HONORARY MEMBERS
Günter Ebert (D), Pamela Gilbert (GB), Barry Goater (GB), Peter Hättenschwiler (CH), Prof. Dr Niels P. Kristensen (DK)

COUNCIL
President: Dr Gerhard Tarmann (A)
Vice-President: Prof. Dr Joaquín Baixeras (E)
General Secretary: Dr David Agassiz (UK)
Treasurer: Dr Robert Trusch (D)
Membership Secretary: Willy De Prins (B)
Ordinary Council Members: Prof. Dr Stoyan Beshkov (BG), Dr Feza Can (TR), David Demerges (F), Dr Jörg Gelbrecht (D), Dr András Kun (H)

NOTA LEPIDOPTEROLOGICA
A journal focused on Palaearctic and General Lepidopterology
Published by the Societas Europaea Lepidopterologica e.V.

Editors. Dr Bernard Landry (Genève, CH), e-mail: bernard.landry@ville-ge.ch
Dr Matthias Nuss (Dresden, D), e-mail: matthias.nuss@senckenberg.de
Paul Sokoloff (Kent, UK), e-mail: paul.sokoloff@ntlworld.com

Editorial Board. Dr Enrique Garcia-Barros (Madrid, E), Prof. Dr Roger L. H. Dennis (Wilmslow, UK), Dr Thomas Fartmann (Münster, D), Dr Axel Hausmann (Munich, D), Dr Peter Huemer (Innsbruck, A), Ole Karsholt (Copenhagen, DK), Dr Erik van Nieukerken (Leiden, NL), Dr Thomas Schmitt (Trier, D), Dr Wolfgang Speidel (Bonn, D), Dr Carlos Lopez-Vaamonde (F)

© Societas Europaea Lepidopterologica (SEL)
ISSN 0342-7536
Type setting: blattwerk | dd
Printed by Druckhaus Dresden GmbH

All rights reserved. No part of this journal may be reproduced or transmitted in any form or by any means, electronic or mechanical including photocopying, recording or any other information storage and retrieval system, without written permission from the publisher. Authors are responsible for the contents of their papers.
Yuri P. Nekrutenko (1936–2010) .......................................................... 179–186

John R. Langmaid, Klaus Sattler & Carlos Lopez-Vaamonde. Morphology
and DNA barcodes show that Calybites hauderii does not occur in the British Isles
(Gracillariidae) ................................................................. 191–197

János Pál Tóth, Judit Bereczki, Nigel Spring & Zoltán Varga. Dispersal ability
and habitat selection in Melitaea telona kovaci Varga, 1967 and M. phoebe
(Denis & Schiffermüller, 1775) (Nymphalidae) in steppe grassland ................................ 199–207

Andreas H. Segerer, Alfred Haslberger & Theo Grünwald. Occurrence of
Olethreutes subtilana (Falkovitsh, 1959) in Central Europe uncovered by
DNA barcoding (Tortricidae: Olethreutinae) ........................................... 209–218

Hans Blackstein & Timm Karisch. Zur Wicklerfauna Tunesiens (Tortricidae) ........ 219–229

Axel Hofmann & Thomas Keil. Contribution to the knowledge of the genus
Zygaena Fabricius, 1775, in Iran (Zygaenidae). Part IX: On two newly discovered
Mesembrynum taxa from the central and southern Zagros range .................................. 233–248

Lutz Lehmann. Lithostege stadiai sp.n. from North Iran
(Geometridae: Larentiinae) ................................................................ 249–251

Łukasz Przybyłowicz & Paul Sammut. Eilema marcida (Mann, 1859) – A new
species for Malta with remarks on the other members of Maltese Lithosiinae
(Arctiidae) ............................................................................. 253–259

Michael Fibiger, Knud Larsen & Ulf Buchsbaum. Phauda bicolor sp. n. from
North Sumatra (Indonesia) (Zygaenidae: Phaudinae) ........................................ 263–269

Jürg Schmid. Teleiopsis laetitiae sp. n. and Teleiopsis lindae sp. n., two hitherto
overlooked mountainous European species (Gelechiidae: Teleiodini)) ....................... 271–283

Boyan Zlatkov. A preliminary study of everted vesicae of several
leafrollers (Tortricidae) ................................................................... 285–300

Book reviews ............................................................................. 230, 252, 260, 270
Corrigenda

Zoltan Varga & Laszlo Rakosy


For the „Acknowledgements“ of our paper on *Maculinea nausithous*, the following sentence should be added:

„The survey was carried out with financial support from the IDEI PNII grant nr. 552/2007 accomplished by the Romanian Ministry of Education, Research and Youth.“
It happened in the Lepidoptera collection hall of the Museum für Naturkunde during the late 1990s. Outside, the east wing of the imperial building was still in ruins, bombed during World War II. To the left of me were the rows of wooden cabinets. Above, the high ceiling and to the right the windows with the wooden frames on which the imperial colour was still visible but peeling off. An old man came up to me, unhurried, thoughtful and hobbling, using a walking stick in his right hand. He introduced himself to me as Yuri Nekrutenko. Only several months later did I learn that Yuri was walking on only one leg, the other replaced by a full prosthesis, a situation that prompted him to say that he had already died as a field entomologist. During this stage of his life, Yuri spent months at German Natural History Museums curating butterfly collections and writing type catalogues, earning some additional money for his life in Kiev.

Yuri Nekrutenko was born on April 30, 1936 in Kiev, into a family of an artist of the Ukrainian Theatre and a movie studio. In 1941, Yuri together with his mother, was evacuated to Uzbekistan. He went to school in Urgut, a small town at the foothills of the Zeravshan mountains. During this time he developed his interested in butterflies. It was in Urgut, where he saw his first “machaon”. After secondary school he entered the Biological Faculty of the Shevchenko University in Kiev. During his University years, along with specialization in zoological systematics, he studied zoogeography, animal
morphology and evolution, using every possible opportunity to collect butterflies during student’s practical field studies. At the same time, he also studied human anatomy and histology at Kiev Medical Institute as well as Latin and Slavic languages at the University.

One of the largest Lepidoptera collections in the former Soviet Union, the Sheljuzhko collection deposited at the Zoological Museum of Kiev University, provided him with a sound for base studying Holarctic butterflies. Later, Yuri came in contact with L. Sheljuzhko who lived at that time in Munich, and who became his most important instructor in the taxonomy of Lepidoptera.

In 1958, during his first expedition to the Caucasus, Yuri made contact with Dr E. S. Miljanowski (Sukhumi) and Prof. Dr A. S. Danilevsky (Leningrad), who influenced his first steps into lepidopterology as a field of professional activity.

After his graduation from University in 1962, Yuri was employed as a research assistant in the Division of Quaternary Studies, Institute of Geological Sciences, as a specialist in systematics and zoogeography working on the interpretation of phylogenetic systematics and Quaternary-recent historical zoogeography. Having access to necessary technical facilities, he started his studies on the ultraviolet reflectance wing pattern of *Gonepteryx* butterflies, which resulted in the publication of numerous articles and a monograph, submitted as a doctoral thesis presented in 1969 at the Academy of Agricultural Sciences in Kiev.

In 1967, Yuri was appointed first as junior, and a year later, as senior researcher in systematic entomology at the Ukrainian Plant Protection Institute. There, supported by the Director, Academician V. P. Vasiliev, he concentrated his research efforts on faunaland taxonomic studies of the butterflies of Crimea and the Caucasus, paying a particular attention to nature conservation. From 1969–1979, he was the editor of the Institute periodical “Plant Protection”. During this period, every year, from April to September, he explored the Crimea and Caucasus, accumulating a comprehensive butterfly collection from these regions. Today, his butterfly collection is deposited at the National Museum of Natural History of Ukraine.

In 1979, Yuri was appointed full-time lepidopterist and member of the senior research staff of the Schmalhausen Institute of Zoology, Ukrainian Academy of Sciences, by then officially involved in the study of the butterfly fauna of the Ukraine, Crimea and Caucasus. He published numerous articles on the fauna, and the books on the butterflies of Crimea (1985) and the Caucasus (1990) certainly became his most well-known publications.

During the last four years, Yuri was editor of “Zbirnyk prac Zoологichnogo Mузейу”, the annual almanac published by Zoological Museum, National Museum of Natural History of Ukraine, were he was employed.

In 2007, Yuri was elected as honorary member of our Society (SEL News 43: 21), and had also been an honorary Member of the Polish Entomological Society.

When I met Yuri, he was living in Kiev with his much younger girl friend Oksana. Yuri first married in 1961, and again in 1970. His two children were born in 1962 (Olga) and 1973 (Anton). He loved to talk about his children, was proud of them and clearly missed them when he was away from Kiev.
Yuri had a really impressive command of languages used to good effect in his editorial activities in Ukrainian, Russian, English and Polish. By 1982, Yuri had been appointed as scientific editor of the Vestnik Zoologii, a bi-monthly journal published by the Institute of Zoology. In 1993, Yuri was nominated for the Editor of the newly established quarterly Journal of the Ukrainian Entomological Society (published from 1993 until 1998). He also was, from 1997, an active editorial board member of Nota lepidopterologica, providing invaluable support to Alain Olivier and myself. In contrast to the modern practice where scientific journals review and often largely rephrase author’s manuscripts, Yuri was of the opinion that the individual style of authors should be retained for publication. Regarding his linguistic abilities, I remember well that he asked me only twice during his more than six months work at the Zoological Museum in Dresden to help him in the translation of a part from an original description of a butterfly species written in German. In both cases, I could not figure out the meaning, as the German authors stumbled over their own nested sentences, making it impossible to interpret the text. In editing books, Yuri became an important supporter of Vadim V. Tshikolovets who published on the butterflies of Turkmenistan (1998), Uzbekistan (2000), Transbaikal Siberia (2002), Tajikistan (2003) and Kyrgyzstan (2005). It has been Yuri’s opinion that not everything should be published in English, which is especially important in the case of field guides, which are primarily needed by the local people in certain regions, and thus are important for encouraging nature conservation. Yuri retained his stubborn views on language, planning for the second part of “The Butterflies of the Caucasus” to be published in Russian, like the first part, but could not find a publisher willing to do this and later lost interest. Thus, one of the major projects of his life remained unfinished. However, Vadim Tshikolovets is now preparing a new volume “The Butterflies of Caucasus and Transcaucasia” in the series “The Butterflies of Palaeartic Asia”, for which Yuri wrote a comprehensive introduction and provided much support for the entire volume. Thus, his dream of a book on Caucasian butterflies will be fulfilled in the near future. Nevertheless, Yuri was undeterred and especially keen to publish the “The Butterflies of Ukraine” in the Ukrainian language (Nekrutenko & Tshikolovets 2005) and also translated the International Code of Zoological Nomenclature into his mother language (Nekrutenko 2003). Yuri was deeply into love with his home country Ukraine. Once, Yuri and I took a walk along the former “death strip” isolating West-Berlin from eastern Germany. He expressed his heartfelt happiness at the end of the Cold War along with the independence of the Ukraine. How many Ukrainian people did not have this luck! During his final years, Yuri spent much time and enthusiasm translating Mikhail Bulgakov’s novel “Master and Margarita” into Ukrainian, a fact that has been acknowledged after his death in the Kiev newspaper “Chreschatik” (June 14, 2010). Yuri would have written a reply to this article, asking why it has not been written in Ukrainian! Yuri was a hard working entomologist. He arose early in the morning, working until late in the evening, even in his 6th decade. He drank a lot of coffee and was certainly a chain smoker, sometimes getting up at night to take a cigarette. His humour was much in evidence, even in serious situations. During one of his visits to Dresden, he collapsed one morning after drinking only coffee for a long time. We called the ambulance. One of us kneeled down, bent over him asking “Yuri, can you hear me?” Yuri slowly moved
his head to the left, then to the right and clearly answered “No!” He was dehydrated, and happily, we got him back from hospital the same evening. Yuri visited Dresden three times, curating all butterfly types and the lycaenid collection at the Zoological Museum. I invited him to stay with me, during which we had much time to work, to talk, to see nature and to visit friends. These times will never be forgotten. One major lesson I basically learned from Yuri during this time was editing our journal, Nota lepidopterologica. I really enjoyed being taught by you – “Thank you so much, my dear friend!”

MATTHIAS NUSS

List of publications on Lepidoptera


Nekrutenko, Y. P. 1965. The value of zoogeographic investigations for the purposes of paleobiogeographic reconstructions. – Materialy po chetvertichnomu periodu Ukrainy (Quaternaria Ucrainica), Kiev, Naukova Dumka: 114–121 (In Russian; English summary).


Nekrutenko, Y. P. 1967. An attempt of compiling a key to species of the genus Gonepteryx Leach (1815) (Lepidoptera, Pieridae) using hidden wing-pattern. – Dopovidi Akademii Nauk Ukrainskoi SSR (B) 3: 263–265 (In Ukrainian; Russian & English summaries).


A prominent Finnish lepidopterist, Jukka Jalava, was born 60 years ago and passed away five years ago, in December 2005. Even though Jukka was a self-taught researcher without academic training, he was recognised as an outstanding expert on the Lepidoptera of Finland and in the micro-moths of the entire Palaearctic region. With his superb “eye for identification” and a wide knowledge of entomology and of natural history in general, Jukka contributed much to the flourishing of microlepidopterology in Finland from the late 1970s.

Jukka Jalava was an enthusiastic and efficient collector. He participated in many Finnish-Soviet/Russian joint expeditions in the 1980s and 1990s to the Altai, Caucasus and Polar Ural Mountains, and to Tuva, Buryatia, Murmansk, Vladivostok and Magadan areas. In the field he collected by day and by night: during the night at light or with baits, and after sorting and preparing material from the previous night he was netting day-flying butterflies and moths. His active field work substantially increased the Lepidoptera collections of the Zoological Museum, University of Helsinki (now the Finnish Museum of Natural History), where he was periodically employed as a museum assistant between 1980 and 1999. Three microlepidopteran species from the Altai Mountains have been named after Jukka Jalava: *Scythris jalavai* Sinev, 1993, *Gnorimoschema jalavai* Povolny, 1994 and *Stephensia jalmarella* Kaila, 1992 (after one of his nicknames “Jalmari”).

Nota lepidopterologica, 24.01.2011, ISSN 0342-7536
Jukka Jalava was friendly, helpful and supportive. He was keen to teach younger colleagues, and he identified their specimens and checked identifications. We will remember Jukka as a free-and-easy, social and colourful fellow.

**Seppo Koponen, Jaakko Kullberg, Lauri Kaila, and Mikhail Kozlov**

**Main publications by Jukka Jalava**


Morphology and DNA barcodes show that *Calybites hauderii* does not occur in the British Isles (Gracillariidae)

**JOHN R. LANGMAID**¹, **KLAUS SATTLER**² & **CARLOS LOPEZ-VAAMONDE**³

¹ Wilverley, 1 Dorrita Close, Southsea, Hampshire, PO4 0NY, U.K.;
  john.langmaid@btinternet.com
² Department of Entomology, Natural History Museum, Cromwell Road, London SW7 5BD, U.K.;
  k.sattler@nhm.ac.uk
³ INRA, UR063 Zoologie Forêtière, F-45075 Orléans, France;
  Carlos.Lopez-Vaamonde@orleans.inra.fr

**Abstract.** Evidence is presented that all British specimens of *Calybites hauderii* (Rebel, 1906) are not that species but the first brood of bivoltine *Caloptilia semifascia* (Haworth, 1828). *C. hauderii* is removed from the British list and its occurrence in Belgium is questioned. *C. semifascia* is normally univoltine in the British Isles but bivoltine populations are now spreading in southern counties.


**Introduction**

*Calybites hauderii* (Rebel, 1906) was first recorded from Britain in 1933 by L. T. Ford under the name *Gracilaria [sic] pyrenaella* (Chrétien, 1908) as identified by E. Meyrick (Ford 1933: 230). Ford had reared nine adults in early July 1933 from a quantity of the characteristic cones he had collected on 9 June on field maple (*Acer campestre* L.). The single locality was a small area of woodland with much *Acer campestre* at St Helen’s, near the coast in the east of the Isle of Wight. The first record from the English mainland was in 1991, when the species was discovered in West Sussex (Agassiz et al. 1993: 162). It appeared in Hampshire in 2000 (Langmaid & Young 2001: 244), since when it has been recorded there regularly, in Surrey in 2007 (JRL, pers. obs.), Oxfordshire in 2008 (Sims 2009: 169) and Kent in 2009 (P. A. Sokoloff, pers. comm.).

In the British literature this species was variously recorded as *Gracilaria [sic] pyrenaella* (Ford 1933: 230), *Caloptilia pyrenaella* (Fletcher 1940: 8; Wakely, 1960: 247), *Eusiplapteryx* (*Gracilaria*) *pyrenaella* (Wakely 1962: 120), *Calybites pyrenaella* (Bradley et al. 1972: 9; Emmet 1979: 53), *Calybites hauderii* (Emmet et al. 1985: 273) and *Caloptilia hauderii* (Bradley 1998: 9). It is worth noting that Emmet et al. (loc. cit.) expressed doubt about the validity of *Calybites* Hübner, 1822, and *Caloptilia* Hübner, 1825, as distinct genera in view of their extremely similar biology.

*Gracilaria [sic] hauderii* was originally described from a pair of specimens collected by Hauder in Austria, Oberösterreich, Kirchdorf [not Kirschdorf!] on 18.viii.1904 (male) and 13.iv.1905 (female). *Gracilaria [sic] pyrenaella* was originally described from the French Basses-Pyrénées from an unspecified number of adults reared by Chrétien from larvae that lived on *Acer campestre*, much in the manner of other ‘*Gracilaria*’ species,
i.e. initially mining and later producing the characteristic cones. The adults emerged in late June and July and Chrétien did not observe a second brood although he suspected there might be one. For an English translation of Chrétien’s description see Fletcher (1940: 8). Subsequently, Leraut (1983: 36) synonymized *G. pyrenaella* with *G. hauderii*, after designating lectotypes for both, and transferred the species to the genus *Calybites*. It is currently listed in the Global Taxonomic Database of Gracillariidae (http://gc.bebif.be) as *Calybites hauderii (= pyrenaella)* and its distribution is given as Austria, Belgium, Czech Republic, France, Hungary, Italy, Romania, Switzerland and United Kingdom.

*C. hauderii* was recorded in Belgium on the strength of two photographs taken in 2004 of a moth that had subsequently been released (De Prins et al. 2005: 53–54, fig. 1). However, with its sub-triangular rather than sub-quadrate costal blotch in the forewing, the specimen looks more like the first brood form *oneratella* Zeller, 1847, of *Caloptilia falconipennella* (Hübner, 1813) (Fig. 1) and the occurrence of *C. hauderii* in Belgium must be considered as unconfirmed. All records of *C. hauderii* elsewhere should be reassessed in the light of our findings.

**Material and Methods**

Suspicions that all was not as it seemed arose in 2008 when a huge abundance of *Caloptilia* spinnings was found in a small grove of *Acer campestre* trees on some common land in Portsmouth, Hampshire, in early June. These spinnings produced moths in July all of which were, apparently, ‘*hauderii*’ (Fig. 3). This was followed in August of the same year with an equally great abundance of spinnings at the same locality (Fig. 2) all of which produced specimens typical of *C. semifascia* (Haworth) (Fig. 4) in September of that year. Although this was the situation in Portsmouth, which is on the south coast of England, it was different 50 km inland at Farnham in Surrey. Here, between 19 May and 12 June 2007, a large number of *Caloptilia* spinnings were collected in the hope of breeding *C. hauderii*. Of approximately one hundred moths that were reared, only two were ‘*hauderii*’ whereas all others were typical *semifascia*.

Many British specimens of what was thought to be *hauderii* (Fig. 3), including some from Ford’s locality in the Isle of Wight, and typical *semifascia* (Fig. 4) were dissected following standard protocol.

DNA was extracted from adult specimens (dry hind legs) using the routine protocol of the CCDB (Ivanova et al. 2006 and the CCDB website: www.dnabarcoding.ca/pa/ge/research/protocols). The ‘DNA barcode’ region of COI was amplified, sequenced and analysed following the protocol described in De Prins et al. 2009.

In total ten individuals of *Caloptilia* were barcoded (Tab. 1); *Caloptilia stigmatella* (Fabricius, 1781) is used as outgroup for the analysis.
Fig. 2. *Caloptilia semifascia* larval spinnings on *Acer campestre*.

Records for those specimens are gathered within the project ‘Gracillariidae – PUBLIC records’ (code GRPUB) in the Published Projects section of the Barcode of Life Data systems (BOLD; www.barcodinglife.org) (Ratnasingham & Hebert 2007). Information on specimen vouchers (field data and GPS coordinates) and sequences (nucleotide composition, trace files) are found in this project by following the ‘view all records’ link and clicking on the ‘specimen page’ or ‘sequence page’ links for each individual record. Sequences are also available on GenBank (Tab. 1).

**Results**

The female genitalia show no differences between the two British forms, ‘hauderi’ and *semifascia*. In the males (Figs 5–7) there are only minor differences in the shape of the cucullus between what we were now recognising as the two superficially distinguishable broods of a single species, *C. semifascia*, and even those differences are not consistent. A request was then made to the Naturhistorisches Museum, Vienna, for the loan of the lectotype male and paralectotype female genitalia slides of *Calybites hauderi*. Examination of them showed that our British specimens definitely did not belong to that species and were not even congeneric with it. The true *hauderi* male is distinct in having a strong ventral spine at about the middle of the valva; such a spine is absent in *Caloptilia*. The *hauderi* female has only one signum in the corpus bursae in contrast to the pair of signa present in *semifascia* and other *Caloptilia* species.

DNA barcodes were obtained for ten specimens of *Caloptilia*; all sequences are complete barcodes of 658 bp except for one (GRACI353-08), which is 398 bp long. Two haplo-
types are reported; one occurs in Denmark (GRPAL118-10) and the Czech Republic (GRACI449-09) and is distinct by a single nucleotide substitution. The mean genetic variation within *Caloptilia semifascia* is 0.05, with a maximum distance of 0.15 between the nine individuals analysed. Interspecific distances are high in *Caloptilia* with up to 11.8 between *C. semifascia* from Denmark (GRPAL118-10) and *C. stigmatella*. The interspecific distances observed within the genus *Caloptilia* are on average 10.73 but can go up to 15.64 (Lopez Vaamonde unpublished data). These values are as high as those found in the genus *Phyllonorycter* (De Prins et al. 2009).

These divergences were calculated using Kimura’s 2 parameter model (K2P), since it takes into account the possibility that the rates of substitutions (transitions and transversions) per site may vary. This is clearly the case for mitochondrial DNA where transitions are generally more frequent than transversions and therefore this model is normally used in Barcode studies to calculate distance values. Please see Hall (2008) and Page & Holmes (1998) for further details about the K2P model and other distance measures for nucleotide sequences.

DNA barcoding, that is the use of a single genetic marker (i.e. COI) to assign the name of a known species to a specimen of unknown identity has been criticised among other things because sometimes two different species may have the same DNA barcode, for instance some *Grammia* Rambur, 1866 (Arctiidae) (Schmidt & Sperling, 2008) and *Agrodiaetus* Hübner, 1822 (Lycaenidae) species (Wiemers & Fiedler, 2007). However, species pairs with 0% interspecific divergence are rare as shown by Hebert et al. (2009) in a large survey of more than 1300 Lepidoptera species from the eastern half of North America. They found only nine pairs of species that shared the same barcode. These cases always involved closely related species. In our case the similarity of both DNA barcodes and genitalia morphology among all nine individuals examined clearly indicates that the British material of ‘*C. hauderi*’ belongs to *C. semifascia*.

It is therefore apparent that *C. semifascia*, which was previously thought to be univoltine in Britain, was actually bivoltine in the Isle of Wight locality at the time of Ford’s discovery in 1933. It has become so also in some southern counties of the English mainland over the past twenty years. Furthermore, the massive infestation of the *Acer campestre* trees in Portsmouth, together with the observation that only a single parasitic hymenopteran was bred from a hundred or so spinnings, might indicate a recent invasion of the bivoltine form of *semifascia* from either continental Europe or possibly the “*hauderi*” locality in the Isle of Wight. The fact that the first brood larvae from Portsmouth all
Tab. 1. Samples used for the DNA barcoding analysis. The SampleID code is a unique identifier linking the record in the BOLD database and the voucher specimen from which the sequence is derived. Additional collecting and specimen data are accessible in BOLD’s public project GRPUB, as well as all sequence data.

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Species</th>
<th>Country</th>
<th>Barcode Number (BOLD)</th>
<th>Accession number (NCBI GENBANK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLV0409</td>
<td>Caloptilia semifascia (identified as C. hauderi)</td>
<td>UK</td>
<td>IBER0004-09</td>
<td>GU695245.1</td>
</tr>
<tr>
<td>CLV0309</td>
<td>Caloptilia semifascia (identified as C. hauderi)</td>
<td>UK</td>
<td>IBER0003-09</td>
<td>GU695244.1</td>
</tr>
<tr>
<td>CLV24508</td>
<td>Caloptilia semifascia (identified as C. hauderi)</td>
<td>UK</td>
<td>GRACI353-08</td>
<td>HQ171490</td>
</tr>
<tr>
<td>CLV0109</td>
<td>Caloptilia semifascia</td>
<td>UK</td>
<td>IBER0001-09</td>
<td>GU695242.1</td>
</tr>
<tr>
<td>CLV21808</td>
<td>Caloptilia semifascia</td>
<td>UK</td>
<td>GRACI326-08</td>
<td>HQ171489</td>
</tr>
<tr>
<td>CLV0209</td>
<td>Caloptilia semifascia</td>
<td>UK</td>
<td>IBER0002-09</td>
<td>GU695243.1</td>
</tr>
<tr>
<td>G09semi</td>
<td>Caloptilia semifascia</td>
<td>Czech Rep.</td>
<td>GRACI449-09</td>
<td>HQ171488</td>
</tr>
<tr>
<td>DP09127</td>
<td>Caloptilia semifascia</td>
<td>Denmark</td>
<td>GRPAL117-10</td>
<td>HM392581.1</td>
</tr>
<tr>
<td>DP09128</td>
<td>Caloptilia semifascia</td>
<td>Denmark</td>
<td>GRPAL118-10</td>
<td>HM392582.1</td>
</tr>
<tr>
<td>G08stigm</td>
<td>Caloptilia stigmatella</td>
<td>Portugal</td>
<td>GRACI448-09</td>
<td>HQ171491</td>
</tr>
</tbody>
</table>


produced the form resembling hauderi and the ones from Farnham mostly produced specimens typical of the second brood of semifascia lends some weight to that possibility. C. semifascia is recorded from almost all European countries and Morocco, Tajikistan, Turkey and Turkmenistan (De Prins & De Prins 2010). Unfortunately we are unable at this stage to comment on its bivoltinism in continental Europe because of confusion with the first brood of C. falconipennella and the true Calybites hauderi.

It should be noted that the name onustella Hübner, 1813, was sometimes applied to a form of semifascia Haworth, 1828, and would, of course, antedate the latter (Karsholt 1996: 303). In fact, World Catalogue of Insects (De Prins & De Prins 2005: 110) and the Global Taxonomic Database of Gracillariidae (Lepidoptera) (http://gc.bebif.be) record Caloptilia onustella Hübner as a valid species, with semifascia in synonymy. Serious doubt about the identity of onustella with semifascia was raised by JRL, and a recent reassessment does indeed indicate that Hübner’s name does not apply to a Caloptilia
species (Bengtsson 2010: 106). We therefore continue to use *semifascia*, the name universally applied to this species in the British entomological literature.

Acknowledgements

Thanks are due to Sabine Gaal-Haszler (Naturhistorisches Museum, Vienna), for the loan of the genitalia slides of *Calybites hauderii*. We would also like to thank Bengt Á. Bengtsson (Färjestaden), Jurate De Prins (Tervuren), Ole Karsholt (Copenhagen), Martin Honey (Natural History Museum, London), Zdeněk Laštůvka (Brno), David Lees (Orléans), Rodolphe Rougerie (Rouen), Ian Sims (Reading), Paul Sokoloff (Orpington), Poul Szyska (Gedser), Ian Thirlwell (Southsea) and Gerry Tremewan (Truro), for information, specimens, logistic support, discussions and comments on the manuscript. Rodolphe Rougerie (Rouen), is also thanked for processing the DNA samples at Guelph Barcoding Center. Sequencing of DNA barcodes was supported by a grant from Genome Canada to the international Barcode of Life project (iBOL).

References


Wakely, S. 1962. Further notes on Euspilapteiyx (Gracilaria) pyrenaecella Chretien. – Entomologist’s Record and Journal of Variation 74: 120–121.
Dispersal ability and habitat selection in *Melitaea telona kovacsi* Varga, 1967 and *M. phoebe* (Denis & Schiffermüller, 1775) (Nymphalidae) in steppe grassland

JÁNOS PÁL TÓTH¹,³, JUDIT BERECZKI¹, NIGEL SPRING² & ZOLTÁN VARGA¹

¹ Department of Evolutionary Zoology and Human Biology, University of Debrecen, Egyetem tér 1, 4010 Debrecen, Hungary
² European Conservation Action Network, Dorset, UK
³ Corresponding author: acutiformis@yahoo.com

Abstract. *Melitaea telona* is a protected species in Hungary. The known range has shown significant contraction over the last decades. In order to conserve this species it is important to understand its dispersal ability and patterns of movement. The, mobility of *M. telona* and the related *M. phoebe* were studied using capture-recapture methods. 307 *M. telona* and 139 *M. phoebe* individuals were marked and 12% recaptured during May 2009 in three study areas with ten sample sites. We estimated the densities of the larval food plant (*Cirsium pannonicum*) and of the most important nectar source (*Dianthus pontederae*). *M. telona* is moderately localized: the species is able to reach habitat patches several hundred metres distant. It tends to occur in high numbers where the food plant is abundant. In these sites, fewer *M. phoebe* were found, while there were higher numbers in the more degraded patches. Our data suggests that the density of the food plant is more important than the abundance of nectar sources in habitat selection by *M. telona*.

Introduction

*Melitaea telona kovacsi* Varga, 1967 is a protected forest-steppe species in Hungary. It lives only in habitats where *Cirsium pannonicum* grows in significant density. Evidence from museum specimens suggest that in the 1960’s this species was widely distributed in the central and northern hills of Hungary. Nowadays it is known from only a few localities in the Budai Hills, the region of the Aggtelek-Karst and the Borsodi Hills. Perhaps the most drastic decline has been observed in the Bükk Mts. There are many museum specimens from this region, but in the last few years we could not confirm the species’ continuing presence here. The Aggtelek region seems to be the only locality where this species still has strong populations and has any chance of a long term conservation (Varga 2007; Varga et al. 2005). In this region there are many suitable habitats for the species in close proximity to each other. The situation in the Bükk Mts. is totally different with the known, suitable habitats sometimes tens of kilometres apart.

Habitat isolation depends on both the hostility of the environment in between and the organism’s gap-crossing ability (Ricketts 2001; Schmitt et al. 2000; Tischendorf and Fahrig 2000; Wratten et al. 2003). Thus to understand isolation, one must consider the distance between all potential source populations and also the landscape between the habitat fragments. Landscape connectivity does not need to imply structural connectivity, but rather functional connectivity. Overall, depending on the species concerned, the landscape context may facilitate or impede movements of insects between habitat patches (Tscharntke and Brandl 2004). The mobility of the species can vary considerably even within a relatively small group like butterflies (Scott 1975).

We have carried out a capture-recapture survey on *Melitaea telona kovacsi* and *M. phoebe*. Our questions were: how localized are the populations, and how strong is
the connection between the habitat patches at different distances apart? In addition we were interested in other basic biological concerns: which plant species are the main nectar sources? What is the relationship between the supply of the larval food plant and the population size?

**Material and methods**

*Target species.* *M. telona* Fruhstofr, 1908 is distributed in the Ponto-Mediterranean belt. Its range extends from the eastern part of the Mediterranean Sea coast across Asia Minor to the north-western part of Balkan Peninsula and southern Italy including Sicily. The subspecies in the Carpathian basin has become isolated from the main distribution area and it has patchy habitats. In Hungary the only known food plant is *Cirsium pannonicum* while in other regions it feeds on different types of Asteraceae, mainly on *Centaurea* species, mostly local endemics (Russell et al. 2007). The species is univoltine, flying from mid-May to mid-June. The females lay their eggs near to the ground on the undersides of the food plant leaves. The young caterpillars live in a web, spreading out over the plant as they feed, leaving only the upper epidermis intact. When the warmer part of the summer arrives, the caterpillars enter diapause and overwinter in the third instar. The next spring they continue feeding, gregariously at first, but later becoming solitary. When fully developed, pupation occurs in the grass litter. The imago emerges one or two weeks later (Varga et al. 2005).

*Melitaea phoebe* (Denis & Schiffermüller, 1775) has the widest distribution in the tribes Melitaeini, with many described subspecies. Its range is nearly continuous, extending from North Africa over Eurasia to the Far East. It is widely distributed in Hungary, and was found at all of the sample sites. It is known to use several larval food plant species: *Centaurea, Carduus, Cirsium* spp. and, like all member of the tribe Melitaeini, is able to absorb iridoid glycosides from the plant (Wahlberg 2000). It is possible to feed the caterpillars with *Cirsium pannonicum*. Moreover, we collected young caterpillars from this plant and later realised they were *Melitaea phoebe*. Generally it is only possible to separate the caterpillars once they have reached the 4th instar, based on the coloration of the head capsule. *M. phoebe* has a black and *M. telona* has a brick red larval head capsule (Russell et al. 2007). The young caterpillars feed together like *M. telona*, but *M. phoebe* is bivoltine. The first brood flies nearly at the same time as *M. telona* and the second flies from the end of June/beginning of July to the end of August/beginning of September. To summarise the comparison of these two species, we can say that while *M. phoebe* is a widely distributed euryoecious species, *M. telona* is a narrowly distributed food plant specialist.

Even though these two species are very similar; we are able to separate them with a high degree of accuracy based on the morphology of wings and the shape of the tips of the antennae (Varga 2007; Varga et al. 2005).

**Data sampling.** Our study areas were in three well-known *M. telona* localities: Szőlöhegy near to Jósvafő, and Zabanyak and Borház-tető between Tornakápolna and Varbóc in the Aggtelek-Karst area. The vegetation of the study areas belongs to the alliance *Polygalo*
majori-Brachypodietum pinnati. The choice of these study areas was based on three main considerations: the presence of the focal species, a variety of distances between the sample sites, and a variation in the density of the food plant in the different sites. The Szőlőhegy study area has been extensively cultivated for a long time, most typically for fruit production, using widely spaced fruit trees with seasonally mown herbaceous vegetation. Thanks to this sensitive management, the vegetation on this hill has become very similar to that of forest steppe. We had five sample sites here.

A: is good condition steppic grassland with Stipa tirs, S. joannis and Iris pumila. Cirsium pannonicum has a high density here. It is rich in dicots (Jurinea mollis, Inula ensifolia, Polygala major, Scorzonera purpurea, many tall forb Asteraceae and Apiaceae etc).

B: with degraded vegetation, dominated by grasses. There is little evidence of the food plant here.

C: formerly used as a forestry hayfield. Nowadays, this site is mown irregularly by the staff of the national park. It is characterized by many different grass and herbaceous species, including some tall forbs and polycormon-forming species (Echium maculatum, Peucedanum cervaria, Centaurea spp., and Inula hirta, I. ensifolia, Thymus spp., Dorycnium germanicum)

L: is cut every year. Some Fabaceae are abundant here, e.g. Onobrychis arenaria, Hippocrepis comosa and Vicia tenuifolia.

N: is a slightly bushy patch, poor in dicotyledonous plants.

On the Zabanyik hill we can see the remains of fruit trees, indicating its former use as an orchard, similar to the Szőlőhegy. Compared with the Szőlőhegy, this hill is drier and warmer. Probably the species-rich patches are edaphically treeless. However, close to the top we can see some old Italian pubescent oaks (Quercus virgiliana) with a species-rich fringe vegetation (Anemone sylvestris, Cytisus procumbens, Dracocephalum austriacum, Euphorbia polychroma). We had three sample sites here.

G: This site is very near the oak forest on the south-east slope of the hill. It is a species-rich semi-natural grassland.

H: Facing Szőlősardó on the south-west slope of the hill, this site is drier and a little poorer in species. Stipa joannis and S. tirs are characteristic here.

I: is very bushy and poor in species. The south-east and north-east parts border Pinus nigra plantations.

The Borház-tető used to be a fruit production area too. Nowadays we can only see a few relict vines which bear witness to this activity. The north-east slope with Bromus erectus has been burned every year. We chose two sample sites here on the western slope very close to each other:

J: is a slightly bushy and dry patch with clastic soil. Some parts of this are very rich in Stipa tirs and S. joannis.

K: is near to the forest with many bushes; the dominant grass species is Brachypodium pinnatum.
Methods. Our data were collected through capture-recapture surveys on three or four occasions (Tab. 1) in 2009 May 15–25 from ten sample quadrats (sample sites) with dimensions 50 × 40 m. We worked on five sites simultaneously between 9:00 and 13:00 for 3 hours, only in good weather conditions. Captured butterflies were marked with a water
Fig. 2. The observed movement events. The size of the circles is commensurate with the number of butterflies, and the thickness of the lines with the frequency of the movement events. The distances are the measured distances between the middles of the sample quadrats.

resistant XF marker pen. We wrote a code on the underwing, consisting of a letter and a number. This code enabled butterflies to be recognized on recapture and their movement pattern deduced. The following information was registered on the field sheets: the sex, the species, and the activity before capture (or recapture), the latter being important in identifying nectar sources. *M. phoebe* and *M. telona* are very similar, so all specimens were re-identified on recapture to double-check. Misidentifications were not noticed. From the daily distribution of the marked animals we concluded that the sampling was made at the second part of the flight period (Tab. 1). It may have been better if we had started the survey before the peak of the flight period. However, it came earlier than we had anticipated because of the hot and dry weather conditions.
Tab. 1. Marked individuals of *M. telona* (t) and *M. phoebe* (ph) with date. Some of the sites we could not sample on the first day (–).

<table>
<thead>
<tr>
<th>date</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t</td>
<td>ph</td>
<td>t</td>
</tr>
<tr>
<td>V.16</td>
<td>28</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>V.20</td>
<td>24</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>V.22</td>
<td>12</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>V.25</td>
<td>6</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>sum</td>
<td>70</td>
<td>11</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>date</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t</td>
<td>ph</td>
<td>t</td>
<td>ph</td>
<td>t</td>
<td>ph</td>
<td>t</td>
<td>ph</td>
</tr>
<tr>
<td>V.15</td>
<td>14</td>
<td>13</td>
<td>9</td>
<td>1</td>
<td>27</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>V.18</td>
<td>11</td>
<td>22</td>
<td>8</td>
<td>11</td>
<td>15</td>
<td>9</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>V.21</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>15</td>
<td>4</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>V.25</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>sum</td>
<td>29</td>
<td>41</td>
<td>21</td>
<td>13</td>
<td>59</td>
<td>13</td>
<td>14</td>
<td>2</td>
</tr>
</tbody>
</table>

The coordinates of the sample sites were measured with GPS, and were matched with Google Earth to a satellite image. The centres of the sample quadrats were connected with lines and measured. The value was used as the distance between the quadrats. Movement patterns were drawn from the field sheets data.

After the capture-recapture survey, we estimated the density of *Cirsium pannonicum* and *Dianthus pontederae*. Five 2 × 2 m quadrates were marked randomly at each sample site, and the two plant species were counted in these sample sites. We calculated the density of plants per m². The relation between the observed numbers of butterflies and the density of the nectar source and the larval food plant were analysed using Pearson’s correlation.

**Results**

307 *M. telona* and 139 *M. phoebe* were marked; 12% of *M. telona* and 14% of *M. Phoebe* were recaptured. The sex ratio was 56% male and 44% female in the case of *M. telona* and 70% male and 30% female in case of *M. phoebe* individuals.

The most *Melitaea* individuals were observed in the sites “A” and “G”, and the fewest in sites “N” and “B” (Tabs 1 and 2). *M. telona* and *M. phoebe* were observed at every sample site but in very varying proportions (Fig. 2). The biggest differences were in the Szőlőhegy. The ratio changed from 92% to 36%. The smallest differences were observed in the Borháztető 46% and 44%, respectively, but in this place the two sample sites were very close to each other. On the Zabanyik Hill this ratio varied between 93% and 77%, respectively.

Feeding *M. telona* individuals (51% males, 49% females) were observed on 64 occasions during the capture-recapture survey. This sex ratio is not significantly different from the sex ratio of the marked butterflies. Feeding was recorded 62 times on *Dianthus pontederae* (96%), once on *Ajuga reptans* and once on *Polygala major*.

We found a significant (*p* < 0.05) but slightly different level of correlation between the density of *Dianthus pontederae* and *Cirsium pannonicum* and the observed number of
Tab. 2. The sum of observed *M. telona* (N t) and *M. phoebe* (N ph) individuals on the last three days, as well as the density of *C. pannonicum* (C.p.) and *Dianthus pontederae* (D.p.) in the sample sites.

<table>
<thead>
<tr>
<th></th>
<th>N t</th>
<th>N ph</th>
<th>C.p./m²</th>
<th>D.p./m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>42</td>
<td>7</td>
<td>18.9</td>
<td>6.2</td>
</tr>
<tr>
<td>L</td>
<td>24</td>
<td>10</td>
<td>5.4</td>
<td>3.2</td>
</tr>
<tr>
<td>N</td>
<td>11</td>
<td>18</td>
<td>2.2</td>
<td>1.75</td>
</tr>
<tr>
<td>B</td>
<td>12</td>
<td>10</td>
<td>0</td>
<td>1.05</td>
</tr>
<tr>
<td>C</td>
<td>18</td>
<td>8</td>
<td>5.35</td>
<td>1.85</td>
</tr>
<tr>
<td>J</td>
<td>15</td>
<td>28</td>
<td>0.15</td>
<td>1.3</td>
</tr>
<tr>
<td>K</td>
<td>12</td>
<td>12</td>
<td>4.75</td>
<td>0.05</td>
</tr>
<tr>
<td>G</td>
<td>32</td>
<td>13</td>
<td>18.65</td>
<td>4.95</td>
</tr>
<tr>
<td>H</td>
<td>14</td>
<td>2</td>
<td>4.95</td>
<td>2.55</td>
</tr>
<tr>
<td>I</td>
<td>17</td>
<td>5</td>
<td>0.35</td>
<td>6.75</td>
</tr>
</tbody>
</table>

Individuals: \( r = 0.7 \) for the nectar source, and \( r = 0.9 \) for the larval food plant. The connection between the two sources is not statistically significant. If we compare the ratio of *M. telona* and *M. phoebe* with the density of the food plant we can see *M. phoebe* never has a significant ratio where *Cirsium pannonicum* grows densely (Tab. 2). From the 37 movement events discernible for *M. telona* we conclude that the individuals can fly several hundred metres (Fig. 2). The longest registered distance was 420 m. The greater the distance between two sample sites, the less likelihood there is of observing flights between them. Naturally these distances are just approximate values, calculated from a map. However, as butterflies do not fly in straight lines, in reality their routes will surely be much greater than our estimated values.

**Discussion**

The closely related *Melitaea cinxia* Linnaeus, 1758 can survive for 12–13 days in cloudy cool weather (Hanski et al. 2006). Similar results were obtained by us in an air-conditioned laboratory environment, using overwintered *M. phoebe* and *M. telona* caterpillars collected from the sample sites in spring. These butterflies hatched in the laboratory, and were fed on *Spiraea* sp. flowers with a honey and water mixture as a supplement, and were able to survive more than 14 days at stable temperatures of 22°C. During the field work, the warm, very dry weather probably reduced the butterflies’ life expectancy. Because the intervals between samplings were usually 2 days (maximally 4 days), we think that the low level of recaptures cannot be explained simply by a high level of mortality caused by the dry weather. Rather by the mobility of butterflies – because all the sample sites are in large areas with suitable vegetation for *M. telona*, this species can easily move out from the sample sites. From our results we can see that the butterflies can move between patches several hundred metres apart. This ability could be very important for the long term survival of populations, especially in habitats which are subjected to deliberate partial or complete burning in spring. These fires can be extremely dangerous for *M. telona* – they could possibly kill all the individuals in a patch, because the species feeds, overwinters, and pupates in the litter at ground level. However if there are patches where the species can survive within flying distance, then recolonization is possible and the species will not necessarily become extinct. An important question for the conservation of *M. telona* is its relationship with *M. phoebe*. In our survey, *M. phoebe* occurred at all the sample sites. Moreover, in some quadrats, greater numbers of *M. phoebe* were recorded than of *M. telona*. These were the sites with degraded vegetation. *M. phoebe* has the ability to develop on *Cirsium pannonicum* but interestingly *M. phoebe* tends to be found in lower num-
bers where that plant is abundant. We have information from studies of strong and stable populations over several decades. Almost certainly *M. phoebe* has always occurred in these places or nearby, but cannot displace *M. telona*. We think the main condition for the long-term survival of *M. telona* is the high density of the larval food plant.

An additional exciting question is the possibility of hybridisation. Enzyme electrophoresis has not shown any evidence of hybridisation between these two species (Pecsénye et al. 2007), but this does not mean that they do not mate. It is possible that the hybrids are sterile or have a lower viability (or perhaps they do not hatch from eggs). It might be that there is so-called ‘reproductive interference’ between these two species (Gröning and Hochkirch 2008) and that this could explain the extinction of *M. telona* from some of its former known localities and the continued occurrence *M. phoebe* in these places. Further work is needed to resolve this question.

Our survey shows there is a strong connection between the target species observed numbers and the density of *Cirsium pannonicum* and *Dianthus pontederae*. In spite of the presence of many other flowering plants like *Campanula sibirica*, *Cytisus procumbens*, *Genista tinctoria*, *Helianthemum ovatum*, *Inula ensifolia*, *Lotus corniculatus*, *Onobrychis arenaria*, *Polygala major* and so on, feeding was recorded on mostly (96%) *Dianthus pontederae*.

Many plants such as *Jurinea mollis*, *Centaurea scabiosa* or *Cirsium pannonicum* were flowering later and mostly in very low numbers because the extremely dry spring. We have recorded butterflies feeding on these plants several times in the last few years. So it could be a mistake to conclude from our findings this year that this species is a nectar source specialist – an impression supported by the fact that *M. phoebe* individuals were also only recorded on *D. pontederae*, when we know that this species also lives in habitats where pink flowers do not occur (for example several weedy associations). In order to get more complete information about the nectar sources, we should have to repeat the survey in a year with more average weather.

The situation with the larval food plant is totally different. The target species, *M. telona*, is a true specialist. The species occurs only where *C. pannonicum* also occurs. One very interesting site is “I”, where the nectar source has a significant density (6.75/m²) but the marked butterflies’ numbers were much lower than we expected (Tab. 2). The larval food plant also had a very low density here (0.35/m²). If we delete this sample site from the dataset, we get a much stronger correlation (p<0.01, r=0.892) between nectar source and larval food plant, so this data is very valuable in our few samples because it indicates the secondary importance of the nectar source.

In conclusion, contrary to our expectations, *M. telona* has a greater mobility than we would have expected from its insular distribution and its specialisation (in nature) on one larval food plant. Future surveys will have to take this into consideration. If we want to increase the number of recaptures to get more accurate information about the population size or the dispersion ability, we must achieve a better coverage of the habitat with sample sites. It is better to choose habitats where there is a high density of food plants, not just because we observed the largest number of *M. telona* in these places but because we also observed the lowest number of *M. phoebe*. 
Acknowledgements

Without the following people we would not have been able to carry out this survey. Wendy Astill, Karen Aylward, Tim Baker, Jonathan Bradley, Jess Chappell, Richard and Ann Collier, Sam Hyde-Roberts, Stephanie Rogers, Linda Meadows, Richard Muirhead, David Norfolk, and Tim Thomas all of whom worked very hard in the field. Thanks to Kathy Henderson the coordinator of the European Conservation Action Network, Attila Huber, Roland Farkas, and Sándor Boldogh, the members of Aggtelek National Park who helped us to organize the work. The survey was aided by the European Conservation Action Network, supported by the Leonardo da Vinci fund of the EU Lifelong Learning Programme.

References

Occurrence of *Olethreutes subtilana* (Falkovitsh, 1959) in Central Europe uncovered by DNA barcoding (Tortricidae: Olethreutinae)

**Andreas H. Segerer**1, **Alfred Haslberger**2 & **Theo Grünewald**3

1 Zoological Collection of the State of Bavaria (Zoologische Staatssammlung München), Münchhausenstr. 21, 81247 Munich, Germany; Andreas.Segerer@zsm.mwn.de
2 Waschau 14, 83317 Teisendorf, Germany; a.haslberger@bglmed.de
3 Klötzmüllerstr. 202, 84034 Landshut, Germany; dr_gruenewald@web.de

**Abstract.** We identified a total of 14 specimens of the olethreutine moth, *Olethreutes subtilana* (Falkovitsh, 1959) from various locations in southern and central Germany (Bavaria, Rhineland-Palatinate, Thuringia). This species was previously known from European Russia through the eastern Palearctic; hence the findings represent the first records for Central Europe. Specimens were detected among large series of the widespread and common *O. arcuella* (Clerck, 1759); they had been overlooked and confused with the latter, as *O. arcuella*, with its very characteristic wing pattern, was believed to represent the only species of this group in Central and Western Europe. The first *O. subtilana* was only accidentally detected in the course of a genetic all-species survey of the Bavarian animals (“Barcoding Fauna Bavaria”). This paper compiles and illustrates the key characters allowing unambiguous identification, and describes the present state of knowledge of distribution, habitats and phenology in Germany. The impact of the finding is briefly discussed with respect to the potential of DNA barcoding, the value of scientific collecting, and the importance of sufficient sample sizes in faunistic surveys.


**Introduction**

DNA barcoding is a modern molecular approach for efficient *ad hoc* re-identification of species by using a defined signature sequence (Hebert et al. 2003, 2004; Steinke & Brede 2006; Ratnasingham & Hebert 2007; Stoeckle & Hebert 2008). It is claimed that the sequence of the 658 bp long ‘barcode region’ at the 5’ end of the mitochondrial cytochrome oxidase subunit I gene is a marker which allows unambiguous identification of animal species, though this topic remains controversial (e.g., Janzen 2004; Meyer & Paulay 2005; Will et al. 2005; DeSalle 2006; Rubinoff 2006; Rubinoff et al. 2006, Elias et al. 2007) and a number of exceptions to the rule have been reported (e.g., Hurst & Jiggins 2005; Whithworth et al. 2007; Wiemers & Fiedler 2007). Suitability of DNA barcoding for large-scale assessments of Lepidoptera was nevertheless shown by Hebert et al. (2010).
In the course of a current all-species barcoding survey of the fauna of Bavaria, southern Germany (Haszprunar 2009; BFB 2010), we accidentally discovered the presence of the leaf roller Olethreutes subtilana (Falkovitsh, 1959) in Germany. This species, originally described from Siberia (Vaganovo, Kemerovskoy oblast), was hitherto known to occur from north-western and central Russia through Siberia, reaching the Amur and Primorye regions, the Kurils, Korea, China and Japan in the east (Kawabe 1982; Kuznetsov 1987; Park & Park 1988; Razowski 2003; Aarvik 2010; Dubatolov 2010). Though being readily identifiable by morphological characters, it has been overlooked in Central Europe and confused with the widely distributed and common species, O. arcuella (Clerck, 1759). This paper presents the first records of O. subtilana from Central Europe and discusses the impact of this finding under some general aspects.

Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH</td>
<td>Alfred Haslberger</td>
</tr>
<tr>
<td>AHS</td>
<td>Andreas H. Segerer</td>
</tr>
<tr>
<td>BC</td>
<td>Barcoding</td>
</tr>
<tr>
<td>BFB</td>
<td>Barcoding Fauna Bavaria</td>
</tr>
<tr>
<td>BOLD</td>
<td>Barcode of Life Data System</td>
</tr>
<tr>
<td>CCDB</td>
<td>Canadian Centre for DNA Barcoding</td>
</tr>
<tr>
<td>COI</td>
<td>Cytochrome oxidase subunit I</td>
</tr>
<tr>
<td>iBOL</td>
<td>international Barcode of Life project</td>
</tr>
<tr>
<td>RCAH</td>
<td>Research Collection of Alfred Haslberger, Teisendorf</td>
</tr>
<tr>
<td>RCTG</td>
<td>Research Collection of Theo Grünwald, Landshut</td>
</tr>
<tr>
<td>TG</td>
<td>Theo Grünwald</td>
</tr>
<tr>
<td>ZSM</td>
<td>Zoological Collection of the State of Bavaria, Munich</td>
</tr>
</tbody>
</table>

Methods

Dissection of terminalia was done following the standard protocol of Robinson (1976). Forewing length was measured under a stereo binocular from wing base to apex, excluding the fringes.

As a complement to traditional morphological observations, DNA barcodes were obtained by sampling dry legs from collected specimens and sequencing at the CCDB (Canada) using the standard high-throughput protocol as described in Ivanova et al. (2006); regularly updated protocols used at the CCDB can also be found at: http://www.dnabarcoding.ca/page/research/protocols. All barcoded specimens of the two species in question are listed below in the paragraph ‘Material’. Images and further details such as voucher hosting institution, GPS coordinates and trace files can be obtained from the Barcode of Life Data System (BOLD) (Ratnasingham & Hebert 2007) in the public-access project FBLTO. Sequences were analyzed using BOLD analysis tools. The terms ‘sequence variation’ and ‘genetic distance’ refer to the analysis of the COI 5’ barcode fragment (full length 658 bp) with Kimura 2 Parameter. Genetic distances between species are given in % minimum pairwise distance, infraspecific variation in % maximum pairwise distance. The distribution map was created using the publicly accessible GPS Visualizer website (http://www.gpsvisualizer.com/).
Nota lepid. 33 (2): 209–218

Fig. 1. Olethreutes subtilana (left column) and O. arcuella (right column) from Germany, each column displaying a specimen of very small (top), typical (middle) and very large size (bottom). The specimen in the upper left was the first O. subtilana recognized in Germany (♂, Salzachau near Laufen, 2.6.2008; leg. et coll. A. Haslberger, barcode no. BC ZSM Lep 25167). The comparatively large size of the specimen in the lower left is untypical for O. subtilana (♀, Huberspitz, M.6.1993, leg. et coll. A. Speckmeier (in ZSM). Scale bar, 1 cm.


Results

Discovery of Olethreutes subtiliana in Germany. Olethreutes arcuella (Clerck, 1759) – the type species of Olethreutes Hübner, 1822 – is a well-known leaf roller occurring in wood- and scrubland of almost any European country (Razowski 2003; Aarvik 2010). In the second half of the 20th century, two species of similar appearance were described from Russia, but thought to represent eastern palearctic vicariants not present in Central Europe: O. subtiliana (Falkovitch, 1959) and O. captiosana (Falkovitch, 1960) (see also Aarvik 2010). The discovery of O. subtiliana in Germany just happened by chance in the course of the genetic BFB survey of Bavarian animals. Although the BFB database of O. arcuella had been already completed, we decided to include a further specimen which stood out from a series of O. arcuella by its exceptionally small size. To our great surprise, its COI 5’ partial sequence (‘barcode’) turned out to be markedly different from that of
Fig. 2. Terminalia of *O. subtilana* and *O. arcuella*. a: *O. subtilana*, male, prep. M3677-AHS. b: *O. arcuella*, male, prep. M3672-AHS. c: *O. subtilana*, female, prep. M3671-AHS. d: *O. arcuella*, female, prep. M3666-AHS. Figures are not given to the same scale.

*O. arcuella* (6.8 % genetic distance), suggesting that it could belong to a distinct species of *Olethreutes*. For comparison, the mean distance of species within Olethreutinae genera is 8.9%, the mean variation within species 0.6% (*n* = 455; preliminary, original data from the BFB project, queried from BOLD as of June 30, 2010). Subsequent dissection of the specimen in question showed the species to be *O. subtilana*. Morphological follow-up screening of our collections unveiled the presence of even more specimens of *O. subtilana* from further places in southern and central Germany (see chapter ‘Material’ above, and fig. 3), hitherto unrecognized within large series of *O. arcuella*. To date, we have been able to trace 14 specimens of *O. subtilana* among a total of ~250 Central, Western and Eastern European specimens of ‘*O. arcuella*’ present in our collections.

**Differential diagnosis.** Though strongly resembling *O. arcuella* in its external markings, the wingspan of *O. subtilana* is conspicuously small. (The name ‘*subtilana*’ was therefore very appropriately chosen). Of 18 specimens examined thus far, all but one were distinctly smaller than even the very smallest *O. arcuella*; only one exceptionally large specimen had a forewing length in the range of very small *O. arcuella* (6.8 mm) (Tab. 1, Fig. 1 – lower left).

Thus, size is a good marker for selecting specimens worth studying in further detail, and the very smallest ones of a series should be dissected to confirm the identity. The terminalia of both species are highly distinctive in both sexes, allowing unambiguous identification. As the original description of Falkovitsh (1959) may not be familiar to all microlepidopterists, and the figures of the adults in Razowski (2003) are unfortunately drawn to the same size (i.e., to different scales), we give a compilation of the essential differences of both species below in order to facilitate identification (Tab. 1, Figs 1–2). Alternatively, the species can be easily recognized by DNA barcoding (for access to reference data, see chapter ‘Methods’).
Tab. 1. Morphological key characters suitable for identification of *O. subtilana* and *O. arcuella*. * Only the smallest 45 out of a series of ~250 specimens were measured.

<table>
<thead>
<tr>
<th>character</th>
<th><em>O. subtilana</em></th>
<th><em>O. arcuella</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of forewing (Fig. 1)</td>
<td>5.4–6.8 mm mean 6.0 mm (<em>n</em> = 18)</td>
<td>Small specimens: 6.5–8.5 mm* mean: 7.2 mm (<em>n</em> = 45)*</td>
</tr>
<tr>
<td>Overall aspect of specimens in almost any case distinctly smaller than <em>O. arcuella</em>; only 1 specimen was in the size range of <em>O. arcuella</em></td>
<td>Overall aspect of specimens in almost any case distinctly larger than <em>O. subtilana</em></td>
<td></td>
</tr>
<tr>
<td>Male terminalia (Fig. 2)</td>
<td>Ventral margin simple, not markedly irregular nor conspicuously edged. Tuft of bristles on sacculus located close to cucullus</td>
<td>Sacculus with a strong, conspicuous outer edge and an irregularly scalloped margin posterior of edge. Tuft of bristles on sacculus located closer to basal opening than to cucullus</td>
</tr>
<tr>
<td>Valva</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phallus</td>
<td>Vesica simple, cornuti absent</td>
<td>Vesica containing ~10 small cornuti, usually visible at the posterior tip of phallus</td>
</tr>
<tr>
<td>Uncus</td>
<td>Distinctly notched at apex</td>
<td>Barely notched at apex</td>
</tr>
<tr>
<td>Female terminalia (Fig. 2)</td>
<td>Antrum simple, cylindric to funnel-shaped, with ring-like ostium bursae</td>
<td>Posterior part of antrum protruded, conspicuously swollen around ostium bursae, like a knob</td>
</tr>
</tbody>
</table>

**Distribution, habitats and phenology.** Distribution and frequency of *O. subtilana* in Central Europe are still poorly understood. Our efforts to verify *O. subtilana* from C and W European countries other than Germany were thus far in vain (see chapter ‘Material’ above), but we have checked the available material from our own collections only, and no systematic survey on a larger scale has been undertaken yet.

Our present observations suggest that *O. subtilana* might be a quite local and possibly rare species. All known places of occurrence are within, or at least closely associated to, mountainous regions (Alps, Bavarian Forest, Thuringian Forest, and Palatine Forest) (Fig. 3) and lie generally below 900 m altitude. Adults are active during day, flying in deciduous wood- and scrubland of different types (including alluvial forests, bog forests, trivial woodland and parks). Behaviour and biotopes are obviously similar to those of *O. arcuella*, and in most places both species occur syntopically. The bulk of specimens known to date is from south eastern Bavaria but this may well be an artefact: the records from other, widely separated parts of Germany (Thuringia, Palatinate) rather indicate that the species may have a much wider distribution than previously thought. We expect to find further populations especially in the low mountain ranges of Germany as well as in adjacent countries, but possibly also in more distant areas.
Most specimens of *O. subtilana* were caught within the first half of June, about one week later than the peak flight of *O. arcuella*; this observation, however, is statistically not well supported and may be artificial due to small sample size (Fig. 4).

**Discussion**

Though *O. subtilana* was already known from Eastern Europe (north-western and central Russia: Kuznetsov 1987), the identity of *O. arcuella* as the sole species of the group occurring in Central Europe was obviously never in doubt until Razowski (2003) and Aarvik (2010). This may at least in part be due to the fact that *O. arcuella* is very common and widely distributed and cannot be mistaken for any other palearctic tortricid, except for the two ‘eastern’ species mentioned above. Thus, visual diagnosis has been considered to be safe and unequivocal for identification of central European ‘*O. arcuella*’ and there seemed to be no need for any closer examination of series by collectors. As a result, *O. subtilana* has been overlooked in Central Europe for decades. Retrospectively, its occurrence in Germany is not completely surprising. It seems quite evident that the zoogeographic pattern of its distribution refers to a so called ‘euro-siberian’ species, the range of which reaches further to the west than previously thought (Lattin 1967: 378). The question of the exact western and southern boundaries of its range must be left open at present.
**O. subtilana** does not seem to be a neozoon currently expanding its area. Instead, there are records dating back to the 1940s and probably the 1920s (see chapter ‘Material’). The seeming accumulation of records in recent years in south-eastern Bavaria is most probably a bias caused by enhanced microlepidotterological collecting activities in this area since the 1990s.

In order to elucidate the pattern of distribution, we encourage European collectors to check their series of ‘O. arcuella’, and to collect very small ‘O. arcuella’ systematically in the field.

Beyond being a finding of mere zoogeographical and faunistic interest, the detection of **O. subtilana** in Germany is also an issue of more general impact:

First, the finding adds substance to a growing body of literature corroborating the potential of DNA barcoding for species identification, biodiversity assessment, biogeography and other disciplines. The late detection of **O. subtilana** in Central Europe despite the extensive work of so many lepidopterists is clearly a case where DNA barcoding has effectively and efficiently enhanced the knowledge of the German fauna, demonstrating that the method is well capable of challenging pre-existing hypotheses about the spectrum of species occurring within a certain area. Although the demands and efficacy of DNA barcoding have been a matter of controversy (e.g., Janzen 2004; Meyer & Paulay 2005; Will et al. 2005; DeSalle 2006; Rubinoff 2006; Rubinoff et al. 2006, Elias et al. 2007), and there are some papers reporting poor performance and pitfalls in some groups (e.g., Hurst & Jiggins 2005; Whithwort et al. 2007; Wiemers & Fiedler 2007), the general benefits for identification of species are clearly evident. As a preliminary result of the BFB project, the method is suitable for unambiguously identifying approximately 98% of the Bavaria moth species (Hausmann, Segerer, unpublished). The remainder corresponds to interesting cases of barcode sharing. In contrast, about 5% of the species show deep infraspecific COI-splits (Hausmann, unpublished), but this is not affecting re-identification because these haplotypes do not match with other species. Such genetic polymorphisms, including possible cryptospecies need to be studied in detail in the future. Secondly, the detection of **O. subtilana** in Central Europe is a textbook example of the importance of scientific collecting. Though there is general
agreement that collecting is an indispensable scientific standard in entomology, it has been and is consistently claimed even by some professionals that in-field identification of ‘unmistakable’ species (either by sight or photography) is equivalent to collecting, in terms of both efficiency, protection of natural resources, and nature conservation. Following this argument, *O. subtilana* would not have been detected in Bavaria, due to confusion with another species hitherto thought to be “absolutely unmistakable”.

Rather, it was the presence of large series of *O. arcuella* collected from many different places that eventually led to the discovery of *O. subtilana*. Countless numbers of *O. arcuella* have been recorded by in-field sighting of which the accuracy has to be questioned now.

A third lesson that can be learned is about the importance of sufficiently large sample sizes in barcoding (or any other faunistic) studies. The particular project design of BFB generally limits the number of specimens to be barcoded to four per species, preferably from geographically distinct and widely separated areas of Bavaria. This strategy is evidently sufficient for most, but not all cases: While *O. arcuella* is very common in Germany, *O. subtilana* apparently is not. The occurrence of the latter would have been definitely overlooked in the course of BFB simply for statistical reasons, unless we had not decided to extend the database of *O. arcuella* to a further specimen of somewhat ‘strange’ appearance. We conclude that some entomological intuition can be important and helpful when selecting specimens for studies restricted to small sample sizes.

Acknowledgements
We thank Paul Hebert and his colleagues at the Biodiversity Institute of Ontario (Canada) for their enthusiastic support of our project and the agencies that support their work: Genome Canada, the Ontario Ministry of Research and Innovation, and the Natural Sciences and Engineering Research Council of Canada (NSERC). We are highly grateful to Axel Hausmann (ZSM) for invaluable discussions and critical comments on the paper. Further thanks to Miki Sakamoto (Neuötting) for translating Japanese literature, Olga Schmidt (ZSM) for her help with Russian literature, Paul Sokoloff (Kent, UK) for improving the English, and Ulf Buchsbaum and Mei-Yu Chen (both: ZSM) for excellent technical support. The current study is part of the „Barcoding Fauna Bavaria“ project (BFB) which is financially supported by the Bavarian Ministry of Science, Research and Art (Bayerisches Staatsministerium für Wissenschaft, Forschung und Kunst, Munich, Germany).

Literature


Zur Wicklerfauna Tunesiens (Tortricidae)

HANS BLACKSTEIN¹ & TIMM KARISCH²

¹ Buckower Weg 1, 14712 Rathenow, Germany; Hans.Blackstein@gmx.de
² Straße der Jugend 6, 01877 Demitz-Thumitz, Germany; qlkr8@web.de

Abstract. The authors present new records of Tortricidae from the poorly known fauna of Tunisia. 23 species were captured during several expeditions between 2005 and 2008 by the German collectors H. Hoppe, T. Lange, L. Lehmann and A. Rudolph. The male and female genitalia of Cnephasia cf. albatana (Chretien, 1915) and the female genitalia of the holotype of Eana antiphila Meyrick, 1913 are figured for the first time. Aethes hoppei sp. n. is described as new species and belongs to the Aethes bilbaensis (Rössler, 1877) species group.

Einleitung


Material und Methoden

Nach Informationen von Hoppe und Lehmann (i. litt. 2010) listen wir nachfolgend die wichtigsten Fundorte nebst einer Kurzcharakterisierung auf.

Nordwesttunesien, Provinz Jendouba, Kroumirie, südlich Ain Draham, 36°57’N, 08°47’O, 630 m, Lichtfang (LF); Lebensraumausstattung: bewachsene Dünen; Naturpark Fejja, 15 km nordwestlich Ghardimaou, 36°30’28.4”N 8°19.17”O, 820 m, LF; Lebensraumausstattung: Eichenwald.

Nordwesttunesien, Provinz Beja, Cap Negro, nördlich Nefza, 37°05’N, 09°04’O, 90 m, LF; Lebensraumausstattung: bewaldetes Hügelland mit Macchie sowie Quercus coccifera, Q. suber, Pinus pinaster und Populus alba.

Nota lepidopterologica, 24.01.2011, ISSN 0342-7536
Nordwesttunesien, Provinz El-Kef, südwestlich El Kef, 36°6'55.2"N, 08°31'41"O, 410 m, LF; Lebensraumausstattung: gebirgiger Westteil des Tell-Atlas um El-Kef mit landwirtschaftlichen Nutzflächen und atlanto-mediterran beeinflußten Aleppo-Kiefernwäldern.
Dorsale, Provinz Kasserine, Südrand Jebel Chambi, 20 km westlich Kasserine, 35°09'54"N, 08°42'41"O, 840 m, LF; 12 km westlich Kasserine, Südhang, Nationalpark Jebel Chambi, 35°09'55.6"N, 08°42'29.2"O, 865 m, LF; 21 km westlich Kasserine, 35°09'12"N, 08°40'1"E, 900 m, LF; 19 km südwestlich Kasserine, 35°08'90"N, 08°42'40"O, 850 m; Lebensraumausstattung: landwirtschaftliche Nutzflächen mit Feldern und Obstplantagen sowie überweideten Halagrasseppen (Lygeum spartum), an Berghängen Pinus halepensis-Wälder mit Quercus ilex und Elementen der Macchie.
Dorsale, Provinz Nabeul, Strandhotel Cedria Beach, nordwestlich Soliman, 36°42'75"N, 10°24'64"O, 20 m, LF; Lebensraumausstattung: bewachsene Dünen, dahinter Lagunen und offene Wasserflächen mit Röhrichten und Salzwiesenelementen; nordöstlich Korbous, nördlich Menzel Bouzelfa, 36°50'07"N, 10°35'24"O, 170 m; Lebensraumausstattung: Macchie mit Quercus ilex, Q. coccifera und Pinus halpensis, z. T. auch noch bewaldete Hügelketten.
Sahelzone, Provinz Gafsa, Qued Melah bei El Ksar, südöstlich Gafsa, 34°22'86"N, 08°50'03"O, 250 m, LF (2); Bou Omrane, Jebel Biada, 28 km östlich Gafsa, 34°20'N, 09°03'O, 300 m, Lichtfalle; 30 km östlich von Gafsa, Gebirge Jebel El Onk., LF; Lebensraumausstattung: steppenartige, beweidete Vegetation in den Höhenlagen, bei Gafsa größere, meist trockene Flußbetten (Ouesd) mit Tamarisken und halobionter niederer Vegetation.
Sahelzone, Provinz Jerid, südöstlich Tamerza, 70 km westlich Gafsa, 34°23'N, 07°55'O, 280 m, LF. Sahelzone, Provinz Kebili, nördlich Stefini, 15 km nördlich Kebili, 33°48'45"N, 09°00'40"O, 26 m, LF; 2 km südwestlich Bazma, 12 km südlich Kebili, 33°37'56"N, 08°58'22"O, 30 m, LF; Lebensraumausstattung: Salztonnen mit salzumpfartigen Flächen am Rande und vegetationslosen Bereichen im Zentrum; zwei halbwüstenartige Gebirgsketten von West nach Ost verlaufend.
Sahelzone, Provinz Gabes, Wadi 3 km westlich Café Jellili, 33 km westlich Matmata, 33°34'N, 09°39'O, 175 m, LF; Nordteil Jebel Dahar, 3 km östlich Matmata, 33°32'N, 09°59'O, 500 m, LF; nordwestliches Dahargebirge 1 km südlich Matmata, 450 m; Zmerten, 9.2 km südlich Toujane, 33°23'N 10°06'O, 525 m, LF. Sahelzone, Provinz Tatouine, Südteil Jebel Dahar, 4 km westlich Chenini, 32°54'30"N, 10°13'50"O, 500 m, LF; Lebensraumausstattung: beweidete Beifuß-Halagrassteppe, bei weniger starkem Weidedruck und an Felshängen auch Gebüsche und Halbsträucher (Cytisus, Lycios, Thymelaea, Haloxylon, Lycium, Scabiosa, Thymus u. a.)

Abkürzungen

coll. HB Privatsammlung Hans Blackstein, Steckelsdorf
coll. TK Privatsammlung Timm Karisch, Demitz-Thumitz
DEI Senckenberg Deutsches Entomologisches Institut, Müncheberg
MNHN Museum national d’histoire naturelle, Paris
MB Museum für Naturkunde Berlin

Ergebnisse

Tortrix viridana Linnaeus, 1758

Phtheochroa syrtana Ragonot, 1888

**Material.** 1 ♂, Sahelzone: Qued Melah bei El Ksar, 05.X.2005, leg. Hoppe, coll. TK (Gen.-Präp. 2562, Karisch).

Cochylimorpha cultana (Lederer, 1855)


Cochylimorpha straminea (Haworth, 1811)

**Material.** 2♀, Dorsale, Strandhotel Cedria Beach, 13.IV.2006, Hoppe, coll. TK (1♀ Gen.-Präp. 2557, Karisch). 1♀, Sahelzone, Zmerten, 13.05.2008, Lange & Hoppe, coll. HB.

Cochylimorpha alternana (Stephens, 1834)

**Material.** 1♀, Sahelzone: Zmerten, 13.V.2008, Lange & Hoppe, coll. HB.

Aethes hoppei sp. n.  

**Figs 1, 8**


**Beschreibung.** Flügelspanne ♂ 12 mm. Grundfarbe der Vorderflügel kräftig gelb; zwei parallele, rotbraune Binden, die besonders auf der medianen Seite gezackt sind; Mittelbinde an der Discoidalzelle schmal durchschnitten und leicht zum Außenrand verbreitet; Costa von der Wurzel bis zur Mittelbinde rotbraun. Fransen von Grundfarbe. Hinterflügel hell bräunlich-gelb, Fransen etwas heller.

♂ **Genital** (Fig. 8): Uncus stumpf; Socii lang sichelartig; Tegumen mit zwei dornförmigen Fortsätzen; Valve breit, gedrungen, Cucullus breit gerundet, Saccus kräftig sklerotisiert, caudal vorgewölbt; Vinculum basal stark verbreitert. Aedeagus ziemlich schlank, mit zwei lateralen Fortsätzen, die am Ende mit zwei Zähnen besetzt sind und unterseits einen weiteren, feinen, dornförmigen Fortsatz aufweisen; Schafft des Apex ventro-apical zugespitzt.

**Weibchen:** Unbekannt.

**Differentialdiagnose.** Die neue Art gehört in die Aethes bilbaensis (Rössler, 1877)-Gruppe und ähnelt äußerlich Aethes bilbaensis sehr, von der sie sich im Genital durch den fehlenden caudalen Vorsprung des Saccus und stark verbreiterte Arme des Vinculum unterscheidet. Allerdings zeigt A. hoppei im Genital mehr Beziehungen zu
A. confinis Razowski, 1974, jedoch ragt bei Aethes hoppei sp. n. der Cucullus viel deutlicher vor, die caudale Vorwölbung des Sacculus ist verkürzt und die lateralen Arme des Phallus sind deutlich breiter und auch etwas kürzer. Das Coecum ist nicht so schmal wie bei A. confinis, sondern breit wie bei A. bilbaensis.

Verbreitung. Die neue Art ist bisher nur vom Typenfundort bekannt.

Lebensweise. Informationen zu den Präimaginalstadien liegen nicht vor.

Cochylis molliculana Zeller, 1847

Material. 1♂, Dorsale, Strandhotel Cedria Beach, 13.IV.2006, Hoppe, coll. TK (Gen.-Präp. 2559, Karisch); 2♀, gleiche Daten, aber 24.IV.2006, Hoppe & Rudolph, coll. TK.


Cnephasia cf. albatana (Chrétien, 1915)  


unsersen Daten in Tunesien weiter verbreitet. Razowski (1965) bringt nur die übersetzte Originalbeschreibung der Art, bildet aber die Genitalien und den Falter nicht ab. Leider ist der Holotypus von C. albatana derzeit nicht verfügbar (Luquet i. litt. 2010), so daß keine Sicherheit bei der Determination des vorliegenden Materials erlangt werden kann. Da uns Tiere von C. cf. albatana in beiderlei Geschlecht vorliegen, bringen wir nachfolgend die Beschreibung und Abbildung der Genitale sowie ein Foto des Falters (Fig. 4), um auch später eine Überprüfung der Zuordnung des hier erwähnten Materials zu gewährleisten.

**Beschreibung.** C. gen. m. (Fig. 9). Uncus mäßig lang, schmal, knapp oberhalb der Basis bis unterhalb des Apex mit kurzen, rauen Borsten; Socii sehr klein, rundlich; Gnathosarme kräftig, Endplatte vergleichsweise klein; Valve schmal, terminal stark verschmälert und recht lang ausgezogen; Sacculus kräftig, mit einem am Ende fein bedornten Prozessus, der leicht konkav ist und am Ende frei vorspringt; Vinculum verbreitet. Phallus schlank, am Bulbus ejaculatorius proximal verbreitert, apikal seitlich mit einem zahnförmigen Vorsprung; distales Ende des Phallus abgeflacht und mit scharfen Seitenencken; Coecum relativ schmal.

C. gen. f. (Fig. 11). Papillae anales breit und rundlich; Sterigma breit dreieckig, caudal mit ausgefranstem Rand; Colliculum kappenförmig, zentral weniger sclerotisiert, mit breiter Wulst am Ostium bursae; Ductus bursae kurz und mäßig breit; Corpus bursae länglich-sackförmig, mit schmalem, dornigem Band, welches bis etwa 2/3 der Länge in den Corpus bursae ragt.


**Cnephasia zernyi** Razowski, 1959


*Anmerkung.* Im Hochgebirge (Marokko) wurde die Art im Juli beobachtet. Nachweise sind aus Marokko (Großer Atlas, Tachdirt in 2200–2700 m) und Algerien (nach Razowski 1965) bekannt. Es handelt sich hier offenbar um eine ausschließlich nordafrikanische Gebirgsart, die in Tunesien in Mittelgebirgen lebt. Die bisher festgestellten Flugzeiten lassen auf zwei Generationen im Jahr schließen.
Eana antiphila Meyrick, 1913  


♀ Genital (Fig. 10). Papillae anales breit und relativ lang; Apophyses sehr kräftig; Sterigma breit, mit ausgezogenen Ecken, caudal stärker gebuchtet und in der Mitte eingeschnitten; Ostium bursae mit schmalem, sclerotisiertem Rand; Colliculum länger als breit, proximal einseitig etwas verlängert; Ductus bursae mäßig lang und breit; Corpus bursae länglich oval, mit langem, proximal verbreitertem Dornenband.

Batodes angustiorana (Haworth, 1811)

Material. 2♂, Nordwesttunesien, Cap Negro N Nefza, 19.V.2008, Lange & Hoppe, 1♂ coll. HB, 1♂ coll TK.

Periclepsis accinctana (Chrétien, 1915)

Material. 4♂, Dorsale, Südrand NP Jebel Chambi, 12.X.2005, Hoppe, coll. TK.


Lozotaenia cupidinana (Staudinger, 1859)


Cacoecimorpha pronubana (Hübner, 1799)


Clepsis neglectana (Herrick-Schäffer, 1851)

Material. 1♂, Nordwesttunesien, SW Le Kef, 410 m, 25.IV.2008 LF, leg. Lange & Hoppe, coll. HB (Gen.-Präp. 1442, Blackstein). 1♂, Dorsale, NP Jebel Chambi, 865 m, (Gen.-Präp. 1445, Blackstein) 27.IV.2008, Lange & Hoppe, coll. HB.

Clepsis consimilana (Hübner, 1814–1817)


Clepsis siciliana (Ragonot, 1894)


Crocidosema plebejana Zeller, 1847

Material. 1♂, Dorsale, Nordöstlich Korbous, 05.IV.2007, Hoppe & Rudolph, coll. TK (Gen.-Präp. 2548, Karisch). 1♀, Sahelzone, südöstlich Matmata, 450 m, 16.V.2008 LF, Lange & Hoppe, coll. HB.

Pelochrista bleuseana (Oberthür, 1888)

Material. 1♂, Dorsale, Südrand NP Jebel Chambi, 07.IV.2007, Hoppe & Rudolph, coll. TK (Gen.-Präp. 2543, Karisch).

Pelochrista modicana (Zeller, 1847)


Anmerkung. Die Individuen von Tunesien sind sehr kontrastreich gezeichnet.
Cydia blackmoreana (Walsingham, 1903)

Material. 1♂, Sahelzone, südöstlich Tamerza, 08.IV.2007, Hoppe & Rudolph, coll. TK.

Cydia cf. succedana (Denis & Schiffermüller, 1775)

Material. 1♂, Dorsale, NP Jebel Chambi, 12 km W Kasserine, 27.IV.2008, Lange & Hoppe, coll. HB (Gen.-Präp. 1443, Blackstein).

Anmerkungen. Das Exemplar weicht etwas von typischen C. succedana Tieren ab und stimmt auch nicht ganz mit der aus Tunesien beschriebenen C. tunisiana Aarvik & Karsholt, 1993 überein, gehört jedoch nach Genitalvergleich (Fig. 12) in die unmittelbare Nähe dieser Arten. Erst wenn weiteres Material vorliegt, kann gegebenenfalls eine weitere Differenzierung vorgenommen werden.

Cydia triangulella (Goeze, 1783)

= splendana Hübner, 1796–1799

Material. 2♂, 8♀, Nordwesttunesien, Kroumirie, 01.X.2005, Hoppe, coll. TK (1♂, 3♀ Gen.-Präp. 2545–2547, 2553 Karisch); 1♂, südöstlich Cap Negro, 02.X.2005, Hoppe, coll. TK (Gen.-Präp. 2544, Karisch).

Anmerkung. Ein vorliegendes Cydia-♀ von Kroumirie (Gen.-Präp. 2563, Karisch; Imago Fig. 6), 01.X.2005, Hoppe, coll. TK, ist von brauner Grundfarbe. Es entspricht genitaliter jedoch C. triangulella, so dass es unter Vorbehalt zunächst hier eingereiht werden soll.
Selania leplastriana (Curtis, 1831)

Material. 1♂, Sahelzone, nördlich Steftini, 20.IV.2007, Hoppe & Rudolph, coll. TK (Gen.-Präp. 2549, Karisch); 1♂, 1♀, Dahar, 4 km westlich Chenini, 430 m, 12.V.2008, Lange, coll. HB.

Zusammensetzung der Fauna


Danksagung


Literatur


Recently, two teams of lepidopterists independently from each other provided evidence that ‘Microlepidoptera’ do not form a natural community of descent, and that butterflies are deeply nested within this artificial group, close to gelechioids (Regier et al. 2009; Mutanen et al. 2010). For practical reasons, the term ‘Microlepidoptera’ is still in use, because methods of collecting and preparation are different for larger and smaller Lepidoptera and there is a need for identification guides to those Lepidoptera which are not treated in the bulk of literature on ‘Macrolepidoptera’ in the traditional sense. The recently published book by Joop Kuchlein & Leo Bot on the ‘Microlepidoptera’ from The Netherlands might thus be highly welcome.

The book is divided into an introduction, an illustrated glossary, a revised checklist of the Dutch Microlepidoptera, a list of scientific and Dutch names of Microlepidoptera, the identification keys (comprising 300 pages) and is completed with an index to the scientific names of Lepidoptera. The inside pages of the book cover provide colour photos of a set moth of each family of Microlepidoptera, which may help direct the reader to the correct family. Otherwise, identification should start using the key to families which contains supporting black and white drawings. At the family level, additional explanations are provided to the taxa and reference is made to the key of species of the respective family. Here, it is a bit impractical that one needs to check the page number in the contents at the beginning of the book to find the next key. For larger families, the ‘key to species’ starts with a key to subfamilies and reference is made to the next sub-key, but the page number has to be checked in the contents again. Beside this little inconvenience, the keys are clear and quick to use. Once keyed to a particular species, additional information is provided on wingspan, further morphological characters, and adult flight-time. For a final check of identification, the authors refer to the colour photographs presented on the website www.kleinevlinders.nl. On that site, the same identification keys are available and even more comfortable to use.

I have checked the Pyraloidea in greater detail, which is treated by the authors as one family Pyralidae. While it is still a matter of dispute whether to translate the basal dichotomy in Pyraloidea into two families Crambidae and Pyralidae or not, other examples of systematics and nomenclature used by Kuchlein & Bot are less acceptable. The use of ‘Pyraustinae’ in the sense of Pyraustidae sensu Marion (1954) is rather outdated. This taxon contains the Acentropinae, Evergestininae, Odontiinae, Pyraustinae, Schoenobiinae, Scoparininae and Spilomelinae. The latter taxon is not mentioned at all; together with Pyraustinae it forms the “Pyraustinae (narrow sense)” sensu Kuchlein & Bot. Other examples are the use of Nymphulinae which have for some time been synonymised with Acentropinae, Conobathra and Trachyceara with Acrobasis as well as Dipleurina and Witesia with Eudonia. This makes the use of the book unnecessarily confusing. The nomenclature could have been easily updated by using www.faunaeur.org or, in case of the Pyraloidea, also by www.pyraloidea.org. The key to the family failed to mention for the Pyraloidea two important characters which can easily be recognised using a magnification lens or a stereomicroscope, without further preparation: the presence of scales at the base of proboscis as well as the abdominal tympanal organ, of which the tympana can be recognised in dried specimens. At species level, I wonder whether identification can rely on external characters only. It would make the investigation of genitalia obsolete, saving a lot of time. But things are not that easy. Looking at Scoparia ambiguus and S. basistrigalis, two species which are frequently mixed up in collections, the keys do not provide precise characters for their identification. I know small specimens of S. basistrigalis as well as S. ambiguus specimens with a
well chequered forewing fringe, making the key characters given by Kuchlein & Bot obsolete. In contrast, an important character for *S. basistrigalis*, the black streak at the base of forewing, which gives this species its name, is not mentioned at all. *S. ambigualis* has a distinct uniform grey coloured base of forewing. Nevertheless, individual variation will require that, from time to time, even the most experienced lepidopterist checks the genitalia for proper identification of these two species, as it is the case for many Lepidoptera. This should at least have been mentioned in a book of this nature.

Matthias Nuss

References


Contribution to the knowledge of the genus *Zygæna* Fabricius, 1775, in Iran (Zygænidae). Part IX: On two newly discovered *Mesembrynus* taxa from the central and southern Zagros range

**AXEL HOFMANN** 1 & **THOMAS KEIL** 2

1 Verenweg 4, 79206 Breisach-Hochstetten, Germany; hofmann@abl-freiburg.de
2 Wachwitzer Bergstr. 5b, 01326 Dresden, Germany; Thomas-Keil@web.de

**Abstract.** Two new taxa of the genus *Zygæna* are described from the Iranian Zagros range: *Zygæna mirzayansi* sp. n. from the central part of the Zagros and *Z. fredi valii* ssp. n. from the mountainous regions in the province Kerman. There are observations on the preimaginal biology of the two taxa. For *Z. mirzayansi* sp. n., the full grown larva is known. It was found on *Eryngium billardieri*. *Zygæna fredi valii* ssp. n. feeds on *Bupleurum exaltatum* (M. Bieb.) or a very close related *Bupleurum*. The larvae of *Z. fredi syntypica*, *Z. fredi escaleraiana* and *Z. mirzayansi* are figured for the first time. The type-localities of *Z. fredi escaleraiana* and *Z. escalera* have been located more precisely. The types of *Z. fredi*, *Z. fredi escaleraiana*, *Z. fredi syntypica* and *Z. mirzayansi* are figured.


**Introduction**

The phylogenetic relationships within the *manlia*-group are complicated. Revisions were proposed by Naumann & Racheli (1978), Naumann & Tarmann (1983) and Naumann & Tremewan (1984) but were never published. Although our knowledge of the biology has increased because of recent, intensive fieldwork in Iran, the status of many of the nominal taxa remains unclear. During the last decade, new taxa have been described, including some whose systematic position and status remain unclear (e.g. *Z. ginnerieissi* Hofmann, 2000, *Z. rubricollis shahkühlhica* Hofmann, 2005, *Z. rubricollis tenhageni* Hofmann & Tremewan, 2003); others have been raised or reinstated to species level (e. g. *Z. nocturna* Ebert, 1974, *Z. aisha* Naumann & Naumann, 1988, *Z. fredi* Reiss, 1938), or transferred from one species to another (e. g. *Z. manlia kerma- nensis* Tremewan, 1974 to *Z. rubricollis kermanensis*, *Z. manlia araxis* Koch, 1936 to *Z. araxis* and later to *Z. rubricollis araxis*). Investigation of type-material as well as new discoveries of localities where several sympatric species of the *manlia*-group occur are of great importance in determining specific and infraspecific relationships. Some confusion still exists. For example, at Shah-Kuh (Gorgan S.) it seems that, in addition to *Z. cacuminum* Christoph, 1877 and *Z. manlia* Lederer, 1870, there are one or two further species group taxa of the *manlia*-group occurring in this locality. One has been described as *Z. rubricollis shahkühlhica* Hofmann, 2005. Another population discovered by T. Keil in the eastern Alborz close to the type-locality of *Z. cacumi-
num is neither this taxon nor Z. manlia. It is at present unnamed and might belong to “shahkuhica” although it is reasonably well differentiated, added to which we are still unsure what the taxa “shahkuhica” and “manlia” really are.

In the vicinity of Semirom (Esfahan), there are biotopes where Z. fredi and Z. rubricolis tenhageni are syntopic, thus directly confirming their heterospecificity. In the same biotope a third species of the manlia-group was found in 2002, and later at other places and provinces (Fars, Chaharmahal-va Bakhtiyari, Esfahan). Another taxon became known to us from the province of Kerman. Several larvae were found on Bupleurum exaltatum (M. Bieb.) or a very close related Bupleurum. Morphological characters, host-plant association and its distribution provide arguments for conspecificity with Z. fredi from the central Zagros range. Here we are describing these new taxa.

**Abbreviations**

CAHO  Collection Axel Hofmann, Breisach-Hochstetten, Germany.
CTKD  Collection Thomas Keil, Dresden, Germany.
HMIM  Hayk Mirzayans Insect Museum, Tehran, Iran.
NRMS  Naturhistoriska Riksmuseet, Stockholm, Sweden.
TLMF  Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria.
ZFMK  Zoologisches Forschungsmuseum A. Koenig, Bonn, Germany.

**Zygaena fredi** Reiss, 1938

"Zygaena (Peristygia) fredi" n. spec. “Reiss, H. 1938: 290, fig. d3. Type locality: “Iran, Fars, beim Fort Sine Seif id an der Straße Chiraz-Kazeroun in etwa 2200 m Höhe“.

The original description was based on 1♂, 1♀, on loan from Wilhelm Brandt and collected by Fred Brandt on 29 May 1937; one further ♂ was collected but was not available to Reiss, one ♂ is figured (d3) in monochrome and is referred to as “Type”, i.e. holotype. While the original figure depicts this specimen with both antennae, both are now lost and the position of the abdomen has changed as genitalia dissection had been made (vide Fig. 1). The holotype is deposited in the NRMS. Taxonomically placed in the cuvieri-group, the author compared Z. fredi with Z. cacamium and Z. manlia.

During fieldwork undertaken in 2002 in the Gol Andaz valley near Deh Bakri (Kerman, Bam W.), G. M. Tarmann and T. Keil found specimens that were not easily referable to any other taxon. The association of these diurnal moths with a yellow-flowered, narrow-leaved Bupleurum sp. was readily apparent, as most of the individuals were found close to these plants. The “new taxon” occurred in the biotope together with two further Mesembrynum species (Z. aisha Naumann & Naumann, 1980, Z. ginnereissi Hofmann, 2000), while Z. chirazica Reiss, 1938 and Z. sengana Holik & Sheljuzhko, 1956, were also observed there. On 10 May, T. Keil found a female depositing eggs on one of these Bupleurum plants and a few weeks later (2.vi.2002) A. Kallies found several batches of eggs that were deposited irregularly at the base of the stems inside these plants. The same day the first larvae emerged and accepted only Bupleurum as a host-plant.

Based on these observations, specific investigations have been possible during subsequent years to provide new data, especially on the distribution of this Bupleurum-
feeding species. Independently, A. Hofmann had already found a few specimens at Shingara (Jiroft N.) the same year. There the moths showed the same association with Bupleurum at a site where no Eryngium species were present. The same or a very similar Bupleurum species was noted in 2005 and 2009 at Kuh-e Garin (Prov. Hamadan), at Kuh-e Bol (Eqlid vic.) and at Semirom (Prov. Esfahan); at the latter site, T. Keil found a full-grown larva of Z. fredi syntopica under a stone directly beneath a Bupleurum plant on 9.v.2005. Larvae from Semirom were reared in captivity (A. Hofmann, unpubl.) through the diapause stage to L5 on several Bupleurum species (B. falcatum, B. rotundifolium) None of the Eryngium species that was offered was accepted.

More than two dozen fully grown larvae (25.6.2009) and batches of eggs (8.7.2005) were observed lower down on the stems of the Bupleurum plants at Kuh-e Garin, (Prov. Hamadan, Nahavand SW, Gardaneh-ye Gema Siab, 2,750–2,850 m) (A. Hofmann).

Two fully grown larvae were found on 17.6.2009 at Gardaneh-ye Cheri (Prov. Chaharmahal-va-Bakhtiyari, Zarde-Kuh-reg., Samsami vic., 3,100 m). Like on Kuh-e Garin; they were sitting deep down in the wooden parts of thorny Astragalus bushes, amongst which the larval host-plant was present and protected from grazing herbivores (A. Hofmann).

Moreover, a population presumably belonging to Z. fredi (or a closely related taxon) was recently discovered in the central Alborz (A. Hofmann, unpubl.). Here, on the south side of the Kendevan pass, a female was noted nectaring at the white flowers of Cephalaria microcephala next to a solitary plant of Bupleurum exaltatum (M. Bieb.); an intensive search provided a single batch of 35 eggs that had been laid around a stem of the plant (T. Kia-Hofmann, pers. obs.). Two further females were kept in boxes in which both individuals deposited batches of eggs (n = 45), but only on the stems and flowers of Bupleurum. After seven days the larvae emerged. As host-plants, only Bupleurum species were accepted, the larvae initially showing a preference for the flowers.

There can be no doubt that a widely distributed species, or even a group of species, live on Bupleurum spp. in the Irano-Afghan highlands, knowledge that has been overlooked until recently. Very recent fieldwork in 2007 by A. Hofmann in central and eastern Afghanistan confirms this observation. At Kuh-e Paghman (Prov. Kabul), in the vicinity of Panjao (Prov. Bamiyan) and in the Panjshir valley (near Astanah), adults of Z. rubricollis Hampson, 1900 were observed in biotopes where only a single species of umbellifer was growing. In captivity, two females from Cheshmeh Gardaneh (Prov. Panjshir, Astanah – Shava) laid eggs on the narrow leaves of an offered Bupleurum species, behaviour that is identical to that observed in Iranian Bupleurum-feeder species (Hofmann, 2009).

**Zygaena fredi escaleraiana** Holik, 1958

"Zygaena (Coelostis) seitzi escaleraiana n. ssp." Holik, O. 1958: 68: 17. Type locality: Iran, „Haut-Kharoun, Chindaar Vallée“.

The original description was based on 1♂, 1♀ from the “Sammlung René Oberthür, die sich jetzt im Museum Alexander Koenig in Bonn befindet” (Holik, 1958).
The author mentioned that both specimens, labelled “Perse, Escalera”, were collected by de la Escalera on the same date and probably at the same site. Holik referred to Poujade (1900) when re-describing *Zygaena escalerae*, specimens of which had the
same labels, and gave more detailed information in the locality: „Haut-Kharoum, Chindaar Vallée“. He mentioned that all efforts to find the exact geographical location for this locality had failed.

The σ is cited as “Holotypus”, the Ψ as “Alloptypus”; both were collected “VII. 1899 (?)”. The citation on the label is erroneous: “escalaraica” or “escaleraica”.

Holik compared the specimens with Z. seitzi and stated that the only difference is in the coloration of the forewings, which were red instead of yellow. He supposed this red form to be the more ancestral one.

Originally described as a subspecies of Z. seitzi, the position of this taxon has remained unclear, as the type specimen had never been figured. We found the original σ specimen in coll. C. M. Naumann (now Museum Alexander Koenig, Bonn) where apparently it was on loan for the major revision of the whole manlia-group. Although the specimen is not in perfect condition, it is obvious to us that it belongs to the Bupleurum-feeding group of species and the nominal taxon escaleraiana is here placed as a subspecies of Z. fredi. Furthermore, we have succeeded in tracing the exact location of the hitherto doubtful type-locality. Hofmann & Tremewan (1996) inconsistently give: “Iran: Khuzestan, upper reaches of the Karun River (‘?Haut-Kharoum, Chindaar vallée’)” for Z. rubricollis escaleraiana and “Iran: Lorestan, upper reaches of the Karun River (‘?Haut-Kharoum, Chindaar vallée’)” for Z. escalera. In fact there is a village named “Chendâr” that is situated by the Kuhrang river, a primary tributary of the Karun River in the province of Çahârmahâl-va-Bakhtiyâri east of the Zarde-Kuh.

We define here the type-locality for Z. fredi escaleraiana and Z. escalera as follows: “Iran, Çahârmahâl-va-Bakhtiyâri, Chelgerd SE., Chendâr vic., Ab Kuhrang, [32°18’ 53”N 50°13’12”E]”.

Based on phenotypic similarity to the holotype, we provisionally refer the geographically surrounding populations to this subspecies until more material is available:

- Lorestan, Kuh-e Garin, Nahavand SW, 2400–2750 m
- Lorestan, Osturan-Kuh, vic. Dorud, 3200 m
- Esfahan, Khonsar, pass NW, 2800–2900 m
- Esfahan, Khonsar S, Derre Bid, 2600–3000 m
- Esfahan, Fereydun Shahr S, Kamaran valley, 2600–3000 m
- Chaharmahal-va-Bakhtiyari, Zarde-Kuh-region, Samsami vic., 2900–3100 m

In 2004 and 2005, *Zygaena fredi* was found on the Gardaneh-ye Cheri, a pass in the vicinity of Samsāmi (Zarde-Kuh region), at a higher altitude of around 3,000 m, ca 18 km from the type-locality as the crow flies. Here *Z. fredi* is sympatric and partly synchronous with *Z. seitzi*, thus confirming their heterospecificity, although gene flow cannot be completely ruled out as T. Keil found a single specimen of *Z. seitzi* with orange-red forewing spots. However, all other observed specimens (37 males, 14 females of *Z. seitzi*; 6 males, 6 females of *Z. fredi*) are clearly referable to one or the other species. *Zygaena fredi* was observed at the end of its flight period (9–10 July 2005) when the adults of *Z. seitzi* were in fresh condition. The two species are not precisely syntopic, as their biotopes are separated by ca 500 m. While *Z. seitzi* flies 100 m higher together with *Z. cambysea* and *Z. bakhtiyari*, in the biotope of *Z. fredi* only *Z. chirazica* was noted. At this site several plants of a narrow-leaved *Bupleurum* sp. were present. *Zygaena seitzi* from Samsāmi was reared ab ovo on *Eryngium* spp., as with all other populations of this species. On 17.6.2009, A. Hofmann found fully grown larvae of both species at this site, when the first specimens of *Z. fredi* were already flying. The larvae of both syntopic species cannot be confused (figs 65, 71).

Both species also seem to be sympatric in the Shiraz region, as the original specimens of *Z. fredi* were labelled “Fort Sine ...”. However, there are no recent records of *Z. fredi* from that area since its discovery there by F. Brandt in 1938.

**Zygaena fredi syntopica** Hofmann & Tremewan, 2003  
Figs 3, 27–28, 43–44, 57


Although other populations from the central Zagros range, e.g. from Gardaneh Meymand (Boyer Ahmad-va Kohgiluyeh, 2,550–3,000 m), from Kuh-e Bol (Fars, Eqlid SSE, 2,700–3,000 m) and from Gardaneh Timur Gun (Fars, Eqlid W, 2,650–2,750 m), are not so strongly darkened as typical *Z. fredi syntopica* from the vicinity of Semirom, they are provisionally referred to this subspecies.

**Zygaena fredi valii** ssp. n.  
Figs 4–12, 29–31, 45–47, 58

*Derivatio nominis*: Shah Nematollah Vali (ca 1350–1452 A.D.), Grand Master of Sufism, buried in Mahan/Kerman.


**Diagnosis.** Of medium size (♂ 25–27 mm, ♀ 25–28 mm). Head and antenna black, thorax black with double red patagia, abdomen black with a red cingulum present on one segment, closed on the underside, always present in both sexes, extremities black. Forewing ground colour black with slight greenish sheen, coloration of spots warm red. Basal blotch formed by confluence of spots 1 + 2 + 2a; spot 2 prominent, spots 1 and 2a small, longitudinal, each forming a streak; spot 2a reaching the dorsum of wing, while a black streak along the costa is located above spot 1; spot 3 small, triangular (occasionally rounded), never connected to subquadrate, well-developed spot 4. Spot 5 in size between that of spots 4 and 3, oval or rounded-subquadrat, isolated, occasionally connected to spot 6 in the area crossed by the medial veins. Spot 6 elongate, always reduced in its upper part. Hindwing warm red, slightly translucent, especially in the discal area. Black border pronounced from apex to the anal field and significantly developed as a tooth near tornus, the tooth extending towards the translucent field (this character is less significant in specimens from further west (Shingara and Darb-e Behesht). Easily distinguished from all other populations of *Z. fredi* by the remarkable tooth on the hindwing and the always reduced spot 6 in its upper part.

**Male genitalia** (n = 3). Uncus processes very short, triangular (Figs 29–31), lamina dorsalis with 4 “Hauptdorne” present on each side (figs 45–47); these characters agree well with the genitalia of the male specimen of *Z. fredi* from Estabanat figured by Görgner & Hofmann (1982: 51, figs 7.1–7.4). The uncus of *Z. fredi syntopica* is of the same shape, although it appears to be slightly longer; the “Hauptdorne” on the lamina dorsalis are less pronounced.

**Female genitalia** (n = 2; Fig. 58). Ostium bursae weakly sclerotized as in other Irano-Afghan *Mesembrynum* species. “Schildchen” very characteristic, crescent-shaped, more weakly developed than in *Zygaena mirzayansi* sp. n. (Fig. 61).

**Distribution.** *Zygaena fredi valii* ssp. n. is restricted to the province of Kerman where specimens have been found by several lepidopterists in at least five localities on the south side of the Kuh-e Hezar, between Darbmarzar and Deh Bakri. No records are available from the north side of the high mountains such as Kuh-e Hezar and Kuh-e Lallezar.
Bionomics. In the Gol Andaz valley (Deh Bakri vic.), at an altitude of around 2,800 m, the first moths were already flying on 10 May 2002. The latest recorded date is 4 June (Sarbishan, 2,900 m), indicating a flight period from the end of the first week of May to the beginning of June. This is extraordinarily early, as all localities are situated at high altitudes between 2,600 and 3,250 m. In the nearer vicinity of Deh Bakri, at around 2,000 m, where Z. chizraica and Z. ginnereissi are found from mid May, no specimens of Z. fredi valii ssp. n. were ever observed.

We have received a detailed description of this locality from our colleague G. M. Tarmann/Innsbruck: “The slopes contain strongly changing rocks of volcanic origin; they consist partly of dark, black, bluish or reddish porphyrites or volcanic ash, partly of almost white granite. In the gravel of the riverbed, even Palaeozoic chalks are notable. Here the vegetation is dominated by Artemisia sp. and small bushes of Prunus spp. Higher up, Prangos also occurs. The slopes are dominated by Artemisia sp., cushions of different Astragalus spp., Acantholimon sp., Polygonum spinosum and Prunus spp.; moreover, several small Acer trees are present.” Several larvae of Z. fredi valii were found on Bupleurum exaltatum (M. Bieb.) or a very close related Bupleurum.

Taxonomic remarks. As the Bupleurum-feeding group was only recently recognised as a distinct species-group, further taxonomic changes are to be expected when more detailed and comparable information on the biology and distribution of several nominal taxa becomes available. For the moment it would be speculative to postulate how many nominal taxa and biospecies are involved in this species complex. Morphological and phenotypic similarities with Z. fredi from Estabanat, with its type-specimens from the vicinity of Shiraz, and with specimens described as Z. fredi syntopica suggest a taxonomic placement of valii as an infraspecific taxon of Z. fredi although this cannot be properly supported by some diagnostic characters such as the extraordinary “hind-wing tooth”.

Investigating species boundaries and biotopes are of special interest as the syntopic occurrence of two or more taxa provides confirmation of their heterospecificity. From the province of Esfahan (vicinity of Semiro), the nominal taxa Z. rubricollis tentensageni Hofmann & Tremewan, 2003 and Z. fredi syntopica Hofmann & Tremewan,
2003 were described, their type-localities (biotopes) being on the same mountain slope. Ecologically, they are only slightly separated by their different phenologies. While the adults of Z. seitzi tenhageni occur together with Z. haematina from the beginning to the middle of June and can even be observed until the first week of July, Z. fredi syntopica flies together with Z. chirazica, both species occurring earlier and are at the end of their flight period when Z. seitzi tenhageni and Z. haematina begin to emerge. Surprisingly, in 2002 a further biospecies of this complex was discovered at the same locality by Thomas Keil. Investigations at home and comparisons with all other species have shown that this new species is related to the other two syntopic Mesembrynum-species and it is described below.

**Etymology.** Shah Nematollah Vali (ca 1350–1452 A.D.), Grand Master of Sufism, buried in Mahan/Kerman.

**Zygæna mirzayansi sp. n.**


**Diagnosis.** Species of medium size (♂ 25–28 mm, ♀ 25–30 mm). Head and antenna black, antennæ short, especially in females. Thorax black with double red patagia, abdomen black with a red cingulum present on one segment, closed on the underside, always present in both sexes, extremities black; abdomen and thorax in males noticeably hairy, in fresh moths reminding one of Z. exulans. Forewing ground colour black, without sheen, coloration of spots warm red, spots 1 + 2 + 2a confluent, forming a blotch but never reaching the dorsum of wing where a black streak is always present; spot 3 small, triangular, always connected to subquadrate spot 4, without any tendency of separation. Spot 5 variable, rounded, mostly isolated, occasionally connected to spot 6 in the area of the medial vein. Spot 6 elongate. Hindwing warm red, a black border pronounced at apex and as a double tooth near tornus, which occasionally extends into the discal area when there is a tendency to divide the red field by a black streak that is also visible on the underside.
Male Genitalia (n = 5). Uncus processes short, broad basally, triangular (Fig. 37), lamina dorsalis narrower basally, distally extending with 5–6 “Hauptdorne” present on each side; distal spines protruding beyond distal end of lamina dorsalis (Fig. 53). Compared with the other two syntopic Mesembrynum species, the processes of the uncus are more triangular in Z. mirzayansi sp. n. In the lamina dorsalis of Z. fredi and Z. seitzi tenhageni, the main spines are less significant and the basal part of the lamina is broader basally.

Female Genitalia (n = 1; Fig. 61). Ostium bursae weakly sclerotized, “Schildchen” well developed, triangular.

Bionomics. In the vicinity of Semirom the new species was found at two separate, not very steep, east to south-east facing slopes about 2–3 km from each other. In both localities, Z. mirzayansi sp. n. inhabits weakly grazed, comparatively mesophilous biotopes that are relatively rich in herbs mixed with high grasses. Only a single male was found at the adjacent, very steep boulder scree, where Z. chirazica, Z. haematina and Z. fredi syntopica are common.

At the type-locality, moths were observed from 30 May – 2 June and were flying synchronously with Z. rosinae, while the other syntopic species begin to fly during the second half of the flight period of Z. mirzayansi sp. n. It is remarkable that all three biotopes are located at an altitude of over 2600 m. Therefore, the flight period seems to be relatively early in the season. This may be one reason why this new species was not discovered before.

During several days at the beginning of June 2004, copulae were observed relatively early, between 12.00 h and 13.00 h local time, some of the copulae being accompanied by a second male. Not a single un-copulated female was observed, thus indicating that this is the normal mating time of Z. mirzayansi sp. n. No moths were observed nectar- ing.

In spite of intensive fieldwork that was undertaken from 2002 to 2009 in order to find larvae or cocoons, our knowledge of the preimaginal stages of Z. mirzayansi sp. n. remains poor. From several larvae, all of which were referred to Z. seitzi tenhageni in the field, one ♀ of Z. mirzayansi sp. n. emerged (e.p.: 10.7.2007, cult. T. Keil). The fully grown larva was found on the underside of an Eryngium leaf. It is very similar in coloration to that of Z. seitzi tenhageni. However, there is a good character for separating it from Z. seitzi tenhageni, viz. the black setae that are shorter and are present on all segments (Figs 66, 67).

Systematic position. As long as no molecular investigations have been undertaken for comparison with the phylogenetic tree published by Niehuis et al. (2007), no satisfactory decision can be made on the systematic position of Z. mirzayansi sp. n. except that it belongs in the subgenus Mesembrynum and that it might be closely related to some of the species that were formerly placed under Z. rubricollis.

Moreover, detailed data on the preimaginal biology and confirmation of the larval host-plant are urgently needed. The fact that Z. mirzayansi sp. n. is syntopic with Z. fredi syntopica and Z. seitzi tenhageni shows that conspecificity of Z. mirzayansi sp. n. with either of these two taxa is not possible. Without this evidence, which was obtained directly during fieldwork, one would hesitate to separate it as a distinct species in spite
of some of the extraordinary phenotypic characters: the strongly haired thorax and abdomen, the connection of the black ground colour dorsad of spot 2a to the thorax and the strange double tooth of the hindwings underline the isolated position of this new species.

**Distribution.** In the same year when T. Keil found the first specimens at Semirom, J.-U. Meineke collected a single female near the village of Sibak, south of Fereydun Shahr. Here *Z. mirzayansi* sp. n. is syntopic with other *Mesembrinus* species (*Z. manlia*...
lia, Z. tamara, Z. cambysea). In 2005, A. Karbalaye and a colleague from Esfahan collected a small series of the new species in the vicinity of Suriyan, thus confirming that the species has a wider distribution in the central Zagros range. One further record was made in 2006 when T. Keil found the new species near Shahr-e Kord, where it flies together with Z. rosinae, Z. tamara and other Zygaena species. It can therefore be assumed that this early-flying species will be found in further localities within this area and new records are also expected further north and south-east in the Zagros range.


**Acknowledgements**

We thank our colleagues Dr Axel Kallies, Dr Jörg-Uwe Meineke, Mr Bernard Mollet, Dr Hannes Rietzsch, Professor Dr Gerhard M. Tarmann and Dr W. Gerald Tremewan for their help and companionship during our fieldwork in Iran. G. M. Tarmann and W. G. Tremewan discussed the present paper with us and once more the latter improved the English manuscript. Thanks also to Dr Wolfgang ten Hagen for providing us with information on the interesting localities near Semirom and Borujen. Messrs Georges Betti, Manfred Dietz, Jiri Klir, Peter Hofmann, Ahmad Karbalaye (Tehran, Iran) and Alireza Naderi (Karaj, Iran) generously provided invaluable information on localities, together with collected material. We also thank our friends, field guides and drivers in Iran: Messrs Amir Hanafi, Mohammad Dawarnejad, Gholamreza Shadadian, Hamid Mohareri and Reza Shirazi. Moreover, we thank our helpful colleagues from the Department of Biology (University of Tehran): Professor Dr H. Sepehri and her colleagues Dr Alireza Sari and Professor Dr Hossein Akhani; Dr Ebrahim Ebrahimie and Ms Helen Alipanah (Plant Pests & Diseases Research Institute, Tehran). The host-plants mentioned in this paper were kindly determined by Professor Dr H. Akhani. Last but not least we thank our respective wives Tabassom and Christine for understanding our time-consuming passion and for their support.

References


Lithostege stadiei sp.n. from North Iran (Geometridae: Larentiinae)

LUTZ LEHMANN

Friedrich-List-Str. 41, 15890 Eisenhüttenstadt, Germany; luleehst@t-online.de

Abstract. Lithostege stadiei sp. n. is described from North Iran and compared with Lithostege buxtoni Prout, 1920. A list of Iranian Lithostege species is provided.


Introduction

Members of the genus Lithostege Hübner, 1825 are distributed throughout the Holarctic region. They prefer steppe-like to arid habitats and are especially species rich in the Middle East from Turkey to western Central Asia. Adults often fly in early spring, sometimes even in the winter months. The species included in the genus are probably not monophyletic, and the genus still awaits a thorough revision considering the whole Holarctic fauna and including DNA analysis. Our knowledge of the Asian species is still incomplete and new species have been described in the last two decades, even from Europe (L. clarae Gastón & Redondo, 2004, from Spain) or were recorded as new for Europe (Hausmann & Seguna 2005). Twelve species have been recorded from Iran so far: L. amoena Prout, 1938 (recently reported by Lehmann et al. 2009), L. caressata (Hübner, 1817), L. griseata (Denis & Schiffermüller, 1775), L. palaeestensis Amsel, 1935, L. fissurata Mabille, 1888, L. notata Bang-Haas, 1906, L. luminosa Christoph, 1885, L. flavicornata (Zeller, 1847), L. odessaria Boisdouval, 1848, L. witzenmanni Standfuss, 1892 and L. buxtoni Prout, 1920 (according to literature and material in the Hayk Mirzayans Insect Museum (HMIM) of the Iranian Research Institute of Plant Protection in Tehran (IRIPP, formerly PPDRI) examined by Hossein Rajaei and the author). A new, characteristic species of Lithostege found by two of the numerous Hungarian lepidopterological expeditions to Iran will be described below.

Lithostege stadiei sp. n.


Description. (Figs 1–3). Wingspan 29 mm, forewing length 15 mm. Head beige-grey. Antenna dark grey, setose. Thorax grey. Forewing sand-coloured with characteristic
narrow whitish band, running from basal area to wing tip, broadest above discocellular vein, bordered below by a darker brownish line which bends towards apex at the end of the cell, terminal line whitish, fringes brown at base. Forewing below the longitudinal band towards inner margin darker, suffused with grey scales. Hindwing white. Forewing underside (Fig. 2) paler, pattern reminiscent of that of the upperside but much more diffuse, slightly darker towards costa. Hindwing underside whitish.
Male genitalia (Fig. 5). Uncus short, stout, tapered. Valva short, broad, tapering, not rounded as in most other Lithostege. Costa sclerotised, without separate process. Valva membranous. Basal projection of valve (harpe) long, strout, reaching nearly length of costa. Saccus strongly developed, long, broad at base. Aedeagus relatively long, nearly straight, not curved, slightly constricted, without cornutus.

Female. Unknown.

Diagnosis. Due to its characteristic coloring and pattern, the species can not be confused with any other. The systematic position of the new species in Lithostege and its closest relatives remain unclear. Judging from wing pattern and male genitalia, Lithostege buxtoni Prout, 1920 distributed in South Iran (Lehmann et al. 2009) seems to be related. The new species differs by the tapering valva and the length and shape of the saccus.

Distribution. Altogether seven specimens were collected at the southern slopes of the northwestern Elburs (Alborz) mountain chain in North Iran, Province of Zanjan (Kuh-e Sendan Dag Mts.). The area is characterized by rather hot and dry mountain slopes. Unfortunately, the first received specimen, agreeing with the holotype, was lost during a car theft in Prague.

Life history. Unknown. The type series was collected beginning to late October, an unusual flight time for Lithostege species.

Derivatio nominis. The new species is dedicated to Dirk Stadie, renowned expert of the life history of West Palaeartic Macrolepidoptera and companion on collecting trips to South Iran, Jordan and Oman.

Acknowledgements

I am grateful to Balázs Benedek and György Fábián (Budapest, Hungary) for presenting the material from Iran for description and to Norbert Pöll (Bad Ischl, Austria) and Robert Trusch (SMNK Karlsruhe, Germany) for the permission to include their material. I express my sincere thanks to Reza Zahiri (Tehran, now Turku, Finland) for the genitalia preparation of Lithostege buxtoni and to Hossein Rajaei (Tehran, now Karlsruhe, Germany) for disposing his knowledge of Iranian Larentiinae. I also thank Axel Hausmann (ZSM Munich, Germany) for improving the manuscript.

References


To most lepidopterists, Günter Ebert is known as the editor and author of the book series “Die Schmetterlinge Baden-Württembergs”, published in German between 1991 and 2005 (see book review Nota lepidopterologica 31 (2008): 24). He travelled to Afghanistan several times between 1957 and 1971 studying butterflies and moths. In his new book “Auf Expedition in Afghanistan”, based on his diary of these travels, Günter Ebert describes his experiences in 22 chapters with 250 original photographs in black and white or colour.

At that time, the world was very different from today. In the 1950s, a flight ticket was much too expensive, and thus, the young enthusiast Günter Ebert travelled by train to Italy, changed to a ship for Karachi, continuing by bus to Afghanistan. A one way journey took him one month (today, we can easily manage an entire trip using air plane and a four wheel drive vehicle within one month). Inside Afghanistan, Günter Ebert met the inevitable time consuming difficulties with bureaucratic officials and slow transportation by corroded buses or going by yak and horse. We are told about the Afghan people he met during his journey, from nature, cities and villages in a poor country, at that time still in peace. The narrations are fascinating and strongly inspirational.

As Günter Ebert received financial support for his travel via Hans Georg Amsel (Karlsruhe) and Walter Forster (München), two men who were interested in the afghan Micro- and Macro-lepidoptera respectively, he collected Lepidoptera, deposited at the zoological collections in Karlsruhe and München today. This material served as a base for many publications on afghan Lepidoptera, including the descriptions of many new species, e.g. of Pyraloidea, by Hans Georg Amsel und Rolf-Ulrich Roesler. In this context, the book also is very interesting as it serves as a rich source of information on the physical geography and vegetation zones of Afghanistan, illustrated by maps. Many afghan localities which are familiar to us from type localities and labels pinned on dried moths are mentioned in the book, along with descriptions on their position and local conditions at that time. An index at the end of the book helps to find these localities in the book, giving different spellings which are in use for the geographic names. The book also contains an index to names of plants and animals and a short list of references.

Beside its value for entomologists, Günter Ebert’s book makes fascinating reading for anyone. It reports from a time before Afghanistan became a country of wars (since 1979!) and thus is a strong contrast to the everyday news in the media. Reading the book makes us dream of a peaceful Afghanistan, with happy people and butterflies on the wings...

MATTHIAS NUSS

* To be obtained from: Naturwissenschaftlicher Verein Karlsruhe, c/o Staatliches Museum für Naturkunde Karlsruhe, Erbprinzenstr. 13, 76133 Karlsruhe, Germany; schmetterlinge-bw@smnk.de
**Eilema marcida** (Mann, 1859) – A new species for Malta with remarks on the other members of Maltese Lithosiinae (Arctiidae)

ŁUKASZ PRZYBYLOWICZ & PAUL SAMMUT

1 Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Sławkowska 17, 31-016 Kraków, Poland; lukasz@isez.pan.krakow.pl
2 137, ‘Fawkner/2’, Dingli Road, Rabat RBT 9023, Malta; farfett@onvol.net

**Abstract.** *Eilema marcida* (Mann, 1859) is recorded for the first time from Malta. Specimens belonging to this taxon were originally determined as *Eilema pygmaeola* Doubleday which does not belong to the lepidopterofauna of Malta. Some biological and faunistic data on *E. marcida* and *Eilema caniola* are provided. Information on all the three species of Maltese Lithosiinae is summarized.

**Introduction**

The Maltese Islands are a group of small, low-lying islands situated almost at the centre of the Mediterranean, from 35°48'28" to 36°00'00"N and 14°11'04" to 14°34'37"E. They are 92 km south of Sicily and 252 km north of the Libyan coast. The total area of the archipelago is 320 km/sq. The Maltese archipelago is composed of three inhabited islands, Malta, Gozo and Comino and a number of smaller, uninhabited islets and rocks. From the ecological point of view, the most important of these are Cominotto, Filfa, St. Paul’s Island and Fungus rock. Malta is the main island. The highest point is at Dingli, on the west side of Malta and is 253 m above sea level. Lakes and rivers are lacking and only a few permanent freshwater springs are to be found.

The Maltese climate is typically Mediterranean, with mild, wet winters and hot, dry summers. Annual rainfall is variable and the average for the last forty years is about 500 mm. Most of the rain falls between October and March and the period between April and September constitutes the dry season. The mean temperature for the last 45 years was 18.7°C. The average for February, the coldest month is 12.36°C, while that for August, the hottest month is 26.39°C. Snow never falls. Relative humidity is generally high (65–80%) all the year round. Windy conditions are the norm. About 92% of the days of the year have a minimum of 1.85 km per hour of wind and the prevailing wind is the *mistral* or the north-westerly wind.

The natural vegetation of the Maltese Islands is dominated by the Mediterranean scrub communities of which the best representatives are the various types of garigue, typical of rocky ground and characterized by such species as *Thymbra capitata* (L.) Cav., *Anthyllis hermanniae* L., *Teucrium fruticans* L., *Erica multiflora* L., and the endemic *Euphorbia melitensis* Parl., (Lanfranco 1995). Garigue ecosystems, such as found at Ras il-Pellegrin, il-Kortin tal-Mellieha and Ta’ Ċenċ in Gozo, make up to about 10% of the natural environment (Lanfranco 2002). In favoured situations, such as under cliff faces, scrub community occurs as maquis, with *Ceratonia siligua* L., *Olea europaea* L., *Pistacia lentiscus* L., *Rhamnus oleoides* (L.), *Teucrium flavum* L., *Prasium majus* L., *Lonicera implexa* Ait., *Smilax aspera* L., *Acanthus mollis* L., *Capparis orientalis* Du-
mehel, and others (Lanfranco 1995). Less than 3% of the natural environment is of this type (Lanfranco 2002).

No natural woods occur, although remnants of a few Quercus ilex woods, such as found at Buskett, near Dingli, at Wardija and Mellieha still remain or are reduced to maquis. The semi-artificial woodland at Buskett is fairly characteristic of a Mediterranean evergreen wood (Lanfranco 1995). Wooded areas account to only 1.4% of the natural environment (Lanfranco 2002).

Freshwater habitats are scarce in Malta, especially during the summer months. Permanent streams, such as at Wied il-Luq in Buskett, Wied tal-Bahrija in Bahrija and Wied il-Lunzjata in Gozo are dominated by plant communities comprising Arundo donax L., Cyperus longus L., Holoschoenus vulgaris Link., Populus albus L., Salix pedicellata Desf., Ulmus canescens Melville, sometimes accompanied by Laurus nobilis L.

Dune communities are also very rare and are largely degraded. These are characterized by species belonging to Salicornia, Suaeda, Crithmum, Limonium, Phragmites australis (Cav.) Trin. ex Steudel, Juncus acutus L., Pancratium maritimum L., Euphorbia, Sal-sola, Medicago, and others (Lanfranco 1995). Dune areas still exist at Ghadira Bay and Rodum il-Hmar in Mellieha, at Armier Bay and Ramla in Gozo. The botanical nomenclature follows Weber & Kendzior (2006)

Material and methods

The moths were collected at light, either using moth traps running throughout the night with 18W Actinic light, or at light against a white sheet, using 250W mixed MV and UV light run on a portable 1000W generator for about three hours, mostly on moonless nights. Moths from the light traps were retrieved in the morning while those attracted to white sheets were handpicked when they settled on the sheet. All collecting sites, except Rabat and Naxxar which are in built up areas, are open countryside and away from human habitations. They are mostly garigue and maquis habitats with small groves of Pinus halepensis Mill. and Ceratonia siliqua L. It is not uncommon to find dead branches of these trees completely covered with lichens of the genus Ramalina. Although in Malta the actual larval host plants for none of the Lithosiinae species have been established, it is not impossible that such lichens form the diet of the larvae of Eilema species.

Results

Eilema marcida (Mann, 1859)

Distribution. Northwest Africa (Morocco, Tunisia), south Spain, France (only Corsica), central and south Italy, Sardinia and Sicily.

Remarks. *E. marcida* was for a long time confused with *Eilema pygmaeola* (Double-day, 1847) and treated as a synonym of subspecies *E. pygmeola pallifrons* (Zeller, 1847). Recently Grassi & Zilli (2005) confirmed its species level status on the base of examination of male and female genitalia. This opinion is also followed by later authors (Gastón, Macià & Ylla 2007; Leraut 2006). From the Maltese Islands only *E. pygmeola pallifrons* has been recorded until now. However the specimens sent for the examination to the first author belong undoubtedly to *E. marcida*. Further examination of additional material including the specimen being the first “*E. pygmeola pallifrons*” recorded from Malta revealed all known specimens to be *E. marcida*. The misidentification is caused by the fact that when the specimen was collected, the taxon *E. marcida* was widely accepted as only a synonym of *E. pygmeola pallifrons*.

As a result of the present study, *E. pygmeola pallifrons* (Zeller, 1847) should be excluded from the list of Maltese Lepidoptera.
Analyzed material indicates that on Malta the species produces two generations per year. Moths of the spring generation (f.g.) fly for a much shorter time than those of the summer generation (s.g.) with about one month gap from the mid-June until the mid-July. The first generation flies in May (first 12.v.) and June (last 12.vi.). The second generation lasts from July (first 12.vii) until September (last 23.ix.). Moths of the first generation (Figs 20–31) are significantly larger compared to the representatives of the second generation (Figs 32–38). Forewing length of males (7 examined) belonging to f.g. varies between 11–12 mm (on average 11.5 mm) while those of s.g. (2 examined) varies between 8–9 mm (on average 8.5 mm). In females, forewing length of f.g. (12 examined) varies between 10–12 mm (on average 10 mm) while those of s.g. (5 examined) is about 9 mm. The colouration of moths from the s.g. is also significantly paler and more homogenous with usually much less distinct dark suffusion of outer portion of hind wing especially in the males.

The occurrence of two generations is also reported from Italy (Parenzan 1982) where, in contrast to Malta, “in the more southern districts” the species shows “two largely overlapping generations in early summer and late summer-early autumn” (Grassi & Zilli 2005).

During the study 11 specimens (4♂, 7♀), belonging to the first (2♂, 4♀) and the second (2♂, 3♀) generation were dissected. Among the dissected males there is one specimen with only 2 cornuti in the vesica (Fig. 2). The middle cornutus is absent. The remaining two retain the position and shape typical for the species (Fig. 1). This feature was, without any details, already noted by Grassi & Zilli (2005), although it was never illustrated.

**Eilema caniola** (Hübner, 1808)  


**Distribution.** West Palaearctic. West and South Europe north to the south of Ireland, western part of North Africa, Asia Minor and the Caucasus. Known also from Sicily (de Freina & Witt 1987). Recorded from Malta for the first time by A. Valletta (1973).

**Remarks.** The species is common on the island and has been collected in many places. Imagoes can be found in two periods. The first generation (Figs 3–11) is on the wing during April and May while the second generation (or the overlapping second and third generation) flies during July and the beginning of November (Figs 12–19).


Fig. 41. Map of Maltese Archipelago showing distribution records. ● *E. marcida* (Mann), ○ *E. caniola* (Hübner), ▲ *L. quadra* (Linnaeus).

**Lithosia quadra** (Linnaeus, 1758)

**Material.** Malta, Mellieha, Ghadira Bay, 35°58′14″N, 14°20′57″E, 1♂, 3.viii.1976, L. Cassar leg; Naxxar, 35°54′35″N 14°26′29″E, 1♂, 11.xi.1996, A. Seguna leg.

**Distribution.** Palaearctic. From Western Europe to Japan. Absent in North Africa. On Sicily recorded only recently from Saracena, Scagliola (Giuliano & Parenzan 1994), Portella Arena (Bella, Russo & Parenzan 1995) and Galvarina (Parenzan & Porcelli 2006).
Remarks. This very characteristic species was collected on Malta for the first time by L. Cassar (Sammut 1984). Until now only 2 specimens are known. This fact, and the fact that the second specimen has been collected more than 20 years after the first, strongly suggest that they have reached the Maltese Islands during some occasional migration and as yet, have failed to establish permanent population.

Acknowledgements

We cordially thank Anthony Seguna for the loan of his Eilema material from Malta and Alberto Zilli for providing some bibliographical data.

References


The Gelechiidae are a globally distributed family, currently with some 4700 validly described and countless unnamed species. The fauna of North America has been partially treated in a contemporary fashion by R. W. Hodges; that of southern Africa about half a century ago by A. J. T. Janse. The Gelechiidae of other parts of the world have been unevenly treated, some areas like the Russian Far East have been well covered, but many others are still nearly untouched. Even though these moths can be found virtually everywhere, and particularly in xerothermic habitats they can be extremely abundant, they have never been among the most popular Lepidoptera. Their appearance which is often of a more modest type among Lepidoptera, and identification problems due to the external similarity of numerous species – supplemented by intraspecific variation that can be similar in many species – are obvious reasons for this situation. Dissection of genitalia is often the only means of getting a reasonably safe identification, especially if the moth is taken outside the collector’s backyard, or the collector is very experienced.

The Gelechiidae fauna of Europe is now at good hands. After publication of the first of the planned four volumes dedicated to the European Gelechiidae (Huemer & Karsholt 1999) in the book series Microlepidoptera of Europe (Apollo Books) the second volume is now available. One may wonder why it took a decade to cover a quarter of the European species of a moth family. The reasons for this “delay” become immediately apparent when a closer look is taken at the new volume, covering the large tribe Gnorimoschemini. Just a brief glance to the abstract: a total of 211 species in 20 genera are recognized in Europe, including descriptions of fifteen new species. What catches the reader’s eye is the amount of new synonymies proposed: no less than 42 species group names are sunk as synonymy (and some other taxonomic changes are also made). The history of Lepidoptera study in Europe has traditionally been plagued by synonymies that as a general feature is historically understandable due to the difficulties in correctly interpreting verbal descriptions of more or less greyish brown species. Yet, the gnorimoschemini Gelechiidae seem a particularly troubled exception. This was the favourite group of the late Dalibor Povolný. As much as he contributed to the knowledge of this group, he also created a lot of obscure taxa by describing species based on insufficient material, often worn singletons, sometimes males, sometimes females.

The present authors have had to face of a jungle of all imaginable (and some unimaginable) obstacles: misidentified type species, mixed type series, types in desperately bad condition, faked types, stolen types (“cleptotypes”), no types at all, transitions of slides of primary type material, difficulties built to make the study of crucial material as difficult as possible, last minute massive additions of crucial new material especially from SE Europe, not to mention the profound trouble: the Gnorimoschemini are a particularly difficult group of moths. Species are similar to each other; they vary in a similar fashion; their genitalia are often quite similar to each other. Many species are known from a very wide geographical area by extremely scattered records. So, the authors have first had to face a heroic task to form a concept about “what is a species”, in every single case – in cases of allopatry there cannot even be a single correct answer, but the status of each population should nevertheless be considered. As if that was not enough, in attempting to find correct names for each of these species, the troublesome issues described above had to be resolved. All this effort makes this book extraordinary among identification guides. It is also a thorough taxonomic revision that raises the state-of-art of the study of this group to a new level. As a colleague I cannot but sympathise with the present authors, as reading the book I find many similarities with my own work as a taxonomist attempting to resolve
another inadequately studied gelechioid group (Elachistidae). In this world taxonomists have enough to study. The world is losing biodiversity, and taxonomic expertise should be channeled to improving our knowledge of the insect fauna. The enormous efforts needed to rectify inadequate prior studies seem to impose an unfair burden on those taxonomists. Few practicing taxonomist can easily keep track on everything when studying any larger group. An obvious help for them would be the use of peer-reviewed journals as publication forums. They should be considered as life-insurance as providing last-minute rescue from errors and (often) invaluable second opinions the value of which the author can consider prior to publication. Peer-review should not be seen as a hinderance to publication or a limitation on the freedom of publication. It is a means to improve the quality of publication which is also for the author’s benefit.

If one wants to search for inadequacies, some inconsistencies might be picked as examples. *Caryocolum schleichi* is considered to be a widely distributed species with different appearance, genitalia and biology in different allopatric populations that are treated as subspecies. *Scrobipalpa salinella* as ‘traditionally’ understood is divided in three species: *S. salinella, S. spergulariella* and *E. salicorniae*. The arguments for this division seem rather vague, referring to differences in size and wing markings (host plants overlap between ‘species’) and different colour of larva (what might be the effect of differently pigmented food substrate??). The argument-based decisions in this complex are in my view inconsistent when contrasted to those arguments which nevertheless are considered as sufficient to keep the populations of *C. schleichi* conspecific. The reader gets the feeling that in cases like these two the last word has not yet been said. But, these particular points illustrate one of the greatest virtues of the book. I wish to draw attention to the transparency of the authors in explaining their reasoning behind each taxonomic or other decision. They do not hide behind ‘authority’, but give their arguments which can then be further elaborated and tested by focused studies. That makes this volume a formidable scientific contribution, the kind and quality towards which all taxonomists should aim. Certainly, the European Gnorimoschemini are not yet “ready”, as novel methods, especially those based on DNA studies are fast becoming easier and cheaper. But their contribution can only be built on, and put to perspective against, background knowledge like the present volume provides. Let the book tell the rest.

Lauri Kaila

**Reference**

Phauda bicolor sp. n. from North Sumatra (Indonesia) (Zygaenidae: Phaudinae)

MICHAEL FIBIGER¹, KNUD LARSEN² & ULF BUCHSBAUM³

¹ Molbechs Allé 49, 4180 Sorø, Denmark; michael.fibiger@gmail.com
² Røntoftvej 33, 2870 Dyssegård, Denmark; knudlarsen@dbmail.dk
³ Zoologische Staatssammlung München, Münchhausenstr. 21, 81247 München, Germany;
  UlfBuchsbaum.Lepidoptera@zsm.mwn.de

Abstract. During an expedition to Sumatra in February and March 2002 the authors discovered an undescribed zygaenid moth: Phauda bicolor, sp. n. Forty five specimens were obtained. In order to clarify its systematic position one specimen was preserved in ethanol for molecular analysis. The male and female genitalia are illustrated. A potential related species from North India: Phauda fuscalis Swinhoe, 1892 is compared. DNA sequence of the mitochondrial gene cytochrome oxidase subunit I is included in the character set.


Introduction

With excellent help from the late Dr. E. W. Diehl, Pematang Siantar (N Sumatra), the authors visited some of the vanishing mountain rainforests in northern and western Sumatra. Between two collecting sites the authors stopped to admire and photograph an enormous tree of the Fig family (Fig. 1). In spider webs on the bark we found several specimens of a peculiar looking zygaenid moth. Soon we also discovered a number of live specimens under the tree’s leaf-crown. When we returned, we stopped again by the tree and managed to collect more material, to preserve a specimen in ethanol; and look for larvae and food plant. Genitalia examination confirmed that the species can be associated with Phaudinae. The subfamily is only known from East- and Southeast Asia (Fänger et al. 1999; Holloway et al. 2001; Scoble 1992) from China to the Malay Archipelago (Alberti 1954). Phaudinae was established by Kirby (1892). Alberti (1954) discussed the systematic placement of Phauda Walker, 1854 and Alopogaster Hampson, 1892 in this subfamily. On the best available interpretation, we come to the conclusion that the moths collected on Sumatra belong to an undescribed species related to Phauda fuscalis (Swinhoe, 1892). Here we describe this new species. To complete the character set of the new species, we provide DNA sequence information as suggested by Tautz et al. (2003) & Knölke et al. (2005). DNA was extracted from thoracic muscle tissue of one paratype (sample ID: DNATAX02239) using Qiagen (Hilden, Germany) tissue kit according to manufacturers protocols. Mitochondrial (mtDNA) cytochrome oxidase subunit I (COI) gene was amplified with PCR using protocols and primers as in Simon et al. (1994). Direct sequencing of dye labelled (BigDye V2 ready reaction master mix, Applied Biosystems) templates was carried out using an ABI 377 auto-
Fibiger et al.: Phauda bicolor sp. n. from Sumatra

Six single strand sequences were assembled to 1547 bp of COI gene and the tRNA beforehand and aligned to the COI gene of Bombyx mori (Linnaeus, 1758) (Lepidoptera: Bombycidae; GenBank accession number NC_002355). DNA is stored in the frozen DNA collection of the Zoologische Staatssammlung München under storage number DNATAX02239.

![Fig. 1. The prominent Fig-tree on North Sumatra, with the authors and Günter Riedel. (photo: Tanja Kothe)](image)

**Phauda bicolor sp. n.**

**Material.** Holotype ♂ (Fig. 2): *Indonesia*, North Sumatra, Purba, 1 km South of Seribudolok, 2°54‘59“N 98°38‘24“E, 1380 m, 3.iii.2002, leg. Fibiger, Larsen & Buchsbaum, coll. ZSM. – Paratypes, 44♂ and ♀ (Fig. 3), same data as holotype (1♂ genit. prep. 4273, 1♀ genit. prep. 4274 M. Fibiger, 1♀ DNA ID-No.: DNATAX02239), coll. Fibiger, Larsen, Zoologische Staatssammlung München, Shen-Horn Yen, C. Naumann (Zoologisches Forschungsmuseum Alexander Koenig, Bonn), G. Tarmann, G. Tremewan.

**Diagnosis.** Wingspan: male 22–26 mm, forewing 10–13 mm; female 26–34 mm, forewing 13–16 mm. Proboscis rudimentary, less than 1 mm long. Labial palps 2-segmented, rudimentary, less than ¼ mm long; maxillary 1-segmented. Antennae thread-like, ciliate in both sexes. Ocelli absent. Chaetosemata present, relatively large. Head, antennae, eyes, thorax, and all scales on thoracic segments, legs and wings pitch black and more or less shining, though not on the wings. Both fore- and hindwings elongated, broadest at ⅜. The forewing venation is with a full CuP. Scales on wings narrow, hair-like. Hindwings semitranslucent, Abdomen bright orange. The first two segments black dorsally; a black and quadrangular bar present dorsally on remaining segments. Underside of the abdomen bright orange. In *P. fuscalis* the abdomen is wholly black (Swinhoe 1892)). Male with two long, slightly orange coremata-brushes arising from the 8th segment laterally and posteriorly. The same brushes on
P. fuscalis are “fiery red hairs” (Swinhoe 1892).

**Male genitalia** (Fig. 4). Uncus large, broad, arrow-shaped; subapically spatulate; apically with a down-curved hooked tip. Tegumen broad, as long as vinculum. Saccus finger-like, almost as long as vinculum. Juxta circular. Fultura superior membranous, covered with diminutive spines. Valva broadest at base, attenuate at slightly upturned apex. Sacculus sclerotised at base. Clavus digitate, slightly setosed. Editum large, globular, dominating the valva, comprising hundreds of small circular cells with short hair-like scales. Valva with long, spreading hair-like setae. Phallus long, narrow, tapered from mid coecum to apex. Vesica a little shorter than phallus, curving 90 degree dorsally; broadest 2/3 covered with numerous spicules out; on dorsal side from base to mid clothed with spicules.

**Female genitalia** (Fig. 5). Papillae analis lunar-shaped; the straight sides against each other. Posterior apophyses slightly longer than the ovipositor valves. The 8th abdominal segment slightly sclerotised. Anterior apophyses rather short, heavily fused to the 8th segment. Lamella postvaginalis prominent, ovoid, slightly sclerotised. The antevaginal plate small, sclerotised. Antrum with a ventral sclerotised plate, upon which the ductus seminalis arises. First third of ductus bursae almost straight; the second part tightly coiling ten times before the large globular corpus bursae.

Figs 4—5. Genitalia of Phauda bicolor sp. n. 4. ♂, 5. ♀.
Fig. 7. Type locality of *Phauda bicolor* sp. n. shown on the map for North Sumatra (Indonesia).

**Cytochrome oxidase subunit I (COI-5P).**

*Phauda bicolor* sp. n. (Sample ID: AJ556909; Barcode ID: GBGL0272-06; GenBank Accession: AJ556909; Residues: 901; Comp. A: 294; Comp. G: 135; Comp. C: 133; Comp. T: 336; Ambiguous: 0):
**Phauda mimica** Strand, 1915 (Sample ID: LS-06-0055.1; Barcode ID: LEFIA1293-10; GenBank Accession: ; residues: 670; Comp. A: 208; Comp. G: 97; Comp. C: 98; Comp. T: 265; Ambiguous: 0)

Phauda mimica

**Bionomy.** We suggest that the habitat for the moth is in the leaf-crown of fig trees. The authors probably found a relict population in a tree surviving from the once undisturbed rainforest. The moths were diurnal, flying in early March. Figs 6 a, b show two living specimens at the type locality on 03 March 2002 in the ground vegetation close around the *Ficus* tree. The larvae of *Phauda* are possibly specialists on Moraceae (Fänger et al. 1999, Holloway et al. 2001)

**Distribution.** *Phauda bicolor*, sp. n. is only known from the type locality. The authors believe it will not be easy to find elsewhere. On Fig. 8 the type locality is represented on the map of Sumatra.

**Remarks.** The systematic position of Phaudinae remains controversial. The taxon comprises approximately 50 species, all occurring in South East Asia (Epstein et al. 1999). Phaudinae is recognised by the absence of ocelli; the well developed chaetose mata; the elongated, narrow forewing; the translucent, sometimes spiralled ductus bursae; and the bipectinate (male) or biserrate (female) antennae. However, the antennae of both the male and female are ciliate in *Phauda bicolor* sp. n. One of the characters of the Phaudinae is the only distally present CuP of the forewing; however, in *Phauda bicolor* sp. n. the CuP vein matches those of the Zygaeninae, Chalcosiinae, and Procrinidae. The hindwing venation in *Phauda bicolor* sp. n. has a full CuP, which is distally stalked with Cu2. The pair of hairs at the posterior abdomen, which is characteristic for Phausdinae, is present in *P. bicolor* sp. n.
Acknowledgements

The authors wish to express their gratitude to their travel companions, who recorded several specimens of Phauda bicolor, sp. n., to Shen-Horn Yen for help with identification and discussion, to the late Prof. Dr. Clas M. Naumann for comments and improvements to the manuscript. Special thanks to Michael A. Miller and Konstantin Witt for their excellent and efficient DNA Lab work. The genetic part of this paper, conducted at the Zoologische Staatssammlung Munich, Germany, was part of the DNA-TAX (www.zsm.mwn.de/DNATA) project aimed at establishing an insect sequence database for DNA taxonomy purposes. The project is part of the Entomological Data Information System (EDIS) initiative under the direction of BIOLOG, founded by the German Federal Ministry for Education and Research (BMBF project ID 01LC99004/2).

Figs 8–12. SEM illustrations of Phauda spp.
8. Head of P. fusca (Swinhoe, 1892).
9. Head of P. bicolor sp. n.
10. Compound eye of P. bicolor sp. n.
11. Antenna of P. bicolor sp. n.
12. Brush at abdomen of P. bicolor sp. n.
Literature


This monographic work dedicated to the Tiger Moths and Lichen Moths (Arctiidae) of the Iberian Peninsula and the Balearic Islands is a very useful and well-produced work which will undoubtedly become a point of reference for those interested in this colourful and fascinating group of moths.

The book covers all 65 arctiid species found in this south-western corner of Europe; among these Eilema marcida (Mann, 1859), E. complana (Linnaeus, 1758), E. pseudocomplana (Daniel, 1939), Setina cantabrica de Freina & Witt, 1985, and Coscinia mariarosae Expósito, 1991 are considered to be valid species. The latter two species plus Eilema predota (Schawerda, 1927), Coscinia benderi Marten, 1957, C. romiei Sagarra, 1924, Ocnogyna zoraida (de Graslin, [1837]), Artimelia latreillei (Godart, [1823]) and Hyphoraia dejani (Godart, 1822) are endemic to this area. Two more, Eilema albicosta (Rogenhofer, 1894), endemic to the Canary Islands, and Mauricia brevetti (Oberthür, 1882), only known from Morocco and Algeria, have been collected only once from Spain in 1958 and 1991 respectively, and although included in the guide the authors believe they are likely to be accidental introductions. Old references to Setina aurita (Esper, 1787), Arctia flavia (Fuessly, 1779), Ocnogyna advena (Fabricius, 1787) and O. pudens (H. Lucas, 1853) are considered to be either misidentifications or the result of mislabellings and therefore excluded from the guide.

All 65 arctiid species are treated individually. The contents are organized in sections: A photographic illustration of a set male and female is provided together with data on wingspan and sexual dimorphism; in many cases live adults, larvae and pupae are also pictured. Similar species are noted, briefly giving distinguishing traits; there are also well-drawn figures of the male genitalia. A diagnostic key (Appendix 1) helps in the identification of the 17 species of the genus Eilema present in this region. For each arctiid species, those subspecies and forms occurring within the Ibero-balearic region, described either from the region or from elsewhere, are mentioned. Seasonality, voltinism, type of habitats (with illustration), adult behaviour and larval food plants comprise the biology section. Useful comments accompany an updated distribution map, which uses dots and/or shaded areas to show occurrence. Where needed, taxonomic comments are also included. The last section deals with the conservation status of each species, their listing in Red Books, threats and possible conservation measures. Appendix 2 comprises four plates showing set specimens from all species covered in the book; Appendix 3 includes useful comments on the rearing of arctiid caterpillars based on the authors’ experience.

This work is the most complete field guide ever produced on the arctiids of the Iberian Peninsula and the Balearic Islands. A scientific editor might have helped with the finishing touches (the authors edited the book themselves) and a bilingual Spanish/English text or at least some summary text in English would have enhanced the value of the work. Despite this minor criticism, the book is rigorous but also useful, colourful and practical, using terms understandable to any amateur. It is the kind of lovely book that helps young people to become lepidopterists.

VÍCTOR SARTO I MONTEYS
Teleiopsis laetitiae sp. n. and Teleiopsis lindae sp. n.,
two hitherto overlooked mountainous European species
(Gelechiidae: Teleiodini)

JÜRГ SCHMID

Poststrasse 3, 7130 Ilanz, Switzerland; schmid.ilanz@kns.ch

Abstract. Teleiopsis laetitiae sp. n. is described based on nine males and two females collected in the Alps of Grisons, Switzerland. Wing pattern and genital characteristics are described and illustrated. Further specimens originating from Austria, Italy, Macedonia, Greece and Turkey were identified in museum collections. Teleiopsis lindae sp. n. is described and characterized based on specimens collected in Spain and Portugal. Differential diagnosis is provided for these and related species.


Introduction

Teleiopsis bagriotella (Duponchel, 1840) occurs in the mountain regions of Europe, from Portugal to Greece and in Turkey (Huemer & Karsholt, 1999). It was described from France as Anacampsis bagriotella. The detailed description mentions a greyish-reddish ground colour, tinted with brown and a white band at the periphery of the forewings. A rather schematic drawing accompanies the description (Godart & Duponchel, 1838, p. 608, fig. 312) (Fig. 1). Herrich-Schäffer describes Gelechia elatella (Herrich-Schäffer, 1853) (Fig. 2) and the very careful and detailed figure 499 reveals beyond doubt that „elatella“ is a synonym of A. bagriotella Duponchel, an opinion first expressed by Joannis in 1915 and consequently embraced by the modern literature (Karsholt & Razowski 1996; Huemer & Karsholt 1999). Pitkin (1988) designated a lectotype from Vaugirard (France).

In a modern revision of the Gelechiidae family (Huemer & Karsholt, 1999) as well as in a Guide to the Microlepidoptera of Europe (Parenti, 2000), specimens showing a much more uniform dark coloring without the typical white banding of the forewing are illustrated apart from the „typical“ bagriotella phenotype. Linda Pitkin (1988) in a meticulous revision of the Genus Teleiopsis, had already observed that such dark phenotypes exist which she grouped into two “forms”: “southeastern”, occurring from Austria to Turkey and “southwestern” from the Pyrenees, Spain and Portugal. She also observed particular features in the genital apparatus of these “forms”. This material was
however considered insufficient to justify the erection of new species. Huemer & Karsholt (1999) mention that „this variation found in *bagriotella* seems, at least to some degree, to be geographical, and it may also be correlated with the geology of its localities“.

Abbreviations

BNM Bündner Naturmuseum, Chur, Switzerland  
TLMF Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria  
ZMUC Zoologisk Museum, Natural History Museum of Denmark, Copenhagen

Material and Methods

In recent years, a total of 24 „*bagriotella*“ specimens have been collected at various localities in the Alps of Grisons, Switzerland. While the “typical” phenotype is widely distributed in this area, so far only the region of the Tujetsch valley situated in northwestern Grisons harbours the “dark” phenotype in addition to the “typical” form. In total, eleven “dark” phenotypes from Tujetsch valley and 13 “typical” phenotypes from all over Grisons, six of which originated also from the Tujetsch valley, were available for study. From this material, five male and two female genital preparations of “dark phenotype” specimens were made according to standard procedures. They were embedded in water-soluble medium (Disney & Henshaw, 1988) between two transparent acetate foils and attached to the pin of the respective specimen. As controls five male and two female specimens of the “typical” phenotype, some originating from the same valley were examined.

Two additional “dark” phenotypes from Austria and Italy were identified by external appearance in the TLMF (courtesy Dr. P. Huemer). Genital slides, male and female, were prepared and compared to “typical” specimens. From ZMUC (courtesy O. Karsholt), a total of 14 specimens from Italy, Greece and Turkey including some of the specimens determined by Pitkin as “southeastern form” of *T. bagriotella* were examined, partly dissected and analyzed.

Results

Analyzing field data and sampled specimens, the following observations were made: In the Tujetsch valley, the two phenotypes occur sympatrically but not strictly syntopically. They seem to occupy different microhabitats, which in some instances were situated close to each other at a distance less than 1 km (Fig. 5). No phenotypically intermediate specimens were observed. Careful examination of male and female genitalia revealed several constant major differences in both sexes between the two phenotypes. These characteristics were also present with remarkably little variation in the “dark” phenotype specimens from Italy to Turkey. These various findings, taken together, support the concept of two distinct species being involved. The “dark” phenotype of *T. bagriotella* is hereby described as new species.


**Teleiopsis laetitiae** sp. n.


Description. Wingspan, ♂: 18.6–22 mm (N=19), mean: 20.1 mm. ♀: 19.2–20.3 mm (N=3) mean: 19.7 mm. Some of the above mentioned specimens were not suitable for wingspan measurements as the wings were not suitably positioned.

Male, female (Fig. 6): Head greyish brown, mottled, frons lighter. Third segment of labial palpi with two dark brown or black bands, tip grey. Thorax and tegulae greyish mottled. At posterior half of thorax a brown transverse band of raised scales. Ground colour of forewing greyish brown predominantly composed of light brown serrate scales with white tips. A pronounced black or dark brown band of raised scales at basal third extending obliquely from costa to dorsum. Band lined medially and distally by ferruginous raised scales. At mid forewing one or two irregular longitudinal patches of black raised scales, heavily lined ferruginous. Distal third of forewing beginning with a narrow dark transverse patch or band of raised scales, lined heavily ferruginous. Towards apex transverse zone of lighter scales. At costa, rarely a trace of pinkish scales. Near apex at mid wing, two thin longitudinal streaks of black scales, sometimes barely visible. Apical fringes mottled by white-tipped scales. Hindwings light grey.

Male genitalia (Fig. 7): Uncus narrow, tapered, pointed, always clearly extending beyond gnathos. Base of valva flush with or slightly posterior of sclerotized area of tegumen. Sacculus only slightly longer than apex of costa. Phallus slender, curved. Lamina of ductus ejaculatorius very long, longer than length of phallus. Posterior lobe of eighth tergite not reaching tip of choremata. Chorematal spine with a pointed, barbed hook end (Figs 26, 29).

Female genitalia (Figs 8–9): Similar to T. bagriotella and T. diffinis. Postero-dorsal emargination of antrum broader than in bagriotella. Subposterior pouch more anterior. Sclerotized longitudinal fold not reaching subposterior pouch and distinctly less developed than in bagriotella. Signum serrate, lobes tapered, one almost pointed, longer than width of base.

Derivatio nominis. The species is named in memory of Laetitia Schmid-Capeler.

Differential diagnosis (Figs 10–11). T. laetitiae may easily be separated from T. bagriotella by the wing pattern and coloration. The white band at the distal part of forewing and a white patch at dorsum are always noticeable in bagriotella, in fresh as well as in worn specimens. T. laetitiae has a strongly marked blackish oblique band at the proximal half of forewing. In the male genitalia, sacculus is only slightly longer than costa in laetitiae, whereas in bagriotella it reaches considerably beyond costa. This feature is very constant. Lamina of ductus ejaculatorius is longer than the length of
phallus in *laetitiae* but much shorter in *bagriotella*. Choremata reach beyond posterior lobe of eighth tergite in *laetitiae*, while in *bagriotella*, they are shorter than or as long as posterior lobe. Chorematal spine is of complex shape and often in duplicate in *bagriotella*. In *laetitiae* the single spine has the form of a barbed hook (Figs 27, 29). In the female, the modest sclerotized fold and the smaller emargination of antrum in *T. laetitiae* distinguishes this species from *T. bagriotella*.

**Biology.** In Switzerland, both sexes of *T. laetitiae* were attracted to light at four different sites between 17.vii and 15.viii. These biotopes are south exposed, siliceous rocky slopes extending from 1440 m to 1600 m and characterized by xeromontane vegetation of which *Laserpitium halleri* (Apiaceae) was a regular element (although it is probably not the host-plant). *T. laetitiae* is certainly a rather local species and more restricted in distribution than *T. bagriotella*, which seems to prefer more mesophilic rocky habitats.

**Distribution.** The description of *T. laetitiae* was originally based on material collected in a small area in the Central Alps of Switzerland. In the course of this study, further specimens were detected in museum collections originating from Austria, Italy, Macedonia, Greece and Turkey. The “dark *bagriotella*” specimen from Greece illustrated in Huemer & Karsholt, (1999, fig. 49 a) is now part of the paratype series of *T. laetitiae*. A specimen from Valle d’Aosta, Italy, illustrated by Parenti (2000) certainly also represents *T. laetitiae*.

In the course of this study, alleged *bagriotella*-material from Spain and Portugal was also examined. Some of these specimens have been included in the *Teleiopsis*-revision by Pitkin (1988) and were then determined as “*T. bagriotella*, southwestern form”.

---

Fig. 5. Tujetsch valley, the westernmost part of Grisons, Switzerland. Distribution of *T. bagriotella* and *T. laetitiae* sp. n.
Examination of the genital structures confirmed the differences already observed by Pitkin and since these were found also in additional material and proved to be very constant, it was concluded that the Iberian “bagriotella” constitute a species of its own.

**Teleiopsis lindae** sp. n.


**Description.** Wingspan, ♂: 18—21 mm (N=6), mean: 19 mm. ♀: 19 mm (N=1). Male (Fig. 14), female: Head dark brown to greyish brown, mottled, frons lighter. Third segment of labial palpi with two dark brown or black bands, tip pale. Thorax and tegulae brown to greyish mottled. At posterior end of thorax two conspicuous bunches of white scales. Ground colour of forewing dark brown with black elements: A black or dark brown band of partly raised scales at basal third extending obliquely from costa to dorsum. At mid forewing two irregular longitudinal patches of black raised scales, sometimes lined by brown scales. Distally a thin broken longitudinal line of white scales. Distal third of forewing beginning with two unconspicuous black patches. Apically thereof, a transverse band of pale or light brown scales, being broadest at costa, where pink scales predominate and gradually thinning towards dorsum. Near apex at mid wing, two thin longitudinal streaks of black scales. Termen of apex consisting of alternate black and white markings. Apical fringes fuscous and mottled by white-tipped scales. Hindwings light grey.

Male genitalia (Fig. 15). Uncus narrow, tapered, pointed, extending beyond gnathos. Base of valva flush with or slightly posterior of sclerotized area of tegumen. Sacculus longer than apex of costa. Phallus slender, almost straight. Lamina ductus ejaculatorii long, longer than length of phallus. Posterior lobe of eighth tergite extending beyond choremata. Choremal spine ending in a hook (Fig. 28).

Female genitalia (Figs 16—17). Similar to *laetitia*. Posterodorsal emargination of antrum broad. Sclerotized longitudinal fold reaching subposterior pouch and distinctly more developed than in *laetitia*. Signum small, lobes serrate, longer than width of base and conspicuously slender.

**Derivatio nominis:** In honor of Linda M. Pitkin who first discovered morphological differences in *bagriotella*-subpopulations.

**Biology.** In Portugal, *T. lindae* was captured just after dusk in an open area with scattered grassland, some herbs and small bushes and with patches of snow still in early July (O. Karsholt, pers. comm.)

**Distribution.** *T. lindae* was found in mountainous areas in Spain and Portugal at altitudes from 1720 to 1950 m. Pitkin (1988) mentions material from the French Pyrenees, which she attributed to the “southwestern form” of *bagriotella* i.e *T. lindae*. 
Differential diagnosis. While *T. bagriotella* and *T. laetitiae* are easily separated by external characters and male and female genitalia, *T. lindae* lies somewhat in between (Figs 18–20). The following criteria may be applied to unambiguously separate the three species:
Figs 10–13. Comparison of habitus and genital structures of *T. laetitiae* (10–11) and *T. bagriotella* (12–13). Note the considerably longer sacculus in *bagriotella* and the shorter lamina ductus ejaculatorii (arrows).

- Valva: sacculus much longer than costa in *bagriotella*, clearly longer in *lindae* and barely longer in *laetitiae* (Figs 21–23).
- Lamina ductus ejaculatorii: short in *bagriotella*, long in *lindae* and *laetitiae* (Figs 11, 13, 15).
- Coremata: slightly shorter or as long as lobe of tergite in *bagriotella*, shorter in *lindae* and longer to much longer in *laetitiae* (Figs 24–26).
- Corematal spine: complex hook in *bagriotella*, rounded hook in *lindae* and acute barbed hook in *laetitiae* (Figs 27–29).
- Antrum with small emargination in *bagriotella*, wide in *lindae* and *laetitiae*. Sub-posterior pouch near posterior margin in *bagriotella*, more anterior in *lindae* and *laetitiae*. Sclerotized fold well developed and reaching subposterior pouch
In *bagriotella*, this fold is also well developed and reaches pouch also, but since pouch is more anterior, fold is shorter. In *laetitia*, fold is modest and does not reach pouch (Figs 30–32).
Signum square in *bagriotella*, with more tapering arms in *laetitiae* and with long and slender arms in *lindae* (Figs 34–36).

*T. laetitiae* and *T. lindae* are externally very similar to *Teleiodes diffinis* (Haworth, 1828). Although the latter is generally easily separated from *T. laetitiae* and *T. lindae* by its considerably smaller wingspan (*T. diffinis*: 13–18 mm, *laetitiae*: 19–22 mm, *lindae*: 18–21 mm), single specimens of *T. diffinis* may exceptionally reach almost the size of *T. laetitiae*. In these cases, identification may only be achieved by genital dissection. In the male, the rounded tip of uncus separates *T. diffinis* from *T. lindae* and *T. laetitiae*; in sacculus, there is a conspicuous bulgy dilatation in *diffinis* (Fig. 39). In the female, the antrum presents distally with a circular, lid-like structure below the distal emargination (Fig. 33).
Another species superficially very similar to *T. laetitiae* is *Teleiopsis latisacculus* Pitkin, 1988, recorded from Macedonia, Turkey and Egypt. Apart from its smaller wingspan, it may also be identified by genital dissection (see Huemer & Karsholt, 1999).

**Discussion**

The fact that the sympatrically occurring *T. bagriotellica* and *T. laetitiae* differ not only in external appearance but also show constant differences in their genital structures of both sexes justifies their taxonomic rank as separate species. The occurrence of *T. bagriotellica* has been verified in light of these findings anew and thus ascertained as occurring in the French Alps (e.g.: Col de la Boira, Col du Galibier, Col de la Lombarde, Col d’Izoard, Col des Seigneurs [all in TLMF]), in Italy (e.g. Sella-Gruppe, Schnalstal [in TLMF]), in Switzerland (e.g. Graubünden [coll. Schmid and TLMF]), in Austria (e.g. Salzburg, Venedigergruppe, Tirol [in TLMF]), in Montenegro (Durmitor [in TLMF]) and in Macedonia [in TLMF]. Thus in many parts of Europe both species may occur in sympatry.

The case of *T. lindae* is not so straightforward: this taxon occurs in a region where both *T. bagriotellica* and *T. laetitiae* are absent. By external appearance and some
This species resembles *laetitiae* rather than *bagriotella*. Hence, the possibility that *T. lindae* is a western subspecies of *laetitiae* cannot entirely be discarded. However, the genital differences in both sexes as already observed by Pitkin (1988) were confirmed and validated by additional material in this study. It seems reasonable therefore to consider *T. lindae* a distinct species. It remains to be seen whether or not molecular data will confirm this interpretation in the future.

**Acknowledgements**

The author is much indebted to Dr. Peter Huemer, TLMF Innsbruck, Austria, for stimulating discussions, literature, loan of material and professional support. Ole Karsholt, ZMUC, Copenhagen, Denmark has kindly provided most valuable material and field data.
Fig. 38. *T. diffinis* (top) and *T. laetitiae* (below). Fig. 39. Uncus, gnathos and sacculus of *T. diffinis* (right).

References


A preliminary study of everted vesicae of several leafrollers (Tortricidae)

BOYAN ZLATKOV

Sofia University, Faculty of Biology, Department of Zoology and Anthropology, 8, Dragan Tsankov Blvd., 1164 Sofia, Bulgaria; bzlatkov@gmail.com

Abstract. In this study the everted vesica of 23 tortricid species belonging to all European tribes with the exception of Eulini (Tortricini, Cochylini, Cneusiini, Archipini, Sparganothini, Polyorthini, Bactrini, Olethreutini, Enarmonini, Eucosmini, and Grapholitini) are described. In all investigated species, the vesica is tubular with the gonopore located terminally or subterminally, with the exception of the representatives of Cochylini, in which the diameter of the vesica vastly exceeds the diameter of the phallus and the gonopore is located laterally. The vesica appears to be non-eversible in many Eucosmini. Two main types of cornuti are observed: 1) special sclerotised projections of the vesica typical for examined Cochylini, and 2) modified deciduous or non-deciduous (fixed) setae in Archipini, Enarmonini, Eucosmini and Grapholitini. Several modifications improving the injection eversion technique of Dang (1993) are described.

Introduction

The taxonomic significance of the morphology of everted vesica (endophallus) is well known. It is used for taxonomic purposes in many lepidopterous families (Matthews, 1998). Recently, examination of this structure has been applied to resolve some taxonomic problems and to complement descriptions in some microlepidopterous families such as the Pyraloidea (e. g. Ferris 2004; Ferris & Nordin 2004). The first attempts at studying the everted vesica of Microlepidoptera were implemented by Dang (1993). He successfully everted vesicae of 12 species in four families (Tortricidae, Oecophoridae, Gelechiidae, and Nepticulidae) introducing two original techniques. The author described the vesicae of 9 tortricid species. Scattered illustrations of vesicae can be found in other works, e.g. Baixeras (1992, 2002). Later, Brown (2003) illustrated vesicae of 10 species of genus Orthocomotis. In his work the vesicae were everted but not inflated, and the three-dimensional structure is not visible. With the exception of the Dang’s work (op. cit.), no special investigations on the three-dimensional structure of the tortricid vesica have been attempted. In the present study the vesicae of 23 representatives of all European tribes except the Euliini are described and illustrated. Although the number of examined species is insufficient to draw general conclusions, some aspects of the morphology of the tortricid vesica are discussed. They may serve as basis of further studies.

Material and methods

Materials from the following collections were dissected: collection of the author, preserved in the Department of Zoology and Anthropology, Sofia University “St. Kliment Ohridski” (all species except Pelatea klugiana); National Natural History Museum, Sofia (P. klugiana only). In this study the classification of Razowski (2002, 2003) is used.
For vesica eversion a modified version of the injection method of Dang (1993) was applied. Dang’s method requires a tiny hypodermic needle with a modified tip. Instead of metal needles, self-made glass needles (capillaries) were used. The main advantage of the capillary is that its diameter can be accurately adjusted to the diameter of the phallus. Moreover, a separate capillary for each individual phallus may be prepared very easily.

Preparing of capillary. The glass capillaries are made from an ordinary glass tube (diameter 3–4 mm) by heating it with a spirit-lamp flame and pulling in opposite directions. The glass tube should not be made from fireproof glass, otherwise pulling is very difficult. After the first pulling, the diameter of the capillary usually is about 0,5–1 mm. In order to achieve a smaller diameter the capillary should be heated and pulled again. In this way, a very fine capillary (0,05 mm or even narrower) can be obtained (Fig. 1). The wide part of glass tube should not exceed 3–4 cm in length, so if necessary it should be shortened by using a glass cutter. The cutting edge of the tube is heated in a flame until it becomes round. The diameter of capillary varies in length and it can be cut by scissors (under water to protect eyes from small glass fragments!) at a point where the diameter is as desired. The diameter of capillary should be only a little smaller than the diameter of the phallus to be examined.

The prepared capillary is attached to a syringe (5–10 ml) by plastic female luer with hose (Fig. 2). Instead of syringe, a special device may be used (see Lange 1963), but it is very difficult to prepare this without special knowledge.

Technique of eversion. As previously mentioned, the technique of Dang (1993) was used but with several modifications. The genitalia are extracted by standard procedure: the abdominal segments are macerated in boiling 10% KOH and cleaned. To avoid repeating Dang’s methodology only differences in the technique are mentioned here.

After neutralization with glacial acetic acid, the phallus is transferred to a solution of Chlorazol black (0,03% in 70% ethanol). After 2–5 min the phallus is transferred to 70% ethanol for 1 minute. Immersion in the 70% ethanol bath is repeated to remove the staining solution. The phallus is then transferred to 5% ethanol for 1 minute. This procedure fully restores the softness of the vesica. Whilst the phallus is still submerged in 5% ethanol, the capillary, filled with absolute ethanol, is inserted into the phallus. Slight pressure is applied on the syringe. The syringe is then removed, together with the phallus and maximal pressure immediately applied to the syringe to inflate the vesica. The sudden pressure might eject the phallus, so this step should be carried out over a dish containing absolute ethanol. A continuous flow of alcohol is maintained for a few seconds to harden the vesica. The the phallus is then removed from the capillary and put it in absolute ethanol for a few seconds. Finally, the phallus is transferred to isopropanol. If necessary, the inflation is repeated, but this time with isopropanol.

The next step follows Dang’s method.

The everted vesica is embedded in a drop of Euparal and placed in a self-made hemispherical plastic container (Fig. 3) pinned underneath the specimen. In this way the vesica is enclosed in permanent medium without deformation. The other genital parts are preserved in the same way.
By experiment, I have found that in many species eversion is often only possible during the first 3–5 min after maceration of the genitalia. In many cases, 10 min after the transfer from KOH solution into 5% ethanol the vesica becomes non-eversible, especially in small specimens. Even if the vesica is successfully everted with 5% ethanol, it may remain flattened if it is not treated with absolute alcohol immediately after eversion. One possible reason for this phenomenon could be changes of the proteins in the thin cuticle of the vesica caused by a change in alkalinity. In addition, vesica eversion of old museum specimens is much more difficult than eversion of fresh specimens.

Drawing of illustrations. The drawings were prepared from photographs taken by a digital camera mounted on transmitted light microscope. Inflated vesicae taken from the isopropanol were embedded into a thick layer of Euparal on a special slide (Fig. 4) and photographed immediately. The contours of photographed objects
were copied onto tracing paper in pencil and then the detailed structure was drawn from direct observation. Completed pencil drawings were digitalized and edited using Adobe Photoshop CS software.

Everted vesicae are drawn mainly in two aspects: lateral (left) and dorsal. In a few cases, the vesica is illustrated in right or ventral aspect in order to get a better view of some important characters.

**Results**

**Descriptions of everted vesicae**

Two important measurements are used for description: length of phallus (Lph) and length of vesica (Lv). Lph is the length of the sclerotised part of the phallus which is non-invertible (in some species there is a sclerotised part which is inverted, but eversi-
ble!). Lv is the distance between the distal part of the phallus and the most distal part of the vesica, including diverticula. These measurements are only tentative and should not be treated as absolute. Often the vesica merges into the ductus ejaculatorius without a distinct boundary. In these cases, the length is defined approximately. Usually the ductus takes up the stain more readily than the vesica and so is more intensively coloured, or it is a little narrower than the vesica; these two factors may be helpful in determining the junction between them. In most cases more than one specimen from a species was examined; where it was possible only to look at a single example, this is noted.

In this paper the term “diverticulum” is used to designate the bag-like expansions of the vesica. Kristensen (2003) refers to these structures as the “outpocketings”, but the first term is very common in taxonomic literature for Macrolepidoptera (especially Noctuidae) and is preferred here.

_Tortrix viridana_ Linnaeus, 1758

Lph = 0.87 mm, Lv ~ 1 mm. Phallus curved, with large coecum; vesica large, wider than the phallus, cylindrical, apically narrowed. Vesica bearing a large, bag-like diverticulum on right side near middle; right side of diverticulum with 6 cornuti in two regular and parallel rows. The cornuti are stout, heavily sclerotised non-deciduous and conical, with large bases (sockets) and no neck (neck is a constriction at base). The proximal cornuti are almost half the length of the distal ones.

_Accleris boscanoides_ Razowski, 1959

Lph = 0.42 mm, Lv ~ 0.28 mm. Phallus cylindrical, slightly ventrally curved, with a long semi-membranous area which is is part of the vesica when everted, on the ventral side and a relatively large, ventrally-pointed coecum; vesica is also cylindrical, shorter than the phallus and bears a large diverticulum beginning subdorsally from the right side; diverticulum heart-shaped in lateral view with two groups of long, stout, non-deciduous cornuti similar to these in _T. viridana_. The dorsal group consists of four and the lateral of two cornuti. A single cornutus is located ventrally on the vesica between the phallus and diverticulum.

_Obraztsoviana maculosana_ (Haworth, 1811)

Lph = 0.63 mm, Lv = 0.26 mm. The phallus with long coecum (1/3 of the phallus’ length), the opening is dorsally located. The distal half is dorsally membranous and formed by the vesica. The vesica has numerous hollow cornuti divided into three groups. The proximal group consists of 13 on the dorsal base of the vesica, mostly laterally, on both sides. The medial group consists of 4 cornuti one of which is the largest on the vesica. The distal group is formed from numerous relatively small cornuti. Vesica is bulbous in the medial area and cylindrical in the distal part. The bulbous part bears the longest cornutus, located dorsally. The distal half is curved to the right and
then anterad so that the apical part is anteriorly directed. The gonopore is narrow and located on the left side of the bulbous part of the vesica.

**Aethes tornella** (Walsingham, 1898)  
*Fig. 8*

Only one specimen was examined. Lph = 0,6 mm, Lv ~ 0,5 mm. Phallus tubular, ventrally curved, with a relatively long coecum. A slightly sclerotised plate covers the distal half of the dorsal part of the vesica when it is inverted within the phallus. After eversion this plate is located on the right side. Phallus with spoon-like apex ventrally. Vesica huge compared to the phallus and has a complicated structure. It is divided into two large sections. The right section is dorso-laterally directed and bears three short and wide diverticula, one lateral and two medial, positioned one under another. The left section is directed laterally and bears two diverticula. The gonopore is located on the upper surface of the left section. There is a small slightly sclerotised process nearby. The whole surface of the vesica, with exception of the basal part, is covered with small weak spine-like processes (spinulae) which are smaller in size and denser on the left section.

**Cochylidia implicitana** (Wocke, 1856)  
*Fig. 9*

Lph = 0,5 mm. Boundary between the phallus and vesica indistinct, so Lv was not measured. Phallus curved ventrally, with a very short coecum and a narrow terminally located opening. Coecum with two hemispherical prominences laterally. The distal part of the phallus bears a sharp, conical spine. The dorsal half is mostly membranous, cup-shaped, without a distinct border with the vesica. The basal region of the vesica is dorsally sclerotised and near to this region bears 10 hard, hollow cornuti, which are actually sclerotised projections of vesica. The next part of the vesica is directed at first to the right and then to the left. The surface of the distal half is covered with small non-sclerotised spinulae that are denser in the apical area. The apical area ends with a strobile-shaped structure on the left side consisting of numerous, dense weakly-sclerotised spines. The location of the gonopore is undefined.

**Eana canescana** (Guenée, 1845)  
*Fig. 10*

Lph = 0,95 mm, Lv ~ 0,3 mm. Phallus tubular, slightly ventrally curved; vesica relatively simple, S-shaped (curved first dorsally then ventrally) bearing large conical diverticulum located dorsolaterally and directed to the right.

**Cnephasia cupressivorana** (Staudinger, 1871)  
*Fig. 11*

Lph = 0,68 mm, Lv ~ 0,20 mm. Phallus long and narrow (only 0,03 mm in the narrow-est part), widened at the basal half near the dorsally located opening; coecum relatively
short and ventrally curved. The distal half of the right wall is mainly membranous with the exception of its medial region, which is well-sclerotised and has a small tooth near the end; vesica extremely simple, short and cylindrical, with small bulbous extension near the base.

**Ptycholoma lecheana** (Linnaeus, 1758)  
**Fig. 12**

Lph = 1,3 mm, Lv ~ 0,6 mm. Phallus fairly straight and laterally flattened; coecum with a large flat sclerotised envelope. The end of the phallus bears a larger ventro-terminal process and a smaller dorsal spine; vesica relatively short, small, with two diverticula on the left side. Dorsal diverticulum shorter and almost conical, directed anteriorly; ventral diverticulum finger-like, with 4 short cornuti (deciduous?) at its apex.

**Aphelia ferugana** (Hübner, 1793)  
**Fig. 13**

Lph = 0,76 mm, Lv ~ 0,4 mm. Phallus cylindrical, base ventrally bent, with short coecum, apex with short sharp ventral process; vesica also cylindrical, with constriction at the base, bearing two diverticula on the left side, one short and one long. The shorter one is directed antero-dorsally, and the longer one is directed postero-ventrally. The longer diverticulum ends with two long, deciduous, sword-shaped cornuti, ca. 0,36 mm long. The gonopore is located terminally.
Sparganothis pilleriana (Denis & Schiffermüller, 1775)  

Fig. 14

Only one specimen was examined. Lph = 0.7 mm, Lv ~ 0.6 mm. Phallus tubular, slightly laterally flattened and ventrally curved; opening wide, located ventrally. In this region the phallus forms a dome-like prominence on the right side. A weakly sclerotised plate is present at the distal end of phallus in its dorsal part. Vesica tubular, apically narrowed, with bulbous expansion at the distal third; bulbous expansion with eight sword-shaped deciduous cornuti, each ca. 0.43 mm long. The point of attachment of each cornutus is laterally located and divides the cornutus into two unequal parts. The shorter part posteriorly directed and curved at the end and longer (proximal) part almost straight. The attachment points of the cornuti are arranged alternatively, into two annular rows.

Olingia schumacherana (Fabricius, 1787)  

Fig. 15

Only one specimen was examined. Lph = 0.75 mm, Lv = 0.30 mm. Phallus tubular, slightly ventrally curved with two small, lateral claw-like processes at apex; coecum

short with sclerotised basal apodemes; vesica very simple, without any sclerotised structures, tubular at the proximal part and widening at the distal part, with two short, wide diverticula dorsally and ventrally; ventral diverticulum larger than dorsal.

*Bactra robustana* (Christoph, 1872)

Lph ~ 0.23 mm. Phallus curved downwards and then bent to the left; coecum absent; vesica directed to the right, reduced and indistinguishable from the ductus ejaculatorius. There are two eversible sclerotised plates on the vesica: dorsal and left, divided by the membranous parts of the vesica. Three annular structures are visible on the ductus (possibly an artifact?).

*Endothenia marginana* (Haworth, 1811)

Only one specimen was examined. Lph = 0.50 mm, Lv = 0.25 mm. Phallus ventrally bent with a ventrally located, anterior opening; dorsally bearing a well sclerotised
carina; coecum short; diameter of vesica almost equal to the diameter of the phallus. The vesica has 7 fixed, dorso-lateral cornuti on the left side arranged into longitudinal rows; distal cornuti shorter than proximal cornuti. A collar-like, slightly sclerotised extension is present at the end of the vesica, around the gonopore. The extension forms very indistinct diverticula at left and at right. The cornuti are stout, each with a bulbous base set in a shallow pit and with an indistinct neck. Ductus relatively wide.

**Lobesia indusiana** (Zeller, 1847)  
Fig. 18

Lph = 0,7 mm. Phallus heavily sclerotised, apically pointed, slightly ventrally bent, with a short carina on the ventral aspect; distal half dorsally membranous. Vesica almost completely reduced, conical and directed anteriorly, without any specific structures. Although many specimens were examined, the location of the primary gonopore remains undefined.

**Orthotaenia undulana** (Denis & Schiffermüller, 1775)  
Fig. 19

Dang (1993) described the vesica of this species for the first time. Lph = 0,63 mm, Lv ~ 0,55 mm. Phallus slightly flattened laterally and ventrally curved, without a coecum and with two membranous sections: dorsal and ventral. There is an extension of the wall of the phallus starting venterolaterally from the left side and ending on the ventral side of the vesica. A stout cornutus with socketed base present at the end of this sclerotised band. Vesica cylindrical, bent to the left; gonopore sunk between two short and wide, indistinct diverticula.

**Olethreutes arcuellus** (Clerck, 1759)  
Fig. 20

Lph = 0,59 mm, Lv ~ 0,38 mm. Phallus slightly ventrally and laterally (at right) curved and lacking a coecum; dorsal and right side of the distal half membranous; vesica almost cylindrical, wider than the phallus and curved to the right. The ductus ejaculatorius is much narrower than vesica, which bears two groups of non-deciduous cornuti. Proximal group subdorsally located consisting of four long spines arranged in a row in line with the long axis. Distal group dorsolaterally located, on the left side comprising seven shorter cornuti arranged in two longitudinal rows.

**Pelatea klugiana** (Freyer, 1836)  
Fig. 21

Only one specimen was examined. Lph = 0,5 mm, Lv ~ 0,18 mm. Phallus cylindrical and slightly ventrally curved; distal third membranous dorsally; vesica very short, spherical bearing two tiny, indistinct prominences located dorsolaterally and a large, short and spherical ventral diverticulum.

Ancylis achatana (Denis & Schiffermüller, 1775)  
Fig. 22

Lph = 0.62 mm, Lv = 0.37 mm. Phallus almost straight, narrow and cylindrical, with a very short coecum; distal third with membranous areas on both sides; vesica with two very indistinct diverticula located dorsolaterally on both sides. The cornuti are remarkable, numbering between 55 and 60, located on the right side, forming a compact group. They are deciduous and during eversion all of them were separated from the vesica as a compact formation. Their main part is cylindrical, sharp at the distal end and curved in the direction of vesica. In the basal half they have two flat lateral prominences. There is a group of several spicules located almost in the middle of each cornutus, located on side which is opposite to the vesica; each cornutus attached by a thin fragile slightly curved and terminally located neck (Fig. 31).

Thiodia citrana (Hübner, 1796–99)  
Fig. 23

Lph = 0.90 mm, Lv ~ 0.50 mm. Phallus dorsally curved and slightly narrowed apically; coecum very short. Only the proximal third of the right side is sclerotised; the remaining part is membranous and merges into the vesica. A large prominence is present at
the left side near the apex, covered by several blunt spines. The vesica is relatively short, cylindrical, bearing ca. 10 long, flat, lanceolate, deciduous cornuti located at the left side and pointed anteriorly. These are indistinctly S-shaped and joined by a small neck in their sub-apical region to the vesica. On the opposite side, the vesica has a slightly sclerotised plate and in non-everted vesica this plate envelops the cornuti as a semi-cylinder.

**Epinotia abbreviana** (Fabricius, 1794)  
Lph = 0,50 mm, Lv ~ 0,40 mm. Phallus cylindrical and almost straight; opening located slightly laterally (on the right); coecum absent. Vesica cylindrical without any specific characters apart from 16 deciduous cornuti, ca. 0,35 mm long. These are S-shaped, flat, lanceolate and located on the dorsal side in a compact group directed anteriorly. Basal part relatively narrow, apical part wider, curved ventrally and tapering at the end. Each cornutus is joined to the vesica by a typical setal base, located subapically on the ventral side of the cornutus.

**Cydia amplana** (Hübner, 1796–99)  
Lph = 0,90 mm, Lv ~ 0,40 mm. Phallus sinuate, the proximal part dorsoventrally flattened, wide and the distal part laterally flattened; opening terminally located, coecum absent. A short dentate crest on the left side of the apical part. Vesica short, membranous, dorsally directed to the right. The short and tubular base is followed by a wider and bulbous section with numerous longitudinal folds covered by very short fingerlike processes. This part is followed by the ductus ejaculatorius without any distinct boundary evident between them.

**Grapholita lunulana** (Denis & Schiffermüller, 1775)  
Lph = 0,58 mm, Lv ~ 0,3 mm. Phallus well sclerotised, distally narrowed, without a coecum; distal part slightly curved to the left; ventral and left surfaces with spicules; vesica relatively wide, dorsolaterally directed consisting of two parts: proximal section more or less spherical and almost twice as wide as the narrowest part of the phallus; distal section narrower, bulbous bearing a compact bundle of 13–15 anteriorly directed deciduous cornuti, similar to those found in **Epinotia** and **Thiodia**. Cornuti lanceolate, flat and wide, slightly sinuate; point of attachment subbasally located.

**Pammene splendidulana** (Guenée, 1845)  
Lph = 0,57 mm, Lv ~ 0,35 mm. Phallus cylindrical, slightly dorsally bent, with a big fingerlike process on the ventral side of the apical part; opening terminally located, coecum missing. Basal part of vesica narrow, cylindrical, followed by a much wider,

dorsally-pointed bulbous part. There are two fixed, cylindrical, well-sclerotised cornuti on the ventral side, with bases socketed and similar to those of E. marginana, but a neck is absent.

Discussion

Tortricid vesicae are rather variable but, with the exception of Cochylini, the main form is cylindrical. The vesica in the Tortricinae is usually longer and more variable when compared with the Olethreutinae. Both representatives of Tortricini (Tortrix viridana and Acleris boccanoides) are characterized by a cylindrical vesica with a large diver- ticulum at the right side bearing stout, socketed and fixed cornuti. The vesica is more variable in the Cochylini, and in all examined species is rather voluminous. In contrast to all other tribes, the gonopore is located laterally; the ductus ejaculatorius is much narrower than the vesica. Cornuti (if present) are non-deciduous, but obviously differ-
ent in comparison to the other tribes. Apparently the cornuti in all examined Cochylini are sclerotised spiniform projections of the vesica. The vesica of Cnephasiini is relatively narrow, corresponding to a narrow phallus, simple, with a short bubble-shaped part. None of species studied possessed cornuti. The species of Archipini show several common characters in the design of the vesica. It is cylindrical, with an apical gonopore and deciduous or fixed cornuti are attached to the end of a diverticulum. Usually the vesica has a second diverticulum, without cornuti, located near the first one (see also Dang, op. cit.). Although only one representative of Sparganothini was examined, the vesica shows similarity with some Olethreutine species: it is large, apically narrowed and without a distinct boundary with the ductus. The cornuti are very long, as long as the phallus, deciduous, numerous and attached to the vesica with sockets, in the same way as in the Eucosmini and some Grapholitini – with a short neck located basolaterally on the cornutus. Moreover, the cornuti are slightly sinuate and directed anteriorly. Only one species from Chlidanothinae was studied and no conclusions on the structure of the vesica could be made. The vesica of *O. schumacheriana* is similar to the Cnephasiini vesicae.

The vesica in the Olethreutinae is less varied, always with an apically located gonopore and often shortened. In *Bactra robustana* (Bactrini), the vesica is very simple, like a membranous extension of the phallus, very short, and without a distinct border with the ductus. In the Olethreutini the vesica is relatively varied, sometimes reduced (*Lobesia*) or shortened (*Pelatea*). The cornuti, if present, are non-deciduous, socketed, well sclerotised cylindrical spines. *Ancylis achatana* (Enarmoniini) has a long field with cornuti on the vesica; this field is restricted in the tribes described below. The deciduous cornuti are dorsoventrally flattened, similar to those in Eucosmini and Grapholitini, but the basal neck is apically located. The vesicae of all studied Eucosmini show significant similarity. They are tubular, relatively long and have a bundle of many (more than 10) deciduous, socketed lanceolate, flat cornuti attached to the vesica by a short basolateral neck, and always anteriorly directed. The other typical character is a sclerotised plate on the vesica, opposite the cornuti. It is visible without eversion as a semi-cylindrical
 nota krap.33 (2): 285-300 

Plate enveloping cornutii. In many cases this plate makes the vesica non-eversible (I did not managed to evert vesica of Eucosma metzneriana (Treitschke, 1830), Gypsonoma minutana (Hübner, 1796-99) (Fig. 28), Epiiblema graphanum (Treitschke, 1835), Notocelia uddmanniana (Linnaeus, 1758), or N. trimaculana (Haworth, 1811)). The vesica of the Grapholitini is similar to that of the Eucosmini, but has a more prominent bulbous part. Cornutii, if present, may be deciduous and flat (e. g. Grapholita) as in Eucosmini or non-deciduous and cylindrical (e. g. Pammene) as in some Olethreutini. Usually, cornutii in the Tortricidae are divided into two types: deciduous and non-deciduous, but this classification appears to be artificial because of different origin of these types. I observed two further types of cornutii.

The first type includes sclerotised projections of the vesica. In fact they are non-deciduous. These cornutii are hollow and their cavities are not separated from the lumen of the vesica. This is typical for some Cochylini.

The second type includes structures certainly derived from setae. They are very common among many representatives of the family. Setaceous cornutii could be non-deciduous (fixed) or deciduous. Fixed cornutii are usually cylindrical, heavily sclerotised (Tortricini, Olethreutini), sometimes with an indistinct neck at the base (Endothenia). Deciduous cornutii are flat, tapered at both ends and have a basal (Archipini, Enarmoniini (Fig. 31)) or basolateral (Sparganothini, Eucosmini (Figs 28c, 32), Grapholitini) thin and fragile constriction (neck) which is broken during copulation (Fig. 30). Types of cornutii observed in Tortricidae are shown on Fig. 29.

**Conclusion**

This modified eversion technique allows better inflation of the vesica for examination of its three-dimensional structure. Some species have a non-eversible vesica due to
presence of a sclerotised plate enveloping the cornuti. Usually the vesica in examined species is cylindrical and slightly wider than the distal end of the phallus. The gonopore is located terminally. In most cases the diameter of the vesica does not significantly exceed the diameter of ductus ejaculatorius. An exception to this rule is seen within the tribe Cochylini in which there is a very wide, voluminous vesica and a laterally located, narrow gonopore, respectively ductus ejaculatorius. It is most probable that the structure of the everted vesica could be used for resolving taxonomic problems in many genera. However, significant similarity in combination with simplicity of the vesicae in Eucosmini and Grapholitini may limit its usefulness. A careful study of specific characters (including number, position and morphology of cornuti, dimensions of vesica etc.) is likely to be useful for distinguishing closely related species.

Acknowledgements

I would like to thank Colin W. Plant (Bishops Stortford, England) and Paul Sokoloff (Kent, U. K.) for the help with the English language, Joaquin Baixeras (Spain) for providing literature, and the Editor and the reviewers for precious comments that improved the earlier version of the manuscript.

References


Lange, A. B. 1963. Some microsurgical instruments and adjustments. – Zoologicheskij zhurnal 42: 8 1257–1260 [In Russian, with English summary].


Reply of the author to the book review by V. V. Zolotuhin published in *Nota lepidopterologica* 33(1): 173–175

I always eagerly await the next, new issue of *Nota lepidopterologica*. With the arrival the 1st part of volume 33, much to my surprise I found on pages 173–175 an extensive review of my book devoted to the African Thyretini (Thyretini of Africa. An Illustrated catalogue of the Thyretini (Lepidoptera: Arctiidae: Syntominae) of the Afrotropical Region). My astonishment was caused by the fact that I had not expected an extrapalaearctic topic to be included in the scope of a journal focusing entirely on the Palaearctic Lepidoptera.

After publication of the book I was anticipating some constructive criticism and correction of mistakes from my fellow lepidopterists through a book review.

The review written by Vadim V. Zolotuhin may well confuse readers of *Nota lepidopterologica* since the leading critical argument is based on the fact that the reviewer wished to see an extensive monograph rather than an “illustrated catalogue”. In general however, the review leaves the reader with the impression that the book is poorly prepared, full of obscurities and, in what is probably the core conclusion, does not deliver the content suggested by its title. I absolutely do not agree with such an opinion and below I present some contra arguments to Zolotuhins’ statements.

First of all I must refute the suggestion that the book was ever intended to be “a revision-monograph”. This term, in the sense of taxonomy, is widely understood as a comprehensive treat-ment of a taxon. Extensive revisions (monographs) typically revise all known species within a group, add any newly discovered species, and assemble and synthesize all available information on the ecological associations, geographic distributions, and morphological variations within the group (http://en.wikipedia.org/wiki/Monograph; http://www.e-taxonomy.eu). This term was neither used in the book nor in any advertisements preceding its publication. It was only treated as such by the reviewer: “Thus, this monograph, by Dr Łukasz Przybyłowicz from Cracow, is particularly welcome”. Instead of being a revisionary monograph the book was repeatedly defined by me as “an Illustrated Catalogue”, “a comprehensive, illustrated catalogue” or “present catalogue” as I was always aware it does not aspire to be any kind of revisionary monograph. This misunderstanding of the type of publication resulted in so numerous, critical “wishes” of the reviewer. Before starting the work on the catalogue, I evaluated the present state of knowledge of Thyretini and highlighted the most useful and feasible way to treat the topic. Such pre-evaluation of the problems allowed me to formulate the statements which were later elaborated in the book:

Preparation of the complete catalogue of the species-group taxa of the tribe Thyretini based on the examination of all available primary types. I should say that the former catalogue of Kiriakoff (1960) omitted several old taxa and naturally did not cover those described later. It also did not give any data on the type locality and the deposition of the types. In order to prepare such a catalogue I examined all of the 333 primary types except in a few cases (lost, destroyed or inaccessible) and these are marked in the text. The quality of many of them (including genital preparations) did not allow a detailed comparison to be made with similar taxa. The real problem arose in that a large number of very similar species were described on the basis of a single specimen (this is especially the case in the descriptions of Kiriakoff). The diagnostic characters presented in the original descriptions were very often so minor and obscure or compared to more morphologically distant species. The lack of drawings of genital details and photos of the habitus precluded any reliable taxonomic conclusions. The only solution to this problem is indeed an extensive revision based on morphological and molecular characters made on extensive material from a large area. As there is little chance of such an analysis in
the foreseeable future I decided to retain many the taxa in their present status, even though they might be changed after future comprehensive studies. I am convinced that the synonymizations should be done on a solid base of data and knowledge, since implementing many new synonyms would only make the systematics of the Thyretini even more complicated and cumbersome. Faced with such a situation, I compiled the full list of all known species-group taxa accompanied with taxonomic and nomenclatorial data as well as remarks. I hope I succeeded in preparing a publication which summarizes all the information which can be useful as a basis for a more detailed study of the Afrotropical Thyretini in the future.

Preparation of the iconography. I am very well aware that curators and collectors badly need the images of the habitus of every species. I was willing to make the book more useful for a broader audience of readers and therefore, I decided to illustrate each available species. This was my second target while preparing the book. Here again I met the same problems of similar species known only from unique specimens. As the book was always intended to be a scientific catalogue and not an album, atlas or an illustrated field guide I decided to use the type specimens rather than fresh specimens with higher quality. This approach ensured that the specimens represented the proper, described species. The short, explanatory information is given on the 8th page of the catalogue. The same procedure was followed while preparing images of male and female genitalic structures. Here again I was forced in numerous cases to show old, badly preserved preparations. The quality of the slides was not good but I intended to present to the reader how the particular taxon was described, based on slides of the type specimens. I am proud and happy that I managed to gather on just a few plates almost ALL representatives of Afrotropical Thyretini what in my opinion is really a great help for collectors and curators. I noticed that in most cases Thyretini are usually left as unsorted material in collections.

Preparation of short descriptions. Having the catalogue and illustrations I decided to add some short information on each species. Here again a large number of controversial taxa unfortunately resulted in a number of unclear statements. Such a situation was, however unavoidable, bearing in mind the poor taxonomic knowledge of the group and the lack of material from poorly studied genera or species groups. I would like to add that in many cases, however, short diagnoses accompanied by illustrations and the checklist of the group are helpful in identifying even superficially similar species. The Reviewer’s comment on the lack of descriptions of larval morphology and the biology of species is strange and groundless. It is a widely known truth that the immature stages and biology of many groups of tropical moths are almost unknown. While preparing the book I did what I could to find all published information dealing with all aspects of Thyretini and ALL this information, even old and trifling, is presented under the relevant species. However, I never intended, as the reviewer wished, to undertake the additional study of chaetotaxy, morphology or developmental biology based on preserved material.

After assembling and analyzing all the original descriptions, and references dealing with any kind of topic related to Thyretini, I realized that nothing more could be added with present stage of knowledge without extensive and detailed studies. I also hoped and assumed that the presentation of the main clusters of information on Afrotropical Thyretini (the catalogue, illustrations, short taxonomic and nomenclatorial notes on each species) in one book would be welcomed by the lepidopterists and would encourage both professionals and amateurs to undertake more thorough and detailed studies on this fascinating group of tropical Arctiids.

I kindly ask the reader of Nota lepidopterologica to allow me to briefly respond to the critical remarks of V. V. Zolotuchin. I shall follow the numeration presented in his review. As it was stressed above the book is a catalogue and not a revision and its aim is certainly not the in depth study of the entire range of all aspects of the species’ variability. Let me leave the comments on the layout as the subjective opinion of the reviewer. The implementation of
distribution maps in the catalogue, given the scarcity of data on the species distribution at the moment, was never my intention. Diagnostic characters are given as precisely as the accumulated material allowed. Furthermore, I intentionally abbreviated them as this chapter is rather an addition to the catalogue. I repeat again that the title of the book clearly indicates that it is a catalogue and not a comprehensive morphological revision.

Identification keys are generally NEVER provided in the catalogues. A detailed discussion on the complicated and/or controversial taxa based on such a small amount of available material is not possible at the moment and this can be done only after accumulating new information. I hope and believe that lepidopterists, including the reviewer himself, will revise the genera or complexes of species of Arctiidae, and Afrotropical Thyretini in particular.

“The author’s point of view” is exceptionally clear. The genus *Pseudothyretes* shows a very strong sexual dimorphism and homogeneous habitus of each sex. The discovery of conspicuous differences in the male genitalia (depicted on plate 16) enables easy differentiation of species within this genus based on males. The females are still a “black hole” and further taxonomic speculations seem pointless. Again, I stress that my “short statements” are only remarks to the catalogue and illustrations and they are not a revisional elaboration of the group under consideration.

The final judgement on the usefulness and the helpfulness of the book will be made by its users. The book reflects the current stage of knowledge and it should be treated only as the starting point for further study. It summarised all published data and indicates how much should be still done to get a clearer picture on the diversity of Afrotropical Thyretini. So, it certainly is “the first comprehensive tool facilitating the identification”. It is true that a lepidopterist having this one book only is able now to identify the Afrotropical Thyretini specimens as far as it is possible with the present state of knowledge.

Regretfully I should conclude that it would have been better that the reviewer had read more attentively the title of the book he was reviewing. It is obvious that he confused two types of publications – catalogues and revisions. It is also very regretful that the editorial board of *Nota lepidopterologica*, consisting of outstanding European lepidopterists, allowed publication of such an unfounded critical review in a journal not specialising in the Afrotropical region.

ŁUKASZ PRZYBYLOWICZ
Nota lepidopterologica index to volumen 33 by taxon and author names, with publication dates.

Publication dates

Contents
Kolev, Z. 2010 (15.v.). A significant range extension for Pyrgus caelalae (Rambur, 1839) with the first record from the western Balkan Peninsula (Hesperiidae). 33 (1): 107–113.

Nota lepidopterologica, 24.01.2011, ISSN 0342-7536


Vis, R. 2010 (15.v.). Recent geographic range expansion of Brephidium exiles (Baoisduval, 1852) (Lycaenidae) in Oman, Arabian Peninsula. 33 (1): 133–134.


Index of taxonomical changes


luna sp. n. (Flavinarosa) – Solovyev, A. V. 2010 (15.v.): 33 (1): 120.


**Nota lepidopterologica** wird als wissenschaftliche Zeitschrift von der Societas Europaea Lepidopterologica (SEL) herausgegeben und den Mitgliedern der SEL zugesandt. Autoren, die Manuskripte für die Publikation in der Nota lepidopterologica einreichen möchten, finden die jeweils gültigen Autorenrichtlinien auf der Homepage der SEL unter http://www.socleurelpe.eu. Der Verkauf von Einzelheften und älteren Jahrgängen von Nota lepidopterologica sowie der Verkauf der Zeitschrift an Nichtmitglieder erfolgt durch Apollo Books, Kirkeby Sand 19, DK-5771 Stenstrup; e-mail: apollobooks@vip.cybercity.dk. Die Mitgliedschaft bei der SEL steht Einzelpersonen und Vereinen nach Maßgabe der Satzung offen. Der Aufnahmeantrag ist an den Mitgliedssekretär Willy De Prins, Dorpstraat 401 B, B-3061 Leefdaal, Belgien; e-mail: willy.de.prins@telenet.be zu richten. Das Antragsformular ist im Internet auf der Homepage der SEL erhältlich. Der Mitgliedsbeitrag ist jährlich am Jahresanfang zu entrichten. Er beträgt für Einzelpersonen € 35,00 bzw. für Vereine € 45,00. Die Aufnahmegebühr beträgt € 2,50. Die Zahlung wird auf das SEL-Konto 19 56 50 507 bei der Postbank Köln (BLZ 370 100 50) erbeten (IBAN: DE63 3701 0050 0195 6505 07; BIC: PBNKDEFF). Mitteilungen in Beitragsangelegenheiten werden an den Schatzmeister Dr. Robert Trusch, Staatliches Museum für Naturkunde, Erbrinzenstr. 13, 76133 Karlsruhe, Germany; e-mail: trusch@smnk.de erbeten. Adressenänderungen sollten umgehend dem Mitgliedssekretär oder dem Schatzmeister mitgeteilt werden.

Published by the Societas Europaea Lepidopterologica (SEL), **Nota lepidopterologica** is a scientific journal that members of SEL receive as part of their membership. Authors who would like to submit papers for publication in Nota lepidopterologica are asked to take into consideration the relevant instructions for authors available on the SEL homepage at http://www.socleurelpe.eu. The sales of single and back issues of Nota lepidopterologica as well as sales to non-members of SEL are under the responsibility of Apollo Books, Kirkeby Sand 19, DK-5771 Stenstrup; e-mail: apollobooks@vip.cybercity.dk. The membership is open to individuals and associations as provided for by the statutes of SEL. Applications for membership are to be addressed to the Membership Secretary Willy De Prins, Dorpstraat 401 B, B-3061 Leefdaal, Belgium; e-mail: willy.de.prins@telenet.be. The application form is available on the SEL homepage. The annual subscription is to be paid at the beginning of the year. It is 35.00 € for individuals or 45.00 € for associations. The admission fee is 2.50 €. Dues should be paid to SEL account no. 19 56 50 507 at Postbank Köln [Cologne] (bank code 370 100 50; IBAN: DE63 3701 0050 0195 6505 07; BIC: PBNKDEFF) or to local treasuries as mentioned on the website. Communications related to membership contributions should be sent to the Treasurer Dr Robert Trusch, Staatliches Museum für Naturkunde, Erbrinzenstr. 13, 76133 Karlsruhe, Germany; e-mail: trusch@smnk.de. Changes of addresses should be immediately communicated to the Membership Secretary or the Treasurer.

Publié par la Societas Europaea Lepidopterologica (SEL), **Nota lepidopterologica** est un périodique scientifique envoyé à tous les membres de la SEL. Les auteurs qui désirent publier des manuscrits dans la revue sont priés de tenir compte des Instructions aux auteurs disponibles sur le site Web de la SEL: http://www.socleurelpe.eu. Les ventes de numéros supplémentaires ou d'anciens numéros de Nota lepidopterologica, ainsi que les ventes de numéros aux personnes n'étant pas membres de la SEL sont sous la responsabilité de Apollo Books, Kirkeby Sand 19, DK-5771 Stenstrup; courriel: apollobooks@vip.cybercity.dk. Tel que prévu dans ses statuts, les individus de même que les associations peuvent devenir membres de la SEL. Les demandes d'adhésion doivent être envoyées au Secrétaire responsable des adhésions, Willy De Prins, Dorpstraat 401 B, B-3061 Leefdaal, Belgique; courriel: willy.de.prins@telenet.be. Le formulaire d'adhésion est disponible sur le site Web de la SEL. L'adhésion se paie au début de l'année. Elle est de 35 € pour les individus et de 45 € pour les associations. Les frais d'admission sont de 2.50 €. Les paiements peuvent être envoyés au compte de la SEL: no. 19 56 50 507, Postbank Köln [Cologne] (code bancaire 370 100 50; IBAN: DE63 3701 0050 0195 6505 07; BIC: PBNKDEFF) ou au trésorier local tel que mentionné sur le site Web. Toute question en rapport avec l'adhésion doit être envoyée au Trésorier, Dr. Robert Trusch, Staatliches Museum für Naturkunde, Erbrinzenstr. 13, 76133 Karlsruhe, Germany; courriel: trusch@smnk.de. Tout changement d'adresse doit être mentionné immédiatement au Secrétaire responsable des adhésions ou au Trésorier.