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IN PRAGUE**
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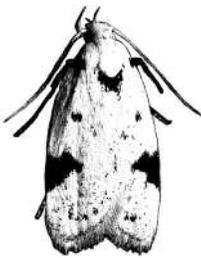
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I.N.  G.A.

NEWSLETTER OF
THE INTERNATIONAL NETWORK OF
GELECHIOID AFICIONADOS



David Brooker Images
Photo: David Brooker

Dear Gelechioid Aficionados,

In the 2020 issue of INGA we are happy to welcome Mark Metz, a Lepidoptera systematist working at the Smithsonian Institution in Washington (USNM), who joins us as the fifth co-editor. Mark's work especially focuses on gelechiids and he was featured as a gelechioid aficionado in issue 5 of INGA back in 2015.

In this issue we take a tour of the National Museum in Prague and are introduced to its curator of Lepidoptera and gelechioid aficionado Jan Šumpich, learn about a new approach in phylogenetic assessment of Gelechioidea, and take a look at postage stamps with gelechioid motifs from around the world.

As always we welcome contributions from all the community members for the upcoming issues, and thank David Brooker, Jan Šumpich, Qing-Yun Wang, Hou-Hun Li, Ole Karsholt, and Bob Heckford for providing texts and images for the current issue of the newsletter.

As the first issue of the new decade comes to you amid a global pandemic of unprecedented proportions, we at the editorial team sincerely hope that you and all your loved ones remain safe until the world becomes a better place again.

I.N.G.A. team

Gorgeous European Day-Flying Oecophorid Moth



Cover image:
Alabonia geoffrella (L.)
(Oecophoridae) occurs
in Europe and has
larvae feeding in rotting
wood.

Thanks to David
Brooker for allowing us
to feature his photo!



National Museum in Prague: A less known depository of Lepidoptera collections in the centre of Europe

Jan Šumpich

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A brief history of the Museum

The institution of the National Museum in Prague currently includes five separate museums, focused on history (Historical Museum), music (Czech Museum of Music), Asian, African and American cultures (Náprstek Museum), literary collections (National Museum Library) and natural sciences (Natural History Museum). The main mission of the National Museum at the time of its establishment (1820) was to gather and conserve the collections for the future generations. Many years later, when the museum was already highly professionalized, it gradually divided into separate



specialized workplaces with scientific goals. You can get acquainted with the rich history of the National Museum via its official homepage (<https://www.nm.cz/>).

The Natural History Museum was officially founded in 1964. However, the collections of the National Museum were already extraordinarily rich at that time, and the Entomological Department already had been active for 44 years (founded in 1920 as a part of Zoological Department and established as a separate Entomological Department in 1952). A number of renowned specialists alternated in the leading positions of the department. The first of them was Prof. Dr. Jan Obenberger, DrSc., a world-famous coleopterologist specialized in the jewel beetles (Buprestidae). From the very beginning, the main attention of the department has been paid to the beetles – a trend continuing to the present day. Thanks to many thousands of type specimens, the beetle collections represent a phenomenon of the whole museum and are frequently visited by specialists from around the world.

History of lepidopterological collections

Compared to the coleopterological division, the collections of Lepidoptera, and lepidopterology in general, were always somewhat sidelined. The basis of Lepidoptera collections is represented by a generous gift from prof. Franz Anton Nickerl (1813–1871) and his son Ottokar Nickerl (1838–1920) (and partly also grandson Ottokar Nickerl jun. (1873–1904)). However, the collection of so called Macrolepidoptera was interspersed (partly into the systematical collection) ca. in the 1950s and has become more or less worthless scientifically (due to the fact that only some specimens were labelled). On the contrary, the collection of "Microlepidoptera" has remained mostly in the original arrangement and in original boxes, and despite the above mentioned handicap with the localization it still remains an extraordinarily valuable evidence concerning the Bohemian Microlepidoptera – both entomologists (namely O. Nickerl) published numerous faunistic papers from which a correct

localization of unlabelled collection specimens is often possible (e.g. 150 years old vouchers of *Dichomeris barbella* (Denis et Schiffermüller, 1775) from Bohemia, see Šumpich & Skyva 2016).

The main Lepidoptera collection was later extended by numerous smaller collections. Those, however, were rather of a local importance and without great taxonomical value. Besides the collections of both Nickerls, which contain the type material of taxa described by themselves, it is necessary to mention a large collection of butterflies (mainly the tropical ones), donated by Napoleon Manuel Kheil (1849–1923). It contains numerous types, predominantly from the island of Nias, Indonesia. So, with some exceptions, these collections became the only bearers of scientific value in Lepidoptera. The collections began to grow in a delightful way (even by the type material) thanks to managerial skills and personal scientific activity of dr. Josef Moucha (1930–1972, specialist in butterflies and the flies in the family Tabanidae) in the 1960s and 1970s. However, his premature death in a traffic accident not only stopped his scientific carrier, unfortunately, but also caused a significant slowdown in both the collecting activities of the National Museum and the progress in the Czechoslovak lepidopterology in general.



Gelechioid Aficionado

*Jan Šumpich:
The fourth curator of
Lepidoptera collections in the
National Museum*

Let me take this opportunity to add a few words about myself, although I do not consider this important. Last year I was 50, and I have been interested in Lepidoptera since I was eight (of course with a strong support of my father during those times). Unlike my colleagues who have focused solely on scientific goals (instead a time-consuming building of their own collections) since the beginning of their careers, I have chosen a completely opposite way. From the beginning my father taught me about importance of every single species in nature, so even in collecting, none of them should be omitted. Also I collected my first Microlepidoptera (*Tortrix viridana* and *Platyptilia nemoralis*) almost simultaneously with my first Lepidoptera (*Arctia caja* and *Vanessa atalanta*) in general. Although I have never forgotten Macrolepidoptera, I have always preferred Microlepidoptera, and one group – the gelechioid species – in particular.

Anyone who was not successful in finding a prestigious entomological position immediately after finishing the university (or even during the studies) knows the associated pitfalls if he/she decided to remain without changing the field of interest. However, I think that even as an entomologist of a local nature conservation agency, or as a private entomologist lately, I was able to find my way through the amateur entomology and at least contribute to its progress a little. Indeed, in a country with a long entomological tradition such as Czechia, every collecting success means double pleasure. I do not know exactly whether the dozens of Lepidoptera species recorded from Czechia for the first time together with several newly described species or only my large collection was the reason I was offered the position of curator in the National Museum. However, the result is that I actually have held this position since 2014.

Microlepidoptera

Since the donation by O. Nickerl in 1920, which was the first to contain also Microlepidoptera, the collections of Microlepidoptera in the National Museum grew very slowly. Approximately by the





1960s, these were expressly unique gifts and purchases of complete collections that were not large in size but relatively rich in species (Josef Müller, Friedrich Zimmermann, Josef Soffner, Edvard Troníček and Vilém Vlach). Their common feature was, with a few exceptions, a focus on the Czech fauna. No new collection of Microlepidoptera was deposited in the museum till 2014, but relatively numerous material from Czechia, Slovakia, Israel, Iran and other countries (to a lesser extent) was obtained and prepared under the direction of previous curators (the Israeli gelechiids were processed recently and the results are incorporated in the first Israeli checklist of Gelechiidae, cf. Bidzilya et al. 2019). An imaginary boon began after 2014, when the National Museum was endowed with Microlepidoptera collections by several extraordinary Czech entomologists (Jaroslav Marek, Jan Liška, Jan Skyva, Ivo Novák), who also obtained collection material (including type material) from other countries, and

consequently, the collection of Microlepidoptera in the National Museum increased several times. Obviously, I take it for granted that my collection will also become a part of this someday. Upon joining the National Museum, my collecting effort has not reduced in any way. I just have shifted from Europe a little to the east and started to store collected specimens in boxes in the property of the museum. Among the areas that I especially like include Armenia and the vast Altai Mountains on the border of Kazakhstan, Russia, Mongolia and China. I do not have any skilled preparator of Microlepidoptera (however, I am trying hard to find him/her since I have been working in the museum), the self-setting of material from several-week expeditions is therefore very lengthy (fortunately, weekends and tolerant wives still exist). However, I do not intend to give up the preparation – firstly, I am used to work like this for most of my life, and secondly, I believe that numerous papers will hardly be remembered after years, whereas a well-prepared specimen will remain a permanent value for future generations (when possibly no butterflies or moths will occur in the wild, at least in some parts of the so-called developed world).

The Altaic collections clearly show a high species diversity of this mountain range (especially of its deep valleys and flat steppes continuing over the border with Mongolia), but also its relatively high rate of endemism. The number of recently described taxa from the Altai, with the holotypes deposited mostly in our museum, still remains significantly lower than the number of species that are apparently undescribed and still awaiting the description (and I do not take into account the groups to which I am not oriented so much, e.g. Pyralidae, most Tortricidae, etc.). So let this text be a challenge for everyone looking for additional material to study – it also may be worth checking out our collections. In addition to the above mentioned, material (across various groups) from Laos, Indonesia, Iran, China or even Panama can be found in our collections.



Vision

Perhaps I could be expected to answer a question of how many Lepidoptera specimens we have in the museum, or at least how large our collection of gelechioid species is. I really do not know. Overall, surely over a million, but hard to estimate how many more. After all, the collection of Jan Šumpich (a specialist in Pterophoridae) itself, which he personally donated to the museum in 2017, includes substantially more than 200,000 prepared specimens (largely from the group of Microlepidoptera).

However, not knowing the exact numbers is not so serious a pitfall as is the fact that no general collection of Microlepidoptera has been established yet, so the particular collections (also partly concerning Macrolepidoptera) still remain in the original and often a very confusing arrangement. And it is the precise sorting of the whole Microlepidoptera material, together with establishing the general systematical collection, that I feel as my biggest task before my retirement in 15 years.



Sophronia salaganella Šumpich & Bidzilya, 2019, described from Altai Mts. (Photo: Jan Šumpich)

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A further discussion on the phylogeny of Gelechioidea

Qing-Yun Wang & Hou-Hun Li

The superfamily Gelechioidea (Lepidoptera: Obtectomera) has a high species diversity and cosmopolitan distribution (Hodges 1998). It consists of more than 18,400 described species. Relative to its high diversity and wide distribution, this superfamily is still one of these little-known groups. Therefore, it is a large and complex group, which also leads to the confusion and instability of the interrelation between higher taxa. For a long time, many researchers from different countries, mainly European and America, have done a lot of research and made important contributions on classification systems of Gelechioidea, including many early morphological studies. But for such special groups, most of them are difficult to get appropriate results, although research works are always progressing.

When new methods are involved, such as molecular biology, they are soon applied in research and morphological methods are combined to solve such problems. However, relationships among families and subfamilies in Gelechioidea have been exceptionally difficult to resolve using morphology or single gene genealogies. Multiple gene genealogies had been used in the molecular phylogenetic studies on Gelechioidea during the past years, but their phylogenetic relationships remain controversial, mainly due to their limited taxa sampling relative to such high species diversity.

Previously, the understanding of Asian fauna was relatively insufficient because the materials used in the research work were inadequately sampled from Asia. However, the distribution of key groups of Gelechioidea are different all over the world, and research results have certain limitations with some problems yet to be solved due to geographical region and the

complexity of those groups. A comprehensive understanding of the phylogeny of Gelechioidea requires more regional participation and wider use of materials. Based on the above considerations, our recent research expects to make some progress in this area when Asian materials are widely used.

In this paper, 89 ingroup species representing 55 genera are sequenced, and these data were added to data downloaded from GenBank; six species representing four closely related superfamilies are chosen as outgroup. The molecular phylogeny of Gelechioidea is reconstructed based on the concatenated dataset composed of one mitochondrial marker (COI) and seven nuclear markers (CAD, EF-1 α , GAPDH, IDH, MDH, RpS5, wingless).

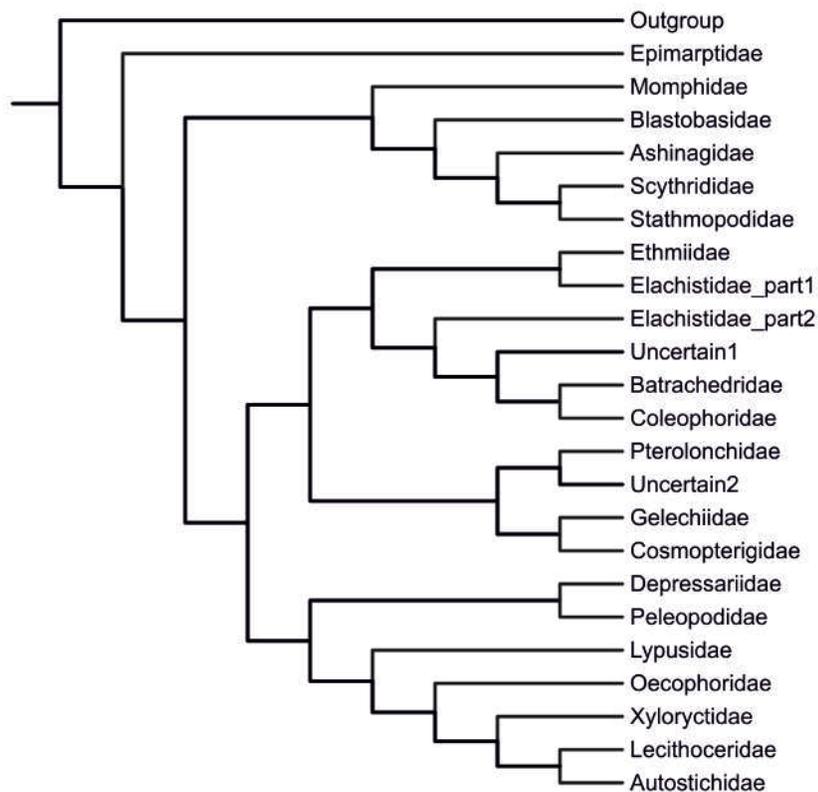


Fig. 1. Simplified version of the phylogenetic tree obtained in the study by Wang & Li (2020)

Geometric morphometric analyses using merged landmark dataset from fore and hind wings of 118 representative species are conducted.

The main results are as follows:

- 1) The study confirms the monophyly of Gelechioidea as all the ingroup species converged together as an independent clade, and the outgroup taxa separated from the clade of Gelechioidea in both model-based analyses with quite high support values.
- 2) New definitions of five families. We revised the classification status and definition of problematic taxa based on our molecular phylogenetic trees, including Autostichidae, Depressariidae, Peleopodidae, Ashinagidae and Epimarptidae.
- 3) The result reveals and highly supports that Scaeosophinae is a separate subfamily within Cosmopterigidae. Analysis of the Ethmiinae indicate strong monophyly, and this subfamily is elevated again to family status of Ethmiidae. The phylogenetic relationships between subfamilies of Stathmopodidae and Blastobasidae are still undefined.

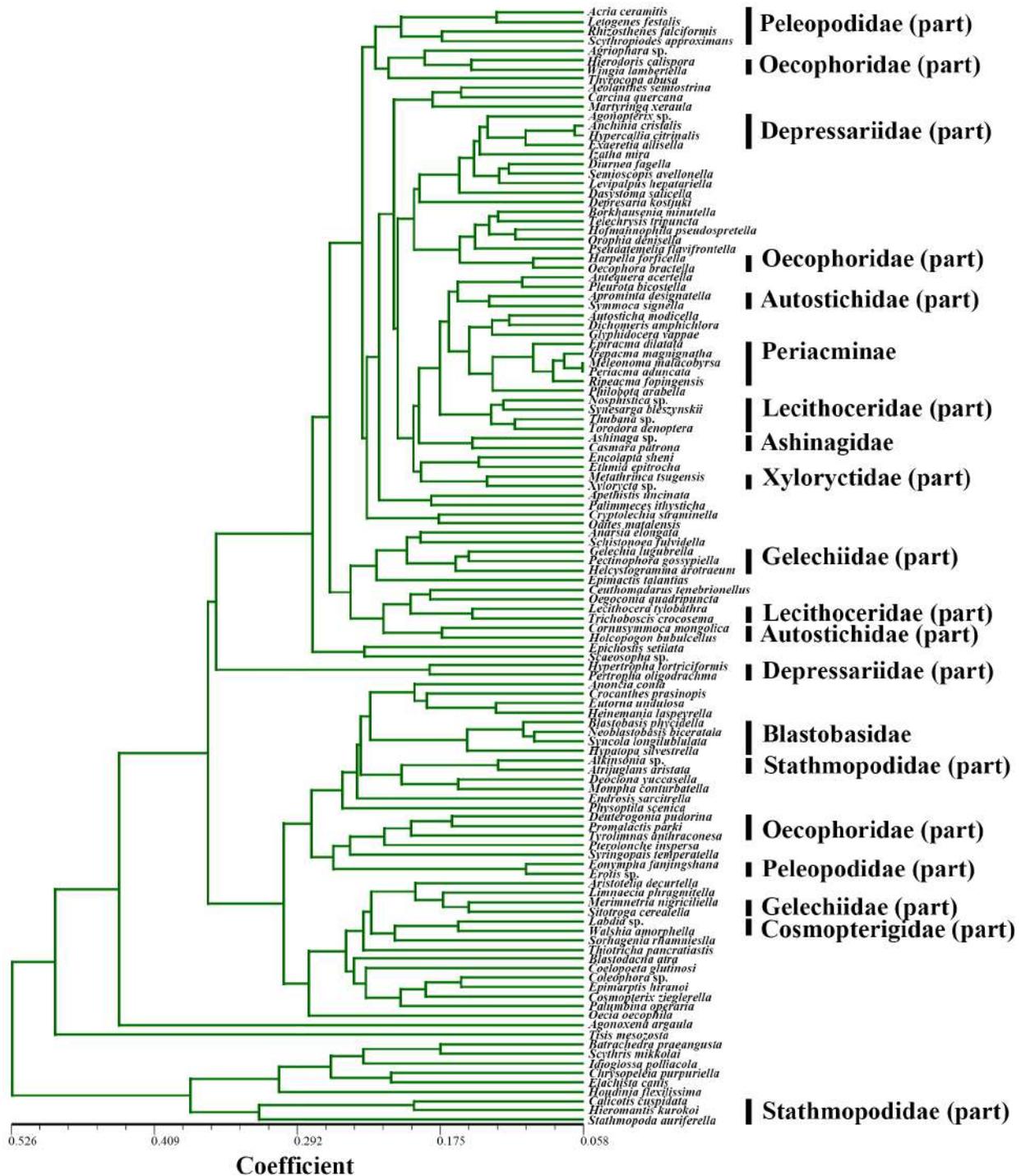


Fig. 2. Phenetic tree with 118 gelechioid species based on Procrustes distance computed from merged data set. Clades are labelled with family and subfamily names.

4) Interfamilial relationships: The clade consisting of Autostichidae, Lecithoceridae, and Xyloryctidae is supported with high values, and this clade also seems to be relatively close to the Oecophoridae-clade and the Lypusidae-clade. The quite close relationship between Gelechiidae and Cosmopterigidae had been demonstrated in the previous cladistic analysis of morphological characters (Kaila, 2004) as well as the analyses of gene sequences (Bucheli & Wenzel, J. 2005; Kaila et al., 2011; Karsholt et al. 2013; Heikkilä et al., 2014; Sohn et al. 2016), and this is also strongly supported in in this paper. The clade containing Stathmopodidae, Scythrididae, Ashinagidae, Blastobasidae and Momphidae is supported with high support values. A simplified version of the phylogenetic tree presented in the paper is in Fig. 1.

5) Morphometric analyses of wing shapes: Results of the clustering analysis of wing shapes demonstrated that some families or subfamilies within Gelechioidea had good convergence effect, which was largely consistent with the molecular results. The phylogenetic information provided by the GM analysis of wings is valuable for the identification of certain gelechioid groups. Fig. 2.

*The full article Phylogeny of the superfamily Gelechioidea (Lepidoptera: Obtectomera), with an exploratory application on geometric morphometrics, authored by Qing-Yun Wang and Hou-Hun Li was recently published in *Zoologica Scripta*.

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Gelechioids on Stamps

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Postal stamps are unique outlets for countries to showcase important issues, raise public awareness, and commemorate persons or events of national significance. Stamps are windows into the art and culture of the countries, and thus subjects represented are by definition wide and varied in nature. With millions of hobbyists worldwide, stamp collecting is among the top past-times and its contribution to global economy is non-trivial.

Most philatelists are thematic collectors, meaning they specialize only on particular topics represented on stamps. Entomology is one such theme. Numerous books and checklists exist that have over time attempted to catalogue insects and lepidopterans on stamps (e.g. Stanley 1979, Wright 1993, Domingo 2002 etc.). Although modern reviews and statistics on taxonomic groups are notably lacking, there is little doubt that lepidopterans continue to dominate the world of insect stamps: Hamel (1990) determined that 68.4% of all insect stamps published globally until that year represented Lepidoptera, followed distantly by Coleoptera (9.8%), Diptera (9.1%), Hymenoptera (6.1%), and other insect orders.

While working on a global taxonomic review of entomological stamps, I came across a few gelechioids that in my opinion deserve more attention. The first stamp is from the Central African Republic (CAR), issued in 1965, with a face value of 30 Central African CFA francs (equal to about 5 cents US at the time), illustrating a caterpillar of the Pink Bollworm *Pectinophora [Platyedra] gossypiella* (Saunders, 1844) (Gelechiidae: Apatetrinae: Pexicopiini) infesting a cotton boll, accompanied by a nicely mounted adult at the bottom left corner. This stamp was published as part of a set of three, with the other two stamps depicting pests of coffee (*Epicampoptera strandi* Bryk, Drepanidae, and *Cephonodes hylas* (L.), Sphingidae). The Pink Bollworm is a late-season key pest of cotton across the world, inflicting major damage on crops in Africa. Cotton has been cultivated in CAR since 1924. Since the country gained its independence in 1960, cotton has been one of its four principal exported cash crops, ranging from c. 25,000 to 45,000 tons a year. During the early 1960s, many Central African countries including CAR, Rhodesia and Malawi suffered major outbreaks of the Pink Bollworm, resulting in nearly 50% yield losses (Cadou 1970; Cauquil & Vincens 1982).





The second stamp is from Kiribati (Gilbert Islands until 1979), issued in 1980, with a face value of 25 Kiribati cents (about 20 cents US at the time), illustrating an *Ethmia nigroapicella* (Saalmüller, 1880) (Ethmiidae). Also known by its common name 'kou leaf worm', this moth is widely distributed from Madagascar across the Indian Ocean to Japan, Australia and the Pacific Islands, with larvae that feed on *Ehretia* spp. and *Cordia subcordata* (Boraginaceae). This stamp, issued soon after Kiribati's independence from the United Kingdom, is

part of a set of four with the theme 'Lepidoptera Fauna of Kiribati'. The other species depicted in this series are *Achaea janata* (L.) (Erebidae: Erebininae), *Utetheisa pulchelloides* Hampson (Erebidae: Arctiinae), and *Anua* (= *Thyas*) *coronata* (F.) (Noctuidae).

A set of four stamps issued by Micronesia in 1990, each with a face value of 45 Micronesian cents (about 45 cents US at the time), depict four moths identified only to family: A gracillariid (*Caloptilia* sp.), a 'yponeutid' (*Anticrates* sp., Lacturidae), and two cosmopterigids. One of these (lower left) is *Trissodoris honorariella* (Walsingham 1907), a common moth widespread in the Pacific region with caterpillars that feed on Pandanus species (Pandanaeae). The other (lower right) appears to be one of the many species in the ubiquitous genus *Pyroderces*, with several species present in the Australian and Pacific regions. The moths in this genus are recorded feeding on more than 40 plant families (NHM HOSTS database, www.nhm.ac.uk/our-science/data/hostplants).



And finally, in 2011 Kenya published 100 stamps (4 sheets of 25) celebrating the 40th anniversary of the International Centre of Insect Physiology and Ecology in Nairobi (www.icipe.org). Among the 25 specimens of Lepidoptera depicted on one of these sheets, there is a *Stathmopoda* sp., identified only as *Gelechioidea* sp. This specimen, reared on *Psydrax polhillii* Bridson (Rubiaceae) and currently residing in ICIPE, represents one of the hundreds of species reared as part of a 5-year survey of insects feeding on indigenous fruits in Kenya, a project led by entomologist Robert S. Copeland (ICIPE) in collaboration with many others, including Scott Miller and David Adamski (USNM) on Lepidoptera (Copeland et al 2009, Adamski et al 2010, Miller et al 2014).



Stamp info

1. Central African Republic: Stamp Number: CF 55, Yvert et Tellier: CF 57, Michel/Stanley Gibbons/Stampworld: CF 90
2. Kiribati: Stamp Number: KI 357, Michel: KI 355, Yvert et Tellier/Stampworld: KI 34
3. Micronesia: Stamp Number FM 130a, Michel/Stampworld FM 199-202
4. Kenya: Stamp Number KE 853h, Stampworld KE 857

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Leading Microlepidopterists awarded

At the Butterfly Conservation AGM held in Shrewsbury, England, held on 16 November 2019, two prominent microlepidopterists and Gelechiid aficionados, Bob Heckford and Ole Karsholt, were awarded. Bob received the Marsh Christian Trust Award for Lifetime Achievement in Lepidoptera Conservation, and Ole the 2019 Marsh Christian Lepidoptera Award for Distinguished Service in the field of Lepidoptera Conservation and Research in Europe.



Bob is a Scientific Associate at the NHM, London, and a Volunteer Specialist with the National Trust. Bob has a very long list of publications and has greatly contributed to knowledge on many aspects of Lepidoptera. He is one of the authors of volume 4 of *The Moths & Butterflies of Great Britain and Ireland* and has been a co-editor of the *Checklist of the Lepidoptera of the British Isles* published in 2013. As part of the award, Bob was presented with a wonderful framed painting by Richard Lewington that had several species whose life-histories he had discovered, usually with Stella Beavan, or had added to the British list.

Ole's decades of research on European microlepidoptera are reflected in his numerous papers and books, including two volumes on the Gelechiidae in the *Microlepidoptera of Europe* series co-authored with Dr. Peter Huemer. He has also co-authored *The Lepidoptera of Europe*, a distributional Checklist (1996), *The Nordic-Baltic Checklist of Lepidoptera* (2017), and is a regular contributor to *The Annual Review of Danish microlepidoptera*. Ole retired from his position at the Natural History Museum of Denmark a few years ago but continues his collaboration with other researchers.



Congress Announcement



The **22nd European Congress of Lepidopterology**, organized by University of Tartu and Societas Europaea Lepidopterologica, will be held on May 31st-June 5th, 2021 at Laulasmaa (40 km W of Tallinn), Estonia.

For preliminary queries, contact Toomas Tammaru at toomas.tammaru@ut.ee. (Photos: Toomas Tammaru)

Congress website: <https://sel2021.ut.ee/avaleht>



Recent Publications on Gelechioidea

Compiled by Maria Heikkilä

Articles dealing with pest or biocontrol issues are not included.

2018 additions

Please see I.N.G.A. issue n. 8 for other articles published in 2018: https://mississippientomologicalmuseum.org.msstate.edu/Researchtaxapages/Lepidoptera/Gelechioidea/INGA/INGA_issues/I.N.G.A._8_2019.pdf

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