

Editorial

Dear Herbulotians,
some time has passed since the last FH Newsletter was published, but much has happened during this time.

First, it seems that other scientific communities found FH a great example of accumulating and streamlining taxonomic efforts on a specific group. In 2023, three of our FH “scientific board” team (Pasi Sihvonen, Hossein Rajaei and Axel Hausmann) have been invited by the group of experts working on Noctuoidea to present an online talk on the structure and organization of our Forum Herbulot initiative. In this talk the details of key steps, experiences and failures of building FH were presented to help Noctuoidea experts to found a similar initiative.

Also, many expeditions were executed by the members of FH in different parts of the worlds, including the expedition in South Africa in January 2023 (see the detailed report in this newsletter).

LE STUDIUM
CONFERENCES
ORLÉANS | 2023

25 - 29 September 2023

Conservation, Ecology and Systematics of Lepidoptera in a changing world

The 23rd European Congress of Lepidopterology & 11th Forum Herbulot

LOCATION
Hôtel Dupanloup
1. rue Dupanloup
45000 Orléans - FR

CONVENOR
Dr Carlos Lopez-Vaamonde
Forest Zoology Research Unit IURZFI/ Centre INRAe Val de Loire - FR
& Insect Biology Research Institute (IRBI), University of Tours / CNRS - FR

This conference is organised in the framework of the regional thematic research network "Entomocentre"

PROGRAM - REGISTRATION
registration@lestudium-ias.fr
www.lestudium-ias.fr

Picture by Antoine Guiguet

11th international congress of Forum Herbulot 25.-29.9.23, Orléans-France

As another major event, after the long Covid break, we had our 11th Forum Herbulot international congress in Orléans, France along with the 23rd Society for European Lepidoptera (SEL) congress, from 25–29. September 2023. Many thanks to Dr. Carlos Lopez-Vaamonde for the perfect organization of this congress and to Pasi Sihvonen and Niklas Wahlberg for preparing and realizing the FH session.

The Forum Herbulot Newsletter appears regularly two times per year and will be posted on the webpage of Forum Herbulot: www.herbulot.de. Old issues can be accessed there. Membership in the Forum Herbulot initiative is free.

For more information contact Axel Hausmann: hausmann.a@snsb.de or Hossein Rajaei: hossein.rajaei@smns-bw.de

11th international congress of Forum Herbulot

25.-29.9.2023, Orléans-France

The participants enjoyed the following talks (abstracts can be requested):

Hossein Rajaei (Germany) - Forum Herbulot: a successful collaborative network coordinating research on geometrid moths

Axel Hausmann (Germany) - We want them all! - Completing the DNA-library for European Lepidoptera in the BGE project.

Flavia Rossina Joele Alves de Moraes (Brazil) - Phylogenomics of a neotropical geometrid tribe reveal contrasting patterns of phylogenetic signal in wing color characters

Leidys Murillo Ramos (Colombia) - Emptying the taxonomic trash bin: molecular phylogenies resolve the polyphylies of Oenochrominae and Desmobathrinae.

Shabnam Kumari (India) - What underlies the unimodal elevational species richness pattern of Geometridae moths (Lepidoptera: Heterocera) in the protected area of the North-western Himalayan Biogeographic province, Himachal Pradesh, India?

Erki Ounap (Estonia) - Molecular phylogeny of North European Geometridae (Lepidoptera, Geometroidea)

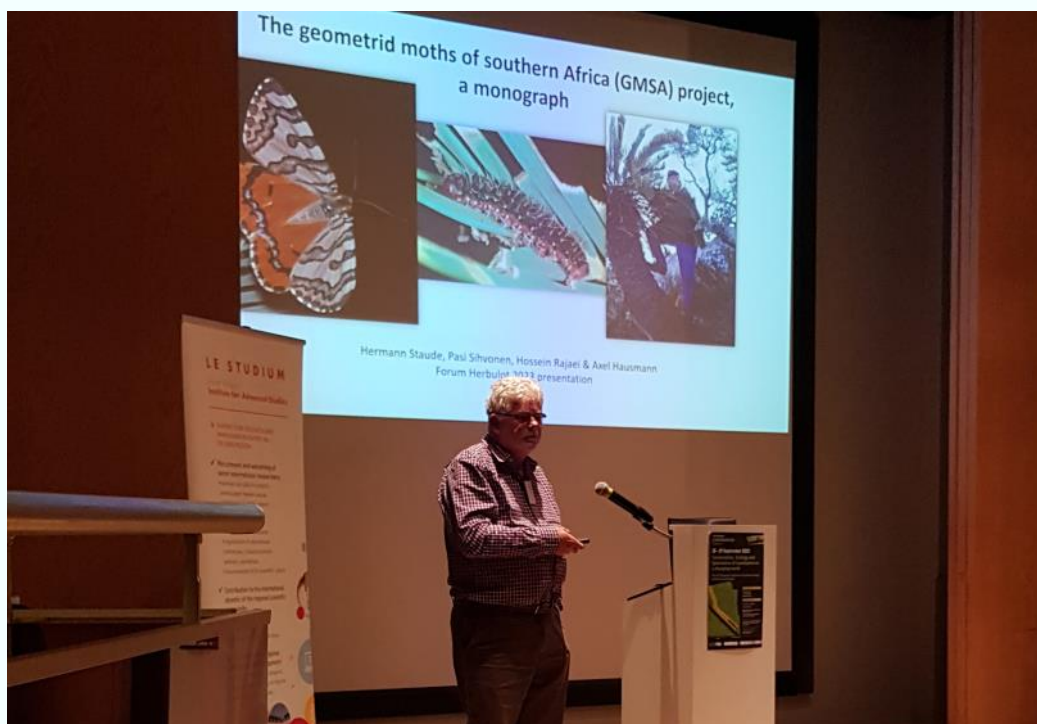
Kadri Ude - A phylogenetic-comparative study on wing shape in Geometridae

Pasi Sihvonen (Finland) - Species delimitation in allopatry: a case study on African cycad moths (Geometridae: Ennominae)

Claude Tautel (France) - The early stages and systematic position of *Gypsochroa renitidata* (Hübner, [1817]) (Lepidoptera, Geometridae)

Hermann Staude (South Africa) - Geometrid moths of southern Africa (GMSA) project, a monograph.

Axel Hausmann & Hossein Rajaei



12th international congress of Forum Herbulot

27.-31.1.2025, South Africa

In 2025 we will celebrate the “silver” anniversary of hosting the large collection of Claude Herbulot in Zoological State Museum of Munich (in the year 2000). Just after this important event, Manfred Sommerer (who will celebrate his 85th birthday on June 15 2024) recognized the necessity of a scientific platform for “studies on the family Geometridae”. This foundation was called “Forum Herbulot” initiative and aimed to facilitate the scientific exchange between the experts at a global scale and bring them together.



Left: Paul Hebert collecting South African Lepidoptera during the Forum Herbulot 2012. Right: Participants of the Forum Herbulot 2012.

This Newsletter is intended to motivate participation at the Forum Herbulot 2025 in South Africa, where we will celebrate this “silver” anniversary. We already had an exciting meeting in South Africa in 2012 (see photos) and we are counting the days to go back there again. This forthcoming FH congress will bring us back to our regular tradition to have meetings in remote areas to come together, to have fun in collecting, exchanging experience and planning scientific cooperation. In this newsletter we give the first announcement and information on this meeting. A subsequent Newsletter is planned for summer 2024 to concretize the plans and give some additional information.

Next Forum Herbulot will take place in South Africa, near Johannesburg during 27.-31.1.2025. Hermann Staude has agreed to host the meeting, but we will divide the workload so that Hermann finds the meeting place and negotiates the details locally, while Hossein Rajaei, Pasi Sihvonen, Luis Parra and Axel Hausmann will take care of the practicalities remotely. These include for instance registration, abstract evaluation, correspondence with participants on logistics, general inquiries etc.

Please indicate if you and your family, or friends, or colleagues (=how many persons) plan to attend the meeting. Send this information to pasi.sihvonen@helsinki.fi and hossein.rajaei@smns-bw.de by 23 February, 2024.

This will help to understand what kind of venue will serve our needs. This is just indicative number, not registration, which will be done later. Also, if somebody wishes to join the Organisation Committee, please indicate this in the same mail. Based on the interest, we will see if suitable tasks are available and how those could be divided.

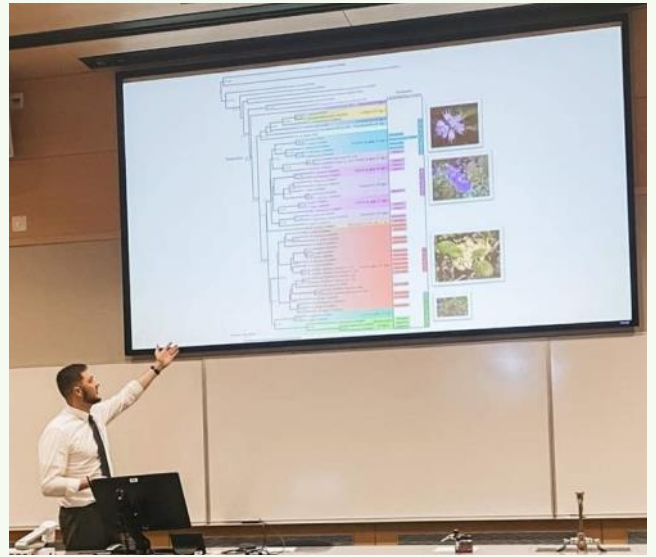
Organization Committee of 12th FH

PhD project on American Stamnodini (Larentiinae) completed

Tanner Matson (tan.matson@gmail.com)

Tanner Matson successfully completed his dissertation in April at the University of Connecticut (USA), under the principal advisorship of David L. Wagner. Concurrently, he was a predoctoral fellow at the U.S. National Museum of Natural History, with a research focus on Geometridae systematics, phylogenetics, and life history. His dissertation centered around the larentiine tribe Stamnodini, known for its diversity primarily in the Americas, yet also represented by ten species in the eastern Palearctic and Indo-Pacific regions.

Two of his three dissertation chapters have been published, collectively detailing the descriptions of 17 new species, primarily from Mexico. The third and most extensive chapter will soon be submitted to the Smithsonian Institution Scholarly Press. This comprehensive manuscript unfolds in two parts. Firstly, it presents a monographical treatment of the Stamnodini of North America north of Mexico, offering a thorough overview of thirty-seven species. This work includes detailed larval information for 27 North American Stamnodini species, significantly expanding on the existing 11 known life histories prior to this effort. It also includes a multi-locus phylogeny encompassing 53 stamnodine taxa.



Secondly, this manuscript includes a review of the Stamnodini genera not represented in the fauna north of Mexico, accompanied by a global checklist summarizing all taxonomic changes, including numerous new combinations, the elevation of several species from subspecific to full species status, the proposal of new synonymies, and the descriptions of additional new species and genera.

A particularly notable contribution to global taxonomy stems from the findings regarding *Stamnodes* Guenée, [1858]. Formerly considered a global and speciose genus, Matson's phylogenetic analyses have revealed that *Eutrepesia* Herrich-Schäffer, 1855, nests deeply within the current concept of *Stamnodes*, rendering the latter paraphyletic. Consequently, Matson's upcoming publication will restrict *Stamnodes* to the Old World, redefining much of the New World generic classification.

Matson is set to commence a postdoctoral position at the U.S. National Museum of Natural History this spring. His primary focus will be on the Neotropical holdings derived from four decades of caterpillar rearing and adult collections conducted by Dan Janzen, Winnie Hallwachs, and others in Costa Rica.

Citations for Matson's first two dissertation chapters:

- Matson T. A., Wagner D. L. (2020) A new *Stamnodes* from the southwestern United States (Lepidoptera, Geometridae, Larentiinae). ZooKeys, 923: 79–90. <https://doi.org/10.3897/zookeys.923.48290>
- Matson T. A. (2023). A review of Mexican *Stamnodes* (Lepidoptera: Geometridae) with the description of 16 new species. European Journal of Taxonomy, 911(1): 1–79. <https://doi.org/10.5852/ejt.2023.911.2371>

Field trip to South Africa: Chasing diurnal *Aletis* moths and their caterpillars

Pasi Sihvonen, University of Helsinki

Since the early 2000s, I have had a dream of studying the evolution and systematics of day flying *Aletis* geometrid moths in Africa. The passion stems from my PhD (completed in 2003), when I worked on the morphology of these peculiar insects. Even in the collections, these butterfly look-alike moths did not seem to make much sense when compared to their nocturnal relatives in the subfamily Sterrhinae. Therefore, I have been hoping to see these moths in their natural habitat, and to observe their behavior also.



The team by the Indian Ocean on 19 January 2023. From left: Hossein Rajaei (Germany / Iran), Pasi Sihvonen (Finland), Reinier Terblanche (South Africa), Hermann Staude (South Africa), Øystein Opedal (Sweden / Norway), Leidys Murillo Ramos with Aurora (Colombia / Sweden), and Sille Holm (Estonia).

Finally, in January 2023 an international team of friends met in South Africa, and we spent the next weeks visiting *Aletis* habitats and collecting material for the planned research. Our expedition was led by South Africans Hermann Staude and Reinier Terblanche, and we were able to enjoy their immense knowledge on their home country, including its fauna, plants, butterflies, caterpillars, culinary, culture, laughter, and stories. Our main objective was to collect population samples from locations that were known to harbor slightly different looking specimens in the *Aletis libyssa* complex. We focused on caterpillars, which were more abundant than adults at that time of the year. Hermann and Sille Holm have been working extensively on caterpillars earlier, and they trained us how to find them.

The systematics of *Aletis* are notorious. This is because the populations are allopatric, they are part of a mimicry complex, potentially including behavioral mimicry also, the wing color and caterpillar patterns are variable, and the genitalia are rather uniform. In our study, we will apply an integrative approach to understand the evolution of these forest inhabiting and unpalatable moths, supplementing the morphological, life history and distribution data with DNA barcodes and genomic data. With our data, we try to answer the following questions: When did the *Aletis* lineage split off from its nearest nocturnal relatives? Did these moths shift to inhabit forest habitats and undergo adaptive radiation? Is there gene flow between existing allopatric populations and are *Aletis* moths models or mimics in the complex involving several families across Lepidoptera? We look forward to presenting the results to you in the next Forum Herbulot in South Africa in January 2025!



Left: A caterpillar of *Aletis libyssa*. The coloration is assumed to signal predators that it is unpalatable. **Right:** Reinier Terblanche's experience on butterfly collecting was useful and, in several locations, he came back with numerous *Aletis* adults. Moth specialists are more used to sitting by the light and wait for the moths to come, and we were struggling to use the net in the afternoon sun!

Do geometrid color patterns contain phylogenetic signal?

What the charming tribe Palyadini says about it

Flávia R. Joele (flaviajoele@gmail.com)

2024 begins with the anticipation of the publication of the first UCE phylogenomic paper on Geometridae. The study carried out at the Moth Systematics Lab led by Ivonne Garzón-Orduña at UNAM in Mexico City, explored the evolution of various color characters in the tribe Palyadini (Fig. 2). Palyadini is a highly diverse neotropical clade, whose colorful wings feature eyespots, one of the most enigmatic pattern elements in animals. Although Lepidoptera systematists, particularly those outside Papilionoidea, historically have seen wing color characters with suspicion, preferring genitalia or DNA as more-trusted sources, the paper reveals that a few color characters in Palyadini do present phylogenetic signal. Putative homologues are explained by common ancestry at the genus level, but not at the tribal level, where all are homoplastic. The work also identified the “Metargyria color pattern” as an striking example of convergence.



Fig. 1. Flávia R. Joele and her supervisor, Ivonne Garzón-Orduña, during fieldwork in the highlands of Chiapas

Evolving independently three times inside Palyadini, but also at least 6 more times outside of the tribe. Featured by different groups of moths all resting with their wings spread in nature, including geometridae, swallowtail moths, wild silk moths and even in at least one Nymphalid, this remarkable convergence surely confers an evolutionary advantage for these species.

The paper is the result of Flávia R. Joele’s M.Sc. thesis titled “*Phylogenomics of the geometrid tribe Palyadini (Lepidoptera: Geometridae) reveals contrasting patterns of phylogenetic signal in wing color characters*” accepted for publication in the journal *Cladistics*. The study of wing color in Palyadini demonstrates that although moths’ genomes contain an abundance of genetic variation, evolution has operated sometimes in repetitive ways. The paper emphasizes the power of high level phylogenies to identify large scale patterns that can later be explained by disciplines concerned with evolutionary mechanisms such as population genetics and evolutionary biology.

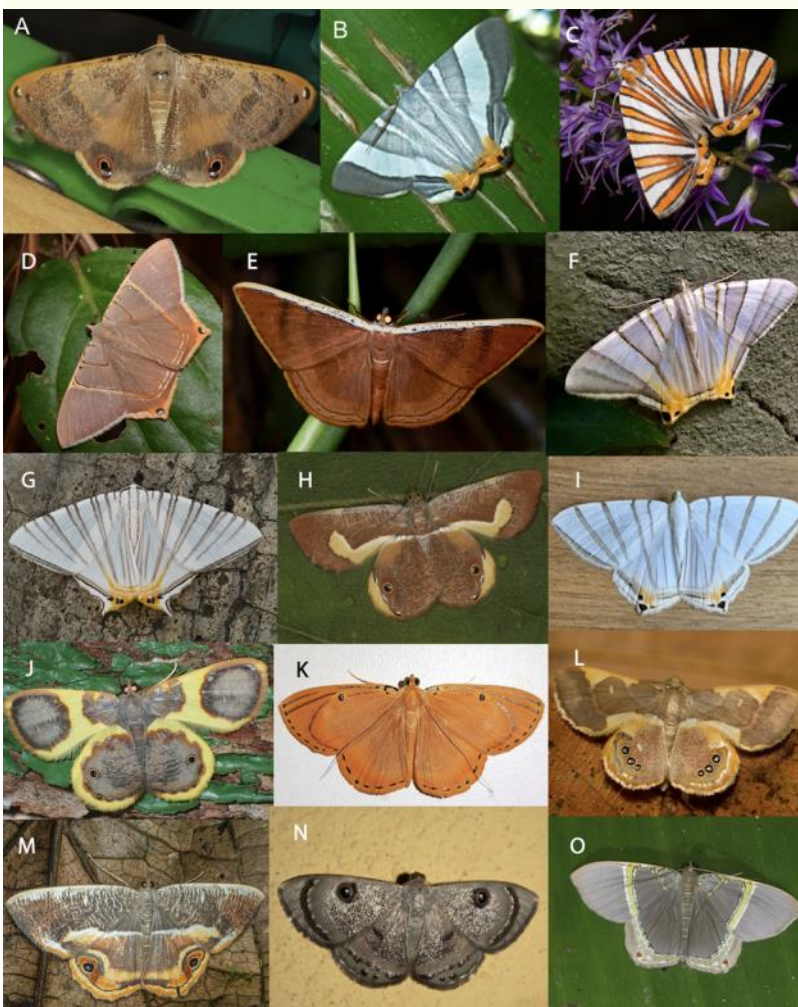


Fig. 2. Representative species of Palyadini in nature to describe the diversity of wing color patterns. Source of photos: iNaturalist (all photos were either released under a Creative Commons Attribution-Non-Commercial license or were authorized to use in this publication by the owner).

Online taxonomic facility of Geometridae published

H. Rajaei, A. Hausmann, M. Scoble, D. Wanke, D. Plotkin, G. Brehm, L. Murillo-Ramos & P. Sihvonen

23 years ago, the global catalogue of the “Geometrid Moths of the World” was published by Scoble et al. (1999). Seven years later, a narrower version of this catalogue was edited and updated by Scoble & Hausmann (2007) and published as “Online list of valid and available names of the Geometridae of the world”. Both catalogues are important source of information for researchers studying different aspects on the geometrid moths.

Both catalogues have become partially outdated during the years, and as a response to this, a team of Herbulotians (members of the Forum Herbulot) updated the catalogue and are going to publish it as an updatable database in the new website of Forum Herbulot <https://geometroidea.smns-bw.org/>.

An overview of the database, in addition to the global species richness and systematics of Geometridae, will be published as a peer reviewed paper in the open access journal “Integrative Systematics” <https://bioone.org/journals/integrative-systematics-stuttgart-contributions-to-natural-history>.

The database presents the current classification of all geometrid taxa, valid genera, species and subspecies, synonyms and type localities. In addition, the paper includes an annotated list of all 202 subfamily, tribe, and subtribe names in systematic order, based mostly on a series of recently published molecular phylogenetic analyses.

WORLD CATALOGUE OF GEOMETRID MOTHS

How to cite this database:
Rajaei H., Hausmann A., Scoble M., Wanke D., Plotkin D., Brehm G., Murillo Ramos L., Sihvonen P. 2022: An online taxonomic facility of Geometridae (Lepidoptera), with an overview of global species richness and systematics. Integrative Systematics, 5 (2): pp. <https://geometroidea.smns-bw.org/> Version dd.mm.yyyy.

Geometra SEARCH ADVANCED SEARCH HIERARCHY SEARCH

1357 records found | Check all records

Family: Geometridae Leach, 1815 Subfamily: Archiarinae Fletcher, 1953 Genus: Archicaris Hübner, [1825]

- Archicaris parthenias parthenias (Linnaeus, 1761) (Phalaena (Noctua)) T.L. in Sweden
- = fulvulata (Pallas, 1773) (Phalaena) T.L. in (Russia)
- = glaucescens (Goeze, 1781) (Phalaena/Noctua) T.L. in
- = glaucofasciata (Goeze, 1781) (Phalaena/Geometra) T.L. in
- = plebeja (Linnaeus, 1761) (Phalaena/Noctua) T.L. in Sweden
- = vidua (Fabricius, 1775) (Bombyx) T.L. in Anglia (England)

Family: Geometridae Leach, 1815 Subfamily: Ennominae Duponchel, 1845 Genus: Abraxa Leach, [1815]

Family: Geometridae Leach, 1815 Subfamily: Ennominae Duponchel, 1845 Genus: Athysa McDunnough, 1930

Family: Geometridae Leach, 1815 Subfamily: Ennominae Duponchel, 1845 Genus: Agriopa Hübner, [1825]

Hierarchy Search

Filter tree

- Family: Geometridae Leach, 1815
 - Subfamily: Archiarinae Fletcher, 1953
 - Genus: Archiarides 2
 - Genus: Archicaris 14
 - Genus: Boudinotiana 11
 - Genus: Caenosyntele 1
 - Genus: Lachnocephala 1
 - Genus: Leucobrephe 7
 - Subfamily: Desmobathrinae Meyrick, 1886
 - Subfamily: Ennominae Duponchel, 1845

Rajaei H., Hausmann A., Scoble M., Wanke D., Plotkin D., Brehm G., Murillo Ramos L., Sihvonen P. 2022: An online taxonomic facility of Geometridae (Lepidoptera), with an overview of global species richness and systematics. Integrative Systematics, 5 (2): <https://doi.org/10.18476/2022.577933>.

Published and won a prize!

Lepidoptera Iranica

Edited by Hossein Rajaei & Ole Karsholt

An international team including 73 lepidopterists from around the world got together and prepared the most comprehensive catalogue of the Lepidoptera of Iran, which took 13 years!

The authors critically reviewed all up to now published data during the last 225 years, and added numerous new records from the many institutional and private collections to the list. All names were evaluated and a status was given to each species, all unconfirmed or erroneously recorded taxa were explained with a detailed note. Two superfamilies, three families and a large number of species are reported for Iran for the first time, and a number of new taxonomic changes are introduced (including new synonymies, new combinations and revised status).

The catalogue gives a general overview of the fauna of Iran, highlights gaps in knowledge, and provides an estimate of the number of Lepidoptera species expected to occur in the country. Also, it narrates the history of the lepidopterology in Iran, since the first documented lepidopterological expedition to this country by the French entomologist, Guillaume-Antoine Olivier. Finally, a comprehensive list of the locality names that were difficult to localize on geographic maps were georeferenced in a gazetteer.

It has been published as a special issue entitled "Lepidoptera Iranica", in the peer-review journal „Integrative Systematics“

The book received a big attention. Just after the publishing, two book reviews were published (Ghafouri Moghaddam & Latibari 2023; Minaee 2023). Additionally the book was recognized as the best book in the field of entomology in Iran, by the „Entomological Society of Iran“ and won a prize.

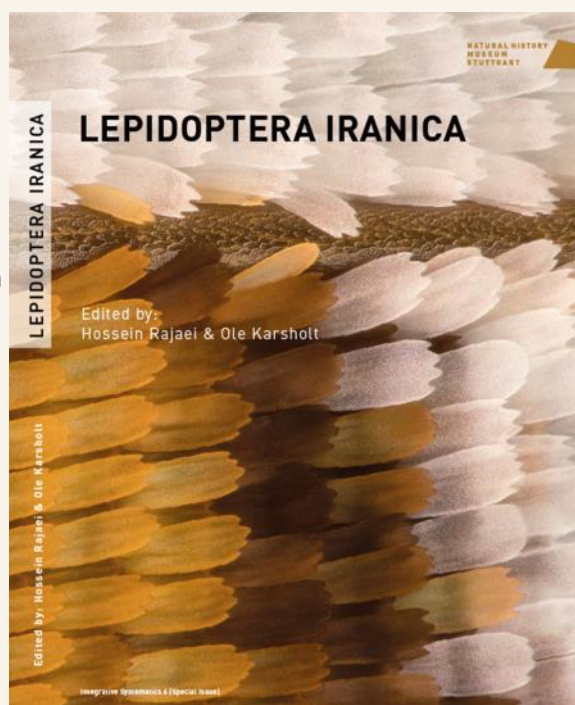
The hardcover of the book for is available here: <https://www.naturkundemuseum-bw.de/museum/publikationen/integrative-systematics#c8204>

For the PDF version, see here: <https://bioone.org/journals/integrative-systematics-stuttgart-contributions-to-natural-history/volume-6/issue-Sp1>

References.

Ghafouri Moghaddam, M. & Heidari Latibari, M. (2023) Book Review: *Lepidoptera Iranica* – A captivating journey into the fascinating world of Iran's butterflies and moths. *Journal of Insect Biodiversity and Systematics*, 9 (3): 469-472.

Minaee, K. (2023) Book review: Rajaei, H. & Karsholt, O. (Eds.) (2023) *Lepidoptera Iranica*. *Integrative Systematics*, 6 (Special Issue), I–XVI + 1–459. *Zootaxa*, 5315 (4): 399–400



PhD project on Iranian Geometrid moths completed:

A journey through the world of Iran's geometrids

Dominic Wanke (dominic.wanke@smns-bw.de)



On the 12th of December 2023 I defended my PhD thesis at the State Museum of Natural History in Stuttgart. In my thesis I focused on the Geometridae biodiversity of Iran, a country in which two of the world's 36 global biodiversity hotspots are present – the Irano-Anatolian and the Caucasian.

These hotspots, located within the Alborz and Zagros Mountains, are home to numerous endemic species crucial for the biodiversity of the country. As you can see, this was for me and still is a very exciting area for studying the biodiversity. Despite the advanced knowledge of Palearctic geometrid moths, the Middle East and Central Asia remained relatively unexplored. To bridge this gap, my thesis comprised three key parts. The first two parts are closely interwoven, where I addressed taxonomic

challenges within difficult genera using an integrative approach and using multi-gene phylogenetic analysis to solve uncertainties on genus and tribal level. For these two parts of my research, I used collection material. I was lucky that we have such a strong unity in our community, which allowed me to examine around 10,000 specimens from 33 collections. I would like to take this opportunity to express my heartfelt thanks to all those who have given me access to their valuable material of their collections.

After hours of examination of morphological characters and collection of molecular data in the framework of my PhD project, several genera could be revised. These revisions provide valuable information for the identification of species, an understanding of their distribution and provide an important base for studies in the neighboring countries.



Nychiodes subvirida Brandt, 1938

The phylogenetic analyses lead to significant reclassifications, towards monophyletic groups. In the third part, I used distribution data to identify biodiversity hotspots and regions with unique faunal elements, revealing exceptional species richness along the Zagros and Alborz Mountains. Thereby the southern mountain areas showed to be the most species-rich regions. The findings, indicated two transition zones between zoogeographical realms, emphasized the importance of these areas for conservation.

Nonetheless, time passes by so quickly and I am happy to say that I have met wonderful people who have actively supported me. Gratitude fills me as I eagerly anticipate the unfolding chapters in the captivating world of geometrids that now captivates my attention.

Completing the DNA barcode reference library for European geometrids (project Biodiversity Genomics, BGE)

Axel Hausmann (contact: Hausmann.a@snsb.de)

Since 2022 a consortium of 33 institutions from 20 European countries (<https://biodiversitygenomics.eu>) is working on the completion of the DNA barcode library for all European metazoan species. The first focus is on pollinators (e.g. butterflies and moths) and on building a pan-European consortium on genomics. In the framework of the first project phase (2022-2025) "shotgun" sequences including the barcode region will be provided for 33,000 old museum specimens in order to fill the gaps, aiming at achieving at least three DNA barcodes for each European species. Currently, the coverage in Lepidoptera is at 75%, in Geometridae at 99.3% (with at least one barcode) or 97.0% (with at least three barcodes), respectively:

I. Completely missing (i.e. 3 specimens needed):

1. *Idaea fuerteventurensis*,
2. *Chesias rhegmatica*,
3. *Disclisioprocta purpurarium*,
4. *Xanthorhoe inaequata*,
5. *Asthena lactularia*,
6. *Isturgia homochromata*,
7. *Isturgia punctistrigaria*,
8. *Plesiomorpha flaviceps* (neozoon)

II. Covered by one barcode (i.e. 2 specimens needed):

1. *Idaea acutipennis*
2. *Idaea ibizaria*
3. *Idaea neglecta*
4. *Chesias angeri*
5. *Epirrhoe balearia*
6. *Lithostege clarae*
7. *Psychophora cinderella*
8. *Eupithecia ogilviata*
9. *Crocallis cypriaca*
10. *Crocallis matillae*
11. *Ekboarmia sagnesi*
12. *Microbiston lanaria*
13. *Ourapteryx niveiscythes*

III. Covered by two barcodes (i.e. 2 specimens needed):

1. *Xenochlorodes magna*
2. *Idaea millesimal*
3. *Idaea rupicolaria*
4. *Idaea spissilimbaria*
5. *Limeria macraria*
6. *Scotopteryx burgaria*
7. *Eupithecia mystica*
8. *Eupithecia mandarinca*
9. *Eupithecia pindosata*
10. *Eumannia arenbergeri*
11. *Larerannis orthogrammaria*
12. *Peribatodes aragonis*
13. *Peribatodes ebusaria*
14. *Sciadia dolomitica*

Any input will be highly appreciated!

