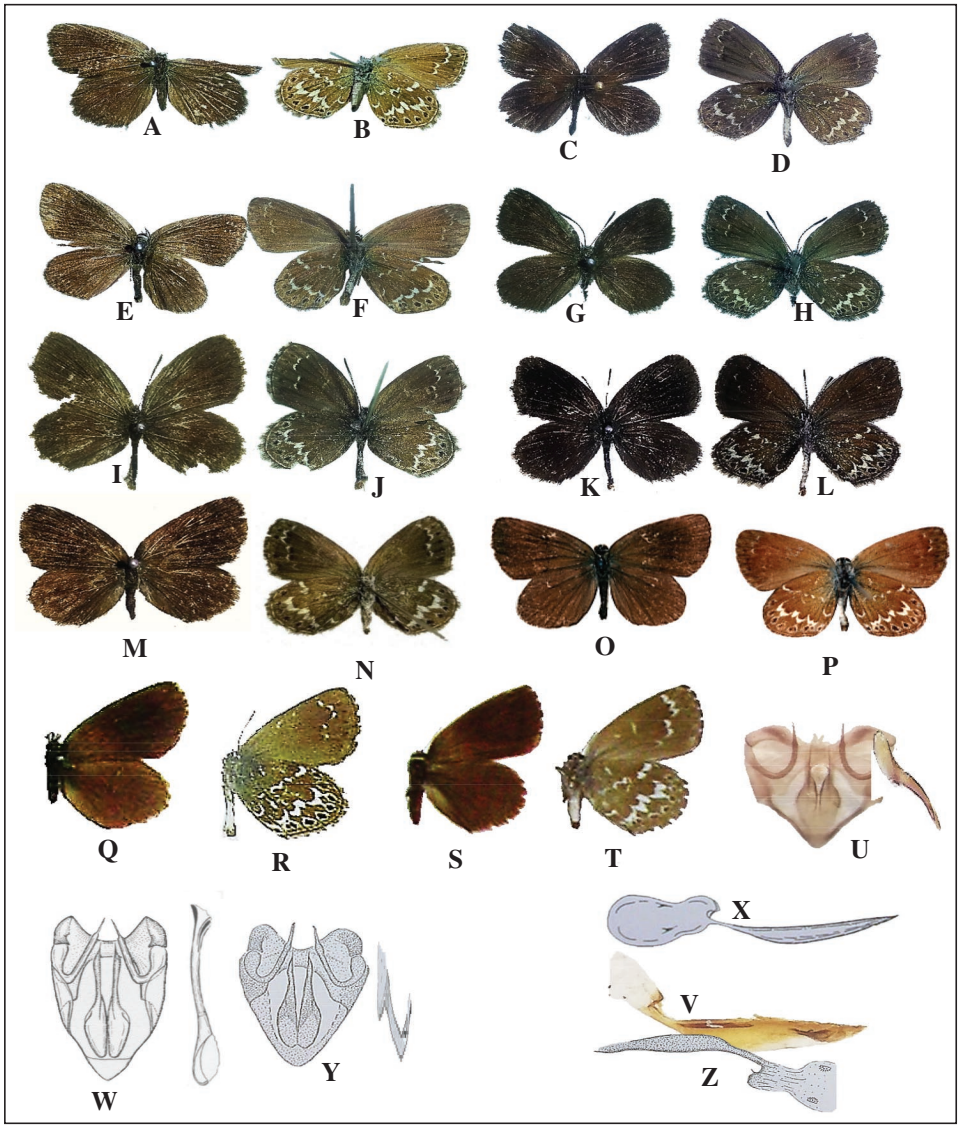

Figure 1. Imago and genitalia of *Neolycaena lynara* group. **A-B.** Female. Peter the Great ridge, Lyakhsh village (by the author). **C-D.** Male. Hissar ridge, Ramit gorge. **E-F.** Male. Peter the Great ridge, Hojapulod gorge (by the author). **G-H.** Male. Peter the Great ridge, Childara gorge (by the author). **I-J.** Male. Sarsarak ridge (by the author). **K-L.** Male. **M-N.** Female, Hazratisho ridge, Anjirak gorge (by the author). **O-P.** Male. ssp. *oksana* (by Korb, 2015). **Q-R.** Male of nominotypic (by Tuzov et al. 2000). **S-T.** Female ssp. *karategina* (by Weidenhoffer et al. 2004). **U.** Male genitalia and V. Female genitalia (by the author). **S.** Male genitalia and **T.** Female genitalia of nominotypic (by Zhdanko, 1998). **U.** Male genitalia and **V.** Female genitalia (by the author). **W.** Male genitalia and **X.** Female genitalia of nominotypic (by Zhdanko, 1998). **Y.** Male genitalia and **Z.** Female genitalia of ssp. *karategina* (by Weidenhoffer et al. 2004).

Representatives of the genus *Neolycaena* have dark brown wing ground color both dorsally and ventrally, but white and black spots are prominent on the ventral side. The main morphological differences of the current subspecies are as follows: The ssp. *oksana* fore wing male 12 mm, differs from the nominotypical one by the poorly developed wing pattern in the forewing underside and by poor visible wing pattern elements in hindwing underside (in total they are 1.5-2 times thinner than in the nominotypical subspecies) (see figures O-P); and, the ssp. *karategina* fore wing male 12-14 mm, both wings narrower, elongated, underside of hind wing white postdiscal band well developed, formed by white bows proximally very faintly bordered with brown and shifted towards outer margin, female somewhat larger, fore wing 13,5-15,5 mm, markings better developed than in males (see figures S-T).

According to the primary descriptions, the main distinguishing features in the structure of the genitals of males *N. lunara* and *N. karategina*, the latter, which were later accepted as ssp. *karategina*, are the following: *N. lunara* - the valvae are bean-shaped at the base, thin in the distal part with a thickening closer to the distal end, which is pointed and does not go beyond the posterior edge of the tegumen; *N. karategina* - valva from the broad proximal part gradually narrowed till needle shaped ending.

It is important to note that when studying a series of material of the *N. lunara* group from different parts of Tajikistan, one can observe variability in the parameters, patterns, as well as the coloring of the wings (see figures A-N). Morphological features characteristic of the existing subspecies of *N. lunara* can be observed among specimens of the same population, which raises doubts about the validity of the described subspecies. Therefore, our study focuses on studying the morphological features of *N. lunara* at the population level, the results serve to understand the real position and status of the taxa of the *N. lunara* group.

Figure 2. Distribution of *N. lunara* in Tajikistan. The black dot indicates the known localities.

Material and methods

The material for this paper was the author's collections in the years 2014, 2022 and 2023 from the Central and Southwestern parts of Tajikistan. The size of the fore wings, the shape of the wings, the coloring, and patterns of the wings in both sides, as well as the structure of the genitalia were studied. In particular, the size of the fore wings was measured from the base of the wings to the tip, the shape of the wings was studied for elongation and roundness, the wing patterns for the degree of its development, and the genitalia were studied for any deviation of its structure. The obtained data on the morphological features of all collected samples were compared with each other, and as a result, any changes or deviations in all listed characteristics could be considered.

Material examined: Peter the Great Mountain ridge, surroundings of the Lyakhsh village, 1 ♂, 2 ♀, 4-VII-2014; Peter the Great Mountain ridge, Hujapulod gorge, 6 ♂, 3 ♀, 12-VII-2014; Peter the Great Mountain ridge, Childara gorge, 10 ♂, 2 ♀, 23-VI-2022; Hazratisho ridge, Anjirak gorge, 3 ♂, 2 ♀, 15-VII-2021, Hazratisho ridge, Anjirak gorge, 18 ♂, 29-VI-2023; Sangloh ridge, 13 ♂, 2 ♀, 5-VI-2023; Hissar ridge, Ramit gorge, 2 ♂, 12-VI-2023 (Figures 3-4).

Figure 3. The habitat of *N. lunara* in the Anjirak gorge, Hazratisho ridge (by the author).

Figure 4. The habitat of *N. lunara* in the Childara gorge, Peter the Great Mountain ridge (by the author).

Results and discussion

During the processing and study of the *N. lunara* group, some differences were found in the size and shape of the wings, as well as in the wing pattern. These changes are as follows: the forewing length of males collected from the Peter the Great Mountain ridge (17 specimens), ranged from 12 mm to 14 mm, but most specimens (10 specimens) had a wing length of 13 mm, and females (7 specimens) had a wing length of 13-16 mm. The population collected from the Sangloh ridge (15 specimens), had males (13 specimens) ranging from 9-11 to 13 mm, while females (2 specimens) had a wing length of 14 mm. The forewing length of specimens from the Hazratisho ridge (23 specimens), was 13-14 mm for males (21 specimens), and 14 mm for females (2 specimens). The two males collected from the Hissar ridge measured from 11-12.3 mm. The color of the upperside of wings is mainly dark brown, monotonous brown, light brown, and the colors of the wings from below are mostly brown and dark brown. The fore and hind wings are oval in shape, but there are specimens with narrow wings, the fringe is spotted, but the white gaps are noticeably thinner than the brown ones. The patterns of the underside of the wings are similar to the nominate subspecies, but with greater variability. In particular, on the underside of the forewing there is the presence or absence of a discal stroke, postdiscal spots are well or less well developed, submarginal black dots are faintly noticeable and sometimes absent, a

brownish-gray background from the base is sometimes absent. Also, in some specimens this background has a golden-ochre tint, and in other specimens this tint generally absent. On the underside of the hindwing, the basal grayish - blue plaque in some specimens reaches up to half of the discal cell, and in other specimens it does not enter beyond the basal area. Discal spots are sometimes developed, and in other cases they occur only in the form of two white dots, postdiscal spots are presented in two forms - wider and thinner. Submarginal black dots are rounded in some specimens, and pointed in others, and these dots are sometimes surrounded by white scales, but there are specimens without white scales. In addition, in one specimen from the Hazratisho ridge, the submarginal dots between veins M3-Cu1 and Cu1-Cu2 have insignificant orange-ochre scales on the outside, and this was also noted for two paratypes of the nominotypical subspecies.

When studying the structure of the genitals of both males and females of *N. lunara* belonging to different populations from Tajikistan, no significant deviations were found in all parameters of the genitals. In particular, there were investigated the shape of the valva, the shape of the vinculum and uncus, the shape, and branches of the gnathos in males, and in females, the shape and size of the ductus, the shape of the antrum, and the structure of the ostium, which fully corresponded to the nominotypical subspecies. It is important to note that the distinctive features peculiar to the genitals of the previously described taxon *N. karategina* reliably correspond to the genitals of our butterflies and *N. lunara*, which indicates belonging to the same species.

As can be seen from the figures (U, W, Y and X, V, Z), there are no special differences in the male and female genitals of butterflies, according to which they could be divided into two taxa. According to all parameters, the genitals of *N. lunara* and ssp. *karategina* coincide with each other, and they are completely identical, and those small deviations that could be observed when comparing both genitalia are naturally accompanied by the genitalia of many taxa within the same genus. As a rule, sometimes these deviations occur when preparing of the genitals drug. As Korb (2013) notes, genital structures of the same species are depicted in different ways (up to a significant dissimilarity of drawings) and the reason for this is different approaches to research: the use /non-use of pressed drugs, straightening/non-straightening of individual structures, different orientation of individual structures, etc. Thus, the features of the valva structure mentioned above for the description of *N. karategina* are not the basis for the description of a new taxon.

According to the above data, the *N. lunara* shows a large variability in the size and shape of the wings, as well as the wing pattern. These variations can be observed among specimens of the same population. For example, the collected by us from the Ramit gorge, the type locality of the subspecies *karategina,* fully correspond to the nominative subspecies. Among the species collected in different parts of the Peter the Great Mountain ridge there are specimens that look similar to the nominate, to ssp. *karategina* and ssp. *oksana*, and collected from the Hazratisho ridge are characteristic of both the nominative subspecies and the ssp. *oksana*. From the Sangloh ridge have signs of nominotypicaly and partially ssp. *oksana.* Thus, the morphological variability of the *N. lunara* is observed in all its populations in Tajikistan, where it occurs.

In addition, *N. lunara* are found in similar biotopes at all points of distribution in Tajikistan, that is, this species is confined to slopes with the presence of woody-shrubs and rock outcrops. This is evidenced by literary sources (Zhdakno, 1998), as well as our data. Given the above, only the nominotypical subspecies *N. lunara* is distributed in Tajikistan and there is no need to divide this species into subspecies, and the previously described subspecies should be considered as synonyms.

It is necessary to conduct such studies on other groups of species in Tajikistan, as there are many problems in the subspecific status of some taxa. To solve these problems, the necessary amount of material for each of these species will be required, collected at different periods of the year and at all points of their distribution in Tajikistan. With such a volume of material, careful study of their

morphological features, comparison of individuals of each population with other populations, it is possible to judge the real status of these taxa in the system.

Distribution: Currently, *N. lunara* is reliably known from the Hazratisho, Vakhsh, Kugitek, Sarsarak ridges and the Peter the Great Mountain ridge. *N. lunara* probably meets on the Darvaz ridge (Figure 2).

Ecology: It is found at altitudes of 1300-2700 m.a.s.l., depending on the location, the flight is observed from the beginning of June and lasts until the first half of August. Univoltine.

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REVISIÓN DE PUBLICACIONES
BOOK REVIEWS

T. Racheli & G. C. Bozano
Guide to the Butterflies of the Palearctic Region: Papilionidae part V
109 páginas
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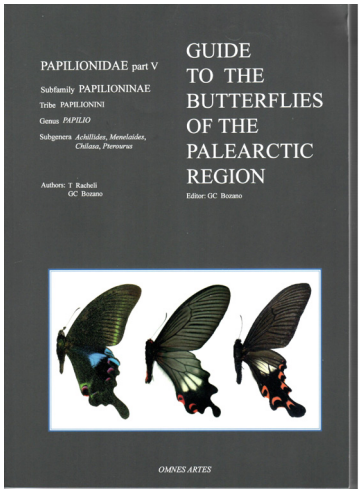
ISBN: 978-88-87989-33-5



Tenemos en nuestras manos, una nueva entrega de esta interesante serie conocida como *Guide to the Butterflies of the Palearctic Region*, concretamente se trata de la quinta parte de los Papilionidae Latreille, [1802], estudiándose la subfamilia Papilioninae Latreille, [1802] y la Tribu Papilionini Latreille, [1802] y, dentro de ella, el género *Papilio* Linnaeus, 1758 (con cuatro subgéneros *Achillides* Hübner, [1819]), *Menelaides* Hübner, [1819], *Chilasa* Moore, [1881] y *Pterourus* Scopoli, 1763).

En esta entrega se tratan 10 especies que se encuentran en la Región Paleártica Oriental, se establecen tres nuevas sinonimias: *Papilio epycides curiatius* Frushtorfer, 1902 (= *Chilasa epycides yamabuki* Yoshino, 2008), *Motasiona* Niculescu, 1979 (= *Gilvicornis* d'Abrera, 2016) y *Pterourus* Scopoli, 1777 (= *Esperourus* Grishin, 2021).

De todas y cada una de las especies, nos presentan la descripción original, así como de todas las sinonimias consideradas, al igual que ocurre con las subespecies que los autores consideran como válidas en este trabajo. También nos encontramos con las principales características que nos permiten diagnosticarlas, datos sobre la morfología de la genitalia del macho, interesantes notas taxonómicas, datos sobre su distribución (que podemos ver en un mapa de la región Paleártica) y las principales referencias bibliográficas consideradas.

Es importante destacar, que se presentan excelentes fotografías de los ejemplares, no sólo de la especie original, si no de un gran número de subespecies consideradas. Termina la obra con una detallada bibliografía específica, que recoge todas las referencias contempladas a lo largo del trabajo y que consideramos imprescindibles en su conjunto.

No podemos terminar estas líneas, sobre este excelente trabajo y, de la que ya podemos considerar como una serie clásica, sin felicitar a los autores por la realización de tan importante trabajo, así como a la Editorial una vez más, por su dedicación en publicar esta obra básica, que no debe de faltar en ninguna biblioteca que se precie, tanto institucional como particular. El precio de este libro es de 32 euros y los interesados lo pueden pedir a:

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Egg chorion exploration of two important pests of family Noctuidae Latreille, 1809 from Himachal Pradesh (India) (Insecta: Lepidoptera)

Amritpal Singh Kaleka, Sainika Jallundhara & Yachana Kapoor

Abstract

Modern systematics uses taxonomy to reflect evolutionary history and in Lepidoptera, immature stage morphology is largely unknown for most species, but it has potential for classification and systematic studies as, Lepidoptera are common major and minor agricultural pests, the present study includes the examination of ultrastructure of Lepidoptera eggs of two pests, *Agrotis ipsilon* (Hufnagel, 1766) and *Spodoptera litura* (Fabricius, 1775) through scanning electron microscope (SEM), following a thorough investigation of the structural complexity of these tiny eggs, detailed ultrastructural descriptions, and comparative analyses, as well as identification keys, for important egg characters have been compiled, these findings will enrich the taxonomic database and update future pest management studies aimed at early potential pest detections at a much earlier stage of their life histories.
Keywords: Insecta, Lepidoptera, Noctuidae, aeropyles, *Agrotis ipsilon*, egg, micropylar rosette, micropyles, *Spodoptera litura*, ultrastructure, India.

Exploración del corion de los huevos de dos importantes plagas de la familia Noctuidae Latreille, 1809 de Himachal Pradesh (India) (Insecta: Lepidoptera)

Resumen

La sistemática moderna utiliza la taxonomía para reflejar la historia evolutiva y en Lepidoptera, la morfología del estado inmaduro es en gran parte desconocida para la mayoría de las especies, pero tiene potencial para la clasificación y los estudios sistemáticos, ya que, los Lepidoptera son plagas agrícolas comunes mayores y menores, el presente estudio incluye el examen de la ultraestructura de los huevos de Lepidoptera de dos plagas *Agrotis ipsilon* (Hufnagel, 1766) y *Spodoptera litura* (Fabricius, 1775) mediante microscopio electrónico de barrido (MEB), tras una minuciosa investigación de la complejidad estructural de estos diminutos huevos, se han compilado descripciones ultraestructurales detalladas y análisis comparativos, así como claves de identificación, para importantes caracteres de los huevos; estos hallazgos enriquecerán la base de datos taxonómica y actualizarán futuros estudios de gestión de plagas dirigidos a la detección precoz de posibles plagas en una fase mucho más temprana de sus historias vitales.
Palabras clave: Insecta, Lepidoptera, Noctuidae, aeropilos, *Agrotis ipsilon*, huevo, roseta micropilar, micropilos, *Spodoptera litura*, ultraestructura, India.

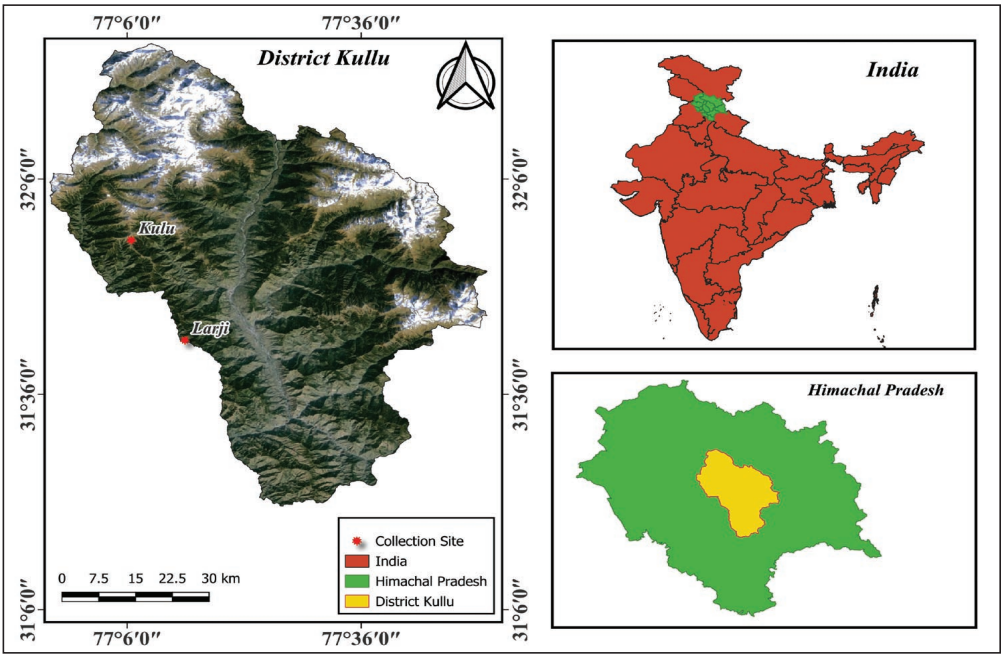
Introduction

There are various techniques for analyzing taxonomic characters, such as morpho-taxonomy,

molecular taxonomy, behavioral taxonomy, and ecological taxonomy, among others. Identification of moths (particularly adults) always relied on characters such as wing maculation, wing venation, male and female genitalic characters and other features, but ultrastructural characters particularly of immature stages such as egg chorion patterns remain completely ignored for many years, even though such characters are equally important for identification. This research aims to fill a gap in taxonomic data and improve the recognition of species at the immature levels. Egg shell architecture has been shown to have taxonomic and phylogenetic significance in several Lepidopteran families Noctuidae (Salkeld 1984), Lycaenidae (Munguira et al. 2015), Danaidae (Kitching, 1985), Mnesarchaeidae (Kobayashi & Gibb, 1995), (Rougerie & Estradel, 2008), Pieridae (Llorente-Bousquets & Castro-Gerardino, 2007; Llorente-Bousquets et al. 2018; Hernández–Mejía et al. 2013), Nymphalidae (García-Barros & Martín, 1995; Freitas & Brown, 2004; Nieves-Uribe et al. 2015), Arctiidae (Kaleka et al. 2023a; 2023b), Lasiocampidae (Kaleka et al. 2023c) and others.

In present study, scanning electron microscope (SEM) was used to inspect and depict eggs of two important pest moths i.e., *Agrotis ipsilon* (Hufnagel, 1766) and *Spodoptera litura* (Fabricius, 1775). This comparative examination will enable the use of exo-chorionic characters in the systematics of the species under consideration, as well as aid in the formation of identification guides. Few important examples of this are the works of Hernández-Roldán et al. (2012) in Hesperiidae, Dolinskaya (2019) in Notodontidae, Munguira et al. (2012) in Lycaenidae and many others.

Both these species i.e., *Agrotis ipsilon* (Hufnagel, 1766), The Black Cutworm and *Spodoptera litura* (Fabricius, 1775), Tobacco Cutworm referable to ditrysian family Noctuidae are polyphagous pests. Morphological features such as egg chorion texture, polygonal cell types, presence of number of aeropylar and micropylar openings, and shape of micropylar rosette have been observed on the eggshells of both investigated species, and these characters must surely be of great taxonomic value at specific as well as generic levels in order to facilitate the identification tasks of moths at much earlier stages of their life histories, i.e., eggs, and such investigations must be expanded in order to improve and elevate the morphological classification of moths at an early stage of development. This article also provides differentiation keys for these two moth species based on examined egg characters.



Materials and Methods

In the month of April 2022, a collection tour was conducted in the locality of Larji (Kullu) (31.7251ºN, 77.2190ºE), District of Himachal Pradesh to collect moth eggs. The light trap method was used to collect and mate adult moths to obtain newly laid eggs. The female's freshly laid eggs were then picked with fine forceps and brushes. The collected eggs were preserved in 70% alcohol and glycerol in a ratio of 8:2; After obtaining eggs, the collected moths were killed, stretched, and preserved in fumigated and air-tight wooden entomological boxes for further identification.

For sample preparation and further SEM investigations methodology adopted by Kaleka et al. (2023) was followed:

Fixation: The sample material, namely the eggs, were fixed in 2.5% glutaraldehyde for at least one hour. The material was then immersed in phosphate buffer solution (PBS) with a pH of 7.4 and rinsed repeatedly for at least 15 minutes.

Dehydration: The eggs were dehydrated by moving them through a series of graded ethyl alcohol solutions (in 50% alcohol for 15 minutes, then 70% and 90% alcohol for 15 minutes each, and three changes in 100% alcohol for 10 minutes each).

Mounting and sputtering: The sample material was dehydrated properly before being mounted on aluminium stubs with double-sided adhesive carbon tape and sputter coated with a gold and platinum mixture.

Scanning: The sputtered egg samples were observed and studied using a SEM (JEOL) JSM-6510LV available at the Punjabi University's Sophisticated Instrumentation Centre in Patiala. The egg chorion, micropylar region, arrangement of micropylar rosette, aeropyles, and other external ultra-structural characters present on the eggshell were photographed.

Analysis: Different egg characters were identified from SEM micrographs using terminology proposed by Zolotuhin and Kurshakov (2009) and Dolinskaya (2019). The images were labelled using Adobe Photoshop CS6 software. Metric analyses of egg diameters were performed using ImageJ software.

Results

Agrotis ipsilon (Hufnagel, 1766) (Figures 1-6)

Egg Shape and Size: The egg of this noctuid moth species is spherical in its shape with 0.573mm diameter.

Egg Chorion: The egg chorion texture of this species is highly sculptured, with a total of 35 well defined ribs and ridges all over the egg chorion surface which are considered a species-specific character in noctuid moth eggs. The chorion is made up of rectangular and pentagonal shaped polygonal cells, starting write after the secondary petaloid cell (SPC) series and extending almost up to the base of the egg. The polygonal cells of the egg have well defined walls with clear and smooth base which imparts clear shape and boundaries to these polygonal cells.

Micropylar Region: The micropylar region of this egg is composed of micropyles which are present in a micropylar pit and which is again surrounded by a series of primary petaloid cells (PPC). The PPC are than encircled by a series of secondary petaloid cells, which are very different in their shapes, sizes, numbers, and texture. No, such visibly clear prominent transition zone is seen present between micropylar region and the general egg chorion surface of the egg.

Micropylar Rosette: The micropylar rosette on this egg is prominently present just in center at the anterior pole of the egg. The micropylar rosette is formed of a series of total 10 primary petaloid cells fashioned in a way that forms a flower shape around the micropylar pit. These PPC are double- walled towards the micropylar pit and up to one third of the entire cell shape. The base of these petaloid cells is slightly textured with prominent walls separating them from each other. The PPC are again seen surrounding by a series of 14 secondary petaloid cells, which are clearly not uniform in their shape and sizes. Micropylar rosette as observed is completely devoid of air- spaces or aeropyles.

Micropyles: The micropyles or also as they are called micropylar openings are observed in a well-defined square shaped micropylar pit in the very center of the micropylar rosette. The micropylar pit is clearly visible and holds four micropyles one at each corner of the square which are deep.

Aeropyles: Aeropyles or the aeropylar openings are the air-spaces present on the egg for the exchange of gases between the embryo and its environment. The aeropyles on this egg are observed present but they are limited to only four rows of the polygonal cells from where the micropylar rosette ends. These aeropyles are circular in their shapes as seen from above, but as they are present embedded into the walls of the polygonal cells, the exact shape they hold is cylindrical, each polygonal cell carries up to four to six aeropylar openings according to the shape of the polygonal cells. These air spaces are not uniformly present in each polygonal cell rather they are present in somewhat scattered manner, as no such clear pattern is visible in their actual arrangements. After four rows of the polygonal cells all the remaining egg chorion is completely devoid of the aeropyles.

Material Examined: India, Himachal Pradesh, Kullu, Larji, 2366 m, ♀, 20-VI-2022, Sainika Jallundhara, 2 eggs.

Distribution: Asia, Australia, Central and South America, Europe, Mexico, New Zealand, North Africa, Pacific Rim, and Southern Canada.

Spodoptera litura (Fabricius, 1775) (Figures 7-12)

Egg Shape and Size: The egg is ellipsoid in its shape when seen from above with somewhat swollen and flat base with a diameter of 0.439mm.

Egg Chorion: The general egg chorionic surface is highly sculptured and irregular with prominently visible ribs and ridges. The number of ribs present on the egg surface is considered as a species-specific character in Noctuid eggs. In the present species, the total number of ribs is 42-44. These ridges are countable up to the middle of the egg after which the egg sculpturing starts fading and becomes almost smooth towards egg base. The lateral sides of the egg are found to have some rectangular and squarish polygonal cells and their boundaries or walls are well defined with smooth texture-free base which gives every polygonal cell a clear and specific shape.

Micropylar Region: The micropylar region of this egg is present in the very center of the top anterior end of the egg. The micropylar area shows distinct and clearly visible structures such as micropylar rosette having micropylar openings in a small micropylar pit and series of primary and secondary polygonal cells. No, such visibly clear prominent transitional zone is present between micropylar region and the general egg chorion surface of this egg.

Micropylar Rosette: The micropylar rosette is placed at anterior pole of the egg and is composed of nine primary petal shaped cells or petaloid cells which provides a flower like appearance. These cells surround a small squarish micropylar pit in the center of the rosette which holds micropylar openings. The primary petaloid cells are further surrounded by an arrangement of total 16 secondary petaloid cells having slightly raised walls and a texture free base. These secondary petaloid cells are not uniform in their shapes and sizes. The PPC and SPC are completely devoid of any aeropylar openings.

Micropyles: These micropyles or also known as micropylar openings are present in center of the small squarish micropylar pit surrounded by series of PPC and SPC. The micropyles are four in number present one at each corner of the square pit.

Aeropyles: The rectangular and squarish polygonal cells are seen holding long and hollow cylindrical aeropylar structures on lateral sides of the egg. The aeropyles are present at each corner of the polygonal cell i.e., four aeropylar openings per cell are present all over the chorionic surface.

Material Examined: India, Himachal Pradesh, Kullu, Larji, 2366 m, ♀, 28-VI-2022, Sainika Jallundhara, 3 eggs.

Distribution: Australasia, Pacific Islands and Tropical & Temperate Asia.

Key to the studied species of family Noctuidae (Based on egg characters):

Egg chorion uniformly patterned with rectangular and pentagonal cells; 35 longitudinal ribs present all over the egg chorion; Micropylar rosette formed of 10 Primary petaloid cells and 14 Secondary petaloid cells; four to six aeropylar openings present on the walls of each polygonal cell ....*Agrotis ipsilon* (Hufnagel, 1766)

Egg chorion uniformly patterned with square and rectangular cells; 42-44 longitudinal ribs present

all over the egg chorion; Micropylar rosette formed of nine Primary petaloid cells and 16 Secondary petaloid cells; four aeropylar openings present on the walls of each polygonal cell..... ..... *Spodoptera litura* (Fabricius, 1775)

Discussion

For the first time, the egg morphology, ultrastructure of egg chorion, and patterns in two species of Noctuid moths, *Agrotis ipsilon* (Hufnagel, 1766) and *Spodoptera litura* (Fabricius, 1775), were thoroughly investigated under scanning electron microscope. The external morphology or ultrastructure of the egg's chorion differs between the two studied species in terms of chorion sculpturing, the number of primary and secondary cells forming the micropylar rosette, and the number and shape of micropylar and aeropylar openings.

There have been very few studies on the aeropylar openings found on the egg chorion of lepidopteran eggs. Fehrenbach et al. (1987) tried to count the number of aeropyles on egg chorion in two Noctuid species, *Heliothis virescens* (Fabricius, 1777) and *Spodoptera littoralis* (Boisduval, 1833). *Heliothis virescens* (Fabricius, 1777) produced 50 aeropyles per egg, while *Spodoptera littoralis* (Boisduval, 1833) produced 400. The current study attempted to investigate the number and shape of aeropylar openings in the species under consideration. The number of aeropyles per polygonal cell present on the egg chorion has been recorded, and four to six aeropyles per polygonal cell have been observed in *Agrotis ipsilon* (Hufnagel, 1766) which remains limited to only four per cell in case of *Spodoptera litura* (Fabricius, 1775). The comparative ultrastructural details of the eggs of these two noctuid pest species have been summarized in Table 1 to simplify the similarities as well as differences between the two pests of same family. Through present investigations and based on studies carried out by Fehrenbach et al. (1987), on eggs of two noctuid lepidopteran pests namely, *Heliothis virescens* (Fabricius, 1777) and *Spodoptera littoralis* (Boisduval, 1833) we can conclude that the presence of ribs and ridges on the egg chorion as observed on all these species is a species-specific character and in present study too these are similarities between the two species when we consider the egg characters like shape of the polygonal cells, shape of the micropylar pit and number of micropyles.

Table 1. Comparative account of important ultrastructural egg characters investigated in the present study.

EGG FEATURES	STUDIED SPECIES	
	***Agrotis ipsilon* (Hufnagel, 1766)**	***Spodoptera litura* (Fabricius, 1775)**
EGG SHAPE	Spherical	Ellipsoid
EGG SIZE (DIAMETER)	0.573mm	0.439mm
CHORION TEXTURE	Highly Sculptured	Highly Sculptured
SHAPE OF POLYGONS	Rectangular & Pentagonal	Square & Rectangular
NUMBER OF AEROPYLES (PER POLYGONAL CELL)	04-06	04
NUMBER OF MICROPYLES	04	04
NO. OF PRIMARY PETALOID CELLS (PPC)	10 Petaloid	09 Petaloid
NO. OF SECONDARY PETALOID CELLS (SPC)	14 Petaloid	16
SHAPE OF MICROPYLAR PIT	Square-Shaped	Square-Shaped
TOTAL NUMBER OF RIDGES	35	42-44

In genus *Spodoptera* Guenée, Skudlik et al. (2005) carried out a detailed study on the eggshell ultrastructure of the eggs of *Spodoptera exigua* (Hübner, 1808). As far the shape of the egg is concerned, it is ellipsoid in *Spodoptera litura* (Fabricius, 1775) and spherical in *Spodoptera exigua* (Hübner, [1808]). In micropylar rosettes, 11 primary petaloid cells are involved in the arrangement in *Spodoptera exigua* (Hübner, [1808]) whereas nine primary petaloid cells form this arrangement in *Spodoptera litura* (Fabricius, 1775). They observed only single micropyle or micropylar opening in *Spodoptera exigua* (Hübner, 1808) and 4 micropylar openings are present in the present examined species i.e., *Spodoptera litura* (Fabricius, 1775). In the present study, the general chorionic surface is observed with same pattern of polygons and ridges giving an appearance of honeycomb as found in *Spodoptera exigua* (Hübner, [1808]).

For identification and differentiation of discrete taxa, superficial morphological attributes such as general coloration, ornamentation of the head, thorax, and abdomen, wing maculation, wing venation, and particularly, male, and female genitalic features are traditionally used. Based on current and relevant previous important works, it is easy to conclude that the ultrastructural features are also noteworthy and can authenticate and strengthen the morpho-taxonomy. Additionally, these types of investigations can be carried out in regard to pest management programs and crop protection from potential pests such as both the currently studied species as well as other species which are harmful agricultural pests.

Spodoptera litura (Fabricius, 1775) is a pest that is highly polyphagous (EPPO, 1979). According to a CABI (2018) factsheet, larvae consume at least 120 plant species. Shekhawat et al. (2018) cite literature indicating that *Spodoptera litura* (Fabricius, 1775) feeds on 180 host species, whereas Shu et al. (2017) cite literature indicating that *Spodoptera litura* (Fabricius, 1775) feeds on 389 hosts. Hosts can be found in at least 40 plant families. In contrast, the black cutworm *Agrotis ipsilon* (Hufnagel, 1766) is widespread in many temperate and subtropical regions, where it is a major pest of field crops, vegetables, and grasses. These moths frequently lay their eggs on weeds near crop fields, after which the larvae move to the plants, cutting off seedlings and destroying them. Almost all vegetable plants, as well as alfalfa, clover, cotton, rice, and others, are preferred crops (Capinera, 2009). So, the proper egg chorion studies and then the identification keys based on the egg characters will allow us to identify these types of harmful pests at the early egg stage and the exact pest management programs can be formulated for them before the larval stages hatch and attacks the crop fields and so that, crop damage can be reduced to much lower levels.

It is justified to mention here again that these SEM inspections of the eggshells of these moth species will prove to be valuable approach when it comes to identification of moths at earlier stage of their life-histories i.e., egg. Such investigations can be helpful regarding discrimination of different taxa at family, generic or species levels and even for resolving out species complexes.

In current study, as discussed above significant differences were observed in egg chorions of both the species. These findings will surely help in recognizing species and improving morpho-taxonomy at the immature stage. Tables 1 summarize significant observations from present study.

At last, on basis of these investigations this study can surely set a solid foundation and contribute a suitable model for carrying out such investigations on Indian moths by upcoming researchers in field of taxonomy.

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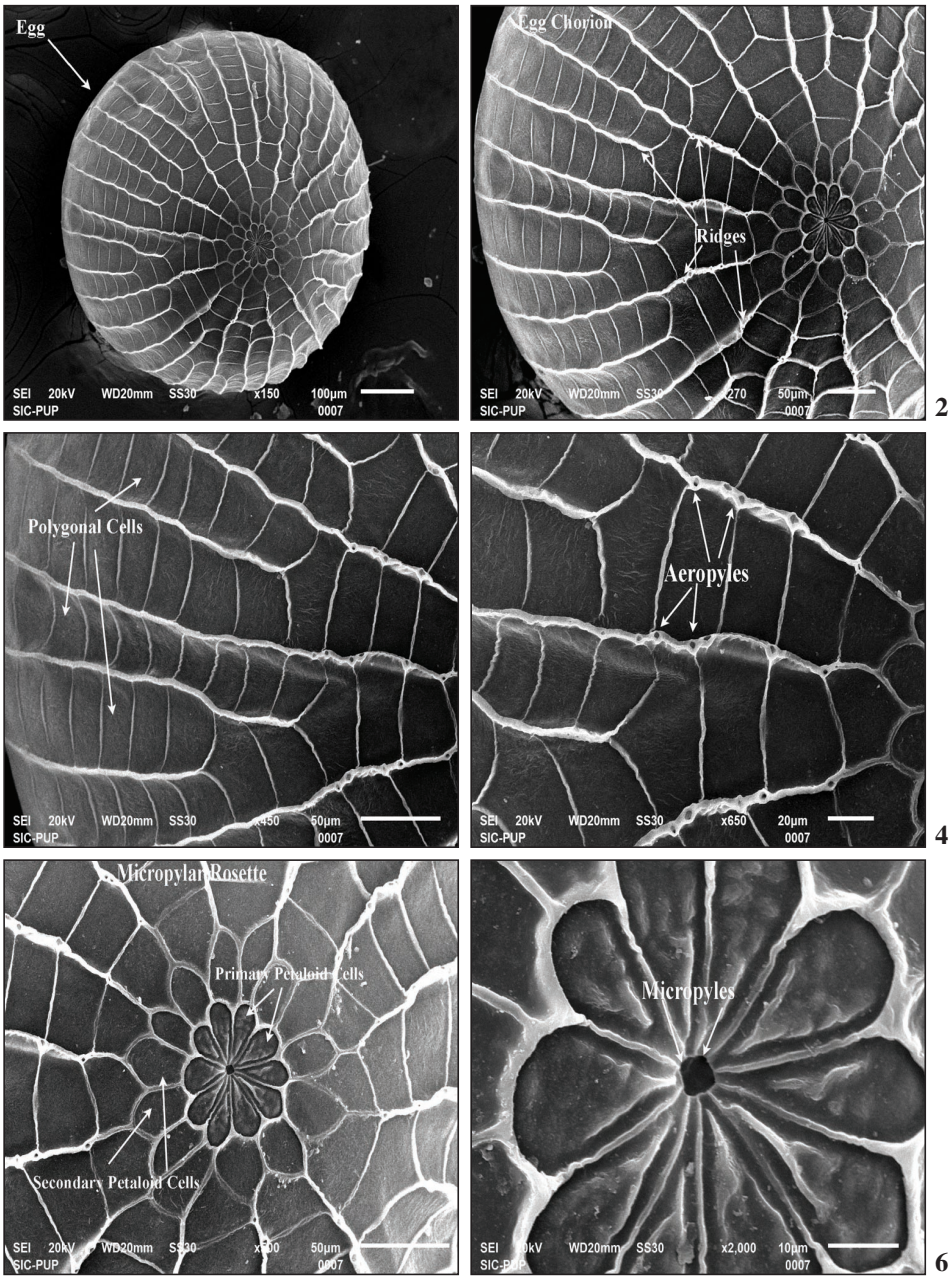
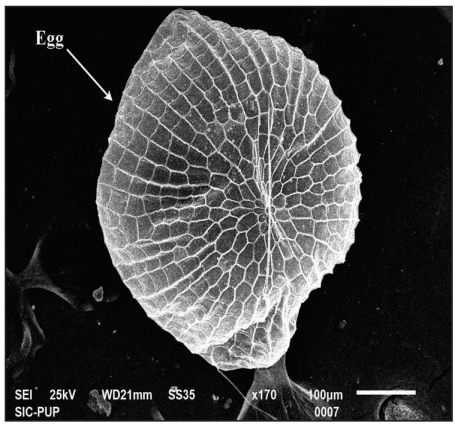


Figures 1-6. Egg of *Agrotis ipsilon* (Hufnagel, 1766): **1.** Dorsal view (Egg). **2-3.** Egg Chrorion. **4.** Aeropyles. 5-6. Micropylar Region.



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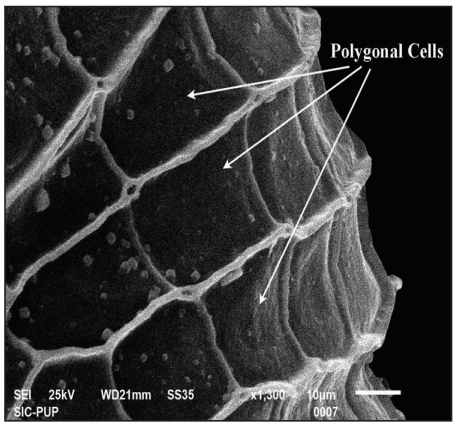

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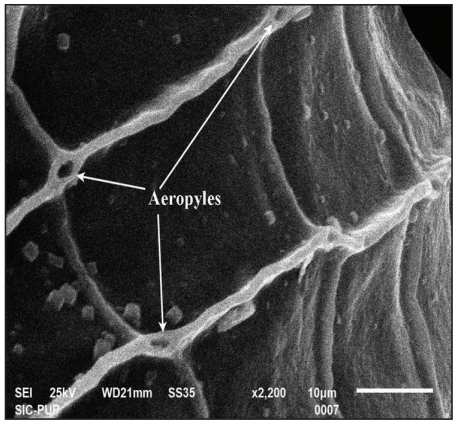

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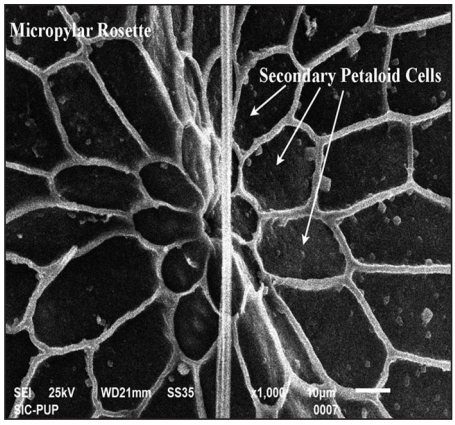

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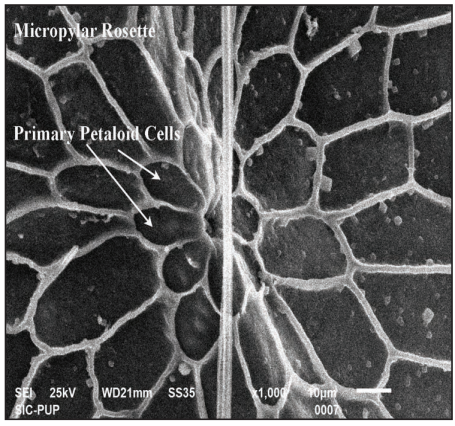

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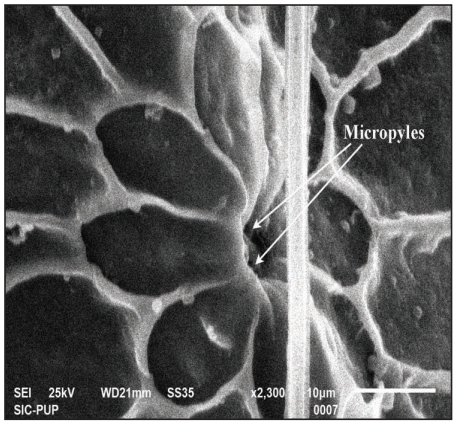

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Figures 7-12. Egg of *Spodoptera litura* (Fabeicius, 1755): **7.** Dorsal view (Egg). **8.** Egg Chrorion. **9.** Aeropyles. **10-12.** Micropylar Region.

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New or interesting Pyraloidea for the European and Italian faunas (Insecta: Lepidoptera)

Graziano Bassi, Friedmar Graf & František Slamka

Abstract

New data on European Pyraloidea are shown following the study of material present in the authors' collections as well as well as in the Natural History Museum of Denmark (Copenhagen). *Catoptria plitvicensis* Bassi, sp. nov. and *Catoptria velebitica* Bassi, sp. nov. from Croatia, and *Melathrix edmundsi* Slamka, sp. nov. from Crete are described. *Arsissa firusella* (Amsel, 1961) (Pyralidae: Phycitinae), *Euchromius subcambridgei* Błeszyński, 1965 (Crambidae: Crambinae) and *Crocidophora tuberculalis* Lederer, 1863 (Crambidae: Pyraustinae) are new for Europe. *Gymnancyla hillneriella* Gastón & Vives, 2018, *Pempeliella ardosiella* (Ragonot, 1887), *Pempeliella bulgarica* Slamka & Plant, 2016, and *Phycita torrenti* Agenjo, 1962 (all Pyralidae: Phycitinae) are reported as new for Italy. *Calamotropha paludella* (Hübner, [1824]) (Crambidae: Crambinae) is reported as new for Sicily, *Gymnancyla canella* ([Denis & Schiffermüller], 1775) (Pyralidae: Phycitinae) is reported as new for Sardinia and South Italy. *Pempelia alpigenella* (Duponchel, 1836) (Pyralidae: Phycitinae) is reported as new for Northwestern Italy and *Bradyrrhoa gilveolella* (Treitschke, 1833) (Pyralidae: Phycitinae) is reported as new for continental Italy.
Keywords: Insecta, Lepidoptera, Pyraloidea, Crambidae, Crambinae, Phycitinae, Pyralidae, Pyraustinae, new records, new species, Europe.

Pyraloidea nuevos o interesantes para la fauna europea e italiana (Insecta: Lepidoptera)

Resumen

Se presentan nuevos datos sobre los Pyraloidea europeos tras el estudio del material presente en las colecciones de los autores, así como en el Museo de Historia Natural de Dinamarca (Copenhague). Se describen *Catoptria plitvicensis* Bassi, sp. nov. y *Catoptria velebitica* Bassi, sp. nov. de Croacia y *Melathrix edmundsi* Slamka, sp. nov. de Creta. *Arsissa firusella* (Amsel, 1961) (Pyralidae: Phycitinae), *Euchromius subcambridgei* Błeszyński, 1965 (Crambidae: Crambinae) y *Crocidophora tuberculalis* Lederer, 1863 (Crambidae: Pyraustinae) son nuevas para Europa. *Gymnancyla hillneriella* Gastón & Vives, 2018, *Pempeliella ardosiella* (Ragonot, 1887), *Pempeliella bulgarica* Slamka & Plant, 2016 y *Phycita torrenti* Agenjo, 1962 (todas Pyralidae: Phycitinae) se señalan como nuevas para Italia. *Calamotropha paludella* (Hübner, [1824]) (Crambidae: Crambinae) se comunica como nueva para Sicilia, *Gymnancyla canella* ([Denis & Schiffermüller], 1775) (Pyralidae: Phycitinae) se comunica como nueva para Cerdeña y el sur de Italia. *Pempelia alpigenella* (Duponchel, 1836) (Pyralidae: Phycitinae) se comunica como nueva para el noroeste de Italia y *Bradyrrhoa gilveolella* (Treitschke, 1833) (Pyralidae: Phycitinae) se comunica como nueva para Italia continental.
Palabras clave: Insecta, Lepidoptera, Pyraloidea, Crambidae, Crambinae, Phycitinae, Pyralidae, Pyraustinae, nuevos registros, nuevas especies, Europa.

Pyraloidea nuovi o interessanti per la fauna Europea ed Italiana (Insecta: Lepidoptera)

Riassunto

Nuovi dati sui Pyraloidea europei vengono illustrati in seguito allo studio di materiale presente nelle collezioni

degli autori e del Museo di Storia Naturale della Danimarca (Copenhagen). Vengono descritte *Catoptria plitvicensis* Bassi, sp. nov. e *Catoptria velebitica* Bassi, sp. nov. dalla Croazia, e *Melathrix edmundsi* Slamka, sp. nov. da Creta. *Arsissa firusella* (Amsel, 1961) (Pyralidae: Phycitinae), *Euchromius subcambridgei* Błeszyński, 1965 (Crambidae: Crambinae) e *Crocidophora tuberculalis* Lederer, 1863 (Crambidae: Pyraustinae) sono nuovi per l'Europa. *Gymnancyla hillneriella* Gastón & Vives, 2018, *Pempeliella ardosiella* (Ragonot, 1887), *Pempeliella bulgarica* Slamka & Plant, 2016 e *Phycita torrenti* Agenjo, 1962 (tutti Pyralidae: Phycitinae) sono segnalati come nuovi per l'Italia. *Calamotropha paludella* (Hübner, [1824]) (Crambidae: Crambinae) è segnalata come nuova per la Sicilia, *Gymnancyla canella* ([Denis & Schiffermüller], 1775) (Pyralidae: Phycitinae) è segnalata come nuova per la Sardegna e il Sud Italia. *Pempelia alpigenella* (Duponchel, 1836) (Pyralidae: Phycitinae) è segnalata come nuova per l'Italia nord-occidentale e *Bradyrrhoa gilveolella* (Treitschke, 1833) (Pyralidae: Phycitinae) è segnalata come nuova per l'Italia continentale.
Parole chiave: Insecta, Lepidoptera, Pyraloidea, Crambidae, Crambinae, Phycitinae, Pyralidae, Pyraustinae, nuove segnalazioni, nuove specie, Europa.

Introduction

The European and Italian Pyraloidea fauna are relatively well known, especially compared to Microlepidoptera. However, extensive field research, migrations linked to climate change and the passive dispersal caused by human activities ensure that interesting novelties constantly appear. We report here data gathered from our collections and from loans of specimens from valuable European collections.

Material and Methods

Samples were collected using a 100 W mixed light lamp in combination with two 20 W UV energy-saving tubes BL 368 (Graf) and with 160 mixed light lamp or 15 W superactinic tubes (Bassi).

Genitalia preparations were made following Robinson (1976). The terminology of the genitalia follows Błeszyński (1965), Klots (1970) and Slamka (2019). Genitalia photographs were taken with a Canon S120 digital camera mounted on a Leitz Laborlux 12 (Bassi), with a Bresser Science Infinity trinocular microscope directly by its own system camera (Graf), and with Nikon D3100 digital camera mounted on a Meopta microscope (Slamka). The habitus photos were made with a A Sony system camera with a Sony SEL-30M35 macro lens, Nikon D3100 and D3300 digital cameras. The images were enhanced with Adobe Photoshop Elements (Bassi, Slamka) and ACDSee Photo Studio Ultimate 2020 (Graf). Genitalia are preserved in a glycerin vial pinned under the specimens or after maceration of abdomens in hot 10% aqueous KOH, cleaned, stained variously with Fuchsine, Orange G and/or Chlorazol black, and slide-mounted in Euparal.

Abbreviatons used

GS	genitalia slide
M	meter(s)
RCFG	Friedmar Graf Research Collection, Bautzen, Germany
RCGB	Graziano Bassi Research Collection (to be deposited in MHNG), Avigliana, Italy
RMČS	Marek Dvořák, Collection I. Richter, Malá Čausa, Slovakia
SNMB	Slovak National Museum Bratislava, Slovakia
ZMUC	Zoological Museum collection, Natural History Museum of Denmark, Copenhagen

Results

PYRALOIDEA
CRAMBIDAE
Crambinae

***Catoptria plitvicensis* Bassi sp. nov.** (Figures 1, 27)

Holotype female: CROATIA, Rastovača near Plitvice, 510 m, 44º54'N, 15º37'E, 2-3-VII-2007, G. Bassi leg., GS 4907 GB, RCGB.

Description: Wingspan 23 mm. Labial palpus 3.5 X eye diameter, downcurved distally, bronze ochre brown with inner side white. Maxillary palpus white. Antenna filiform, brown with costa bronze brown. Frons rounded, slightly produced, off-white. Chaetosemata fully developed. Ocelli small. Vertex white. Patagium white, pale brown laterally. Tegulae grey brown. Thorax white with edge brown. Wings with pattern and colours as illustrated (Figure 1). Underside of forewing brown, with subterminal area paler. Underside of hindwing off-white suffused with grey, with terminal line brown. Legs pale reddish brown, white on inner side; tibial spurs narrow, the external 0.5 as long as the internal.

Female genitalia (Figure 27): Papillae anales subtriangular, with sclerotized section narrowing dorsally. Apophyses posteriores subtriangular, 0.6 as long as papillae anales. Apophyses anteriores absent. Abdominal segment VIII large, sclerotized, with tergite higher than papilla + apophyses and sternite modified especially in the large basis and medial protuberance. Ostium bursae rounded, with sterigma only slightly produced ventrally. Ductus bursae 2.4 X as long as corpus bursae, sinuous, strongly wrinkled up to 0.8 of its length. Corpus bursae suboval, scobinate and with drop-like signum.

Male: unknown.

Diagnosis: The wing pattern is similar to that of the other species of the *C. permutatella* group with the medial stripe of the forewing interrupted by brown bands. However, the narrow brown bands, the single yellowish subapical dot along costa and the pale grey brown hindwing are distinctive features. The female genitalia are similar to those of *C. spatulellus* (Turati, 1919) (Bassi & Huemer, 2020, Figures 22-24), an Italian species with uniform white streak in the forewing, differing in having a large and rounded ostium bursae, with the sterigma only slightly produced ventrally and the basal plate of the sternite of abdominal segment VIII laterally sinuate and with strong medial protuberance as opposed to the strongly produced sterigma and the laterally stouter basal plate of the sternite of abdominal segment VIII and with lamellate medial protuberance in *C. spatulellus*.

Distribution: So far known only from the type locality.

Etymology: The new species derives its name from the Plitvice lakes, which are very close to type locality.

***Catoptria velebitica* Bassi, sp. nov.** (Figures 2, 28)

Holotype ♀: CROATIA, Velebit Mts, 1 km W[est of] Brusane, 625 m, 44º30'N, 15º14'E, 27-VI-2003, B. Skule & C. Hviid, GS 5526 GB, ZMUC.

Description: Wingspan 28 mm. Labial palpus 3 X eye diameter, downcurved distally, brown with inner side white. Maxillary palpus basally brown, then white. Antenna filiform, brown with costa pale bronze brown. Frons rounded, slightly produced, white. Chaetosemata pale brown, fully developed. Ocelli small. Vertex white. Tegulae pale ivory yellow. Thorax white. Wings with pattern and colours as illustrated (Figure 2). Underside of forewing bright yellow brown, with costa, apex and subterminal area off-white and with transversal bands of the upperside visible. Underside of hindwing white, with terminal line yellow brown; a large subterminal ill-defined brown band is clearly visible around apex

and first part of termen, the same band hardly distinguishable on upper side of wing. Legs white with tarsi pale yellow, white on inner side; tibial spurs narrow, the external 0.7 as long as the internal.

Female genitalia (Figure 28): Papillae anales subtriangular, with sclerotized section narrowing dorsally. Apophyses posteriores slender, subtriangular, 0.8 as long as papillae anales. Apophyses anteriores absent. Abdominal segment VIII large, sclerotized, folded laterally. Ostium bursae cup-shaped, sterigma pointed, strongly produced anteriorly. Ductus bursae 1.6 X as long as corpus bursae, sinuous, strongly wrinkled up to 0.7 of its length. Ductus seminalis branching at 0.7 length of ductus bursae. Corpus bursae large, suboval, scobinate and with small rounded signum.

Male: unknown.

Diagnosis: This species is distinguishable from other species of the *C. permutatella* group which a forewing medial stripe interrupted by brown bands in the more brown-grey ground colour of the forewing, being more reddish in the other species, for having both transverse brown bands proceeding, changing direction, beyond the medial stripe to the costa, and, in having two larger off-white spots postmedially along costa. *Catoptria captiva* Bassi, 1999 also has the forewing brown bands angled and traceable up to the costal edge, but it has a reddish-brown ground colour and a single subapical white dot. In the female genitalia the strongly produced sterigma and abdominal segment VIII strongly folded laterally distinguish *C. velebitica* from the related *C. casperella* Ganev, 1983, *C. gozmanyi* Błeszyński, 1956, and *C. myella* (Hübner, 1796) (Figures 29-31).

Distribution: So far known only from the type locality.

Etymology: The new species derives its name from the Velebit Mountains, where the holotype was collected.

Euchromius subcambridgei Błeszyński, 1965 (Figures 3, 13, 25)

Material examined: 3 ♀, ITALY, Sicily, Caltanissetta, Umgebung [near] Gela, 37.085165, 14.192386, 30-VIII-2020, am Licht [at light], F. Graf leg., RCFG. 1 ♀, Sicily, Syracuse Province, Umg.[near] Palazzolo Acreide, 36.991583, 15.023972, 2-IX-2020 am Licht [at light], F. Graf leg., RCFG.

Distribution: Cape Verde Islands, Sudan, Tunisia (Schouten, 1992). **New for Europe**.

Remarks: A living specimen (Figure 13) and a pinned specimen (Figure 3), both from Palazzolo Acreide are illustrated. The female genitalia is rpresented in figure 25.

Calamotropha paludella (Hübner, [1824]) (Figure 4)

Material examined: 1 ♀, ITALY, Sicily, Castellammare del Golfo (TP) [Trapani Province], Castello di Baida, 500 m, 1-5-X-2014, G. Bassi leg., RCGB.

Distribution: Cosmopolitan (except America). **New for Sicily**.

Remarks: The specimen is illustrated as Figure 4. This rather common moth was surprisingly not yet reported from Sicily. The examined female is a particularly small specimen with a wingspan of only 22 mm, versus females of an average wingspan of 29 mm on the Italian mainland.

Pyraustinae

Crocidophora tuberculalis Lederer, 1863 (Figures 5, 24)

Material examined: 1 ♀, ITALY, Venetien, [Emilia-Romagna, Lido di Volano, Ferrara Province], Po Delta, -2 m, 44.812205, 12.252319, 2-VIII-2020, am Licht [at light], F. Graf leg., RCFG

Distribution: North America: Canada: Quebec, and U.S.A. from Eastern Texas eastwards to Atlantic coast (Moth Photographers Group, 2019). **New for Europe**.

Remarks: This adventive species was surely introduced by human activities, and more specimens will probably be discovered, as demonstrated by the presence of cornuti in the corpus bursae of the collected specimen (Figure 24, arrows) proves the presence of males. Also the caterpillars lives on rather ornamental bamboo plants (*Arundinaria* spp.).

Remarks: This specimen is illustrated as figure 5 and its female genitalia as figure 24.

Phycitinae

Gymnancyla canella ([Denis & Schiffermüller], 1775) (Figures 7, 17)

Material examined: 2 ♂, ITALY, Sardegna, Cabras [Oristano Province], lago [Lake] Mistras vicino al mare [near the sea], 1 m, 39,895º N, 8,459º E, 7-IX-2021, G. Longo Turri leg., GS 7380 GB, RCGB and Longo Turri Collection, 1 ♀, Puglia, Gargano, Capoiale [Cagnano Varano, Foggia Province], Strandnähe [near the beach], 5 m, 41.912059, 15.714298, 10-VIII-2020, am Licht [at light], F. Graf leg., RCFG.

Distribution: Europe, up to Denmark and U.K. and eastwards to the Urals. Turkey, North Africa (Roesler, 1973). In Italy previous records are from Liguria and the Po basin. **New for South Italy and Sardinia**.

Remarks: The male species is illustrated as figure 7; its male genitalia, culcita and sclerotization's of abdominal segments 2-4 are illustrated as figure 17. The female specimen and its genitalia are illustrated on Lepiforum (2008-2024).

Gymnancyla hillneriella Gastón & Vives, 2018

Material examined: 1 ♂, 3 ♀: ITALY, Basilicata, Umgebung [near] Ferrandina [Matera Province], 227 m, 40.479273, 16.459486, 18-VIII-2020, am Licht [at light], F. Graf leg., RCFG.

Distribution: Spain. **New for Italy.**

Remarks: The adult and the male and female genitalia of these specimens are illustrated on Lepiforum (2008-2024).

Pempeliella ardosiella (Ragonot, 1887) (Figures 8, 18)

Material examined: 1 ♂, ITALY, Basilicata [Potenza Province], Mt Pollino, 1350 m, dint. [near] Rif[ugio] Pedarreto, 7-14-VII-1991, G. Bassi leg., GS 3871GB, RCGB.

Distribution: Gibraltar, Portugal, Spain, Southern France (Slamka, 2019). **New for Italy.**

Remarks: This specimen is illustrated as figure 8. The male and culcita in figure 18.

Pempeliella bulgarica Slamka & Plant, 2016

Material examined: 1 ♀, ITALY, Abruzzen, Umgebung [near] Menzano [L'Aquila, L'Aquila Province], 1094 m, 42.422538, 13.192740, 7-VIII-2020, am Licht, F. Graf leg., RCFG.

Distribution: Bulgaria, Albania, Hungary, Russia, Serbia, Turkey (Slamka, 2019). **New for Italy**.

Remarks: This specimen and its genitalia are illustrated on Lepiforum (2008-2024).

***Melathrix edmundsi* Slamka, sp. nov.** (Figures 6, 15, 19)

Holotype ♂, Villa Xylia, 15-XI-2016, Agios Georgios, 74056, Crete [Greece]; leg[it] Henry Edmunds; GS 2161 F. Slamka, SNMB.

Description (Figure 6): Wingspan 23.9 mm. Antenna with short whitish cilia 1.2x as long as diameter of antenna. Base of flagellum with sinus surrounded by raised scales. Labial palpus about 1.5 X eye diameter. Frons, patagium, thorax, abdomen and legs ochre. Forewing ground colour ochre sprinkled with light brown along the costa, the cubital and medial veins and on the dorsum; apex darker, grey brown. Three distinct brownish spots in middle of cubital vein, and on radio-medial transverse vein (= discoidal spot), and a longitudinal fine blotch in middle of M1. Submarginal dots brown, placed in ochre-whitish fine line. Fringes brownish with two narrow logitudinal brown lines. Hindwings (quadrifid venation) off-white suffused with grey brown, more intensely along costa and termen, as a narrow line along dorsum. Fringes whitish with thin medial brownish line.

Male genitalia (Figure 19): Uncus broad, rounded. Gnathos triangular, pointed. Tegumen broad, 0.6 as long as vinculum. Vinculum U-shaped, distally concave. Transtilla well developed, narrow.

Valva subtriangular, narrowing towards apex, with cucullus broadly rounded; costa basally with longitudinal cluster of well sclerotized spines (about 8-10) (Figure 19, arrow), (during dissection a separate thorn (Figure 19, arrow "?") was found, probably broken off from this cluster of spines). Sacculus weakly sclerotized with longitudinal groves. Juxta oval, with two lateral slender lobes with delicate cilia apically. Anellus broad, slightly sclerotized. Phallus 1.5 X as long as valva, stout, with three cornuti, the first straight and short, the second longer, with the basal part broader and fusiform, the third, apically placed, strong and hooked; with several scobinations apically. Abdominal tergite VIII rounded with two paired, narrow sclerotized plates. Culcita well sclerotized with lateral pair of scale tufts. All other *Melathrix* spp. (*M. coenulentella* (Zeller, 1846), *M. proteella* Slamka, 2019, *M. cornutella* (Amsel, 1951), *M. fartakensis* (Rebel, 1931), *M. belutschistanella* (Amsel, 1961)), known so far from the Western Palaearctic have distinctly different genitalia and forewing markings, see Slamka (2019, pp. 103-106, pls. 17, 58-60) and Amsel (1961, p. 368, fig. 87, pl. 3 fig. 171).

Female: unknown.

Diagnosis: *Melathrix edmundsi* sp. nov. is very similar in external characters to *M. praetextella* (Christoph, 1877) (Slamka, 2019, pl. 17, figs 110 a-h). Reliable identification from *praetextella* is possible based on the genitalia as follows: in *praetextella* (Slamka, 2019, pl. 58, figs110 a-c) the phallus has only two strong, slightly bent cornuti; a longitudinal cluster of sclerotized spines is absent; the sacculus has a narrow pointed tip; and the sclerotized base of the culcita is different, with a lateral pair of very long and thin scale tufts. All other *Melathrix* species have distincty different genitalia and forewing markings (see Slamka, 2019, pp. 103-106, pls. 17, 58-60).

Habitat and biology: Habitat (Figure 15) is xerothermic with grass and stone near the sea with mixed scrub and lentic bushes (Fabiaceae), and wild olives (H. Edmunds, pers. comm.). The specimen was collected in November. The preimaginal stages and host plant are unknown.

Distribution: So far known only from the type locality in Crete (Greece).

Etymology: The name of this species is dedicated to the English collector Henry Edmunds, who collected the new species.

Arsissa firusella (Amsel, 1961) (Figures 9, 14, 20)

Gnathomorpha firusella Amsel, 1961. *Ark. Zool.,* (2), *13*, 373

Type locality: IRAN, Comé, Barm-i-Firus.

Material examined: 1 ♂, ALBANIEN, Qark Gjirokastra, Rruga Cajupit, 1251 m, 40.194812, 20.177663, 23-VI-2023, am Licht [at light], F. Graf leg., RCFG. 2 ♂. TURKEY, Prov. Ankara, 5 km S Sereflikochisar, 950 m, 5-V-2001, leg. Marek Dvořák, Collection I. RMČS.

Distribution: Iran. **New for Europe and Turkey**.

Remarks: Amsel (1961, p. 374) mentioned a single female paratype from a different locality (not yet traced), but it is not clear if this specimen belongs to *A. firusella* or to a different, similar species. *Arsissa firusella* should belong to the genus *Pima* based on morphological features, but the confirmation needs further study. This specimen is illustrated as figures 9 and 14, the male genitalia and culcita as figure 20, the habitat in Albania on figure 16.

Pempelia alpigenella (Duponchel, 1836) (Figures 10, 21, 22)

Material examined: 1 ♂, I[TALY]-Piemonte, Val Susa, Mompantero, Mt. Rocciamelone, 1100 m, 20-VI-1998, G. Bassi leg., GS 4413 GB, RCGB; 1 ♂, I[TALY]-Piemonte, Val Susa, Avigliana (TO), PNLA Sede, 340 m, 9-16-IX-2004, G. A. Bonicelli leg., GS 7285 GB, RCGB.

Distribution: South of France, Albania eastwards to Altai Mountains (Slamka, 2019). In Italy previous records are from Abruzzo and Romagna. **New for Northwestern Italy**.

Remarks: The specimen from Mompantero is illustrated as Figure 10, the male genitalia and culcita as Figures 21 (specimen from Avigliana) and 22 (specimen from Mompantero).

Phycita torrenti Agenjo, 1962 (Figures 11, 26)

Material examined: 1 ♀, I[TALY]-Piemonte, Val Susa, Avigliana (TO), PNLA Sede, 340 m, 9-16-IX-2004, G. A. Bonicelli leg., GS 7286 GB, RCGB.

Distribution: Spain, Southern France, Portugal and from Croatia to Turkey (Slamka, 2019). **New for Italy**.

Remarks: The specimen collected is illustrated as figure 11, and its female genitalia as figure 26.

Bradyrrhoa gilveolella (Treitschke, 1833) (Figures 12, 23)

Material examined: 1 ♂, I[TALY]-Piemonte, Vernante (CN), Palanfré, 1400 m, 44º11'N, 07º50'E, 16-VII-1982, G. Bassi leg., GS 864 GB, RCGB.

Distribution: Sicily (old data, not reported recently), Albania and Eastwards to Kirghizstan. (Roesler, 1993). **New for continental Italy**.

Remarks: The specimen collected in Western Piedmont (Figure 12) enlarges the distribution area far to the west. The male genitalia (Figure 23) slightly differ from those of eastern specimens but considering the absence of additional material and the poor nomenclatural stability, the Treitschke type being lost, we consider the differences as falling within the normal range of intraspecific variability.

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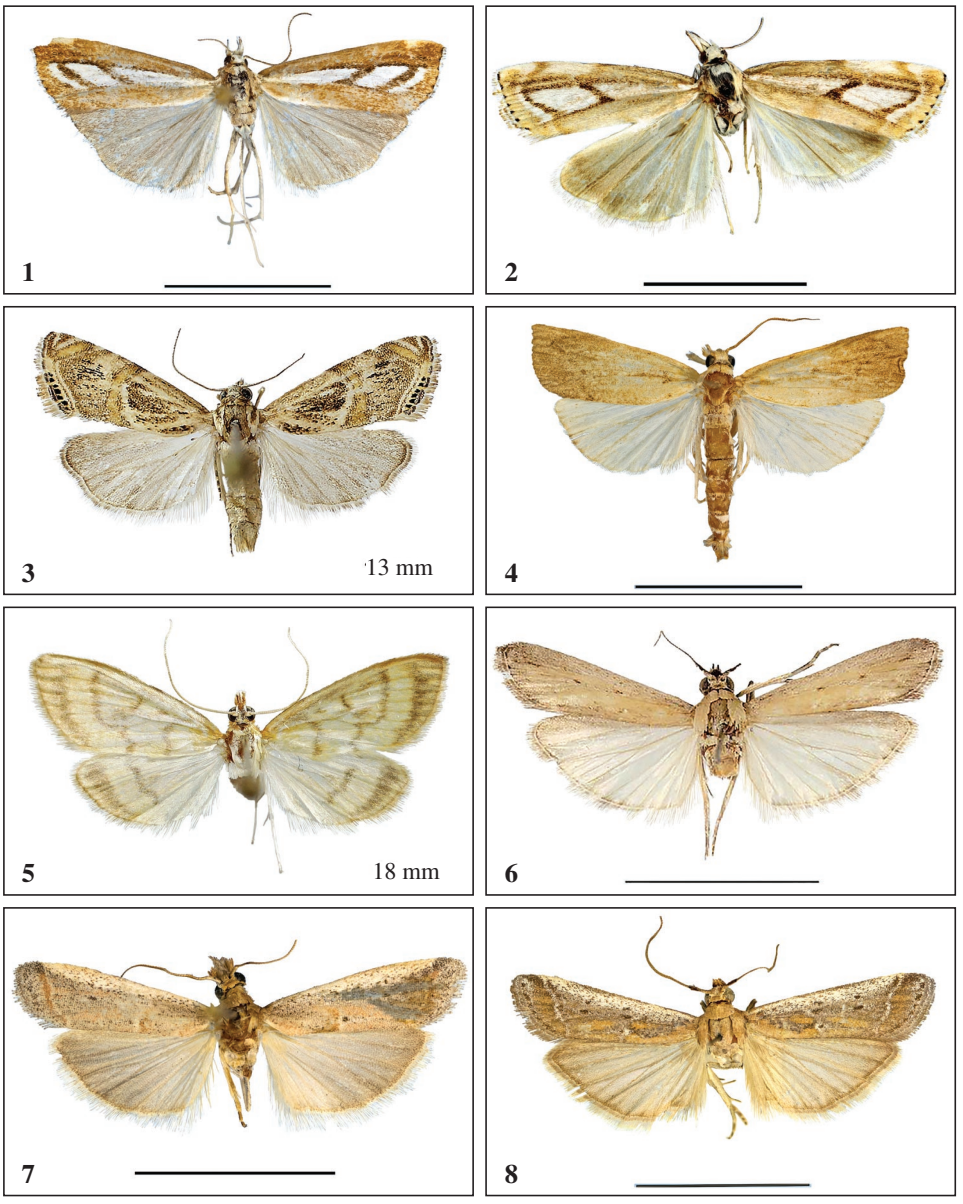
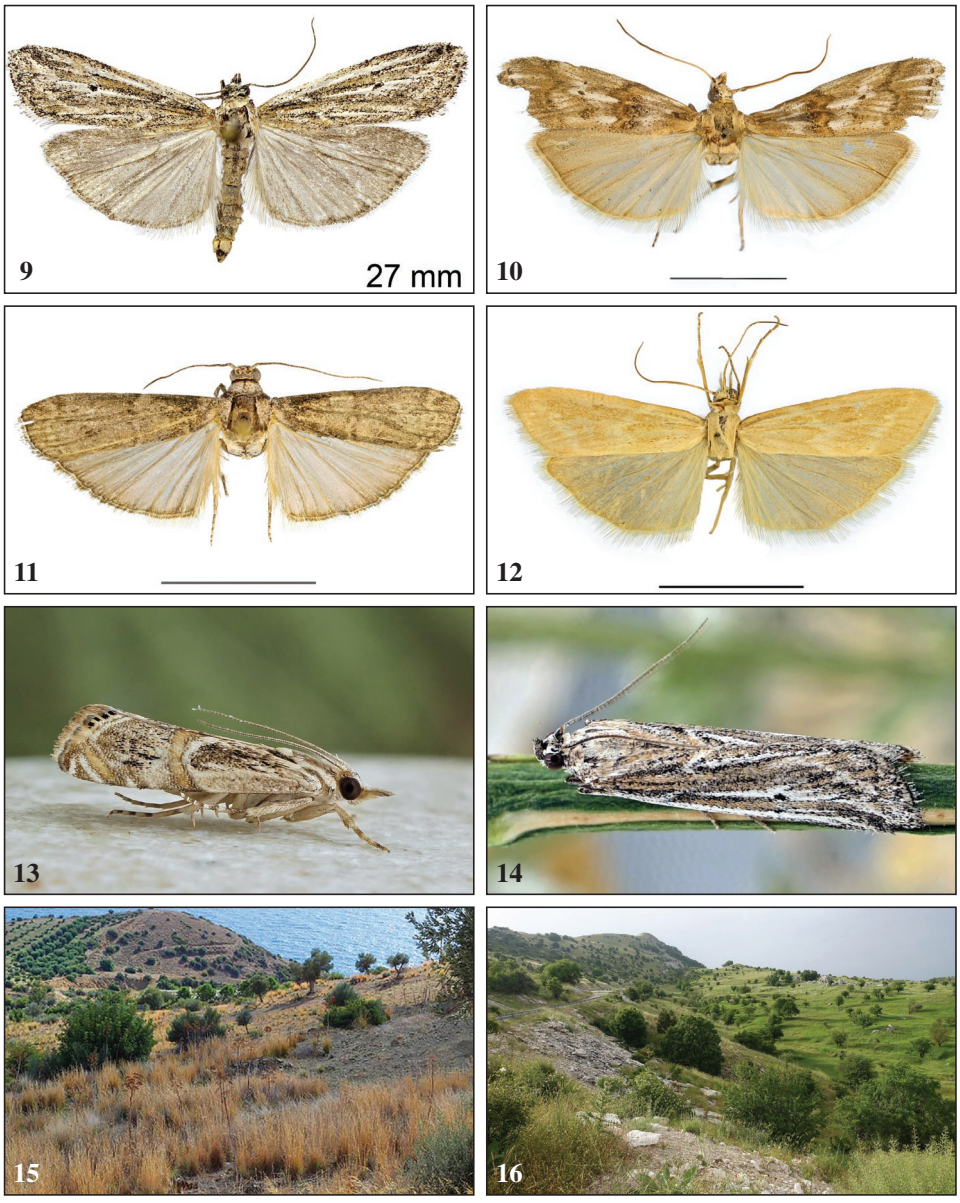
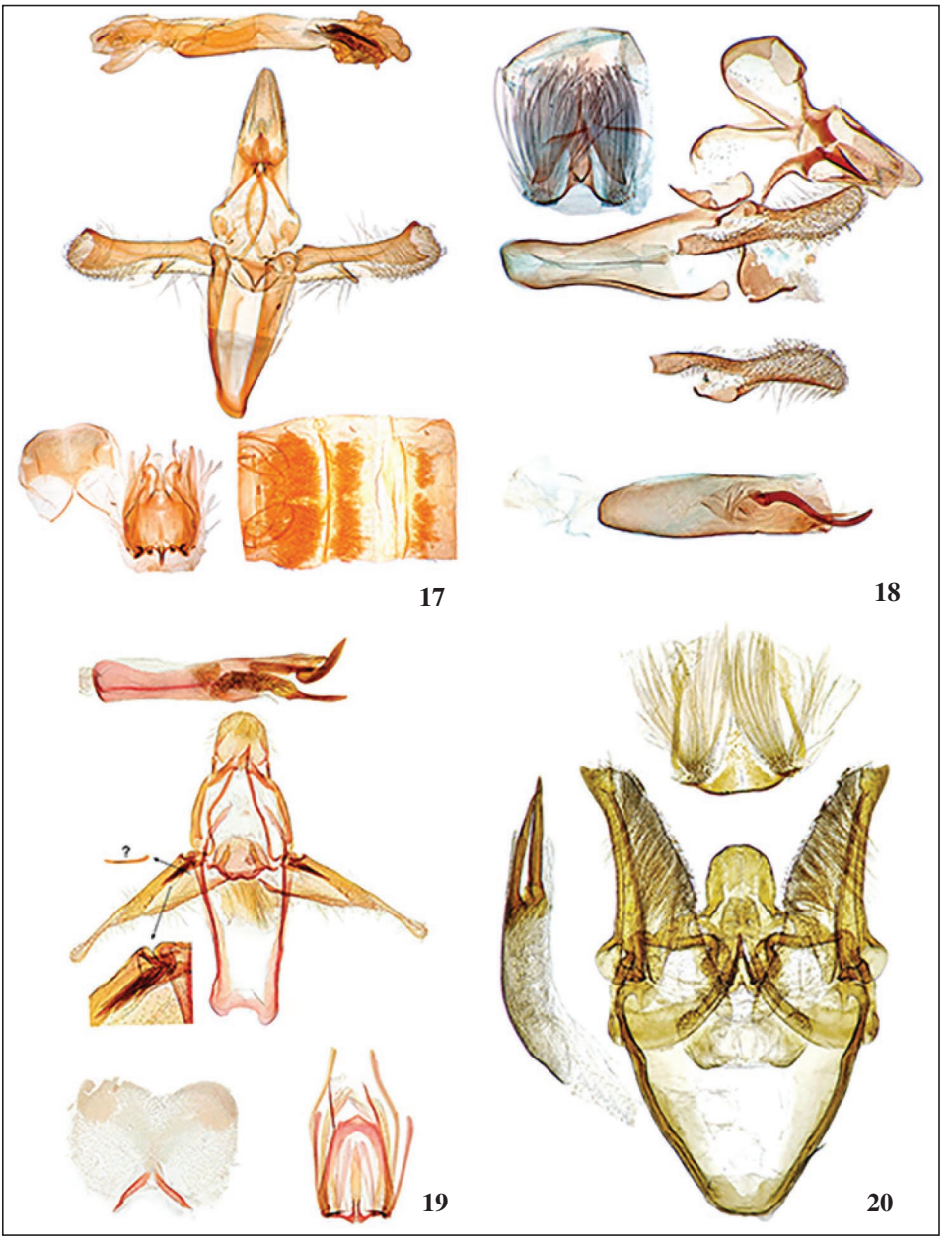


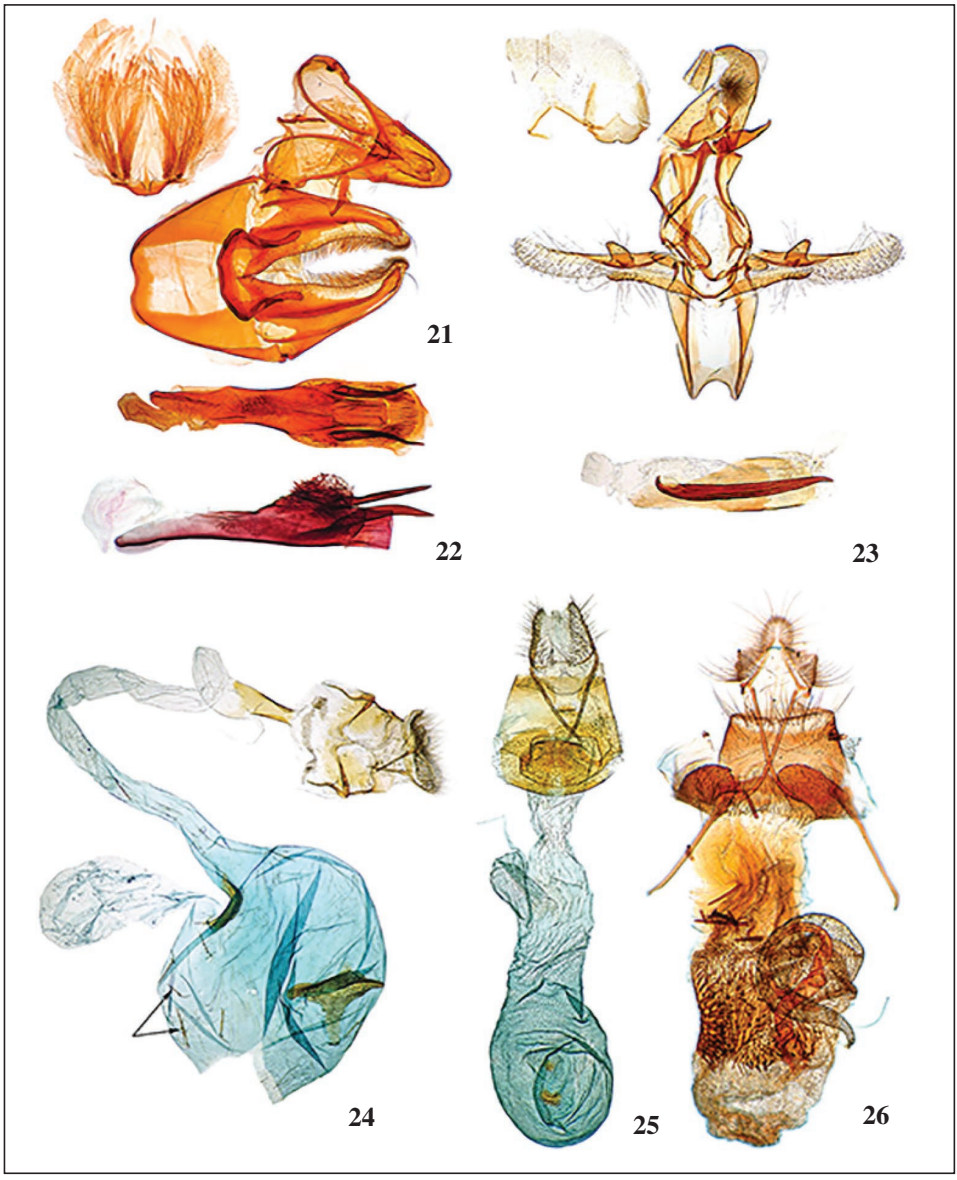
Figures 1-8. Pyraloidea spp., habitus. Scale bar = 10 mm. **1.** *Catoptria plitvicensis* Bassi, sp. nov., holotype. **2.** *Catoptria velebitica* Bassi, sp. nov., holotype. **3.** *Euchromius subcambridgei* Błeszyński, Italy, Sicily, Palazzolo Acreide (Syracuse Province). **4.** *Calamotropha paludella* (Hübner), Italy, Sicily, Castellammare del Golfo (Trapani Province). **5.** *Crocidophora tuberculalis* Lederer, Italy, Emilia-Romagna, Lido di Volano (Ferrara Province). **6.** *Melathrix edmundsi* Slamka, sp. nov., holotype. **7.** *Gymnancyla canella* ([Denis & Schiffermüller]), Italy, Sardegna, Cabras (Oristano Province). **8.** *Pempeliella ardosiella* (Ragonot), Italy, Basilicata, Mount Pollino (Potenza Province).



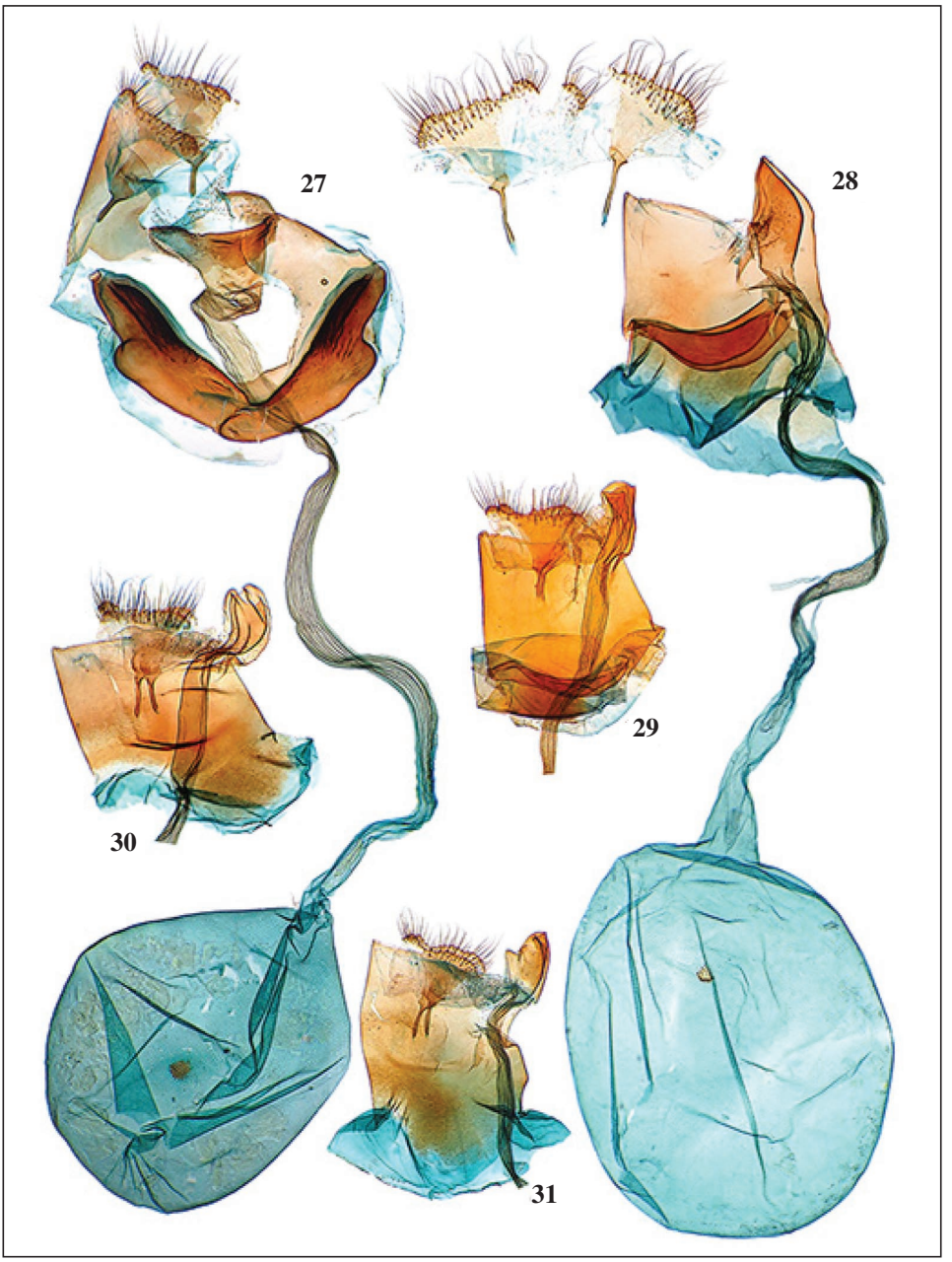
Figures 9-16. Pyraloidea spp., habitus and habitat. Scale bar = 10 mm. **9.** *Arsissa firusella* (Amsel), Albania, Gjirokastra District. **10.** *Pempelia alpigenella* (Duponchel), Italy, Susa Valley, Mount Rocciamelone, (Torino Province). **11.** *Phycita torrenti* Agenjo, Italy, Susa Valley, Avigliana, (Torino Province). **12.** *Bradyrrhoa gilveolella* (Treitschke), Italy, Palanfré (Cuneo Province). **13.** *Euchromius subcambridgei* Błeszyński, Italy, Sicily, Palazzolo Acreide (Syracuse Province). **14.** *Arsissa firusella* (Amsel), Albania, Gjirokastra District. **15.** *Melathrix edmundsi* Slamka, sp. nov., habitat. **16.** *Arsissa firusella* (Amsel), habitat in Albania, Gjirokastra District.



Figures 17-20. Phycitinae spp., male genitalia and culcita. **17.** *Gymnancyla canella* ([Denis & Schiffermüller]), Italy, Sardinia, Cabras (Oristano Province). **18.** *Pempeliella ardosiella* (Ragonot), Italy, Basilicata, Mount Pollino (Potenza Province). **19.** *Melathrix edmundsi* Slamka, sp. nov., holotype. **20.** *Arsissa firusella* (Amsel), Albania, Gjirokastra District.



Figures 21-26. Pyraloidea spp., male genitalia, culcita and female genitalia. **21.** *Pempelia alpigenella* (Duponchel), male genitalia with aedeagus in dorso-ventral view, Italy, Susa Valley, Avigliana, (Torino Province). **22.** *Pempelia alpigenella* (Duponchel), aedeagus in lateral view, Italy, Susa Valley, Mount Rocciamelone (Torino Province). **23.** *Bradyrrhoa gilveolella* (Treitschke), male genitalia, Italy, Palanfré (Cuneo Province). **24.** *Crocidophora tuberculalis* Lederer, female genitalia, Italy, Emilia-Romagna, Lido di Volano (Ferrara Province). **25.** *Euchromius subcambridgei* Błeszyński, female genitalia, Italy, Sicily, Palazzolo Acreide (Syracuse Province). **26.** *Phycita torrenti* Agenjo, female genitalia, Italy, Susa Valley, Avigliana (Torino Province).



Figures 27-31. *Catoptria* spp., female genitalia. **27.** *C. plitvicensis* Bassi, sp. nov., holotype. **28.** *C. velebitica* Bassi, sp. nov., holotype. **29.** *C. casperella* Ganev, North Macedonia. **30.** *C. gozmanyi* Błeszyński, paratype, Romania, Retyezát. **31.** *C. myella* (Hübner), Slovenia.

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REVISIÓN DE PUBLICACIONES
BOOK REVIEWS

P. Buchner & M. Corley
Microlepidoptera of Europe, Volumen 10, Depressariidae
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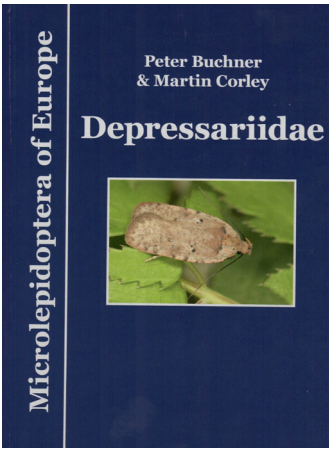

De nuevo tenemos en nuestras manos otra entrega de la ya clásica obra sobre los Microlepidoptera de Europa, concretamente el volumen décimo, que de la mano de nuestros estimados amigos y conocidos especialistas en esta familia el Dr. Peter Buchner y Martin Corley podemos contemplar en estos momentos, con una labor de más de veinte años.

La confección general es la ya conocida de los anteriores volúmenes, pero en esta ocasión, nos da a conocer la interesante familia Depressariidae que, a pesar de haber sido ampliamente estudiada por nuestros apreciados colegas el Dr. Hans-Joachim Hannemann (1925-2010, lamentablemente fallecido) y el Dr. Alexander L. Lvovsky, siempre hay cosas nuevas que descubrir, como ha ocurrido en este caso, tratándose 192 especies, de las que seis son nuevas para la Ciencia, 23 nuevas sinonimias, una nueva combinación y dos subespecies pasan al rango de especies y una especie pasa al rango de subespecie.

Comienza el libro con una Introducción a los Depressariidae, en el sentido moderno, seguida de los agradecimientos, pasamos a su clasificación, morfología, descripción de la genitalia, datos biomómicos y métodos empleados, sobre las ilustraciones, clave de los géneros europeos y la lista detallada de las especies tratadas, agrupadas en cinco géneros.

Ya dentro de la parte principal de la obra, se tratan todos los géneros válidos con sus sinonimias y especies tipo, con datos generales sobre su descripción, genitalia, distribución, bionomía y anotaciones extras.

Similar es el tratamiento a cada una de las especies consideradas donde nos presenta las referencias bibliográficas de cada una de ellas, así como de sus sinonimias, una diagnosis sobre su morfología externa, como la genitalia del macho de la hembra, distribución, biología y cuando, es necesario, comentarios que permiten despejar dudas sobre la problemática con respecto a la especie tratada y a las próximas, así como otros datos de interés. Todas las especies están detalladamente fotografiadas a todo color, así como de la genitalia del macho y de la hembra de cada una de ellas, fotografiadas en blanco y negro.

Con una excelente y detallada tabla donde podemos apreciar a primera vista donde se encuentran cada una de las especies consideradas y con una bibliografía especializada, se termina la obra.

Nuevamente este décimo volumen mantiene la excelente calidad de los volúmenes anteriores, por lo que felicitamos a la Editorial por su esfuerzo y dedicación en esta obra y no podemos por menos de felicitar a los autores por su trabajo bien realizado, en el que podemos ver una vez más la gran profesionalidad de este.

Esta obra no puede faltar en las bibliotecas de todos aquellos estudiosos de esta interesante familia y con un precio de 135,20 euros los interesados lo pueden pedir a:

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Primer registro conocido de un ginandromorfo bilateral de *Lasiocampa serrula* (Guenée, 1858) (Lepidoptera: Lasiocampidae)

Jesús Gómez-Fernández

Resumen

Se presenta el primer registro conocido para la ciencia de un ginandromorfo bilateral de *Lasiocampa serrula* (Guenée, 1858), procedente de Hoya de Baza, Granada (España).
Palabras clave: Lepidoptera, Lasiocampidae, *Lasiocampa serrula*, ginandromorfismo, ginandromorfo bilateral, Hoya de Baza, Granada, España.

First known record of a bilateral gynandromorph of *Lasiocampa serrula* (Guenée, 1858) (Lepidoptera: Lasiocampidae)

Abstract

The first known scientific record of a bilateral gynandromorph of *Lasiocampa serrula* (Guenée, 1858) from Hoya de Baza, Granada (Spain) is presented.
Keywords: Lepidoptera, Lasiocampidae, *Lasiocampa serrula*, gynandromorphism, bilateral gynandromorph, Hoya de Baza, Granada, Spain.

Introducción

El ginandromorfismo es una anomalía cromosómica que ha sido documentada ampliamente por la ciencia y frecuente, mayormente, en la clase Insecta, en especial Lepidoptera y otros organismos. Etimológicamente se deriva del griego *ôæßíé* (gine*)*: femenino, *Üíäñï* (andro): masculino y *ìïñöï* (morfo): forma. Los ginandromorfos presentan características morfológicas reunidas de ambos sexos (Van Kempen & Van Der Steen, 1982), macho y hembra, por lo general evidenciadas en diferentes partes del cuerpo, y cuando en cada parte se distribuye de manera equitativa y simétrica, es decir, que cada mitad con respecto al eje longitudinal corresponde a un sexo diferente (Josephrajkumar et al. 1998), hablaremos de que se trata de un ginandromorfo bilateral completo. No se debe de confundir con una teratología, causada mayormente por agentes externos, físicos o químicos.

Los ginandromorfos surgen durante los primeros estadios del desarrollo por la pérdida de un cromosoma o por la fertilización de un huevo con dos núcleos femeninos (Robinson, 1971), aunque en otras ocasiones se forma por la infección de una bacteria del género *Wolbaccha*, que causa un patrón femenino en un individuo genéticamente predestinado a ser un macho (Pereira et al. 2003). Si el fallo en la segregación de los cromosomas se produce en las primeras divisiones del zigoto se generará un ginandromorfo bilateral, pero si se produce más tarde se formará un ginandromorfo en mosaico. La eclosión de un ginandromorfo es rara (Bernardino et al. 2007; Narita et al. 2010) por lo que hay un ginandromorfo por cada 8000 ejemplares con fenotipo normal (Josephrajkumar et al. 1998). Los ejemplares

ginandromorfos son difíciles de encontrar en las colecciones entomológicas, la mayoría de los lepidopterólogos incluso nunca han podido capturar y examinar alguno a lo largo de su vida.

En la región Paleártica, *L. serrula* (Guenée, 1858) es una especie que se distribuye por el sur de Europa (España) y en el norte de África, donde está presente desde Marruecos, continuando por todo el litoral mediterráneo, hasta Palestina e Israel (Leraut, 2006; Lewandowski & Fischer, 2008; Zolotuhin, 2015). En Marruecos vuela la subespecie *marocanna* Staudinger, 1894, de aspecto marrón rojizo y en Argelia y Túnez lo hace la subespecie *undulata* (Staudinger, 1894) con un color amarillo claro (Leraut, 2006). En España coloniza el arco mediterráneo desde Huelva hasta Alicante, siendo su hábitat principalmente zonas esteparias y vegetación de dunas con saladares litorales y prelitorales (Redondo et al. 2015).

Las alas anteriores de *L. serrula* tienen un color ocre-gris, con una línea transversal clara y un punto blanco discal, las posteriores son del mismo color pero de un tono más tostado que se aclara hacia el área basal (Gómez de Aizpúrua, 2007). Esta especie presenta un dimorfismo sexual muy acentuado, como en todas las especies del género *Lasiocampa* (Zolotuhin, 2015). Los machos tienen una envergadura de 35-40 mm. y las hembras de 40-60 mm. (Leraut 2006), presentando los machos unas antenas bipectinadas plumosas (Gómez de Aizpúrua, 2007) y las hembras unas antenas filiformes (Pérez De-Gregorio et al. 2001). Todo lo anterior hace que sea muy fácil su diferenciación a simple vista.

Las larvas, de hábitos nocturnos (Lewandowski & Fischer, 2008), ostentan una tupida pilosidad de color naranja y azul sobre el dorso en jóvenes orugas, volviéndose amarillo y azul al envejecer, los costados son grises con trazos segmentales oblicuos blancos y también latero-ventrales (Gómez de Aizpúrua, 2007). Sus plantas nutricias son *Suaeda fruticosa* Forssk. ex J. F. Gmel., *Suaeda vera* Forssk. ex J. F. Gmel., *Haloxylon spp., Salsola spp., Atriplex spp. y Arthrocnemum indicum* (Willd.) Moq. (Leraut, 2006; Zolotuhin, 2015). Tejen un capullo denso, fuerte, de seda oscura, fijado entre las hierbas o la hojarasca del suelo (Gómez de Aizpúrua, 2007; Zolotuhin, 2015).

L. serrula tiene su tiempo de vuelo en el periodo comprendido entre septiembre y noviembre (De Freina & Witt, 1987; Pérez De-Gregorio et al. 2001; Leraut, 2006), en una sola generación anual (Gómez de Aizpúrua, 2007), volando al anochecer entre el nivel del mar y los 500 m. de altitud, siendo ambos sexos atraídos por la luz artificial (Pérez De-Gregorio et al. 2001).

Material y métodos

El ejemplar aquí mostrado procede de uno de los capullos cedidos para el estudio y observación de la especie *L. serrula* que se lleva realizando desde hace varios años. El origen de dichos capullos fue una puesta de huevos de una hembra grávida capturada en trampa de luz en Hoya de Baza, Granada (UTM 30SWG35) (España), de los cuales las orugas eclosionadas (3-IX-2016) fueron criadas con *Atriplex halimus* L., hasta completar el total desarrollo de éstas, ya que son orugas tranquilas que se crían con facilidad (Gómez de Aizpúrua, 2007).

Para la determinación y clasificación, se ha seguido en la nomenclatura a Vives Moreno (2014) y las fotografías fueron realizadas con una cámara Canon EOS 1300D con objetivo Canon EFS 18-135 mm, lente de cuatro aumentos, tiempo de exposición 1/250s, sensibilidad ISO-100 y una resolución de 3720 X 2772 píxeles,

Resultados

El ejemplar adulto en buen estado, con una envergadura alar de 50 mm, eclosionó el 19-VI-2017, junto a otros ejemplares en la jaula de cría previamente preparada para tal acontecimiento. Durante el tiempo desde que se recibió el capullo hasta su eclosión permaneció a una temperatura de 20º C constante en el laboratorio, controlada por dos climatizadores-deshumidificadores Inventor, con una humedad relativa entre 30-40%. No fue hasta después que estiró completamente las alas cuando el autor se dio cuenta de que algo extraño sucedía con la anatomía de dicho ejemplar, pensando en un primer mo-

mento que se trataba de alguna teratología. Se observa el dimorfismo sexual en un único individuo, su lado derecho (vista dorsal) presenta el aspecto y la anatomía de un macho, mientras que el izquierdo lo presenta de una hembra, incluso las antenas, bipectinadas de macho en el lado derecho y filiformes de hembra en el izquierdo. También se observa dicha diferencia en el abdomen e incluso en los genitales, tratándose de un ginandromorfo longitudinal perfecto.

Figuras 1-2. Ginandromorfo de *Lasiocampa serrula*: **1.** Vista dorsal. **2.** Vista ventral.

Agradecimiento

A Aquilino Albadalejo García, por los capullos cedidos de esta especie, para el estudio y observación de la misma, sin el cual no hubiera sido posible el hallazgo de este ejemplar, por su amistad, disponibilidad y colaboración; a María Gómez del Prado y María Antonia del Prado Gómez por su apoyo y paciencia, y a las correspondientes Instituciones por la concesión de los permisos que nos facilitan y permiten seguir trabajando en nuestras investigaciones, dentro del Proyecto Científico de SHILAP. También mi agradecimiento y especial en recuerdo al fallecido Dr. Vadim Viktorovich Zolotuhin, con el cual tuve una amistosa relación y fue en parte el culpable de mi interés por la familia Lasiocampidae, por sus sabios consejos y dedicación.

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Mista Ponting, 2025 a replacement name for *Tisma* Razowski, 2014 (Tortricidae), a homonym of *Tisma* Giglio-Tos, 1917 (Mantidae) (Insecta: Lepidoptera, Mantodea)

John Ponting

Abstract

The genus name *Tisma* Razowski, 2014 (Tortricidae) is a homonym of *Tisma* Giglio-Tos, 1917 (Mantidae) and requires a replacement name. Hence, the new name *Mista* Ponting, nom. nov., is proposed.
Keywords: Lepidoptera, Tortricidae, Mantodea, Mantidae, *Mista*, *Tisma*, nomenclature, homonym.

***Mista* Ponting, 2025 nombre sustitutivo de *Tisma* Razowski, 2014 (Tortricidae), un homónimo de *Tisma* Giglio-Tos, 1917 (Mantidae) (Insecta: Lepidoptera, Mantodea)**

Resumen

El nombre del género *Tisma* Razowski, 2014 (Tortricidae) es un homónimo de *Tisma* Giglio-Tos, 1917 (Mantidae) y requiere un nombre sustitutivo. Por lo tanto, se propone el nuevo nombre *Mista* Ponting, nom. nov.
Palabras clave: Lepidoptera, Tortricidae, Mantodea, Mantidae, *Mista, Tisma*, nomenclatura, homonimia.

Text

Giglio-Tos (1917, p. 68) proposed the genus *Tisma* Giglio-Tos, 1917 (Mantodea, Mantidae) for three species of mantid from Madagascar: *Hierodula acutipennis* Westwood, 1889, *H. freyi* Brancsik, 1892 and *Stagmatoptera gradidieri* Saussure & Zehntner, 1895. He subsequently (Giglio-Tos, 1927, p. 466) designated *H. acutipennis* Westwood, 1889 as the type species of the genus. Roy (2005) described three further species: *Tisma paulini* (p. 53), *T. peyrierasi* (p. 54) and *T. chopardi* (p. 56). These six species are listed in the most recent checklist of Mantidae (Patel & Singh, 2016, p. 36).

Razowski (2014, p. 344) proposed the genus of Tortricidae *Tisma* Razowski, 2014 (Olethreutinae: Olethreutini) and included a single species, *Tisma mista* Razowski, 2014 from New Caledonia that remains the only species in the genus. The type specimen is deposited in the National Museum Natural History, Smithsonian Institution, Washington DC. The accompanying preparation of the genitalia is labelled GS 143090 and is deposited in the same institution.

Tisma Razowski, 2014 is a homonym of *Tisma* Giglio-Tos, 1917. *Mista* Ponting, **nom. nov.** (Zoobank: um:zoobank.org:pub:F1EB3FFC-A73A-4B1F-BCD2-D29A9F7B5C43) is proposed as a replacement name for *Tisma* Razowski, 2014 preoccupied by *Tisma* Giglio-Tos, 1917. The new name is an anagram of the original genus name. The gender is feminine. The genus includes a single species,

Mista mista (Razowski, 2014), **comb. nov.** In accordance with Article 67.8 of the International Code of Zoological Nomenclature (1999) *Tisma mista* Razowski, 2014 remains the type species by original designation.

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Platynota stultana Walsingham, 1884 a new record for Malta (Lepidoptera: Tortricidae, Tortricinae, Sparganothini)

Aldo Catania, Anthony Seguna, John J. Borg & Paul Sammut

Abstract

Platynota stultana Walsingham, 1884 is reported for the first time from the Maltese Islands. A Maltese name is proposed for this new record.
Keywords: Lepidoptera, Tortricidae, *Platynota stultana*, Maltese Islands.

Platynota stultana **Walsingham, 1884 nuevo para Malta (Lepidoptera: Tortricidae, Tortricinae, Sparganothini)**

Resumen

Platynota stultana Walsingham,1884 se menciona por primera vez para Malta. Se propone un nombre maltés para este nuevo registro.
Palabras clave: Lepidoptera, Tortricidae, *Platynota stultana*, Malta.

Introduction

Platynota stultana Walsingham 1884, is a member of the family Tortricidae. It is native to the northwestern part of Mexico and the adjacent southwestern part of the USA (Powell, 1983). Since the mid-1980s, it has also established itself in Hawaii (Miller & Hodges, 1995).

Platynota stultana was initially recorded in Europe in 2009, specifically in Spain's Murcia and Almeria provinces, through routine agricultural area monitoring conducted by pest control services. It was predominantly found infesting *Capsicum* sp. (Solanaceae) during this surveillance period (Groenen & Baixeras, 2013).

Although there was no published literature in entomological journals, Spanish popular electronic agricultural journals and leaflets have included information on this pest and provided details on its distribution and its potential control in Spain (Hymenoptera, 2011). Records in Spain state that it was actually discovered between 2005 and 2008 in parallel fieldworks in the provinces of Almeria, Alicante, and Granada (Groenen & Baixeras, 2013).

In the UK, a single larva of *Platynota stultana* was found at a plant nursery during 2004 (Korycinska & Eyre, 2013; Agassiz & Feltwell, 2020, both cited in Trematerra & Colacci, 2022). In June 2018, a pupa of *Platynota stultana* was discovered in Germany on *Capsicum* sp., imported from Spain (Lepiforum, 2024). In Italy especially in Apulia, Saline near Zapponeta, observations were made during 2020 to 2022 and recorded by Trematerra & Colacci (2022). The status of *Platynota stultana* in

other European countries indeed remains uncertain, highlighting the need for additional research and monitoring efforts to understand its distribution and its potential impact across the continent.

This species is highly polyphagous and was reported to feed on over 100 plant species belonging to 30 different families. As *Platynota stultana* feeds in agricultural and horticultural settings, invading garden and ornamental plants, fruit trees and vegetables, it is recognised as an important pest of both greenhouses and fields (Trematerra & Colacci, 2022).

Material examined

MALTA, 1 ♀, Żebbuġ, 13-II-2024, 35º52'5.86"N,14º26'20.35"E [at light], A. Catania leg; (in coll. A. Catania).

Figure 1. a) Underside. **b)** Upperside of *Platynota stultana* Walsingham,1884 - MALTA, Żebbuġ, 1 ♀, 13-II-2024.

Discussion

From the Maltese Islands no less than 74 species of Tortricidae have been recorded (Sammut, 2020), with the latest addition being *Clavigesta gerti* Larsen, 2010 (Seguna et al. 2022).

The occurrence of *Platynota stultana* in Malta is not a surprise as many ornamental flowers and agricultural crops are imported regularly from both neighbouring countries across Europe and beyond. This small moth, which can measure between 12-25 mm, is very easily overlooked while inspecting vegetative matter, especially because its larvae form small silken tubes between leaves and folds of plants. *Platynota stultana* prefers to feed on certain agricultural crops, particularly grapes and greenhouse fruits and vegetables like tomatoes, and this highlights its potential impact on agricultural production. This species poses a significant threat as it targets ripening bunches of grapes, where larvae can break the skin of the berries, facilitating the initiation of rot by yeast and fungi. Furthermore, *Platynota stultana* demonstrates also a preference for crops belonging to the Solanaceae family, including species like capsicum and aubergines. This feeding behaviour could lead to substantial losses in yield and quality for farmers cultivating these crops (Trematerra & Colacci, 2022).

The species is new to the Maltese Lepidopterofauna, and we propose the Maltese name Platinota**.**

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NOTICIAS GENERALES / *GENERAL NEWS*

REVISORES 2023-2024 / *REFEREES 2023-2024*.– Los siguientes revisores colaboraron en la evaluación de los manuscritos durante el año 2023-2024. Expresamos nuestros más sinceros agradecimientos a estas personas por el tiempo y energía que dedicaron a sus evaluaciones, de las cuales dependen los estándares de calidad y la puntualidad de la revista SHILAP Revista de lepidopterología (SHILAP Revta. lepid.) / *The following referees collaborated on the evaluation of manuscripts during 2023-2024. We express our sincerest thanks to them for the time and energy devoted to their evaluations, since the standards of quality and timeliness of the journal SHILAP Revista de lepidopterologia (SHILAP Revta. lepid.) depend on them*: Dr. Vinicius Albano Araujo (Brasil / *Brazil*); Dr. Virginia Alvarado (Costa Rica / *Costa Rica*); Dr. Muhammad Asghar (India / *India*); Dr. Tito Bacca (Colombia / *Colombia*); Dr. Joaquín Baixeras Almela (España / *Spain*); Dr. Giorgio Baldizzone (Italia / *Italy*); Dr. Saskia Bastian (Francia / France); Dr. Vitor O. Becker (Brasil / *Brazil*); Dr. Bengt Å. Bengtsson (Suecia / *Sweden*); Dr. Suman Bhowmik (India / *India*); Dr. Atanu Bora (India / *India*); Dr. John Brown (EE.UU. / *USA*); Dr. Márcio Zikán Cardoso (Portugal / *Portugal*); Dr. Carlos Eduardo Beserra Nobre (Portugal / *Portugal*); Dr. José Clavijo A. (Venezuela / *Venezuela*); Dr. Ropert Knight Colwell (EE.UU. / *USA*); Mr. Martin Corley (Reino Unido / *United Kingdom*); Dr. Indiana Cristóbal Ríos-Malaver (Colombia / *Colombia*); Dr. María Isabel Di Mare (Costa Rica / *Costa Rica*); Dr. Sven Erlacher (Alemania / *Germany*); Ing. Andrés Expósito Hermosa (España / *Spain*); Mr. Fréderic Carbonell (Francia / *France*); Dr. Sónia Ferreira (Portugal / *Portugal*); Dr. André Victor Lucci Freitas (Brasil / *Brazil*); Mr. Justin Formosa (Malta / *Malta*); Dr. Reinhard Gaedike (Alemania / *Germany*); Dr. Lovish Garlani (India / *India*); Dr. Jorge M. González (EE.UU. / *USA*); Mr. Wolfang tem Hagen (Alemania / *Germany*); Dr. Fernando Hernández Baz (México / *Mexico*); Dr. Peter Huemer (Austria / *Austria*); Dr. Priscilla Hurtado (Costa Rica / Costa Rica); Dr, Fazekas Imre (Hungría / *Hungary*); Dr. Edona Kabashi-Kastrati (Kosovo / *Kosowo*); Dr. Tarun Karmakar (India / *India*); Dr. Toni Koren (Eslovenia / *Slovenia*); Mr. Ole Karsholt (Dinamarca / *Denmark*); Dr. Sibel Kizildag (Turquía / *Türkiye*);Dr. Stanislav Korb (Rusia / *Russia*); Dr. Girish Kumar (India / *India*); Dr. Scott Miller (EE.UU. / *USA*); Dr. Gerardo Lamas Müller (Perú / *Peru*); Dr. Bernard Landry (Suiza / *Switzerland*); Dr. Houhun Li (China / *China*); Dr. Miguel López Munguira (España / *Spain*); Dr. Carlos Lopez Vaamonde (Francia / *France*); Dr. Tanner Matson (EE.UU. / *USA*); Dr. Carlos G. C. Mielke (Brasil / *Brazil*); Dr. Rafael Obregón Romero (España / *Spain*); Dr. Antonio S. Ortiz (España / *Spain*); Dr. Ing. Pedro del Estal Padillo (España / Spain); Dr. Evandro Pires Lopes (Portugal / *Portugal*); Dr. Muzafar Riyaz (Turquía / *Türkiye*); Dr. Robert Schouten (Países Bajos / *The Netherlands*); Mr. Arnold Sciberras (Malta / *Malta*); Dr. Talisma Sheikh (India / *India*); Dr. José Manuel Grosso Silva (Portugal / *Portugal*); Dr. Arun Pratap Singh (India / *India*); Dr. Koster Sjaak (Países Bajos / *The Netherlands*); Dr. Indiana Cristobal Rios Malaves (Colombia / *Colombia*); Dr. Sheik Mohammed Shamsudeen (India / *India*); Dr. Taslima Sheikh (India / *India*); Dr. Sumit Singh (India / *India*); Dr. Andrey Sochivko (Rusia / *Russia*); Dr. Vitaly Spitsym (Rusia / *Russia*); Dr. Ryan St Laurent (EE.UU. / *USA*); Mr. Jukka Tabell (Finlandia / *Finland*); Dr. Gerhard Tarmann (Austria / *Austria*); Dr. Pasquale Trematerra (Italia / *Italy*); Paolo Triberti (Italia / *Italy*); Dr. Hector A. Vargas (Chile / *Chile*); Dr. Roger Vila Ujaldón (España / Spain); Dr. Antonio Vives Moreno (España / *Spain*); Dr. Shaxia Wang (China / *China*); Dr. Martin Wiemers (Alemania / *Germany*); Dr. Aqsa Xainabr (India / *India*); Dr. José Luis Yela García (España / *Spain*); Dr. Josef Ylla Ullastre (España / *Spain*).- **DETALLES / *DETAILS*:** SHILAP; Apartado de correos, 331; E- 28080 Madrid, ESPAÑA / *SPAIN* (E-mail: avives1954@outlook.es).

II JORNADAS DE MARIPOSAS EN SIERRA DE GATA, VILLAMIEL, CÁCERES (ESPAÑA / SPAIN).- Desde el "Microrrefugio de Mariposas Almaillo" se están organizando las segundas jornadas sobre Mariposas. Después del éxito conseguido el año pasado, ya hay fecha para este encuentro: 3 y 4 de mayo. Este año nos quedamos en Villamiel, donde desarrollaremos el evento. En los próximos días recibiréis la programación y se abrirá el periodo de inscripción. Si alguna de las personas, que recibáis este correo, no queréis seguir recibiendo información, hacérnoslo llegar.- **DETALLES / *DETAILS***: Microrrefugio de Mariposas Almaillo; José Gabriel González Vázquez http://microrrefugioalmaillo.org/ (E-mail: mailloforesta@gmail.com).

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