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SHILAP REVISTA DE LEPIDOPTEROLOGIA

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Checklist of butterflies from the rupestrian grasslands of Serra do Cipó, Minas Gerais, Brazil (Lepidoptera: Papilionoidea)

A. C. V. Pires, M. V. Beirão, G. W. Fernandes, I. F. Oliveira, G. C. N. Pereira, V. D. Silva, O. H. H. Mielke & M. Duarte

Abstract

The aim of this study is to provide a list of the butterflies (Lepidoptera: Papilionoidea) that occur in the rupestrian grasslands of Serra do Cipó, Minas Gerais, Brazil. Butterflies were sampled using VSR traps and entomological nets in seven undisturbed plots between 800 and 1400m above sea level. We collected 1,520 individuals belonging to 172 species. Among these species, four are on the Brazilian list of endangered species: *Cunizza hirlanda planasia* (Stoll, 1790), *Magnastigma julia* Nicolay, 1977, *Strymon ohausi* (Spitz, 1933) and *Rhetus belphegor* (Westwood, 1851).
KEY WORDS: Lepidoptera, Papilionoidea, conservation, threatened species, inventory, Brazil.

Levantamento de borboletas dos campos rupestres da Serra do Cipó, Minas Gerais, Brasil (Lepidoptera: Papilionoidea)

Resumo

O objetivo desse estudo é fornecer uma lista de borboletas (Lepidoptera: Papilionoidea) que ocorrem nos campos rupestres da Serra do Cipó, Minas Gerais, Brasil. As borboletas foram coletadas utilizando a armadilha VSR e rede entomológica em sete áreas não perturbadas entre 800 e 1400 metros de altitude. Coletamos 1520 indivíduos pertencentes a 172 espécies. Entre as espécies coletadas, quatro constam na lista nacional oficial de espécies da fauna ameaçadas de extinção: *Cunizza hirlanda planasia* (Stoll, 1790), *Magnastigma julia* Nicolay, 1977, *Strymon ohausi* (Spitz, 1933) and *Rhetus belphegor* (Westwood, 1851).
PALAVRAS CHAVE: Lepidoptera, Papilionoidea, conservação, espécies ameaçadas, levantamento, Brasil.

Listado de mariposas de los campos rurales de la Serra do Cipó, Minas Gerais, Brasil (Lepidoptera: Papilionoidea)

Resumen

El objetivo de este estudio es proveer una lista de mariposas (Lepidoptera: Papilionoidea) que se encuentran en las praderas herbáceas de la Serra do Cipó, Minas Gerais, Brasil. Las mariposas fueron colectadas usando trampas VSR y red entomológica en siete áreas no perturbadas entre los 800 y 1.400 metros de altitud. Colectamos 1.520 individuos pertenecientes a 172 especies. Entre estas especies, cuatro de ellas figuran en la lista brasileña de especies amenazadas: *Cunizza hirlanda planasia* (Stoll, 1790), *Magnastigma julia* Nicolay, 1977, *Strymon ohausi* (Spitz, 1933) y *Rhetus belphegor* (Westwood, 1851).
PALABRAS CLAVE: Lepidoptera, Papilionoidea, conservación, especies amenazadas, inventario, Brasil.

Introduction

The Cerrado (savanna-like vegetation) is one of the most threatened ecosystem due to urban expansion, agriculture, fire, afforestation, extraction of ornamental species, mining and road construction (BARBOSA *et al.,* 2010; RIBEIRO & FREITAS, 2010; NEGREIROS *et al.,* 2011; FERNANDES *et al.,* 2014). The Espinhaço range comprises a group of mountains between the municipality of Ouro Branco (MG) and the southern part of the state of Bahia (Chapada de Diamantina), and extends for approximately 1200 km, with elevations greater than 800 m a.s.l.. Serra do Cipó is located in the southern part of the Espinhaço range, where there is a predominance of a complex ecosystem called the Rupestrian Grassland (FERNANDES, 2016; GIULIETTI, 1987). The plant species of this ecosystem have striking morpho-anatomical peculiarities that comprise a flora with high degree of morphological and behavioral convergence, diversity, and endemism (FERNANDES, 2016; ECHTERNAACHT *et al*., 2011; RAPINI *et al.,* 2008; NEGREIROS *et al.,* 2014).

Butterflies have been considered one of the best flagship species for conservation because most species are conspicuous and colorful (NEW, 1997). Other reasons that make butterflies good environmental indicators are: short lifespan, diurnal habits, high diversity, easy sampling, identification and relatively well known taxonomy (BROWN & FREITAS, 1999; BHARDWAJ *et al*., 2012). Butterflies are involved in many ecological interactions, have close relationships with plants, and have been used as models in ecological and evolutionary studies. Butterflies are also used in many studies for habitat conservation because they are especially vulnerable to landscape and habitat fragmentation and loss, responding quickly to changes in vegetation and climate (BROWN & FREITAS, 1999; ROY & SPARKS, 2000).

A species checklist is of fundamental importance for conservation plans and environmental monitoring methods (MIELKE *et al.*, 2008). The recognition of endemisms and local rarities are also important criteria to determine which areas have conservation potential (ROMERO & NAKAJIMA, 1999). Among the threatened Brazilian Lepidoptera, *Rhetus belphegor* (Westwood, 1851) (Riodinidae: Riodininae) is the only species recorded from Serra do Cipó (BROWN, 1993; MACHADO *et al.*, 2008; NASCIMENTO & CAMPOS, 2011). However, this may be due to the lack of studies on Lepidoptera in the entire region. We expect that the number of endangered and endemic species will rise as more studies are carried out. Furthermore, we expect that these studies will lead to a better understanding of the butterfly fauna composition on the unique environment of the rupestrian grasslands. The aim of this study was to report the first list of butterfly species of the rupestrian grasslands in Serra do Cipó, a region that has been intensely studied for other groups of organisms (e.g., galling insects: LARA *et al.*, 2002; ants: ARAÚJO & FERNANDES, 2003; free-feeding herbivores: RIBEIRO *et al.*, 1998).

Materials and Methods

Study area

Serra do Cipó has a humid, subtropical climate with a dry winter and a temperate summer (Cwb in Köppen's classification) (ALVARES *et al.*, 2013), with mean temperatures between 17.4 and 19.8º C. The annual precipitation is about 1500 mm, with a wet season from November to January, a transitional period from February to April, and a dry season from May to September followed by another transitional post-dry period in October (MADEIRA & FERNANDES, 1999). The soil of Serra do Cipó is sandy, shallow, extremely oligotrophic and with high concentrations of aluminum and low capacity for water retention, (NEGREIROS *et al.*, 2008; NEGREIROS *et al.*, 2011). The study plots were located inside the National Park of Serra do Cipó and the Environmental Protection Area Morro da Pedreira, in the district of Serra do Cipó, Minas Gerais, Brazil (Fig. 1).

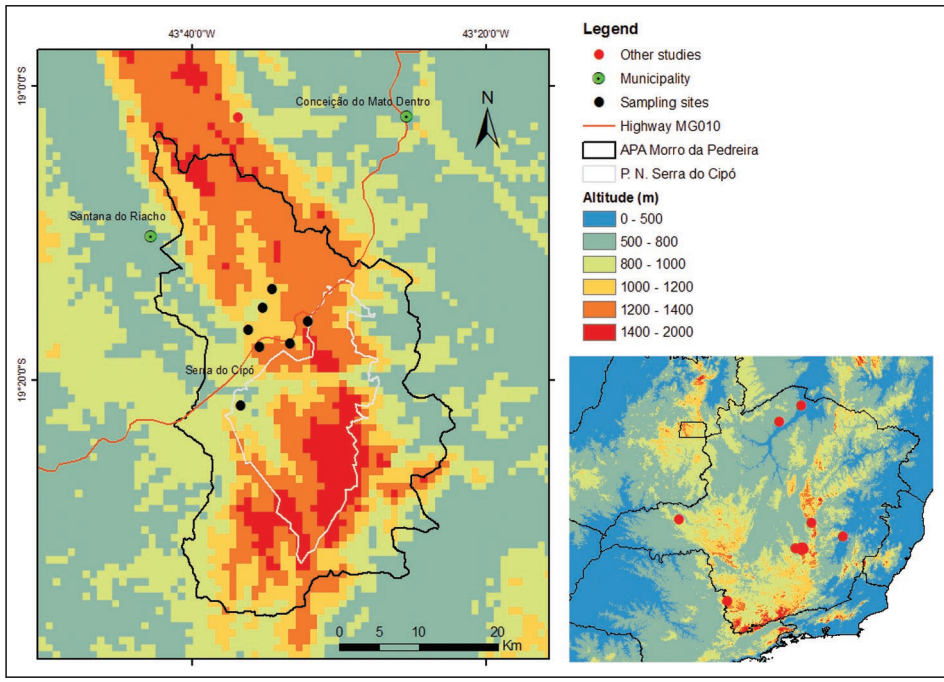

Fig. 1.– Map of Serra do Cipó with Parque Nacional da Serra do Cipó and Área de Proteção Morro da Pedreira limits, the sampling sites (black dots), other butterfly surveys in Minas Gerais (red dots) and the altitudinal gradient between 0 and 2000 m a.s.l.

Sampling

Butterflies were recorded in seven plots between 800 and 1400 m a.s.l.. In each plot three transects separated by 500m were sampled, for a total of 21 transects for the whole collecting area. Butterflies were sampled using both nets and traps. For sampling butterflies using nets, each transect was 250 m in length. Sampling employed two well-trained researchers sampling for two consecutive hours. Sampling took place 3 times during the day: soon after sun rise (at 08:00 am-10:00 am), in the heat of the day (11:00 am-1:00 pm) and just before sun set (2:00 pm-4:00 pm). For sampling butterflies using traps, four Van Someren-Rydon (VSR) traps were placed in each transect separated by a distance of 50 m. Traps were baited with a mixture of banana and sugar cane that had been fermented for 48 hs. Traps were set on the first day while the next three days were reserved for daily butterfly collection at all traps.

Sampled individuals were immediately sacrificed and placed in entomological envelopes. Each envelope included the date, time of sampling (in case of net study), sampling point, trap number (for trap sampling) and the name of the collector. In the laboratory, the butterflies were identified using available field guides (D'ABRERA, 1981, 1984, 1987, 1994, 1995; CANALS, 2003; UEHARA-PRADO *et al*., 2004; SILVA *et al*., 2010) and the specimen collections of the Campinas University (Unicamp), Zoological Museum of São Paulo University (MZUSP), and Coleção Entomológica Pe. Jesus Santiago Moure at Paraná University (UFPR). Classification followed LAMAS (2004) and subsequent revisions (MIELKE, 2005; WAHLBERG *et al*., 2009; DUARTE & ROBBINS, 2010; WARREN *et al.*, 2013). Sampling occurred in January, April, July

and October 2012, and January, May, August and October 2013, encompassing the times of the year with the greatest differences in weather conditions (MADEIRA & FERNANDES, 1999).

Accumulation curves

We constructed two accumulation curves, one for each method (entomological net and trap), in order to evaluate the sampling efficiency of both methods. Species curves were constructed using the Vegan package (2.2-1 version) (OKSANEN *et al*., 2015) in the R program environment (R CORE TEAM, 2015).

Results

Total butterfly sampling effort was 336 net hours and 252 trap days. The traps sampled only four subfamilies (Biblidinae, Charaxinae, Satyrinae and the satyroid lineage of the subfamily Nymphalinae) of the family Nymphalidae (DEVRIES *et al*., 2001; FREITAS & BROWN, 2004). We recorded 1,520 individual butterflies of 172 species belonging to 17 subfamilies (Table I). Six butterfly families were recorded and the number of species per family was: 59 species of Hesperiidae, 28 of Lycaenidae, 54 of Nymphalidae, 5 of Papilionidae, 12 of Pieridae, and 14 of Riodinidae. The most common species were *Paryphthimoides* sp2 (Nymphalidae) (N=135), *Eurema elathea flavescens* (Chavannes, 1850) (Pieridae: Coliadinae) (N=125), *Hemiargus hanno* (Stoll, 1790) (Lycaenidae: Polyommatinae) (N=122), *Yphthimoides manasses* (C. Felder & R. Felder, 1867) (Nymphalidae: Satyrinae) (N=92), and *Pyrisitia nise tenella* (Boisduval, 1836) (Pieridae: Coliadinae) (N=75). Together, these five species, represented 36% of the total sample. We recorded 71 (41%) species with only one capture (singletons). Only four species occurred in all seven studied areas: *Hemiargus hanno*, *Junonia evarete* (Cramer, 1779) (Nymphalidae: Nymphalinae), *Eurema elathea flavescens* (Chavannes, 1850) and *Phoebis sennae marcellina* (Cramer, 1777) (Pieridae: Coliadinae). One new species was found in this study: *Paryphthimoides* sp. 2 (Nymphalidae) (A. V. L. Freitas personal observation) was found between 800 and 1400 m a.s.l. The new species is deposited in Campinas University (Unicamp) museum. Some specimens cannot be identified at species level due to the damage suffered during the sampling or because of the wing scale loss that occurs naturally throughout the insect's life. Others belong to a poorly studied butterfly group, the Satyrinae, which has many species with uncertain taxonomic position.

The accumulation curve for sampling by net butterfly richness per family did not indicate a tendency to asymptote. Although our sampling effort was similar to other studies in non-forest ecosystems (e.g. CARNEIRO *et al*., 2014; CARVALHO *et al*., 2015; MARCHIORI & ROMANOWSKI, 2006), the area studied showed a high richness of butterflies, indicating that we might be able to discover more butterfly species if more localities are sampled. The accumulation curve for sampling by trap exhibited a tendency towards asymptote (Fig. 2).

Discussion

The number of species found in this study is similar to that found by other surveys of grassland habitats in Brazil (ISERHARD *et al*., 2010; DOLIBAINA *et al*., 2011; CARNEIRO *et al*., 2014; CARVALHO *et al*., 2015), but is lower than that of other types of locations, such as the Atlantic rain forest (652 species: BROWN, 1992) and Cerrado (839 species: MIELKE *et al*., 2008). However, in addition to the need for further sampling, as indicated by the accumulation curve, our study was restricted to a single area that was smaller than the areas in the other studies.

Among the sampled species, 107 (62.2%) are considered typical of open environments or have been recorded in other grassland environments (MIELKE *et al*., 2008; ISERHARD *et al.*, 2010; DOLIBAINA *et al*., 2011; CARVALHO *et al.*, 2015; BROWN, 1992; CALLAGHAN, 1982; KAMINSKI *et al*., 2015; MARCHIORI & ROMANOWSKI, 2006; KAMINSKI *et al*., 2012;

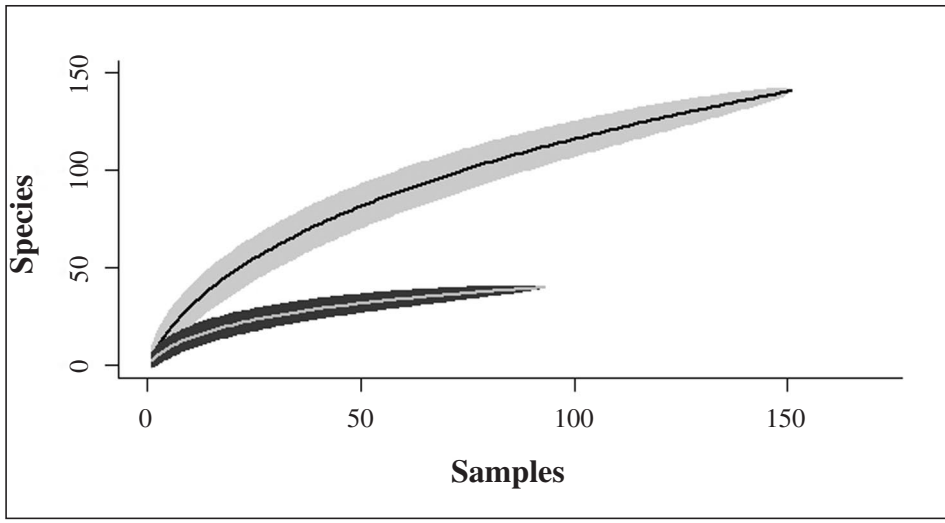

Fig. 2.– Accumulation curves for species of butterflies in Serra do Cipó (MG, Brazil). The gray curve is net sampling while the black curve is trap sampling.

KAMINSKI & CARVALHO-FILHO, 2012; PAZ *et al*., 2013; FREITAS & MARINI-FILHO, 2011; GOZZI *et al*., 2012; SILVA *et al*., 2015). Only 25 (14.5%) of the species found in this study had been previously recorded in the only other study done in the Espinhaço mountain range (NERY *et al*., 2014) (Table 1).

Table I.– List of butterfly species from Serra do Cipó (MG, Brazil). S = number of species, * = registered species of nearby region [53] and + = species found in other grasslands.

Species	Abundance	Species	Abundance
Hesperiidae (S= 59)		*Chalcone* sp.	6
Eudaminae (S= 14)		*Conga chydaea* (Butler, 1877) +	1
Chioides catillus (Cramer, 1779) +	11	*Conga urqua* (Weeks, 1909) +	23
Cogia azila Evans, 1953	3	*Copaeodes jean favor* Evans, 1955 +	2
Cogia calchas (Herrich-Schäffer, 1869)	6	*Cumbre* sp.	2
Cogia hassan evansi Bell, 1937	20	*Cymaenes warreni* (Weeks, 1901)	2
Epargyreus sp.	2	*Euphyes eberti* Mielke, 1972	6
Phocides polybius phanias (Burmeister, 1880) +	2	*Euphyes* sp.	1
Typhedanus undulatus (Hewitson, 1867) +	2	*Hylephila phyleus* (Drury, 1773) +	5
Udranomia spitzi Hayward, 1942 +	14	*Hylephila* sp.	1
Urbanus carmelita barra Evans, 1952	2	*Lerema caraca* Mielke, 1992	3
Urbanus cindra Evans, 1952 +	11	*Lerema veadeira* Mielke, 1968 +	1
Urbanus dorantes (Stoll, 1790) +	2	*Lerodea erythrostictus* (Prittwitz, 1868) +	1
*Urbanus evenus (*Ménétriès, 1855) +	5	*Lerodea eufala* (Edwards, 1869) +	1
Urbanus procne (Plötz, 1881) +	2	*Nastra tanta* Evans, 1955 +	1
Urbanus simplicius (Stoll, 1790) +	1	*Panoquina bola* Bell, 1942 +	4
Hesperiinae (S= 30)		*Panoquina peraea* (Hewitson, 1866)	7
Chalcone briquenydan (Weeks, 1901) +	2	*Polites vibex catilina* (Plötz, 1886) +	2

Species	Abundance
Pompeius dares Plötz, (1883) +	1
Quasimellana mielkei Burns, 1994	7
Synale metella (Plötz, 1882) +	1
Thespieus homochromus Mielke, 1978	5
Vehilius inca (Scudder, 1872) +	5
Vettius lucretius (Latreille, 1824) +	1
Vidius nostra nostra Evans, 1955 +	3
Vidius similis Mielke, 1980 +	3
Vidius sp.	8
Wallengrenia premnas (Wallengren, 1860) +	1
Xeniades chalestra Hewiston, 1866 +	1
Pyrginae (S= 14)	
Chiomara basigutta Plötz, 1884 +	27
Elbella intersecta losca Evans, 1951+	1
Elbella luteizona (Mabille, 1877) +	2
Gesta gesta Prittwitz, 1868 +	1
Gesta heteropterus (Plötz, 1884) +	1
Gorgythion sp.	4
Heliopetes arsalte (Billberg, 1820) +	8
Heliopetes macaira orbigera (Mabille, 1888) +	7
Heliopetes omrina (Butler, 1870) *+	16
Pyrgus orcus (Stoll, 1780) *+	30
Pyrrhopyge amythaon Bell, 1931	1
Sophista latifasciata (Spitz, 1930) +	3
Timochreon doria (Plötz, 1884)	1
Viola violella (Mabille, 1897) +	5
Zopyrion evenor Godman & Salvin, 1901 +	5
Lycaenidae (S= 28)	
Lycaeninae (S= 1)	
Arcas ducalis (Westwood, 1852) +	1
Polyommatinae (S= 2)	
Hemiargus hanno (Stoll, 1790) +	124
Leptotes cassius (Cramer, 1775) *	32
Theclinae (S= 25)	
Allosmaitia strophius (Godart, [1824])	4
Arawacus tarania (Hewitson, 1868)	2
Badecla badaca (Hewitson, 1868)	10
Calycopis caulonia (Hewitson, 1877) +	1
Calycopis janeirica (Felder, 1862)	1
Chlorostrymon telea (Hewitson, 1868)	2
Cyanophrys herodotus (Fabricius, 1793)	1
Evenus regalis (Cramer, 1775)	1
Gargina gargophia (Hewitson, 1877)	1
Magnastigma julia Nicolay, 1977 +	4
Michaelus thordesa (Hewitson, 1867)	1
Nicolaea schausa (E. Jones, 1912)	3
Nicolaea socia (Hewitson, 1868)	2
Nicolaea sp.	1
Ocaria ocrisia (Hewitson, 1868)	1
Pseudolycaena marsyas (Linnaeus, 1758) *+	1
Rekoa marius (Lucas, 1857)	1
Rubroserrata ecbatana (Hewitson, 1868)	1
Strymon cestri (Reakirt, [1867]) +	1
Strymon cyanofusca Johnson, Eisele & MacPherson, 1990	1
Strymon mulucha (Hewitson, 1867)	3
Strymon ohausi (Spitz, 1933)	15
Strymon oreala (Hewitson, 1868) +	2
Thereus sp.	1
Theritas triquetra (Hewitson, 1865) +	1
Nymphalidae (S= 54)	
Biblidinae (S= 10)	
Biblis hyperia (Cramer, 1779) *+	1
Callicore astarte (Cramer, 1779) *+	1
Callicore sorana (Godart, [1824]) *+	43
Eunica cuvierii (Godart, 1819) *+	12
Eunica tatila (Herrich-Schäffer, [1855]) *+	12
Hamadryas amphinome (Linnaeus, 1767) *+	2
Hamadryas februa (Hübner, [1823]) *+	2
Hamadryas feronia (Linnaeus, 1758) *+	6
Temenis laothoe (Cramer, 1777) *+	1
Nica flavilla (Godart, [1824])	1
Charaxinae (S= 3)	
Memphis moruus (Fabricius, 1775) *+	3
Siderone galanthis (Cramer, 1775) *+	3
Zaretis strigosus (Gmelin, [1790]) +	1
Danainae (S= 2)	
Danaus gilippus (Bates, 1863) +	9
Danaus plexippus (Linnaeus, 1758)	1
Heliconiinae (S= 3)	
Heliconius besckei (Ménétriés, 1857) *	1
Heliconius erato phyllis (Fabricius, 1775) *+	4
Heliconius ethilla nacarea (Godart, 1819) *+	1
Ithomiinae (S= 1)	
Placidina euryanassa (Felder & Felder, 1860)	1
Nymphalinae (S= 10)	
Anartia jatrophae (Linnaeus, 1763) +	2
Colobura dirce (Linnaeus, 1758) *+	1
Eresia lansdorfi (Godart, 1819) *+	1
Euptoieta hegesia meridiania Stichel, 1938	3
Junonia evarete (Cramer, 1779) *+	43
Smyrna blomfildia (Fabricius, 1781) *+	1
Tegosa claudina (Eschscholtz, 1821) +	2
Vanessa braziliensis (Moore, 1883) +	11
Vanessa myrinna (Doubleday, 1849) +	7
Satyrinae (S= 25)	
Caligo brasiliensis (Felder, 1862) +	2
Cissia sp.1	6
Eryphanis automedon (Cramer, 1775)	2
Guaianaza pronophila (Butler, 1870)*	1
Forsterinaria quantius (Godart, [1824])*+	4
Godartiana muscosa (Butler, 1870) *+	3

Species	Abundance
Hermeuptychia atalanta (Butler, 1867) +	1
Hermeuptychia maimoune (Butler, 1870)	1
Moneuptychia itapeva (Freitas, 2007) *+	14
Moneuptychia soter (Butler, 1877) *+	2
Morpho helenor mielkei Blandin, 2007 *+	11
Opsiphanes invirae (Hübner, [1808]) *+	3
Paryphthimoides melobosis (Capronnier, 1874)	41
Paryphthimoides phronius (Godart, [1824]) *+	5
Paryphthimoides poltys (Prittwitz, 1865) *+	7
Paryphthimoides sp.1	135
Paryphthimoides sp.2	21
Pharneuptychia phares (Godart, [1824])	2
Taygetina kerea (Butler, 1869) +	2
Taygetis laches (Fabricius, 1793) *+	6
Yphthimoides affinis (Butler, 1867) *+	24
Yphthimoides patricia (Hayward, 1957)	92
Yphthimoides ochracea (Butler, 1867) *+	2
Yphthimoides renata (Stoll, 1780) *+	4
Yphthimoides sp.1	6
Papilionidae (S= 5)	
Papilioninae (S= 5)	
Battus polydamas (Linnaeus, 1758) +	1
Heraclides thoas brasiliensis (Rothschild & Jordan, 1906) +	1
Parides anchises (Linnaeus, 1758) +	1
Parides bunichus diodorus (Hopffer,, 1865) +	37
Parides neophilus eurybates (Gray, [1853])	1
Pieridae (S= 12)	
Coliadinae (S= 8)	
Anteos clorinde (Godart, [1824])	1
Aphrissa statira (Cramer, 1777) +	1
Eurema albula (Cramer, 1775) *+	1
Eurema elathea flavescens (Chavannes, 1850) *+	125
Eurema phiale paula (Röber, 1909) *+	3
Phoebis sennae marcellina (Cramer, 1777) +	28
Pyrisitia leuce (Boisduval, 1836) +	5
Pyrisitia nise tenella (Boisduval, 1836) +	75
Pierinae (S= 4)	
Ascia monuste orseis (Godart, [1819]) *+	1
Cunizza hirlanda planasia Fruhstorfer, 1910 +	1
Glutophrissa drusilla (Cramer, 1777) +	3
Hesperocharis anguitia (Godart, 1819)	2
Riodinidae (S= 15)	
Riodininae (S= 15)	
Anteros lectabilis Stichel, 1909 +	1
Ariconias glaphyra (Westwood, 1851)	28
Aricoris pasquita (Stichel 1910)	1
Aricoris propitia (Stichel, 1910) +	48
Aricoris tutana (Godart, [1824]) +	12
Baeotis johannae Sharpe, 1890	8
Chalodeta theodora (Felder & Felder, 1862)	1
Dachetola azora (Godart, [1824]) +	4
Emesis diogenia Prittwitz, 1865	13
Lemonias stalachtioides (Butler, 1867)	4
Lyropteryx terpsichore Westwood, 1851	3
Rhetus belphegor (Westwood, 1851) +	3
Stichelia bocchoris (Hewitson, 1876)	5
Synargis axenus (Hewitson, 1876) +	7
Synargis calyce (Felder & Felder, 1862)	1

The most abundant and species rich families were Hesperiidae (over one third of all collected species, 33.7%) and Nymphalidae (31.9%). These are the most species rich butterfly families in the Neotropics (LAMAS, 2004). They are also known to have a positive association with monocotyledons during their early life stage (DEVRIES, 1985; FERRER-PARIS *et al*., 2013), and since monocotyledons are dominant in the rupestrian grasslands of Serra do Cipó (RAPINI *et al*., 2008), they likely contribute to the wide distribution of these butterfly taxa. The most abundant butterfly species was a new species of *Paryphthimoides*, indicating the need for more inventories in the region of Serra do Cipó. The other abundant butterfly species in this study are known to be common in open, grassland, ruderal or even in disturbed areas (BROWN, 1992). The species that were found at all of the sampling points of this study have wide distributions and occur in many regions of Brazil (MOTTA, 2002).

In comparison to other surveys in Minas Gerais, the present study was fourth in the total number of butterfly species encountered, behind studies in Poços de Caldas (EBERT, 1969), São Francisco River (SOARES *et al*., 1999) and Uberlândia (MOTTA, 2002) (see Table II). Of all the species collected by us, 61 had not been previously recorded for Minas Gerais, with 32 (52.4%) species of Hesperiidae, 14 (22.9%) species of Lycaenidae, 22 (36%) species of Nymphalidae, 2 (3.2%) species of Pieridae, and 10 (16.4%) species of Riodinidae. Therefore, this study greatly expands knowledge of the butterfly fauna of Minas Gerais.

Butterflies of tropical mountains remain poorly known, which makes it difficult to recognize and determine the conservation and endemic status of these major taxa of herbivores. For example, the species *Arcas ducalis* (Westwood, 1852) (Lycaenidae: Theclinae), which was found in our study, was previously known to be restricted to mountaintop environments with preserved vegetation in southern and southeastern Brazil (NICOLAY, 1971; BROWN, 1992; BROWN, 1993).

Table II.– Comparison of butterfly surveys in Minas Gerais, Brazil. * = studies with only fruit feeding butterflies (Nymphalidae)

Reference	EBERT, 1969	SOARES *et al.*, 1999	MOTTA, 2002	SILVA *et al.* 2007	SILVA *et al.*, 2010 *	SILVA *et al.*, 2012 *	SOARES *et al.*, 2012	GOZZI *et al.*, 2012 *	NERY *et al.*, 2014	ARAÚJO & PAPROCKI, 2015	SILVA *et al.*, 2015*	This study
Local	Poços de Caldas	São Francisco River	Uberlândia	Belo Horizonte	Rio Doce	Belo Horizonte	Belo Horizonte	Januária	Serra do Intendente	Betim	Nova Lima	Serra do Cipó
Habitat	Primary forest and open grassland	Caatinga, riparian forest and Cerrado	Cerrado	Urban	Atlantic Forest	Urban	Urban	Cerrado e caatinga	Cerrado and riparian forest	Urban	Rupestrian field and riparian forest	Rupestrian grassland
Number of species	572	180	251	91	83	45	78	39	60	23	63	172
Number of individuals				170		1219	165	5249	394	66	2245	1520
Hesperiidae	223	66	52	26			10		5	2		59
Lycaenidae	87	32	36	1			7		3	0		28
Nymphalidae	164	56	110	42	83	45	46	39	46	17	63	54
Papilionidae	16	3	8	4			3		0	2		5
Pieridae	35	16	17	14			7		5	2		12
Riodinidae	42	7	28	4			5		1	0		15

This species is considered endangered in the states of São Paulo, Rio de Janeiro, and Espírito Santos (BROWN & FREITAS, 1999; OTERO *et al*., 2000; AZEVEDO *et al*., 2007). Another example is *R. belphegor*, with three individuals collected in one plot at 1300 m a.s.l. in the present study. This species is on the Brazilian red list of threatened species (MMA, 2014) and is classified as Endangered (EN) by the International Union for Conservation of Nature (IUCN). Another species reported here, *M. julia* and *Strymon ohausi*, both belonging to family Lycaenidae, are also classified as Endangered (EN) by the IUCN (FREITAS & MARINI-FILHO, 2011; MMA, 2014). *Cunizza hirlanda planasia* (Pieridae: Pierinae) is another species on the national red list of threatened species (MMA, 2014), and is listed as Vulnerable (VU) indicating that more information about its biology and distribution are required. This was the first record *of M. julia, S. ohausi* and *C. hirlanda planasia* in Serra do Cipó, all sampled outside the Serra do Cipó National Park (a full protection conservation unit); however, they were found in Morro da Pedreira Environmental Protection Area (a sustainable use conservation unit). Our record on the distribution of *Hermeuptychia atalanta* (Butler, 1867) (Nymphalidae: Satyrinae) represents a new record for southeastern Brazil (SERAPHIM *et al*., 2014).

Conclusion

Results have shown that rupestrian grasslands host a great diversity of butterflies, including species listed as endangered. Because it is a montane environment, particularly exposed to the consequences of global warming, conservationist efforts are needed in order to protect the integrity of this unique ecosystem.

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

Solicitud de autorización para recoger lepidópteros 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 Investigation 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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Fauna of Spilomelinae from Wuzhi Mountain Nature Reserve, Hainan Island, China (Lepidoptera: Pyraloidea, Crambidae)

X.-L. Wei, J.-P. Wan & X.-C. Du

Abstract

Fauna of Spilomelinae from Wuzhi Mountain was analysed. There are 95 species in 54 genera of Spilomelinae from this area. One species is newly recorded from China, three genera and thirteen species are recorded from Hainan Island for the first time. Fifty-four genera show 16 distributional patterns and ninety-five species show 14 distributional patterns in this Zoogeographical region of the world. One genus and seventeen species are endemic to the Oriental region. The indicates that Spilomelinae from this area are closely related to the Palaearctic region and next to the Australian and Afrotropical regions; specimens from the Oriental region constitute the majority and most genera and species show cross-region distribution.
KEY WORDS: Lepidoptera, Spilomelinae, fauna, Wuzhi Mountain Nature Reserve, Hainan Island, China.

Fauna de Spilomelinae de la Reserva Natural de la Montaña Wuzhi, Isla de Hainan, China (Lepidoptera: Pyraloidea, Crambidae)

Resumen

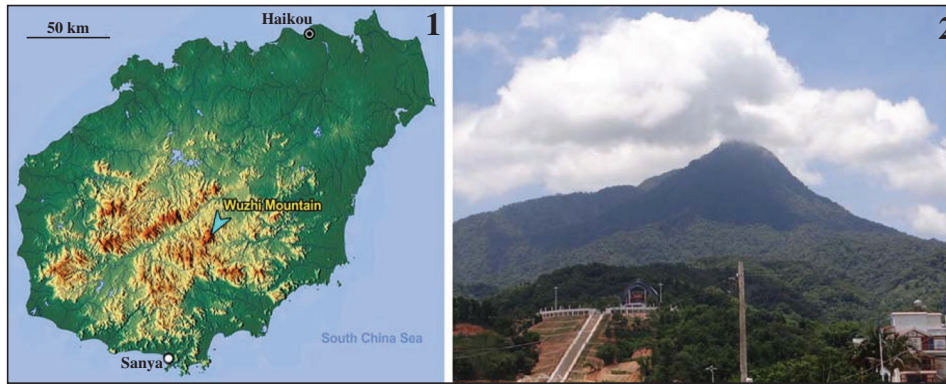
Fue analizada la fauna de Spilomelinae de la Montaña de Wuzhi. De esta área se encontraron 95 especies en 54 géneros de Spilomelinae. Una especie es un nuevo registro para China, tres géneros y trece especies son primeros registros para la isla de Hainan. Cincuenta y cuatro géneros muestran muestra 16 patrones de distribución y noventa y cinco especies muestra 14 patrones de distribución en las regiones zoogeográficas del mundo. Un género y diecisiete especies son endémicas de la región Oriental. Ello indica que los Spilomelinae de esta área, están próximos a los de la región Palaeártica y luego a los de las regiones Australiana y Afrotropical; los componentes de la región Oriental constituyen la mayoría de ellos y la mayoría de los géneros y especies tienen una distribución cruzada entre regiones.
PALABRAS CLAVE: Lepidoptera, Spilomelinae, fauna, Reserva Natural Montaña Wuzhi, isla de Hainan, China.

Introduction

Spilomelinae is subordinate to Crambidae (Lepidoptera: Pyraloidea). It comprises about 3780 described species in 262 genera in the world and 471 species in 111 genera are distributed in China (SOLIS & MAES, 2002; DU, 2008; DU & LI, 2008a; DU & LI, 2008b; DU & LI, 2008c; DU & LI, 2011; DU & LI, 2014; XU & DU, 2016; ZHANG & LI, 2016). Many species of this subfamily are important economical pests, larvae of them can cause major damage to agriculture and forestry (WANG, 1980).

Wuzhi Mountain National Nature Reserve is located in central Hainan Island (109º 39’ 30”-109º 47’ 50”E, 18º 49’ 20”-18º 58’ 54”N) and in the Oriental region within the Zoogeographical region of the world (ZHANG, 1999). It is the largest nature reserve and is one of the largest pristine tropical

forest areas in Hainan Island. Its altitude reaches 1867 m, the highest mountain of Hainan Island. Only some sporadic literatures are related to the fauna of insects from Wuzhi Mountain (FU, 2000; HOU & CHEN, 2011; SONG & HUANG, 2002). There is no report about the fauna of Spilomelinae from this area so far. The aim of this study is to find out species diversity and the fauna of Spilomelinae from Wuzhi Mountain.



Figures 1-2.– 1. The location of the Wuzhi Mountain Nature Reserve, Hainan Island, China (the map available from https://maps-for-free.com/). **2.** The highest peak of Wuzhi Mountain (photo by Jian-Yue Qiu).

Materials and Methods

Specimens were collected using high-pressure mercury lamps and were deposited in the College of Plant Protection, Southwest University, Chongqing, China and in the College of Life Sciences, Nankai University, Tianjin, China. The authors consider that there are six zoogeographical regions in the world, comprising the Oriental, Palearctic, Afrotropical, Australian, Nearctic and Neotropical regions. China extends across the Oriental and the Palearctic regions (ZHANG, 1996).

Results and Analysis

Species diversity of Spilomelinae from Wuzhi Mountain

Ninety-five species in 54 genera of Spilomelinae from Wuzhi Mountain were identified. *Rehimena cissophora* (Tumer, 1908) is newly recorded from China. *Bradina nigripunctalis* South, 1901, *Palpita curvispina* Zhang & Li, 2005 and *Palpita hypohomalia* Inoue, 1996 are endemic to China. *Nomophila* Hübner, 1825, *Notesia* Yamanaka, 1992 and *Poliobotys* Shaffer & Munroe, 2007 are newly recorded from Hainan Island. Thirteen species are recorded from Hainan Island for the first time. Based on specimen collection and investigation in the field, *Agrioglypta itysalis* (Walker, 1859), *Bradina diagonalis* (Guenée, 1854), *Lamprosema commixta* (Butler, 1879), *Palpita hypohomalia* Inoue, 1996 and *Parotis marginata* (Snellen, 1895) are dominant species in the population and distribution in Wuzhi Mountain. The statistics show that species diversity of Spilomelinae is abundant in this area (Table 1).

Table 1.– Species, genera and their distribution of Spilomelinae from Wuzhi Mountain in different Zoogeographical regions of the world.

Genera and Species	Oriental	Palearctic	Afrotropical	Australian	Nearctic	Neotropical
Agathodes Guenée, 1854	+	+	+	+	+	+
A. ostentalis (Geyer, 1837)	v	v		v		
Agrioglypta Meyrick, 1932	+	+	+	+		
A. eurytasalis (Walker, 1859)	v	v		v		
A. itysalis (Walker, 1859)	v	v		v		
A. zelimalis (Walker, 1859)	v					
Agrotera Schrank, 1802	+	+	+	+	+	
A. ornata Wileman & South, 1917	v					
Archernis Meyrick, 1886	+		+	+		
A. capitalis (Fabricius, 1794)	v					
Ategumia Amsel, 1956	+	+	+	+	+	+
A. adipalis (Lederer, 1863) ●	v	v				
Bocchoris Moore, 1885	+	+	+	+	+	+
B. inspersalis (Zeller, 1852)	v	v	v			
B. telphusalis (Walker, 1859)	v	v				
Botyodes Guenée, 1854	+	+	+	+		
B. principalis Leech, 1889	v	v				
Bradina Lederer, 1863	+	+	+	+		+
B. diagonalis (Guenée, 1854)	v	v				v
B. geminalis Caradja, 1927	v	v				
B. nigripunctalis South, 1901 ▲	v					
Camptomastix Warren, 1892	+	+		+		+
C. hisbonalis (Walker, 1859)	v	v		v		
Ceratarcha Swinhoe, 1894	+	+				
C. umbrosa Swinhoe, 1894	v	v				
Cirrhochrista Lederer, 1863	+	+		+		
C. brizoalis (Walker, 1859)	v	v		v		
C. kosemponialis Strand, 1859	v	v				
Cnaphalocrocis Lederer, 1863	+	+	+	+		
C. medinalis (Guenée,1854)	v	v	v	v		
Conogethes Meyrick, 1884	+	+		+		
C. punctiferalis (Guenée, 1854)	v	v		v		
Diaphania Hübner, 1818	+	+	+	+		
D. indica (Saunders, 1851)	v	v	v	v		
D. laticostalis (Guenée, 1854)	v					
Diasemia Hübner, 1825	+	+	+	+	+	+
D. accalis (Walker, 1859) ●	v	v		v		
D. reticularis (Linnaeus, 1761)	v	v				
Diplopseustis Meyrick, 1884	+	+		+		
D. perieresalis (Walker, 1859)	v	v		v		
Eurrhyparodes Snellen, 1880	+	+	+	+		+
E. bracteolalis (Zeller,1852)	v	v		v		
Filodes Guenée, 1854	+		+	+		
F. fulvidorsalis (Geyer, 1832)	v			v		
Glauconoe Warren, 1892	+					
G. deductalis (Walker, 1859)	v					
Glyphodes Guenée, 1854	+	+	+	+	+	+
G. actorionalis Walker, 1859	v	v	v	v		
G. bicolor (Swainson, 1821)	v		v	v		
G. bivitralis Guenée, 1854	v			v	v	
G. caesalis Walker, 1859	v					

G. canthusalis Walker, 1859	v	v		v		
G. crithealis (Walker, 1859)	v	v				
G. duplicalis Inoue, Munroe & Mutuura, 1981 ●	v	v				
G. onychinalis (Guenée, 1854)	v	v	v	v		
G. stolalis Guenée, 1854	v		v	v		
Goniorhynchus Hampson, 1896	+	+			+	+
G. butyrosa (Butler,1879)	v	v				
Haritalodes Warren, 1890	+	+	+	+	+	+
H. derogata (Fabricius, 1775)	v	v	v	v	v	v
Herpetogramma Lederer, 1863	+	+	+	+		
H. luctuosalis (Guenée, 1854)	v	v	v			
H. ochrimaculalis (South, 1901) ●	v	v				
Heterocnephes Lederer, 1863	+	+				
H. lymphatalis (Swinhoe, 1889)	v	v				
Hydriris Meyrick, 1885	+	+	+	+	+	+
H. ornatalis (Duponchel, 1832)	v	v	v	v	v	
Hymenia Hübner, 1825	+	+	+	+	+	+
H. perspectalis (Hübner, 1796)	v	v	v	v	v	v
Ischnurges Lederer, 1863	+		+	+		+
I. gratiosalis (Walker, 1859)	v					
Lamprosema Hübner, 1823	+	+	+	+	+	+
L. commixta (Butler, 1879)	v	v				
Leucinodes Guenée, 1854	+		+			+
L. apicalis Hampson, 1896	v					
Marasmia Lederer, 1863	+	+	+	+	+	+
M. poeyalis (Boisduval, 1833)	v		v	v		
Maruca Walker, 1859	+	+	+	+		+
M. vitrata (Fabricius, 1787)	v	v	v	v		
Mecyna Doubleday, 1849	+	+	+	+	+	+
M. dissipatalis (Lederer, 1863)	v	v				
M. quinquigera (Moore, 1888)	v	v				
Metoeca Warren, 1896	+	+	+	+	+	+
M. foedalis (Guenée, 1854)	v	v	v	v	v	
Neoanalthes Yamanaka & Kirpichnikova, 1993	+	+				
N. contortalis (Hampson, 1900)	v	v				
Nomophila Hübner, 1825 ♦	+	+	+	+	+	+
N. noctuella (Denis & Schiffermüller, 1775) ●	v	v			v	v
Nosophora Lederer, 1863	+	+		+		
N. albiguttalis Swinhoe, 1890 ●	v					
N. insignis (Butler, 1881)	v	v				
N. ningpoalis (Leech, 1889) ●	v					
N. semitritalis (Lederer, 1863)	v	v				
Notarcha Meyrick, 1884	+	+	+	+	+	+
N. quaternalis (Zeller, 1852)	v	v	v	v	v	v
Notesia Yamanaka, 1992 ♦	+	+		+		
N. tranquillalis (Lederer, 1863) ●	v	v		v		
Omiodes Guenée, 1854	+	+	+			+
O. tristrialis (Bremer, 1864)	v	v				
Omphisa Moore, 1886	+		+	+	+	+
O. anastomosalis (Guenée, 1854)	v		v	v	v	v
Palpita Hübner, 1808	+	+	+	+	+	+
P. curvispina Zhang & Li, 2005 ▲●	v	v				

P. hypohomalia Inoue, 1996 ▲	v	v				
P. nigropunctalis (Bremer, 1864)	v	v				
P. sejunctalis Inoue, 1997	v					
Parotis Hübner, 1831	+	+		+		
P. angustalis (Snellen, 1895)	v	v				
P. marginata (Hampson, 1893)	v					
P. nilgirica (Hampson, 1896) ●	v	v				
Patania Moore, 1888	+	+	+	+		+
P. chlorophanta (Butler, 1878)	v	v				
P. concatenalis (Walker, 1866)	v					
P. iopasalis (Walker, 1859)	v	v				
P. obfuscalis (Yamanaka, 1998)	v	v				
P. orissusalis (Walker, 1866)	v	v				
P. ruralis (Scopoli, 1763)	v	v				
P. scinisalis (Walker, 1859)	v	v				
P. sellalis (Guenée, 1854)	v	v				
Poliobotys Shaffer & Munroe, 2007 ♦	+			+		
P. ablactalis (Walker, 1859) ●	v			v		
Polygrammodes Guenée, 1854	+	+	+	+	+	+
P. sabelialis (Guenée, 1854)	v	v	v			
P. thoosalis (Walker, 1859)	v	v	v			
Polythlipta Lederer, 1863	+	+	+	+		
P. divaricata Moore, [1886]	v					
Prophantis Warren, 1896	+	+	+	+		
P. adusta Inoue, 1986	v	v		v		
P. octoguttalis (Felder, Felder & Rogenhofer, 1875)	v	v	v	v		
Pycnarmon Lederer, 1863	+	+	+	+		+
P. cribrata (Fabricius, 1794)	v	v	v			
P. marginalis (Snellen, 1890)	v		v			
P. radiata (Warren, 1896) ●	v	v				
Pygospila Guenée, 1854	+	+				+
P. tyres (Cramer, 1780)	v	v	v	v		
Rehimena Walker, 1866	+	+		+		
R. cissophora (Turner, 1908) ■●	v			v		
R. surusalis (Walker, 1859)	v	v				
Spoladea Guenée, 1854	+	+	+	+	+	+
S. recurvalis (Fabricius, 1775)	v	v	v	v	v	v
Stenia Guenée, 1845	+	+	+	+	+	+
S. charonialis (Walker, 1859)	v	v				
Syllepte Hübner, 1823	+	+	+	+	+	+
S. chalybifascia Hampson, 1896	v					
S. taiwanalis Shibuya, 1928	v	v				
S. tibialis (Moore, 1888)	v					
Syngamia Guenée, 1854	+	+	+	+	+	+
S. falsidicalis (Walker, 1859)	v	v				
S. floridalis (Zeller, 1852)	v	v	v			
Total genera	54	47	39	46	23	32
The proportion (%)	100	87.04	72.22	85.19	42.59	59.26
Total species	95	69	24	33	9	7
The proportion (%)	100.00	72.63	25.26	34.74	9.47	7.37
Genera and Species	**Oriental**	**Palearctic**	**Afrotropical**	**Australian**	**Nearctic**	**Neotropical**

Marks note: ▲: endemic species to China; ■: new record species for China; ♦: new record genus for Hainan Island; ●: new record species for Hainan Island.

THE DISTRIBUTION OF GENERA OF SPILOMELINAE FROM WUZHI MOUNTAIN IN ZOOGEOGRAPHICAL REGIONS OF THE WORLD

According to table 1 and table 2, some data of 95 species in 54 genera from Wuzhi Mountain can be summarized. Forty-seven genera, 87.04% of the fauna, are distributed in the Palearctic region; forty-six genera, 85.19%, in the Australian region; thirty-nine genera, 72.22%, in the Afrotropical region; thirty-two genera, 59.26%, in the Neotropical region and twenty-three genera, 42.59%, in the Nearctic region. Fifty-four genera of Spilomelinae from Wuzhi Mountain produce of 16 distributional patterns. Only one genus, *Glauconoe* Warren, 1892, is endemic to the Oriental region. Twenty genera distributed worldwide account for 37.04% of the total, the highest proportion of the fauna. Seven genera, 12.97% of the fauna, are distributed in Oriental, Palearctic and Australian region and the same data in the Oriental, Palearctic, Afrotropical and Australian regions; five genera, 9.26%, in Oriental, Palearctic, Afrotropical, Australian and Neotropical region; three genera, 5.56%, in the Oriental and Palearctic regions. The remaining eleven genera represent another ten distributional patterns respectively. In summary, most genera from Wuzhi Mountain, 98.15% of the fauna, show cross-region distribution, with those belonging to the Oriental region constituting the majority of Spilomelinae from this area, also closely related to the Palearctic and Australian regions, then less so to the Afrotropical and Neotropical regions, and least of all to the Nearctic region respectively.

Table 2.– Distributional patterns of genera of Spilomelinae from Wuzhi Mountain in Zoogeographical regions of the world.

Distribution	**Genera**	**The proportion**
Oriental	1	1.85
Oriental-Palearctic	3	5.56
Oriental-Australian	1	1.85
Oriental-Palearctic-Australian	7	12.97
Oriental-Palearctic-Neotropical	1	1.85
Oriental- Afrotropical-Australian	2	3.70
Oriental-Afrotropical-Neotropical	1	1.85
Oriental-Palearctic-Afrotropical-Australian	7	12.97
Oriental-Palearctic-Afrotropical-Neotropical	1	1.85
Oriental-Palearctic-Australian-Neotropical	1	1.85
Oriental-Palearctic-Nearctic-Neotropical	1	1.85
Oriental-Afrotropical-Australian-Neotropical	1	1.85
Oriental-Palearctic-Afrotropical-Australian-Nearctic	1	1.85
Oriental-Palearctic-Afrotropical-Australian-Neotropical	5	9.26
Oriental-Afrotropical-Australian-Nearctic-Neotropical	1	1.85
Oriental-Palearctic-Afrotropical-Australian-Nearctic-Neotropical	20	37.04
Total	54	100.00

THE DISTRIBUTION OF SPECIES OF SPILOMELINAE FROM WUZHI MOUNTAIN IN ZOOGEOGRAPHICAL REGIONS OF THE WORLD

According to table 1 and table 3, some data of 95 species from Wuzhi Mountain can be summarized. Sixty-nine species, 72.63% of the fauna, are distributed in the Palearctic region; thirty-three species, 37.74%, in the Australian region; twenty-four species, 25.26%, in the Afrotropical region; nine species, 9.47%, in the Nearctic region and seven species, 7.37%, in the Neotropical region. Ninety-five species show 14 distributional patterns. Seventeen species, 17.90% of the fauna, are endemic to the Oriental region; thirty-six species, 37.90%, are distributed in both the Oriental and Palearctic region; twelve species, 12.63%, in the Oriental, Palearctic and Australian region; four species, 4.21%, around the world widely. The rest of species represent another ten distributional patterns respectively. This indicates that most species from Wuzhi Mountain, 82.10% of the fauna, show cross-region distribution, and the members of Oriental region constitute the majority of Spilomelinae from this area. And

Spilomelinae from this area are closely related to the Palearctic region, then to the Australian and Afrotropical regions, and less so to the Nearctic and Neotropical regions.

Table 3.– Distributional patterns of species of Spilomelinae from Wuzhi Mountain in Zoogeographical regions of the world.

Distribution	Species	The proportion
Oriental	17	17.90
Oriental-Palearctic	36	37.90
Oriental-Afrotropical	1	1.05
Oriental-Australian	3	3.16
Oriental-Palearctic-Afrotropical	6	6.32
Oriental-Palearctic-Australian	12	12.63
Oriental-Palearctic-Neotropical	1	1.05
Oriental-Afrotropical-Australian	3	3.16
Oriental-Australian-Nearctic	1	1.05
Oriental-Palearctic-Afrotropical-Australian	7	7.37
Oriental-Palearctic-Nearctic-Neotropical	1	1.05
Oriental-Palearctic-Afrotropical-Australian-Nearctic	2	2.10
Oriental-Afrotropical-Australian-Nearctic-Neotropical	1	1.05
Oriental-Palearctic-Afrotropical-Australian-Nearctic-Neotropical	4	4.21
Total	95	100.00

Remarks

Specimens in this research have been collected from Wuzhi Mountain for many years by the research group and two other institutions, so that results reflect the situation of Spilomelinae from this area.

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Three new species of the genus *Parapammene* Obraztsov, 1960 from Hainan Island, China (Lepidoptera: Tortricidae)

S. H. Lu & H. H. Li

Abstract

Three new species of *Parapammene* Obraztsov, 1960 are described based on the specimens collected in Hainan, China. They are *P. equilata* Lu & Li, sp. n., *P. ventextensa* Lu & Li, sp. n., and *P. hainana* Lu & Li, sp. n. Diagnostic characters of each new species are given, and photos of adults and male genitalia are provided.
KEY WORDS: Lepidoptera, Tortricidae, *Parapammene*, new species, China.

Tres nuevas especies del género *Parapammene* Obraztsov, 1960 de la isla de Hainan, China (Lepidoptera: Tortricidae)

Resumen

Se describen tres nuevas especies de *Parapammene* Obraztsov, 1960 basado sobre los especímenes colectados en Hainan, China. Ellas son *P. equilata* Lu & Li, sp. n., *P. ventextensa* Lu & Li, sp. n. y *P. hainana* Lu & Li, sp. n. Se dan diagnosis de cada nueva especie y se suministran fotos de los adultos y de la genitalia del macho.
PALABRAS CLAVE: Lepidoptera, Tortricidae, *Parapammene*, nuevas especies, China.

Introduction

The genus *Parapammene* was erected by Obraztsov in 1960 with *Phthoroblastis selectana* Christoph, 1881 as the type species. It belongs to the *Grapholita* genus-group of the subtribe Grapholitina in the tribe Grapholitini. The monophyly of *Parapammene* is supported by the ductus bursae with a narrow, band-like sclerite; the seventh sternite in the female being a convex (not flat) plate; and S2 without anterolateral process (KOMAI, 1999). Currently, *Parapammene* consists of 17 species, divided into two species-groups: the *petulantana*-group and the *selectana*-group, distributed in the Palaearctic, Oriental and Australian regions (KOMAI, 1999; BROWN, 2005).

Four species were recorded in China prior to this study: *P. dichroramphana* (Kennel, 1900), *P. hexaphora* (Meyrick, 1935), *P. reversa* Komai, 1999 and *P. selectana* (Christoph, 1881). We herein add three new species to *Parapammene* based on the specimens collected in Hainan Island, China, which belong to the *selectana*-group.

The type specimens are deposited in the Insect Collection of Nankai University (NKU), Tianjin, China.

Descriptions of new species

***Parapammene hainana* Lu & Li, sp. n.** (Figs. 1, 4, 7)

Type material. CHINA: Holotype ♂, Jianfengling (18.44ºN, 108.52ºE), Ledong County, Hainan, 770 m,

5-VI-2015, coll. Peixin Cong, Wei Guan and Sha Hu, slide No. LSH15531. Paratypes: 2 ♂♂, 3-VI~29-V-2015, other same data as holotype, slide Nos. LSH15513, LSH15525.

Diagnosis: This new species is similar to *P. aurifascia* Kuznetsov, 1981 in the male genitalia by the cucullus being more or less rectangular and the costa almost straight. It can be distinguished by the neck about 1/2 width of the valva at base, and the aedeagus abruptly narrowed at distal 1/3; in *P. aurifascia*, the neck is more than 2/3 the width of the valva at base, and the aedeagus is not abruptly narrowed at distal 1/3 (KUZNETSOV, 2005: pl. 48, fig. 4).

Description: Adult (Fig. 1) wingspan 8.0-8.5 mm. Head dark brown, with scales tipped earthy yellow. Antenna blackish brown. Labial palpus ascending, exceeding upper margin of eye, greyish yellow. Thorax and tegula dark brown, scales earthy yellow tipped. Legs yellow except taris blackish brown basally and yellow apically. Forewing slightly widening toward bluntly rounded apex, length slightly longer than two times of the maximum width; costa arched; termen obtuse, with an indistinct notch below apex; dark brown, with scales yellow tipped; costa with nine pairs of yellowish strigulae; dark brown band from costa between second and third pair strigulae oblique to middle of discal cell on anterior margin, then extending obliquely inward to basal 1/3 of dorsum; median fascia leaden, from below third and fourth pair strigulae widening to about middle of outer edge of discal cell, then extending to middle of dorsum; dark brown band from costa between fourth and fifth pair strigulae oblique to beyond upper corner of discal cell, then extending straightly to before tornus; leaden streak from below fifth and eighth pair strigulae respectively, streak below fifth pair strigulae extending to basal 1/3 of R_5, almost touching inner edge of ocelloid patch, streak below eighth pair strigulae oblique to notch of termen; ocelloid patch containing three black dashes, inner edge leaden, rather wide and vertical above tornus, but ill-defined, outer edge absent; several black dashes between two leaden streaks from below eighth pair strigulae to before notch of termen, connected with ocelloid patch; fringe grey, blackish grey tipped, basal line blackish brown. Hindwing dark brown, greyish on costal area overlapped by forewing; fringe greyish brown, dark brown tipped, basal line dark brown.

Male genitalia (Fig. 4): Tegumen emarginate at top in lateral view, about 2/3 length of valva. Gnathos a pair of narrow sclerotized bands joined by membrane on inner margin distally. Valva sub-ovate before neck; costa almost straight, with 5-6 long fine setae below middle, basal process small; basal cavity well defined, ovate; neck distinct, approximayely 1/2 width of valva at base; sacculus with a bunch of fine setae at base, with long hairs extending from ventro-distal corner to before neck; cucullus more or less rectangular, twice as long as wide, shorter than 1/2 length of valva, right angled at ventro-basal corner, covered with dense fine setae from ventro-basal corner along termen and apex to distal part of costa, with hair-like scales along ventral margin. Aedeagus with basal 2/3 slightly narrower, distal 1/3 uniform; cornuti consisting of a row of fine spines (deciduous).

Female unknown.

In male, T4 with a narrow transverse band of granules along anterior edge, and T5 with a broad transverse patch sclerotized along its anterior and posterior margins (Fig. 7).

Distribution: China (Hainan).

Etymology: The specific name is from the type locality.

Parapammene ventextensa **Lu & Li, sp. n.** (Figs. 2, 5, 8)

Type material. China: Holotype ♂, Jianfengling (18.44ºN, 108.52ºE), Ledong County, Hainan, 770 m, 4-VI-2015, coll. Peixin Cong, Wei Guan and Sha Hu, genitalia slide No. LSH15532. Paratype: 1 ♂, same data as holotype, slide No. LSH15527.

Diagnosis: This new species is similar to *P. dichroramphana* (Kennel, 1900), *P. reversa* Komai, 1999 and *P. komaiana* Trematerra, 2009 in the male genitalia by having a triangular cucullus (KUZNETSOV, 2005: pl. 47, fig. 5; KOMAI, 1999: fig. 318; TREMATERRA, 2009: fig. 3), but it can be separated from its allies by having the cucullus extending ventrally and forming a narrow band bearing two lines of scale-like setae.

Description: Adult (Fig. 2) wingspan 8.5 mm. Head earthy yellow. Antenna blackish brown basally

and yellow apically on dorsal surface, dark brown on ventral surface. Labial palpus ascending, exceeding upper margin of eye, earthy yellow. Thorax and tegula dark brown, scales earthy yellow tipped. Legs dominantly yellow, mid- and hindlegs with tibiae brown on outer surface, all tarsi blackish brown basally and yellow apically. Forewing slightly widening toward bluntly rounded apex, length slightly longer than two times of maximum width; costa arched towards apex; termen obtuse, with an indistinct notch below apex; dark brown; costa with nine pairs of yellowish strigulae; dark brown band from costa between second and third pair strigulae oblique to middle of discal cell on anterior margin, then slightly extending obliquely inward to basal 1/3 of dorsum, located before median fascia; median fascia indistinct, dark brown, from below third and fourth pair strigulae extending archly to about middle of dorsum; blackish brown band from costa between fourth and fifth pair strigulae oblique to a little beyond upper corner of discal cell, then extending straight to before tornus, located beyond median fascia; leaden streak from below fifth and seventh pair of strigulae respectively, streak below fifth pair strigulae extending to basal 1/3 of M_1, touching inner edge of ocelloid patch, streak below seventh pair strigulae oblique to notch of termen; ocelloid patch containing 5-6 black dashes, inner edge leaden, vertical above tornus, outer edge absent; several black dashes between two leaden streaks from below seventh pair strigulae to notch of termen, then along termen extending to above tornus; fringe yellowish, blackish grey tipped, basal line blackish brown. Hindwing dark brown, greyish on costal area overlapped by forewing; fringe greyish brown, with blackish brown tips, basal line blackish brown. In male, T4 and T5 with a narrow transverse patch along anterior edge (Fig. 8).

Male genitalia (Fig. 5): Tegumen emarginate at top in lateral view, about 2/3 length of valva. Gnathos a pair of narrow sclerotized bands. Valva with costa almost straight except slightly arched in middle, basal process indistinct; basal cavity well defined, sub-ovate, with long hairs beyond outer margin; neck distinct, approximately 1/2 width of valva at base; cucullus triangular, about 2/5 length of valva, nearly right angled at ventro-basal corner, covered with rows of long fine setae before ventral margin, ventral margin extended, forming a narrow band bearing two lines of scale-like setae. Aedeagus slightly less than 2 times length of cucullus, basal half uniformly thick, thinned from 1/2 to distal 1/3, distal 1/3 uniform; cornuti consisting of a bunch of fine spines (deciduous).

Female unknown.

Distribution: China (Hainan).

Etymology: The specific name is derived from the Latin *vent-* and *extensus*, referring to cucullus with the ventral margin extended and forming a narrow band.

***Parapammene equilata* Lu & Li, sp. n.** (Figs. 3, 6, 9)

Type material. China: Holotype ♂, Jianfengling (18.44ºN, 108.52ºE), Ledong County, Hainan Province, 770 m, 3-VI-2015, coll. Peixin Cong, Wei Guan and Sha Hu, genitalia slide No. LSH15534.

Diagnosis: This new is similar to *P. selectana* (Christoph, 1881) in the male genitalia by having a sub-rectangular cucullus twice as long as wide. It can be distinguished by the cucullus with ventral 1/4 covered with dense fine setae, which occupies about half width of cucullus in *P. selectana* (KOMAI, 1999: fig. 315), and by the forewing being dark brown, while it is earthy yellow in *P. selectana* (Christoph, 1881) (NASU, 2013: 51, figs. 4-36-38).

Description: Adult (Fig. 3) wingspan 12.0 mm. Head dark brown, scales earthy yellow tipped. Antenna blackish brown. Thorax and tegula dark brown, scales earthy yellow tipped. Legs dark yellow, mid- and hindlegs with tibiae brown on outer surface, all tarsi blackish brown basally and yellow apically. Forewing slightly widening toward bluntly rounded apex, approximately two times of maximum width; costa arched; termen obtuse, with an indistinct notch below apex; dark brown, with leaden streaks; costa with nine pairs of yellowish strigulae, basal two pairs not well-defined; dark brown streak from costa between second and third pair strigulae extending obliquely to middle of discal cell, then extending nearly vertically to basal 1/3 of dorsum, located before median fascia; median fascia leaden, from below third and fourth pair strigulae extending archly to middle of dorsum; dark brown band from costa between fourth and fifth pair strigulae widening to upper corner of discal cell, then slightly narrowed to before tornus, its inner

margin straight, outer margin arched outward medially; leaden streak with light blue gloss from below fifth and seventh pair strigulae respectively, streak below fifth pair strigulae extending to basal 1/3 of R_5, almost touching inner edge of ocelloid patch, streak below seventh pair strigulae oblique to before notch of termen; between two light blue leaden streaks set a interrupted black streak oblique to below notch of termen; ocelloid patch containing four black dashes, inner edge leaden with light blue gloss, rather wide and vertical above tornus, outer edge thinner, almost parallel to inner one, interrupted in posterior 1/3; fringe grey, blackish grey tipped, basal line blackish grey. Hindwing dark brown, greyish yellow on costal area overlapped by forewing; fringe greyish brown, with dark brown tips, basal line blackish brown. In male, T5 with a transverse patch of blackish scales along it anterior edge (Fig. 9).

Male genitalia (Fig. 6): Tegumen emarginate at top in lateral view, about 2/3 length of valva. Gnathos a pair of narrow sclerotized bands. Valva sub-ovate before neck; costa gently curved, with an indistinct basal process; basal cavity well defined, ovate; neck distinct, more than 1/2 width of valva at base; cucullus sub-rectangular, about twice as long as wide, longer than 1/2 length of valva, obtusely angled at ventro-basal corner, covered with dense fine setae from ventro-basal corner along termen and apex to distal part of costa, with hair-like scales along ventral margin. Aedeagus slightly longer than cucullus, basal 2/3 conspicuously thicker, distal 1/3 uniform; cornuti consisting of a row of fine spines (deciduous).

Female unknown.

Distribution: China (Hainan).

Etymology: The specific name is derived from the Latin *equi-* and *latus*, referring to the sub-rectangular cucullus with same width basally and distally.

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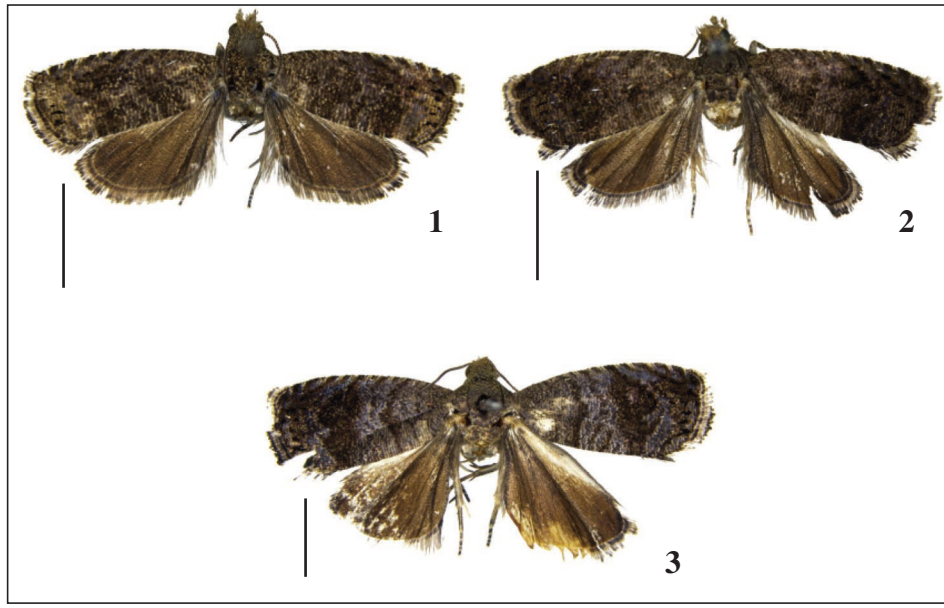

Figures 1-3.– Adults of *Parapammene* spp. **1.** *P. hainana* Lu & Li, sp. n., holotype, ♂; **2.** *P. ventextensa* Lu & Li, sp. n., holotype, ♂; **3.** *P. equilata* Lu & Li, sp. n., holotype, ♂. (scales = 2.0 mm).

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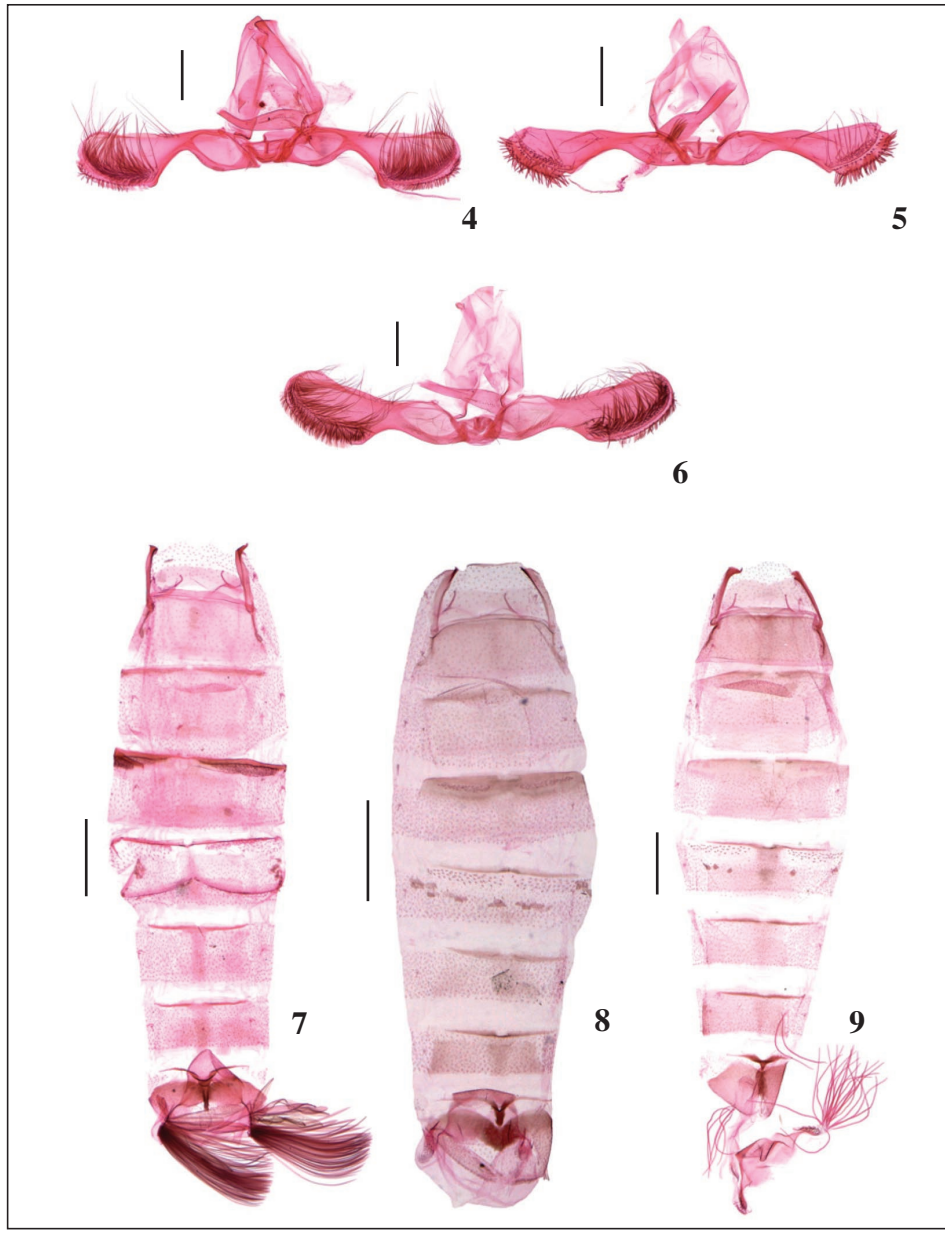

Figures 4-9.– Male genitalia and abdomen of *Parapammene* spp. **4-6.** Male genitalia: **4.** *P. hainana* Lu & Li, sp. n., paratype, slide no. LSH15513; **5.** *P. ventextensa* Lu & Li, sp. n., paratype, slide no. LSH15527; **6.** *P. equilata* Lu & Li, sp. n., holotype, slide no. LSH15534; **7-9.** Abdomens: **7.** *P. hainana* Lu & Li, sp. n., paratype, slide no. LSH15513; **8.** *P. ventextensa* Lu & Li, sp. n., paratype, slide no. LSH15527; **9.** *P. equilata* Lu & Li, sp. n., holotype, slide no. LSH15534. (scales 4-6 = 0.2 mm, 7-9 = 0.5 mm).

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New and interesting Portuguese Lepidoptera records from 2016 (Insecta: Lepidoptera)

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Abstract

32 species are added to the Portuguese Lepidoptera fauna, mainly as a result of fieldwork undertaken by the authors and others in 2016. In addition, second and third records for the country, new province records and new food-plant data for a number of species are included. A summary of recent papers affecting the Portuguese fauna is included.
KEY WORDS: Insecta, Lepidoptera, distribution, Portugal.

Novos e interessantes registos portugueses de Lepidoptera em 2016 (Insecta: Lepidoptera)

Resumo

Como resultado do trabalho de campo desenvolvido pelos autores e outros, principalmente no ano de 2016, são adicionadas 32 espécies de Lepidoptera à fauna de Portugal. Adicionalmente, são apresentados segundos e terceiros registos de espécies previamente conhecidas, bem como novas plantas alimentícias para algumas espécies. Finalmente, é apresentado um sumário dos mais recentes trabalhos relevantes para a fauna portuguesa.
PALAVRAS CHAVE: Insecta, Lepidoptera, distribuição, Portugal.

Nuevas e interesantes citas portuguesas de Lepidoptera en 2016 (Insecta: Lepidoptera)

Resumen

Como resultado del trabajo de campo efectuado por los autores y otros, principalmente durante el año de 2016, se añaden 32 especies de Lepidoptera a la fauna de Portugal. Además, se añaden segundos y terceros registros de especies ya conocidas y también nuevas plantas nutricias para algunas otras especies. Finalmente, se presenta un resumen de los trabajos más recientes que son relevantes para la fauna portuguesa.
PALABRAS CLAVE: Insecta, Lepidoptera, distribución, Portugal.

Introduction

This paper is the eleventh in the series of annual summaries of new knowledge of Portuguese Lepidoptera. It gives records of species of Lepidoptera added to the Portuguese fauna in 2016, together with new province records not included in the checklist (CORLEY, 2015). Additional data includes

new data on larval food-plants within the country and second and third records of species for the country, which are only indicated when they are not in new provinces. Papers published in 2016 that relate to the Portuguese Lepidoptera fauna are listed and briefly summarised. Finally, an Appendix lists the new species for Portugal separately, with numbers indicating their correct position in the checklist; new genera for Portugal have author and year of publication given.

32 species new for Portugal are listed below, of which seven are new for the Iberian Peninsula. A few of the new species listed here have been previously listed for Portugal, but the records were rejected in CORLEY (2015), as being erroneous or unsubstantiated.

In CORLEY *et al*. (2016) the number of Lepidoptera species recognised from Portugal was 2626. With the current paper and other papers mentioned herein, this total has risen to 2657.

Material and Methods

Most species were captured at mercury vapour light over or beside a white sheet, but a few were taken at Heath-type traps with 8 w black actinic tubes. For specimens not taken at light, the means of capture is given. Specimens are retained in the collections of the original recorders, unless otherwise stated. However, a few records are based only on photographic evidence.

The order and nomenclature of families and species has been revised in accordance with the new Portuguese list (CORLEY, 2015). The nomenclature of plant names follows CASTROVIEJO (1986-2015) where possible and otherwise follows TUTIN *et al*. (1964-1980).

The entry for species new for Portugal concludes with a summary of the known European distribution, and available information on the larval food-plant, given in square brackets if the information comes from outside Portugal.

Localities with UTM squares and altitude: (District in brackets)

The map below shows the 10x10 km UTM grid squares from which records cited in this paper were made.

Localities

Abiúl (Pombal)	NE3913	180 m
Alambre (Setúbal)	MC9760	115 m
Aljezur, 3 km S of	NB1827	25 m
Alto de Penaboste, Serra da Nogueira (Vinhais)	PG7720	1150 m
Amendoeira da Serra (Mértola)	PB1583	155 m
Ansião, 2 km E. of,	NE5019	250 m
Árvore (Vila do Conde)	NF2377	40 m
Balsamão (Macedo de Cavaleiros)	PF7993	450 m
Barragem de Azibo (Macedo de Cavaleiros)	PG7503	610 m
Bobal (Mondim de Basto)	NF9784	850 m
Boliqueime (Loulé)	NB7510	70 m
Buracas de Casmilo (Condeixa-a-Nova)	NE4333	300 m
Carrapateira (Vila do Bispo)	NB0806	25 m
Carrazedo, 1 km S.W. of, (Bragança)	PG7425	890 m
Carvalheira, Serra da Estrela (Manteigas)	PE2274	1050 m
Casais do Porto, Louriçal (Pombal)	NE2229	20 m
Castelo de Juromelo, Rabaçal (Penela)	NE4828	250 m
Castro Laboreiro (Melgaço)	NG6954	970 m
Chão de Couce (Ansião)	NE5218	300 m
Cidadelhe (Vinhais)	PG6635	1020 m

Condeixa-a-Nova	NE4438	100 m
Corredoura, Serra da Pevide (Porto de Mós)	ND1383	200 m
Couce (Valongo)	NF4356	50 m
Covelas, Sambade, Serra de Bornes (Alfândega da Fé)	PF6687	985 m
Dine (Vinhais)	PG7141	740 m
Esculca, Beça, Serra do Barroso (Boticas)	PG0815	790 m
Estevais (Torre de Moncorvo)	PF6267	450 m
Faia Brava reserve, Algodres (Figueira de Castelo Rodrigo)	PF6135	450 m
Fonte da Cabra, Serro Ventoso (Porto de Mós)	ND1479	350 m
França, 5 km west of, (Bragança)	PG8241	750 m
Furadouro (Condeixa-a-Nova)	NE4335	250 m
Gambelas (Faro)	NB9100	25 m
Guadramil (Bragança)	QG0143	700 m
Ilha da Culatra (Faro)	PA0395	4 m
Ilha da Murraceira (Figueira da Foz)	NE1542	3 m
Lagares (Penafiel)	NF5452	230 m
Lagoa (Mira)	NE2077	12 m
Lagoa da Ervideira, Pedrogão (Leiria)	NE0820	50 m
Lama Grande, Serra de Montesinho (Bragança)	PG8346	1390 m
Louriçal (Pombal)	NE2228	40 m
Lousada	NF6070	270 m
Madriz (Soure)	NE3141	8 m
Malhada Tramazeira, Vale de Rossim (Seia)	PE1972	1420 m
Mata do Urso (Pombal)	NE0924	25 m
Mindelo (Vila do Conde)	NF2274	5 m
Moura da Serra, Mata da Margaraça (Arganil)	NE9252	500 m
Olhos de Água de Alviela, Amiais de Baixo (Santarém)	ND2466	120 m
Pampilhosa de Botão (Mealhada)	NE4964	90 m
Parque Biológico de Gaia (Vila Nova de Gaia)	NF3650	110 m
Penelas (Vila Real)	PF0566	280 m
Penhas da Saúde (Covilhã)	PE2323	1515m
Poço (Condeixa-a-Nova)	NE4406	220 m
Podre, Castro Laboreiro (Melgaço)	NG6850	800 m
Pontão dos Alambiques (Alfândega da Fé)	PF7178	500 m
Ponte da Carba, Celas (Vinhais)	PG7222	710 m
Ponte da Barca	NG4927	80 m
Ponte de Jugais, Lapa dos Dinheiros (Seia)	PE1071	570 m
Porto	NF3355	80 m
Quinta da Estrelinha, Rubiães (Paredes de Coura)	NG3138	255 m
Quinta do Canal, Bizorreiro (Figueira da Foz)	NE1639	3 m
Quinta do Zacarias (Alfândega da Fé)	PF7479	250 m
Ribeira de Cércio (Miranda do Douro)	QF2494	685 m
Rio Maças, 3 km W of Vimioso	QG0307	405 m
Salgueiros (Vinhais)	PG6341	930 m
Santuário de Santo Ambrósio, Vale do Porco (Macedo de Cavaleiros)	PF7799	580 m
São Romão (São Bras de Alportel)	NB9412	200 m
São Vicente de Penso (Braga)	NF4693	210 m
Sapais de Castro Marim (Castro Marim)	PB3820	4 m
Sargaçal (Lagos)	NB2711	30 m
Serra de Janeanes (Condeixa-a-Nova)	NE4434	350 m
Terras do Risco, Serra da Arrábida (Sesimbra)	MC9757	205 m

Vale dos Veados, Serra da Arrábida (Setúbal)	MC9959	150 m
Valongo	NF4159	200 m
Verride (Montemor-o-Velho)	NE2441	100 m

Recorders

Rui Andrade	Ana Rita Gonçalves	Tatiana Moreira
Miguel Berkemeier	Valter Jacinto	João Nunes
Tineke van Boven	Edmundo Jesus	Pedro Pires
João Pedro Cardoso	José Lemos	Fernando Romão
Ricardo Cardoso	Tiago Magalhães	Jorge Rosete
Martin Corley	Eduardo Marabuto	Carlos Silva
Mike Dale	Ernestino Maravalhas	Ana Valadares
Isaias Ferreira	Cristiana Marques	
Pedro Gomes	Vanessa Mata	

Abbreviations and symbols

coll.	collection
comm.	communicated by
conf.	confirmed by
det.	determined by
*	New for Portugal, i.e. not listed for Portugal in CORLEY (2015).
**	New for the Iberian Peninsula.

Provinces:

ALG	Algarve	DL	Douro Litoral
BA	Beira Alta	E	Estremadura
BAL	Baixo Alentejo	M	Minho
BB	Beira Baixa	R	Ribatejo
BL	Beira Litoral	TM	Trás-os-Montes

List of families and species

NEPTICULIDAE

Stigmella speciosa (Frey, 1858)
E: Vale dos Veados, leafmine on *Acer monspessulanum*, 20-X-2016, Gonçalves, det. Corley.

Stigmella ilicifolia (Mendes, 1918)
TM: Quinta do Zacarias, 28-VIII-2016, Corley and Gonçalves.

** *Bohemannia quadrimaculella* (Boheman, 1853)
TM: Ponte da Carba, 23-VII-2016, Pires, det. Corley. North-west Europe to Sweden, Czech Republic, Italy and Corsica, Romania. [*Alnus glutinosa*].

Ectoedemia caradjai (Groschke, 1944)
BL: Ansião, 18-VII-2016, Rosete, det. Corley.

ADELIDAE

Nemophora barbatellus (Zeller, 1847)
BL: Ansião, on *Centaurea pullata* flowers, 28-V-2016, Corley and Rosete.

Adela collicolella Walsingham, 1904
E: Alambre, seen by day, 19-III-2016, Nunes and Berkemeier.

TISCHERIIDAE

Tischeria decidua Wocke, 1876
BL: Condeixa-a-Nova, 17-IX-2015, Rosete, Jesus and Ferreira, det. Corley.

MILLIERIDAE

Millieria dolosalis (Heydenreich, 1851)
TM: Santuário de Santo Ambrósio, 23-IV-2016, Nunes, Silva and Jesus, det. Corley.

HELIOZELIDAE

Heliozela sericiella (Haworth, 1818)
BL: Ansião, 23-IV-2016, Rosete, det. Corley.

TINEIDAE

Infurcitinea corleyi Gaedike, 2011
DL: Lagares, 22-VII-2016, Nunes and Silva, det. Corley.

Infurcitinea italica (Amsel, 1954)
BL: Ansião, 18-VII-2016, Rosete, det. Corley.

Novotinea muricolella (Fuchs, 1879)
BL: Buracas de Casmilo, 4-IX-2015, Rosete, det. Corley.

* *Gaedikeia kokkariensis* Sutter, 1998
TM: Estevais, at black Heath trap, 1-VI-2016, Corley and Mata. Greece, Spain. Larva unknown.

Reisserita flavofimbriella (Chrétien, 1925)
DL: Valongo, 7-VII-2016, Nunes, det. Corley.

* *Tinea columbariella* Wocke, 1877
BL: Casais do Porto, 6-IX-2016, Rosete, det. Corley. Most of Europe, absent from a few countries and nearly all Mediterranean islands. [Larva found on detritus in birds' nests, dovecotes etc.].

Tinea trinotella Thunberg, 1794
TM: Cidadelhe, 6-VI-2016, Corley.

Crassicornella agenjoi Petersen, 1957
DL: Couce, 9-VII-2016, Nunes and Silva.

Opogona omoscopa (Meyrick, 1893)
DL: Porto, larva on bark and dead wood of *Bougainvillea*, VIII-2016, Nunes.

BUCCULATRICIDAE

* *Bucculatrix diffusella* Menhofer, 1943
DL: Mindelo, 5-VII-2016, Nunes, det. Tokár (fig. 1). Spain, Italy, Croatia, Bulgaria. [*Artemisia maritima*].

Bucculatrix frangutella (Goeze, 1783)
BA: Ponte de Jugais, 26-VIII-2016, Corley and Gonçalves.

GRACILLARIIDAE

Caloptilia elongella (Linnaeus, 1761)
TM: Bobal, reared from larva on *Alnus glutinosa*, 28-X-2016, Nunes.

Caloptilia conimbricensis Corley, 2014
TM: Rio Maças, 30-VIII-2016, Corley.

** *Aspilapteryx inquinata* Triberti, 1985
ALG: Carrapateira, 18-IV-1993, Corley. France, Italy, Greece. [*Teucrium polium*].

Spulerina simploniella (Fischer von Röslerstamm, 1840)
DL: Lagares, 22-VII-2016, Nunes and Silva.

Parornix tenella (Rebel, 1919)
E: Fonte da Cabra, 18-IX-2015, Rosete, det. Corley.

Phyllonorycter millierella (Staudinger, 1871)
TM: Penelas, reared from leafmine on *Celtis australis*, 8-X-2016, Nunes (fig. 2).

YPONOMEUTIDAE

Zelleria hepariella Stainton, 1849
BL: Ansião, larvae on *Phillyrea latifolia*, 28-V-2016, Corley.

Paradoxus osyridellus Millière, 1869
BL: Chão de Couce, 3-IX-2016, Corley and Rosete; TM: Quinta do Zacarias, 28-VIII-2016, Corley.

Parahyponomeuta egregiella (Duponchel, 1839)
TM: Lama Grande, larvae on *Erica umbellata*, 5-VI-2016, Corley.

Paraswammerdamia albicapitella (Scharfenberg, 1805)
E: Fonte da Cabra, 18-IX-2015, Rosete.

Ocnerostoma friesei Svensson, 1966
BB: Penhas da Saúde, 25-VIII-2016, Corley and Gonçalves.

GLYPHIPTERIGIDAE

Acrolepia autumnitella Curtis, 1838
TM: Penelas, leafminer on *Solanum dulcamara*, 8-X-2016, Nunes.

ARGYRESTHIIDAE

Argyresthia goedartella (Linnaeus, 1758)
BB: Penhas da Saúde, 25-VIII-2016, Corley and Gonçalves.

* *Argyresthia bonnetella* (Linnaeus, 1758)
TM: Alto de Penaboste, 14-VIII-2016, Marabuto, Gonçalves, Nunes, Silva and Moreira (fig. 3); França, 31-VIII-2016, Corley and Gonçalves. Europe, but absent from Greece and Mediterranean islands. [Larva in shoots of *Crataegus*].

LYONETIIDAE

Phyllobrostis daphneella Staudinger, 1859
BL: Buracas de Casmilo, 4-IX-2015, Rosete, det. Corley.

PRAYDIDAE

Distagmos ledereri Herrich-Schäffer, 1854
DL: Parque Biológico de Gaia, 12-III-2016, Nunes and Silva.

AUTOSTICHIDAE

Arragonia punctivittella (Zerny, 1927)
Second record. BAL: Amendoeira da Serra, 10-IX-2016, Marabuto, Nunes, Silva and Jesus.

Holcopogon bubulcellus (Staudinger, 1859)
BAL: Amendoeira da Serra, 10-IX-2016, Marabuto, Nunes, Silva and Jesus.

Symmoca signatella Herrich-Schäffer, 1854
BAL: Amendoeira da Serra, 10-IX-2016, Marabuto, Nunes, Silva and Jesus.

Symmoca tofosella Rebel, 1893
BAL: Amendoeira da Serra, 10-IX-2016, Marabuto, Nunes, Silva and Jesus, det. Corley.

Symmoca revoluta Gozmány, 1985
BAL: Amendoeira da Serra, 10-IX-2016, Marabuto, Nunes, Silva and Jesus.

Symmoca alhambrella Walsingham, 1911
DL: Penafiel, 22-VII-2016, Nunes and Silva, det. Corley.

Dysspastus fallax (Gozmány, 1961)
DL: Penafiel, 22-VII-2016, Nunes and Silva, det. Corley.

LECITHOCERIDAE

Hieroxestis briantiella (Turati, 1879)
TM: Quinta do Zacarias, 28-VII-2016, Corley.

OECOPHORIDAE

Esperia sulphurella (Fabricius, 1775)
M: Castro Laboreiro, on window, 30-V-2016, Corley.

DEPRESSARIIDAE

Agonopterix liturosa (Haworth, 1811)
TM: França, larva on *Hypericum perforatum*, 5-VI-2016, Corley.

Agonopterix purpurea (Haworth, 1811)
BL: Buracas de Casmilo, 15-X-2015, Rosete.

Agonopterix curvipunctosa (Haworth, 1811)
BL: Castelo de Juromelo, 22-XII-2016, Nunes, Silva, Jesus and Pires.

Agonopterix umbellana (Fabricius, 1794)
BB: Penhas da Saúde, 25-VIII-2016, Corley, Gonçalves and Ferreira.

Agonopterix pallorella (Zeller, 1839)
M: Podre, 30-V-2016, Corley.

Agonopterix subpropinquella (Stainton, 1849)
ALG: São Romão, larvae on *Centaurea pullata*, 22-III-2016, Corley.

Depressaria adustatella Turati, 1927
TM: Estevais, at black Heath trap, 1-VI-2016, Corley and Mata.

Depressaria velox Staudinger, 1859
BL: Lagoa da Ervideira, larvae on *Seseli tortuosum*, 27-V-2016, Rosete and Corley.

Depressaria veneficella Zeller, 1847
TM: Pontão dos Alambiques, larvae on *Thapsia villosa* flowers, 1-VI-2016, Corley; Ribeira de Cércio, larvae on *Thapsia villosa* flowers, 4-VI-2016, Corley.

COSMOPTERIGIDAE

* *Cosmopterix zieglerella* (Hübner, 1810)
TM: Penelas, larvae in leafmines on *Humulus lupulus*, 8-X-2016, Nunes. Middle latitudes of Europe, north to Sweden and Latvia, south to Spain, Italy and Bulgaria, absent from Mediterranean islands.

Coccidiphila gerasimovi Danilevsky, 1950
BA: Ponte de Jugais, 26-VIII-2016, Corley; TM: Rio Maças, 30-VIII-2016, Corley.

Vulcaniella grabowiella (Staudinger, 1859)
BL: Ansião, 23-VII-2016, Rosete, det. Corley.

GELECHIIDAE

Syncopacma larseniella Gozmány, 1957
DL: Valongo, 7-VII-2016, Nunes, det. Corley.

* *Syncopacma albipalpella* (Herrich-Schäffer, 1854)
BL: Ansião, 5-VII-2016, Rosete, det. Corley. Western Europe east to Austria, absent from Ireland and Mediterranean islands. [*Genista anglica*].

Anacampsis timidella (Wocke, 1887)
TM: Dine, 2-IX-2016, Corley and Gonçalves.

Pseudosophronia exustellus (Zeller, 1847)
BAL: Amendoeira da Serra, 10-IX-2016, Marabuto, Nunes, Silva and Jesus, det. Corley.

* *Dichomeris marginella* (Fabricius, 1781)
TM: Estevais, 1-VI-2016, Corley. Most of Europe, Corsica, absent from a few countries and from other Mediterranean islands. [*Juniperus* spp.].

Pectinophora gossypiella (Saunders, 1844)
Second record. ALG: Boliqueime, 3-X-2009, Dale.

Bryotropha terrella (Denis & Schiffermüller, 1775)
BL: Chão de Couce, 3-IX-2016, Corley and Rosete.

Bryotropha figulella (Staudinger, 1859)
E: Praia do Samouco, 1-IV-2016, Rosete, det. Corley.

Bryotropha dryadella (Zeller, 1850)
E: Fonte da Cabra, 18-IX-2015, Rosete, det. Corley; BL: Buracas de Casmilo, 4-IX-2015, Rosete, det. Corley.

Aristotelia ericinella (Zeller, 1839)
BB: Penhas da Saúde, 25-VIII-2016, Corley, Gonçalves and Ferreira.

Isophrictis constantina (Baker, 1888)
Second record. TM: Quinta do Zacarias, 2-VI-2016, Corley.

* *Metzneria littorella* (Douglas, 1850)
ALG: Boliqueime, 28-IV-2011, Dale (fig. 4). England, France, Spain, Italy, Corsica, Sardinia, Sicily, Cyprus, south Russia. [On seeds of *Plantago coronopus*].

** *Psamathocrita dalmatinella* Huemer & Tokár, 2000
ALG: Aljezur, netted at dusk, 21-V-2002, Corley; BL: Poço, 7-VI-2016, Rosete, det. Corley. Croatia. [*Achillea holosericea*].

Gelechia senticetella (Staudinger, 1859)
E: Terras do Risco, from larva on *Juniperus phoenicea*, 25-VIII-2016, Nunes, det. Corley.

Psoricoptera gibbosella (Zeller, 1839)
BL: Chão de Couce, 3-IX-2016, Corley and Rosete.

Scrobipalpa obsoletella (Fischer von Röslerstamm, 1841)
BL: Quinta do Canal, 16-IX-2016, Rosete, det. Corley.

** *Caryocolum huebneri* (Haworth, 1828)
TM: Dine, 2-IX-2016, Corley and Gonçalves. Middle latitudes of Europe, north to Sweden and south to Italy and Serbia. [*Stellaria holostea*].

Neotelphusa sequax (Haworth, 1828)
TM: Quinta do Zacarias, 28-VIII-2016, Corley.

Neotelphusa cisti (Stainton, 1869)
TM: Barragem de Azibo, reared from larva on *Cistus salviifolius*, 10-VI-2016, Nunes, det. Corley.

* *Neotelphusa traugotti* (Huemer & Karsholt, 2001)
BL: Lagoa, 17-IX-2016, Nunes, det. Corley (fig. 5). Spain. Larva unknown.

* *Carpatolechia intermediella* Huemer & Karsholt, 1999
TM: Quinta do Zacarias, 2-VI-2016, Corley. Spain. Larva unknown.

Stenolechia gemmella (Linnaeus, 1758)
BL: Furadouro, 7-IX-2015, Rosete, Jesus, Ferreira and Gonçalves.

ELACHISTIDAE

Elachista nuraghella Amsel, 1951
TM: Covelas, 31-V-2016, Corley.

* *Elachista pollinariella* Zeller, 1839
TM: Carrazedo, 4-VI-2016, Corley; Cidadelhe, 6-VI-2016, Corley. Middle latitudes of Europe north to Denmark and Finland, south to Spain, Italy and Romania, absent from British Isles and Mediterranean islands. [*Festuca*, *Poa*, *Trisetum*, *Brachypodium*].

Elachista chrysodesmella Zeller, 1850
BA: Ponte de Jugais, 26-VIII-2016, Corley.

Elachista pigerella (Herrich-Schäffer, 1854)
Second record. BL: Ansião, 5-VII-2016, Rosete, det. Corley.

Elachista scirpi Stainton, 1887
BL: Ilha da Murraceira, 31-V-2016, Rosete, det. Corley.

Haplochrois ochraceella (Rebel, 1903)
BL: Abiúl, 4-VII-2008, Rosete, det. Corley. The species was published as new for Portugal in CORLEY *et al*. (2016). This is a second, but earlier record.

COLEOPHORIDAE

Coleophora lutarea (Haworth, 1828)
M: Podre, flying over *Stellaria holostea* by day, 29-V-2016, Corley.

Coleophora gryphipennella (Hübner, 1796)
Second record. TM: Carrazedo, 4-VI-2016, Corley.

Coleophora flavipennella (Duponchel, 1843)
TM: Carrazedo, from leafmine on *Quercus pyrenaica*, 24-VI-2016, Nunes, det. Corley.

Coleophora serratella (Linnaeus, 1761)
BL: Madriz, 15-VII-2016, Rosete, det. Corley.

** *Coleophora hemerobiella* (Scopoli, 1763)
TM: França, case on *Crataegus monogyna*, 5-VI-2016, adult reared, Corley. Europe from Britain and Scandinavia to Italy and Greece, Sardinia, Sicily.

Coleophora discordella Zeller, 1849
BL: Quinta do Canal, 16-IX-2016, Rosete, det. Corley.

Coleophora lusitanica Baldizzone & Corley, 2004
TM: Covelas, swept in meadow in afternoon, 31-V-2016, Andrade, det. Corley, in coll. Corley.

Coleophora zelleriella Heinemann, 1854
DL: Valongo, 7-VII-2016, Nunes, det. Corley.

* *Coleophora sisteronica* Toll, 1961
BL: Verride, 31-VII-2009, Rosete, det. Corley. Spain, France, Italy. [*Coronilla minima*].

Coleophora helianthemella Millière, 1870
BL: Buracas de Casmilo, 4-IX-2015, Rosete.

Coleophora vulnerariae Zeller, 1839
TM: Carrazedo, 4-VI-2016, Corley.

Coleophora glaucicolella Wood, 1892
TM: Quinta do Zacarias, 28-VIII-2016, Corley and Gonçalves.

Coleophora maritimella Newman, 1863
BL: Ilha da Murraceira, 31-V-2016, Rosete, det. Corley.

Coleophora galbulipennella Zeller, 1838
TM: França, larval feeding signs on *Silene nutans*, 4-VI-2016, Corley.

Coleophora scabrida Toll, 1959
TM: Quinta do Zacarias, 2-VI-2016, Corley; DL: Mindelo, at black Heath trap, 7-VI-2016, Corley and Mata.

Coleophora vanderwolfi Baldizzone, 1985
TM: Quinta do Zacarias, 2-VI-2016, Corley, det. Baldizzone.

BATRACHEDRIDAE

* *Batrachedra praeangusta* (Haworth, 1828)
TM: Ponte da Carba, under bark of *Populus*, 23-VII-2016, Gonçalves and Pires (fig. 6). Almost all Europe except the Balkan countries and Mediterranean islands. [*Salix* and *Populus*].

SCYTHRIDIDAE

Scythris tributella (Zeller, 1847)
BL: Ansião, 28-V-2016, Corley and Rosete.

Scythris cistorum (Millière, 1876)
DL: Penafiel, 22-VII-2016, Nunes, Silva and Jesus, det. Corley.

Scythris insulella (Staudinger, 1859)
E: Corredoura, 16-VI-2015, Rosete, det. Corley.

* *Scythris lafauryi* Passerin d'Entrèves, 1986
M: Mindelo, 7-VI-2016, Corley. Spain, France. Larva unknown.

Scythris inertella (Zeller, 1855)
ALG: Sapais de Castro Marim, larvae on *Salsola vermiculata* and *Suaeda vera*, 18-III-2016, Corley.

MOMPHIDAE

* *Mompha subbistrigella* (Haworth, 1828)
BL: Ansião, 6-VIII-2016, Rosete, det. Corley. Almost all Europe, but absent from some Balkan countries and from Corsica. [*Epilobium montanum*].

Mompha propinquella (Stainton, 1851)
Second record. TM: Lama Grande, 1-IX-2016, Corley and Gonçalves.

Urodeta hibernella (Staudinger, 1859)
E: Alambre, 19-III-2016, Nunes and Berkemeier.

PTEROLONCHIDAE

Pterolonche albescens Zeller, 1847
BAL: Amendoeira da Serra, 10-IX-2016, Marabuto, Nunes, Silva and Jesus.

ALUCITIDAE

Alucita hexadactyla Linnaeus, 1758
BL: Louriçal, 15-VIII-2016, Rosete, det. Corley.

PTEROPHORIDAE

Agdistis frankeniae (Zeller, 1847)
BL: Ilha da Murraceira, 31-V-2016, Rosete, det. Corley.

Agdistis tamaricis (Zeller, 1847)
BL: Quinta do Canal, 26-VIII-2016, Rosete, det. Corley.

Merrifieldia malacodactylus (Zeller, 1847)
BL: Ansião, 24-VI-2016, Rosete, det. Corley.

EPERMENIIDAE

Ochromolopis staintonellus (Millière, 1869)
BA: Faia Brava, 2-XI-2016, Romão, det. Corley.

TORTRICIDAE

Paramesia gnomana (Clerck, 1759)
BB: Penhas da Saúde, 25-VIII-2016, Corley, Gonçalves and Ferreira.

Avaria hyerana (Millière, 1858)
TM: Balsamão, larva on *Hypericum*, 24-IV-2016, Nunes.

Lozotaeniodes formosana (Frölich, 1830)
BB: Penhas da Saúde, 25-VIII-2016, Corley, Gonçalves and Ferreira.

Eana canescana (Guenée, 1845)
TM: França, 31-VIII-2016, Corley and Gonçalves.

Cnephasia delnoyana Groenen & Schreurs, 2012
TM: Covelas, 31-V-2016, Corley.

* *Cnephasia chrysantheana* (Duponchel, 1843)
TM: Quinta do Zacarias, at black Heath trap, 2-VI-2016, Corley and Mata. Southern Europe, north to France and Czech Republic, absent from most of Balkans and from Corsica. [Larva polyphagous on herbaceous plants].

** *Acleris lorquiniana* (Duponchel, 1835)
BL: Quinta do Canal, 26-VIII-2016, Rosete. Middle latitudes of Europe, north to Sweden and Finland and south to France and Romania. [*Lythrum salicaria*].

* *Acleris cristana* (Denis & Schiffermüller, 1775)
TM: Dine, 2-IX-2016, Corley and Gonçalves (fig. 7). Almost all Europe except Balkan countries and Mediterranean islands. [*Prunus spinosa*, also *Crataegus* and *Malus*].

Acleris rhombana (Denis & Schiffermüller, 1775)
TM: Santuário de Santo Ambrósio, larvae on *Prunus avium* and *Cydonia oblonga*, 23-IV-2016, Nunes.

Acleris hyemana (Haworth, 1811)
TM: Lama Grande, larva on *Erica tetralix*, 15-VIII-2016, Nunes, det. Corley.

Acleris literana (Linnaeus, 1758)
TM: Dine, 2-IX-2016, Corley and Gonçalves.

Aethes francillana (Fabricius, 1794)
TM: Quinta do Zacarias, 28-VIII-2016, Corley and Gonçalves.

Cochylis hybridella (Hübner, 1813)
BA: Ponte de Jugais, 26-VIII-2016, Corley, Gonçalves and Ferreira.

Cochylis atricapitana (Stephens, 1852)
TM: Quinta do Zacarias, 28-VIII-2016, Corley and Gonçalves.

Hedya atropunctana (Zetterstedt, 1839)
BL: Ansião, 6-VIII-2016, Rosete, det. Corley.

** *Lobesia virulenta* Bae & Komai, 1991

BA: Ponte de Jugais, 26-VIII-2016, Corley and Gonçalves. Central Europe north of the Alps, Scandinavia and the Baltic countries. European populations belong to subspecies *mieana* Falck & Karsholt, 1998. The type subspecies occurs in Japan. [*Aegopodium podagraria*. In Japan appears to be polyphagous].

Lobesia porrectana (Zeller, 1847)

BL: Madriz, 15-VII-2016, Rosete, det. Corley.

Acroclita subsequana (Herrich-Schäffer, 1851)

BA: Faia Brava, 2-XI-2016, Romão.

Epinotia tetraquetrana (Haworth, 1811)

M: Podre, 29-V-2016, Corley.

* *Pelochrista fusculana* (Zeller, 1847)

BL: Serra de Janeanes, 29-IV-2016, Rosete, det. Corley. Southern Europe north to France and Romania, absent from Corsica.

Eucosma conterminana (Guenée, 1845)

E: Praia do Samouco, 11-VI-2015, Rosete, det.Corley.

Eucosma urbana (Kennel, 1901)

DL: Lousada, 7-VIII-2016, R. Cardoso, det. Corley.

Gypsonoma dealbana (Frölich, 1828)

BA: Ponte de Jugais, 26-VIII-2016, Corley.

Gypsonoma aceriana (Duponchel, 1843)

R: Olhos de Água de Alviela, 3-VI-2015, Ferreira, det. Corley.

Notocelia roborana (Denis & Schiffermüller, 1775)

Second record. TM: Guadramil, 13-VIII-2016, Marabuto, Gonçalves, Nunes, Silva and Moreira.

Dichrorampha letarfensis Gibeaux, 1983

DL: Valongo, 22-VI-2016, Nunes, det. Corley.

Strophedra nitidana (Fabricius, 1794)

DL: Valongo, larva on *Quercus robur*, XI-2016, Nunes.

BRACHODIDAE

Brachodes funebris (Feisthamel, 1833)

ALG: Gambelas, 30-VI-2016, Jacinto, det. Corley from photo.

SESIIDAE

Bembecia himmighoffeni (Staudinger, 1866)

TM: Esculca, drowning in swimming pool, 1-VII-2016, Maravalhas, conf. Corley.

Pyropteron leucomelaena (Zeller, 1847)

BL: Serra de Janeanes, 21-VII-2016, Rosete, det. Corley.

PYRALIDAE

Hypsopygia glaucinalis (Linnaeus, 1758)
DL: Lagares, 28-X-2016, Nunes, Silva, Jesus and Lemos.

Aglossa brabantii Ragonot, 1884
TM: Estevais, at black Heath trap, 28-VIII-2016, Corley, Mata and Gonçalves.

* *Polyochodes stipella* Chrétien, 1911
ALG: Ilha da Culatra, 3-VIII-2008, J. P. Cardoso, det. Corley. Spain. [Larva on roots of *Stipa*].

Dioryctria sylvestrella (Ratzeburg, 1840)
DL: Valongo, 1-VII-2016, Nunes, det. Corley.

Epischnia prodromella (Hübner, 1799)
TM: Carrazedo, netted at sunset, 4-VI-2016, Corley.

Epischnia asteris Staudinger, 1870
E: Praia do Samouco, 29-X-2016, Rosete.

Ceutholopha isidis (Zeller, 1867)
Third record. ALG: Boliqueime, 27-VIII-2010, Dale.

Moitrelia hispanella (Staudinger, 1859)
TM: Barragem de Azibo, reared from larva on *Thymus*, 1-VI-2016, Nunes, det. Corley.

Pseudacrobasis tergestella (Ragonot, 1901)
BA: Ponte de Jugais, 26-VIII-2016, Corley and Gonçalves.

Acrobasis bithynella Zeller, 1848
BB: Penhas da Saúde, 25-VIII-2016, Corley, Gonçalves and Ferreira.

Acrobasis fallouella (Ragonot, 1871)
TM: Estevais, 29-VIII-2016, Corley.

Phycitodes inquinatella (Ragonot, 1887)
ALG: Boliqueime, 20-VIII-2010, Dale.

Phycitodes saxicola (Vaughan, 1870)
BA: Ponte de Jugais, 26-VIII-2016, Corley.

Phycitodes albatella (Ragonot, 1887)
TM: Dine, 2-IX-2016, Corley and Gonçalves.

Ephestia disparella Hampson, 1901
DL: Penafiel, 21-VIII-2016, Nunes and Silva, det. Corley.

CRAMBIDAE

Pleuroptya crocealis (Duponchel, 1834)
BA: Ponte de Jugais, 26-VIII-2016, Corley, Gonçalves and Ferreira.

Agrotera nemoralis (Scopoli, 1763)
BA: Ponte de Jugais, 26-VIII-2016, Corley, Gonçalves and Ferreira.

Metasia ibericalis Ragonot, 1894
BL: Pampilhosa de Botão, 7-VII-2016, Jesus, det. Marabuto.

Metasia cuencalis Ragonot, 1894
BA: Ponte de Jugais, 26-VIII-2016, Corley, Gonçalves and Ferreira.

* *Cydalima perspectalis* (Walker, 1859)
M: São Vicente de Penso, 22-VIII-2016, Gomes, det. Marabuto from photo; Quinta da Estrelinha, 23-VIII-2016, Mata, van Boven and Marques, det. Corley from photo; Ponte de Barca, 30-X-2016, Marabuto. An East Asian species which appeared in Germany in 2006 and has spread rapidly in Europe with records from Belgium, Netherlands, France, England, Denmark, Switzerland, Italy, Austria, Czech Republic, Slovakia, Slovenia, Hungary, Croatia, Romania and Russia; first recorded in Spain (Pontevedra) in 2014 (PÉREZ-OTERO *et al*., 2014). [*Buxus sempervirens*].

Herpetogramma licarsisalis (Walker, 1859)
TM: Dine, 2-IX-2016, Corley and Gonçalves.

**Chilo suppressalis* Błeszyński, 1965
BL: Quinta do Canal, 23-IX-2016, Rosete, det. Corley. Spain, France, Hungary, Corsica. [*Oryza*, *Zea*, *Saccharum*].

Eurrhypis pollinalis (Denis & Schiffermüller, 1775)
TM: Quinta do Zacarias, 2-VI-2016, Corley.

Eurrhypis guttulalis (Herrich-Schäffer, 1848)
BL: Mata do Urso, 26-IV-2016, Rosete.

Mesocrambus tamsi Błeszyński, 1960
BL: Madriz, 15-VII-2016, Rosete, det. Corley.

GEOMETRIDAE

Idaea belemiata (Millière, 1868)
DL: Lagares, 22-VII-2016, Nunes and Silva.

Idaea longaria (Herrich-Schäffer, 1852)
DL: Mindelo, 7-VI-2016, Corley.

Idaea nexata (Hübner, 1813)
BL: Mata do Urso, 31-III-2016, Rosete.

* *Lythria purpuraria* (Linnaeus, 1758)
TM: Estevais, 29-VIII-2016, Corley and Gonçalves; Rio Maça, 30-VIII-2016, Corley and Gonçalves. Earlier records of *L. purpuraria* such as that of Mendes (1903) refer to *L. sanguinaria* (Duponchel, 1842). Middle and southern Europe, absent from British Isles, Belgium, Netherlands, Scandinavia and most Mediterranean islands. [*Polygonum aviculare*].

Scotopteryx coelinaria (Graslin, 1863)
BB: Penhas da Saúde, 25-VIII-2016, Corley, Gonçalves and Ferreira.

Operophtera brumata (Linnaeus, 1758)
DL: Couce, larva on *Salix*, 4-IV-2016, Nunes.

* *Philereme transversata* (Hufnagel, 1767)
TM: Estevais, 1-VI-2016, at black Heath trap, Corley and Mata. Almost all Europe, absent from Norway and Mediterranean islands. [*Rhamnus*, *Frangula*].

Eupithecia extraversaria Herrich-Schäffer, 1852
DL: Árvore, 7-VIII-2016, Jesus.

Macaria notata (Linnaeus, 1758)
BL: Chão de Couce 3-IX-2016, Corley and Rosete.

Chiasmia aestimaria (Hübner, 1809)
BL: Ilha da Murraceira, 31-V-2016, Rosete.

Colotois pennaria (Linnaeus, 1761)
ALG: Sargaçal, 19-XII-2016, Valadares.

Paradarisa consonaria (Hübner, 1799)
BL: Moura da Serra, 15-V-2016, Rosete.

Phaiogramma faustinata (Millière, 1868)
BL: Chão de Couce 3-IX-2016, Corley and Rosete.

NOTODONTIDAE

Stauropus fagi (Linnaeus, 1758)
TM: Estevais, 2-VI-2016, Corley.

EREBIDAE

Zebeeba falsalis (Herrich-Schäffer, 1839)
TM: Estevais, at black Heath trap, 1-VI-2016, Corley and Mata.

Orgyia antiqua (Linnaeus, 1758)
TM: Ponte da Carba, 23-VII-2016, Pires, Gonçalves, Jesus and Silva.

Miltochrista miniata (Forster, 1771)
BA: Ponte de Jugais, 26-VIII-2016, Corley, Gonçalves and Ferreira.

Odice blandula (Rambur, 1858)
TM: Estevais, 29-VIII-2016, Corley.

NOCTUIDAE

Pseudozarba bipartita (Herrich-Schäffer, 1850)
TM: Estevais, 1-VI-2016, Corley.

Acontia lucida (Hufnagel, 1766)
BL: Furadouro, 27-VII-2016, Jesus and Ferreira.

Moma alpium (Osbeck, 1788)
BA: Ponte de Jugais, 26-VIII-2016, Corley, Gonçalves and Ferreira.

Calophasia almoravida Graslin, 1863
TM: Cidadelhe, 6-VI-2016, Corley.

Stilbia anomala (Haworth, 1812)
BB: Penhas da Saúde, 25-VIII-2016, Corley, Gonçalves and Ferreira.

Amephana aurita (Fabricius, 1787)
BL: Poço, 7-VI-2016, Rosete.

* *Hoplodrina blanda* (Denis & Schiffermüller, 1775)
BA: Malhada Tramazeira, 27-VIII-2016, Corley and Nunes. Almost all European countries. [Larva polyphagous on herbaceous plants including grasses].

Spudaea ruticilla (Esper, 1791)
DL: Parque Biológico de Gaia, 12-III-2016, Nunes and Silva.

Conistra rubiginea (Denis & Schiffermüller, 1775)
DL: Lagares, 8-IV-2016, Nunes, Silva and Jesus.

Cosmia trapezina (Linnaeus,1758)
BL: Ansião, 24-VI-2016, Rosete.

Ammopolia witzenmanni (Standfuss, 1890)
BA: Faia Brava, 2-XI-2016, Romão.

Trigonophora haasi (Staudinger, 1892)
BB: Penhas da Saúde, 25-VIII-2016, Corley, Gonçalves and Ferreira.

Orthosia incerta (Hufnagel, 1766)
DL: Parque Biológico de Gaia, 12-III-2016, Nunes and Silva.

Egira conspicillaris (Linnaeus, 1758)
BL: Moura da Serra, 15-V-2016, Rosete.

Dichagyris constanti (Millière, 1860)
Fourth record. TM: Estevais, 29-VIII-2016, Corley and Gonçalves.

Paucgraphia erythrina (Herrich-Schäffer, 1852)
BB: Penhas da Saúde, 25-VIII-2016, Corley, Gonçalves and Ferreira.

* *Xestia stigmatica* (Hübner, 1813)
TM: Salgueiros, 18-VIII-2012, Marabuto and Magalhães; Dine, 2-IX-2016, Corley and Gonçalves (fig. 8). Almost all Europe, absent from Netherlands, Finland and Mediterranean islands. [Larva probably polyphagous on herbaceous plants].

Recent Literature

BALDIZZONE (2016) reveals that *Coleophora murciana* Toll, 1960 is the previously unknown male of *C. perplexella* Toll, 1960. The two species are therefore synonymised, with *C. perplexella* treated as the senior name. Both have been recorded from Portugal (CARVALHO & CORLEY, 1995; CORLEY, 2015).

CORLEY *et al*. (2016) add 39 species to the Portuguese fauna and delete one.

GASTÓN *et al*. (2016) show that *Hypsotropa vulneratella* (Zeller, 1848) described from Sicily, is not present in the Iberian Peninsula, where it is replaced by a new species (*H. vazquezi* Gastón, Macià, Ylla & Huertas, 2016). In Portugal, the genus has been recorded only from Algarve. No Portuguese specimens were examined by GASTÓN *et al*. (2016), but they are considered to belong to the new species due to the proximity to populations in Huelva, Spain.

SKOU *et al*. (2016) revise the genus *Ekboarmia*, and describe a new species *E. miniaria* Skou, Stüning & Sihvonen from Baixo Alentejo, Portugal.

TABELL & WIKSTRÖM (2016) add *Coleophora proterella* Wikström & Tabell, 2016 to the Portuguese list. The record replaces that for *C. virgaureae* (CORLEY *et al*., 2012; CORLEY, 2015) which was misidentified.

VAN NIEUKERKEN *et al*. (2016) provide a new global classification and catalogue of Nepticuloidea. This includes recognition of *Glaucolepis* Braun, 1917 as a genus separate from *Trifurcula*, and *Fomoria* Beirne, 1945 and *Zimmermannia* M. Hering, 1940 as genera separate from *Ectoedemia.* The genus *Acalyptris* is placed after *Parafomoria*. No subfamilies are recognised within either Nepticulidae or Opostegidae. New combinations for Portuguese species are given in the Appendix below.

Appendix: Changes to the Portuguese fauna list

Species added to the Portuguese fauna listed in this and other papers are summarised here, each with a number indicating their placement in the checklist (CORLEY, 2015). New genera for the Portuguese fauna show the author and year of publication of the genus.

Name changes due to changes at genus level or to new synonymy are given, with each species retaining its list number. In a case where a new name is provided for a previously misidentified species, the new species retains the number of the misidentified species. Thus *Hypsotropa vazquezi* Gastón, Macià, Ylla & Huertas, 2016 replaces *Hypsotropa vulneratella* (Zeller, 1848) which GASTÓN *et al*. (2016) show to be absent from the Iberian Peninsular, but the new species retains the number 1440 in the checklist.

The opportunity is also taken to correct some minor errors in CORLEY (2015).

0025.2 *Stigmella stettinensis* (Heinemann, 1971)

The following six species removed from *Ectoedemia*:

Glaucolepis Braun, 1917

0045 *Glaucolepis thymi* (Szöcs, 1965)

0046 *Glaucolepis corleyi* (Laštůvka & Laštůvka, 2007)

0047 *Glaucolepis stoechadella* (Klimesch, 1975)

0048 *Glaucolepis rosmarinella* (Chrétien, 1914)

0049 *Glaucolepis bupleurella* (Chrétien, 1914)

0050 *Glaucolepis chretieni* (Laštůvka, Laštůvka & Van Nieukerken, 2007)

Bohemannia Stainton, 1859

0063.1 *quadrimaculella* (Boheman, 1853)

The following six species removed from *Ectoedemia*:

Fomoria Beirne, 1945

0064 *Fomoria septembrella* (Stainton, 1849)
Zimmermannia M. Hering, 1940
0065 *Zimmermannia atrifrontella* (Stainton, 1851)
0066 *Zimmermannia liebwerdella* (Zimmermann, 1940)
0067 *Zimmermannia longicaudella* (Klimesch, 1953)
0068 *Zimmermannia hispanica* (Van Nieukerken, 1985)
0069 *Zimmermannia liguricella* (Klimesch, 1953)
Eumasia Chrétien, 1904 (*Pygmaeotinea* Amsel, 1957)
0148 *Eumasia crisostomella* (Amsel, 1957)
Gaedikeia Sutter, 1998
0170.1 *kokkariensis* Sutter, 1998
0190.1 *Tinea columbariella* Wocke, 1877
0214.1 *Bucculatrix diffusella* Menhofer, 1943
0233.1 *Aspilapteryx inquinata* Triberti, 1985
0348.1 *Argyresthia bonnetella* (Linnaeus, 1758)
0495.1 *Cosmopterix zieglerella* (Hübner, 1810)
0521.2 *Syncopacma albipalpella* (Herrich-Schäffer, 1854)
0545.2 *Dichomeris marginella* (Fabricius, 1781)
0598.1 *Metzneria littorella* (Douglas, 1850)
Psamathocrita Meyrick, 1925
0611.1 *dalmatinella* Huemer & Tokár, 2000
0624 *Ornativalva pseudotamariciella* Sattler, 1967 (*tamariciella auct. nec* Zeller, 1850). Correction of misspelling.
0692.1 *Caryocolum huebneri* (Haworth, 1828)
0698.1 *Neotelphusa traugotti* (Huemer & Karsholt, 2001)
0702.1 *Carpatolechia intermediella* Huemer & Karsholt, 1999
0718.1 *Elachista pollinariella* Zeller, 1839
Elachista occidentella is a synonym of *E. hispanica*, therefore number 0720 disappears.
0721 *Elachista hispanica* Traugott-Olsen, 1992 (*occidentella* Traugott-Olsen, 1992).
0771.2 *Coleophora hemerobiella* (Scopoli, 1763)
0775 *Coleophora murciana* is male of *C. perplexella*, therefore number 0775 disappears.
0776 *Coleophora perplexella* Toll, 1960 (*murciana* Toll, 1960)
0784.1 *Coleophora sisteronica* Toll, 1961
0832 *Coleophora proterella* Wikström & Tabell, 2016 (*virgaureae auct. nec* Stainton, 1857).
0866.1 *Batrachedra praeangusta* (Haworth, 1828)
0886.1 *Scythris lafauryi* Passerin d'Entrèves, 1986
0905.1 *Mompha subbistrigella* (Haworth, 1828)
1026.1 *Cnephasia chrysantheana* (Duponchel, 1843)
1037.1 *Acleris lorquiniana* (Duponchel, 1835)
1037.2 *Acleris cristana* (Denis & Schiffermüller, 1775)
1106.1 *Lobesia virulenta* Bae & Komai, 1991
1147.1 *Pelochrista fusculana* (Zeller, 1847)
1440 *Hypsotropa vazquezi* Gastón, Macià, Ylla & Huertas, 2016 (*vulneratella auct. nec* Zeller, 1848).
Polyochodes Chrétien, 1911
1441.1 *stipella* Chrétien, 1911
1584 *Pleuroptya crocealis* (Duponchel, 1834). Missing brackets added.
Cydalima Lederer,1863
1603.1 *perspectalis* (Walker, 1859)
1642.1 *Chilo suppressalis* Błeszyński, 1965
1714 *Psilogaster loti* (Ochsenheimer, 1810). Missing brackets added.

1831.1 *Lythria purpuraria* (Linnaeus, 1758)
Tribe Phileremini
Phileremе Hübner, 1825
1882.2 *transversata* (Hufnagel, 1767)
2015.1 *Ekboarmia miniaria* Skou, Stüning & Sihvonen, 2016
2316.1 *Hoplodrina blanda* (Denis & Schiffermüller, 1775)
Fissipunctia Beck, 1991 (*Apterogenum* Berio, 2002)
2419 *ypsillon* (Denis & Schiffermüller, 1775)
2562.1 *Xestia stigmatica* (Hübner, 1813)

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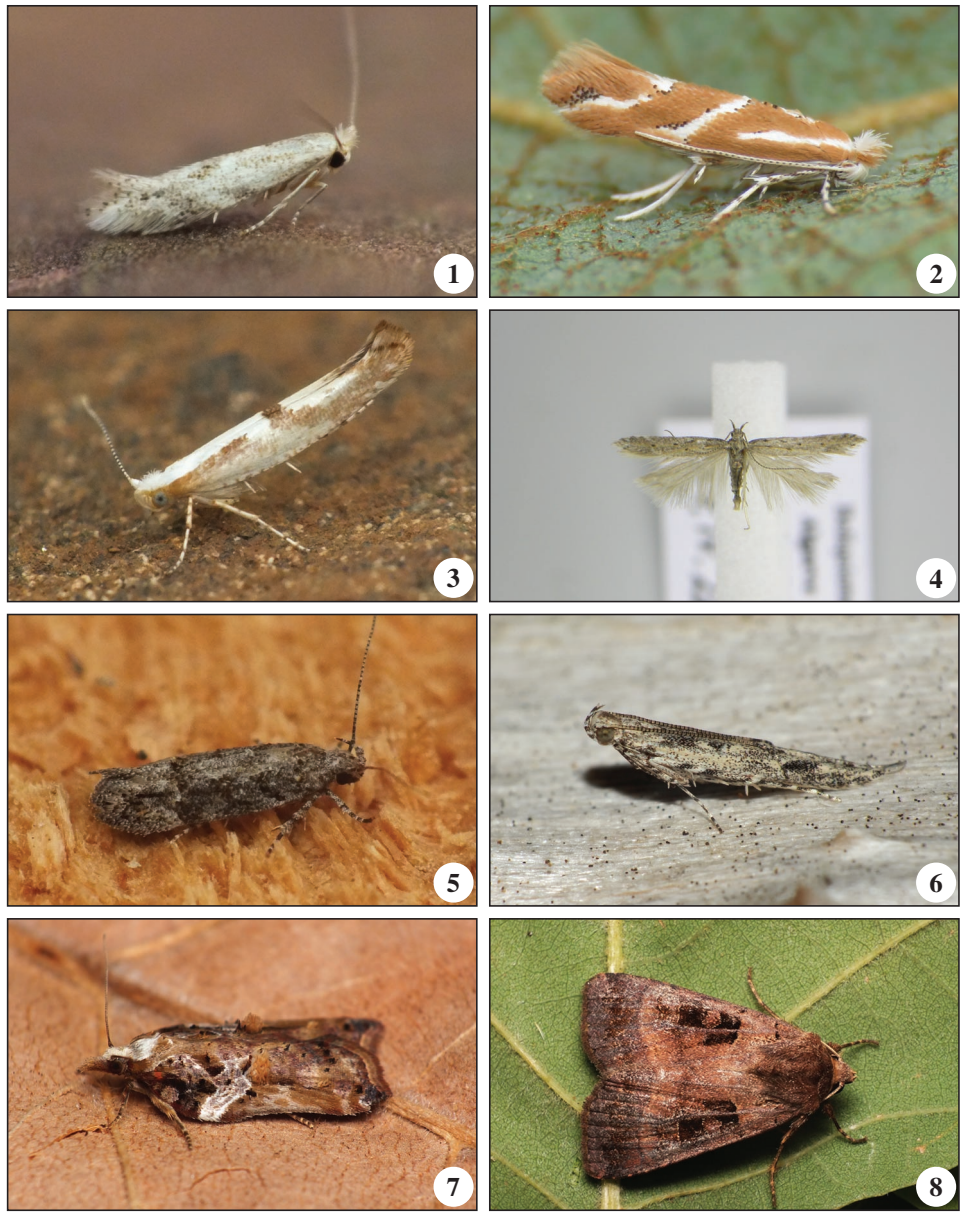

Figures 1-8.– 1. *Bucculatrix diffusella* Menhofer, 1943, Mindelo (J. Nunes). **2.** *Phyllonorycter millierella* (Staudinger, 1871), Penelas (J. Nunes). **3.** *Argyresthia bonnetella* (Linnaeus, 1758), Serra da Nogueira (J. Nunes). **4.** *Metzneria littorella* (Douglas, 1850), Boliqueime (M. Dale). **5.** *Neotelphusa traugotti* (Huemer & Karsholt, 2001), Mira (J. Nunes). **6.** *Batrachedra praeangusta* (Haworth, 1828), Celas (A. Gonçalves). **7.** *Acleris cristana* (Denis & Schiffermüller, 1775), Dine (A. Gonçalves). **8.** *Xestia stigmatica* (Hübner, 1813), Dine (A. Gonçalves).

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New or poorly known Douglasiidae from the Palaearctics (Lepidoptera: Douglasiidae)

R. Gaedike

Abstract

Five new species of the genus *Tinagma* Zeller, 1839 were described and illustrated (*T. fasciatum* Gaedike, sp. n., *T. mikkolai* Gaedike, sp. n., *T. jalavai* Gaedike, sp. n., *T. kullbergi* Gaedike, sp. n., *T. caucasicum* Gaedike, sp. n.). New country records for five species of the same genus (*T. perdicella* Zeller, 1839, *T. balteolella* (Fischer von Röslerstamm, 1841), *T. klimeschi* Gaedike, 1987, *T. bledella* (Chrétien, 1915), T. *ocnerostomella* (Stainton, 1850)) and for two species of the genus *Klimeschia* Amsel, 1938 (*K. transversella* (Zeller, 1839), *K. cinereipunctella* (Turati & Fiori, 1930) are provided.
KEY WORDS: Lepidoptera, Douglasiidae, *Tinagma*, *Klimeschia*, new species, new record, distribution, Palaearctics.

Douglasiidae nuevos o pobremente conocidos del Paleártico (Lepidoptera: Douglasiidae)

Resumen

Se describen e ilustran cinco nuevas especies del género *Tinagma* Zeller, 1839 (*T. fasciatum* Gaedike, sp. n., *T. mikkolai* Gaedike sp. n., *T. jalavai* Gaedike sp. n., *T. kullbergi* Gaedike sp. n., *T. caucasicum* Gaedike sp. n.) y se proporcionan nuevos registros de países para cinco especies del mismo género (*T. perdicella* Zeller, 1839, *T. balteolella* (Fischer von Röslerstamm, 1841), *T. klimeschi* Gaedike, 1987, T. *bledella* (Chrétien, 1915), *T. ocnerostomella* (Stainton, 1850)) y para dos especies del género *Klimeschia* Amsel, 1938 (*K. transversella* (Zeller, 1839), *K. cinereipunctella* (Turati & Fiori, 1930).
PALABRAS CLAVE: Lepidoptera, Douglasiidae, *Tinagma*, nuevas especies, nuevos registros, distribución, Paleártico.

Introduction

According to REGIER *et al*. (2015) the Douglasiidae together with the Millieriidae are a member of an unassigned superfamily, located between Gracillarioidea and Hyblaeoidea. Hitherto 32 species (23 from the Palaearctics, 8 from the Neotropics and 1 from the Australis) are known worldwide.

The study of still undetermined material of this family has allowed us to describe some new members of the genus *Tinagma* Zeller, 1839 and to establish some new country records.

For the loan of this valuable material I wish to thank the late Jukko Jalava from the Finnish Museum of Natural History in Helsinki, Finland (FMNH), Ole Karsholt from the Zoological Museum in Copenhagen, Denmark (ZMUC) and Giorgio Badizzone, Asti, Italy. For making the colour pictures I thank Christian Kutzscher from the Senckenberg Deutsches Entomologisches Institut in Müncheberg, Germany (SDEI).

Abbreviations

coll. Baldizzone	Giorgio Baldizzone, Asti, Italy
FMNH	Finnish Museum of Natural History, Helsinki, Finland
SDEI	Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany
ZMUC	Zoological Museum, Copenhagen, Denmark

Tinagma perdicella Zeller, 1839

GREECE: ♂, Greece, Thessaly, 3,1 km NE Metsovo, Katara Pass, 1580 m, 19-VI-2013, leg. P. Skou; ZMUC; BULGARIA: 3 ♂♂, Rila Mts, 1950-2150 m, 42º 0‘8N, 23º 26‘E, 1-VIII-2013, leg. O. Karsholt; ZMUC: **First records for the countries**.

***Tinagma fasciatum* Gaedike, sp. n.** (Figs 1, 6)

Holotype: 1 ♂, RUSSIA: Tuva rep., 50º 01‘N, 95º 03‘ E, 1150 m, Lake Tere-Khol, sand dunes, 9-12-VI-1995, Jalava & Kullberg leg.; Gen. präp. [genitalia slide] Gaedike Nr. 5707; Holotypus ♂, Tinagma fasciatum sp. n., det. R. Gaedike 2017. Deposited in the Finnish Museum of Natural History, Helsinki, Finland.

Diagnosis: Superficially distuingishable from the other species, described below, by the colouration of forewings. Somewhat similar to *T. mongolicum* Gaedike, 1991, but the pattern of forewing of that species is more greybrown and the apical fourth is completely brown.

Description (Fig. 1): Wingspan 11 mm; head, thorax and tegulae with white scales with grey tip, labial palpus curved up, white, scales on second segment long, directed downward, with grey tips, third segment thin, short; scape of antenna with white-grey scales too, flagellum light grey, ringed; forewing on white groundcolour with a goldenbrown pattern: a broad strip between 1/3 and 1/2 from costa to dorsum, parallel sided, at edge on dorsum with some dark, nearly black scales, an oval patch from end of cell directed oblique to costa at 3/4, prolonged to beginning of fringe as short strip, more or less covered by blackish scales; fringe greyish, overlaid partly with white scales with black tip, apex with a dark brown dot; the space between broad strip and patch, and between patch and apex, white, only some dark tips are visible; basal third with white-grey scales, only the border to the strip white; hindwing light creamy.

Male genitalia (Fig. 6): Vinculum band-shaped, saccus as broad as vinculum, long, with rounded tip; valva broader than long, broadest at base, costal edge apically rounded to oblique apical edge, ending in a short finger-like process, ventral edge at basal half folded, on inside, along the middle of the apical edge, a field of numerous long strong sclerotized bristles, apodeme long and thin; phallus two times longer than valva, from base narrower to pointed tip, with minute sclerotizations in the vesica.

Female genitalia: Unknown.

Etymology: Named after the pattern of forewing.

***Tinagma mikkolai* Gaedike, sp. n.** (Figs 2, 7, 11)

Holotype: ♂, USSR, Magadan obl., Upper Kolyma r., 62º N, 149º 40‘E, 1400 m, mnt. tundra, 22-VII-1987, K. Mikkola leg.; Gen. präp. [genitalia slide] Gaedike Nr. 4186; Holotypus ♂, Tinagma mikkolai sp. n., det. R. Gaedike 2017; FMNH; Paratypes: 1 ♀, same dates, but with genitalia slide Gaedike Nr. 4187; FMNH; 1 ♂, same location, but 13-VII-1987; SDEI.

Diagnosis: Superficially similar to *jalavai*, described below, but scales on head and thorax with more whitish parts, and forewings with greybrown bands, while *jalavai* has dark grey band and patches. In male genitalia the shape of valva is different: *mikkolai* with nearly square valva with winkled costal edge, the finger-like process is short, with field of strong sclerotized bristles without acute tips, while *jalavai* with valva more longer than broad, finger-like process broad, the bristles on insde long, strongly sclerotized with pointed tips.

Description (Fig. 2): Wingspan 9 mm; head, labial palpus, scape of antenna, thorax and tegulae

with nearly white scales with dark grey tip, labial palpus short, on inside more whitish, flagellum dark grey; forewing with pattern of two greybrown bands, the first between 1/3 and 1/2, the second at 3/4 from costa to dorsum, the space between the bands and between the second band to apex more whitish than basal third of wing; tip of apex with a dot of dark grey scales; fringe basally overlaid with long whitish scales with dark tip; hindwing grey.

Male genitalia (Fig. 7): Vinculum band-shaped, saccus somewhat narrower than vinculum, long, with rounded tip; valva nearly square, basal edge vertically, costal edge shorter than ventral edge, angled to apical edge, oblique directed to short finger-like process, on inside a field of numerous strong sclerotized bristles; phallus more than two times longer than valva, slightly curved.

Female genitalia (Fig. 11): Anterior apophysae apically ending triangularly, between the ends with a lancett-shaped sclerotization; ostium basally with sclerotized ring, dorsally prolonged, covered with minute thorns and ending in a cup-shaped emargination; signum a bundle of numerous various-sized strong sclerotized spines.

Etymology: Named after Kauri Mikkola, the collector of the species.

Tinagma jalavai **Gaedike, sp. n.** (Figs 3, 8)

Holotype: ♂, Russia, Tuva rep., 50º 50‘N, 94º 19‘E, 2175 m, E. Tannu-Ola mts, timberline (Larix)steppe, 17-VI-1995, Jalava & Kullberg leg.; Gen.präp. [genitalia slide] Gaedike Nr. 9036; Holotypus ♂, Tinagma jalavai sp. n., det. R. Gaedike 2017;" FMNH; Paratypes: 3 ♂♂, same dates, two of them with genitalia slides Gaedike Nr. 5709 and 5711; FMNH, SDEI.

Diagnosis: See under *mikkolai*.

Description (Fig. 3): Wingspan 9-11 mm; the whitish base of scales on head, thorax and tegulae nearly complete overlaid by dark grey, labial palpus short, straight, on inside more whitish, flagellum of antenna ringed, underside of scape and first half of flagellum whitish; forewing on basal third with same colouration as thorax, followed by a nearly complete dark grey band with indistinct basal border, apical half more whitish, at the end of cell one dark grey patch, apex with dark dot, fringe overlaid with long white scales with dark tip; hindwing grey.

Male genitalia (Fig. 8): Vinculum band-shaped, with long saccus with rounded tip; valva nearly square, somewhat broader than long, basal edge a little curved inward, apical edge oblique from costal edge to the finger-like process, along ventral edge an indication of fold; on inside a field of strong sclerotized bristles with acute tips; phallus nearly three times longer than broadness of valva, straight, with pointed tip.

Female genitalia: Unknown.

Etymology: Named after Jukko Jalava, one of the collectors of the type series.

Tinagma kullbergi **Gaedike, sp. n.** (Figs 4, 9)

Holotype: ♂, Russia, Buryatia, 54º 55‘N, 111º 14‘E, Barguzin valley, 600 m, Dijirga st.[ation], Betula/mead.[0w], 10-VII-1996, Jalava & Kullberg [leg.];" "Gen. präp. [genitalia slide] Gaedike Nr. 5714; Holotypus ♂, Tinagma kullbergi sp. n., det. R. Gaedike 2017; FMNH; Paratypes: 1 ♂, same dates; SDEI; 1 ♂, RUSSIA, Buryatia, 54º 52‘N, 110º 55‘E. Barguzin range 920 m, Olso r.[iver] valley, taiga, 4-6-VII-1996, Jalava & Kullberg [leg.];" "Gen. präp. [genitalia slide] Gaedike Nr. 9035; FMNH.

Diagnosis: The nearly unicoloured forewing make the species distuingishable from the other species here described. In male genitalia the valva with the long narrow finger-like process and the large field of long pointed bristles is characteristic.

Description (Fig. 4): Wingspan 10-12 mm; head, thorax and tegulae dark greybrown, tips of scales light grey, labial palpus short, with same colouration, second segment ventrally with longer scales, scape of antenna somewhat ringed; forewing nearly complete unicoloured dark greybrown, apex with a small dark dot, wing between 1/2 and 3/4 lighter, border to base as an oblique whitish stripe; hindwing with same colouration as forewing.

The colouration of the specimen from Barguzin range is lighter, the tips of scales are whitish, the lighter aerea on forewing with more clear border to base.

Male genitalia (Fig. 9): Vinculum band-shaped, saccus long, narrow, with rounded tip; valva broader than long, base straight, costa somewhat oblique to rounded edge, apical edge curved to long apical process, ventral edge longer than costal edge, inside with fold; on inside along the main part of apical edge a field of long, thin, strong sclerotized pointed bristles; phallus nearly three times longer than valva, slightly curved.

Female genitalia: Unknown.

Etymology: Named after Jakko Kullberg, one of the collectors of the type series.

Remark: Although the colouration of the specimen from Barguzin range is somewhat different to the colouration of the other specimens, the genitalia structure is completely the same, only the size is smaller.

***Tinagma caucasicum* Gaedike, sp. n.** (Figs 5, 10)

Holotype: ♂, USSR, 43º N, 43º E, Kabardino-Balkarskij zap. [National Park], 35 km SE mt. Elbrus, alp. mead. 2500 m, E-slope, 15-VII-1990, J. Jalava [leg.]; Gen. präp. [genitalia slide] Gaedike Nr. 5713; Holotypus ♂, Tinagma caucasicum sp. n., det. R. Gaedike 2017; FMNH; Paratypus: 1 ♂, USSR, 43º N, 43º E, Kabardino-Balkarskij zap. [National Park], 35 km SE mt. Elbrus, subalp. meadows 2300 m, 10-VII-1990, J. Jalava [leg.]; FMNH.

Diagnosis: Superficially characterized by the two dark greybrown patches at dorsum and, opposite, the patches with same colouration on costa. Male genitalia with nearly square valva without fold along ventral edge and with phallus three times longer than valva.

Description (Fig. 5): Wingspan 10-12 mm; scales on head, thorax and tegulae greybrown with whitish tips, head above palpi nearly complete whitish to creamy, labial palpus short, straight, inside creamy, outside dark greybrown; basal third of forewing with same colouration as thorax, dark greybrown are also a patch at dorsum before 1/2, reaching cell, a patch at beginning of fringe, a patch on apex, and patches on costa opposite the patches on costa; the area between these patches covered by scales with more whitish and creamy parts; hindwing light greybrown.

Male genitalia (Fig. 10): Vinculum band-shaped, saccus very long, narrow, with rounded tip; valva nearly square, apical edge oblique to apical finger-like process, along ventral edge no fold on inside visible, along first half of apical edge a field of long, strong sclerotized bristles; phallus three times longer than valva, straight, with pointed tip.

Female genitalia: Unknown.

Etymology: Named after the location of the type series.

Tinagma balteolella (Fischer von Röslerstamm, 1841)

Bulgaria: 1 ♂, W of Gotse Delchew, Popovi Levadi, 1000 m, 25-V-2010, leg. O. Karsholt; ZMUC. **First country record.**

Tinagma klimeschi Gaedike, 1987

Morocco: 2 ♂♂, Anti Atlas: Souss-Massa-Draâ: Idikl 16 km E Tafraoute, 8-10-III-2017, 1580 m, leg. C. Hviid, O. Karsholt, K. Larsen & D. Nilsson; ZMUC. **First country records.**

Tinagma bledella (Chrétien, 1915)

Morocco: 1 ♂, High Altas, Ouirgane, 7 km S, 950 m, 4-VI-2015, leg. C. Hviid, O. Karsholt & K. Larsen; ZMUC. **First country record.**

Tinagma ocnerostomella (Stainton, 1850)

Bulgaria: 1 ♀, 10 km NE Balich, Topola, 29-30-V-2010, leg. O. Karsholt; ZMUC; 1 ♂, 5 km E

Balich, Tuzlata, 29-30-V-2010, leg. O. Karsholt; ZMUC; 1 ♂, 5 km N Sandanski, 23-27-V-2010, leg. O. Karsholt; ZMUC. **First country records.**

Klimeschia transversella (Zeller, 1839)

ROMANIA: 1 ♂,1 ♀, Rimitea area, 46º 22‘ 58“N, 23º 34‘ 44“E, 29-31-V-2009, leg. O. Karsholt; ZMUC. **First country record.**

Klimeschia cinereipunctella (Turati & Fiori, 1930)

CROATIA: 1 ♂, Is. Krk, dint. Di Polijica, 22-IV-2011, leg. et coll. Baldizzone. **First country record**.

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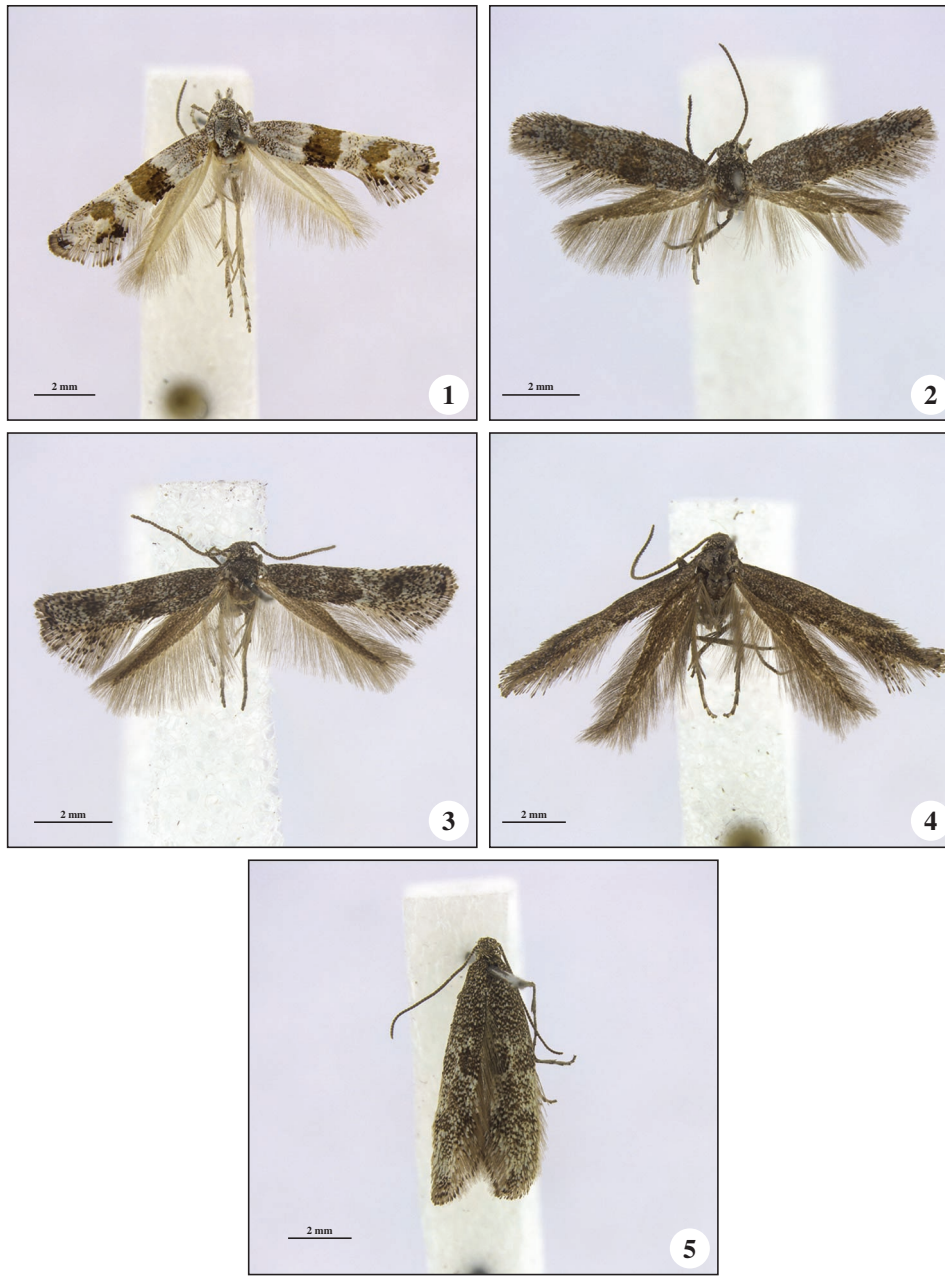
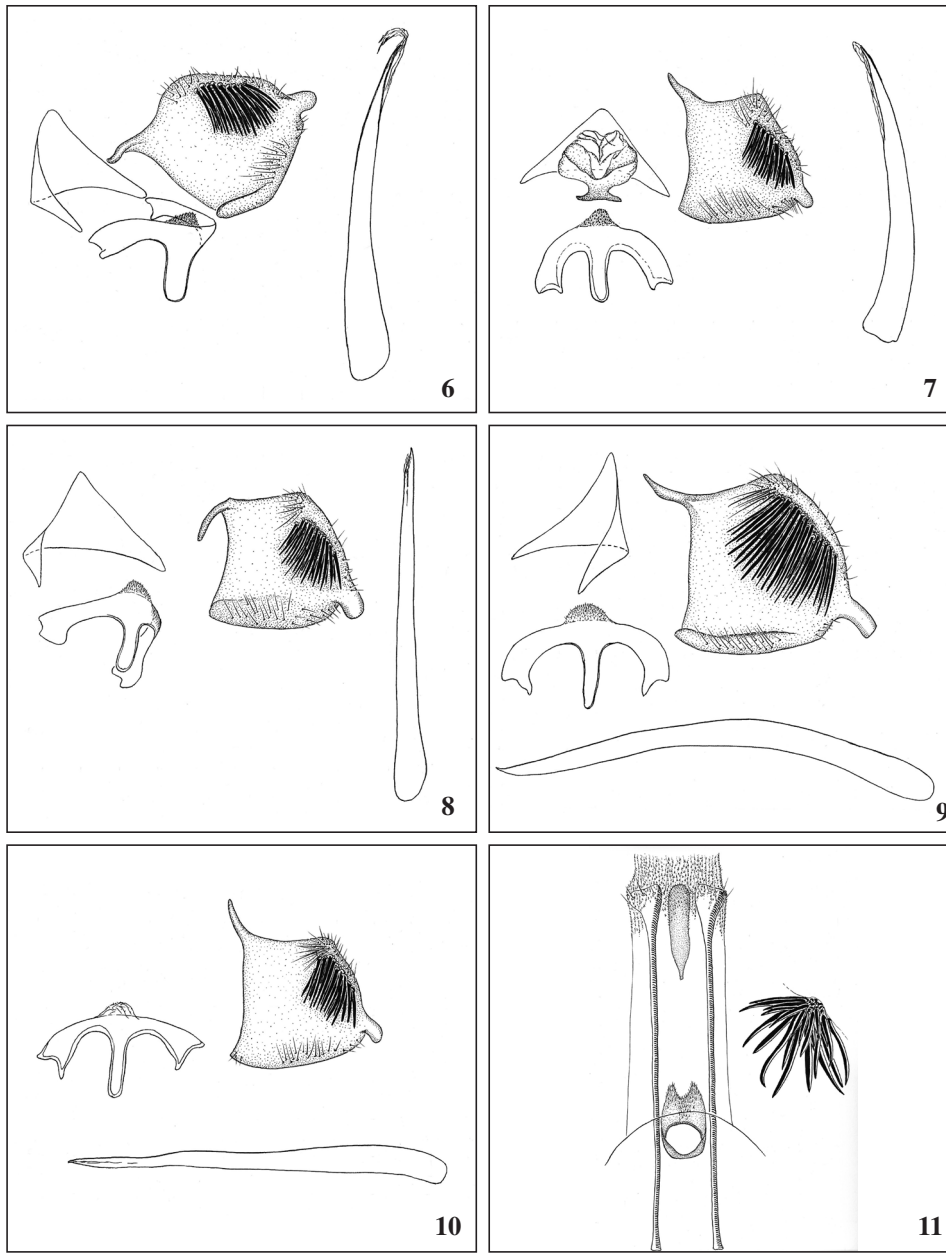


Figs 1-5.– Adults: **1.** *Tinagma fasciatum* Gaedike, sp. n., holotype; **2.** *Tinagma mikkolai* Gaedike, sp. n., holotype; **3.** *Tinagma jalavai* Gaedike, sp. n., holotype; **4.** *Tinagma kullbergi* Gaedike, sp. n., holotype; **5.** *Tinagma caucasicum* Gaedike, sp. n., paratype.



Figs 6-11.– Male genitalia: **6.** *Tinagma fasciatum* Gaedike, sp. n., holotype; **7.** *Tinagma mikkolai* Gaedike, sp. n., holotype; **8.** *Tinagma jalavai* Gaedike, sp. n., holotype; **9.** *Tinagma kullbergi* Gaedike, sp. n., holotype; **10.** *Tinagma caucasicum* Gaedike, sp. n., paratype; Female genitalia: **11.** *Tinagma mikkolai* Gaedike, sp. n., paratype.

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Libro:

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Internet:

DE PRINS, J. & DE PRINS, W., 2011.- *Global taxonomic database of Gracillariidae (Lepidoptera).* Disponible en http://www.gracillariidae.net (accedido el 14 de diciembre de 2011).

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New data on the butterflies of São Tomé e Príncipe: description of one new subspecies from Príncipe, notes, and reference to two faunistic novelties from São Tomé (Lepidoptera: Papilionoidea)

L. F. Mendes, A. Bivar de Sousa & S. Vasconcelos

Abstract

One new subspecies of *Sevenia amulia* (Cramer, 1777) (Nymphalidae, Biblidinae) is described from Príncipe Island and compared with the previously known subspecies. Two faunistic novelties are reported from São Tomé Island and for the country: one species of Lycaenidae (Polyommatinae), another of Nymphalidae (Heliconiinae). The presence on Príncipe Island of another species, an endemic Hesperiidae (Hesperiinae) not reported from the country for almost a century, is confirmed and commented.
KEY-WORDS: Lepidoptera, Papilionoidea, new subspecies, faunistic novelties, new data, São Tomé e Príncipe.

Nuevos datos sobre las mariposas de Santo Tomé y Príncipe: descripción de una nueva subespecie de Príncipe, notas, y referencia a dos novedades faunísticas de Santo Tomé (Lepidoptera: Papilionoidea)

Resumen

Se describe una nueva subespecie de *Sevenia amulia* (Cramer, 1777) (Nymphalidae, Biblidinae) de la isla de Príncipe y se la compara con las subespecies ya conocidas. Dos novedades faunísticas son señaladas de la isla de Santo Tomé y del país: una especie de Lycaenidae (Polyommatinae), otra de Nymphalidae (Heliconiinae). Se confirma y se comenta la presencia real de otra especie en la isla de Príncipe, un Hesperiidae (Hesperiinae) endémico, no citado del país durante casi un siglo.
PALABRAS CLAVE: Lepidoptera, Papilionoidea, subespecie nueva, novedades faunísticas, nuevos datos, Santo Tomé y Príncipe.

Novos dados sobre as borboletas de São Tomé e Príncipe: descrição de uma nova subespécie do Príncipe, notas, e referência a duas novidades faunísticas de São Tomé (Lepidoptera, Papilionoidea)

Resumo

Descreve-se uma subespécie nova de *Sevenia amulia* (Cramer, 1777) (Nymphalidae, Biblidinae) da ilha do Príncipe que se compara com as subespécies já conhecidas. Duas novidades faunísticas são apontadas para a ilha de São Tomé e para o país: uma espécie de Lycaenidae (Polyommatinae), outra de Nymphalidae (Heliconiinae). Confirma-se e comenta-se a real existência na ilha do Príncipe de uma outra espécie, um Hesperiidae (Hesperiinae) endémico, não referido do país durante quase um século.
PALAVRAS-CHAVE: Lepidoptera, subespécie nova, novidades faunística, novos dados, São Tomé e Príncipe.

Introduction

Recent field activities developed in São Tomé e Príncipe by the senior co-author since 2004 allowed us: (i) to conclude that the population of *Sevenia amulia* (Cramer, 1777) (Nymphalidae) exclusively known in the country from Príncipe Island, is somewhat distinct from that of the nominate subspecies, as well as from specimens of *S. amulia intermedia* proceeding from Angola - it is, further, different from *S. rosa*, previously considered as one more subspecies of *S. amulia*; (ii) to identify two species that remained unknown in the country until now, a Lycaenidae (Polyommatinae) and a Nymphalidae (Heliconiinae); and (iii) to rectify the presence in São Tomé e Príncipe of one species of Hesperiidae (Hesperiinae) described nine decades ago. The aim of this contribution is therefor, to discuss the validity of *Andronymus thomasi* Riley, 1928 upon a female obtained in northern Príncipe; to describe one new subspecies of *Sevenia amulia* (Cramer, 1777) endemic from the same island; and to confirm from São Tomé the presence of *Chilades trochylus* (Freyer, 1844) (Lycaenidae) and of *Acraea (Acraea) neobule* Doubleday, Hewitson & Westwood, 1850 (Nymphalidae), both common throughout the Afrotropical Region but previously unknown in the country.

The last general contributions to the knowledge of the Papilionoidea of São Tomé e Príncipe are those of PYRCZ (1981, 1992) and of MENDES & BIVAR-DE-SOUSA (2012a, b). However, a deeper and global study of the butterflies and skippers of the country is close to completion.

Materials and methods

The following abbreviations will be used throughout the text: BM - The former British Museum (Natural History), now Natural History Museum, London, Great Britain; C - Central; CAR - Central African Republic; DRC - Democratic Republic of the Congo; Cu_1 - First cubital vein; CZ - Former Centro de Zoologia of the IICT; D - Dorsal wing surface (recto); E - East, eastern; FW - Forewing; FWL - Forewing length; HW - Hindwing: IICT - Former Instituto de Investigação Científica Tropical, now integrated in the MUHNAC; LM - Collected by the senior author; M_1 - First median vein; M_2 - Second median vein; M_3 - Third median vein; MUHNAC - Museu Nacional de História Natural e da Ciência, Lisbon University, Portugal; N - North, northern; PR - Príncipe Island; S - South, southern; SE - Southeast, south-eastern; ST - São Tomé Island; STPR - São Tomé e Príncipe (country): V - Ventral wing surface (verso).

All the studied specimens were net-collected by the senior author and are part of the entomological series of the CZ (IICT), now integrated in the MUHNAC - the registration numbers concern the sequence followed in the CZ collection. The samples are known from the localities listed below for which the administrative district (only one in PR) is reported and the approximate latitude, longitude, and altitude (in meters above sea level) are presented, based on the JIU (1961/1962 and 1962) maps.

Locality	District	Latitude	Longitude	Altitude
PRÍNCIPE ISLAND				
Bombom road to Airport	Pagué	01º41' N	07º44' E	100-150
Porto Real	Pagué	01º39' N	07º24' E	120
Príncipe Airport	Pagué	01º40' N	07º25' E	180
Terreiro Velho	Pagué	01º37' N	07º26' E	200-220
SÃO TOMÉ ISLAND				
Água Izé	Cantagalo	00º13' N	06º44' E	< 50
Morro Peixe	Lobata	00º24' N	06º39' E	60
Ribeira Funda	Lembá	00º22' N	06º35' E	< 50

The FWL was measured using an etalon clipper along the FW anterior border or costa, from its insertion on the thorax to apex. For the photos of the preserved specimens a Canon EOS-450D camera

supported by a computer Macintosh iMac LED16:9 with a 27-inch widescreen was used. When necessary, the specimen study was performed under the stereomicroscopes Wild M5A and Leica M165C.

Taxonomy

HESPERIIDAE
HESPERIINAE

Genus *Andronymus* Holland, 1896

Andronymus thomasi Riley, 1928 (Figs. 2-3)
Andronymus thomasi Riley, 1928a
Andronymus neander thomasi Riley, 1928. Evans, 1937, Bacelar, 1958; Ackery *et al.*, 1995; Larsen, 2005; Williams, 2008; Mendes & Bivar-de-Sousa, 2012a; Mendes & Bivar-de-Sousa, 2012b.

Material examined: PR: Near Bombom, beginning of the road to the airport, western slope, 20-VI to 8-VII-2016, 1 ♀ (CZ-6024).

Andronymus thomasi was described from ST (RILEY, 1928) and later reported by EVANS (1937, as a subspecies of *A. neander*) from STPR (1 ♂, ST, 1 ♀, PR both noted as in the BM collection, the male being certainly the holotype); there are a few known references but the species was not again observed for almost nine decades. According to LARSEN (pers. comm.) at least the holotype remains in that Museum. *Andronymus thomasi* is endemic from STPR although its recent presence in the ST Island remains unconfirmed and its geographically detailed origin in this island is unknown.

Fig. 1.– Slope on the western side of the forest road close to Bombom - road to the Airport - where the studied *Andronymus thomasi* female was collected.

The studied specimen (FWL: 18 mm) lacks as it is typical to the similar *A. neander*, the clear separation between whitish inner part of the HWV and its brownish border. It is the only Hesperiidae known in the country to show a large and conspicuous transparent white discal spot in the HW (Figs. 2-3). The brownish area of both wings D and V is darker than in *A. neander*, and in the present species there is (almost) no dark punctuation on the light area of the HWV and the marginal cilia are dark brown. The FW is somewhat distinct to that of *A. neander* (photos of East African specimens in KIELLAND, 1990; LARSEN, 1996), being shorter and apically less acute; the subapical spots of *A. thomasi* were reported as being three and smaller than those in *A. neander*. However, in the studied female there are only two subapical spots that are conspicuous, despite being quite small. Further, the white-translucent areas were described as being tinted with yellow, but in the Bombom specimen they are pure white.

The studied female was collected at the beginning of the gravana, still with rains; it comes from close to the limits of the Bombom Lodge in the extreme N Príncipe, from a ca. 10 m high steep forest slope and was perched on the green leaves at 1.5-1.7 m above the soil - no flowering plants were present around (Fig. 1). *A. neander*, which is known throughout most of sub-Saharan Africa except for parts of South Africa, seems to occur in forest, forest-savanna transition and gallery-forest. Nothing is known about the STPR immature stages although the caterpillars of the mainland African species reportedly feed on Fabaceae (*Brachystegia*) and on Malpighiaceae. However, *Brachystegia* is not present in STPR and the Malpighiaceae are rare and poorly diverse in the country (EXELL, 1944; FIGUEIREDO *et al.*, 2011) which suggests possibly distinct insular host-plants for *A. thomasi*.

LYCAENIDAE
POLYOMMATINAE

Genus *Chilades* Moore, 1881

Chilades trochylus (Freyer, 1844) (Figs. 4-5)

Material examined: ST: Morro Peixe, 9-IX to 24-IX-2015, 1 ♂ (CZ-5968); Id, 12-VII-2016, 3 ♂♂, 1 ♀ (CZ-6027). All the specimens were collected between 10.00 and 12.00 h.

Chilades trochylus is easy to recognize taking into account its minute size - FWL: ♂: 7.5-8 mm; ♀: 9 mm - being the smallest butterfly in the country and one of the smallest Afrotropical species. It is also distinctive due to its bluish brown D and the orange-red anal marginal band on the HWD, enclosing three small black spots; this area also exists on the HWV where the black scales of the spots are mixed with numerous others, bright metallic green (Figs. 4-5). STEMPFFER (1967, under *Freyeria*) figures the male genitalia.

The species is known throughout Africa, SE Europe, Near East and Arabia mainly in open, exposed areas, and more rarely along forest pathways. It is now reported for the first time from ST and for the country, where it appears to be localized in the NW drier area of the island. The species is apparently rare in STPR, but the much reduced wingspan of the imagos may have contributed to the fact that it has been previously overlooked. It is often considered to include the genus *Freyeria* Courvoisier, 1920, presently placed in the *Chilades* synonymy (LARSEN, 2005).

The studied specimens were all collected among more or less dry Gramineae and Leguminosae in the road verges, close to cultivated areas - mainly with maize and cassava; they flew slowly and very low, no more than 20-30 cm above the herbs. No other specimens were observed despite the Morro Peixe area being prospected throughout the year (the last time during the end of January 2017).

The caterpillars (never locally observed) are known to feed on *Indigofera* (Fabaceae) and *Heliotropium* (Boraginaceae), both genera with species occurring in STPR (FIGUEIREDO *et al.,* 2011). They are usually attended by *Pheidole* worker ants (Myrmicidae).

NYMPHALIDAE
BIBLIDINAE

Sevenia Koçac, 1996

***Sevenia amulia principensis* Mendes & Bivar de Sousa, ssp. n.** (Figs. 6-7)

Crenis amulia Cramer, 1777. Bacelar, 1958
Sallya amulia (Cramer, 1777). Pyrcz, 1991
Sallya amulia amulia (Cramer, 1777). Pyrcz, 1992
Sevenia amulia amulia (Cramer, 1777). Mendes & Bivar-de-Sousa, 2012a, 2012b

Material examined: Type material: Holotype ♀ (CZ-6053): PR: Porto Real, 25-I-2017, 10-11.30 h. Paratype: PR: Id, 21-I-2016, one specimen without abdomen (CZ-6009) - also collected in mid-morning. Non-type specimen: PR: Airport, 12-X-1955, coll. Décio de Passos, a not well preserved ♀ (CZ-2422).

Description: Female. FWL: 27-29 mm, the specimen without abdomen: 24 mm. D and V as in figures 6 and 7, quite unique among the STPR butterfly species. D is brown with some irregular and indistinct FW darker maculation, mainly a dark irregular spot on the cell apex, and with a very weak, violaceous sheen; one complete row of submarginal dark spots are present on the HW. V is orange and alternated with thin bluish-gray bands and small black markings encircled by light bluish-gray in the HW; additionally there is a row of black submarginal spots in all four wings. FWV with one blackish-brown round spot in the pre-apical area and three small dark brown spots in spaces M_1-M_2, M_2-M_3 and M_3-Cu_1. The male remains unknown.

Biotope: Forest trails margins.

Discussion: Two subspecies of *S. amulia* (Cramer, 1777) are presently known. The nominate one, assigned from Ghana, Nigeria, Cameroon, Gabon, Congo, CAR and C and N DRC, whose type-locality was reported as Sierra Leone (false-locality after LARSEN, 1996); and *S. amulia intermedia* (Carcason, 1961), described from the "Katanga" (Shaba) and also known from other DRC provinces (Lualaba, Lomami, Maniema and Sankuru), Angola, N Zambia and (vagrant?) Botswana. When compared with *S. amulia intermedia* (Figs. 8-9) - material from Angola (Kwanza Sul, Malanje and Bié), was used for comparison - *S. amulia principensis* ssp. n. shows almost no violaceous sheen, being more dark brown than violet. It also has small but quite conspicuous dark spots on the median and medio-cubital spaces of the FWV, which are absent or quite diminished in the remaining subspecies; further, the post-median row of HWV spots is more distant from the wing' border than in *S. amulia intermedia*. *S. rosa* (Hewitson, 1877), described from S Mozambique (Delagoa Bay, currently Maputo Bay), known from woodland and forest margins in Kenya (migrant?), E Tanzania, Malawi, Zambia, E Zimbabwe, Botswana, Namibia (Caprivi strip) and South Africa (KwaZulu-Natal) was also considered a subspecies of *S. amulia* - see ACKERY *et al*. (1995) - but is now accepted as a valid species. It is much lighter and more violaceous than *S. amulia* and has a much strongly marked D, mainly in the female (Figs. 10-11); further, it shares with *S. amulia amulia* and with *S. amulia intermedia* the reduced dark maculation on the FWV, allowing its prompt diagnosis relatively to the new *S. amulia principensis*.

Preliminary DNA barcoding results based on the CO1, revealed no significant differences between *S. amulia intermedia* from Angola (Malanje) and the PR types (not published). Based on the registered morphological dissimilarities, the PR specimens are, however, considered to belong to a new subspecies despite the inconclusive genetic analyses and the absence of information on the male genitalia morphology.

Host-plants: PYRCZ (1991) reports he saw oviposition on *Cola* sp. (Sterculiaceae) at Terreiro Velho, in the extreme S of the island. This is likely to constitute the subspecies' food-plant in the PR. In continental Africa, *Maprounea*, *Sapium* and *Shirakiopsis* (Euphorbiaceae) are considered to be the host-plants of the known subspecies (ANONYMOUS 2017, D'ABRERA, 2004, LARSEN, 1996, 2005) but all these genera remain unknown in STPR (FIGUEIREDO *et al.*, 2011).

Notes: An additional specimen was observed on the wing the January 2017, which together with the reduced number of specimens collected, points to a quite uncommon taxon eventually restricted to the "gravanito", the small dry season. Relatively to PYRCZ (1991) reference to the Terreiro Velho, no date is provided for the observation.

Etymology: The subspecies is named after the PR, the only island from where it remains known and from where it is likely endemic.

HELICONIINAE

Acraea Fabricius, 1807

Acraea (Acraea) neobule Doubleday, Hewitson & Westwood, 1850 (Figs. 12-16)

Material examined: ST: Morro Peixe, 18-IX-2014, 3 ♂♂, 1 ♀ (CZ-5939); Id, 25-VI-2015, 7 ♂♂, 2 ♀♀ (CZ-5960); Id, 19-IX to 24-IX-2015, 1 ♀ (CZ-5968); Id, 09-II-2016, 1 ♂ (CZ-6016); Id, 12-VII-2016, 5 ♂♂, 1 ♀ (CZ-6027). Ribeira Funda, 25-VI-2015, 2 ♂♂, 1 ♀ (CZ-5959); Id, 10-II-2016, 1 ♂, 4 ♀♀ (CZ-6017). Água Izé, 14-VII-2016, 1 ♂ (CZ-6034). All the specimens were collected mid-morning, between 10.00 and 12.00 h.

The FW length is 25-30 mm, with that of the female often being slightly larger. The species, known from the Afrotropical Region, S Arabia included, is somewhat variable which led to the description of several subspecies, presently considered as lacking validity. It is, however, quite distinctive and impossible to mistake with any other *Acraea* from STPR due to the apically vitreous FW with some inconspicuous marginal intervein orange markings and to the existence of marginal lunules on the HW (Figs. 12-16). The FW base and the whole HW ground-colour is deep orange in the males and lighter orange-ochre or greyish in the females. There are several black dots on the FWD, and on both the HW surfaces, which are variably developed but usually larger in the females; one of them is a cell-spot, another exists at the cell apex. The HWD has a wide black margin usually containing orange round dots, almost indistinct in the darker specimens. In the basal HWV there are 2-3 black and white contrasting spots, distinct, however, from the "chequered" basal area of the larger *A. (Acraea) zetes annobona* D'Abrera, 1980, a common and widely distributed species known all along ST and PR.

A. neobule is new for ST and STPR and is known from open habitats and degraded areas, including road verges and agricultural areas, but it does not enter forest. In the Morro Peixe area it is not uncommon in the drier seasons, the gravana (June to August/September) and the gravanito (January/February). In the course of our last visit to the area, in January 2017, no specimen was collected or even seen. In Ribeira Funda it was found mud-puddling (especially males) on the salt mud close to the sea. It is likely to occur sporadically in the eastern coast, since only 1♂was obtained in Água Izé, where *A. zetes annobona* is the dominant *Acraea* throughout the year. It was considered a synonym of the Oriental *A. terpsicore*, though their complete independence is presently fully accepted (LARSEN, 1996).

The known host-plants are *Adenia*, *Passiflora*, *Tryphostemma* (Passifloraceae), *Hybanthus* (Violaceae) *Corchorus* (Tiliaceae) and *Barleria* (Flacourtiaceae); two species of *Adenia*, three of *Passiflora* and two of *Corchorus* are known in STPR (FIGUEIREDO *et al.*, 2011).

Acknowledgements

First of all, we would like to thank the Regional Government of the Príncipe in the person of its President, Engº José Cassandra, for the attention dedicated to the work we have developed in this island and in the country. We also thank the following colleagues and friends: Dominique Bernaud, from Papeete, Tahiti, specialist in the *Acraea* butterflies, who confirmed the identity of the ST species; Cristiane Silveira and Luis Filipe Lopes, from the MUHNAC, for the CO1 analyses performed in several butterfly species, one PR *Sevenia* specimen included. We are, further, deeply

indebted to the HBD Tourism Investments, directly to Philippe Moreau and to the Omali (ST) and Bombom (PR) directors, José Miguel Mendes and Sérgio Duarte, for the continual interest and provision of facilities particularly during our most recent stays in the country; to Estrela Matilde of the Príncipe Trust Foundation, for her friendship and the discussions on the biodiversity of São Tomé e Príncipe; and to Ruben Fortuna, the Bombom eco-guide, an excellent companion during part of the field-work conducted in the Príncipe, specifically in the Porto Real area. SV was funded by the Portuguese Science and Technology Foundation (FCT) through grant SFRH/BI/51643/2011.

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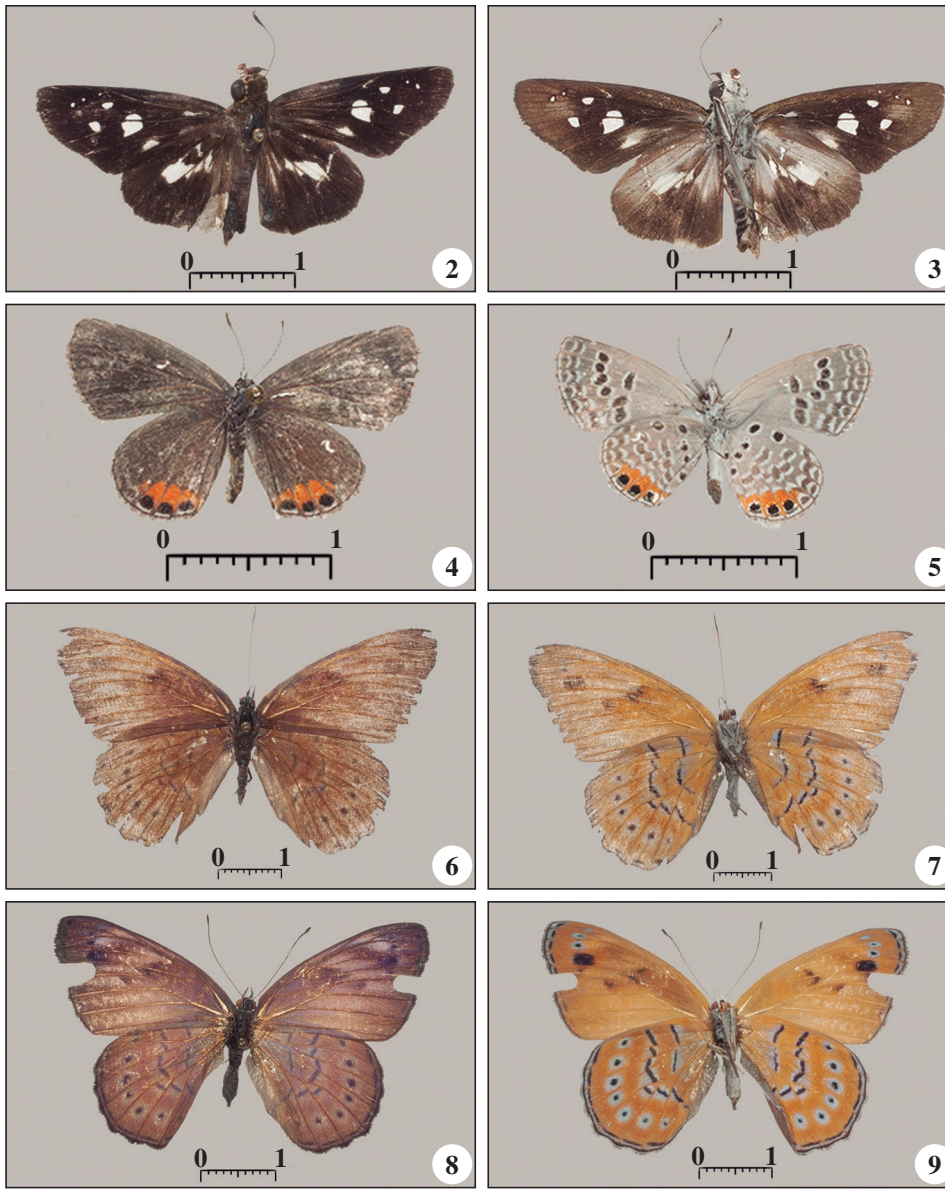
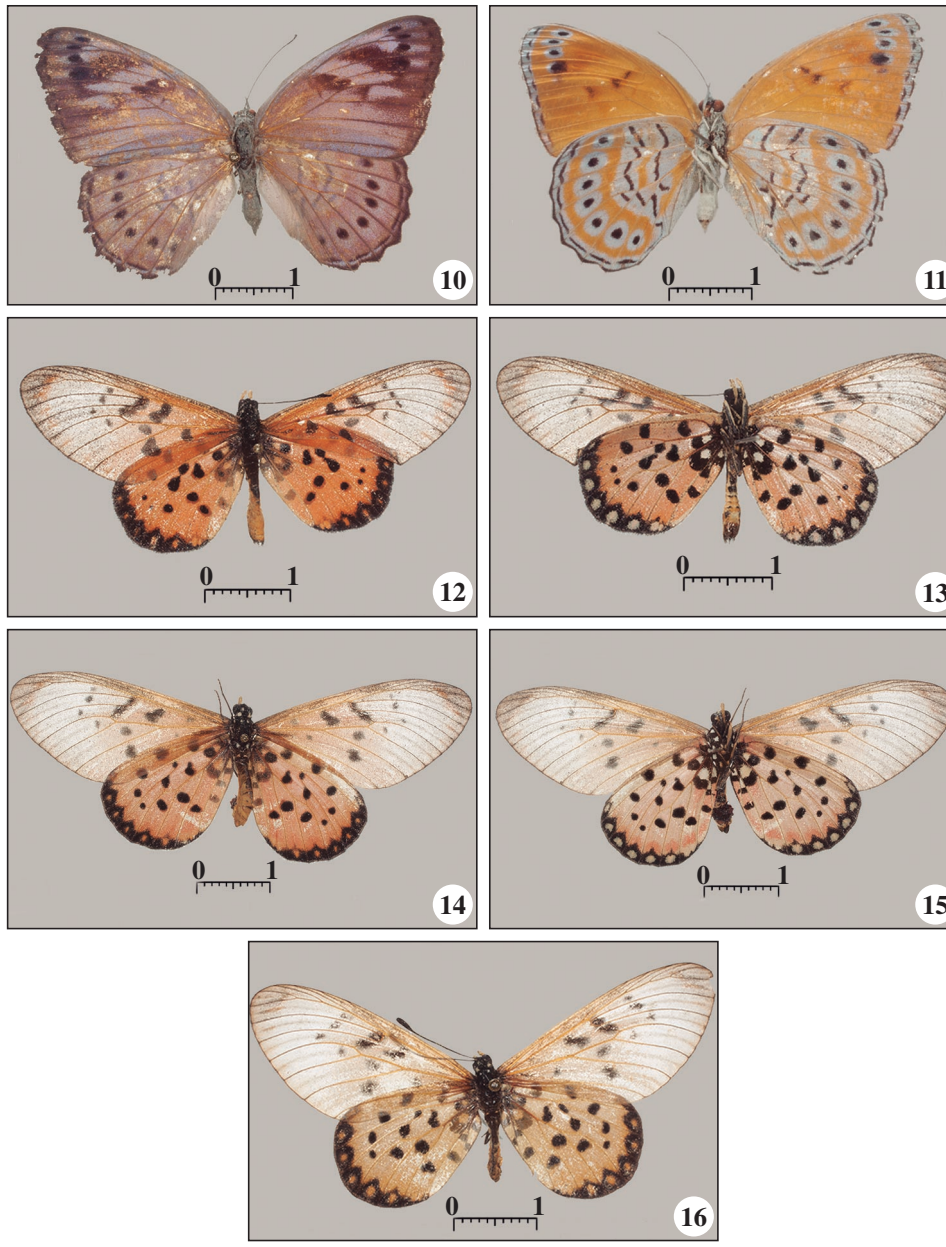


Figs. 2-9.– 2-3. *Andronymus thomasi* Riley, 1928 ♀, collected near the beginning of the road between Bombom and the Airport, PR. **2.** Dorsal; **3.** Ventral. **4-5.** *Chilades trochylus* (Freyer, 1844) from Morro Peixe, ST. **4.** Dorsal; **5.** Ventral. **6-7.** *Sevenia amulia principensis* Mendes & Bivar de Sousa, spp. n., Holotype ♀ from near Porto Real, PR. **6.** Dorsal; **7.** Ventral. **8-9.** *Sevenia amulia intermedia* (Carcasson, 1961) ♀ from Mandongue, Bié, Angola (BS-35032 - for comparison). **8.** Dorsal; **9.** Ventral.



Figs. 10-16.– 10-11. *Sevenia rosa* (Hewitson, 1877) ♀ from Montepuez, Cabo Delgado, Mozambique (BS-15877 - for comparison). **10.** Dorsal; **11.** Ventral. **12-16.** *Acraea (Acraea) neobule* Doubleday, Hewitson & Westwood, 1850 from Morro Peixe, ST. **12.** ♂ dorsal; **13.** Id, ventral; **14.** ♀ dorsal; **15.** Id, another ♀, dorsal; **16.** Id, Ventral.

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Taxonomic notes on Portuguese Microlepidoptera I. *Cacochroa rosetella* Corley, sp. n. (Lepidoptera: Depressariidae, Cryptolechiinae)

M. F. V. Corley

Abstract

Cacochroa rosetella sp. n. is described from central Portugal. It is externally similar to *C. corfuella* Lvovsky, 2000 from Greece, but is clearly different in female genitalia.
KEY WORDS: Lepidoptera, Depressariidae, Cryptolechiinae, *Cacochroa*, new species, Portugal.

Notas taxonómicas sobre Microlepidoptera de Portugal I. ***Cacochroa rosetella*** **Corley, sp. n. (Lepidoptera: Depressariidae, Cryptolechiinae)**

Resumo

Cacochroa rosetella sp. n. é descrita do centro de Portugal. A nova espécie é semelhante externamente a *C. corfuella* Lvovsky, 2000, presente na Grécia, mas apresenta genitália feminina distinta.
PALAVRAS CHAVE: Lepidoptera, Depressariidae, Cryptolechiinae, *Cacochroa*, nova espécie, Portugal.

Notas taxonómicas sobre Microlepidoptera de Portugal I. ***Cacochroa rosetella*** **Corley, sp. n. (Lepidoptera: Depressariidae, Cryptolechiinae)**

Resumen

Cacochroa rosetella sp. n. es descrita del centro de Portugal. La nueva especie es semejante externamente a *C. corfuella* Lvovsky, 2000, presente en Grecia, pero presenta genitália feminina distinta.
PALABRAS CLAVE: Lepidoptera, Depressariidae, Cryptolechiinae, *Cacochroa*, nueva especie, Portugal.

Introduction

This is the first in a planned series of papers on Portuguese Microlepidoptera which will cover various taxonomic topics, such as description of new species, revision of status and description of the second sex of little known species. In this paper a new species of *Cacochroa* Heinemann, 1870 is described.

Methods

Genitalia were dissected using standard techniques (ROBINSON, 1976).

***Cacochroa rosetella* Corley, sp. n.**

Material examined: Holotype ♀ (fig. 1): PORTUGAL, Beira Litoral, 2 km east of Ansião, 18-VII-2015, leg. J. Rosete, Corley gen. prep. 4641. The holotype will be deposited in the Natural History Museum, London.

Description: Wingspan 13 mm. Head with face whitish, crown pale grey mixed light brown. Labial palp slightly recurved, segment 2 thickly scaled, buff near base, dark grey-brown distally, segment 3 two-fifths length of segment 2, slender, pointed, buff with black base and apex. Antenna greyish-white with narrow dark brown rings. Thorax and tegula pale grey mixed light brown. Forewing with costa curved throughout with greatest curvature at two-fifths, apex acute, termen very oblique, tornal angle obsolete; mixed grey and light olive-brown; blackish spots on costa at one-quarter and two-fifths, the second larger, with smaller spots near apex; various black dots, two in fold, two between fold and dorsum, one between cell and costa at one-quarter, one in cell at one-third, a smaller one just beyond this and one at end of cell; cilia grey-brown. Hindwing slightly narrower than forewing, apex acute, dull grey, darker towards apex; cilia dull grey.

Male unknown.

Female genitalia (fig. 2): Papillae anales parallel-sided, rounded at apex; apophyses posteriores 3.5 times as long as apophyses anteriores; ostium bursae partly covered by a broadly triangular plate with obtuse apex and concave sides, antrum conical; ductus bursae narrow, expanding into broadly pyriform corpus bursae; signum (fig. 3) long, three-fifths length of apophysis posterioris, slightly curved blade-like structure with expanded posterior end, abruptly narrowed to parallel-sided one-third, then expanded to anterior half with one margin serrated, acutely pointed.

Diagnosis: The genus *Cacochroa* Heinemann, 1870 was described to accommodate a single species, *C. permixtella* (Herrich-Schäffer, 1854). Comparison was made with *Anchinia* Hübner, 1825, with main differences in labial palps, forewing and hindwing shape. At the time of description genitalia were not in use as a taxonomic aid, but male genitalia have distinctive reduced uncus and gnathos, two processes at end of valva and a harpe on its inner face, long processes at end of juxta and aedeagus hooked at base.

C. corfuella Lvovsky, 2000 was added to the genus because it has external morphology similar to *C. permixtella* and male genitalia fitting the same pattern but with clear differences (LVOVSKY, 2000). The female genitalia show two notable differences, the presence of two sclerites over the ostium and a very different signum from the Y-shaped signum of *C. permixtella*.

For *C. rosetella* the male genitalia are unavailable, but the female genitalia have a single sclerite over the ostium and a signum of similar pattern to that of *C. corfuella* but longer, 1.5 times as long as apophyses anteriores, narrowed before expanding in width and finally tapering to the point, whereas that of *C. corfuella* is of same length as apophyses anteriores, and simply tapers to the point. Together with the external morphology which is very similar to *C. corfuella* this is sufficient to confirm that the new species belongs to *Cacochroa*.

Biology: The only specimen was taken at mercury vapour light in mid-July. The larva and host-plant are unknown. The habitat is woodland on limestone at 250 m, dominated by *Quercus faginea* Lam., *Crataegus monogyna* Jacq. and *Arbutus unedo* L., but with a great variety of shrubs including *Quercus coccifera* L., *Phillyrea latifolia* L. and various herbaceous plants.

Distribution: Only known from Beira Litoral, Portugal.

Remarks: Following the discovery of the holotype, a number of unsuccessful attempts have been made to collect additional material. In addition, larvae have been searched for on *Phillyrea latifolia* which is common in the locality, also without success. *Phillyrea angustifolia* L. is the known host-plant of *C. permixtella* (HUERTAS-DIONISIO, 2003). TOKÁR *et al*. (2005) also give *P. latifolia* as a host-plant. Failure to find additional material could be due to various factors.

Perhaps the species is scarce in the locality or is naturally reluctant to come to light and the host-plant may not be *Phillyrea*.

In fig 2. it is possible that the ductus bursae is broken and not actually as long as it appears in the photo. There is a peculiar tongue-like flap with long hairs attached to the margin of sternite 6. Without additional material it is not possible to know if this is a normal feature of *C. rosetella* or an abnormality.

C. corfuella was described from the island of Corfu, Greece (LVOVSKY, 2000), but has recently been found in Cyprus (BARTON, 2018). *C. permixtella* has a wide distribution from Spain to Turkey and Israel, also including Austria and the Mediterranean islands of Corsica, Sardinia, Crete, Chios and Lesbos.

The classification of Gelechioidea has always been contentious. Recent molecular studies have given greater insight than was possible with earlier classifications based only on morphology, but some uncertainties still remain. In this paper *Cacochroa* is placed in subfamily Cryptolechiinae within family Depressariidae, following HEIKKILÄ *et al*. (2014).

In the Portuguese list (CORLEY, 2015) *C. rosetella* should be placed after *Anchinia cristalis* as species 0479.1.

Etymology: The epithet *rosetella* is in honour of my friend Jorge Rosete, diligent microlepidopterist, who collected the holotype.

Acknowledgements

I am most grateful to Jorge Rosete for allowing me to study his specimen of *C. rosetella*, to Alexander Lvovsky for comments on the female genitalia photo and for confirming that this was undescribed, to André Lameirinhas for the photos of the holotype, to Brian Goodey for the photo of the female genitalia and to Sónia Ferreira for valuable comments on the manuscript and for translating the abstract into Portuguese and Spanish.

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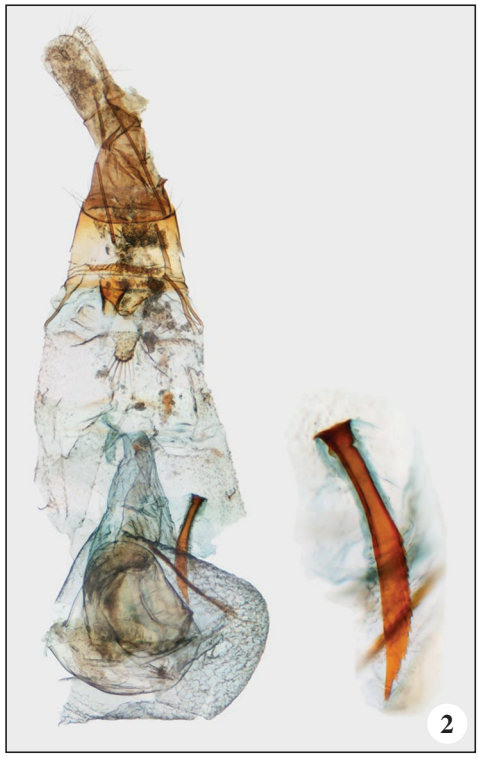

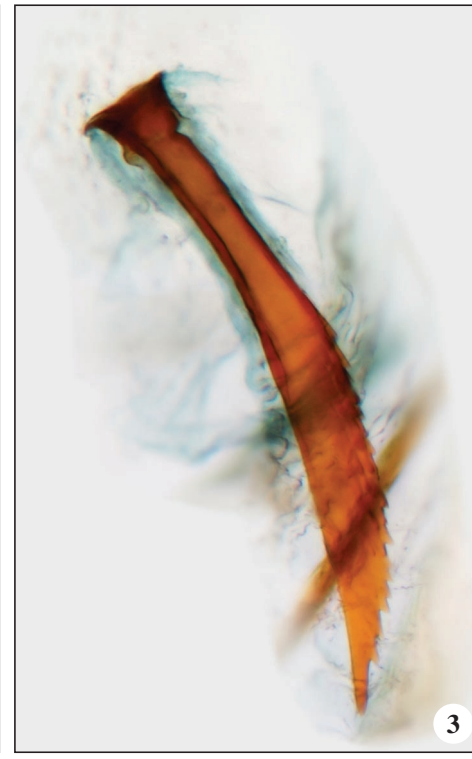

Figs 1-3.– *Cacochroa rosetella* Corley, sp. n. **1.** Holotype, **2.** Female genitalia, **3.** Signum, enlarged, viewed from dorsal side.

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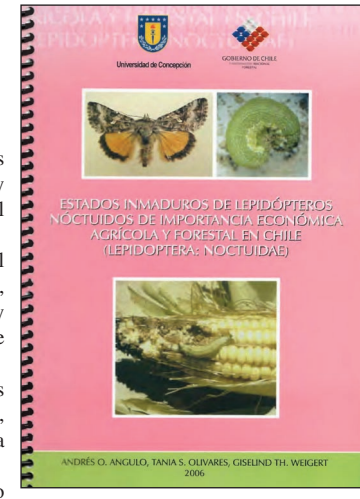
REVISION DE PUBLICACIONES
BOOK REVIEWS

A. O. Angulo, T. S. Olivares & G.T. Weigert
Estados inmaduros de lepidópteros nóctuidos de importancia económica, agrícola y forestal en Chile (Lepidoptera: Noctuidae)
154 pp.
Formato: 25 x 17 cm (encuadernado en espiral)
Universidad de Concepción, Concepción, 2006



Los autores nos presentan un buen manual, de los estados inmaduros de los Noctuidae, que tienen destacada importancia agrícola y forestal en Chile, constituyendo en realidad, una versión ampliada del trabajo anteriormente publicado en el año 1975.

Después de un resumen y una introducción, nos hablan del material y métodos utilizados, sobre la morfología externa de los huevos y larvas, sobre la etología, y un interesante capítulo sobre el mimetismo y homocromismo larval, así como de los adultos con una breve descripción.

Entrando en la parte más importante de este libro, los autores nos presentan las 43 especies tratadas y de todas ellas, nos hablan del huevo, con descripción sobre los resultados de la microscopía electrónica, de la larva, de la pupa y de los adultos fotografiados en color.

Las especies están asociadas a los cultivos más afectados, como pueden ser el tomate, frijol (judía), maíz, papa (patata) y zanahoria, donde los daños que puedan ocasionar producen un fuerte impacto económico, teniendo en cuenta que forman parte de la alimentación básica, de muchas poblaciones humanas.

Si bien este manual está dirigido principalmente al personal más técnico en el control de plagas, también puede ayudar en la identificación de estas especies, dándonos, con detalle, las secuencias de la ovoposición, los tiempos de alimentación y sus principales etapas de desarrollo.

Es interesante la descripción, con cierto detalle la secuencia de la oviposición y una cantidad importante de fotografías realizadas con el microscopio electrónico, donde nos muestran la microestructura del exocorion de las especies consideradas, finalizando una clave para los para huevos, larvas y pupas, así como de una bibliografía específica.

No hay duda qué este libro es importante para todos los entomólogos agrícolas y forestales, principalmente interesados en la fauna Neotropical, felicitando a los autores por el aspecto tan didáctico y práctico que han dado a este libro.

El precio del libro es de 9.730 pesos chilenos y los interesados lo pueden pedir a:

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Contribution to the knowledge of the spring butterfly fauna of the southern Anti-Atlas region, Morocco (Lepidoptera: Papilionoidea)

R. Verovnik, S. Beretta & M. Rowlings

Abstract

Data from eight butterfly surveys, mostly within the last 10 years, were combined to improve the knowledge of the distribution of butterflies in the Anti-Atlas region of Morocco. The records from 40 localities are presented and discussed. A total of 54 species were observed, closely matching the known butterfly fauna of the region. Interesting records for the following species are discussed in detail: *Papilio saharae*, *Zerynthia rumina*, *Euchloe falloui*, *Colotis chrysonome*, *Colotis liagore*, *Callophrys avis*, *Cigaritis allardi*, *Tarucus rosaceus*, *Azanus ubaldus*, *Plebejus allardi*, *Melitaea deserticola*, and *Spialia doris*. Of these *Colotis liagore* is recorded for the first time for Morocco, and two eremic species known only from a few localities are shown to be possible residents in the lower Draa Valley in the Assa region: *Colotis chrysonome* and *Azanus ubaldus*. Although we add valuable new information on the distribution of butterflies in Morocco more systematic research would probably yield many additional interesting records.
KEY WORDS: Lepidoptera, Papilionoidea, distribution, Morocco.

Contribución al conocimiento de la fauna de mariposas primaverales del sur de la región Anti-Atlas, Marruecos (Lepidoptera: Papilionoidea)

Resumen

Los datos de ocho muestreos de mariposas realizados durante los 10 últimos años se combinaron para aumentar el conocimiento de las mariposas de la región del Anti-Atlas de Marruecos. Se presentan y discuten los registros de 40 localidades. Se observaron un total de 54 especies, lo que se ajusta a la fauna de mariposas conocida de la zona. Las citas interesantes de las siguientes especies se discuten con detalle: *Papilio saharae, Zerynthia rumina, Euchloe falloui, Colotis chrysonome, Colotis liagore, Callophrys avis, Cigaritis allardi, Tarucus rosaceus, Azanus ubaldus, Plebejus allardi, Melitaea deserticola* y *Spialia doris*. Entre estas, *Colotis liagore* se cita por primera en Marruecos, y dos especies erémicas, conocidas sólo de unas pocas localidades, se muestran como posibles residentes del bajo Valle de Draa en la región de Assa: *Colotis chrysonome* y *Azanus ubaldus.* A pesar de que añadimos una valiosa nueva información sobre la distribución de las mariposas de Marruecos, constatamos que estudios más exhaustivos podrían proporcionar interesantes registros adicionales.
PALABRAS CLAVE: Lepidoptera, Papilionoidea, distribución, Marruecos.

Introduction

Owing to diverse topography, geology, different climatic zones and most importantly the presence of high mountains, Morocco has the most diverse butterfly fauna in the Maghreb region with a total of 136 species recorded (combined from TENNENT, 1996; TARRIER & DELACRE, 2008). The bulk of the diversity is limited to the high mountains, particularly in the Rif and Middle Atlas in the north,

which receive more precipitation and have many faunistic similarities with the nearby Iberian Peninsula. Further south, the fauna of the Anti Atlas is somewhat impoverished, but still includes several Mediterranean elements, especially at higher altitudes (TARRIER, 1996; TARRIER, 1997; TARRIER & DELACRE, 2008).

Based on exhaustive studies of Michel Tarrier one could conclude that the fauna of butterflies of Morocco, and the Anti Atlas in particular, is well studied apart from the skippers which were entirely neglected in his voluminous work. However, little precise faunistic information has been published on the butterflies of the Anti Atlas so far (DE PRINS *et al*., 1984; BOZANO & GIACOMAZZO, 1988; MÉRIT, 2014) or only vague descriptions of the localities are provided (e.g. TARRIER, 1995, 2000, 2011). In order to fill this gap we give detailed information on the distribution of the butterflies, including skippers, in the Anti-Atlas region gathered during recent surveys. The more important finds, including one new record for the country, are discussed in detail.

Material and methods

In the last 10 years eight independent visits by the three authors were made to the southern Anti-Atlas and its surroundings in order to study the butterfly fauna. The region was first visited by MR as early as 2001. The selection of sites and areas with potentially important butterfly habitat for the more recent studies was made before the trips with the aid of Google Earth images. Adult butterflies were either netted using entomological nets and released after identification, or identified in nature without capture.

List of localities

The list of localities contains the relevant toponyms, altitude, coordinates, a short description of the habitat, and dates of the visits. The numbered localities are shown on the map (Fig. 3) and referred to in the results section for each species recorded.

1. Taroudant, Tioute, within the village oasis, 440 m, 30º 23’ 39.21”N, 8º 41’ 57.72”W, oasis with mosaic of small fields and bushy hedges, 3-IV-2013
2. Ouzzoun, Tiferki, along the road from Taliouline to Igherm, 1300 m, 30º 13’ 30”N, 8º 16’ 29”W, dry, bushy slopes, small gullies, 14-IV-2011
3. Igherm, high plateau on the road 7037 about 2 km east of Adar village, 1810 m, 30º 7’ 41.82”N, 8º 21’ 4.00”W, rocky pasture, 10-IV-2009, 14-IV-2011
4. Tata, Taangoumte, road verge in oasis at the SE edge of the village, 1200 m, 30º 1’ 12.73”N, 8º 18’ 22.52”W, rocky road side, sandy meadows, 18-III-2015
5. Igherm, small valley on the road 7037 about 4 km northeast of Igherm, 1840 m, 30º 6’ 29.10”N, 8º 26’ 6.84”W, woody gully with dry grasslands, 10-IV-2009
6. Igherm, along the road 7038 about 6 km west of the town, 1750 m, 30º 4’ 35.76”N, 8º 31’ 9.96”W, dry grasslands, abandoned arable land, orchards, 10-IV-2009
7. Tafraoute, Amzawr, in a small valley NE of the village, 1580 m, 29º 49’ 53.48”N, 8º 44’ 32.26”W, rocky meadows, flowery banks of a dry river, 14-IV-2011, 17-III-2015
8. Tafraoute, Imi n’ Guerdane, side valley at the village, north of Ait-Abdallah, 1500 m, 29º 50’ 11.94”N, 8º 45’ 59.14”W, rocky slopes, small meadows, 10-IV-2009, 17-III-2015
9. Tafraoute, Azgour, dry riverbed and slopes W of the main road SW of the village, 1530 m, 29º 46’ 13.07”N, 8º 47’ 16.79”W, rocky meadows and slopes, dry riverbed, 15-III-2001, 16-III-2001, 1-IV-2013, 6-IV-2013, 17-III-2015, 25-III-2017
10. Tafraoute, Touli, small lateral valleys N of the main road above the village, 1620 m, 29º 45’ 17.81”N, 8º 47’ 17.05”W, rocky meadows and slopes, dry riverbed, 25-III-2017

11. Tafraoute, Titke, small valley N of the village, 1530 m, 29º 45' 2.07"N, 8º 48' 54.17"W, rocky slopes, dry gully, 1-IV-2013, 6-IV-2013
12. Tafraoute, Tizi' N Tarakatin, in the valley NW of the village, 1360 m, 29º 46' 56.95"N, 8º 51' 59.34"W, dry river bed, 14-IV-2011, 6-IV-2013, 25-III-2017
13. Tafraoute, SW side of the pass on the route 7056 before Tanalt, 1710 m, 29º 48' 12.65"N, 9º 5' 2.83"W, shrubby meadows with dwarf bushes, 8-IV-2009, 17-III-2015
14. Tafraoute, Ait Yiftan, in a small valley at the village, 1490 m, 29º 48' 54.35"N, 9º 2' 30.42"W, grassy meadows and orchards, 6-IV-2013
15. Tafraoute, north of Djebl Lekst on the road 7056 around the waterfall visible below the road, 1380 m, 29º 50' 6.58"N, 9º 1' 28.65"W, cultivated meadows, bushes, roadside, 8-IV-2009
16. Tafraoute, Ida Ougnidif, S facing slopes above the road SW of the town, 1380 m, 29º 50' 29.86"N, 9º 1' 30.20"W, bushy and rocky slopes, 6-IV-2013, 17-III-2015
17. Tafraoute, narrow valley few km before Ait-Iftene on the route 7056 from Ida-ou-Gnidif, 1290 m, 29º 50' 42.36"N, 9º 0' 40.26"W, abandoned meadows, rocky slopes, 8-IV-2009
18. Tafraoute, Tiguissas, along sideroad at the bridge N of the village, 1160 m, 29º 52' 28.17"N, 9º 0' 36.60"W, ruderal area, road verge, 17-III-2015
19. Tafraoute, Imhiln, slopes above main road NW of the village, 1300 m, 29º 55' 35.40"N, 9º 0' 32.52"W, dry grassy rocky slopes, 15-III-2001
20. Tafraoute, small hill almost encircled by the road on the route 105 some 30 km SE of Ait-Baha, 1200 m, 29º 58' 9.15"N, 9º 1' 10.82"W, dry grassland on sandy ground, 8-IV-2009
21. Ait Baha, Azour'n'Ali, at the turn for the village, 960 m, 30º 1' 36.61"N, 9º 2' 40.14"W, grassy meadows in dry hills, 1-IV-2013
22. Ait Baha, Tlata Uoanass, in the small side valley near the reservoir, 620 m, 30º 3' 45.41"N, 9º 6' 51.89"W, grasses in dry hills, 15-III-2001
23. Ait Baha, Targua N'Touchka, oasis and the E side valley, 450 m, 29º 52' 39.52"N, 9º 11' 26.08"W, arable land, bushes, gravels, 26-II-2012
24. Ait Baha, Ait Bibi, the pastures along the river NE of the village, 190 m, 29º 51' 47.03"N, 9º 17' 20.08"W, pastures, dry grasslands, arable land, 26-II-2012
25. Tafraoute, small valley 5 km south of Agard Oudad, at the beginning of the road to Ait-Mansour, 1190 m, 29º 39' 32.31"N, 8º 57' 26.01"W, dry river bed, rocky slopes, 9-IV-2009
26. Tafraoute, north side of the pass north of Tlatat Tasrirt town, 1540 m, 29º 37' 56.88"N, 8º 56' 31.95"W, pastures, rocky slopes, 9-IV-2009, 23-III-2017
27. Tafraoute, Taghaout, in the gorge SE of the village, 1430 m, 29º 36' 21.19"N, 8º 50' 51.77"W, small gorge, rocky slopes and meadows, 16-III-2015, 23-III-2017
28. Tafraoute, first part of the gorge at the settlement Ait-Mansour, 1260 m, 29º 32' 54.58"N, 8º 52' 45.26"W, dry rocky slopes, meadows in the palmery, 9-IV-2009
29. Tafraoute, Ida Ouaassam, along small track on N facing slopes of the mountain N of the village, 1450 m, 29º 31' 49.00"N, 9º 6' 6.30"W, rocky and bushy slopes, 16-III-2015
30. Tafraoute, Col du Kerdous, on the ridge S of the hotel, 1250 m, 29º 32' 45.72"N, 9º 20' 21.04"W, rocky slopes with sparse vegetation, 16-III-2015
31. Tafraoute, Col du Kerdous, along the road down from the pass on N slopes, 1050 m, 29º 32' 50.51"N, 9º 21' 25.88"W, pine plantation, rocky slopes, terraces with cultivations, 16-III-2015
32. Tiznit, Sidi Ahmed Ou Moussa, dry river NE of the town, 450 m, 29º 32' 23.38"N, 9º 26' 49.09"W, olive trees plantation with artificial irrigation, 20-III-2016
33. Tiznit, Mirght, pastures north of the village, 830 m, 29º 24' 17.54"N, 9º 43' 18.81"W, small wadi with sparse almond trees, 20-III-2016
34. Tiznit, Mirght, slopes above the road to Guelmin SW of the village, 910 m, 29º 24.545'N, 9º 43.574'W, rocky and bushy slopes dominated by *Euphorbia*, 14-III-2015
35. Assa,Targoumait, along the road to Assa 15 km SE of the town, 500 m, 28º 46' 32.27"N, 9º 27' 29.84"W, rocky and sandy plane with solitary *Acacia* trees, 15-III-2015

36. Assa, edge of dry riverbed at SW edge of the town, 310 m, 28º 36' 8.02"N, 9º 26' 39.99"W, *Acacia* trees and bushes on dry rocky slope, 15-III-2015, 24-III-2017
37. Assa, in the oasis at the town centre, 300 m, 28º 36' 19.93"N, 9º 25' 40.04"W, abandoned meadows, dry riverbed, 15-III-2015
38. Assa, small wadi at the turn for Tuisgui Remz Jdid from the road to Zag, 290 m, 28º 26' 46.37"N, 9º 21' 56.33"W, dry riverbed with *Acacia* trees, 15-III-2015, 21-III-2016, 24-III-2017
39. Assa, Tistguezzemtz, oasis at the dam in the village, 230 m, 28º 24' 53.86"N, 9º 13' 1.21"W, bushy road verges, rocky slopes, ruderal areas, 15-III-2015, 24-III-2017
40. Assa, large wadi south of Ouarkziz Mts. Along the road to Zag, 250 m, 28º 22' 45.31"N, 9º 23' 11.52"W, bushy and sandy area with *Acacia*, 15-III-2015

Results

Table 1.– The distribution of butterflies and skippers in the southern Anti-Atlas, Morocco. The numbering of localities corresponds to the list of localities in Materials and Methods section.

Species	**Localities**
PAPILIONIDAE	
Papilio saharae Oberthür, 1879	30
Iphiclides feisthamelii (Duponchel, 1832)	3, 5, 9, 10, 17, 19, 29
Zerynthia rumina (Linnaeus, 1758)	1
PIERIDAE	
Pieris brassicae (Linnaeus, 1758)	15, 25, 28, 37
Pieris rapae (Linnaeus, 1758)	1, 3, 4, 5, 6, 8, 9, 11, 12, 14, 15, 16, 17, 20, 21, 23, 24, 25, 26, 27, 28, 32, 35, 37
Pontia daplidice (Linnaeus, 1758)	1, 3, 4, 5, 6, 7, 8, 9, 11, 13, 15, 16, 17, 18, 20, 23, 25, 26, 27, 28, 29, 30, 31, 33, 35, 36, 38, 39, 40
Anthocharis belia (Linnaeus, 1767)	1, 9, 12, 14, 15, 16, 17, 21, 23, 24, 25, 26, 27, 28, 29, 31
Euchloe belemia (Esper, 1800)	3, 12, 22, 29, 31, 32, 39
Euchloe charlonia (Donzel, 1842)	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 19, 20, 22, 25, 26, 27, 29, 30, 31, 33, 34, 35, 36, 38, 39, 40
Euchloe crameri Butler, 1869	3, 4, 6, 9, 12, 14, 16, 17, 20, 25, 26, 27, 28, 29, 30, 35, 38, 39, 40
Euchloe falloui (Allard, 1867)	6, 7, 8, 9, 35, 39
Gonepteryx cleopatra (Linnaeus, 1767)	5, 12, 14, 15, 16, 17, 23, 24
Colias croceus (Geoffroy, 1785)	1, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 38
Colotis chrysonome (Klug, 1829)	38
Colotis evagore (Klug, 1829)	4, 8, 10, 11, 27, 28, 38, 39
Colotis liagore (Klug, 1829)	38
LYCAENIDAE	
Callophrys avis Chapman, 1909	12
Callophrys rubi (Linnaeus, 1758)	5, 9, 31
Cigaritis allardi Oberthür, 1909	16, 34
Tomares ballus (Fabricius, 1787)	3, 9, 11, 13, 16, 19, 21, 22, 26,
Tomares mauretanicus (Lucas, 1849)	8, 9, 12, 19, 21, 27, 34
Lycaena phlaeas (Linnaeus, 1761)	1, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 21, 23, 25, 27, 28, 29, 31, 32, 34, 39, 40

Lycaena phoebus (Blachier, 1905)	3, 5, 12, 14, 17, 18
Lampides boeticus (Linnaeus, 1767)	5, 16, 27, 31, 32, 36
Leptotes pirithous (Linnaeus, 1767)	1, 6, 12, 15, 16, 26
Tarucus rosaceus (Austaut, 1885)	7, 12, 32, 36, 38, 39, 40
Tarucus theophrastus (Fabricius, 1793)	2, 3, 7, 12
Zizeeria knysna (Trimen, 1862)	23, 24, 32
Azanus jesous (Stoll, 1782)	38
Azanus ubaldus (Guérin-Méneville, 1849)	36, 38
Cupido lorquinii (Herrich-Schäffer, 1850)	13, 14, 15, 16
Pseudophilotes abencerragus (Pierret, 1837)	7, 8, 9, 10, 11, 16, 19, 23, 25, 27, 28, 29, 30, 34
Glaucopsyche melanops (Boisduval, 1828)	5, 6
Aricia cramera (Eschscholtz, 1821)	2, 5, 18, 25, 27
Plebejus allardi (Oberthür, 1874)	3, 6, 7, 8, 9
Polyommatus celina (Austaut, 1879)	5, 6, 8, 9, 12, 14, 15, 16, 17, 23, 25, 26, 33
Polyommatus punctifera (Oberthür, 1876)	3, 5, 6, 7, 9, 10, 14, 26
NYMPHALIDAE	
Danaus chrysippus (Linnaeus, 1758)	4, 35, 36, 37, 38, 39
Vanessa atalanta (Linnaeus, 1758)	15, 20, 23, 27, 30, 37
Vanessa cardui (Linnaeus, 1758)	1, 3, 4, 5, 6, 7, 8, 9, 13, 15, 16, 17, 19, 20, 22, 25, 26, 27, 28, 29, 30, 31, 34, 35, 37, 38, 39, 40
Melitaea deserticola Oberthür, 1876	4, 7, 9, 11, 27, 28
Melitaea didyma (Esper, 1778)	3, 8, 9, 17, 19, 27, 29, 30, 32
Melitaea punica Oberthür, 1876	2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 15, 17, 25, 26, 27, 30
Pararge aegeria (Linnaeus, 1758)	1, 23, 28
Lasiommata megera (Linnaeus, 1767)	1, 5, 7, 16, 20, 26, 29, 30, 31
Melanargia ines (Hoffmansegg, 1804)	8, 12, 20, 31
HESPERIIDAE	
Carcharodus stauderi Reverdin 1913	16
Carcharodus tripolinus (Verity, 1925)	3, 7, 9, 11, 12, 14, 15, 19, 25, 26, 27, 28, 33
Gegenes pumillio (Hoffmansegg, 1804)	36
Pyrgus onopordi (Rambur, 1839)	3
Spialia ali Oberthür, 1881	7, 9, 10, 11, 12, 15, 23, 25, 26, 30
Spialia doris (Walker 1870)	2, 3, 4, 9, 10, 11, 38, 40
Thymelicus hamza (Oberthür, 1876)	7, 12
Thymelicus lineola (Ochsenheimer, 1808)	16

Discussion

A total of 54 species were encountered during our surveys representing roughly 40% of the fauna of Morocco. The number of observed species exactly matches the number of species listed for Anti-Atlas (excluding Djebel Sioura) by TARRIER & DELACRE (2008), however the skippers are not included in their list. Given the fact that our visits were limited to March and April, thus excluding most of the late flying satyrids, the number of encountered species could be considered exceptionally high.

Among the most common and widespread species encountered during our surveys are habitat generalists like *Pieris rapae*, *Pontia daplidice*, *Euchloe charlonia*, *Euchloe crameri*, and *Lycaena phlaeas* which thrieve in cultivated landscapes. *Vanessa cardui* was common and widespread only in years with abundant precipitation (like in 2009) when the region becomes an important source area for its migration to Europe (STEFANESCU *et al*., 2011). On the other hand, several rare species were observed and these are briefly discussed below:

- *Papilio saharae* (Fig. 7).- This is a known eremic species limited to arid regions at the northern edge of the Sahara and western part of the Arabian Peninsula (PITTAWAY *et al*., 1994). Two specimens were observed along a ridge south of the Col du Kerdous in mid March, so well outside the flight period of the more widespread sister species *P. machaon* (TARRIER & DELACRE, 2008). One of the specimens was already extremely worn indicating its possible emergence as early as February.
- *Zerynthia rumina*.- According to TARRIER & DELACRE (2008) the species is widespread in Djebel Lekst area near Tafraoute, but we were unable to find any despite targeted searching. Our only observation is from the Tiouite village oasis just south of the Souss Valley.
- *Euchloe falloui* (Fig. 4).- Another eremic species limited to desert regions of North Africa and Arabian Peninsula (TENNENT, 1996). Although considered rare in Morocco, the species was widespread and common in 2015 following the rainy winter in the Anti-Atlas, in some places outnumbering the similar and more widespread *E. belemia*. A similar phenomenon was also observed by Tennent in 1994 (TENNENT, 1996). Our records are from Assa region in the south and at much higher altitudes to the east of Tafraoute and Igherm.
- *Colotis chrysonome* (Fig. 6).- There is very limited information available on the distribution of this conspicuous pierid in Morocco where it is considered migratory (TENNENT, 1996). Tarrier's record from the north-eastern Anti-Atlas at Tazenakht falls into that category, as it is beyond the range of the species host plant *Maerua crassifolia* (Capparidaceae). According to RUNGS (1972) the species was found in lower Draa Valley near Auinet Torkoz north-west of Tan Tan. Based on available cartography this town is however much further upstream near Assa giving us a hint to visit this region in search for the species. We found both the host plant and adults in a small wadi south of Assa (Fig. 8) on the road to Zag. Four fresh males were observed in mid March 2015 and in March 2016 the species was again seen in some numbers at the same site. This indicates that the species is resident in this region or at least forms temporary colonies.
- *Colotis liagore*.- Published here for the first time for Morocco and only previously known from the southernmost part of Algeria in the Maghreb (TENNENT, 1996). It shares its host plant with the previous species, therefore its presence in the Assa region could be anticipated. The two specimens observed at the site south of Assa in 2016 were however still a big surprise. They were syntopic with *C. chrysonome*. Given the presence of its host plant, it is possible that it builds temporary colonies in this part of Morocco, however further surveys are needed to confirm its continuous presence so far north. It must be noted that in 2010 the species was photographed on the road between Dhakla and Aoussard much further south in the West Sahara territory (Raoul Beunen, pers. comm.), this being the first record of the species for the country.
- *Callophrys avis*.- This typical west Mediterranean species has so far not been mentioned from the southern Anti-Atlas (TARRIER & DELACRE, 2008). Here we publish records from the region for the first time: the earliest was by Stefano Bossi in 2005 (Bossi, pers. comm.) and we confirmed its presence at Tizi' N Tarakatin by finding two specimens in a dry wadi north-west of the village in March 2017.
- *Cigaritis allardi*.- This attractive lycaenid has very restricted colonies and is therefore easily overlooked and probably under-recorded. We found it at two sites on very different biotopes. The site near Djebel Lekst the habitat corresponds well with the description by TENNENT (1996) - steep rocky slopes covered by bushes, whereas the site at Mirght represents a pasture heavily overgrown with cactus like *Euphorbia* sp. and thorny brooms (possibly *Genista* sp.), which could be the host plant of the species.
- *Tarucus rosaceus*.- In contrast to the scattered records for this species indicated in Tarrier & Delacre (2008) it proved to be much more common in the south. We found it both at higher altitudes near Tafraoute where it is sympatric with *T. theophrasuts* and near Assa where it is the only species of the genus present.
- *Azanus ubaldus*.- Despite its widespread occurrence in dry tropical regions of Africa and Asia including neighbouring regions (TENNENT, 1996) the species has only recently been confirmed

for Morocco (WEISS, 2000), quite unexpectedly for the northern Atlantic coastal region. The species was common on the outskirts of Assa at the edge of a dry wadi during visits in 2015 2016, and 2017. A copula was observed also in a small wadi south of Assa en route to Zag in 2015. Given the abundance of the acacia trees the species is most probably a permanent resident in the region.

- *Plebejus allardi* (Fig. 5).- First reported for Anti-Atlas by BOZANO & GIACOMAZZO (1988) and then raised to a specific rank (*P. antiatlasicus*) by Tarrier (1995). Regardless of its status, the taxon has a very restricted range limited to the southern Anti-Atlas Mountains. We found the species at several sites east of Tafraoute and east of Igherm always in the presence of its larval host plant *Astragalus caprinus* L. which is usually detected before the butterfly. The reported flight period of the species is from April to May (TARRIER & DELACRE, 2008), however we found the species regularly in mid-March, in some cases even worn specimens.
- *Melitaea deserticola* (Fig. 1).- Due to its similarity to the more widespread *M. didyma* its distribution in Morocco is poorly understood. Although our findings are congruent regarding distribution patterns of both species, *M. deserticola* was not rare and was observed syntopic with *M. didyma* at two sites near Azgour and Taghaout, both east of Tafraoute.
- *Spialia doris* (Fig. 2).- This is another eremic species. It has a restricted and fragmented distribution in northern Africa, where it is known only from southwestern Morocco and Egypt. We found the species at several dispersed sites in the southern Anti-Atlas at elevations between 1200 and 1600 m. Interestingly we also found it further south at Assa along the road to Zag in much more arid semidesert environments. It is very likely that the species is also present in similar habitats in nearby Algeria from where it has not been recorded.

The butterfly data coverage for the southern Anti-Atlas, and in Morocco in general, is still insufficient and there are many regions with very limited or no butterfly records. A more systematic approach is needed with future surveys targeted at covering at least some of the unstudied areas. Although the grazing pressure is less intense in Anti-Atlas compared to the Middle and parts of the High Atlas (authors, pers. observ.), negative impacts of overgrazing are evident especially around villages and areas with easy access. As butterflies are very sensitive to such anthropogenic pressure (Numa et al. 2016) our data will be of great value for future comparisons.

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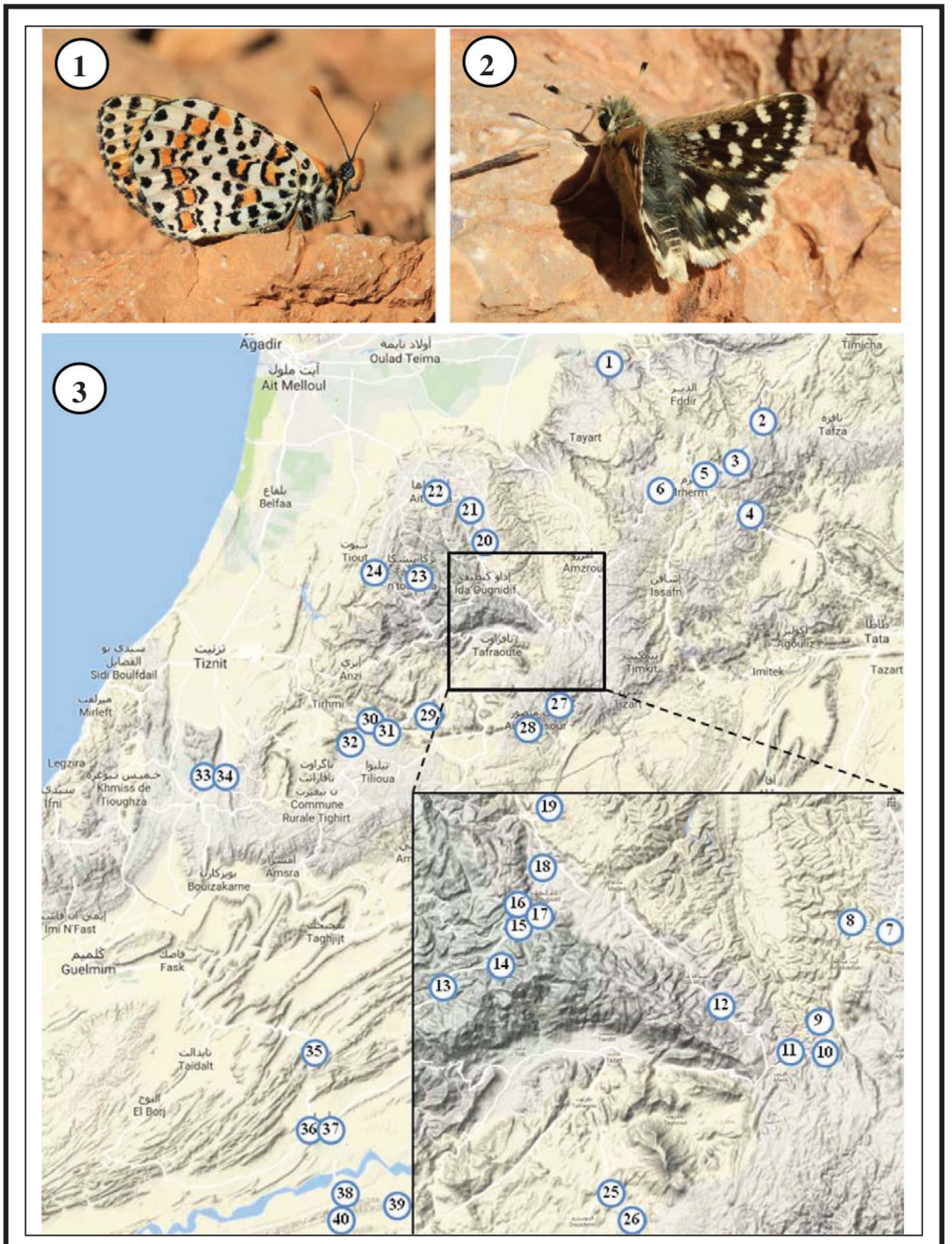
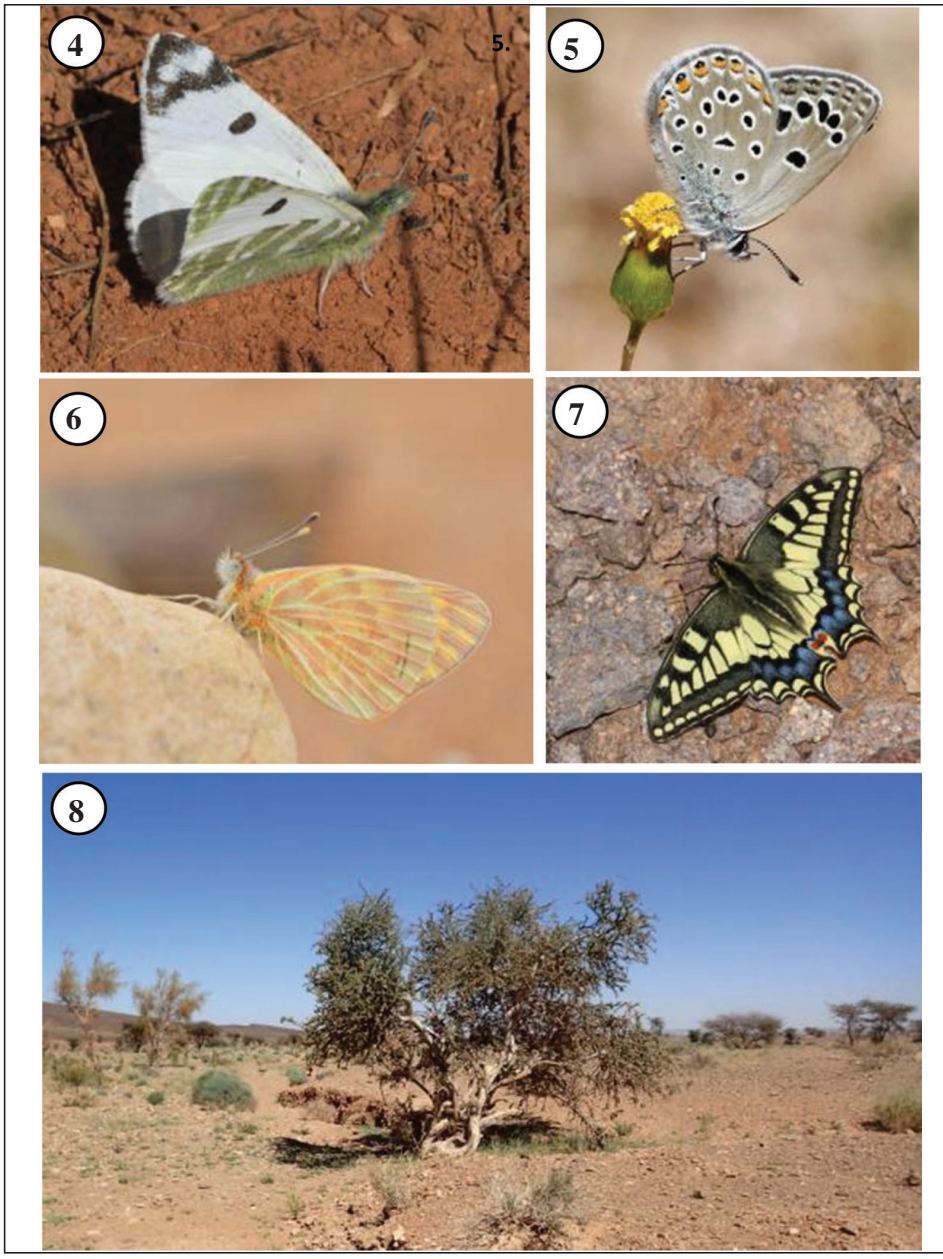


Figures 1-3.– 1. *Melitaea deserticola* is a typical eremic species widespread in Anti-Atlas. **2.** *Spialia doris* is another eremic species with disjunct distribution in northern Africa. **3.** Distribution of the sampling localities. The localities are numbered as in List of localities. The area in central Anti-Atlas is enlarged for clarity.



Figures 4-8.– 4. *Euchloe falloui* was locally common in some years. **5.** *Plebejus allardi* has been observed as early as mid March in Anti-Atlas. **6.** *Colotis chrysonome* was found south of Assa. **7.** *Papilio saharae* was observed hilltopping at Col du Kerdous. **8.** Habitat south of Assa where *Colotis liagore* and *C. chrysonome* were observed. The host plant of both species *Maerua crassifolia* is in the centre of the picture.

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Tortricidae from Ethiopia, 3 (Insecta: Lepidoptera)

J. Razowski, P. Trematerra & M. Colacci

Abstract

Twenty-two species are discussed, and five species are described as new (*Parabactra addisalema* Razowski & Trematerra, sp. n., *Megaherpystis subae* Razowski & Trematerra, sp. n., *Megaherpystis oromiae* Razowski & Trematerra, sp. n., *Eucosmocydia zegieana* Razowski & Trematerra, sp. n., *Thaumatographa amarana* Razowski & Trematerra, sp. n.). New combinations: *Polychrosis acanthis* Meyrick, 1920 is transferred to *Emrahia* Koçak, 1981, *Eucosma accipitrina* Meyrick, 1913, *Eucosma calliarma* Meyrick, 1909, *Eucosma nereidopa* Meyrick, 1927, *Cosmetra maficana* Razowski, 2015, *Cosmetra podocarpivora* Razowski & Brown, 2012, and *Cosmetra taitana* Razowski & Brown, 2015, to *Megaherpystis* Diakonoff, 1969. Known species of *Megaherpystis* are listed. Females of *Endothenia ethiopica* Razowski & Trematerra, 2010, and *Gypsonoma giorgiae* Razowski & Trematerra, 2012 are newly described.
KEY WORDS: Insecta, Lepidoptera, Tortricidae, faunistics, new species, Ethiopia.

Tortricidae de Etiopía, 3
(Insecta: Lepidoptera)

Resumen

Se examinan 22 especies y se describen cinco nuevas especies (*Parabactra addisalema* Razowski & Trematerra, sp. n., *Megaherpystis subae* Razowski & Trematerra, sp. n., *Megaherpystis oromiae* Razowski & Trematerra, sp. n., *Eucosmocydia zegieana* Razowski & Trematerra, sp. n., *Thaumatographa amarana* Razowski & Trematerra, sp. n.). Nuevas combinaciones: *Polychrosis acanthis* Meyrick, 1920 se transfiere a *Emrahia* Koçak, 1981, *Eucosma accipitrina* Meyrick, 1913, *Eucosma calliarma* Meyrick, 1909, *Eucosma nereidopa* Meyrick, 1927, *Cosmetra maficana* Razowski, 2015, *Cosmetra podocarpivora* Razowski & Brown, 2012 y *Cosmetra taitana* Razowski & Brown, 2015, a *Megaherpystis* Diakonoff, 1969. Se presentan las especies conocidas de *Megaherpystis*. Se describe por primera vez la hembra de *Endothenia ethiopica* Razowski & Trematerra, 2010 y *Gypsonoma giorgiae* Razowski & Trematerra, 2012.
PALABRAS CLAVE: Insecta, Lepidoptera, Tortricidae, fauna, nuevas especies, Etiopía.

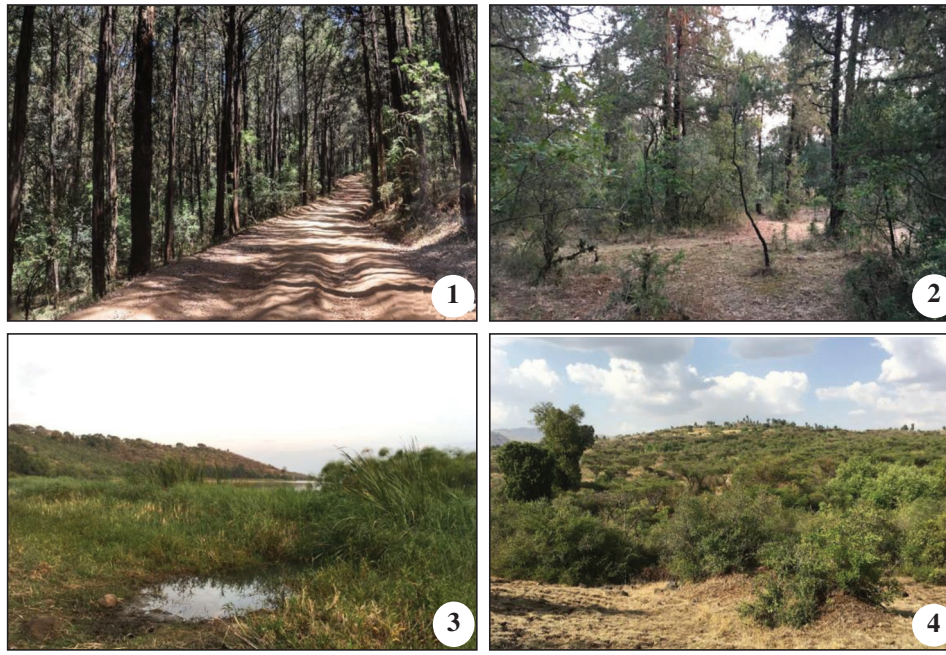
Introduction

Tortricidae of Ethiopia are still very little known and since the MEYRICK (1932) publication of the results of expedition to Abyssinia (Ethiopia) in the years 1926-1927 only the below discussed collections were made.

The history of the entomological expeditions of the University of Molise to southeast Ethiopia in the years 2009 and 2010 were described by RAZOWSKI & TREMATERRA (2010). Those of two expeditions to the Oromia Region by the entomologists of the Molise University and University of Milano were mentioned by same authors (RAZOWSKI & TREMATERRA, 2012).

The material of the present study comes from a new expedition realized on February-March 2017

by the entomologists of the University of Molise to Amhara Region and Oromia Region in Central-Northeast Ethiopia. The itinerary of the expedition was: Oromia Region, Suba Forest, 2500 m/a.s.l., 23-II-2017 (Coord. 8º 58' 18"N, 38º 32' 20"E); Amhara Region, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017 (Coord. 11º 41' 35"N, 37º 19' 13"E); Oromia Region, Suba Forest, 2840 m/a.s.l., 2-III-2017 (Coord. 8º 57' 54"N, 38º 33' 47"E); Oromia Region, Addis Alem, Ambo Park, 2170 m/a.s.l., 3-III-2017 (Coord. 9º 01' 06"N, 38º 21' 35"E) (Figures 1-4).



Figs. 1-4.– Habitats visited during expedition in Ethiopia 2017. **1.** Suba Forest 2500 m/a.s.l. (Oromia Region); **2.** Suba Forest 2840 m/a.s.l. (Oromia Region); **3.** Zegie Peninsula, 1820 m/a.s.l. (Amhara Region); **4.** Addis Alem, Ambo Park, 2170 m/a.s.l. (Oromia Region).

During the above expeditions ca 70 Tortricidae species were collected of which 19 species were described as new. Further 22 species are listed and five new species are described by Razowski & Trematerra in this paper. Eight species were repeatedly found in these collections: *Lozotaenia karchana,* Razowski & Trematerra, 2010; *Lozotaenia sciarrettae* Razowski & Trematerra, 2010; *Procrica ophiograpta* (Meyrick); *Procrica parisii* Razowski & Trematerra, 2010; *Choristoneura palladinoi* Razowski & Trematerra, 2010; *Emrahia tenuivalva* Razowski & Trematerra, 2008; *Endothenia ethiopica* Razowski & Trematerra, 2010; *Gypsonoma giorgiae* Razowski & Trematerra, 2012.

The characteristics of the collection sites are as follows.

SUBA FOREST (Oromia Region), 2500 m/a.s.l. and 2840 m/a.s.l.: Suba Forest is one of the remaining examples of dry Afromontane forest. The vegetation varied with altitude, from high forest on the lower slopes to sub-afro-alpine vegetation at higher altitudes. The natural forest is dominated by *Juniperus procera* Hochst. ex Endl. that grows to 30 m, and forms a relatively open canopy. *Allophylus abyssinicus* (Hochst.), *Euphorbia ampliphylla* Pax, *Maytenus* spp. and *Olea europaea* subsp. *cuspidate* (Wall. ex G. Don) Cif., form the understorey, some *Podocarpus falcatus* (Thunb.) C.N. Page. trees are scattered throughout the forest. At higher altitudes, smaller *Juniperus procera* are mixed with *Erica*

arborea L., the endemic *Jasminum stans* Pax and *Rosa abyssinica* R. Brown. Two giant herbs, *Lobelia gibberoa* Hemsl. and *Solanecio gigas* (Vatke) dominate the sides of the valleys, while the striking *Scadoxus multiflorus* (Martyn) Raf. carpets the forest floor (HAILU *et al*., 2000; SENBETA & TEKETAY, 2001) (Figures 1-2).

ZEGIE PENINSULA (Amhara Region), 1820 m/a.s.l.: the Zegie Peninsula has an area of 1230 ha. The elevation of the area ranges from 1775 to 1985 m/a.s.l.. Three fourth of the total area is surrounded by Lake Tana. This area is dominated by different vegetation such as *Mimusops kummel* Bruce ex A. DC. and *Syzygium guineense* (Willd.) DC. Whereas in the middle of the Peninsula, where the maximum elevation is 1885 m/a.s.l., the density as well as the distribution and type of vegetation varied, dominated by bush and woodland vegetation. In most places inside the Peninsula indigenous trees such as *Apodytus dimidiate* E. Mey. ex Arn., *Celtis africana* N.L. Burm., *Cordia africana* Lam., *Ficus vasta* Forssk., *Millettia ferruginea* (Hochst) Baker and *Rothmannia urcelliformis* (Hiern) Bullock ex Robyns are the dominant ones. Most coffee plantations are grown in the shade of these trees (ALELIGN *et al*., 2007) (Figure 3).

ADDIS ALEM, AMBO PARK (Oromia Region), 2170 m/a.s.l.: this study area could be categorized under Dry Evergreen Montane Forest which is characterized by the dominance of *Juniperus* and *Olea* species (WOLDU *et al*., 1999). The natural vegetation is dominated by shrubs to the large extent, scattered trees and herbaceous species. The study area is characterized by having diverse plant species such as *Albizia schimperiana* Oliv., *Carissa spinarum* L., *Juniperus procera*, *Maytenus arbutifolia* R. Wilczek, *Myrsine africana* L., *Olea europaea* subsp. *cuspidate, Osyris quadripartite* Salzm. ex Decne, *Pterolobium stellatum* (Forssk.) Brenan, etc. However, the vegetation of the area is severely threatened because of anthropogenic activity such as agricultural land expansion and grazing. In addition to this, in many areas, removing of the natural vegetation and replacing it by plantation is common (Figure 4).

Material and methods

Adults of tortricids were collected during the day by net and at night from a white sheet placed behind a 160 Watts mixed light. Genitalia were prepared using standard methods, the abdomen was macerated in 10% KOH and dissected under a stereoscopic microscope, the genitalia were separated and mounted in euparal on a glass slide.

Adults and slides are housed in P. Trematerra Collection, Campobasso (Italy).

Systematic part

ARCHIPINI

Lozotaenia karchana Razowski & Trematerra, 2010

Material examined: 1 ♂ and 2 ♀♀ from Oromia, Suba forest, 2500 m/a.s.l., 23-II-2017; 1 ♀ from Oromia, Suba forest, 2840 m/a.s.l., 2-III-2017.

Remarks: Described from Karcha, Harenna Forest in the Bale Mountains in late January at the altitude of 2350 m and in the Harenna Forest (January, 1600 m) (RAZOWSKI & TREMATERRA, 2010).

Lozotaenia sciarrettae Razowski & Trematerra, 2010

Material examined: 3 ♀♀ from Oromia, Addis Alem, Ambo Park, 2170 m/a.s.l., 3-III-2017.

Described from the Harenna Forest, Karcha Camp from one pair collected late September at the altitude of 2350 m. RAZOWSKI & TREMATERRA (2012) recorded it from the Ilubabor Zone, Bedelle at the Dabeta River. It was collected mid-November at the altitude of 1800 m.

Remarks: The male holotype differs from the female in having slenderer forewing (RAZOWSKI & TREMATERRA, 2010). Facies of the above females is variable as shown in Figures 5, 6, 7.

Procrica ophiograpta (Meyrick, 1933)

Material examined: 3 ♂♂ from Oromia, Suba Forest, 2500 m/a.s.l., 23-II-2017; 4 ♂♂, from Oromia, Suba Forest, 2840 m/a.s.l., 2-III-2017.

Remarks: *P. ophiograpta* was described from Djem-Djem Forest, Ethiopia. RAZOWSKI & TREMATERRA (2010) recorded it from the Bale Mountains (collected late February at the altitude of 2350 m) and, same authors (2012) from Bedelle, Mute Forest (late January, at 2060 m).

Procrica parisii Razowski & Trematerra, 2010

Material examined: 1 ♂ from Oromia, Suba Forest, 2840 m/a.s.l., 2-III-2017.

Remarks: *P. parisii* was described from Dinsho Lodge, Bale Mountains where it was collected in February at the altitude of 3100 m.

The male genitalia were originally mistakenly numbered 43 instead of 46 (RAZOWSKI & TREMATERRA, 2010). The species shows some external variation in the forewing markings and colouration (Figures 8, 24).

Choristoneura palladinoi Razowski & Trematerra, 2010

Material examined: 3 ♂♂ from Amhara, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017.

Remarks: This Ethiopian species was described from Harenna Forest from one male collected late September at the altitude of 1600 m (RAZOWSKI & TREMATERRA, 2010).

OLETHREUTINI

Lobesia semosa Diakonoff, 1992

Material examined: 3 ♂♂ from Oromia, Addis Alem, Ambo Park, 2170 m/a.s.l., 3-III-2017.

Remarks: *L. semosa* was described from the Ambre Mountains, N Madagascar from a single male (Figures 9, 25).

Eccopsis aegidia (Meyrick, 1932)

Material examined: 3 ♀♀ from Oromia, Suba Forest, 2840 m/a.s.l., 2-III-2017.

Remarks: *E. aegidia* was described from Jam-Jam Forest, Ethiopia. The holotype was illustrated by CLARKE (1958), AARVIK (2004) redescribed and illustrated the male and female genitalia of the species. It is known from Kenya and Ethiopia.

Megalota rhopalitis (Meyrick, 1920)

Material examined: 2 ♂♂ from Amhara, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017.

Remarks: *M. rhopalitis* was described from Kenya (Nairobi Forest, 1700 m). According to AARVIK (2004) who redescribed *rhopalitis* it is known from Kenya and Tanzania.

BACTRINI

Bactra stagnicolana Zeller, 1852

Material examined: 1 ♀ from Oromia, Addis Alem, Ambo Park, 2170 m/a.s.l., 3-III-2017.

Remarks: DIAKONOFF (1963) revised this species and provided its distribution. *B. stagnicolana* is known from Mauritius, Nyassaland, South Africa (Cape Province, Southern Rodesia, Zimbabwe, Transvaal: Pretoria, Natal) and Madagascar. Ethiopia is the most north-east stand of the distribution of *stagnicolana* (Figures 10, 26).

***Parabactra addisalema* Razowski & Trematerra, sp. n.** (Figure 11)

Material examined: Holotype ♂ from Oromia, Addis Alem, Ambo Park, 2170 m/a.s.l., 3-III-2017.

Description: Wing span 20 mm. Head and thorax brownish, tegula paler. Foreiwng slender, typical

of the genus. Ground colour brown-yellow; costal strigulae weak, pale; strigulation of wing brownish. Markings brown in form of dorsopostbasal spot, three spots in posterior half of median cell and weak marks from end of the latter to apex of wing. Cilia yellow-brown. Hindwing brownish, creamer apically; cilia similar.

Male genitalia (Figure 27): Uncus narrowed medially, with distal part broad spined apically; socii in form of hairy ends of apical lobes of tegumen; valva broad basally, slender terminally; sacculus with small postbasal group of spines and a large group of terminal spines; aedeagus slender, weakly bent.

Female unknown.

Diagnosis: In the facies, *P. addisalema* is similar to *Bactra lancealana* (Hübner, [1799]) but the valva without bulbous basal part, the terminal lobes of the tegumen and the sacculus similar to those of the Sumatran *Parabactra foederata* (Meyrick, 1909).

Etymology: The specific name refers to the type locality, Addis Alem, Ethiopia.

Emrahia Koçak, 1981

Emrahia Koçak, 1981, Priamus, **1**: 120. Replacement name for *Scoliographa* Diakonoff, 1975.

Scoliographa Diakonoff, 1975, Zool. Meded., **48**: 312. Type species: *Argyroploce hoplista* Meyrick, 1927, Sumatra; nom. preocc.

Remarks: Three species included: *Argyroploce hoplista*, the type-species of *Scoliographa* (Sumatra, India, Taiwan), *Polychrosis acanthis* Meyrick, 1920 (India: Bengal) and *Emrahia tenuivalva* Razowski & Trematerra, 2008 (Mozambique).

The male genitalia of the three are very similar especially of the two lasts mentioned. *E. hoplista* differs from them in deep ventral incision of valva and slender end of uncus.

E. acanthis, **comb. n.** and *E. tenuivalva* have ill-defined ventral incision and may be conspecific. However, they differ in the shape of the sacculus (very shallow in *tenuivalva*). The female genitalia of *hoplista* and the latter have different sterigma and sclerites of antrum. The two Meyrick species are illustrated by CLARKE (1958) and DIAKONOFF (1975). *E. tenuivalva* is here treated as a valid species.

Emrahia tenuivalva Razowski & Trematerra, 2008 (Figure 12)

Material examined: 4 ♂♂ and 1 ♀ from Amhara, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017.

Remarks: *E. tenuivalva* was described from Zitundo and Namaacha, Mozambique where was collected in January in the Acacia savanna and the open savannah (RAZOWSKI & TREMATERRA, 2008).

Description of female genitalia (Figure 28): Sterigma short with lateral lobes; sclerite of antrum uniformly broad, long; signum typical of the tribe.

Endothenia ethiopica Razowski & Trematerra, 2010 (Figure 13)

Material examined: 1 ♂ and 1 ♀ from Amhara, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017.

Remarks: *E. ethiopica* was described from five males collected in Harenna Forest and Dinsho, Geasay Valley, Bale Mountains where it was collected in late September at the altitudes of 2350 and 3000 m. RAZOWSKI & TREMATERRA (2012) recorded it from Ilubabor zone (Bedelle, Mute Forest at 2060 m, and near Bedelle at Dabeda River, late January).

The, above mentioned specimens, characterize with forewings slenderer than those of type series and have shorter terminal edges. The male genitalia of all examined examples seem identical.

The sterigma of *ethiopica* differs from *E. gutturalis* in having much shorter posterior lobe of postostial sterigma and membranous cup-shaped distal part of ductus bursae. Female genitalia of the third related species, *E. albapex* Razowski & Trematerra, 2010 are illustrated by same authors in 2012. It differs from the above mentioned ones by a simple antrum with ill-defined sclerites.

Description of female genitalia, hitherto unknown (Figure 29): Anteostial sterigma in form of belt-like sclerite; postostial sterigma fairly broad with large postmedian lobes; antrum sclerite large with

two ventro proximal processes and dorsal colliculum; distal part of ductus bursae cup-shaped, membranous.

ENARMONIINI

Tetramoera isogramma (Meyrick, 1908) (Figure 14)

Material examined: 6 ♂♂ from Amhara, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017.

Remarks: *T. isogramma* was described from Pretoria, Transvaal, RSA and the type was illustrated by CLARKE (1958) in *Eucosma*; DIAKONOFF (1982) mentioned it from Sri Lanka and South Africa and RAZOWSKI (2015) from South Africa.

EUCOSMINI

Megaherpystis Diakonoff, 1969, Tijdschr. Ent., **112**(3): 97; type-species: *Megaherpystis eusema* Diakonoff, 1969.

Megaherpystis was established for a single Afrotropical species (from Seychelles and Aldabra). Several species were erroneously described or placed in *Cosmetra* Diakonoff, 1977, the genus represented in BROWN catalogue (2005) by two Diakonoff's species and revised by AARVIK (2016). RAZOWSKI & BROWN (2012) redescribed this genus under *Cosmetra*. The list of species included to *Megaherpystis* is as follows.

Megaherpystis accipitrina (Meyrick, 1913), Ann. Transv. Mus., **3**(4) 247 (*Eucosma*) - **comb. n.** Type locality: Barberton, RSA.

Remarks: The holotype, male, was redescribed and illustrated by RAZOWSKI & KRÜGER (2007).

Megaherpystis calliarma (Meyrick, 1909), Ann. Transv. Mus., **2**(1): 8 (*Eucosma*) - **comb. n**. Type locality: Pretoria, RSA.

Remarks: The holotype, female, was redescribed and illustrated by RAZOWSKI & KRÜGER (2007). One male (genital slide 4629, Transvaal Museum) differing from the holotype in having whiter forewing ground colour. RAZOWSKI (2015) recorded it from Royal Natal National Park and Drakensberg, Cathedral Park, RSA.

Megaherpystis maficana (Razowski, 2015), Acta zool. cracov., **58**(1): 46 (*Cosmetra*) - **comb. n**. Type locality: Mafika Lisu Pass, Lesotho, RSA.

Megaherpystis nereidopa (Meyrick, 1927), Exotic Microlepid., **3**: 333 (*Eucosma*) - **comb. n.** Type locality: Kericho, Kenya. *Eucosma phylloscia* (Meyrick, 1937), Exotic Microlepid., **3**: 333 (*Eucosma*). Type locality: N. Bugishu, Uganda.

Remarks: Types of *nereidopa* and *phyllosocia* are illustrated by CLARKE (1958).

Megaherpystis hendrickxi (Ghesquière, 1940), Annls Mus. Congo Belge, (3) **7**(1): 98 (*Polychrosis*). Type locality: Baie du Congo, Congo [Zaire].

Remarks: The holotype was redescribed and illustrated by RAZOWSKI *et al*. (2010) under the generic name *Sycacantha*.

Megaherpystis podocarpivora (Razowski & Brown, 2012), Zootaxa, **32222**: 13 (*Cosmetra*) - **comb. n.** Type locality: Gatamayu Forest, Central Province, Kenya.

Megaherpystis taitana (Razowski & Brown, 2012), Zootaxa, **32222**: 14 (*Cosmetra*) - **comb. n.** Type locality: Ngangao Forest/Taita Hills, Coast Province, Kenya.

***Megaherpystis subae* Razowski & Trematerra, sp. n.** (Figure 15)

Material examined: Holotype ♂ from Oromia, Suba Forest, 2500 m/a.s.l., 23-II-2017; paratype: 1 ♂, same data as holotype.

Description: Wing span 14 mm. Head and thorax brownish cream. Forewing not expanding terminad; costa weakly convex; apex short; termen sinuate. Ground colour brownish cream; strigulation weak, brown. Markings brown consisting of basal blotch diffuse dorsally, median fascia and indistinct subapical and apical elements, all well developed at costa, dorsally and indistinct dorsally, and marked by blackish brown longitudinal lines medially and last towards apex of wing. Cilia brownish. Hindwing brownish, in part translucent, paler basally; cilia concolorous with wing.

Variation: In paratype wing span 13 mm; ground colour browner than in the holotype, markings better visible.

Male genitalia (Figure 30): Uncus slender, broadening terminally, slightly concave apically; socius long, drooping; gnathos weak, slender; valva slender with distinct neck; sacculus almost straight with small convexity at angle; cucullus elongate; aedeagus simple, slender.

Female unknown.

Diagnosis: *C. subae* is related to *C. accipitrina* (Meyrick, 1913) but without uncus which in the latter is well developed, helmet-shaped.

Etymology: The name refers to the type locality, Suba Forest, Ethiopia.

***Megaherpystis oromiae* Razowski & Trematerra, sp. n.** (Figures 16-17)

Material examined: Holotype ♂ from Oromia, Suba Forest, 2840 m/a.s.l., 2-III-2017; paratypes: 3 ♂♂ and 5 ♀♀, same data as holotype.

Description: Wing span 16 mm. Head and thorax pale brownish. Forewing uniformly broad throughout; apex pointed; termen indistintcly concave beneath apex. Ground colour pale brownish; markings dark brown consisting of basal blotch both atrophying dorsally, and apical suffusion. Cilia brownish. Hindwing pale brown, darkening on peripheries. Cilia concolorous with middle of wing.

Male genitalia (Figure 31): Uncus absent; socius drooping, with dorsal thorn; valva rather slender with slender neck and elongate-oval cucullus with rounded ventral lobe; aedeagus short, pointed ventro-terminally.

Female genitalia (Figure 32): Apophyses rather short; anteostial sterigma shallow, membranous; postostial sterigma consisting of two scobinate plates; antrum sclerite slender in proximal half with strongly reduced ventral sack; signa slender.

Diagnosis: *M. oromiae* is closely related to *M. calliarma*; the male of *oromiae* has much slender and longer neck of the valva; from *M. subai* it differs chiefly by the lack of the uncus.

Etymology: The name refers to the type locality, Oromia Region, Ethiopia.

Cosmetra tumulata (Meyrick, 1908) (Figure 18)

Material examined: 1 ♂ from Amhara, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017.

Remarks: *C. tumulata* was decribed from Pretoria and its synonym, *C. neka* Razowski & Brown, 2009 from the Cape Province, RSA.

Gypsonoma giorgiae Razowski & Trematerra, 2012 (Figure 19)

Material examined: 1 ♀ from Amhara, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017.

Remarks: *G. giorgiae* was described from Ilubabor Zone, Bedelle at Dabeda River (1800 m, in mid-November (RAZOWSKI & TREMATERRA, 2012).

Description of female genitalia (Figure 33): Sterigma semioval, rounded proximally, almost straight posteriorly, with small lateral plates; antrum sclerite fairly long; proximal half of ductus bursae broad; signa slender.

Gypsonoma paradelta (Meyrick, 1925)

Material examined: 1 ♂ and 8 ♀♀ from Oromia, Suba Forest, 2500 m/a.s.l., 23-II-2017.

Remarks: *G. paradelta* was described from KwaZulu-Natal, RSA and its synonym *Eucosma picrodelta* Meyrick, 1932 from Djem-Djem Forest, Ethiopia. CLARKE (1958) illustrated the type of the later, RAZOWSKI & KRÜGER (2007) redescribed and figured the holotype of *paradelta*, and AARVIK (2008) revised it, transferred to *Gypsonoma*, and provided its distribution. *G. paradelta* is known from South Africa, Kenya and Tanzania.

GRAPHOLITINI

Eucosmocydia zegieana **Razowski & Trematerra, sp. n.** (Figure 20)

Material examined: Holotype ♂ from Amhara, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017; paratype: 1 ♀, same data as holotype.

Description: Wingspan 13 mm. Head and thorax dark brown, labial palpus dark brown with white scales. Forewing slightly expanding terminad; costa weakly oblique; termen somewhat sinuate. Ground colour white in form of large dorsal patch dorsally marked by small brown spots and darker spots between brown suffusions and strigulae in remaining area of wing; some spots in apical and terminal parts of wing pale orange. Costal strigulae cream. Cilia brown. Hindwing dark brown; cilia paler.

Male genitalia (Figure 34): Tegumen typical of the genus, rather slender; valva slender, long with weak ventral incision; cucullus slender with indistinct ventro-proximal prominence; aedeagus slender, bent.

Female genitalia (Figure 35): Apophyses long; sterigma consisting of pair of weak postostial sclerites; ductus bursae slender, slightly sclerotized in proximal half.

Diagnosis: *E. zegieana* is closely related to *E. pharangodes* (Meyrick, 1920) from Kenya but differs from it in having distinct whitish dorsal patch, slender, long cucullus, and long, slender posterior part of aedeagus, and long anterior membranous part of ductus bursae.

Etymology: The name refers to the type locality, Zegie Peninsula in Ethiopia.

Dracontogena continentalis Karisch, 2005

Material examined: 1 ♀ from Amhara, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017.

Remarks: *D. continentalis* was described as a subspecies of *D. niphadonta* Diakonoff, 1970 from Mbala, Zambia. The genus was revised by AARVIK *et al.* (2012).

Thaumatographa amarana **Razowski & Trematerra, sp. n.** (Figure 21)

Material examined: Holotype ♂ from Amhara, Zegie Peninsula, 1820 m/a.s.l., 28-II-2017; paratypes: 3 ♂♂, same data as holotype.

Description: Wing span 16 mm. Head and thorax pale brown with whitish scales. Forewing weakly expanding terminad; costa slightly convex; termen somewhat oblique, hardly convex. Costal strigulae weak. Ground colour pale brown with whitish admixture; row of whitish strips along termen; strigulation brownish. Markings and suffusions brown consisting of basal, median and postmedian parts. The latter strongly convex beneath costa towards middle. Cilia brownish with darker interruptions. Hindwing greyish brown with some browner strigulae at apex; cilia almost concolorous with middle of wing.

Male genitalia (Figure 36): Tegumen typical of the genus; neck of valva fairly long, moderately broad, without thorns or processes; ventral incision shallow; cucullus oval, symmetrical posteriorly, without ventral lobe, weakly setose ventro-proximally; aedeagus short.

Female unknown.

Diagnosis: *T. amarana* is related to *T. leucotreta* (Meyrick, 1913) but differs from it chiefly in

having short, tapering posteriorly aedeagus; short sacculus; oval, and symmetrical cucullus with almost uniform setation, without group of long ventro-proximal group of setae.

Etymology: The name refers to the type locality, Amhara Region in Ethiopia.

Thaumatographa leucotreta (Meyrick, 1924) (Figures 22-23)

Material examined: 1 ♂ from Oromia, Suba Forest, 2500 m/a.s.l., 23-II-2017; 1 ♀ from Oromia, Addis Alem, Ambo Park, 2170 m/a.s.l., 3-III-2017.

Remarks: *T. leucotreta* is known from Gambia and South Africa. Our specimens have an aberrative colouration and shape of the forewings hence we illustrate the adults and their genitalia (Figures 37-38).

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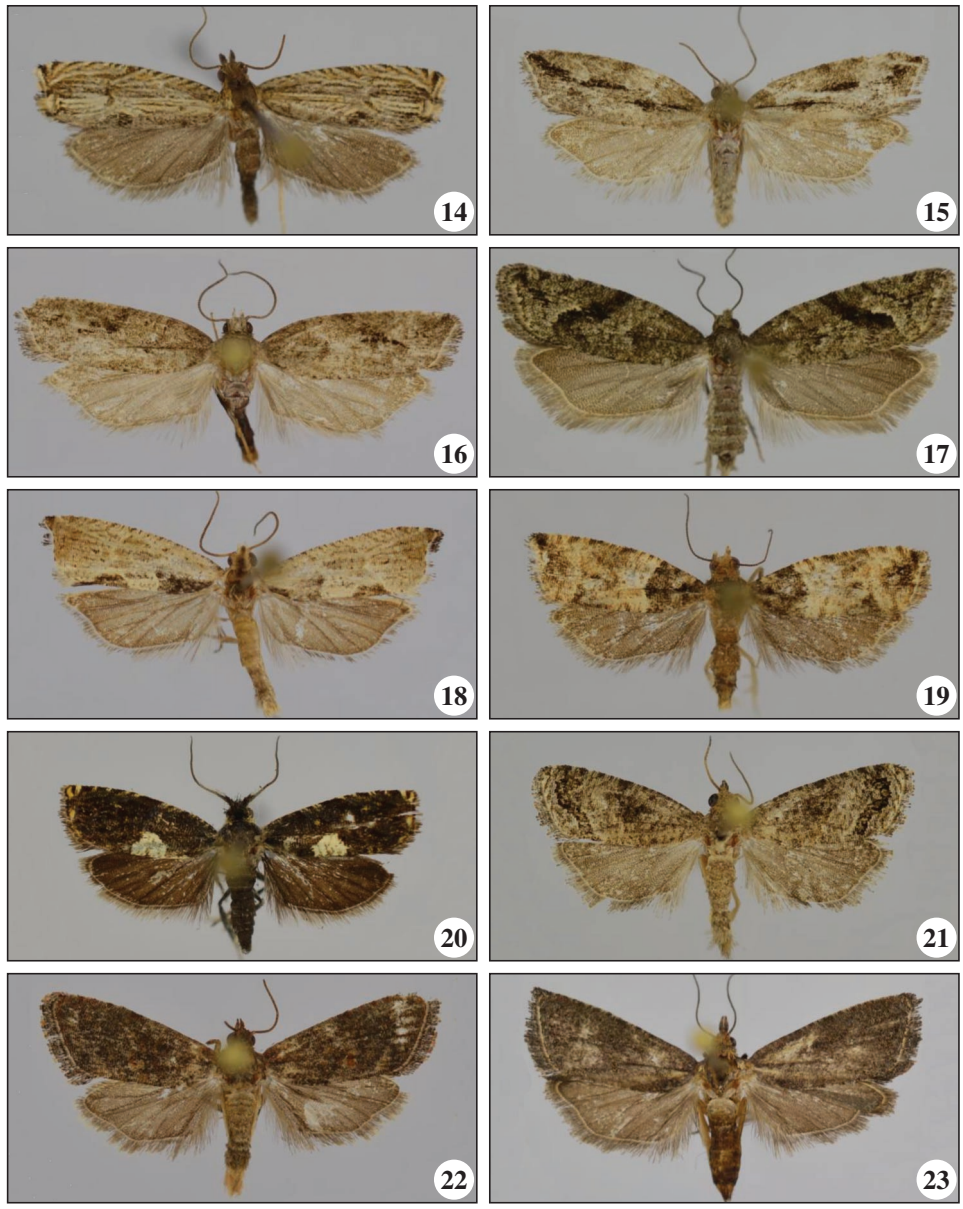
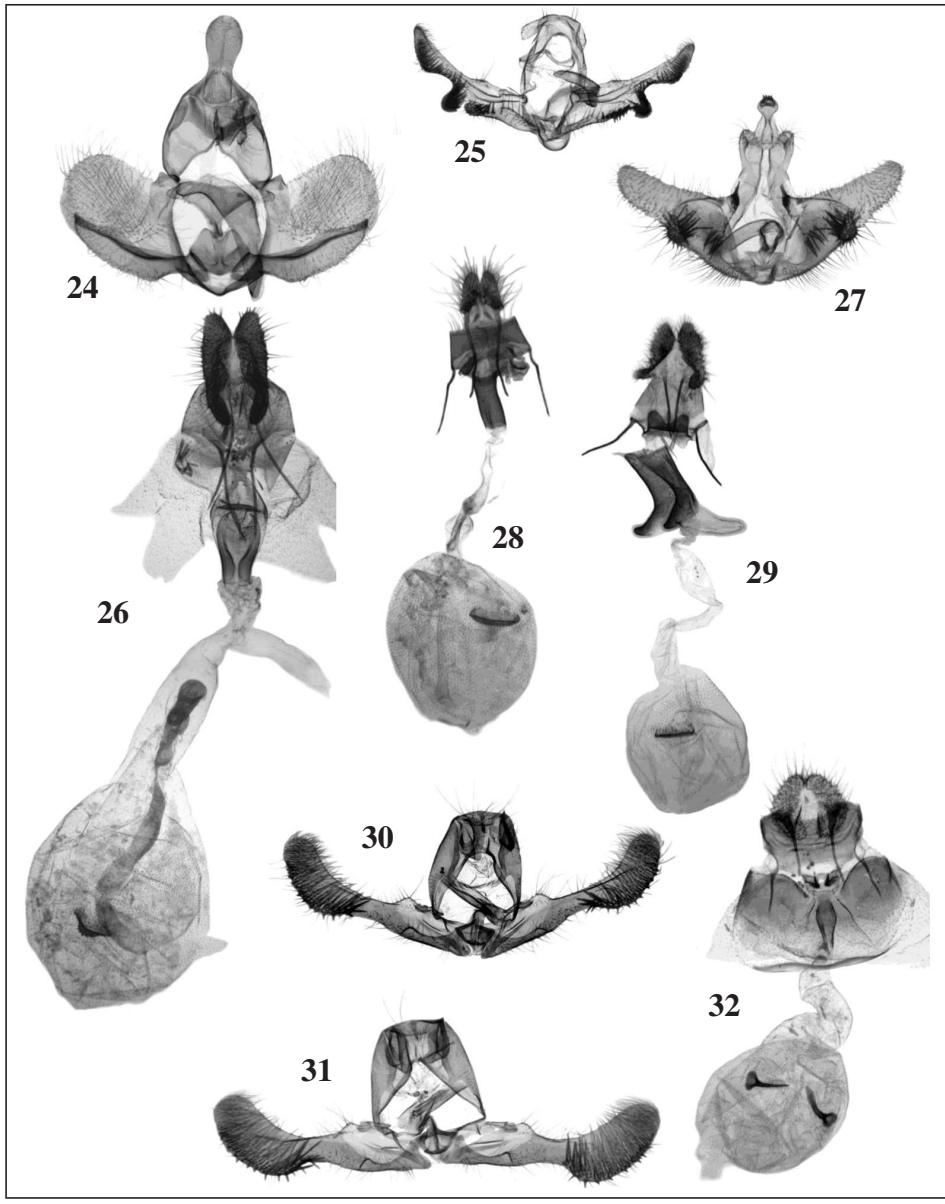
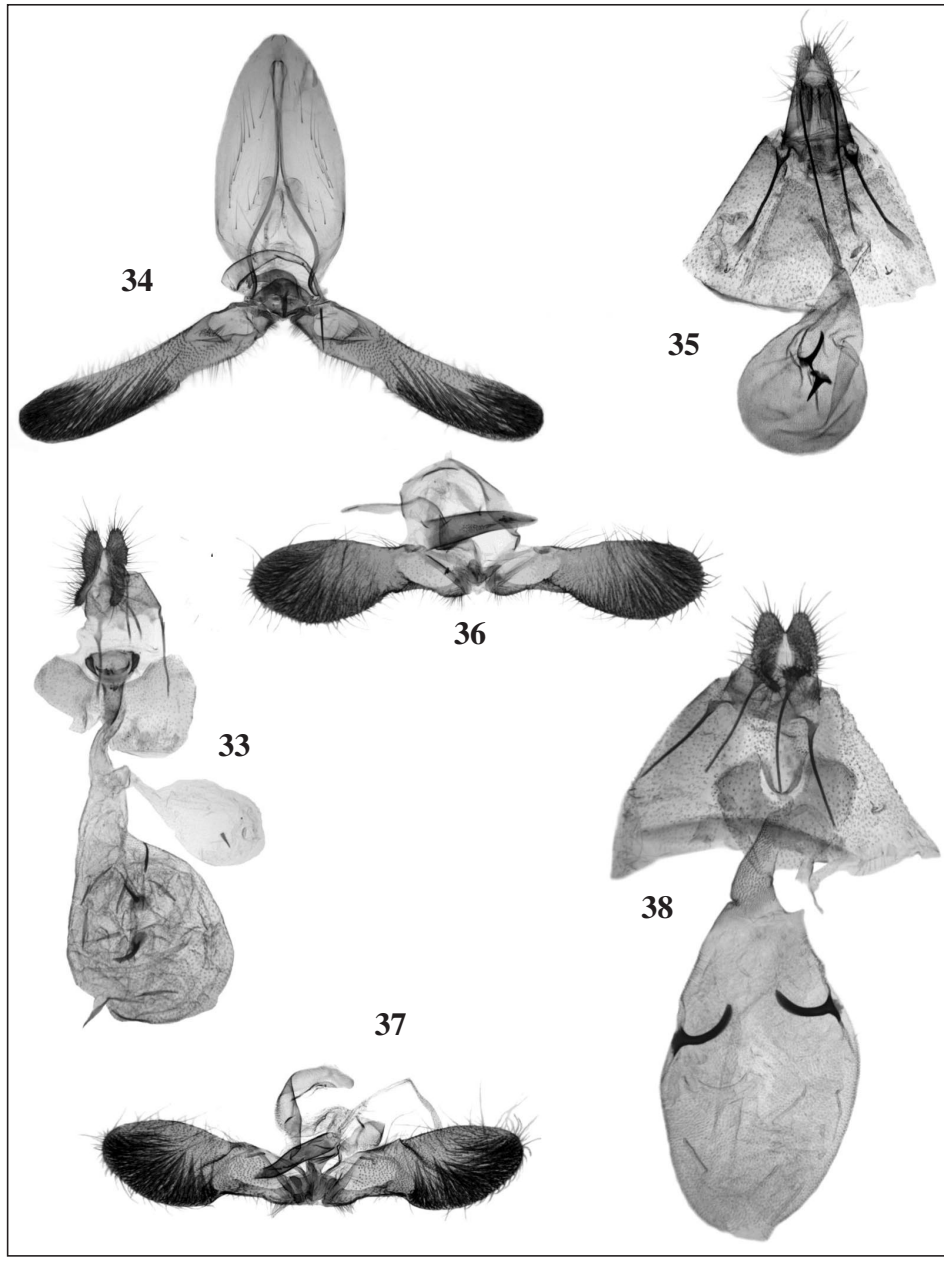
Figs. 5-13.– Adults. **5-7.** *Lozotaenia sciarrettae* Razowski & Trematerra, Ambo Park, Ethiopia; **8.** *Procrica parisii* Razowski & Trematerra, Suba Forest, Ethiopia; **9**. *Lobesia semosa* Diakonoff, Ambo Park, Ethiopia; **10**. *Bactra stagnicolana* Zeller, Ambo Park, Ethiopia; **11.** *Parabactra addisalema* Razowski & Trematerra, sp. n., holotype; **12**. *Emrahia tenuivalva* Razowski & Trematerra, Zegie Peninsula, Ethiopia; **13**. *Endothenia ethiopica* Razowski & Trematerra, Zegie Peninsula, Ethiopia.



Figs. 14-23.– Adults. **14**. *Tetramoera isogramma* (Meyrick), Zegie Peninsula, Ethiopia; **15**. *Megaherpystis subae* Razowski & Trematerra, sp. n., holotype; **16-17**. *Megaherpystis oromiae* Razowski & Trematerra, sp. n., holotype and paratype, male and female; **18**. *Cosmetra tumulata* (Meyrick), Zegie Peninsula, Ethiopia; **19**. *Gypsonoma giorgiae* Razowski & Trematerra, Zegie Peninsula, Ethiopia; **20**. *Eucosmocydia zegieana* Razowski & Trematerra, sp. n., holotype; **21**. *Thaumatographa amarana* Razowski & Trematerra, sp. n., holotype; **22-23**. *Thaumatographa leucotreta* (Meyrick), Suba Forest, Ethiopia



Figs. 24-32.– Genitalia. **24.** *Procrica parisii* Razowski & Trematerra, Suba Forest, Ethiopia; **25**. *Lobesia semosa* Diakonoff, Ambo Park, Ethiopia; **26**. *Bactra stagnicolana* Zeller, Ambo Park, Ethiopia; **27.** *Parabactra addisalema* Razowski & Trematerra, sp. n., holotype; **28**. *Emrahia tenuivalva* Razowski & Trematerra, Zegie Peninsula, Ethiopia; **29**. *Endothenia ethiopica* Razowski & Trematerra, Zegie Peninsula, Ethiopia; **30.** *Megaherpystis subae* Razowski & Trematerra, sp. n., holotype; **31-32**. *Megaherpystis oromiae* Razowski & Trematerra, sp. n., holotype and paratype, male and female.



Figs. 33-38.– Genitalia. **33**. *Gypsonoma giorgiae* Razowski & Trematerra, Zegie Peninsula, Ethiopia; **34-35.** *Eucosmocydia zegieana* Razowski & Trematerra, sp. n., holotype and paratype, male and female; **36**. *Thaumatographa amarana* Razowski & Trematerra, sp. n., holotype; **37-38**. *Thaumatographa leucotreta* (Meyrick), Suba Forest, Ethiopia, male and female.

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Catálogo sistemático preliminar de los Pyraloidea Latreille, 1809 del Parque Natural Cabo de Gata-Níjar (Almería, España) (Lepidoptera: Pyraloidea)

M. Garre, R. M. Rubio, J. J. Guerrero & A. S. Ortiz

Resumen

La superfamilia Pyraloidea está representada en el Parque Natural Cabo de Gata-Níjar (Almería, sureste de España) por 129 especies dentro de las familias Pyralidae y Crambidae. Biogeográficamente, los elementos de distribución mediterránea son mayoritarios (65,9%), incluyendo cuatro endemismos ibéricos: *Hypotia miegi, Hypotia leucographalis, Talis caboensis y Aphomia murciella*. Entre todas las especies estudiadas 19 son nuevas para la provincia de Almería.
PALABRAS CLAVE: Lepidoptera, Pyraloidea, Parque Natural Cabo de Gata-Níjar, Almería, España.

Preliminary systematic checklist of the Pyraloidea Latreille, 1809 from the Cabo de Gata-Níjar Natural Park (Almeria, Spain) (Lepidoptera: Pyraloidea)

Abstract

The Pyraloidea fauna in the Cabo de Gata-Níjar (Almería, southern Spain) Natural Park includes 129 species belonging to families Pyralidae and Crambidae. In relation to biogeography, Mediterranean corotypes are widely represented (65,9%), including four Iberian endemisms: *Hypotia miegi, Hypotia leucographalis, Talis caboensis* and *Aphomia murciella*. The study includes nineteen new records for Almería province.
KEY WORDS: Lepidoptera, Pyraloidea, Cabo de Gata-Níjar Natural Park, Almería, Spain.

Introducción

La superfamilia Pyraloidea es uno de los grupos de Lepidoptera más numerosos que existen con aproximadamente 16.000 especies, de las que en la Península Ibérica se han catalogado más de 519 (VIVES MORENO, 2014). En la provincia de Almería fue AGENJO (1952) el que citó 68 especies de Pyralidae en su obra "Fáunula lepidopterológica almeriense". Posteriormente, YLLA *et al.* (2008) censaron 104 especies y, más recientemente, YLLA *et al.* (2015) inscribieron en dicha lista otras 52. En dichos estudios se recogen algunas capturas realizadas dentro del Parque Natural Cabo de Gata-Níjar y su entorno. El resto de las citas conocidas se deben a estudios esporádicos que otros investigadores realizaron en este espacio natural (HACKMAN, 1968; MUÑOZ, 1992; KING, 2001; HALL, 2006; PÉREZ DE-GREGORIO & REQUENA, 2008a, 2008b, 2010) o proceden de obras de carácter general (SLAMKA, 2006, 2008, 2013; LERAUT, 2012, 2014).

El Parque Natural Cabo de Gata-Níjar es un territorio costero situado en la provincia de Almería de especial interés entomológico debido a su situación geográfica en la Península Ibérica y a su proximidad con el norte de África. Resaltan sus excepcionales valores paisajísticos, geológicos y

botánicos y sus singulares características climáticas que lo convierten en el punto más seco y cálido de Europa (GARRE *et al.,* 2016).

El objetivo de este trabajo es ofrecer un catálogo sistemático de las especies de las familias Pyralidae y Crambidae presentes en el Parque Natural Cabo de Gata-Níjar.

Material y métodos

Se presentan los resultados de los muestreos realizados en diversas localidades del Parque Natural Cabo de Gata-Níjar durante los años 2013, 2014, 2015 y 2016 junto a otros efectuados en años anteriores en el paraje limítrofe de la Rambla de la Granatilla en el municipio de Mojácar. Las estaciones de muestreo se ordenan en la Tabla I:

Tabla I.– Relación de las localidades muestreadas.

Nº	Localidad	Municipio	Altitud (m.s.n.m.)	U.T.M.
1	Salinas de Cabo de Gata	Almería	3	30SWF66
2	Rambla de Morales	Almería	3	30SWF67
3	Playa del Charco	Almería	3	30SWF67
4	Río Alías	Carboneras	8	30SWF99
5	El Saladero	Carboneras	25	30SWF99
6	El Algarrobico	Carboneras	35	30SWF99
7	Cañada de Méndez	Níjar	70	30SWF98
8	Cañada del Madroñal	Níjar	190	30SWF87
9	Cerro de la Cruz	Níjar	220	30SWF87
10	Rambla de la Fuente Vieja	Níjar	60	30SWF98
11	Rambla de Jayón	Níjar	210	30SWF88
12	Rambla de la Granatilla	Mojácar	90	30SWG90

- Estaciones 1-3. Se localizan en el ámbito de los arenales y saladares litorales, colonizados por una flora singular adaptada a la xericidad, inestabilidad y salinidad del suelo.
- Estaciones 4-6. Se ubican en el dominio de la serie fitosociológica del cornical, representada por una formación arbustiva de gran cobertura y diversidad florística.
- Estaciones 7, 10 y 11. Se encuentran en el dominio de la serie del azufaifo, constituida principalmente por sus etapas de degradación y, en gran medida, ocupada por terrenos de cultivo abandonados e invernaderos.
- Estaciones 8 y 9. Se sitúan en el dominio de la serie del lentisco, escasamente representada por su etapa madura y, principalmente, por sus etapas seriales (espartales y tomillares).
- Estación 12. Se halla en el entorno de los retamares edafoxerófilos.

En todas las estaciones se utilizaron trampas de atracción de luz negra y actínica de 6 y 15 vatios (tipo Heath).

La nomenclatura y la ordenación de los taxones en sus correspondientes categorías taxonómicas se ha realizado de acuerdo con VIVES MORENO (2014). En el Apéndice cada taxón se completa con la toponimia distintiva, fecha de captura, número de ejemplares, corotipo y referencias bibliográficas. Las especies citadas por primera vez para la provincia de Almería están marcadas con un asterisco (*). En lo que respecta a las fuentes bibliográficas, se han seleccionado aquellas referidas expresamente al ámbito del Parque Natural, aunque también se han tenido en consideración otras que incluyen las localidades limítrofes de Sierra de Cabrera, Rambla de la Granatilla y El Alquián. En cuanto a los datos

biogeográficos, se han obtenido en su gran mayoría de las principales obras de carácter generalista (GOATER *et al.,* 2005; SLAMKA, 2006, 2008, 2013; LERAUT, 2012, 2014).

Resultados y discusión

El número de especies censadas de los Pyraloidea en el Parque Natural de Cabo de Gata-Níjar y su entorno más próximo es de 129, con 77 especies de la familia Pyralidae y 52 de la familia Crambidae. Esta cifra representa el 24,9% del total de las 519 conocidas en la Península Ibérica (29,3% de Pyralidae y 20,3% de Crambidae) (VIVES MORENO, 2014).

En relación a la distribución biogeográfica de los Pyraloidea, los taxones de distribución mediterránea son mayoritarios en Cabo de Gata-Níjar con el 65,9% del total (Tabla II), aunque también son importantes los elementos de amplia distribución (34,1%), con una aportación significativa de los elementos euroasiáticos (13,2%) y cosmopolitas (11,6%). Probablemente, el porcentaje de especies cosmopolitas y migratorias presentes en este espacio natural podría ser debido a las actividades humanas que se realizan en los alrededores, como es el caso de la agricultura intensiva, el almacenamiento de alimentos y la apicultura. Estas actividades estarían directamente relacionadas con la presencia en el área de estudio de *Galleria mellonella* (Linnaeus, 1758) que ataca a los panales de abejas, *Apomyelois ceratoniae* (Zeller, 1839), *Cryptoblabes gnidiella* (Millière, 1867), *Ostrinia nubilalis mauretanica* Mutuura & Munroe, 1970 y *Palpita vitrealis* (Rossi, 1794), todas ellas plagas de diversos cultivos hortofrutícolas (cítricos, maíz, granado, algarrobo, olivo, almendro). Además, *Cadra calidella* (Guenée, 1845), *C. figulilella* (Gregson, 1871), *Ephestia kuehniella* (Zeller, 1879) y *Plodia interpunctella* (Hübner, [1813]) son especies que ocasionan graves daños en los alimentos almacenados como cereales, frutos secos, pastas alimenticias, legumbres, etc.

Tabla II.– Distribución de las especies de Pyraloidea en las diferentes categorías biogeográficas o corotipos en el Parque Natural Cabo de Gata-Níjar.

Elemento faunístico	nº especies	%	% clases principales
Holártico	3	2,3	34,1
Euroasiático	17	13,2	
Cosmopolita	15	11,6	
Tropical	9	7,0	
Atlanto-mediterráneo	27	20,9	62,8
Asiático-mediterráneo	54	41,9	
Endémico	4	3,1	3,1
TOTAL	**129**	**100,0**	**100,0**

Este espacio natural alberga una interesante fauna adaptada al clima xerotérmico extremo dominante, que soporta las limitaciones edáficas que imponen los hábitats costeros y halofíticos localizados en una parte del área de estudio. Las especies capaces de vivir en estas condiciones son *Agriphila cyrenaicellus* (Ragonot, 1887), *Ancylolomia tripolitella* Rebel, 1909, *Ancylosis yerburii* (Butler, 1884), *Aphomia murciella* (Zerny, 1914), *Arnia nervosalis* Guenée, 1849, *Euchromius cambridgei* (Zeller, 1867), *Euchromius gozmanyi* Bleszynski, 1961, *Euclasta varii* Popescu-Gorj & Constantinescu, 1973*, Evergestis desertalis* (Hübner, [1813]), *Hypotia infulalis* Lederer, 1858, *Pediasia serraticornis* (Hampson, 1900), *Tegostoma erubescens* (Christoph, 1877), etc. Además, han sido catalogados los endemismos ibéricos *Hypotia leucographalis* (Hampson, 1900), *H. miegi* (Ragonot, 1895), *Aphomia murciella* (Zerny, 1914) y *Talis caboensis* Asselbergs, 2009, esta última descrita en el área de estudio. Otros taxones mayormente de distribución atlanto-mediterránea que son poco conocidos y cuentan, en general, con muy pocas citas en la Península Ibérica son: *Anania murcialis* (Ragonot, 1895), *Ancylosis calcariella* Ragonot, 1091, *Cathayia insularum* (Speidel & Schmitz, 1991), *Gymnancyla ruscinonella* (Ragonot, 1888), *Maradana fuscolimbalis* (Ragonot, 1887), *Mesocrambus*

salahinellus (Chrétien, 1917), *Peoria translucidella* (Chrétien, 1911), *Tephris ochreella* Ragonot, 1893, entre otros.

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APÉNDICE

Familia Pyralidae Latreille, 1809
Subfamilia Galleriinae Zeller, 1848

Galleria mellonella (Linnaeus, 1758)

Material estudiado: El Saladero, 7-IX-2014, 1 ♀; Rambla de la Granatilla, 18-VIII-2010, 1 ♂; Rambla de Morales, 17-X-2015, 1 ♀.

Citas bibliográficas: YLLA *et al.* (2015).

Elemento cosmopolita.

Cathayia insularum (Speidel & Schmitz, 1991)

Material estudiado: Rambla de Morales, 17-IV-2015, 1 ♂.

Citas bibliográficas: SPEIDEL & SCHMITZ (1991), YLLA *et al.* (2008).

Elemento atlanto-mediterráneo.

Aphomia (Melissoblaptes) murciella (Zerny, 1914)

Material estudiado: Cañada de Méndez, 17-VIII-2015, 1 ♂, 1 ♀; 18-VIII-2016, 2 ♂♂; 19-VIII-2016, 2 ♂♂.

Citas bibliográficas: ŠUMPICH (2014), restablece la validez de esta especie en contra de la opinión de LERAUT (2014) y no es sinonimia de *A. unicolor* (Staudinger, 1880).

Elemento endémico.

Lamoria anella ([Denis & Schiffermüller], 1775)

Material estudiado: Cañada de Méndez, 15-VIII-2015, 1 ♂; 18-VIII-2015, 1 ♂; 20-VIII-2015, 1 ♀; El Saladero, 16-IV-2013, 1 ♀; 19-V-2013, 1 ♂; 1-IX-2013, 2 ♀♀; 6-IV-2014, 1 ♂; 8-V-2014, 1 ♂; 7-IX-2014, 1 ♀; Río Alías, 8-V-2014, 1 ♀.

Elemento cosmopolita.

Subfamilia Pyralinae Latreille, 1809

Hypotia corticalis ([Denis & Schiffermüller], 1775)

Material estudiado: Cañada de Méndez, 12-VIII-2015, 1 ♂.

Elemento asiático-mediterráneo.

Hypotia infulalis Lederer, 1858

Material estudiado: Cañada de Méndez, 15-VIII-2015, 1 ♂; El Algarrobico, 16-IV-2013, 1 ♂; El Saladero, 27-III-2015, 1 ♂; Playa del Charco, 24-III-2014, 1 ♂; Rambla de Morales, 19-X-2013, 1 ♂; 22-IV-2014, 2 ♂♂; Río Alías, 8-V-2014, 1 ♂.

Citas bibliográficas: PÉREZ DE-GREGORIO & REQUENA (2008b), YLLA *et al.* (2008).

Elemento asiático-mediterráneo.

Hypotia miegi (Ragonot, 1895)

Material estudiado: Cañada de Méndez, 12-VIII-2015, 2 ♂♂; 18-VIII-2015, 1 ♂; 20-VIII-2015, 1 ♀; Rambla de la Fuente Vieja, 10-VIII-2015, 2 ♀♀.

Citas bibliográficas: SLAMKA (2006), YLLA *et al.* (2008).

Elemento endémico.

Hypotia leucographalis (Hampson, 1900)

Material estudiado: Rambla de Morales, 2-V-2014, 1 ♂; 19-V-2014, 2 ♂♂.

Elemento endémico.

Synaphe predotalis (Zerny, 1927)

Material estudiado: Cañada de Méndez, 11-VIII-2015, 1 ♂; 15-VIII-2015, 1 ♂; Playa del Charco, 19-V-2014, 1 ♂; Rambla de la Fuente Vieja, 10-VIII-2015, 1 ♀; Río Alías, 23-VI-2013, 2 ♂♂; 5-VII-2014, 1 ♂.

Elemento atlanto-mediterráneo.

**Pyralis lienigialis* (Zeller, 1843)

Material estudiado: Rambla de la Granatilla, 27-IV-2011, 1 ♀.

Elemento euroasiático.

Aglossa pinguinalis (Linnaeus, 1758)

Material estudiado: Cañada del Madroñal, 27-IV-2016, 1 ♂; Playa del Charco, 24-III-2014, 1 ♂; 8-XI-2014, 1 ♂; Rambla de Jayón, 25-VIII-2016, 1 ♂.

Elemento holártico.

**Aglossa brabanti* Ragonot, 1884

Material estudiado: Río Alías, 8-V-2014, 1 ♂.

Elemento atlanto-mediterráneo.

Stemmatophora combustalis (Fisher von Röslerstamm, 1842)

Material estudiado: Cañada del Madroñal, 17-IV-2014, 1 ♀; Cerro de la Cruz, 16-V-2016, 1 ♂.

Elemento asiático-mediterráneo.

**Stemmatophora vulpecalis* Ragonot, 1891

Material estudiado: El Saladero, 19-V-2013, 1 ♀.

Elemento atlanto-mediterráneo.

**Stemmatophora syriacalis oranalis* (Zerny, 1914)

Material estudiado: El Algarrobico, 23-VI-2013, 1 ♂; El Saladero, 1-VI-2013, 1 ♂; 23-VI-2013, 2 ♂♂; Río Alías, 11-X-2015, 1 ♂.

Elemento asiático-mediterráneo.

Stemmatophora brunnealis (Treitschke, 1829)

Material estudiado: Cañada de Méndez, 20-VIII-2016, 1 ♂; El Saladero, 1-IX-2013, 1 ♂, 1 ♀; Rambla de Jayón, 22-VIII-2016, 1 ♂; 24-VIII-2016, 1 ♀.

Elemento asiático-mediterráneo.

Stemmatophora borgialis (Duponchel, 1833)

Material estudiado: Cañada de Méndez, 12-VIII-2015, 1 ♂; 18-VIII-2015, 1 ♂; El Saladero, 7-IX-1014, 1 ♂; Río Alías, 1-IX-2013, 1 ♂.

Elemento atlanto-mediterráneo.

Maradana (Scotomerodes) fuscolimbalis (Ragonot, 1887)

Material estudiado: El Saladero, 5-VII-2014, 2 ♂♂; Río Alías, 16-IX-2013, 1 ♂.

Citas bibliográficas: VIVES MORENO (2014).

Elemento atlanto-mediterráneo.

Bostra obsoletalis (Mann, 1884)

Material estudiado: Cañada del Madroñal, 17-IV-2014, 1 ♂; 27-IV-2016, 1 ♂; Cañada de Méndez, 13-VIII-2015, 1 ♂; Río Alías, 2-V-2013, 1 ♂; 23-VI-2013, 1 ♀; 7-IX-2014, 1 ♂.

Elemento asiático-mediterráneo.

Loryma egregialis (Herrich-Schäffer, 1838)
Material estudiado: Cañada de Méndez, 12-VIII-2015, 1 ♂; 18-VIII-2015, 1 ♂; 20-VIII-2015, 1 ♂.
Elemento asiático-mediterráneo.

Hypsopygia (Hypsopygia) costalis (Fabricius, 1775)
Material estudiado: El Algarrobico, 7-IX-2014, 1 ♀; Rambla de Morales, 19-V-2014, 1 ♀; Río Alías, 1-IX-2013, 1 ♀.
Elemento euroasiático.

Subfamilia Phycitinae Zeller, 1839

Cryptoblabes gnidiella (Millière, 1867)
Citas bibliográficas: HACKMAN (1968).
Elemento cosmopolita.

Pempeliella ardosiella (Ragonot, 1887)
Material estudiado: Cañada del Madroñal, 17-IV-2014, 2 ♂♂; Cerro de la Cruz, 17-IV-2014, 1 ♂, 1 ♀; El Saladero, 8-V-2014, 1 ♂; Río Alías, 8-V-2014, 1 ♂.
Elemento atlanto-mediterráneo.

**Pempeliella sororiella* Zeller, 1839
Material estudiado: Cañada del Madroñal, 13-III-2015, 1 ♂; 27-IV-2016, 1 ♂; El Algarrobico, 8-V-2014, 1 ♀; El Saladero, 11-X-2015, 1 ♂; 24-II-2016, 2 ♂♂; Río Alías, 2-V-2013, 1 ♂; 19-V-2013, 2 ♂♂.
Elemento asiático-mediterráneo.

Pseudosyria malacella (Staudinger, 1870)
Material estudiado: El Saladero, 19-V-2013, 1 ♂; 3-III-2014, 1 ♂; Río Alías, 24-II-2016, 1 ♂.
Citas bibliográficas: YLLA *et al.* (2008).
Elemento atlanto-mediterráneo.

Khorassania compositella kalischiella (Staudinger, 1870)
Material estudiado: Cañada de Méndez, 18-VIII-2015, 1 ♂.
Citas bibliográficas: YLLA *et al.* (2008).
Elemento euroasiático.

Neurotomia coenulentella (Zeller, 1846)
Material estudiado: Playa del Charco, 2-V-2014, 4 ♂♂.
Elemento asiático-mediterráneo.

Denticera divisella (Duponchel, 1843)
Material estudiado: El Saladero, 16-IX-2013, 1 ♀; Rambla de Morales, 24-III-2014, 1 ♂; 23-II-2015, 1 ♂; 17-IV-2015, 1 ♂.
Citas bibliográficas: KING (2001).
Elemento tropical.

Pima boisduvaliella (Guenée, 1845)
Citas bibliográficas: YLLA *et al.* (2008).
Elemento holártico.

Etiella zinckenella (Treitschke, 1832)

Material estudiado: Cañada de Méndez, 17-VIII-2015, 1 ♂; 18-VIII-2016, 1 ♀; El Algarrobico, 8-VII-2013, 1 ♂; El Saladero, 19-V-2013, 1 ♂; 6-IV-2014, 1 ♀; Rambla de Morales, 2-V-2014, 1 ♀.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento cosmopolita.

Merulempista turturella numidella (Ragonot, 1890)

Material estudiado: Playa del Charco, 2-V-2014, 2 ♂♂; Rambla de Morales, 22-IV-2014, 1 ♂; 2-V-2014, 2 ♂♂; 9-X-2016, 1 ♂; Río Alías, 6-IV-2014, 2 ♂♂.

Elemento asiático-mediterráneo.

Merulempista ragonoti Rothschild, 1913

Material estudiado: El Algarrobico, 3-III-2014, 2 ♂♂; El Saladero, 27-III-2015, 1 ♀; Río Alías, 27-III-2015, 3 ♀♀.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento atlanto-mediterráneo.

Tephris ochreella Ragonot, 1893

Material estudiado: Río Alías, 1-VI-2013, 1 ♂; 8-VII-2013, 1 ♀.

Citas bibliográficas: YLLA *et al.* (2008) la citan como *Tephris cyriella* (Erschoff, 1874). Sin embargo, VIVES MORENO (2014) considera que las citas ibéricas deben referirse a *T. ochreella*.

Elemento atlanto-mediterráneo.

**Alophia combustella* (Herrich-Schaffer, 1855)

Material estudiado: Cañada de Méndez, 17-VIII-2015, 1 ♂, 1 ♀; El Algarrobico, 5-VII-2014, 1 ♀; El Saladero, 5-VII-2014, 1 ♂, 1 ♀.

Elemento asiático-mediterráneo.

Pempelia brephiella (Staudinger, 1879)

Material estudiado: Playa del Charco, 9-XI-2015, 1 ♂; Río Alías, 24-II-2016, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2015).

Elemento asiático-mediterráneo.

Pempelia palumbella ([Denis & Schiffermüller], 1775)

Material estudiado: Cañada de Méndez, 15-VIIII-2015, 1 ♀; Cerro de la Cruz, 17-III-2014, 2 ♂♂; El Saladero, 2-V-2013, 1 ♂; 6-IV-2014, 1 ♂; Rambla de la Fuente Vieja, 10-VIII-2015, 1 ♀.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento euroasiático.

**Psorosa mediterranella* Amsel, 1953

Material estudiado: Cañada de Méndez, 13-VIII-2015, 1 ♂, 1 ♀; 20-VIII-2015, 1 ♂; 19-VIII-2016, 1 ♀.

Elemento asiático-mediterráneo.

Phycita diaphana (Staudinger, 1870)

Material estudiado: Rambla de Morales, 9-X-2016, 1 ♂.

Elemento asiático-mediterráneo.

Amphithrix sublineatella (Staudinger, 1859)

Material estudiado: Cañada del Madroñal, 16-V-2016, 1 ♂; El Saladero, 19-V-2013, 1 ♂; 1-VI-2013, 1 ♂; Rambla de Morales, 2-V-2014, 1 ♂; Rambla de Jayón, 26-VIII-2016, 1 ♂.

Elemento asiático-mediterráneo.

Epischnia illotella Zeller, 1839

Material estudiado: Cañada del Madroñal, 17-IV-2014, 1 ♂; 13-III-2015, 2 ♂♂; Cerro de la Cruz, 4-IV-2015, 1 ♂; El Saladero, 8-VII-2013, 1 ♂, 1 ♀; 6-IV-2014, 1 ♂; 24-II-2016, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento asiático-mediterráneo.

**Nephopterix angustella* (Hübner, 1796)

Material estudiado: El Algarrobico, 11-X-2015, 1 ♂.

Elemento euroasiático.

Oxybia transversella (Duponchel, 1836)

Material estudiado: El Saladero, 2-V-2013, 1 ♂; 15-II-2015, 1 ♀; Río Alías, 19-V-2013, 1 ♂; 24-II-2016, 1 ♂.

Elemento asiático-mediterráneo.

**Acrobasis (Acrobasis) bithynella* Zeller, 1848

Material estudiado: Cañada del Madroñal, 31-X-2016, 1 ♂, 1 ♀; El Algarrobico, 1-XI-2013, 1 ♀; El Saladero, 20-XI-2013, 1 ♀; 25-X-2014, 2 ♂♂, 1 ♀; Río Alías, 20-XI-2013, 1 ♀.

Elemento atlanto-mediterráneo.

Acrobasis (Acrobasis) obliqua (Zeller, 1847)

Material estudiado: El Algarrobico, 6-IV-2014, 1 ♀; El Saladero, 6-IV-2014, 1 ♂, 1 ♀; Rambla de Morales, 2-V-2014, 1 ♀.

Citas bibliográficas: YLLA *et al.* (2015).

Elemento asiático-mediterráneo.

**Acrobasis (Acrobasis) glaucella* Staudinger, 1859

Material estudiado: El Saladero, 8-VII-2013, 1 ♀; 5-VII-2014, 3 ♀; Río Alías, 5-VII-2014, 1 ♂.

Elemento asiático-mediterráneo.

**Acrobasis (Acrobasis) centunculella* (Mann, 1859)

Material estudiado: El Saladero, 6-I-2014, 1 ♂; 3-II-2014, 3 ♂♂; 3-III-2014, 1 ♂.

Elemento asiático-mediterráneo.

Apomyelois ceratoniae (Zeller, 1839)

Material estudiado: Cañada de Méndez, 20-VIII-2015, 1 ♀; El Algarrobico, 6-IV-2014, 1 ♂; 5-VII-2014, 1 ♂; El Saladero, 1-XI-2013, 1 ♂; 8-V-2014, 1 ♂, 1 ♀; 5-VII-2014, 1 ♂; Río Alías, 11-X-2015, 1 ♀.

Elemento cosmopolita.

Myelois circumvoluta (Geoffroy, 1785)

Material estudiado: Cañada del Madroñal, 27-IV-2016, 1 ♂; Río Alías, 16-IV-2013, 1 ♂; Rambla de Morales, 17-IV-2015, 1 ♀.

Elemento euroasiático.

Myelois fuscicostella Mann, 1861

Citas bibliográficas: YLLA *et al.* (2008).

Elemento asiático-mediterráneo.

Valdovecaria hispanicella (Herrich-Schäffer, 1855)

Material estudiado: Cañada de Méndez, 18-VIII-2015, 1 ♀; El Algarrobico, 5-VII-2014, 1 ♀; El Saladero, 5-VII-2014, 1 ♂; Río Alías, 1-VI-2013, 2 ♂♂; 23-VI-2013, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento atlanto-mediterráneo.

Bradyrrhoa marianella Ragonot, 1887

Material estudiado: Playa del Charco, 10-V-2013, 1 ♂; Río Alías, 19-V-2013, 1 ♂; 1-VI-2013, 2 ♂♂; 23-VI-2013, 2 ♂♂.

Elemento atlanto-mediterráneo.

Gymnancyla (Gymnancyla) ruscinonella (Ragonot, 1888)

Material estudiado: El Saladero, 6-IV-2014, 1 ♂; 8-V-2014, 1 ♂; 27-III-2015, 1 ♂; Playa del Charco, 19-V-2014, 1 ♂; Rambla de Jayón, 26-VIII-2016, 1 ♀; Rambla de Morales, 2-V-2014, 3 ♀♀; 19-V-2014, 1 ♀; 11-X-2014, 1 ♀; Río Alías, 5-VII-2014, 1 ♀.

Elemento atlanto-mediterráneo.

Euzophera (Euzophera) pinguis concolorella (Ragonot, 1892)

Material estudiado: Rambla de Morales, 19-V-2014, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento euroasiático.

**Euzophera (Euzophera) lunulella* (Costa, 1836)

Material estudiado: Rambla de Jayón, 23-VIII-2016, 1 ♂; 24-VIII-2016, 1 ♀.

Elemento asiático-mediterráneo.

Ancylosis (Ancylosis) cinnamomella (Duponchel, 1836)

Material estudiado: Cerro de la Cruz, 17-III-2014, 1 ♂; El Algarrobico, 15-II-2015, 1 ♂; El Saladero, 2-V-2013, 1 ♂; 3-III-2014, 1 ♂; 27-III-2015, 1 ♂; Playa del Charco, 9-X-2016, 1 ♂.

Elemento euroasiático.

Ancylosis (Ancylosis) maculifera Staudinger, 1870

Material estudiado: Cañada del Madroñal, 17-III-2014, 2 ♂♂; Playa del Charco, 24-III-2014, 2 ♂♂; Rambla de Jayón, 25-VIII-2016, 1 ♂.

Citas bibliográficas: ASSELBERGS (2002).

Elemento euroasiático.

Ancylosis (Cabotia) oblitella (Zeller, 1848)

Material estudiado: Cañada de Méndez, 17-VIII-2015, 1 ♂; 18-VIII-2015, 1 ♂; Rambla de Morales, 3-V-2015, 3 ♂♂.

Citas bibliográficas: AGENJO (1952).

Elemento euroasiático.

Ancylosis (Staudingeria) brunneella Chretien, 1911

Material estudiado: Rambla de Morales, 24-III-2014, 1 ♂; Río Alías, 3-III-2014, 1 ♀; 8-V-2014, 1 ♀.

Citas bibliográficas: inicialmente citada por AGENJO (1952) como *A. samaritanella* (Zeller, 1867), pero posteriormente corregida en AGENJO (1962).

Elemento asiático-mediterráneo.

**Ancylosis (Staudingeria) calcariella* Ragonot, 1901

Material estudiado: Playa del Charco, 10-V-2013, 1 ♂, 1 ♀; 19-X-2013; Rambla de Morales, 24-III-2014, 1 ♂; 22-IV-2014, 4 ♂♂, 1 ♀; 19-V-2014; 1 ♀; 9-X-2016, 1 ♀.

Elemento atlanto-mediterráneo.

Ancylosis (Staudingeria) yerburii (Butler, 1884)

Material estudiado: Rambla de Morales, 17-IV-2015, 1 ♀.

Elemento asiático-mediterráneo.

**Phycitodes binaevella* (Hübner, [1813])

Material estudiado: Cerro de la Cruz, 17-IV-2014, 1 ♂.

Elemento euroasiático.

Phycitodes saxicola (Vaughan, 1870)

Material estudiado: Cañada del Madroñal, 31-X-2016, 1 ♂; Cerro de la Cruz, 31-X-2016, 2 ♂; Rambla de Morales, 2-V-2014, 1 ♂; 17-X-2015, 1 ♂; 9-XI-2015, 1 ♂, 1 ♀.

Elemento euroasiático.

Phycitodes lacteella (Rothschild, 1915)

Material estudiado: Cañada del Madroñal, 17-III-2014, 1 ♂; 13-III-2015, 1 ♀; 16-V-2016, 1 ♂; El Algarrobico, 27-III-2015, 1 ♀; El Saladero, 27-III-2015, 1 ♀; Playa del Charco, 8-XI-2014, 1 ♂; Rambla de Morales, 2-V-2014, 1 ♂; Río Alías, 15-II-2015, 2 ♀♀; 11-X-2015, 1 ♀; 24-II-2016, 1 ♂.

Elemento asiático-mediterráneo.

Phycitodes inquinatella (Ragonot, 1887)

Citas bibliográficas: YLLA *et al.* (2015).

Elemento asiático-mediterráneo

Archiephestia adpiscinella (Chrétien, 1911)

Material estudiado: El Algarrobico, 3-III-2014, 1 ♂; 6-IV-2014, 1 ♂, 1 ♀; El Saladero, 6-IV-2014, 1 ♀; 15-II-2015, 1 ♂, 1 ♀.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento asiático-mediterráneo.

Plodia interpunctella (Hübner, [1813])

Citas bibliográficas: AGENJO (1952).

Elemento cosmopolita.

Ephestia (Ephestia) disparella Ragonot, 1901

Material estudiado: Cerro de la Cruz, 16-V-2016, 1 ♂; El Saladero, 23-VI-2013, 1 ♂.

Elemento asiático-mediterráneo.

**Ephestia (Ephestia) parasitella* Staudinger, 1859

Material estudiado: El Saladero, 8-V-2014, 1 ♂.

Elemento atlanto-mediterráneo.

Ephestia (Anagasta) kuehniella (Zeller, 1879)

Citas bibliográficas: AGENJO (1952).

Elemento cosmopolita.

Ephestia (Anagasta) welseriella (Zeller, 1848)

Material estudiado: Cañada de Méndez, 17-VIII-2015, 1 ♂; 20-VIII-2015, 2 ♀♀; Cerro de la Cruz, 16-V-2016, 1 ♀; Rambla de la Fuente Vieja, 10-VIII-2015, 1 ♂; Rambla de Jayón, 23-VIII-2016, 1 ♂; 26-VIII-2016, 1 ♂.

Elemento asiático-mediterráneo.

Cadra figulilella (Gregson, 1871)

Material estudiado: Cañada del Madroñal, 17-IV-2014, 1 ♂; Cañada de Méndez, 18-VIII-2016, 1 ♀; Rambla de Jayón, 24-VIII-2016, 2 ♀♀; Rambla de Morales, 2-V-2014, 1 ♀; 19-V-2014, 3 ♂♂; 17-X-2015, 1 ♀; 9-X-2016, 1 ♂; Río Alías, 7-IX-2014, 1 ♀.

Elemento cosmopolita.

Cadra calidella (Guenée, 1845)

Material estudiado: El Saladero, 8-VII-2013, 1 ♀; 7-IX-2014, 1 ♀; Rambla de Jayón, 24-VIII-2016, 1 ♀.

Elemento asiático-mediterráneo.

Anerastia lotella (Hübner, [1813])

Citas bibliográficas: HALL (2006).

Elemento holártico.

Coenochroa ablutella (Zeller, 1839)

Material estudiado: Cañada de Méndez, 14-VIII-2015, 1 ♀; Playa del Charco, 22-IV-2014, 1 ♂; 9-X-2016, 1 ♂.

Citas bibliográficas: AGENJO (1952).

Elemento tropical.

Peoria cremoricosta (Ragonot, 1895)

Citas bibliográficas: HALL (2006).

Elemento asiático-mediterráneo.

**Peoria translucidella* (Chrétien, 1911)

Material estudiado: Cañada de Méndez, 19-VIII-2016, 1 ♂.

Elemento atlanto-mediterráneo.

Ematheudes punctellus (Treitschke, 1833)

Material estudiado: Playa del Charco, 10-V-2013, 2 ♂♂; Rambla de Morales, 2-V-2014, 1 ♂; Río Alías, 2-V-2013, 1 ♂.

Elemento asiático-mediterráneo.

Familia Crambidae Latreille, 1810
Subfamilia Spilomelinae Guenée, 1854

Udea ferrugalis (Hübner, 1796)

Material estudiado: Cañada del Madroñal, 13-III-2015, 1 ♂; El Saladero, 2-V-2013, 1 ♂; Rambla de Morales, 23-II-2015, 1 ♂; Río Alías, 1-XI-2013, 1 ♂.

Citas bibliográficas: AGENJO (1952), HACKMAN (1968).

Elemento cosmopolita.

Udea institalis (Hübner, [1819])

Material estudiado: Cañada del Madroñal, 16-V-2016, 1 ♂; Cerro de la Cruz, 16-V-2016, 2 ♂♂.

Elemento asiático-mediterráneo.

Udea numeralis (Hübner, 1796)

Material estudiado: Cañada del Madroñal, 13-III-2015, 1 ♂; Cerro de la Cruz, 17-III-2014, 1 ♂; 31-X-2016, 1 ♂; El Saladero, 23-VI-2013, 1 ♂; 7-IX-2014, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento asiático-mediterráneo.

Mecyna asinalis (Hübner, [1819])

Material estudiado: Cañada del Madroñal, 17-IV-2014, 1 ♀.

Elemento asiático-mediterráneo.

Duponchelia fovealis Zeller, 1847

Material estudiado: Cañada de Méndez, 17-VIII-2015, 1 ♀; Rambla de Morales, 17-IV-2015, 1 ♂; Río Alías, 11-X-2015, 1 ♂.

Elemento cosmopolita.

Dolicharthria aetnaealis (Duponchel, 1832)

Material estudiado: El Algarrobico, 19-V-2013, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2015).

Elemento atlanto-mediterráneo.

Dolicharthria bruguieralis (Duponchel, 1833)

Material estudiado: Cañada del Madroñal, 27-IV-2016, 1 ♀; 16-V-2016, 1 ♀; 31-X-2016, 1 ♂; El Algarrobico, 16-IV-2013, 2 ♀♀; 24-II-2016, 1 ♂; El Saladero, 1-XI-2013, 2 ♀♀; Río Alías, 25-X-2014, 1 ♀; 11-X-2015, 1 ♀.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento tropical.

Antigastra catalaunalis (Duponchel, 1833)

Material estudiado: Cañada de Méndez, 17-VIII-2015, 1 ♀.

Elemento tropical.

Spoladea recurvalis (Fabricius, 1775)

Material estudiado: El Saladero, 1-XI-2013, 1 ♀; 11-X-2015, 1 ♀.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento cosmopolita.

Palpita vitrealis (Rossi, 1794)

Material estudiado: Río Alías, 23-VI-2013, 1 ♀; 15-II-2015, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento cosmopolita.

Arnia nervosalis Guenée, 1849

Material estudiado: Playa del Charco, 19-X-2013, 2 ♂♂; 24-III-2014, 1 ♂.

Elemento asiático-mediterráneo.

Metasia (Metasia) suppandalis (Hübner, [1823])

Material estudiado: Cañada de Méndez, 14-VIII-2015, 1 ♂; 15-VIII-2015, 1 ♀; 19-VIII-2016, 1 ♀; Rambla de Morales, 19-V-2014, 2 ♂♂.

Citas bibliográficas: PÉREZ DE-GREGORIO & REQUENA (2010).

Elemento asiático-mediterráneo.

Metasia (Metasia) hymenalis Guenée, 1854
Material estudiado: Río Alías, 2-V-2013, 1 ♂; 19-V-2013, 1 ♂; 1-IX-2013, 1 ♂; 8-V-2014, 1 ♂.
Citas bibliográficas: PÉREZ DE-GREGORIO (2006).
Elemento atlanto-mediterráneo.

Metasia (Metasia) ibericalis (Ragonot, 1894)
Material estudiado: Cañada de Méndez, 11-VIII-2015, 1 ♀; El Saladero, 23-VI-2013, 1 ♂.
Elemento atlanto-mediterráneo.

Metasia (Clasperia) cuencalis goundafalis Zerny, 1935
Material estudiado: El Saladero, 5-X-2013, 1 ♂; 5-VII-2014, 1 ♂.
Elemento atlanto-mediterráneo.

Nomophila noctuella ([Denis & Schiffermüller], 1775)
Material estudiado: Cañada de Méndez, 20-VIII-2016, 1 ♀; El Saladero, 16-IX-2013, 1 ♀; 25-X-2014, 1 ♀.
Elemento cosmopolita.

Herpetogramma licarsisalis (Walker, 1859)
Citas bibliográficas: YLLA *et al.* (2008).
Elemento tropical.

Subfamilia Crambinae Latreille, 1810

Euchromius vinculellus (Zeller, 1847)
Material estudiado: Cañada de Méndez, 18-VIII-2015, 1 ♀; El Algarrobico, 16-IX-2013, 1 ♀; 8-V-2014, 1 ♀.
Elemento tropical.

Euchromius gozmanyi Błeszyński, 1961
Material estudiado: Rambla de Morales, 3-V-2015, 1 ♂.
Citas bibliográficas: MUÑOZ (1992), PÉREZ DE-GREGORIO (1995).
Elemento atlanto-mediterráneo.

Euchromius ramburiellus (Duponchel, 1836)
Material estudiado: El Algarrobico, 5-VII-2014, 1 ♂; Rambla de Morales, 2-V-2014, 1 ♂; 19-V-2014, 2 ♂♂.
Citas bibliográficas: AGENJO (1952) y PÉREZ DE-GREGORIO (1989) la citaron como *Euchromius superbellus* (Zeller, 1849) que fue corregido posteriormente en PÉREZ DE-GREGORIO & REQUENA (2014).
Elemento asiático-mediterráneo.

Euchromius gratiosella (Caradja, 1910)
Material estudiado: Rambla de Morales, 24-III-2014, 2 ♂♂; 22-IV-2014, 1 ♂, 2 ♀♀; 17-IV-2015, 1 ♀; 3-V-2015, 1 ♀; Salinas de Cabo de Gata, 10-V-2013, 1 ♀.
Citas bibliográficas: AGENJO (1952) y PÉREZ DE-GREGORIO (1989) la citaron como *Euchromius superbellus* (Zeller, 1849) que fue corregido posteriormente en PÉREZ DE-GREGORIO & REQUENA (2014).
Elemento euroasiático.

Euchromius cambridgei (Zeller, 1867)

Material estudiado: Rambla de Morales, 2-V-2014, 3 ♀♀; 11-X-2014, 3 ♀♀; 9-X-2016, 1 ♀; Río Alías, 23-VI-2013, 1 ♂.

Elemento asiático-mediterráneo.

Agriphila trabeatellus (Herrich-Schäffer, 1848)

Material estudiado: Rambla de Morales, 11-X-2014, 1 ♂, 1 ♀; 9-X-2016, 1 ♂; Río Alías, 1-IX-2013, 1 ♀; 16-IX-2013, 1 ♂; 11-X-2015, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento asiático-mediterráneo.

Agriphila cyrenaicellus (Ragonot, 1887)

Material estudiado: Playa del Charco, 11-X-2014, 1 ♂; 9-X-2016, 1 ♂; Rambla de Morales, 17-X-2015, 1 ♂; 9-X-2016, 2 ♂♂; Río Alías, 19-V-2013, 1 ♂; 16-IX-2013, 1 ♂; 5-X-2013, 1 ♂.

Citas bibliográficas: PÉREZ DE-GREGORIO & REQUENA (2008a), YLLA *et al.* (2008).

Elemento asiático-mediterráneo.

Mesocrambus salahinellus (Chrétien, 1917)

Material estudiado: El Algarrobico, 8-VII-2013, 1 ♂; Rambla de Morales, 19-V-2014, 1 ♂.

Elemento atlanto-mediterráneo.

**Xathocrambus delicatellus* (Zeller, 1863)

Material estudiado: Rambla de Jayón, 23-VIII-2016, 2 ♂♂; 26-VIII-2016, 1 ♂.

Elemento atlanto-mediterráneo.

Pediasia serraticornis (Hampson, 1900)

Material estudiado: Playa del Charco, 11-X-2014, 1 ♂; 17-X-2015, 2 ♂♂.

Citas bibliográficas: PÉREZ DE-GREGORIO & REQUENA (2008a), YLLA *et al.* (2008 [como *P. bolivarellus* (Schmidt, 1930)]).

Elemento asiático-mediterráneo.

**Ancylolomia tentaculella* (Hubner, 1796)

Material estudiado: Río Alías, 16-IX-2013, 1 ♂, 1 ♀; Rambla de Jayón, 25-VIII-2016, 1 ♂.

Elemento asiático-mediterráneo.

Ancylolomia disparalis (Hübner, [1825])

Material estudiado: Cañada del Madroñal, 31-X-2016, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento asiático-mediterráneo.

Ancylolomia tripolitella Rebel, 1909

Material estudiado: Cañada del Madroñal, 31-X-2016, 1 ♂; Cerro de la Cruz, 31-X-2016, 1 ♂; El Algarrobico, 16-IX-2013, 2 ♂♂; Rambla de Morales, 11-X-2014, 1 ♀; Río Alías, 5-X-2013, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2008), PÉREZ DE-GREGORIO & REQUENA (2010).

Elemento asiático-mediterráneo.

Talis caboensis Asselbergs, 2009

Material estudiado: Playa del Charco, 11-X-2014, 1 ♂; 9-X-2016, 2 ♂♂; Rambla de Morales, 11-X-2014, 2 ♂♂, 1 ♀; 9-X-2016, 1 ♀.

Citas bibliográficas: SLAMKA (2008), YLLA *et al.* (2008) y LERAUT (2012) la citaron como *T. arenella* Ragonot, 1887.

Elemento endémico.

Subfamilia Pyraustinae Schrank, 1802

Achyra nudalis (Hübner, 1796)

Material estudiado: Cañada de Méndez, 12-VIII-2015, 1 ♀; Rambla de la Fuente Vieja, 10-VIII-2015, 1 ♀; Río Alías, 1-VI-2013, 1 ♀; 1-IX-2013, 1 ♂; 7-IX-2014, 1 ♂.

Elemento tropical.

Palepicorsia ustrinalis (Christoph, 1877)

Material estudiado: Playa del Charco, 10-V-2013, 1 ♂; Rambla de Morales, 10-V-2013, 2 ♂♂; 2-V-2014, 2 ♂♂; 19-V-2014, 1 ♂.

Citas bibliográficas: AGENJO (1952).

Elemento asiático-mediterráneo.

Pyrausta (Pyrausta) sanguinalis (Linnaeus, 1767)

Material estudiado: Cañada de Méndez, 13-VIII-2015, 1 ♂; Rambla de Jayón, 24-VIII-2016, 1 ♂; Río Alías, 2-IV-2013, 1 ♂.

Citas bibliográficas: AGENJO (1952).

Elemento euroasiático.

Uresiphita gilvata (Fabricius, 1794)

Material estudiado: Cañada de Méndez, 18-VIII-2015, 1 ♂; Río Alías, 2-V-2013, 1 ♂; 1-XI-2013, 1 ♂.

Elemento cosmopolita.

Euclasta varii Popescu-Gorj & Constantinescu, 1973

Material estudiado: El Saladero, 1-VII-2012, 1 ♂; 2-V-2013, 1 ♂; 11-X-2015, 1 ♀; Rambla de la Fuente Vieja, 10-VIII-2015, 1 ♀.

Citas bibliográficas: VIVES MORENO (1980 [como *Euclasta perisalis* Vives, 1980], 2014), PÉREZ DE-GREGORIO & REQUENA (2008a), YLLA *et al.* (2008), SLAMKA (2013).

Elemento tropical.

Ostrinia nubilalis mauretanica Mutuura & Munroe, 1970

Citas bibliográficas: AGENJO (1952).

Elemento cosmopolita.

Anania (Ametasia) murcialis (Ragonot, 1895)

Material estudiado: Rambla de Morales, 19-V-2014, 1 ♂, 1 ♀.

Citas bibliográficas: PÉREZ DE-GREGORIO & REQUENA (2008a), YLLA *et al.* (2008), TRÄNKNER & NUSS (2010).

Elemento atlanto-mediterráneo.

Anania (Ebulea) crocealis (Hübner, 1796)

Citas bibliográficas: YLLA *et al.* (2008).

Elemento euroasiático.

Subfamilia Odontiinae Guenée, 1854

Cynaeda dentalis ([Denis & Schiffermüller], 1775)

Material estudiado: Cañada de Méndez, 18-VIII-2016, 1 ♂; Cañada del Madroñal, 27-IV-2016,

1 ♂; Playa del Charco, 19-V-2014, 1 ♂; Rambla de Jayón, 25-VIII-2016, 1 ♂; Río Alías, 1-VI-2013, 1 ♂.

Elemento euroasiático.

**Tegostoma comparalis* (Hübner, 1796)

Material estudiado: Cañada de Méndez, 12-VIII-2015, 1 ♀.

Elemento asiático-mediterráneo.

Tegostoma erubescens (Christoph, 1877)

Citas bibliográficas: VIVES MORENO (2001 [como *Tegostoma mineti* Vives, 2001], 2014), HALL (2006), SLAMKA (2006).

Elemento asiático-mediterráneo.

Aporodes floralis (Hübner, [1809])

Material estudiado: Cañada de Méndez, 13-VIII-2015, 1 ♀; El Saladero, 8-VII-2013, 1 ♂; Río Alías, 8-VII-2013, 1 ♀; 7-IX-2014, 1 ♀.

Elemento asiático-mediterráneo.

Subfamilia Evergestinae Marion, 1952

Evergestis desertalis (Hübner, [1813])

Material estudiado: Río Alías, 2-IV-2013, 1 ♂; 19-V-2013, 1 ♀.

Elemento asiático-mediterráneo.

Evergestis dusmeti Agenjo, 1955

Material estudiado: Cañada del Madroñal, 16-II-2014, 1 ♀; Río Alías, 2-IV-2013, 1 ♂; 3-II-2014, 1 ♂.

Citas bibliográficas: PÉREZ DE-GREGORIO & REQUENA (2008a), YLLA *et al.* (2008).

Elemento atlanto-mediterráneo.

Evergestis politalis ([Denis & Schiffermüller], 1775)

Citas bibliográficas: YLLA *et al.* (2008).

Elemento euroasiático.

Evergestis isatidalis (Duponchel, 1833)

Material estudiado: Cerro de la Cruz, 16-II-2014, 1 ♂, 1 ♀; Río Alías, 16-XII-2013, 1 ♂; 6-I-2014, 2 ♂♂.

Elemento asiático-mediterráneo.

Subfamilia Scopariinae Guenée, 1854

Scoparia staudingeralis (Mabille, 1869)

Material estudiado: Cerro de la Cruz, 17-III-2014, 1 ♂; El Algarrobico, 6-IV-2014, 1 ♀.

Elemento asiático-mediterráneo.

Eudonia angustea (Curtis, 1827)

Material estudiado: Cañada del Madroñal, 16-II-2014, 2 ♂♂, 1 ♀; El Saladero, 6-I-2014, 1 ♂; 3-II-2014, 1 ♂; Playa del Charco, 21-I-2014, 1 ♀; Río Alías, 2-IV-2013, 1 ♂; 20-XI-2013, 1 ♂; 6-I-2014, 1 ♂; 3-II-2014, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2008).

Elemento asiático-mediterráneo.

Eudonia lineola (Curtis, 1827)

Material estudiado: Cañada del Madroñal, 27-IV-2016, 1 ♀.

Elemento atlanto-mediterráneo.

Subfamilia Glaphyriinae Forbes, 1923

Hellula undalis (Fabricius, 1775)

Material estudiado: El Saladero, 25-X-2014, 1 ♂, 1 ♀; Río Alías, 7-IX-2014, 1 ♀; 25-X-2014, 1 ♀.

Elemento tropical.

Subfamilia Cybalomiinae Marion, 1955

Hyperlais lutosalis (Mann, 1862)

Material estudiado: Cañada del Madroñal, 27-IV-2016, 1 ♂.

Citas bibliográficas: YLLA *et al.* (2008 [como *Hyperlais rivasalis* (Vázquez, 1905)], 2015), GASTON *et al.* (2015).

Elemento asiático-mediterráneo.

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    Article to collective volume:
    REBEL, H., 1901.- Famil. Pyralidae-Micropterygidae. 2 Theil.- *In* O. STAUDINGER & H. REBEL. *Catalog der Lepidopteren des palaearctischen Faunengebietes*: 368 pp. R. Friedlander & Sohn, Berlin.
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A new species of the genus *Nycterotis* Felder, 1874 from Central Brazil (Lepidoptera: Notodontidae, Nystaleinae)

V. O. Becker

Abstract

Nycterotis rhudarioides Becker, sp. n., belonging to the *aroata*-group, from Central Brazil, is described.
KEY WORDS: Lepidoptera, Notodontidae, *Nycterotis*, new species, taxonomy, Brazil.

Una nueva especie del género *Nycterotis* Felder, 1874 del centro de Brasil (Lepidoptera: Notodontidae, Nystaleinae)

Resumen

Se describe *Nycterotis rhudarioides* Becker, sp. n., perteneciente al grupo *aroata,* del centro de Brasil.
PALABRAS CLAVE: Lepidoptera, Notodontidae, *Nycterotis*, nueva especie, taxonomía, Brasil.

Introduction

The New World genus *Nycterotis* Felder, 1874, includes 34 species, ranging from the Southern United States to Argentina (BECKER, 2014: 17). Of these, 25 species were treated before [as *Pentobesa* Schaus, 1901, a junior synonym]: the *xylinoides*-group, with five species, by WELLER (1991), and 20, clustered into four species-groups, by THIAUCOURT (2008). The remaining species, including several names treated as junior synonyms, were transferred from other genera, mostly from *Dasylophia* Packard, 1864 by BECKER (2014: 17). The new species described here, restricted to the Cerrado [Savanna] Region of Central Brazil, belongs to the *aroata*-group.

Nycterotis rhudarioides Becker, sp. n.

Material examined: Holotype ♂, BRAZIL: DF, Planaltina, 15º 35'S, 47º 42'W, 1100 m, 15-V-1982 (Becker, VOB 40210); Paratypes: 1 ♂, 1 ♀, same data, but 30-V-1978 (VOB 34688, g. s. 4641), 20-IV-1982 (VOB 39923), respectively; 1 ♂, Idem: GO: Formosa, 800 m, 19-III-1977 (VOB 20221) (VOB).

Description: Male 25 mm (58 mm wingspan) (Fig. 1). Head, thorax, forewings and abdomen gray, mixed with whitish scales. Labial palpi with ventral, longitudinal dark gray line; dark gray dorsally. Antennae gray; tips of pectination white. Forewings with a diffuse, arched, blackish band, from basal third of costa, bending obliquely towards lower margin of cell, following it, then bending evenly towards apex. Hind wings semitransluscent whitish; a few dark scales near tornus, forming a diffuse, narrow wedge-shaped mark pointing inwards. Abdomen paler ventrally, with a diffuse, dark gray line along middle.

Female: 29 mm (63 mm wingspan) (Fig. 2). Similar to male. Wings broader; termen more rounded. Hind wings with dark scales along posterior margin.

Genitalia male (Figs. 3-4): Uncus long, broad, bent ventrad; apex heart-shaped distally; a small tooth near middle, ventrally. Socii long, cylindrical, apex slightly curved outwards. Valvae short, broad; costa evenly curved, broad end with a digital expansion ventrally, bent distad; sacculus a weakelly sclerotized long triangle; vinculum round. Aedeagus straight, cylindrical, gradually expanded distad; apex with a blunt, short tooth dorsally and a pair of short teeth ventrally. Vesica with a few small spines and several deciduous stellate spinulae. Eighth sternite assymmetrical, divided along middle; distal margin very complex, as shown in figure 5.

Diagnosis: Forewings gray with contrasting dark gray marks; hind wings semitransluscent white. It is the only species in the genus lacking an ochreous tinge on the forewings, thus resembling some species of *Rhudara* Thiaucourt, 1996 especially *R. trepida* (Draudt, 1932) and allies. This character makes it readily distinguishable from all other species in the genus. The male genitalia are similar to those of *R. apostatica* (Dyar, 1915) and *R. densissima* (Dyar, 1915), having the apex of valva similar to those of the former and the uncus like that of the latter.

Etymology: Derived from *Rhudara* Thiaucourt, a Heterocampinae genus.

Acknowledgements

Alexander Schintlmeister (Museum Witt, München) and Robiara U. S. Becker (Reserva Serra Bonita) helped with the illustrations, and Scott E. Miller (USNM), revised the manuscript.

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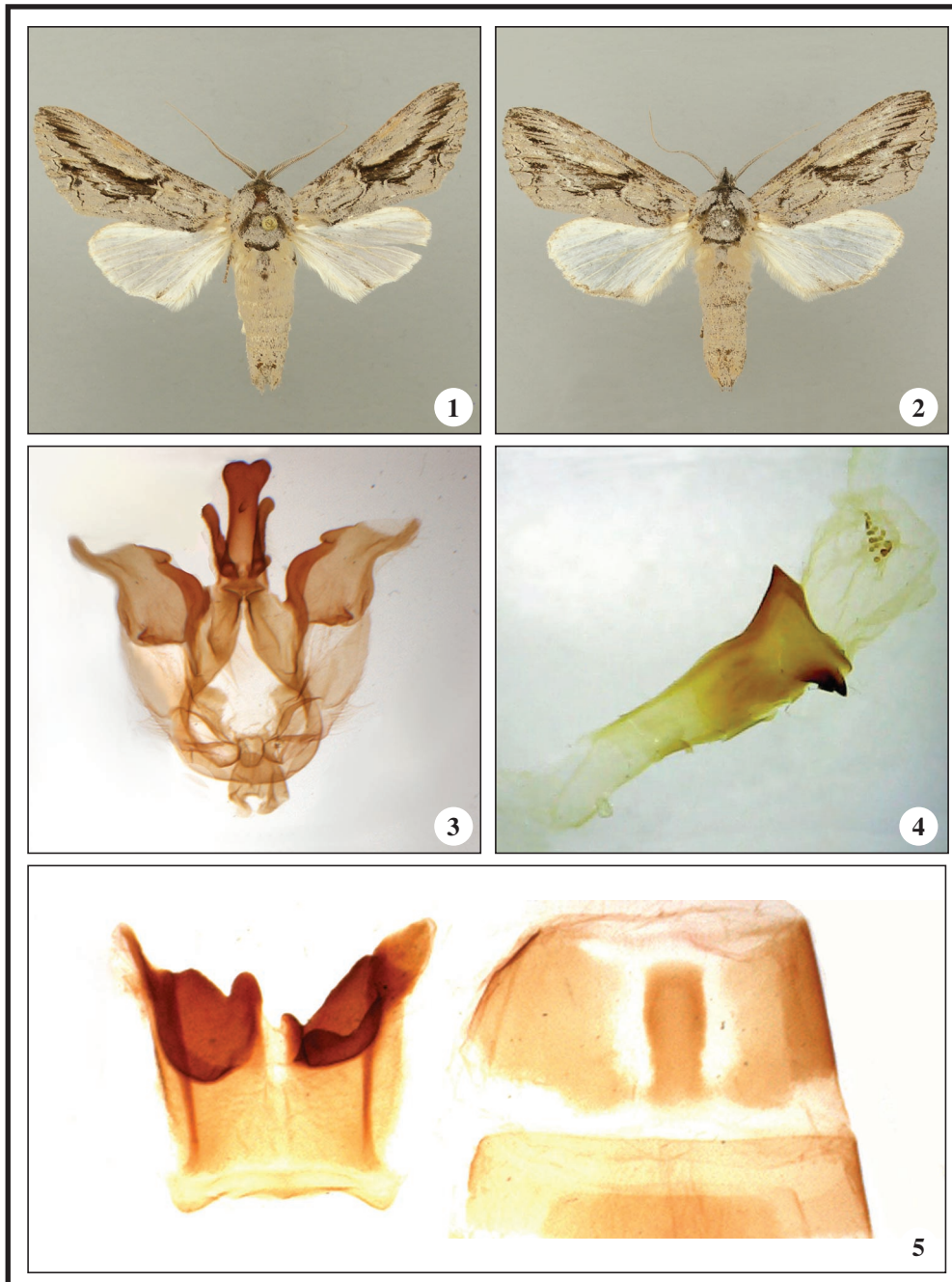

Figs. 1-5.– 1. *Nycterotis rhudarioides* Becker, sp. n., holotype ♂. **2.** Paratype ♀. 3. Paratype ♂, genitalia, ventral view. **4.** Paratype ♂, aedeagus, lateral view. **5.** Paratype ♂, 8th abdominal segment: left sternite, right tergite.

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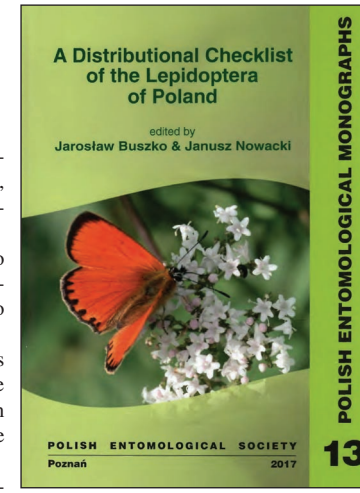
REVISION DE PUBLICACIONES
BOOK REVIEWS

J. Buszko & J. Nowacki
A Distributional Checklist of the Lepidoptera of Poland
222 pp.
Formato: 24 x 17 cm
Polish Entomological Society, Poznań, 2017
ISBN: 978-83-64246-84-5



Bajo la coordinación de nuestros estimados colegas, volvemos a tener una nueva edición de los Lepidoptera que están presentes en Polonia, abarcando un total de 3.254 especies conocidas y repartidas por las diecisiete provincias, que forman este país.

Este libro supone una notable actualización del anterior catálogo publicado en el año 2000 y junto con los autores, es de destacar las aportaciones de los diferentes colaboradores, que han contribuido al estudio de las diferentes familias.

Después de la introducción donde los autores nos informan de los procedimientos seguidos, principalmente la información electrónica de *Fauna Europaea* coordinada por Mr. Ole Karsholt y el Dr. Erik van Nieukerken, así como la más alta clasificación a nivel superfamiliar que siguieron los trabajos de los fallecidos Dr. Kristensen y el Dr. Skalski.

Para la elaboración de esta lista, los autores han seguido tres conceptos básicos, a saber: los datos conocidos en la literatura, el material que se ha colectado y las fotografías que han ido apareciendo en Internet; desgraciadamente, una gran parte de los fondos entomológicos antiguos, fueron dispersados o destruidos durante la Segunda Guerra Mundial, lo que ha conllevado una dificultad añadida, para poder verificar algunos de ellos.

Ya dentro de la parte más importante del libro, se detallan todas y cada una de las especies conocidas y se indican su presencia o ausencia, en las diferentes provincias polacas, lo que ayuda grandemente, a los futuros investigadores, sobre todo cuando analiza la distribución o la posible ampliación de área vital, indicando con diferentes indicadores, si la especie ha sido citada antes de 1960, si está entre los años 1961-1985 o entre los años 1986- 2015.

Es de destacar el apartado "Comentarios" (páginas 145-148), donde los autores nos presentan las principales novedades, apariciones de nuevas especies para la fauna polaca, si las citas anteriores han pasado a sinonimia, sobre nuevas combinaciones, errores de identificación conocidos en anteriores ediciones y que ahora se corrigen, etc.

No podemos terminar estas líneas, sin felicitar a los autores por el gran y excelente trabajo realizado y recomendarlo para todos aquellos que deseen conocer, lo que para nosotros es un entrañable país, como es la fauna lepidopterológica presente en Polonia.

El precio del libro es de 28 euros y los interesados lo pueden pedir a:

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Emisión de sonido en los estados inmaduros de 18 especies de Lycaenidae ibéricos y su posible significado biológico (Lepidoptera: Lycaenidae)

M. Álvarez, M. L. Munguira, E. Ruiz, J. M. Hernández & M. D. Martínez-Ibáñez

Resumen

Se han grabado y analizado las emisiones acústicas en 18 especies de Lycaenidae de la Península Ibérica, tanto mirmecófilas como amirmecófilas. Las especies estudiadas pertenecen a 15 géneros y corresponden a una especie de la tribu Theclini, una de Eumaeini, dos de Lycaenini y 14 Polyommatini. En cinco de ellas sólo se han estudiado las emisiones de la larva y en las otras trece las producidas tanto por la larva como por la pupa. Las larvas de todas las especies estudiadas emitieron sonidos, así como el 77% de las pupas. Se ha estudiado la frecuencia y estructura de la señal emitida en cada especie. El mecanismo de emisión acústica es diferente en larvas y pupas: en las primeras no se ha observado la existencia de un aparato estridulador, mientras que las pupas presentan aparatos estridulatores intersegmentales abdominales. Las larvas de dos especies de *Lycaena*, así como *Cacyreus marshalli* y *Agriades pyrenaicus* producen sonidos en la fase de larva, pero son amirmecófilas. No se han encontrado diferencias en la emisión de sonido entre larvas mirmnecófilas y amirmecófilas. Las pupas de las especies no mirmecófilas no emiten sonido, con la excepción de *Lycaena phlaeas*. Tres de las especies estudiadas (*Glaucopsyche alexis, Iolana debilitata* y *Pseudophilotes panoptes*) no emiten sonido en la fase de pupa aunque son mirmecófilas. Estos resultados indican que la producción de sonido no es un carácter inicialmente relacionado con la mirmecofilia, pero podría estar relacionado con mecnismos de alarma y/o defensa, aunque secundariamente pueda reforzar algunos comportamientos mirmecófilos.
PALABRAS CLAVE: Lepidoptera, Lycaenidae, comportamiento, larva, mirmecofilia, producción de sonido, pupa, Península Ibérica.

Sound production in the immature stages of 18 species of Iberian Lycaenidae and its probable biological function (Lepidoptera: Lycaenidae)

Abstract

We recorded and analysed the acoustic signals of 18 lycaenid butterfly species from the Iberian Peninsula, including myrmecophilous and amyrmecophilous species. The studied species belong to 15 genera and are one Theclini, one Eumaeini, two Lycaenini, and 14 Polyommatini. For five species we studied only the sounds produced by larvae and for 13 the sounds of the larvae and the pupae. Sounds were produced by all the studied larvae and 77% of the pupae. We studied the frequency and structure of the sounds for each species. Sound producing mechanisms are different in larvae and pupae: larvae were not observed to have stridulatory organs while the pupae have intersegmental abdominal stridulatory organs. The larvae of two species of *Lycaena*, *Cacyreus marshalli,* and *Agriades pyrenaicus* produce sounds but are amymercophilous. We did not detect sound production differences between myrmecophilous and amyrmecophilous larvae. Pupae of amyrmecophilous

species do not produce sound, with the exception of *Lycaena phlaeas*. Three of the studied species (*Glaucopsyche alexis, Iolana debilitata,* and *Pseudophilotes panoptes*) are myrmecophilous, but do not produce sounds during the pupal stage. Our results therefore show that sound producing behaviour is not initially related with myrmecophily, but could be related with an alarm and/or defense mechanism, that could secondarily be linked with myrmecophilous behaviours.
KEY WORDS: Lepidoptera, Lycaenidae, behaviour, larva, myrmecophily, pupa, sound production, Iberian Peninsula.

Introducción

La emisión de sonido es un método muy extendido de comunicación inter e intraespecífica tanto en los insectos sociales (HALLIDAY & SLATER, 1983; KIRCHNER, 1997; BILLEN, 2006; CLARIDGE, 2006; HUNT & RICHARD, 2013) como en los Lepidoptera, (FEDERLEY, 1905; YACK *et al.,* 2001; ELIOPOULOS, 2006; BOWEN *et al.,* 2008). En los lepidópteros, la emisión de sonido puede producirse en las fases de larva, pupa y adulto. En los adultos puede originarse al frotar estructuras estriadas de las alas con las patas, como es el caso de algunos Noctuidae (HASKELL, 1961) y en los Sphingidae mediante la expulsión de aire (HINTON, 1948). En las familias Lycaenidae y Riodinidae las larvas y las pupas de la mayoría de las especies producen sonido, mientras que esto no es frecuente en las otras familias de Lepidoptera (DOWNEY & ALLYN, 1973; De VRIES, 1991a; PIERCE *et al.,* 2002; ÁLVAREZ, 2009; ÁLVAREZ *et al.,* 2005). Por otra parte, una elevada proporción de los Lycaenidae y Riodinidae están asociados con hormigas, situación excepcional en los Lepidoptera, por lo que algunos autores piensan que la producción de sonido puede tener relación con la mirmecofilia (De VRIES, 1990; BARBERO *et al*., 2009a; THOMAS *et al.,* 2010).

El método de producción sonora en las larvas de los Lycaenidae no es conocido. Algunos autores indican que puede deberse a contracciones musculares y compresión del aire a través de las tráqueas (SCHURIAN & FIELDLER, 1991; BARBERO *et al.,* 2009b, 2012; SALA *et al.*, 2014). KITCHING *et al.* (1999) describen el sonido emitido por las larvas del Lycaenidae australiano *Jalmenus evagoras* Donovan, 1805*,* indicando que el aparato estridulador podría estar situado en los márgenes de cada segmento abdominal, por encima de la línea del espiráculo. Para otros autores la emisión del sonido puede ser el resultado de una estridulación, y según opinaba NASH (2005), la región tapizada de rugosidades de la cutícula intersegmental en las larvas de cuarta edad del género *Phengaris* podría ser utilizada para producir señales vibratorias.

El sonido producido por las larvas de Lycaenidae, ha sido analizado en escasos trabajos: De VRIES, 1990; 1991a, b; De VRIES *et al*., 1993 y ELFFERICH, 1998. El último autor, ha estudiado el sonido emitido por las larvas de diferentes especies indicando que las larvas de las especies ibéricas *Lycaena phlaeas* (Linnaeus, 1760), *Favonius quercus* (Linnaeus, 1758), *Satyrium ilicis* (Esper, 1779) y *Zizeeria knysna* (Trimen, 1862) emiten sonidos. RIVA *et al.* (2017), también han analizado el sonido de las larvas de doce especies de Lycaenidae, de las cuales *Cacyreus marshalli* (Butler, 1898) y *Scolitantides orion* (Pallas, 1771) son especies ibéricas. Otros autores como BARBERO *et al*. (2009b, 2012) y SALA *et al.* (2014), han registrado la emisión de sonido en larvas y pupas de varias especies de *Phengaris* y su relación con hormigas del género *Myrmica*. Por otra parte, TRAVASSOS & PIERCE (2000), han descrito los diferentes tipos de señales que se producen en la emisión de sonido de las larvas y las pupas del Lycaenidae australiano *Jalmenus evagoras.* Otros trabajos han descrito la emisión sonora en distintas especies sin realizar grabaciones o estudios de sonido (PRELL, 1913; DOWNEY 1966; FIEDLER, 1992).

KLEEMAN en 1774 (citado en DOWNEY, 1966), fue el primer naturalista que observó que las pupas de Lycaenidae emitían sonidos. PRELL (1913) describe el sonido producido por *F. quercus,* indicando que puede deberse a las contracciones de los músculos longitudinales de las zonas dorsolaterales del abdomen. HINTON (1948) indica que los músculos de la pupa están unidos por tonofibrillas a la membrana de la zona intersegmental situadas entre los segmentos abdominales

quinto y sexto, sin quedar claro si esas bandas de músculos pertenecen a la pupa o son estructuras larvarias persistentes. DOWNEY (1966) y DOWNEY & ALLYN (1973) señalan que los sonidos de las pupas pueden producirse por movimientos rápidos dorsoventrales del abdomen, que hacen rozar una placa estriduladora y un rascador presentes en la zona intersegmental de algunos segmentos abdominales. En una completa monografía, ÁLVAREZ *et al.* (2014) describen la estructura del aparato estridulador de las pupas de 35 especies de Lycaenidae ibéricos de las tribus Theclini, Eumaeini, Lycaenini y Polyommatini. Estos autores señalan que la placa estriduladora, localizada en la región posterior del quinto segmento, puede estar constituida por dientes, tubérculos o estrías, mientras que el rascador, situado en la zona anterior del sexto segmento, está formado por dientes.

El primero en describir el sonido emitido por las pupas es PRELL (1913). DOWNEY (1966) menciona el sonido de la pupa de *L. phlaeas* y observa la presencia del aparato estridulador. HOEGH-GULDBERG (1972) describe el sonido en las pupas de algunas especies de Lycaenidae. DOWNEY & ALLYN (1978) identifican tres formas de emisión como resultado de sus análisis de sonido en las pupas de los Lycaenidae: a) señales primarias de pulsos repetidos, audibles por el oído humano, con duración de 5-50 ms y resultantes de perturbaciones sobre la pupa; b) señales secundarias inaudibles para el oído humano (por lo que necesitan amplificación para ser detectadas), formadas por series de pulsos, de una amplitud aproximadamente la mitad que la de las señales primarias y no inducidas; y c) señales terciarias continuas, de intensidad baja y similares a sonidos de fondo. SILVA *et al*. (2014), estudiando Lycaenidae Eumaeini antófagos, señalan que se produce una emisión de sonido al mover el recipiente que contiene las pupas.

Con respecto al significado biológico de las emisiones sonoras, HINTON (1948) establece que dentro de las posibles funciones que puede tener la emisión de sonido en las pupas, la principal sería de tipo defensivo, ya que la pupa estridula cuando es molestada. Por otro lado DOWNEY (1966), especula sobre el papel sexual de la emisión de sonido de las pupas, indicando que éste podría atraer a insectos adultos próximos del sexo opuesto, facilitando que el apareamiento se produzca inmediatamente después de la emergencia del adulto. Sin embargo, también relaciona la emisión de sonido en las pupas con la simbiosis con hormigas (SETTELE *et al.*, 2011) e, incluso, con la función de protección frente a depredadores (DOWNEY, 1967). Para DOWNEY & ALLYN (1973) y DOWNEY (1967) el sonido en las pupas sería un carácter ancestral que apareció inicialmente con una función defensiva y ha podido tener importancia posteriormente en relación con la comunicación con las hormigas. HOEGH-GULDBERG (1972), indica que la hipótesis de mecanismo defensivo en las especies que no están sujetas a depredación se dirigiría hacia la evitación de parásitos más que a la mirmecofilia. Tanto en larvas como en pupas de Lycaenidae han sido descritos diversos parasitoides (OBREGÓN *et al*., 2015) y, de hecho, varios de los individuos estudiados por nosotros se encontraban parasitados. En ÁLVAREZ *et al.* (2014) se indica que la producción de sonido sería un carácter ancestral y ha podido ser utilizado por algunas especies en un contexto de mirmecofilia. En esta línea, en el Lycaenidae australiano *Jalmenus evagoras,* las señales acústicas parecen intervenir en el reclutamiento de hormigas acompañantes (PIERCE & NASH, 1999).

En el presente trabajo se han realizado registros sonoros y se analizan las características del sonido emitido por las larvas y pupas de 18 especies de Lycaenidae pertenecientes a las cuatro tribus de esta familia presentes en la Península Ibérica. Se ha ampliado el número de especies estudiadas desde el punto de vista acústico hasta el momento y se discute el posible significado biológico de las emisiones acústicas.

Material y métodos

Recogida de muestras

La mayoría de los ejemplares han sido recogidos en el campo en la fase de larva en localida-

des del centro y sur de España fundamentalmente. Otros procedieron procedieron de plantas en macetas de jardines particulares (*Cacyreus marshalli*), o de huevos puestos por hembras en el laboratorio. Las especies estudiadas y las localidades y fechas de captura se detallan en la Tabla 1. Todas las larvas se han criado hasta llegar a la fase de adulto para asegurar una correcta identificación de la especie, para lo que ha sido necesario disponer de las plantas nutricias específicas de las larvas de cada una de las especies. Las larvas se separaron individualmente en una placa de petri, la cual se identificaba con el nombre de la especie y a la que se asignaba un código, mantenido para la identificación en las grabaciones de sonido. Dicha placa incluía un papel de filtro humedecido y la planta nutricia de la especie, todo ello se conservó a temperatura ambiente. Las fechas de recogida de los ejemplares comprendieron los años 2004 a 2008, fundamentalmente entre los meses de marzo y julio. La nomenclatura utilizada corresponde a la de Fauna Ibérica (GARCÍA-BARROS *et al.*, 2013), con ligeras modificaciones.

Tabla 1.– Especies de Lycaenidae ibéricos utilizadas para las grabaciones de larvas y pupas, localidades, provincias y fechas de captura.

Especies estudiadas	**Localidad**
Tribu Lycaenini	
Lycaena phlaeas (Linnaeus, 1760)	Oteruelo del valle (Madrid) 7-X-2004
L. bleusei (Oberthür, 1884)	Campo Real (Madrid) 15-VI-2004, Oteruelo del valle (Madrid) 7-X-2004
Tribu Theclini	
Favonius quercus (Linnaeus, 1758)	Soto del Real (Madrid) 20-V-2005, La Granja (Segovia) 28-V-2005
Tribu Eumaeini	
Satyrium ilicis (Esper, 1779)	Miraflores (Madrid) 20-V-2005, La Granja (Segovia) 22-V-2005
Tribu Polyommatini	
Lampides boeticus (Linnaeus, 1767)	Campo Real (Madrid) 15-VI-2004; 29-VI-2004, Puebla de Beleña (Guadalajara) 11-VII-2004
Cacyreus marshalli Butler, 1898	Tres Cantos (Madrid) 24-IX-2008
Zizeeria knysna (Trimen, 1862)	Jerez de los Caballeros (Badajoz) 15-X-2005
Cupido minimus (Fuessly, 1775)	Uña (Cuenca) 17-VI-2005
Scolitantides orion (Pallas, 1771)	Santa Casilda (Burgos) 7-VII-2005
Pseudophilotes panoptes (Hübner, 1813)	Durón (Guadalajara) 29-V-2005
Glaucopsyche alexis (Poda, 1761)	Campo Real (Madrid) 15-VI-2004; 27-V-2005
G. melanops (Boisduval, 1828)	Loeches (Madrid) 29-VI-2004
Iolana debilitata (Schultz, 1905)	Campo Real (Madrid) 15-VI-2004; 29-VI-2004
Polyommatus thersites (Cantener, 1835)	Campo Real (Madrid) 15-VI-2004
Aricia morronensis (Ribbe, 1910)	Puerto del Tejo, Sierra de Cazorla (Jaén) 5-V-2005
A. cramera (Eschscholtz, 1821)	Oteruelo del Valle (Madrid) 20-VII-2004
Kretania hesperica (Rambur, 1839)	Campo Real (Madrid) 22-III-2004; 15-VI-2004; 29-VI-2004
Agriades pyrenaicus (Boisduval, 1840)	Áliva, Picos de Europa (Santander) 1-V-2005

REGISTRO DEL SONIDO

La grabación de los ejemplares, tanto de las larvas como de las pupas, se llevó a cabo en el laboratorio, a temperatura ambiente (20º C-24º C), realizándose una grabación por individuo en

el interior de un vial de plástico, en cuyo fondo se colocó una membrana conectada a un micrófono dinámico omnidireccional con un rango de frecuencia de 100 a 20.000 Hz. De esta forma, se registraba cualquier vibración transmitida tanto por el aire como por el sustrato que tuviese lugar en la cámara. El ruido de fondo se captó en las grabaciones y no ha sido filtrado, pero se ha eliminado en el análisis de sonido. En aquellos ejemplares en los que se efectuaron perturbaciones sobre la pupa para obtener emisiones acústicas, estas se realizaron mediante el roce de un pincel sobre la zona dorsal de la misma. La grabación de las emisiones de sonido en las pupas se ha realizado en varios momentos de su desarrollo: en las etapas iniciales, intermedias y próximas a la eclosión. La señal del micrófono se enviaba a un preamplificador de señal con potenciómetro de entrada que, a su vez dirigía la señal a un digitalizador Creative Audigy ZS, provisto de ganancia de micro. La grabación se digitalizó en formato WAVE PCM monofónico a 32 bits y 44.100 Hz. El sonido se grabó en un ordenador personal dotado del software para la grabación de sonido digital: Creative Wave Studio 5.0 (Adobe, 2007).

Análisis del sonido

Una vez obtenida la señal y registrada en soporte digital, se procedió al análisis de la misma mediante el empleo de los programas Adobe Audition 1.5 (Adobe, 2007) y Gold Wave 5.0 (Gold Wave, 2007) que permiten la visualización del sonograma, así como la obtención del espectro de frecuencias parcial y total. Los espectrogramas se obtuvieron con una FFT (Transformación Rápida de Fourier) de 256 y función de ventana Hamming. Con los programas mencionados se realizaron las siguientes medidas a partir de la grabación obtenida: frecuencia de emisión (rango completo), frecuencia principal de emisión (rango en el que se da la intensidad más alta del sonido), duración de la secuencia de estridulación, presencia de equemas (agrupación de sílabas), estructura silábica de la secuencia de estridulación, duración de las sílabas y hemisílabas, duración del silencio entre sílabas, duración del silencio entre hemisílabas, tasa de emisión (sílabas por segundo) y emisión de sílabas atípicas.

Las grabaciones se encuentran depositadas en el Banco de emisiones sonoras de animales del Departamento de Zoología y Antropología Física de la Facultad de Biología de la Universidad Complutense de Madrid (España). Los ejemplares adultos y las exuvias de las pupas grabadas se encuentran depositados en la Colección de Entomología del Departamento de Biología de la Universidad Autónoma de Madrid (España).

Resultados

Larvas

Se han estudiado las emisiones sonoras de las larvas de 18 especies de licénidos ibéricos pertenecientes a 15 géneros (63% de los géneros de licénidos ibéricos), correspondientes a las tribus Theclini (una especie), Eumaeini (una especie), Lycaenini (dos especies) y Polyommatini (14 especies) (Tablas 1, 2 y 3). Todas las especies estudiadas han emitido sonido, en 15 de ellas de forma espontánea y en las tres restantes (*Pseudophilotes panoptes, Kretania hesperica* y *Agriades pyrenaicus*) como respuesta a una perturbación. Los individuos de las diferentes especies estudiadas, emiten sonidos formados por sílabas simples (Fig. 1). Una excepción a lo anterior es la especie *Satyrium ilicis,* que tiene el sonido estructurado en sílabas dobles o triples, siendo las primeras mayoritarias con respecto a las segundas (Fig. 2). La emisión del sonido se ha producido con un espectro de frecuencias comprendido entre 100 y 3.000 Hz, con unas frecuencias principales situadas generalmente en un intervalo de entre 100 y 700 Hz (Tabla 3). Estas frecuencias entran dentro del espectro audible por el ser humano, aunque en ocasiones, la poca amplitud del sonido emitido hace que sea difícilmente detectable sin amplificación.

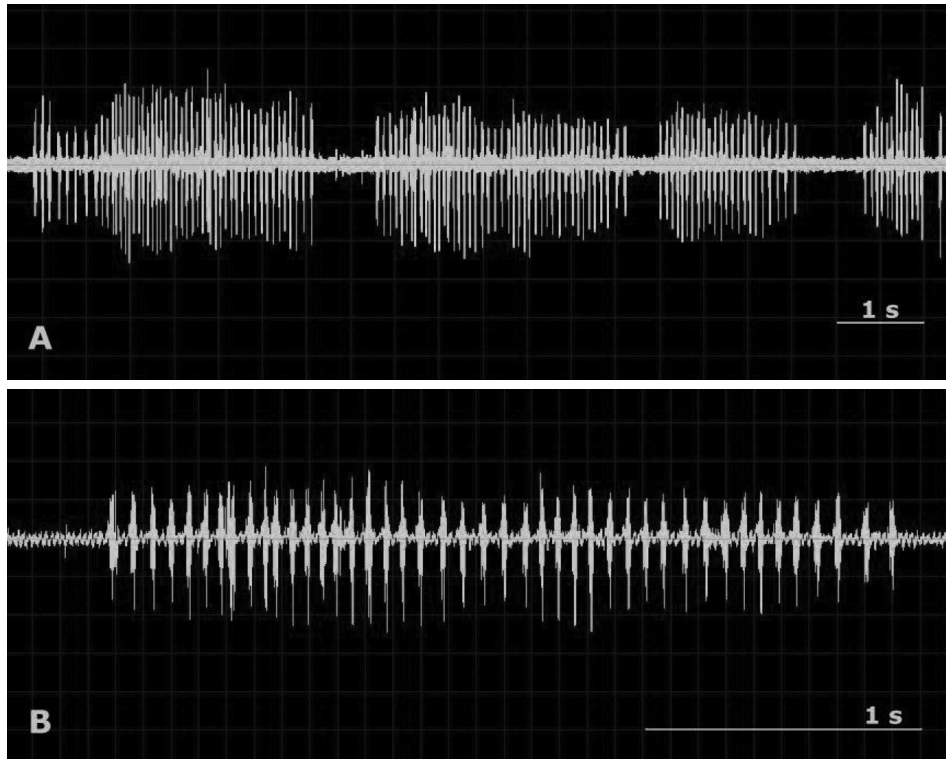

Figura 1.– Sonograma del sonido emitido por una larva de *Aricia cramera*. **A**: Fragmento correspondiente a 11 segundos con el sonido estructurado en equemas, formados por sílabas simples. **B**: Equema constituido por numerosas sílabas simples correspondiente a 3,5 segundos de grabación.

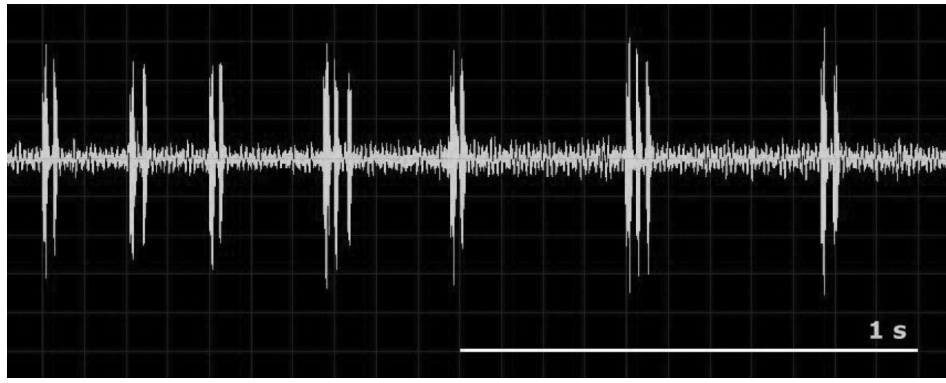

Figura 2.– Sonograma del sonido emitido por una larva de *Satyrium ilicis*. Secuencia de estridulación constituida por duplosílabas y sílabas triples, separadas por espacios que corresponden a la ausencia de sonido.

Tabla 2.– Registro de sonido en las especies de Lycaenidae estudiadas en las fases de larva y pupa. Se indica si son o no mirmecófilas y la presencia o ausencia de aparato estridulador en las pupas. Las líneas discontinuas indican que no se dispuso de pupas para el estudio de esa especie. * Descrito en la literatura. ** Se estudió en la pupa la emisión de sonido sin obtener resultados.

	Sonido larva	**Sonido pupa**	**Mirmecofilia**	**Aparato estridulador**	**Perturbación en la pupa**
Tribu Lycaenini					
Lycaena phlaeas	Si	Si	No	Si	No
L. bleusei	Si	-----	No	Si*	-----
Tribu Theclini					
Favonius quercus	Si	Si	Si	Si	Si
Tribu Eumaeini					
Satyrium ilicis	Si	-----	Si	Si*	-----
Tribu Polyommatini					
Lampides boeticus	Si	Si	Si	Si	No
Cacyreus marshalli	Si	Si	No	No	Si
Zizeeria knysna	Si	Si	Si	Si	Si
Cupido minimus	Si	-----	Si	-----	-----
Scolitantides orion	Si	-----	Si	No*	-----
Pseudophilotes panoptes	Si	No	Si	No	**
Glaucopsyche alexis	Si	No	Si	No	**
G. melanops	Si	-----	Si	No*	-----
Iolana debilitata	Si	No	Si	No	**
Polyommatus thersites	Si	Si	Si	Si	No
Aricia cramera	Si	Si	Si	Si	Si
A. morronensis	Si	Si	Si	Si	No
Kretania hesperica	Si	Si	Si	Si	No
Agriades pyrenaicus	Si	No	No	Si	**

La duración media de las sílabas en la mayoría de las especies se sitúa entre 30 y 60 ms (media 46,1 ms, SD= 16,4 ms, N= 18, Tabla 3), con valores menos frecuentes por debajo de 30 ms (20 ms en *Cupido minimus*) y por encima de 60 ms (82 ms en *S. ilicis* y 85 ms en *Cacyreus marshalli*). En cuanto a la organización de las emisiones de sonido de las 18 especies analizadas, 11 emiten el sonido estructurado en equemas (grupos de sílabas separados por pausas de duración variable, Fig. 3), cinco no presentan equemas y dos especies (*Agriades pyrenaicus* y *Aricia cramera*) presentan variabilidad en este carácter, con individuos que emiten el sonido organizado en equemas y otros que no. Las especies del mismo género presentan parámetros de sonido similares, sobre todo por lo que se refiere a la duración de las sílabas (Tabla 3). Sin embargo, aparecen diferencias en el intervalo entre sílabas y las frecuencias principales, lo que podría deberse a diferencias interespecíficas, que necesitarían estudios más detallados para corroborarse.

Se ha observado la emisión de señales acústicas cuando las larvas estaban tanto en reposo como en movimiento, aunque los sonidos eran más intensos durante los desplazamientos de éstas. Algunos ejemplares al ser molestados arquean su cuerpo y dejan de emitir sonido (*Cupido minimus*), mientras que otros emitían sonido aun cuando su cuerpo se arqueaba (*S. ilicis*). Hemos podido observar algunos casos de larvas parasitadas que también producían sonido.

Pupas

Se han estudiado las pupas de 13 especies de licénidos pertenecientes a 12 géneros (50% de

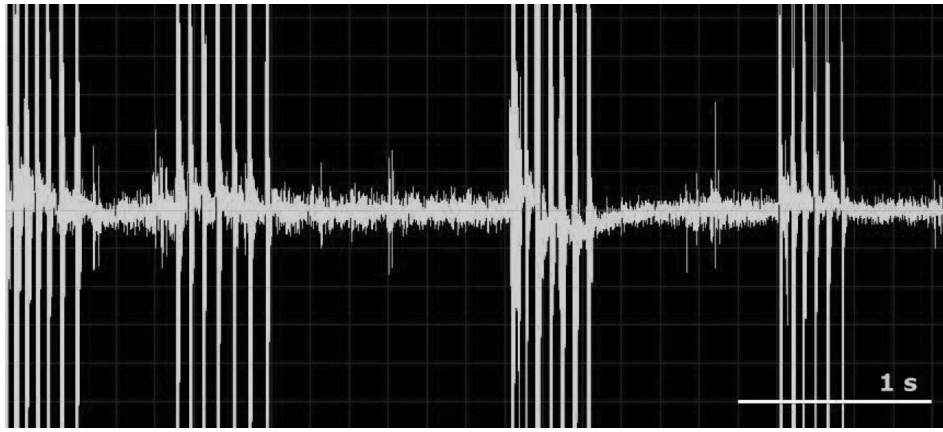

Figura 3.– Sonograma del sonido emitido por una larva de *Lycaena bleusei*. El fragmento corresponde a 5 segundos de grabación y está constituido por cuatro equemas formados por sílabas simples.

Tabla 3.– Número de individuos y grabaciones obtenidas en las larvas de las 18 especies de Lycaenidae ibéricos estudiadas. Para cada especie se proporcionan las medias de duración y el espacio entre sílabas, así como el rango de frecuencias y la frecuencia principal de las emisiones de sonido.

		Duración sílaba (ms)		Duración espacio entre sílabas (ms)		Rango de Frecuencias	Frecuencia principal
	Nº individuos	$\bar{X}$	SD	$\bar{X}$	SD	(Hz)	(Hz)
Tribu Lycaenini							
Lycaena phlaeas	2	42,4	29,5	15,0	143,8	100-1800	160/779
L. bleusei	2	31,8	9,6	32,7	14,8	100-3000	100/204
Tribu Theclini							
Favonius quercus	2	58,8	15,2	68,1	19,5	100-1200	100/1200
Tribu Eumaeini							
Satyrium ilicis	1	81,9	11,1	-----	719,9	200-2300	106/609
Tribu Polyommatini							
Lampides boeticus	2	41,4	12,8	103,9	148,9	100-1800	203/563
Cacyreus marshalli	2	84,6	23,4	15823,0	150,0	100-1000	150
Zizeeria knysna	2	43,1	40,0	564,3	2364,8	100-700	218
Cupido minimus	1	20,4	5,6	26,4	230,3	100-3000	233
Scolitantides orion	1	49,4	7,8	61,9	45,8	100-1400	162/584
Pseudophilotes panoptes	2	32,7	14,6	38,2	18,5	100-1200	185
Glaucopsyche alexis	2	38,6	5,6	51,7	13,9	100-2600	500
G. melanops	1	31,7	5,0	25,9	14,1	100-1400	227
Iolana debilitata	2	38,8	18,8	137,5	686,5	100-3000	164
Polyommatus thersites	1	37,8	8,1	24,0	9,4	100-1400	256
Aricia cramera	2	47,0	15,0	94,8	126,0	100-1100	223/1100
A. morronensis	2	37,6	10,1	124,6	42,0	300-1500	450
Kretania hesperica	1	56,6	9,4	-----	143,0	100-1500	155/1500
Agriades pyrenaicus	1	50,6	11,1	89,6	53,1	100-1600	502

los géneros de licénidos ibéricos), una de cada una de las tribus Theclini y Lycaenini y 11 de la tribu Polyommatini (Tablas 1, 2 y 4). De ellas nueve especies han emitido sonido y cuatro no. Tres de las ocho especies (38%) necesitaron una perturbación para comenzar a emitir sonido (Tabla 2 y Fig. 4). Todas las especies que no han emitido sonido pertenecen a la tribu Polyommatini: *Glaucophyche alexis, Iolana debilitata, P. panoptes* y *A. pyrenaicus*). Estas especies no fonadoras no presentan aparato estridulador, pero *A. pyrenaicus* sí presenta esta estructura y ello nos lleva a pensar que las condiciones de grabación no hayan sido favorables para esta especie de alta montaña. En los individuos de las diferentes especies estudiadas, las sílabas presentes en las emisiones de sonido son sílabas simples, excepto en *Polyommatus thersites* que presenta tanto sílabas simples como dobles. La frecuencia de emisión se encuentra en un rango entre 100 y 4.500 Hz, situándose la mayor parte de frecuencias principales entre los 300 y 600 Hz.

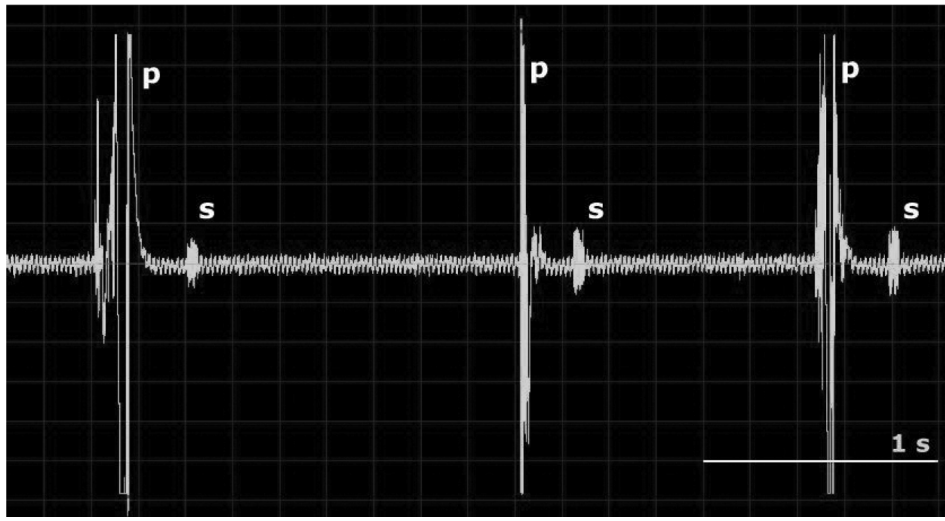

Figura 4.– Sonograma del sonido emitido por una pupa de *Zizeeria knysna*. Se observan las perturbaciones ejercidas sobre la pupa que tienen una mayor intensidad (p) y las respuestas emitidas por la misma con forma de sílabas simples y posteriores al estímulo (s).

La duración media de las sílabas es de 47,3 ms (SD= 18,1; N= 9) y presenta valores comprendidos entre 18 y 108 ms (Tabla 4). La especie con mayor duración de las sílabas es *C. marshalli,* que también resultó ser la especie con un valor más alto para este rasgo en el caso del estado larvario. El intervalo medio entre las sílabas en las diferentes especies es muy heterogéneo, debido a que la emisión de algunas de ellas consiste en una única sílaba separada por silencios muy variables, ya sea por emisión espontánea o tras una perturbación. En este último caso, la tasa de emisión suele ir ralentizándose a medida que transcurre el tiempo tras el estímulo. Por lo que se refiere a las diferencias entre especies del mismo género, solo poseemos datos del género *Aricia*, que presenta, en las dos especies estudiadas, parámetros bastante similares en las variables consideradas (Tabla 4).

Tabla 4.– Características del sonido en las pupas de las nueve especies de Lycaenidae ibéricos estudiadas que emitieron sonido. Se muestra el número de individuos registrados, la duración media de las sílabas emitidas y el rango de frecuencias y frecuencias principales de las emisiones.

	Nº individuos	**Duración sílaba (ms)**		**Rango de Frecuencias (Hz)**	**Frecuencia principal (Hz)**
		$\bar{X}$	**SD**		
Tribu Lycaenini					
Lycaena phlaeas	3	42,2	10,8	100-3000	319
Tribu Theclini					
Favonius quercus	1	18,2	11,3	600-3000	----
Tribu Polyommatini					
Lampides boeticus	1	40,2	23,1	500-4000	1013
Cacyreus marshalli	1	108,3	34,1	300-1800	373
Zizeeria knysna	3	70,7	11,6	200-1700	310
Polyommatus thersites	2	36,4	9,4	395-4500	400/4500
Aricia cramera	3	35,5	22,0	200-1000	500
A. morronensis	5	47,8	16,8	400-4000	574
Kretania hesperica	2	74,1	28,8	250-4500	500

Las emisiones de tres especies (*L. phlaeas, G. melanops* y *A. cramera*) presentan el sonido organizado en equemas, mientras las otras seis especies no. En las primeras etapas de desarrollo de la pupa de las especies fonadoras se ha comprobado la emisión de sonido. Sin embargo, cuando la pupa se encontraba próxima a la eclosión del imago dejaban de emitir, a excepción de un único caso en *Aricia morronensis*. En la mayor parte de los casos en los que el sonido se emite como respuesta a una perturbación, la tasa de emisión e incluso la intensidad son más elevadas al principio para ir relajándose con el tiempo. En la pupa de *A. morronensis* se observan además dos tipos de sonido, uno de menor amplitud y continuado que deja de emitirse cuando se emiten los pulsos de las sílabas simples y el otro el correspondiente a dichas sílabas, que es puntual y de mayor amplitud (Fig. 5).

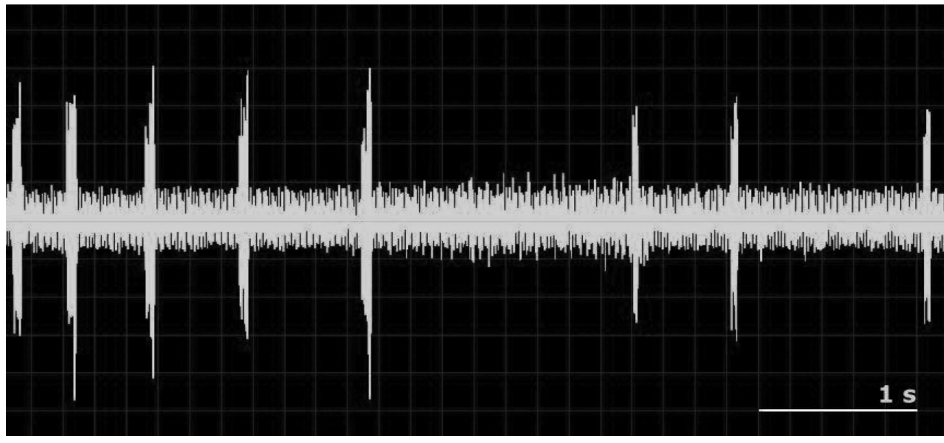

Figura 5.– Sonograma del sonido emitido por una pupa de *Aricia morronensis.* En la imagen aparecen ocho sílabas simples intercaladas con un segundo tipo de sonido continuado que está presente durante toda la grabación, similar a un sonido de fondo.

Discusión

El presente trabajo amplía considerablemente el número de especies de Lycaenidae ibéricos para los que se conoce el comportamiento acústico. Presentamos datos para larvas de 18 especies (25% del total de Lycaenidae ibéricos) y pupas de 13 (18%), pertenecientes a las cuatro tribus de esta familia que están representadas en la fauna ibérica. Por estudios previos de las características del sonido de los Lycaenidae ibéricos se conocían las emisiones de seis especies en la fase larvaria y de una sola en la fase de pupa (*Phengaris alcon*), por lo que nuestra contribución amplía tanto el número de especies estudiadas como su cobertura taxonómica. Todas las larvas de las especies estudiadas han emitido sonido, datos que coinciden con los de ELFFERICH (1998), en cuyos estudios realizados con diferentes larvas de lepidópteros, observó que las larvas de Lycaenidae estudiadas producían vibraciones, lo que no ocurría con las larvas de otros lepidópteros. Nuestros resultados de larvas emitiendo sonidos en reposo no coinciden con los de De VRIES (1991b), que destaca que las larvas solo emiten sonido cuando se están moviendo o cuando están comiendo, no emitiéndolo en reposo.

Todos los sonidos de larvas estudiados se asemejan a un tamborileo o repiqueteo y su estructura es en líneas generales es similar en las distintas especies. Sin embargo, PIERCE & NASH (1999), al analizar el sonido emitido por la larva del Lycaenidae australiano *Jalmenus evagoras*, encuentran una mayor variedad de sonidos, con tres tipos diferentes de señales, que denominan gruñidos, tamborileo y siseos.

Las emisiones se producen tanto en larvas amirmecófilas como mirmecófilas. Sin embargo, en algunas especies mirmecófilas, como *Cupido minimus*, la presencia de hormigas desencadena la emisión de sonido, aunque también se producía estridulación sin la presencia de éstas. En los estudios realizados por ELFFERICH (1998) se afirma que las larvas no experimentan cambios en la emisión del sonido aunque sean atendidas por hormigas, lo cual coincide con nuestros resultados. Por otro lado RIVA *et al*. (2017) y FIEDLER *et al*. (1995), señalan que las especies amirmecófilas emiten menos frecuentemente y de forma más simple que las de las mirmecófilas, reforzando las hipótesis de que la acústica en los Lycaenidae tiene un papel crucial en la interacción con las hormigas, mientras que presenta una función defensiva en especies que no están asociadas con éstas. TRAVASSOS & PIERCE (2000) señalan que la presencia de hormigas influye en la tasa de emisión de dos de los tres sonidos, concretamente en el gruñido y en el siseo, pero no del tamborileo. Nuestros datos (Tabla 2) no apoyan una diferencia de emisiones entre especies mirmecófilas y amirmecófilas, ya que las frecuencias y otros parámetros del sonido son similares en las cuatro especies amirmecófilas (género *Lycaena*, *Cacyreus marshalli* y *Agriades pyrenaicus*) que en el resto. Por ello estos resultados confirman la opinión de algunos autores (DOWNEY, 1967; DOWNEY & ALLYN, 1973; ÁLVAREZ *et al*., 2014) de que inicialmente el sonido no está relacionado con la mirmecofilia, lo que no impide que aquellas que emiten sonido y son mirmecófilas lo utilicen secundariamente para dicha asociación.

En cuanto a la pupa, hemos encontrado dos tipos diferentes de sonidos en algunos casos, pudiendo responder no sólo al frotamiento del aparato estridulador presente en los segmentos quinto y sexto del abdomen, sino a estructuras de otros segmentos, como los dientes que aparecen en muchas especies (ÁLVAREZ *et al.,* 2014). Esto coincide con los datos aportados por DOWNEY & ALLYN (1973) que indican, que los dos tipos de sonido pueden ser atribuidos a diferentes regiones intersegmentales. También explican que los trenes de pulsos emitidos son el resultado de frotar el rascador contra la placa estriduladora, de manera que la velocidad con la que se realizan dichos movimientos dorsales y las diferentes estructuras implicadas en la emisión del sonido (estrías, dientes, tubérculos, ondulaciones) están relacionadas con que los tipos de sonido sean distintos. El número de especies estudiadas en la fase de pupa no nos permite corroborar esta idea, si bien la única especie de nuestro estudio que presenta estrías en el aparato estridulador (*Favonius quercus*) emite sonido con sílabas más cortas que las demás especies, aunque no presenta diferencias para otros parámetros del sonido (Tabla 4, Figura 6).

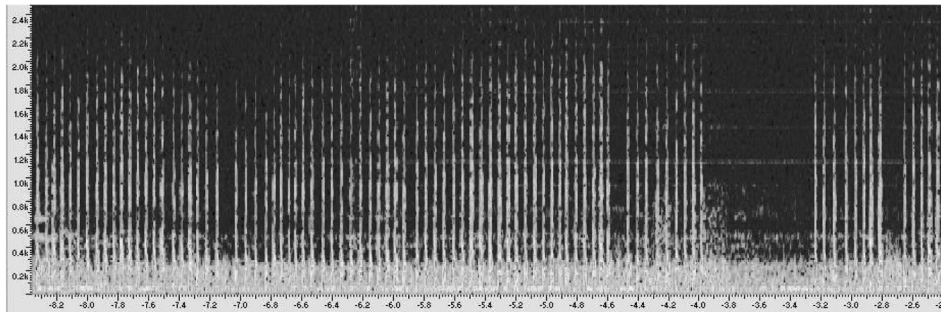

Figura 6.– Espectrogama de la emisión sonora de una larva de *Favonius quercus.* La Frecuencia de emisión se sitúa entre 100 y 2.000 Hz. Escala del eje Y en kHz y del eje X en segundos.

En los estudios que realiza DOWNEY (1966), indica que, en algunas especies, individuos ya próximos a la eclosión emitían sonidos, lo cual concuerda con nuestras observaciones durante la cría en laboratorio. SCHURIAN *et al.* (2006), al analizar los sonidos emitidos por la pupa de *Lysandra coridon* (Poda, 1761), en las distintas fases de pupación observó que había diferencias con respecto a la emisión de sonido. De la misma manera que en las larvas, la emisión de sonido aparece tanto en especies mirmecófilas como en las amirmecófilas (Tabla 2). Las especies que no presentan aparato estridulador (*Iolana debilitata, Glaucopsyche alexis* y *Pseudophilotes panoptes)* no emiten sonido, siendo sin embargo especies mirmecófilas. Esto apoyaría nuevamente las hipótesis de DOWNEY (1967) y ÁLVAREZ *et al*. (2014) de que el sonido no está inicialmente relacionado con la mirmecofilia. El sonido podría tener originalmente un carácter defensivo (tanto frente a predadores como a parasitoides) o de otro tipo, pudiendo ser utilizado secundariamente para otras funciones entre las que podría encontrarse la potenciación de las relaciones con formícidos, como proponen DOWNEY & ALLYN (1973) y BARBERO *et al.* (2009a, 2009b).

Las pupas de la especie amirmecófila *C. marshalli* no presentan aparato estridulador y sin embargo emiten sonidos. Esta sorprendente observación puede deberse a que el sonido se produzca en diferentes regiones intersegmentales, como se señala más arriba, sin que haya estructuras especializadas para la emisión de sonido. Por otro lado, *A. pyrenaicus* presenta aparato estridulador, pero no emitió sonido en nuestro estudio. Este resultado podría deberse, tal como hemos apuntado anteriormente, a que las condiciones de grabación no resultan adecuadas para esta especie de alta montaña.

Las observaciones de las pupas realizadas en este trabajo apoyan la idea de que existe una relación entre la emisión del sonido y una función defensiva o de alarma, puesto que en la mayoría de los casos en los que las pupas emiten sonido, éste es una respuesta a una perturbación. La pupa recibe un estímulo externo y responde a él mediante la emisión de un sonido. Como respuesta a la perturbación la tasa de emisión del sonido también es mayor, para poco a poco ir reduciéndose, conforme nos alejamos temporalmente del estímulo. Esto coincide con las hipótesis de PRELL (1913), para el que la función del sonido sería defensiva, y HINTON (1948) que se apoya para afirmar esto en el hecho de que la pupa estridula cuando es molestada. HOEGH-GULDBERG (1972) que considera la posibilidad de una función de defensa ante parásitos, también describe la emisión de sonidos espontáneos además de los producidos por perturbación, algo que hemos podido constatar en el presente estudio, especialmente en larvas. En contraste con nuestros datos y los de los autores mencionados, DOWNEY (1966) defiende que puede haber una relación entre la emisión del sonido y el comportamiento sexual, de forma que los sonidos de las pupas atraigan a los adultos de la proximidad a los nichos de éstas, para que la cópula pueda suceder inmediatamente después de que emerja el adulto.

SCHÖNROGGE *et al.* (2005) indican que todos los Lycaenidae atendidos por hormigas, mutualis-

tas y parásitos sociales, tienen la capacidad de estridular. Nuestros resultados indican sin embargo que no todos los Lycaenidae atendidos por hormigas estridulan en la fase de pupa, aunque pueden hacerlo en la fase de larva, como en la especie *I. debilitata,* cuya larva es atendida por hormigas y emite sonido, pero en la que la pupa no presenta aparato estridulador y tampoco emite sonido. A pesar del relativamente buen conocimiento que tenemos sobre las emisiones acústicas en Lycaenidae, todas estas incertidumbres y contradicciones hacen patente la necesidad de profundizar en el estudio de este comportamiento, tanto de las estructuras implicadas en la emisión de sonido, como en la función biológica de las mismas. Coincidimos con la opinión de SALA *et al*. (2014) de que las emisiones acústicas en Lycaenidae pueden transmitir un mensaje en varios contextos, ajustándose a la definición de comunicación biológica en la que ambas, señal y respuesta, son adaptativas.

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New records of Noctuinae for Iran with additional distribution data (Lepidoptera: Noctuidae)

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Abstract

Numerous expeditions have been done in Iran during more than 150 years to investigate the Noctuidae fauna. However, still white patches remain to be extensively explored. In this study, night samplings performed by light traps at different Iranian provinces to study some tribes of Noctuinae. Here, we present 43 species and subspecies, among them three species of *Dasypolia eberti* Boursin, 1967, *Episema minutoides* Ronkay, Varga & Hreblay, 1999 and *Polymixis schistochlora* Ronkay, Varga & Hreblay, 1998 are newly reported for the fauna of Iran. Twenty-six of identified taxa are new records for one or more provinces of Iran. Adults and genitalia of new records for Iran are illustrated with notes on their bionomy and identification.
KEY WORDS: Lepidoptera, Noctuidae, Noctuinae, new record, Iran.

Nuevos registros de Noctuinae para Irán con datos adicionales de distribución (Lepidoptera: Noctuidae)

Resumen

Se ha hecho numerosas expediciones en Irán durante los últimos 150 años para investigar la fauna de Noctuidae. Sin embargo, todavía quedan zonas en blanco que necesitan ser analizadas exhaustivamente. En este estudio, utilizamos trampas de luz en diferentes provincias iraníes para estudiar algunas tribus de Noctuidae. Aquí, presentamos 43 especies y subespecies, entre las que tres especies de *Dasypolia eberti* Boursin, 1967, *Episema minutoides* Ronkay, Varga & Hreblay, 1999 y *Polymixis schistochlora* Ronkay, Varga & Hreblay, 1998 son nuevos registros para la fauna de Irán. Veintiseis taxas identificadas, son nuevos registros para una o más provincias de Irán. Se ilustran los adultos y las genitalias de los nuevos registros para Irán, con notas sobre su bionomía e identificación.
PALABRAS CLAVE: Lepidoptera, Noctuidae, Noctuinae, nuevos registros, Irán.

Introduction

The general fauna of Noctuidae s. l. in Iran is almost known since numerous expeditions have been done on this area mostly by European researchers during more than 150 years (e.g. BIENERT, 1870; BRANDT, 1941; EBERT & HACKER, 2002). Recently, due to scientific interest in Noctuidae s. l. fauna by Iranian researchers, studies have been carried out to investigate such diverse fauna in different areas of Iran, resulted in reporting new taxa, new distributional records and local revisions (e.g. SHIRVANI *et al.*, 2008b; RABIEH *et al*., 2013; ESFANDIARI *et al*., 2015). However, still white patches remain to be extensively explored in this vast country which should be done by local experts of this mostly arid territory.

Noctuidae species are plant feeding as caterpillars and nectar feeding as adults, functioning as herbivores, pollinators and prey, as well as being one of the most destructive groups of pests to crops (REGIER *et al*., 2009). Here we intend to deal with some species which, according to old fashion Noctuidae classification, belong to Xyleninae. However, Xyleninae is a paraphyletic group which has no derived character states to support it (YELA & ZAHIRI, 2011). According to inclusive definition of Noctuinae from POOLE (1995), Xyleninae must be integrated to Noctuinae s. s. together with Hadeninae to form the Noctuinae s. l. The monophyly of the subfamily Noctuinae s. l. is very well supported by the molecular results of MITCHELL *et al*. (2006) and ZAHIRI *et al.* (2013), and by morphology (clasper located in middle of valve, larva with dorsally-grooved spinneret) (LAFONTAINE & SCHMIDT, 2010, 2013). This clade includes the true cutworms, many of which are economically important agricultural pests.

Material and Methods

Numerous samplings were carried out to study the fauna of noctuid moths mainly in southern provinces of Khuzestan and Kerman (2015-2016). Additional materials were collected in Khorasan-e-Jonubi and Khorasan-e-Razavi in eastern parts of Iran (2015-2016) as well as Fars province in South of Iran (2011). Night samplings performed at different altitudes and vegetation types of the sampling localities by 8 watt black-light tube surrounded by 3 transparent panes, all perched over a funnel on top of a bucket. The genitalia of both sexes were examined using standard methods. Materials were deposited in the Insect and Mite Collection of Ahvaz (IMCA), Plant Protection Department, Shahid Chamran University of Ahvaz, except some duplicates which were deposited in P. Gyulai's private collection (Hungary). Genera and species were listed alphabetically. Collected species of the genus *Caradrina* were not listed here and will be presented separately.

Results and Discussion

A total of 43 species and subspecies belonging to 22 genera of Noctuinae were collected and identified. Three species of *Dasypolia eberti* Boursin, 1967, *Episema minutoides* Ronkay, Varga & Hreblay, 1999 and *Polymixis schistochlora* Ronkay, Varga & Hreblay, 1998 are newly reported for the fauna of Iran, with illustrations of their adults and genitalia and notes on their bionomy. Twenty-six species and subspecies are new provincial records which marked with an asterisk (*) in the text. Among the new provincial records, 10 taxa are new for the fauna of Kerman province, 12 for Khuzestan province, 4 for Fars province, 3 for Khorasan-e-Jonubi province and 1 for Khorasan-e-Razavi province. Collected materials are presented here, together with provincial distribution in Iran for each taxon.

Family Noctuidae Latreille, 1809
Subfamily Noctuinae Latreille, 1809

Apamea anceps (Denis & Schiffermüller, 1775)*

Distribution in Iran : Khorasan, Tehran (HACKER, 1990; KOÇAK & KEMAL, 2014), Golestan (GUTLEB & WIESER, 2002).

Material examined: 1 ♂, Kerman, Omrudoieh, 29º 05' 55" N 57º 33'13" E, 2971 m., 15-V-2015.

Apamea maraschi (Draudt, 1934)*

Distribution in Iran: Northwest Iran (HACKER, 1990), Khuzestan (RAVAN *et al*., 2015).

Material examined: 1 ♀, Fars, Shiraz, Nurabad, 29º 07' 25" N 52º 38' 05" E, 1000 m., 5-V-2011.

Apamea minoc Babics & Benedek, 2011*

Distribution in Iran: Mazandaran (BABICS & BENEDEK, 2011). This is second record of this species after its description in 2011.

Material examined. 1 ♂, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 27-IV-2011.

Apamea oblonga (Haworth, 1809)*

Distribution in Iran: Northwest Iran (HACKER, 1990), Sistan-va-Baluchistan (EBERT & HACKER, 2002).

Material examined: 2 ♂♂, Kerman, Omrudoieh, 29º 05' 55" N 57º 33' 13" E, 2971 m., 30-VII-2015; 1 ♂, 2 ♀♀, Kerman, Babgorgy, 29º 05' 17" N 57º 33' 33" E, 3029 m., 10-VIII-2015; 1 ♂, 1 ♀, Kerman, Sangdan, 29º 06' 06" N 57º 33'12" E, 2966 m., 13-VIII-2015.

Agrochola lychnidis (Denis & Schiffermüller, 1775)

Distribution in Iran: Tehran (EBERT & HACKER, 2002), Khuzestan (RAVAN *et al.*, 2015), Bushehr (LEHMAN *et al*., 2009). Khorasan-e-Shomali (FEIZPOOR & SHIRVANI, 2014).

Material examined: 1 ♂, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 23-VI-2011.

Anchoscelis oropotamica archar (Ronkay, Varga & Hreblay, 1998)*

Distribution in Iran: Markazi, Mazandaran, Tehran, Alborz (EBERT & HACKER, 2002).

Material examined: 1 ♂, Khorasan-e-Jonobi, Alborz, 32º 59' 59" N 58º 44' 10" E, 1881 m., 16-VI-2015.

Aporophyla canescens (Duponchel, 1826)

Distribution in Iran: Kermanshah, Fars, Bushehr (HACKER, 2001; KOÇAK & KEMAL, 2014; RONKAY *et al.*, 2001), Khuzestan (RAVAN *et al.*, 2015).

Material examined: 3 ♂♂, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 2-VI-2011; 1 ♀, same locality, 3-VI-2015; 1 ♂, Fars, Shiraz, Nurabad, 29º 07' 25" N 52º 38' 05" E, 1000 m., 15-IV-2011.

Aporophyla nigra (Haworth, 1809)

Distribution in Iran: Northwest Iran (RONKAY *et al.*, 2001), Fars, Khuzestan (RAVAN *et al.*, 2015).

Material examined: 2 ♂♂, 1 ♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 14-VI-2015; 1 ♂, 2 ♀♀, same locality, 23-VI-2011; large series from different localities in Fars province in autumn 2016 were collected.

Auchmis detersa demavendi Schwingenschuss, 1955*

Distribution in Iran: Mazandaran, Azarbayejan-e-Sharghi (EBERT & HACKER, 2002; LEHMANN & ZAHIRI, 2011), Tehran, Fars, Lorestan (EBERT & HACKER, 2002), Golestan, Khorasan (GUTLEB & WIESER, 2002; WIESER & STANGELMAIER, 2005).

Material examined: 1 ♀, Kerman, Mohammdabad, 28º 59' 48.8" N 57º 43' 20" E, 2495 m., 2-VII-2015; 1 ♂, 1 ♀, Kerman, Sangdan, 29º 06' 06" N 57º 33' 12" E, 2966 m., 13-VIII-2015; 2 ♂♂, same locality, 6-IX-2015.

Auchmis indica (Walker, 1865)

Distribution in Iran: Kerman (SHIRVANI *et al*., 2008a).

Material examined. 1 ♀, Kerman, Sangdan, 29º 06' 06" N 57º 33' 12" E, 2966 m., 15-IV-2016.

Brandtaxia discalis (Brandt, 1941)

Distribution in Iran: Sistan-va-Balouchestan (BRANDT, 1941), Kerman (BIDAR, 2010; SHIRVANI, 2012), Fars (EBERT & HACKER, 2002).

Material examined: 1 ♂, Kerman, Khabr National Park, 28º 39' 43" N 56º 26' 50" E, 1937 m., 14-IX-2015.

Chloantha hyperici (Denis & Schiffermüller, 1775)*

Distribution in Iran: Kordestan, Azarbayejan-e-Sharghi, Guilan, Mazandaran, Tehran, Alborz, Khorassan-e-Shomali, Golestan (EBERT & HACKER, 2002; GUTLEB & WIESER, 2002; LEHMANN & ZAHIRI, 2011).

Material examined: 1 ♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 13-V-2011.

Conistra pseudopolitina Hacker, 1990*

Distribution in Iran: Bushehr (LEHMAN *et al*., 2009).

Material examined: 1 ♂, 1 ♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 15-VII-2011.

Dasypolia eberti Boursin, 1967 (Figs. 1a-1d)

Identification: Forewing of female has a bluish grey tint but that of male has an orange brown hue. Ante- and postmedial lines are prominent zig-zag in female with a dark median shade. Postmedial line continues to hindwing which is dark brown. However, in male lines are not as strong as female. The large size is a prominent characteristic of this species. It is similar to *D. rjabovi* (Bundel, 1966) but *rjabovi* is much larger and its hindwings present a clear terminal border which does not exist in *D. eberti*.

Distribution and bionomics: It was described from the high altitudes of central Afghanistan. In Iran, it was collected from high altitude of Binaloud on the way to Shirbad peak. The area has the common vegetation of Binaloud mountain (e.g. Mountain Sainfoin, Wild almond (*Amygdalus scoparia*), Downy brome (*Bromus tectorum*), *Bromus*, *Artemisia* and *Astragalus*). This is the first record for the fauna of Iran.

Material examined: 4 ♂♂, 1 ♀, Khorasan-e-Razavi, Binalood, Shirbad way, 36º 16' 49" N 59º 05' 49" E, 2496 m., 28-IX-2016.

Dasypolia ferdinandi Rühl, 1892*

Distribution in Iran: Alborz (EBERT & HACKER, 2002), Golestan, Khorasan (WIESER & STANGELMAIER, 2005). Mazandaran (KOÇAK & KEMAL, 2014).

Material examined: 1 ♂, Kerman, Sangdan, 29º 06' 06" N 57º 33' 12" E, 2966 m., 5-XI-2015.

Dasypolia templi (Thunberg, 1792)*

Distribution in Iran: Alborz (EBERT & HACKER, 2002). Golestan, Khorasan-e-Shomali (WIESER & STANGELMAIER, 2005).

Material examined: 1 ♂, 2 ♀♀, Khorasan-e-Razavi, Binaloud, Shirbad way, 36º 16' 49" N 59º 05' 49" E, 2496 m., 28-IX-2016; 1 ♂, same locality, 21-IX-2016.

Dicycla oo (Linnaeus, 1758)

Distribution in Iran: Esfahan (HACKER & KAUTT, 1999), Azarbayejan-e-Gharbi, Fars, Kohgiluyeh-va-Boyerahmad, Kordestan (EBERT & HACKER, 2002), Kermanshah (MODARRES-AWAL, 2012), Khuzestan (RAVAN *et al.*, 2015), Golestan (GUTLEB & WIESER, 2002).

Material examined. 3 ♂♂, 5 ♀♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 8-IV-2016.

Dryobotodes eremita (Fabricius, 1775)*

Distribution in Iran: Golestan (GUTLEB & WIESER, 2002; WIESER & STANGELMAIER, 2005), Fars (KOÇAK & KEMAL, 2014).

Material examined: 1 ♂, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 7-VI-2011; 2 ♀♀, same locality, 23-VI-2011.

Dryobotodes glaucus Ronkay & Gyulai, 2006*

Distribution in Iran: Kohgiluyeh-va-Boyerahmad (RONKAY & GYULAI, 2006), Esfahan (SHIRVANI, 2012).

Material examined: 1 ♂, Fars, Nurabad, Babameidan, 30º 11' 36" N 51º 31' 27" E, 920 m., 15-IV-2011; 3 ♀♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 16-V-2011 and 2-VI-2011.

Episema lederi Christoph, 1885*

Distribution in Iran: Kermanshah, Guilan, Alborz, Tehran, Azarbayejan-e-Gharbi, Fars, Golestan, Khorasan-e-Shomali, Khorasan-e-Razavi (EBERT & HACKER, 2002; GUTLEB & WIESER, 2002; WIESER & STANGELMAIER, 2005).

Material examined: 3 ♂♂, Kerman, Sangdan, 29º 06' 06" N 57º 33' 12" E, 2966 m., 1-X-2015.

Episema minutoides Ronkay, Varga & Hreblay, 1999 (Figs. 2a, 2b)

Identification: It is closely related to *Episema minuta* Ebert, 1971 which was described from Afghanistan. However, it differs from *minuta* by having prominent black ante- and postmedial crosslines, stronger white cover on veins, darkened smaller reniform stigma and more grey brown hindwing. The habitus is also similar to *E. lederi* but it has smaller size and half pectination in male antenna than *lederi* (RONKAY *et al.*, 1998). There might be variation in wing colour in different populations of *minutoides*.

Distribution and bionomics: It was described from Turkmenistan and inhabits the hot and dry grasslands with sparse vegetation in Rocky Mountains of Kopet-Dagh (RONKAY *et al.*, 1998). In Iran, it was collected from the village of Doulatabad which is located in a valley on the way to Binaloud peak. The area has the common vegetation of Binaloud mountain (e.g. Mountain Sainfoin, Wild almond (*Amygdalus scoparia*), Downy brome (*Bromus tectorum*), *Bromus*, *Artemisia* and *Astragalus*) with several gardens around. This is the first record for the fauna of Iran.

Material examined: 1 ♀, Khorasan-e-Razavi, Binaloud, Doulatabad, 36º 25' 56" N 59º 09' 41" E, 1558 m., 10-X-2016.

Frivaldszkyola cf. *elami* (Benedek & Ronkay, 2001)

Distribution in Iran: Lorestan (BENEDEK & RONKAY, 2001).

Material examined: 1 ♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 23-VI-2011.

This is a female and whole type series are male.

Karmanica chosroes (Brandt, 1938)*

Distribution in Iran: Fars, Bushehr (LEHMAN *et al*., 2009).

Material examined: 1 ♂, 1 ♀, Kerman, Hishin, 28º 38' 23" N 57º 56' 43" E, 1341 m., 24-II-2016.

Leptologia lota (Clerck, 1759)*

Distribution in Iran: Kermanshah, Markazi, Golestan, Khorasan-e-Shomali and Fars, according to distribution of the recently synonymized taxa for *lota* by RONKAY *et al*. (2017).

Material examined: 1 ♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 14-VI-2015.

Maraschia grisescens Osthelder, 1933

Distribution in Iran: Fars (EBERT & HACKER, 2002; RAVAN *et al.*, 2015), Kerman (BIDAR, 2010), Khuzestan (RAVAN *et al.*, 2015).

Material examined: 1 ♂, 1 ♀, Kerman, Khabr National Park, 28º 39' 43" N 56º 26' 50" E, 1920 m., 14-IX-2015; 2 ♂♂, Fars, Neyriz, 29º 13' 22" N 51º 26' 17" E, 2050 m., 28-VIII-2011.

Mormo maura (Linnaeus, 1758)*

Distribution in Iran: It has reported from southwestern and central parts of Iran (HACKER, 1990).

Material examined: 1 ♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 3-VI-2015.

Polymixis atossa (Wiltshire, 1941)*

Distribution in Iran: Fars (WILTSHIRE, 1941); Golestan, Khorasan-e-Shomali (WIESER &

STANGELMAIER, 2005), Bushehr (LEHMAN *et al*., 2009), Khorasan-e-Razavi (RABIEH *et al.*, 2013).

Material examined: 1 ♂, Kerman, Sangdan, 29º 06' 06" N 57º 33' 12" E, 2966 m., 5-XI-2015; 1 ♀, Khorasan-e-Jonobi, Birjand, 32º 59' 59" N 58º 44' 10" E, 1881 m., 16-VI-2015; 1 ♂, Khorasan-e-Razavi, Binaloud, 1504 m., 36º 11' 59"N 59º 29' 44"E, 21-XI-2011.

Polymixis crinomima (Wiltshire, 1946)*****

Distribution in Iran: Kermanshah (WILTSHIRE, 1946), Fars (WILTSHIRE, 1946; EBERT & HACKER, 2002), Kerman (SHIRVANI, 2012), Golestan, Khorasan-e-Shomali (WIESER & STANGELMaier, 2005), Bushehr (LEHMAN *et al*., 2009).

Material examined: 7 ex., Fars, Nurabad, Babameidan, 30º 15' 57" N 51º 30' 14" E, 920 m., 15-IV-2011; 6 ex., Khuzestan, Baqmalek, Imamzade Abdollah, 31º 23' 03" N 50º 09' 13" E, 2030 m., 6-V-2011.

Polymixis colluta apotheina (Brandt, 1938)

Distribution in Iran: Azarbayejan-e-Gharbi, Tehran, Alborz (EBERT & HACKER, 2002), Fars, Khuzestan (RAVAN *et al.*, 2015). Lorestan, Kerman, Sistan-va-Balouchestan (FEIZPOOR & SHIRVANI, 2014), Hormozgan (LEHMAN *et al.*, 2009). Golestan, Khorasan-e-Shomali, Kohgiluyeh-va-Boyerahmad and Kordestan (checked materials at the Stuttgart State Museum of Natural History).

Material examined: 1 ♂, 1 ♀, Kerman, Dochar, 29º 04' 40" N 57º 37' 01" E, 3223 m., 10-IX-2015; 1 ♂, 1 ♀, Kerman, Dehsard, 28º 40' 39" N 56º 33' 02" E, 1811 m., 29-X-2015; 2 ♂♂, 1 ♀, Kerman, Sangdan, 29º 06' 06" N 57º 33' 12" E, 2966 m., 4-IX-2015; 4 ex., same locality, 6-IX-2015 and 1-X-2015; 8 ex., Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 16-V-2011; 10 ex., same locality, 2-VI-2011; 1 ♂, Fars, Tange bolhayat, 29º 44' 02" N 51º 47' 00" E, 1300 m., 29-IV-2011; 3 ex., Fars, Nurabad, 29º 55' 56" N 51º 35' 52" E, 1100 m., 3-VI-2011.

Polymixis dubiosa (Brandt, 1938)

Distribution in Iran: Tehran, Sistan-va-Baluchestan, Hormozgan, Lorestan (EBERT & HACKER, 2002), Kerman (FEIZPOOR & SHIRVANI, 2014).

Material examined: 2 ♀♀, Kerman, Sangdan, 29º 06' 06" N 57º 33' 12" E, 2966 m., 29-IX-2015 and 1-X-2015; 1 ♂, 3 ♀♀, Kerman, Dochar, 29º 04' 40" N 57º 37' 01" E, 3223 m., 10-IX-2015.

Polymixis hedygramma (Brandt, 1941)*

Distribution in Iran: Lorestan, Sistan-va-Balouchestan (BRANDT, 1941; EBERT & HACKER, 2002).

Material examined: 1 ♂, 1 ♀, Khorasan-e-Jonubui, Ark, 32º 57' 39" N 58º 17' 28" E, 1250 m., 8-XI-2015; 1 ♂, 1 ♀, same locality, 1-XI-2016.

Polymixis ivanchiki Pekarsky, 2012*

Distribution in Iran: Kermanshah (PEKARSKY, 2012).

Material examined: 1 ♂, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 2-XI-2011 and 12 ex., same locality, 15-XI-2016; 3 ex., Fars, Firuzabad, 29º 07' 25" N 52º 38' 05" E, 1900 m., 3-XI-2016.

Polymixis philippsi (Püngeler, 1911)*

Distribution in Iran: Fars (FEIZPOOR & SHIRVANI, 2014; SHIRVANI, 2012), Bushehr (LEHMAN *et al*., 2009).

Material examined: 2 ex, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 23-VI-2011.

Polymixis rosinae (Bohatsch, 1908)

Distribution in Iran: Tehran, Alborz (EBERT & HACKER, 2002), Kerman, Azarbayejan-e-

Sharghi, Markazi (FEIZPOOR & SHIRVANI, 2014), Golestan, Khorasan (WIESER & STANGELMAIER, 2005).

Material examined: 1 ♂, Kerman, Sangdan, 29º 06' 06" N 57º 33' 12" E, 2966 m., 5-XI-2015.

Polymixis schistochlora Ronkay, Varga & Hreblay, 1998 (Figs. 3a-3c)

Identification: It is an allopatric sibling species of *P. zophodes* Boursin, 1960, according to RONKAY *et al.* (1998). Forewings of *P. schistochlora* are almost unicolorous, dark olivegreyish with dispersed inconspicuous stigmata and crosslines, whereas *P. zophodes* has more prominent wing pattern and ocherous brown grey colour. The male genitalia of both species are very similar but with a prominent difference that is divergence of projection of the right costal extension from the ventral arch of the basal plate of the harpe in *P. schistochlora* whereas they are parallel in *P. zophodes* (RONKAY *et al.*, 1998).

Distribution and bionomics: It was collected and described from semi-desert rocky grasslands in medium high altitudes of Turkmenistan (RONKAY *et al.*, 1998). In Iran, it was collected from an area in the margin of Lut desert which has high altitude with sparse vegetation.
This is the first record for the fauna of Iran.

Material examined: 1 ♀, Khorasan-e-Jonubui, Ark, 32º 57' 39" N 58º 17' 28" E, 1250 m., 8-XI-2015; 2 ♂♂, 1 ♀, same locality, 1-XI-2016.

Polymixis zagrobia (Wiltshire, 1941)*

Distribution in Iran: Lorestan, Fars (WILTSHIRE, 1941), Kerman, Sistan-va-Balouchestan, Esfahan (FEIZPOOR & SHIRVANI, 2014; SHIRVANI, 2012).

Material examined: 1 ♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 2-XI-2011.

Polymixis zophodes Boursin, 1960*

Distribution in Iran: Fars (FEIZPOOR & SHIRVANI, 2014).

Material examined: 1 ♀, Kerman, Sangdan, 29º 06' 06" N 57º 33' 12" E, 2966 m., 29-IX-2015.

Rhiza laciniosa (Christoph, 1887)

Distribution in Iran: Kerman (SHIRVANI *et al*., 2008a), Khorasan (KOÇAK & KEMAL, 2014).

Material examined: 1 ♂, Khorasan-e-Jonobi, Birjand, 32º 59' 59" N 58º 44' 10" E, 1881 m., 27-V-2015.

Scotochrosta pulla (Denis & Schiffermüller, 1775)*

Distribution in Iran: Esfahan (Poorshabanan & SHIRVANI, 2012). This is the second record of this species from Iran.

Material examined: 1 ♂, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 15-VII-2011; 1 ♂, Fars, Nurabad, Babameidan, 30º 11' 36" N 51º 31' 27" E, 1000 m., 15-IV-2011; 1 ♂, Fars, Qir-va-Karzin, Imam Shahr, 28º 26' 36" N 53º 10' 11", 700 m., 6-V-2011.

Spodoptera cilium Guenée, 1852*

Distribution in Iran: Kermanshah, Hormozgan (EBERT & HACKER, 2002).

Material examined: 1 ♀, Kerman, Jiroft, 28º 39' 11" N 57º 45' 56" E, 659 m., 9-V-2015; 1 ♂, same locality, 15-VI-2015.

Spodoptera exigua (Hübner, 1808)

Distribution in Iran: Azarbayejan-e-Gharbi, Mazandaran, Golestan, Guilan, Lorestan, Tehran, Fars, Kerman, Khuzestan, Sistan-va-Baluchestan, Hormozgan, Bushehr, Kordestan, Kohgiluyeh-va-Boyerahmad (EBERT & HACKER, 2002; GUTLEB & WIESER, 2002).

Material examined: 1 ♀, Kerman, Khabr National Park, 28º 39' 19" N 56º 26' 46" E, 1920 m., 27-V-2015; 1 ♀, Kerman, Jiroft, 28º 39' 11" N 57º 45' 56" E, 659 m., 9-IX-2015; 1 ♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 8-IV-2016.

Spodoptera littoralis (Boisduval, 1833)

Distribution in Iran: Hormozgan, Bushehr (EBERT & HACKER, 2002), Fars, Esfahan, Golestan (MODARRES-AWAL, 2012), Khuzestan (ESFANDIARI *et al.*, 2011), Kerman (KOÇAK & KEMAL, 2014), Khorasan-e-Shomali (WIESER & STANGELMAIER, 2005).

Material examined: 1 ♂, 1 ♀, Khuzestan, Malaqa, 31º 35' 57" N 50º 00' 50" E, 1100 m., 8-IV-2016; 1 ♂, Khuzestan, Gotvand, 32º 18' 24" N 48º 45' 37" E, 112 m., 25-VI-2015; 1 ♂, Khuzestan, Ahvaz, 31º 16' 15" N 481 36' 02" E, 17 m., 16-II-2016; 1 ♂, Kerman, Dalfard, 28º 56' 50" N 57º 39' 29" E, 1605 m., 24-VI-2015.

Xanthia gilvago (Denis & Schiffermüller, 1775)*

Distribution in Iran: Golestan (GUTLEB & WIESER, 2002; WIESER & STANGELMAIER, 2005).

Material examined: 1 ♂, Kerman, Sangdan, 29º 06' 06" N 56º 33' 12" E, 2966 m., 1-X-2015; 3 ♀♀, same locality, 10-XI-2016; 1 ♀, Kerman, Dehsard, 28º 40' 39" N 57º 33' 02" E, 1811 m., 5-XI-2016.

Conclusion

Larvae of some species which were recorded in our study such as *D. glaucus*, *D. eremita*, *D. oo* and *S. pulla* usually feed on oak as their host-plant. The collected localities of these moths in the studied areas include the oakwood forests. However, further studies are necessary for providing detailed information on the bionomics of some of our collected species.

All of our three new records for the fauna of Iran were collected in autumn which indicates the importance of investigating the autumn fauna in Iran. This period seems to be less explored than spring fauna. These results together with several new provincial records in our study point out that the Iranian fauna of Noctuidae still needs more intensive samplings to discover its unknown species. Moreover, since threats hanging over the fauna of Iranian ecosystems (JOWKAR *et al.*, 2016), we should have the chance to finish compiling the inventory of the moth fauna before it disappears. Meanwhile, the knowledge of Noctuoidea in Iran suffers from the lack of identification books which contain high quality photos, detailed diagnostic characters and provincial distribution maps.

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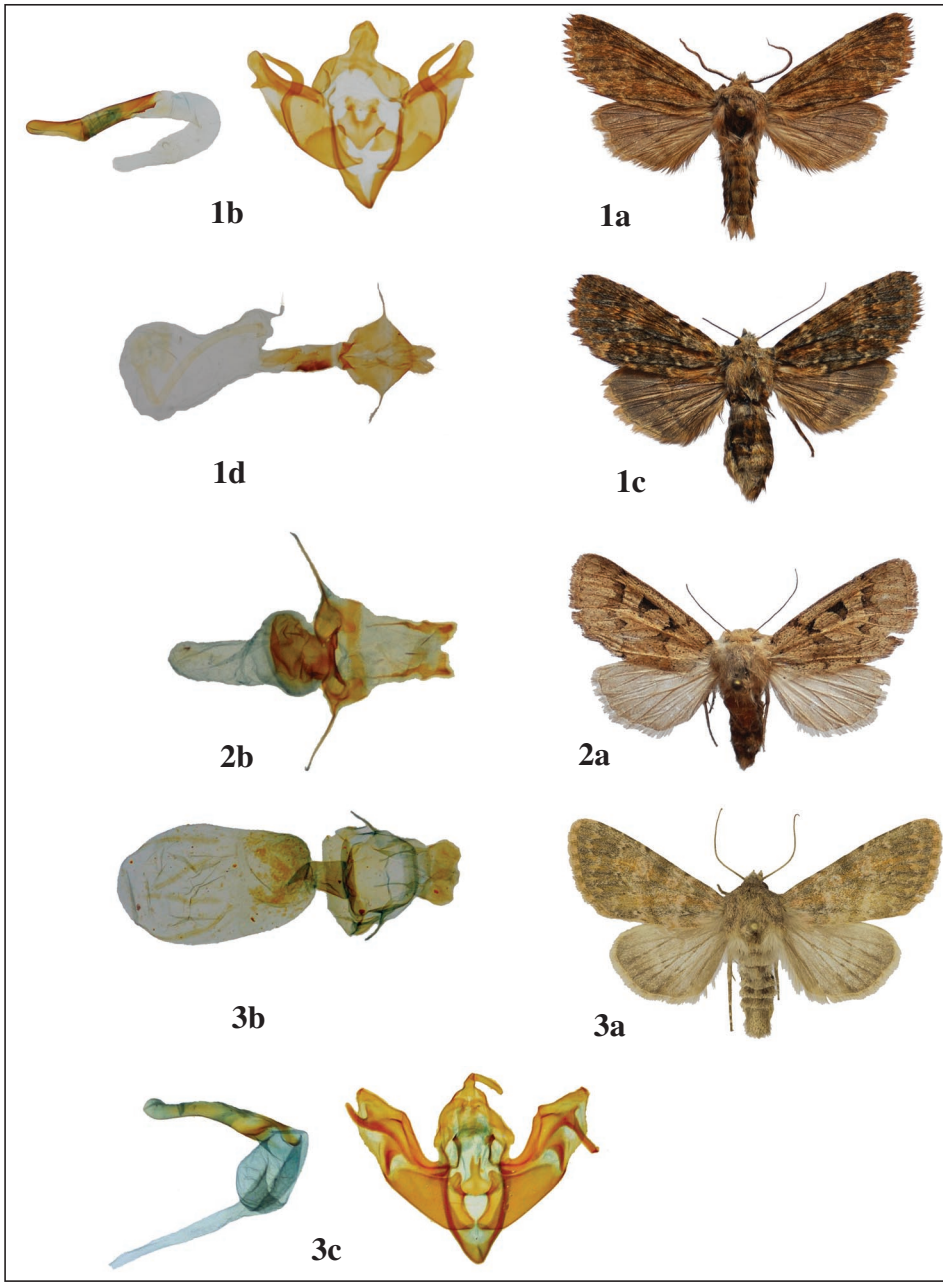

Figures 1-3.– 1. *Dasypolia eberti*: **a.** adult male, **b.** male genitalia, **c.** adult female, **d.** female genitalia; **2.** *Episema minutoides*: **a.** adult female, **b.** female genitalia; **3.** *Polymixis schistochlora*: **a.** adult female, **b.** female genitalia, **c.** male genitalia.

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Revision of the genus *Aleyda* Schaus, 1928 with the description of one new species (Lepidoptera: Mimallonidae)

R. A. St Laurent, T. L. McCabe & T. Malm

Abstract

The genus *Aleyda* Schaus, 1928 is revised. The male of the type species of *Aleyda*, *A. accipiter*, is redescribed, and the female is figured for the first time. *Aleyda heppneri* St Laurent, McCabe & Malm, sp. n. from Panamá and French Guiana is newly described. Male and female genitalia of both species are figured for the first time.
KEY WORDS: Lepidoptera, Mimallonidae, *Cicinnus*, *Euphaneta*, taxonomy, French Guiana, Panama.

Revisión del género *Aleyda* Schaus, 1928 con la descripción de una nueva especie (Lepidoptera: Mimallonidae)

Resumen

Se revisa el género *Aleyda* Schaus, 1928. Se redescribe el macho de la especie tipo de *Aleyda*, *A. accipiter* y la se figura hembra por primera vez. Se describe una nueva especie *Aleyda heppneri* St Laurent, McCabe & Malm, sp. n., de Panamá y la Guyana francesa. Por primera vez, se figura la genitalia de ambas especies.
PALABRAS CLAVE: Lepidoptera, Mimallonidae, *Cicinnus*, *Euphaneta*, taxonomía, Guyana francesa, Panamá.

Introduction

This paper is part of an ongoing project revising genera belonging to the enigmatic Mimallonidae, the sole family of Mimallonoidea. *Aleyda* Schaus, 1928 was described to include the single species *Cicinnus accipiter* Dognin, 1916. Schaus's description of the genus focused predominantly on wing venation characteristics, which was standard procedure for the generic classification of SCHAUS (1928). Apart from the description of DOGNIN (1916), redescription and new combination of SCHAUS (1928), and FORBES'S (1942) brief account of *A. accipiter* from Panama, reports of *Aleyda* in the literature are sparse. Both species checklists of the family Mimallonidae included *A. accipiter* (GAEDE, 1933; BECKER, 1996).

SCHAUS (1928) figured a painting of a male *A. accipiter*, which we presume to be based on the holotype, and no other images of this species have so far been published. Here we seek to redescribe the type species *A. accipiter* in greater detail and provide photographs of both sexes for the first time. The female, briefly described by FORBES (1942), is figured here for the first time. A new species of *Aleyda* is described and the genitalia of both sexes of *A. accipiter* and the new species are figured. The male and female genital morphology is used to infer the phylogenetic relationship between *Aleyda* and two other genera.

Material and methods

Aleyda specimens are scarce in natural history collections. We studied material from the following institutions:

CUIC	Cornell University Insect Collection, Ithaca, New York, USA
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA
MGCL	McGuire Center for Lepidoptera & Biodiversity, Gainesville, Florida, USA
NHRS	Entomological Collections, Swedish Museum of Natural History, Stockholm, Sweden
NYSM	New York State Museum, Albany, New York, USA
USNM	National Museum of Natural History [formerly United States National Museum], Washington D.C., USA.

Morphological terminology follows KRISTENSEN (2003). Genitalia and abdomens are preserved in glycerol filled microcentrifuge vials, or small vials attached to the specimen's pin.

All figures were manipulated with Adobe Photoshop CS4 (Adobe 2008). The map was built with SimpleMappr (SHORTHOUSE, 2010) and edited with CS4. All geographical coordinates are approximate, and are based on the localities provided on specimen labels when coordinates were not explicitly given. GPS data were acquired with Google Earth.

Systematic part

Aleyda Schaus, 1928
Aleyda Schaus, 1928: 641
Aleida; Gaede 1931, misspelling
Aleyda; Forbes 1942
Aleyda; Becker 1996

Type species: *Cicinnus accipiter* Dognin, 1916: 20 by original designation.

Description Male: Head: Dark brown, eyes very large, occupying more than two-thirds area of head; antenna pale brown, tan, bipectinate to tip with distal third of pectination much shorter; labial palpus thin, short, not extending much beyond frons, three segmented, third segment reduced, barely visible. Thorax: Coloration as for head, scattered with black petiolate scales. Legs: Coloration as for thorax, vestiture thick, long; tibial spines short, sharp, almost entirely covered in scales. Forewing dorsum: Forewing length: 17 mm, wingspan: 32–34 mm. Narrow, elongate, outer margin concave, apex weakly falcate. Ground color chestnut brown with smoky black diffusion proximally, lighter distally, sparsely scattered with small black petiolate scales, especially antemedially. Antemedial area may be lighter gray than remainder of wing. Antemedial line outwardly convex, nearly semi-circular, reaching from costa to anal margin of wing, postmedial line inwardly concave, bent oppositely to antemedial line, not reaching costa. Maculation of postmedial line mostly restricted below cell, remainder of postmedial line faint or absent. Hyaline discal patch narrow, somewhat lunate, stretching across cell. Fringe coloration orange-brown. Forewing ventrum: As for forewing dorsum but ante- and postmedial lines more diffuse, coloration slightly lighter, especially along anal margin where coloration light gray. Black petiolate scales more prevalent. Hindwing dorsum: Rounded, margin convex, anal angle accentuated, markings like forewing dorsum but smaller, less defined. Discal hyaline patch present, but smaller, not lunate, irregularly shaped. Hindwing ventrum: Following same pattern as forewing ventrum. Frenulum absent or vestigial, unapparent. Venation: Typical of Mimallonidae, but Rs3 + Rs4 quite long-stalked with stalk only slightly shorter than bifurcation of Rs3 + Rs4. Abdomen: Relatively small in size, hardly reaching beyond anal angle of hindwing, if at all. Coloration as for thorax, black scales present at junction with thorax. Genitalia: Vinculum somewhat boxlike, ventral corners of vinculum accentuated as small, rounded, inwardly

angled knobs (apodemes). Uncus extends beyond saccular edge of valvae, triangular in shape, highly truncated along its length, widening slightly apically. Gnathos U-shaped with widened sclerotized area at base of "U" but without projections of any sort. Valvae relatively short, triangular, distally angled upward, saccular edge tightly curled channel which holds heavily sclerotized, curved arms originating from base of vinculum. Arms slightly bent mesally along length, extend inward, but do not meet. Juxta connects to rectangular mesal region of transtilla. Juxta extends ventrally as elongate, backwardly angled lip which connects to base of vinculum. Phallus short, rectangular, strongly narrowed basally. Tubular vesica bag-like, but weak and not closely examined.

Female: Head as for male, antennae smaller overall but pectination as in male, labial palpus shorter, blunter, segments less clearly defined due to thick scaling. Thorax: As for male. Legs: As for male. Forewing dorsum: Forewing length: 19-21 mm, wingspan: 38-45 mm. As for male but broader, ovoid, margin slightly convex, apex blunt, not falcate. Coloration and patterning as for male but markings more well defined, ante- and postmedial lines more strongly curved, light gray coloration more prominent, especially antemedially and postmedially near anal wing margin. Forewing ventrum: As for forewing dorsum but ante- and postmedial lines more diffuse, coloration slightly lighter, especially along anal margin and tornal area where coloration light gray. Black petiolate scales more prevalent. Hindwing dorsum: Rounded, margin convex, markings like forewing dorsum but smaller, less defined. Discal hyaline patch present, but smaller, not lunate, irregularly shaped. Hindwing ventrum: Following same pattern as forewing ventrum. Frenulum absent (or vestigial). Abdomen: As for male but more robust overall. Genitalia: Quite small relative to overall size of moth (considering other genera of Mimallonidae); tergite of VIII mostly membranous with slightly more well sclerotized V-shaped section mesally. Apophyses anteriores slightly shorter than apophyses posteriores. Lamella antevaginalis a setae-covered narrow bar, either side of lamella antevaginalis with distinct, rounded protuberances covered in short, fine setae. Ductus bursae shorter than overall size of genitalia, tube-like; corpus bursae small, bag-like, roughly equal in size to one of the setae-covered protuberances on either side of lamella antevaginalis. Papillae anales truncated ventrally.

Diagnosis: The combination of the following characteristics immediately distinguishes *Aleyda* from all known Mimallonidae genera: exceptionally narrow wings (particularly in the male), thin hyaline patches on all wings (those of the forewing being lunate), and the presence of semi-circular ante- and postmedial lines either oppositely curved or tangent to each other. Male genitalia can be recognized by the saccular curl along the valva which holds vincular tusks when in their natural position. Valvae are otherwise simple, without teeth or membranous regions as in some similar *Cicinnus* Blanchard, 1852 species. The only genus with which *Aleyda* could be confused, *Euphaneta* Schaus, 1928, have broader, more ovoid wings, lunate hyaline patches on all wings (not just the forewings), and straighter ante- and postmedial lines. The uncus of *Euphaneta* is broadly triangular, not deeply truncated as in *Aleyda*.

Remarks: *Aleyda*, as currently understood, is a small, rarely collected genus found in Costa Rica, Panama, Venezeula, and broadly in the Amazon rainforest. External morphology as well as genitalia structures of both sexes are highly reminiscent of *Euphaneta*. Shared external traits of *Aleyda* and *Euphaneta* were previously mentioned in the diagnosis. Such shared characteristics are unique to these two genera within Mimallonidae. Male genitalia of both genera also display extended vincular arms and an absence of gnathos protrusions. See HERBIN (2016, figs 115-118) for figures of male genitalia of both known *Euphaneta* species.

Although natural history information for *Aleyda* is lacking, the host plant information of the closely related *Euphaneta* is known. DINIZ *et al*. (2013) report the following hosts from Malpighiaceae for *E. divisa* (Walker, 1855): *Byrsonima coccolobifolia*, *B. pachyphylla*, and *B. verbascifolia.* However, when *Byrsonima* was offered to a newly hatched *A. accipiter* larva, it was not accepted (C. Owens pers. comm.).

Considering the similarities between *Aleyda* and *Euphaneta*, together with *Cicinnus* which display many similar genitalia characters, we believe these three genera are all very closely related,

and ongoing molecular phylogenetic work of the first author has supported this conclusion, specifically that *Aleyda* and *Euphaneta* are sister genera.

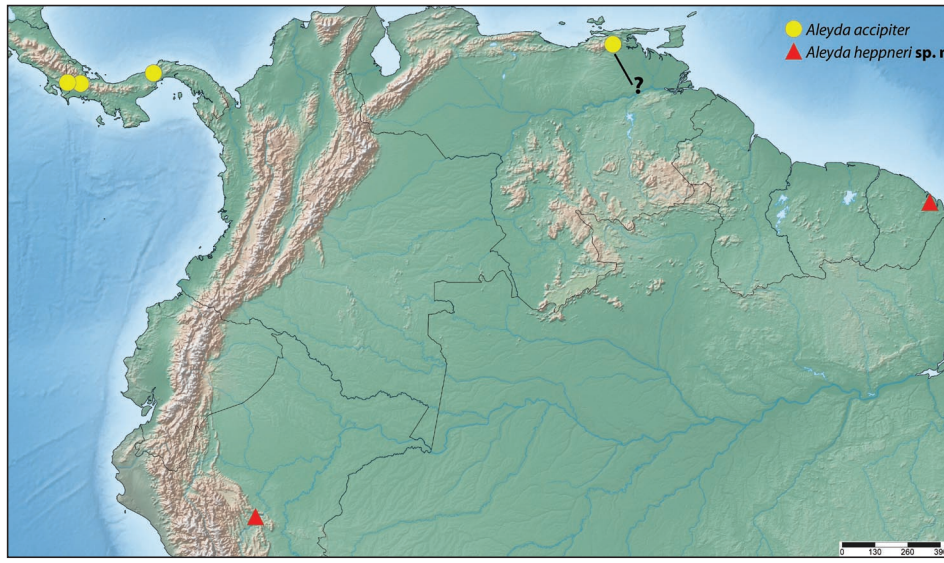

Fig. 1.– Localities of all examined *Aleyda* specimens. The question mark denotes a specimen putatively identified as *A. accipiter*, see remarks of that species.

Aleyda accipiter (Dognin, 1916) (Figs 1, 2-4, 7, 9, 11-14)

Cicinnus accipiter Dognin, 1916: 20

Aleyda accipiter; Schaus, 1928: 641, fig. 86g

Aleida accipiter; Gaede 1931, genus misspelled

Aleyda accipiter; Forbes, 1942

Aleyda accipiter; Becker, 1996

Type material: Holotype ♂. Lino Panamá [Alto Lino?], 800 m, Coll. Fassl/ Dognin Collection/ *Cicinnus accipiter* type ♂ Dgn/ USNM-Mimal: 1020/ Type No. 29697 U.S.N.M. / illegible label/ (USNM, examined). No paratypes.

Additional material examined (1 ♂, 5 ♀♀): Costa Rica: Puntarenas: 1 ♀, Sabalito: 5-I-2018, living individual photographed by C. Owen, not collected. Panamá: Panamá Oeste: 3 ♀♀, Barro Colorado Island, C. Z. [Canal Zone]: 3-XI, M. Bates leg. [St Laurent diss.: 4-24-17:1] (CUIC); 4-I-1935, M. Bates leg., MCZ-ENT 00637013 (MCZ); 2-V-1935, A. Friedman [leg.], MCZ-ENT 00637014 (MCZ). Chiriquí: 1 ♂, Lino [Alto Lino?], 800 m: Fassl [leg.], NHRS-TOBI 000001871 [dissected] (NHRS). Venezuela: Monagas: 1 ♀, Caripe: 26-I-2018, M. García leg. (Collection of M. García, Venezuela).

Redescription of Male: Head, thorax, legs, abdomen: As for genus. Forewing dorsum: Forewing length: 17 mm, wingspan: 32 mm (n=1). As for genus, but wing overall narrower and more elongate relative to the body than in *A. heppneri* sp. n. below. Ante- and postmedial lines never tangent to each other. Forewing ventrum: As for forewing dorsum but ante- and postmedial lines more diffuse, coloration slightly lighter, especially along anal margin where coloration light gray. Black petiolate scales more prevalent. Hindwing dorsum: As for genus, but hyaline patch wider than in *A. heppneri* sp. n. and reduced postmedial line marking situated roughly midway along anal margin of wing.

Hindwing ventrum: Following same pattern as forewing ventrum. Genitalia: (Fig. 7) As for genus but valva more acutely angled upward toward uncus, valva thus somewhat rectangular in shape distally, valva deeply curved at base at junction with vinculum. Uncus narrow, handbell shaped. Phallus short, rectangular, narrowed basally, posterior lobe short, straight.

Redescription of Female: Head as for male, antennae smaller overall but pectination as in male. Thorax: As for male. Legs: As for male. Forewing dorsum: Forewing length: 19 mm, wingspan: 38 mm, n=1. As for male but broader, ovoid, margin slightly convex, apex blunt, not falcate. Coloration and patterning as for male but markings more well defined, ante- and postmedial lines more strongly curved, light gray coloration more prominent, especially antemedially and postmedially near anal wing margin. Forewing ventrum: As for forewing dorsum but ante- and postmedial lines more diffuse, coloration slightly lighter, especially along anal margin and tornal area where coloration light gray. Black petiolate scales more prevalent. Hindwing dorsum: Rounded, margin convex, markings like forewing dorsum but smaller, less defined, similar to male but postmedial line marking situated closer to thorax, roughly one quarter length of anal wing margin distal from thorax. Discal hyaline patch present, but smaller, not lunate, irregularly shaped. Hindwing ventrum: Following same pattern as forewing ventrum. Abdomen: As for male but more robust overall. Genitalia: (Fig. 9) As for genus but lamella antevaginalis smoothly curved, setae covered lobes on either side of lamella antevaginalis regularly shaped, ovoid. Ventral margins of papillae anales truncated to form small lobes.

Diagnosis: The sharply acute forewings of the male distinguish this species from the only congener *A. heppneri* sp. n. Furthermore, the ante- and postmedial lines are never touching in either sex, the opposite is true in *A. heppneri* sp. n. where the semicircular lines are tangent, or at least barely touching due to black diffusions between the lines (in the single examined female). Male genitalia are recognized by the deep curve upward of the valvae where they meet the vinculum as well as by the more rectangular shape of the valvae, which are smoothly curved in *A. heppneri* sp. n. The uncus is much narrower in *A. accipiter* and the phallus smaller with a squared terminus as oppose to a downwardly angled apex in *A. heppneri* sp. n. The margin of the lamella antevaginalis is smooth in female *A. accipiter*, and irregularly edged in *A. heppneri* sp. n.

Remarks: This species was described by DOGNIN (1916) from a single male specimen. An additional male from the same locality and collector as the holotype was located in NHRS. Apart from these two males, no others have been located by the authors. Several females from Panama in the MCZ as well as a recently photographed live specimen (Figs 11-13) from Costa Rica represent the only other examined specimens of this rare species. The Costa Rican report is a country record for *A. accipiter*. Vitor Becker (pers. comm.) mentioned that he has had this species in his collection, but we were unable to examine this material.

The discovery of the aforementioned live female *A. accipiter* from Costa Rica (Figs 11-13) provided some valuable information pertaining to the life history of this species. The individual was observed, during the day (first seen at 15.33 h local time) in Sabalito, Costa Rica. According to the observer, C. Owen, the specimen arrived during the daylight hours (C. Owen pers. comm.). Therefore, it is possible that *A. accipiter* displays at least some diurnal behavior, which would help explain the rarity of this species in collections. This individual laid a single, cylindrical green egg (Fig. 14). The egg eclosed 10 days later. The hatchling first instar larva appeared typical of related mimallonid genera *Cicinnus* and *Euphaneta*. The larva was offered *Byrsonima* and *Psidium* L. (Myrtaceae), but did not feed and perished (C. Owen pers. obs.). These unique observations will hopefully encourage future work on the life history of this species.

An additional newly observed *Aleyda* specimen was brought to the first author's attention. A single female was collected in Caripe, Venezuela by M. Garcia. We were able to examine a photo of this specimen, and putatively identify it as *A. accipiter* due to the fact that the ante- and postmedial lines of the forewings are not tangent, but rather are clearly separate as in all examined *A. accipiter*. This record is the first for this genus from Venezuela, and greatly expands the known distribution of *A. accipiter* assuming that this population is indeed conspecfic with the Central American populations.

***Aleyda heppneri* St Laurent, McCabe, & Malm, sp. n.** (Figs 1, 5, 6, 8, 10)

Type material: Holotype ♂: PERU: San Martin 225 m, Pumarini Lodge, 10 km E., Shapaja 24-27 Oct 2012, J. B. Heppner & C. Carrera [06.36.27º, -76.12.51º]/ HOLOTYPE male *Aleyda heppneri* St Laurent and McCabe, 2018 [handwritten red label]/ PROJECT PHOTO J. B. Heppner 13435/ St Laurent diss.: 3-30-17:1 (MGCL). Paratype (1 ♀): FRENCH GUIANA: 1 km W. Amazonia, 04.34.08º, -52.12.37º, 290 m: 9-II-2005, T. McCabe [leg.], St Laurent diss.: 3-27-17:1, Paratype female *Aleyda heppneri* St Laurent, McCabe & Malm, 2018 [yellow label] (NYSM).

Description Male: Head, thorax, legs, abdomen: As for genus. Forewing dorsum: Forewing length: 17 mm, wingspan: 34 mm, n = 1. As for genus, but wing overall shorter and blunter than in *A. accipiter* above. Ante- and postmedial lines tangent to each other. Gray coloration well defined antemedially. Forewing ventrum: As for forewing dorsum but ante- and postmedial lines more diffuse, coloration slightly lighter, especially along anal margin where coloration light gray. Black petiolate scales more prevalent. Hindwing dorsum: As for genus, but hyaline patch narrower than in *A. accipiter*, reduced postmedial line marking situated roughly one quarter along anal margin of wing. Hindwing ventrum: Following same pattern as forewing ventrum. Genitalia: (Fig. 8) As for genus but valva smoothly curved, deeply curved at base where valva meets vinculum. Uncus triangular. Phallus relatively long, somewhat ovoid with distal terminus downwardly sloping, phallus strongly narrowed basally with posterior lobe downturned.

Female: Head as for male, antennae smaller overall but pectination as in male. Thorax: As for male. Legs: As for male. Forewing dorsum: Forewing length: 21 mm, wingspan: ~45 mm, n=1. As for male but broader, ovoid, margin slightly convex, apex blunt, not falcate. Coloration and patterning as for male but markings more well defined, ante- and postmedial lines more strongly curved, light gray coloration more prominent, especially antemedially and postmedially near anal wing margin, lines not touching as in male. Forewing ventrum: As for forewing dorsum but ante- and postmedial lines more diffuse, coloration slightly lighter, especially along anal margin and tornal area where coloration light gray. Black petiolate scales more prevalent. Hindwing dorsum: Rounded, margin convex, markings like forewing dorsum but smaller, less defined. Discal hyaline patch present, but smaller, not lunate, irregularly shaped. Hindwing ventrum: Following same pattern as forewing ventrum. Abdomen: As for male but more robust overall. Genitalia: (Fig. 10) As for genus but lamella antevaginalis irregularly edged, setae covered lobes on either side of lamella antevaginalis also irregular, with anterior margin of VIII with narrow sclerotized region devoid of setae.

Diagnosis: Conversely to the diagnosis of *A. accipiter*, the blunt, less elongated forewings of the male distinguishes *A. heppneri* from *A. accipiter*. Additionally, the ante- and postmedial lines are tangent to one another, or are at least barely touching due to black diffusions between the lines (in the single examined female). Male genitalia are recognized by smoothly curved valvae and the broader, more triangular uncus. The phallus of *A. heppneri* is larger, with a downturned terminus as oppose to the rectangular end of the *A. accipiter* phallus. The irregular edge of the lamella antevaginalis in female *A. heppneri* distinguishes it from the smooth edged *A. accipiter*.

Remarks: Considering external and genitalia morphology differences between the holotype of *A. heppneri* and *A. accipiter*, we consider the species here described from Peru and French Guiana as distinct enough to warrant specific status. Mimallonidae fauna of the Amazon basin are widely distributed within this biome, and taxa are largely shared between French Guiana and lowland Peruvian Amazon (McCabe and St Laurent pers. obs.). This, and the fact that the ante- and postmedial lines are placed closer together on the French Guiana female than in any of the five examined females of *A. accipiter*, corresponds well to this character of the male.

Etymology: This species is named for the collector of the holotype, John Heppner (MGCL), who kindly provided the holotype to the first author for study.

Acknowledgements

Casey Owen (Costa Rica) provided vital life history information pertaining to an observed *A.*

accipiter, and gave us permission to publish her excellent photos documenting this observation. Marcial García (Venezuela) offered important locality information regarding a recently collected *Aleyda* specimen from Venezuela. We would like to thank the following individuals and their institutions for providing the specimens, or photos of specimens, that were utilized in this study: Jason Dombroskie (CUIC), Rachel Hawkins (MCZ), John Heppner (MGCL), Daniel Herbin (France), and Roger Hutchings, Vitor O. Becker (Brazil).

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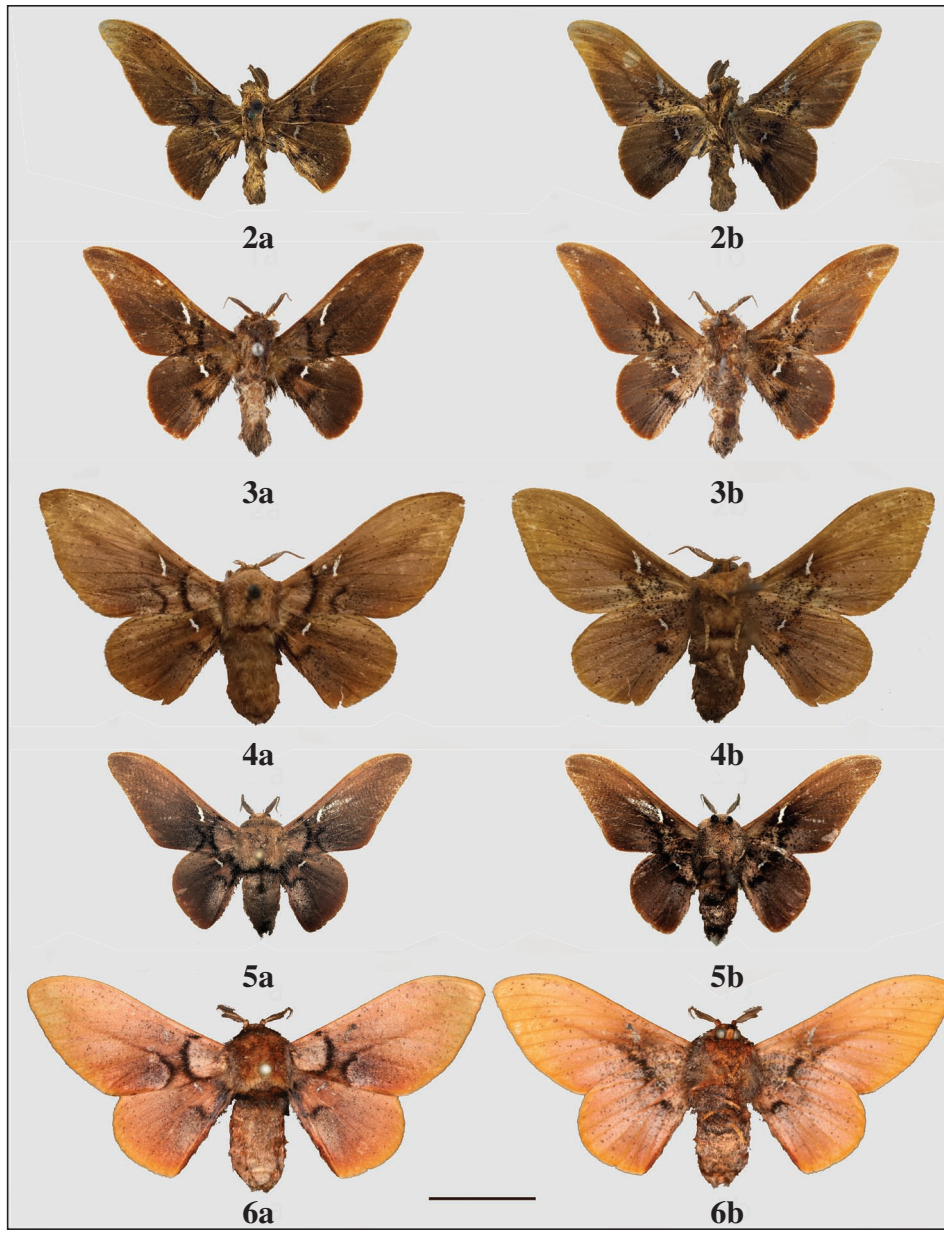
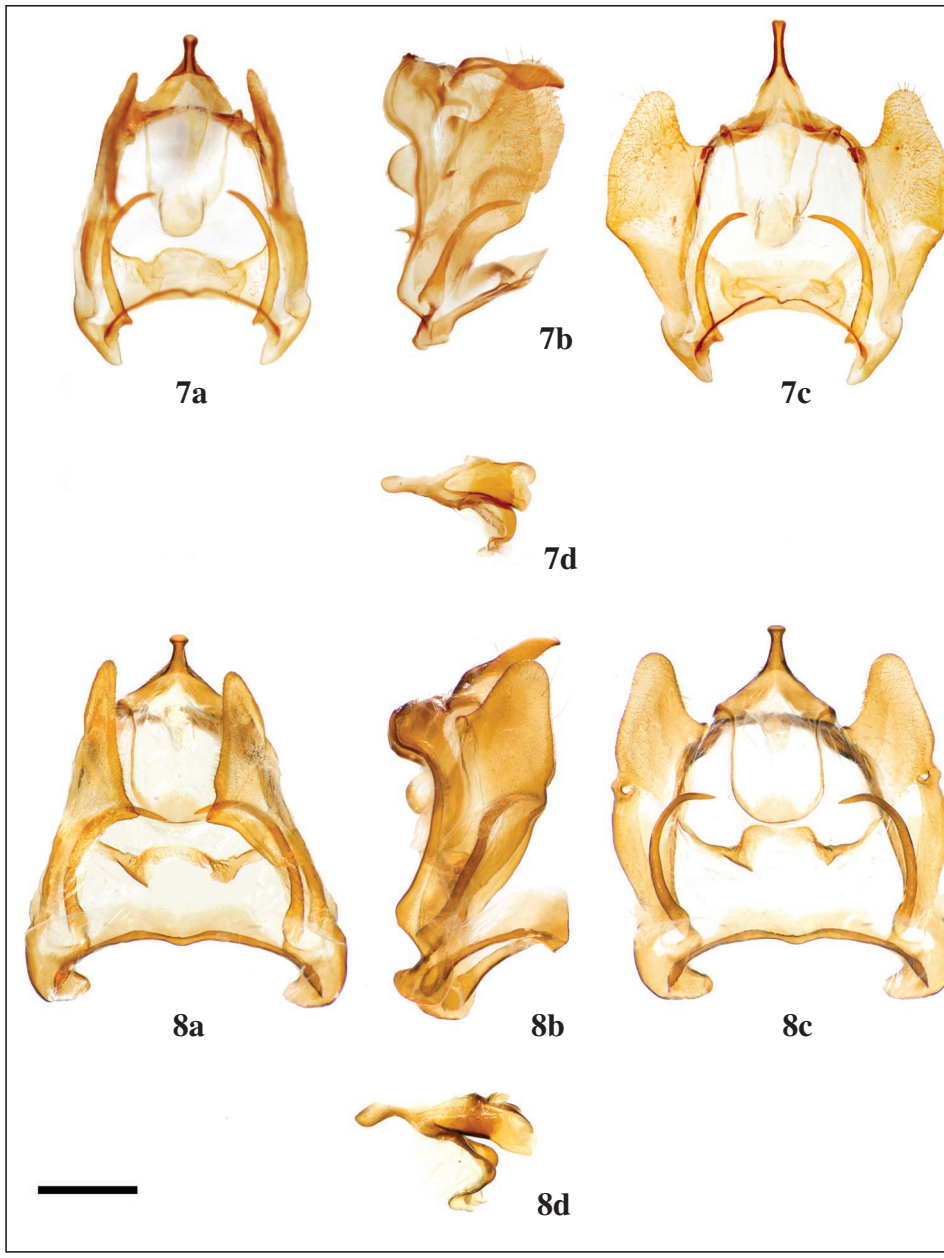
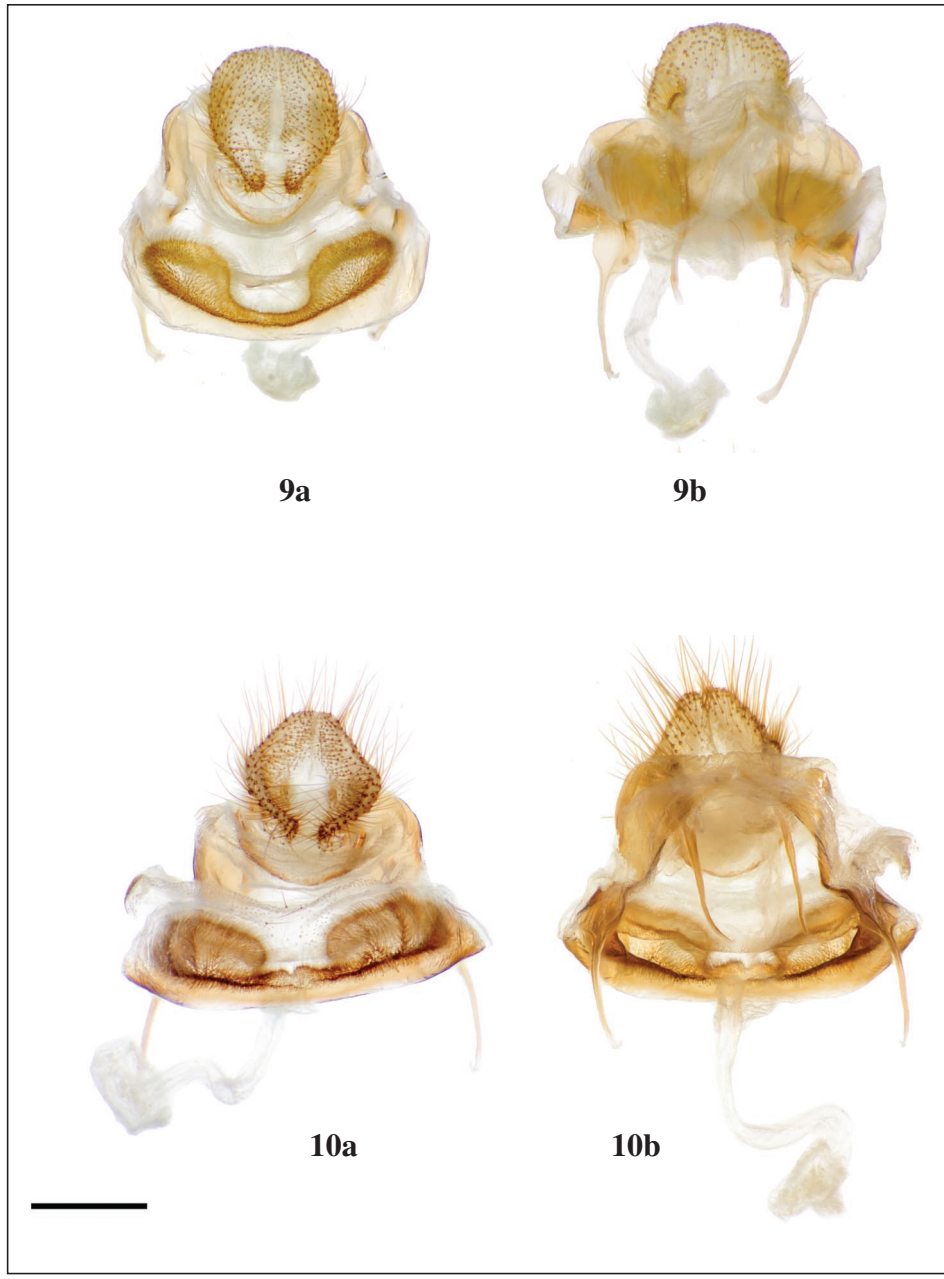


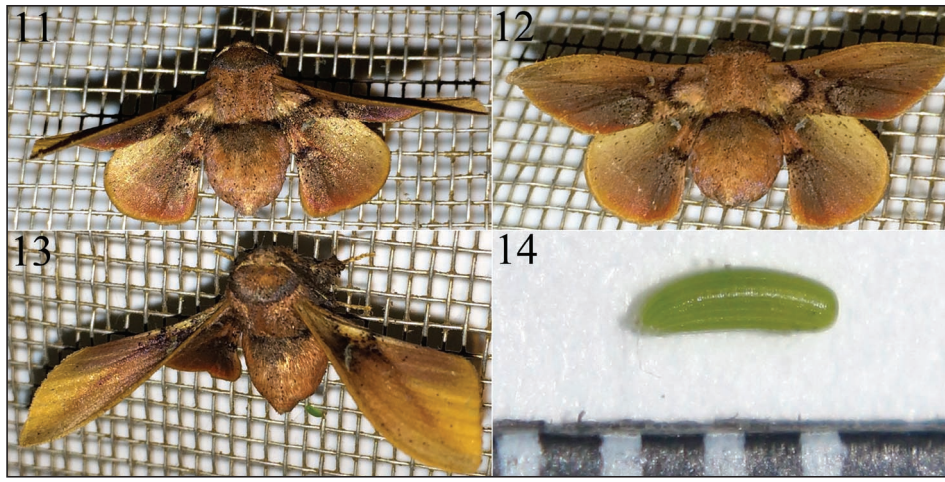
Figs. 2-6.– Adults of *Aleyda*, a: dorsal; b: ventral. **2.** *A. accipiter* male holotype, Lino, Panama (USNM). **3.** *A. accipiter* male, Lino, Panama (NHRS). **4.** *A. accipiter* female, Barro Colorado Island, Canal Zone, Panama (CUIC). **5.** *A. heppneri* St Laurent, McCabe & Malm, sp. n., male holotype, Peru, San Martin, Pumarini Lodge, 10 km E. Shapaja (MGCL). **6.** *A. heppneri* paratype female, French Guiana, 1 km W. Amazonia (NYSM). Scale bar = 1 cm.



Figs. 7-8.– Male genitalia of *Aleyda*, a: ventral, natural position; b: lateral; c: ventral, valvae open; d: phallus, lateral. **7.** *A. accipiter*, Lino, Panama, NHRS-TOBI 000001871 (NHRS). **8.** *A. heppneri* St Laurent, McCabe & Malm, sp. n., holotype, Peru, San Martin, Pumarini Lodge, 10 km E. Shapaja [St Laurent diss.: 3-30-17:1] (MGCL). Scale bar = 1 mm.



Figs. 9-10.– Female genitalia of *Aleyda*, a: ventral; b: dorsal. **9.** *A. accipiter*, Barro Colorado Island, Canal Zone, Panama [St Laurent diss.: 4-24-17:1] (CUIC). **10.** *A. heppneri* St Laurent & McCabe, sp. n., paratype female, French Guiana, 1 km W. Amazonia [St Laurent diss.: 3-27-17:1] (NYSM). Scale bar = 1 mm.



Figs. 11-14.– *Aleyda accipiter* female in situ and egg, Costa Rica, Puntarenas, Sabalito. Width of screen squares ~2 mm. Photos courtesy of Casey Owen, used with permission. **11.** Dorsal. **12.** Posterodorsal. **13.** Anterodorsal. **14.** Egg.

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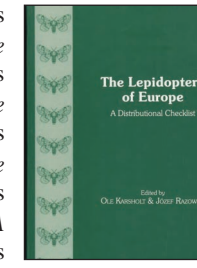

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First female record of the Psychidae species *Dahlica michaela* Arnscheid, 2016, in the Pyrenees of Huesca in Aragon (Spain) (Lepidoptera: Psychidae, Naryciinae)

W. R. Arnscheid & M. R. Gärtner

Abstract

In 2016 the senior author described the Psychidae species *Dahlica michaela* from the Pyrenees of Aragon based on 10 males, reared from larvae. No females were included in the type series. It was assumed that the female larvae live hidden on the ground near rocks where the male larvae were found. During a hiking trip on 28 April 2017 a small larval case has been detected attached near the base of a rock at the type locality. From this case a female emerged on 10 May 2017.
KEY WORDS: Lepidoptera, Psychidae, Dahlicini, *Dahlica*, morphology, distribution, biology, Huesca, Spain.

Primer registro de la hembra de la especie de Psychidae *Dahlica michaela* Arnscheid, 2016, en el Pirineo de Huesca en Aragón (España) (Lepidoptera: Psychidae, Naryciinae)

Resumen

En 2016, el autor principal describió la especie Psychidae *Dahlica michaela* del Pirineo aragonés a partir de 10 machos, que fueron criados de larvas. En la serie tipo no se incluyó ninguna hembra. Se ha supuesto que las larvas hembras viven escondidas en el suelo cerca de las rocas donde se han encontrado las larvas del macho. Durante una excursión de senderismo el 28 de abril de 2017 a la localidad tipo, se ha detectado una pequeña larva adherida al fondo de una roca. En este caso, una hembra que eclosionó el 10 de mayo de 2017.
PALABRAS CLAVE: Lepidoptera, Psychidae, Dahlicini, *Dahlica*, morfología, distribución, biología, Huesca, España.

Erstmalige Entdeckung des Weibchens der Psychidae *Dahlica michaela* Arnscheid, 2016, in den Pyrenäen von Huesca in Aragonien (Spanien) (Lepidoptera: Psychidae, Naryciinae)

Zusammenfassung

2016 beschrieb der Erstautor die Psychidae-Art *Dahlica michaela* aus den Pyrenäen der Region Aragonien nach 10 Männchen, die aus gesammelten Raupen gezüchtet wurden. In der Typenserie war kein Weibchen enthalten. Es wurde daher angenommen, dass die weiblichen Larven sehr versteckt am Boden in der Nähe der Felsen leben, an denen die männlichen Larven gefunden wurden. Während einer Wanderung am 28. April 2017 entlang der Felsen des Typenfundortes wurde ein kleiner Raupensack angesponnen am Fuß eines Felsens gefunden. Aus diesem schlüpfte ein Weibchen am 10. Mai 2017.
SCHLÜSSEL WORTE: Lepidoptera, Psychidae, Dahlicini, *Dahlica*, morphologie, verbreitung, biologie, Huesca, Spanien.

Introduction

As reported by (ARNSCHEID, 2016a, b; ARNSCHEID & WEIDLICH, 2017) only a few species of *Dahlica* Enderlein, 1912, are known from the Iberian Peninsula. These species belong to either the subgenus *Dahlica* Enderlein, 1912, or the subgenus *Brevantennia* Sieder, 1953. The latter is characterized by the short antennae of the female which bear less than 11 segments, mostly 3-5. Moreover, the male genitalia show a low genital index (mostly < 1.0; ARNSCHEID & WEIDLICH, 2017). Both subgenera are characterized by the absence of a tarsal epiphysis which is present in the subgenus *Siederia* Meier, 1953. The subgenus *Dahlica* was, until now, not known from Spain or Portugal as well as the alpine and south-east European distributed subgenus *Postsolenobia* Meier, 1958. When *Dahlica michaela* was described, it´s inclusion in the genus *Dahlica* was provisional. Due to the lack of females, it could not be definitively verified whether or not it belongs to *Brevantennia*. The general appearance, relatively broad scales on forewings, and the higher genital index were good reasons for the inclusion into *Dahlica*.

Dahlica michaela is presently only known from the type locality, a coniferous belt with a dense population of *Buxus sempervirens* and *Ilex aquifolium* in Benasque (Province of Huesca, Aragon). It seems quite certain that the flight period ranges from the middle of May to early June. During a hiking trip to the Valle de Ballibierna on 28 April 2017, we found a small larval case at the type locality of *D. michaela* near the base of a rock. We collected the case suspecting it could be the long missed female. After a few days, a female emerged and after a short assumed the mating position on the case for two days without laying eggs. Because no other sexual species of Dahlicini occur at the type locality, we have not the slightest doubt that this is the female of *D. michaela*. At the type locality two parthenogenetic *Dahlica* species exist (ARNSCHEID, 2016a, b). At the same rocks, we collected the larval cases of *D. triquetrella* (Hübner, [1813]) and *D. lichenella* (Linnaeus, 1761) and reared these to adults in recent years. Furthermore the asexual psychid species *Diplodoma laichartingella* (Goeze, 1783), *Eumasia parietariella* (Heidenreich, 1851), *Pseudobankesia casaella* Hättenschwiler, 1994, and *Apterona nylanderi* (Wehrli, 1927) occur in the same habitat.

Description

Adult female (Figs 1, 2). Length 4.0 mm, light greyish. Apterous, but head, antenna and legs well developed. Antenna with 17 segments. Labial palp reduced, forleg, midleg and hindleg with one pair of tibial spurs. Tarsi of all legs with 4 segments; tarsal segments not fused.

The intersegmental membrane between segment VII and VIII is covered with long spines.

Pupa (Figs 2, 3). Capito-prosternal plate with antennal sheaths and leg sheaths of equal length. Dorsal part of segments light brownish, divided. Anal hair-tuft ventrally, creamy white.

Case (Fig. 3). Length 6.2 mm, width 2.0 mm, yellowish brown, covered densely with particles of soil and other mineral debris, especially small stones.

Discussion

As noted the inclusion of *D. michaela* in the genus *Dahlica* was provisional, based on the general appearance of the males, their relatively broad scales on forewings and the higher genital index. After examination of the only known female we now have no doubt that *D. michaela* belongs to the subgenus *Dahlica* and not to *Brevantennia* due to the length of the antenna (17 segments). This generic placement is also supported by the fact that after emergence pupal exuviae of *Brevantennia* females often project more or less at a right angle from the case unlike that of *D. michaela*.

Acknowledgement

We are grateful to our friend Dr M. Weidlich (Neißemünde, Germany) for critical comments. We

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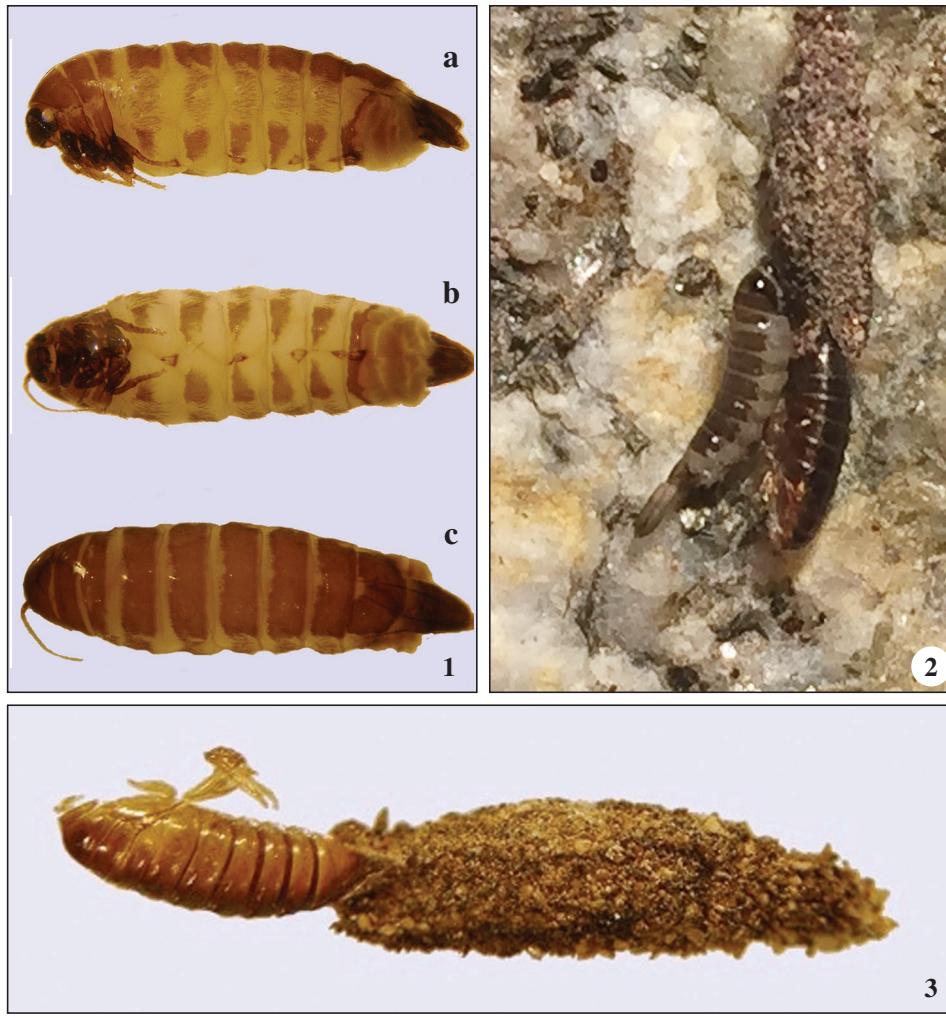

Figs 1-3.– 1. Female of *Dahlica michaela.* **a.** lateral view. **b.** ventral view. **c.** dorsal view. **2.** Female of *Dahlica michaela* in mating position. **3.** Female case with exuvia of *Dahlica michaela*, Arnscheid 2016.

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Bocchoris bleusei (Oberthür, 1887) a new species for the Maltese Islands (Lepidoptera: Crambidae)

A. Catania

Abstract

Bocchoris bleusei (Oberthür, 1887) is here recorded for the first time from the Maltese Islands.
KEY WORDS: Lepidoptera, Crambidae, *Bocchoris bleusei*, Malta.

Bocchoris bleusei **(Oberthür, 1888) una nueva especie para Malta (Lepidoptera: Crambidae)**

Resumen

Bocchoris bleusei (Oberthür, 1887) se cita por primera vez para Malta.
PALABRAS CLAVE: Lepidoptera, Crambidae, *Bocchoris blusei*, Malta.

Introduction

Bocchoris bleusei (Oberthür, 1887) is a Multi brooded moth, known from the North African countries Libya, and Tunisia. It is also recorded from Tenerife and La Gomera Spain, Iran and Afghanistan.

Material examined

MALTA, 1 ♂, Żebbug, 12-V-2017, at light, leg. A. Catania. Both genus and species are new to the lepidopterofauna of the Maltese Islands. I propose the Maltese name "Sinklera dehbija", after the golden markings on its wings.

Discussion

SPEIDEL *et al*. (1991) include this species in the genus *Bocchoris* Moore, 1885. In SLAMKA (2013), it is mentioned that this species may be discovered in Malta, Sicily and Sardinia. This assumption was probably triggered by the fact that these Mediterranean countries are close to North Africa and there is the possibility of accidental importation or migration. KARSHOLT & VAN NIEUKERKEN (2011), forgot to mention this species which is present and described from Algeria. REBEL (1906) mentions *Bocchoris bleusei* (Oberthür, 1888) from Tenerife, in the Canary Islands so its European range starts from these Southern European islands including Malta. From the 10th till the 12th of May, south-westerly winds of around 30 Km/hr persisted over the Maltese Islands. This is typical weather for the months of April and May and generally brings to our shores various species of

Heterocera, amongst which one can list *Autographa gamma* (Linnaeus, 1758)*, Trichoplusia ni* (Hübner, [1803])*, Chrysodeixis chalcites* (Esper, [1803]), *Helicoverpa armigera* (Hübner, [1808]), *Heliothis nubigera* (Herrich-Schäffer, 1851), *Heliothis peltigera* (Hübner, [1808]), *Hyles livornica* (Esper, 1780). It is here also good to note that two rare species have been recorded during these dates and though not new records for the Maltese islands are valid as they are very rare migratory species. These include *Tysanoplusia daubei* (Boisduval, 1840) and *Isturgia disputaria* (Guenée, 1858), the latter species being the second record for Malta (CATANIA, 2008).

Bocchoris bleusei feeds on the succulent plant *Suaeda vera* (Forssk. ex J. F. Gmel.) of the Amaranthaceae family. This was formerly known as *Suaeda fruticosa* (WOLFGANG & MICHAEL, 1989). It is a scarce plant in Malta and grows on coastal areas. The possibility that *Bocchoris bleusei* adapts itself and becomes established in Malta may be possible if other specimens apart from this record managed to make their way to our shores.

Bocchoris bleusei (Obth.), MALTA, 1 ♂, Żebbug, 12-V-2017.

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REVISORES 2016-2017 / *REFEREES 2016-2017*.– Los siguientes revisores colaboraron en la evaluación de los manuscritos durante el año 2016-2017. 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 2016-2017. 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*: Mr. Ernst Arenberger (Austria / *Austria*); Mr. Jan Asselbergs (Holanda / *Holland*); Dr. Giorgio Baldizzone (Italia / *Italy*); Dr. Francesca Barbero (Italia / *Italy*); Dr. Hernan Beccacece (Argentina / *Argentina*); Mr. Gottfried Behounek (Alemania / *Germany*); Mr. Balázs Benedek (Hungría / *Hungary*); Dr. Francesca Barbero (Italia / *Italy*); Mr. Gian C. Bozano (Italia / *Italy*); Dr. Mirna Martins Casagrande (Brasil / *Brazil*); Dr. Rafael Citores González (España / *Spain*); D. Francisco Javier Conde de Saro (España / *Spain*); Dr. Wolfgang Eckweiler (Alemania / *Germany*); Dr. Ing. Pedro del Estal Padillo (España / *Spain*); Ing. Andrés Expósito Hermosa (España / *Spain*); Dr. Enrique García-Barros Saura (España / *Spain*); Dr. Paul Goldsten (EE.UU. / *USA*); Dr. Axel Hausmann (Alemania / *Germany*); Dr. John B. Heppner (EE.UU. / *USA*); Prof. Dr. Ahmet Ö. Koçak (Turquía / *Turkey*); Prof. Dr. Gerardo Lamas Muller (Perú / *Peru*); Dr. Jean-François Landry (Canadá / *Canada*); Prof. Dr. Houhun Li (China / *China*); Dr. Wolfram Mey (Alemania / *Germany*); Dr. Olaf H. H. Mielke (Brasil / *Brazil*); Dr. Miguel López Munguira (España / *Spain*); Dr. Pietro Passerin d'Entrèves (Italia / *Italy*); Dr. Ana Paz (Brasil / *Brazil*); Dr. Soraya Peña de Camus (España / *Spain*); Mr. John Tennent (Gran Bretaña / *Great Britain*); Prof. Dr. Tomasso Racheli (Italia / *Italy*); Prof. Dr. Józef Razowski (Polonia / *Poland*); Dr. Angela Roggero (Italia / *Italy*); Dr. Víctor Sarto Monteys (España / *Spain*); Dr. Christian Schmidt (Canadá / *Canada*); Dr. Klaus Schurian (Alemania / *Germany*); Dr. Pasi Sihvonen (Finlandia / *Finland*); Dr. Sergei Sinev (Rusia / *Russia*); Dr. Frantiπek Slamka (Eslovaquia / *Slovakia*); Dr. Alma Solis (EE.UU. / *USA*); Dr. Wolfgang Speidel (Alemania / *Germany*); Mr. Jukka Tabell (Finlandia / *Finland*); Dr. Pasquale Trematerra (Italia / *Italy*); Dr. Vadin Tshikolovets (Ucrania / *Ukraine*); Prof. Dr. José Luis Viejo Montesinos (España / *Spain*); Dr. Antonio Vives Moreno (España / *Spain*); Dr. Hugo van der Wolf (Países Bajos / *The Netherlands*); Dr. Adriana Inés Zapata (Argentina / *Argentina*).– **DETALLES / *DETAILS*:** SHILAP; Apartado de correos, 331; E- 28080 Madrid, ESPAÑA / *SPAIN* (E-mail: avives@orange.es).

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