



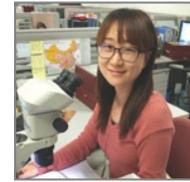
**AFROTROPICAL
GELECHIIDAE**
PAGE 11



SORA KIM
PAGE 8



MATT MEDEIROS
PAGE 3



GA-EUN LEE
PAGE 8

I.N. G.A.

NEWSLETTER OF THE INTERNATIONAL NETWORK OF GELECHIOID AFICIONADOS



Photo by Paul Bertner

Dear Gelechioid Aficionados,

One year has passed and it is time for the 6th issue of I.N.G.A. newsletter. This issue introduces three gelechioid aficionados, Ga-Eun Lee, Sora Kim and Matt Medeiros, and provides insights into fascinating Afrotropical gelechiids. We would also like to congratulate Ron Hodges who was elected to President Emeritus of the Wedge Entomological Research Foundation.

The year 2017 will also bring the first Gelechioid Symposium, which will be held during the 20th European Congress of Lepidopterology in Pograd, Croatia, 24-30 April 2017. The program is still in the making, but as a sneak peak, we can reveal that Dr. Lauri Kaila from the Finnish Museum of Natural History will present the keynote. In addition, Dr. David Adamski from the Smithsonian, Dr. Ole Karsholt from the Natural History Museum of Denmark and Dr. Dan Rubinoff from the University of Hawai'i have confirmed their participation. Abstract submission deadline is January 31st, 2017 so there is still time for you to submit your abstract and join us. We are looking forward to meeting many I.N.G.A. members at the symposium!

We welcome any contributions from the community to be published in the coming issues and greatly thank Paul Bertner, Oleksiy V. Bidzilya, Ga-Eun Lee, Sora Kim, Matt Medeiros and Eric Metzler for providing texts and images for the current newsletter.

Happy and Successful New Year to all!

I.N.G.A. team

*Ant-mimicking
stathmopodid
from Mt. Isarog
national park,
Philippines*



Cover image, two images above and the one on page 19 are kind courtesy of Paul Bertner

<https://www.flickr.com/photos/rainforests/>

<https://rainforests.smugmug.com/>

Gelechioid Aficionado:

Matt Medeiros

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At the age of twenty-two when I had just finished my with my undergraduate degree, I was taking some time off to work on an assembly line of a plumbing-parts factory when I started scheming about what I would study as a grad student. I knew I loved insects and that I wanted to work in Hawaii; most of my family lived there, and it had long held a fond spot in my heart. I also knew I was fascinated by parallel or repeated evolution, as well as systematics. Not knowing where to start and needing some advice, I randomly emailed Frank Howarth at the Bishop Museum in Honolulu. I introduced myself and asked him, “If you were me and just starting out, what would you work on for your PhD?” In addition to a group of katydids, Frank suggested that I work on two genera of Hawaiian Lepidoptera that were not only in need of revision, but which both had at least one species with a transition to flightlessness. One of these two groups was the Hawaiian *Schrankia* (Erebidae), and when I revised it, I ended up naming a sometimes-flightless cave species *S. howarthi* in honor of Frank (Medeiros et al. 2009). The other group Frank suggested was the *Thyrocopa* (Xyloryctidae).

Thyrocopa is endemic to Hawaii, and contains 32 described species (Medeiros 2008; Medeiros 2009; Medeiros 2015); several species remain undescribed. This beautiful group of generalists is remarkable for two reasons. First, there are two flightless species that live only at high elevations, approximately 2700 meters and above. One of these species, *T. apatela*, lives only near the summit of Haleakala volcano on the island of Maui (Fig. 1), and the second, *T. kikaelekea*, lives at high elevations on the slopes of Mauna Loa and Mauna Kea on the Big Island of Hawaii. Rather than flying, adults of these species jump about, stabilizing themselves with their reduced wings. Males as well as females of both species have reduced wings, which is quite uncommon – usually, only female Lepidoptera of flightless species have reduced wings (Sattler 1991).



**Matt Medeiros outside Kaumana Lava
Tube Cave, Hawaii, April 2016.
Photo by Matt Medeiros**

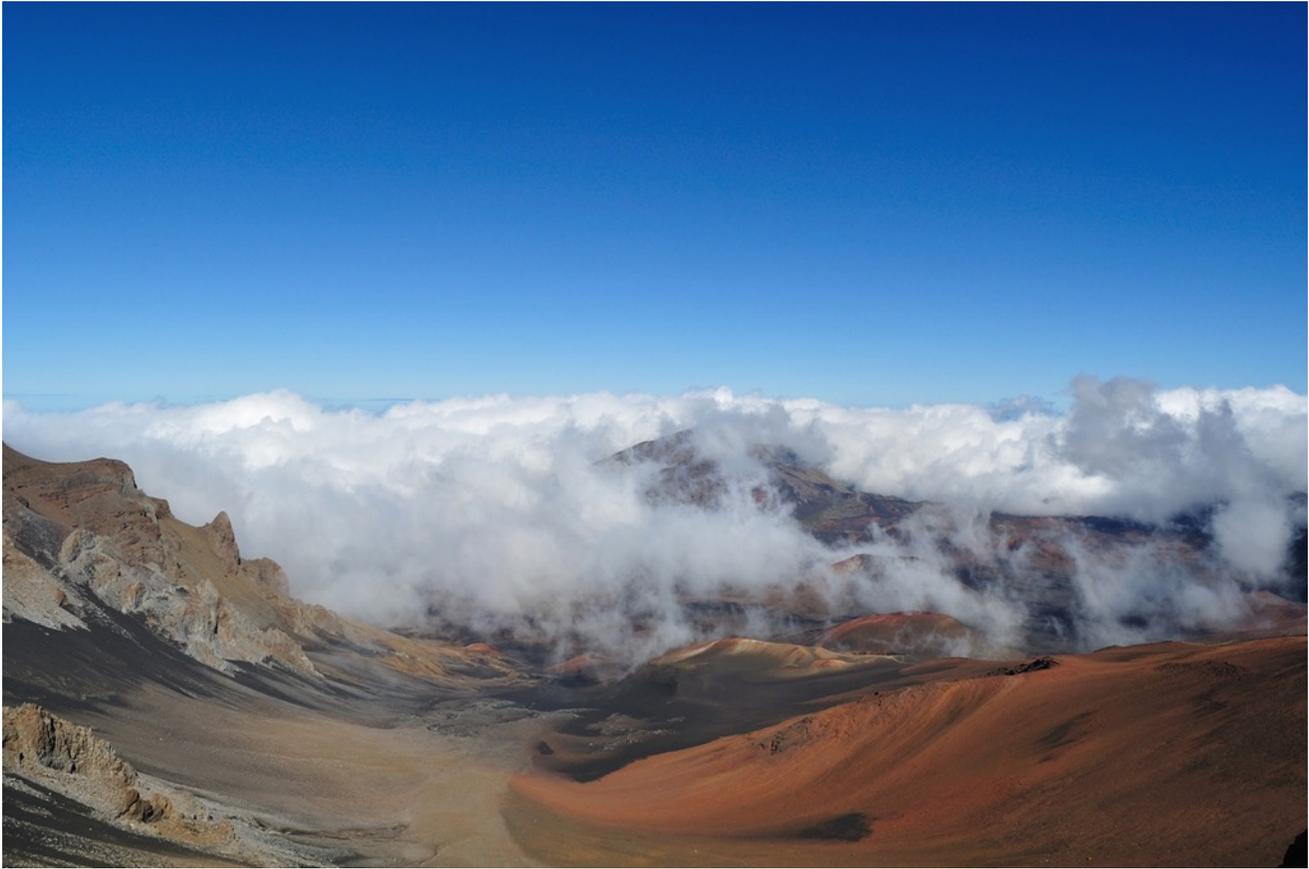


Fig. 1. The summit area of Haleakala volcano on Maui, the home of *Thyrocopa apatela*.
Photo by Matt Medeiros

As a graduate student, I set out to determine whether flightlessness had evolved once or twice in this genus. Did a flightless species from one of these high-elevation areas somehow colonize the other island? Or were the flightless species on Maui and the Big Island sister to fully-flighted species on their respective islands? A molecular phylogeny as well as male genitalia morphology supported the second hypothesis: *T. apatela* and *T. kikaulekea* each colonized high-elevation habitats independently, and each lost the ability to fly in a short period of time – an exciting case of possible parallel evolution in similar habitats (Medeiros & Gillespie 2011). As an alternative to parallel evolution, wing reduction in these species may be a result of phenotypic plasticity; this possibility is supported by the existence of fully winged *T. apatela*, which are sometimes found living in sympatry with brachypterous individuals (Medeiros 2009). Whether allele frequencies are changing in *T. apatela* and *T. kikaulekea*, or whether some sort of developmental or epigenetic factor is responsible for adults with reduced wings (or, some combination of the two; see Gillespie 2016 for a review of some of these central concepts) are areas that I hope to work on in the future.

Before discussing *Thyrocopa* further, I would like to digress and tell you about how my career evolved around the time I transitioned from working on the phylogenetics to the biogeography of *Thyrocopa*. After earning my PhD in 2011, I decided to forgo other opportunities and instead teach at the high school level. The US's National Science Foundation had paid my last two years worth of stipend as a graduate student, and I was tasked with teaching students ranging in age from 6-18 years

old. I found that working with these students was not only rewarding, but fun (and funny). I decided to attempt to forge a new path where, despite working in a high school, I would continue to collaborate with my academic colleagues and publish entomological research. Lately, I've even been mentoring several students at my school, The Urban School of San Francisco, and a few of them have co-authored papers with me. My recent research areas have branched out to include not only other Hawaiian Lepidoptera, such as revisiting recently discovered lava-tube cave moths, but also New World Adelidae (led by Don Davis of the US National Museum; Fig. 2), ethanol consumption in primates (led by Robert Dudley of UC Berkeley), and the Grylloblattidae, or "ice-crawlers" (led by Sean Schoville of the University of Wisconsin).

And now, back to *Thyrocopa*. Another amazing thing about this group is that not only do at least 30 species inhabit the eight "main" Hawaiian Islands, two species occur in the remote and tiny "Northwestern" Hawaiian Islands. *T. neckerensis* lives on Necker island, a ~18 hectare island ~490 km northwest of the main islands, and *T. nihoa* lives on Nihoa island, ~69 hectares large and ~240 km northwest of the main islands. These two typical flighted species live on these dry, windy, rocky islands, and other than being significantly hotter than the summit areas of Maui and the Big Island, Necker and Nihoa are not terribly unlike the high-elevation areas inhabited by the flightless *T. apatela* and *T. kikaelekea*. That said, Necker and Nihoa are separated from Maui and the Big Island



Fig. 2. Don Davis and the author at Hawaii Volcanoes National Park, April 2016.
Photo by Matt Medeiros

by hundreds of kilometers of open ocean, and they're also separated by several much larger main islands as well, including Kauai, Oahu, and Molokai.

One might expect that *Thyrocopa* colonized the Hawaiian Islands in a stepping-stone pattern, from one island to the next, as is seen in several other groups (Wagner & Funk 1995). If that were the case, one would find close relatives on adjacent islands – barring extinction, of course. However, it instead appears that one clade of *Thyrocopa* has dispersed to, and colonized, many similar dry, rocky, and windy habitats: the “windswept clade” (Medeiros et al. 2015; Fig. 3). This clade is characterized by species living in dry areas of Necker, Nihoa, Maui, the Big Island, Lanai, and the uninhabited Kahoolawe, and these species typically have a forewing pattern that blends in with the very sandy soils upon which they are found. In fact, the much older Necker and Nihoa islands have been back-colonized by “windswept” *Thyrocopa* from much younger islands (Medeiros et al. 2015)!

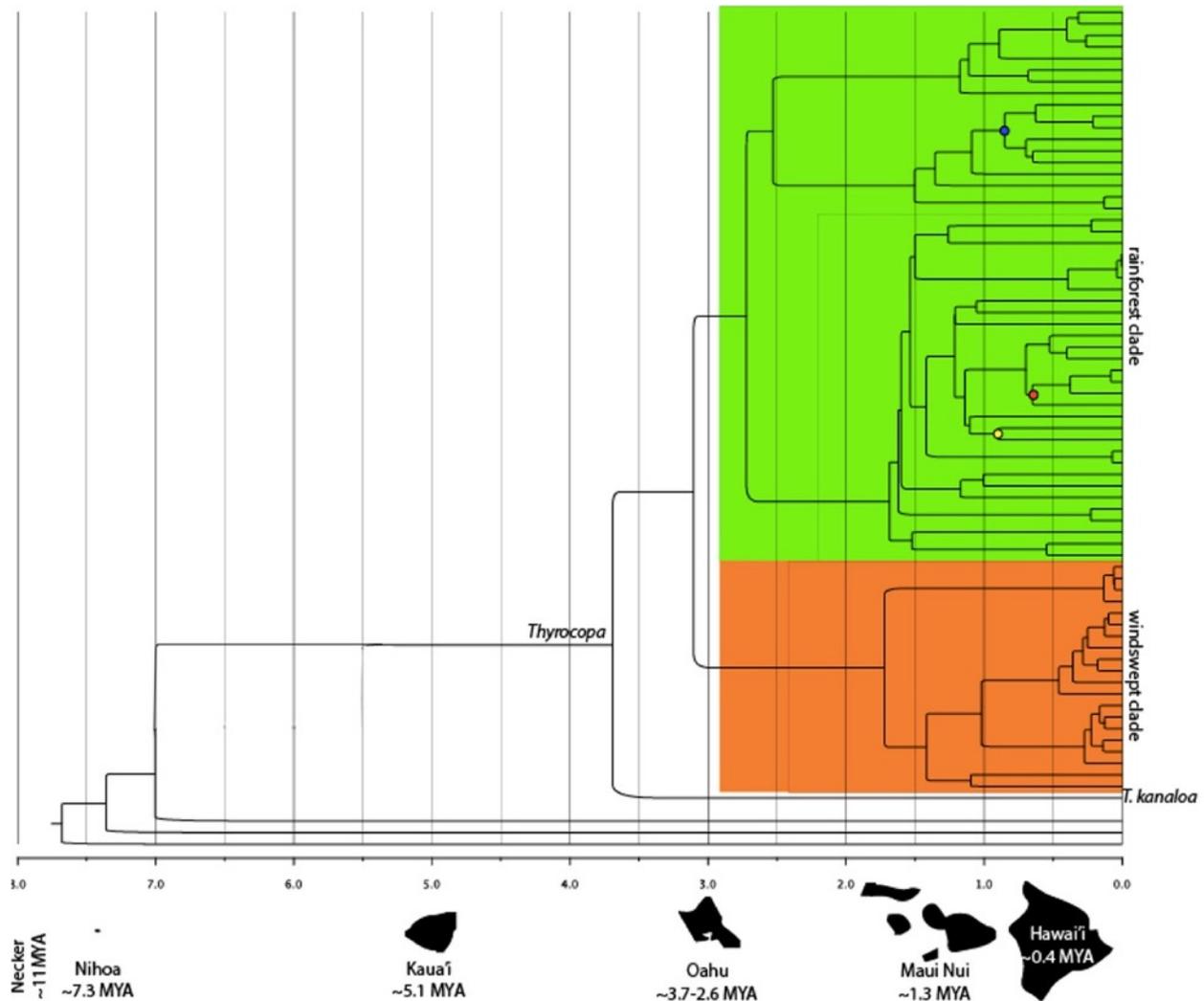


Fig. 3. General phylogeny and biogeographic pattern of *Thyrocopa*. Nodes are placed along estimates of their age (scale is on the bottom axis in MYA along with ages of island emergence); colored dots indicate calibration points. See Medeiros et al. 2015 for additional details and species labels at tips. Figure adapted from Medeiros et al. 2015.

In much the same way, a similar pattern has occurred in rainforest species, which have colonized areas of suitable and similar wet habitat across the main Hawaiian islands. These species are each others' closest relatives, despite often living geographically much closer to members of the "windswept clade." These days, I'm spending whatever time I can searching for additional *Thyrocopa* species that may inhabit dry areas of Oahu and Kauai, or even Molokai, as was reported by Perkins (1913) even though he evidently didn't collect any of these specimens.

Studying Hawaiian Lepidoptera while based on the mainland and teaching high school isn't always easy. Thankfully, I have a number of friends and colleagues based in Hawaii who have been very supportive of my efforts, and I couldn't do this without their help and hospitality. They include, but are not limited to, Cynthia King, Dan Rubinoff, Betsy Gagné, Steve Montgomery, Jesse Eiben, Will Haines, Raina Kaholoaa, Karl Magnacca, Paul Krushelnycky, Forest & Kim Starr, and of course, the now-mainland-based Frank Howarth. I also thank the outstanding Urban School of San Francisco for more support than could ever have been expected, and I also thank Robert Dudley of UC Berkeley for providing me with lab space and library access.

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Gelechioid Aficionado:

Ga-Eun Lee

I am a Ph.D. student in the College of Life Science, Nankai University in China. I study Chinese Thiotrichinae, a new subfamily of Gelechiidae recently proposed by Karsholt et al. (2013). My early interest was mainly in butterflies, and I worked in an Insect Ecology Museum in Korea as a manager in charge of raising larvae. I became fascinated by moth taxonomy when I had a chance to visit the McGuire Center for Lepidoptera & Biodiversity at the Florida Museum of Natural History in Gainesville, FL, USA. I was able to meet many great entomologists whose influence led me enter this field, and I'm especially fortunate to have met Professor Kye-Tek Park who suggested that I study Lepidoptera in China.

China's biological diversity is enormous because of its two biogeographic realms: Palearctic and Oriental. Our Lepidoptera Laboratory specializes in micromoths and has a huge collection of specimens collected from throughout the country. I work with my adviser Professor Houhun Li, Professor Shuxia Wang, and twenty-one colleagues who all study microlepidoptera. For my thesis, I am conducting research on the taxonomy of Thiotrichinae based on morphological and molecular data. Subfamily Thiotrichinae is most diverse in Asia, particularly in the Oriental Region. This group is morphologically well differentiated and is in need of further revision. I hope to share new research information with gelechiid taxonomists throughout the world.



Gelechioid Aficionado:

Sora Kim

I work as a quarantine officer in the Animal and Plant Quarantine Agency, Korea, and I also belong to Seoul National University, Korea (where I have had some articles published). I recently published some papers about invasive or quarantine pests (belonging to Lepidoptera or Hemiptera) that investigate genetic variability, phylogenetic relationships, expansion and a possible geographic origin, and the development of a new molecular marker.

I am basically a lepidopterist focusing on taxonomy, phylogeny and evolution of gelechioids. Since the Ph. D. degree work at Seoul Nat. Univ., I've been reviewing, reporting or doing DNA barcoding of Korean or Southeast Asian gelechioid families, such as Oecophoridae, Stathmopodidae, Epimarptidae or Lecithoceridae.

However, my major research was about the systematic study of Oecophoridae. As a part of my doctoral dissertation, I tested a monophyly of the family level of Oecophoridae, within Gelechioidea, and confirmed the molecular phylogenetic relationship among its constituents, and analyzed the ancestral character states inferred from oecophorid microhabitats and larval sheltering strategy patterns. Those results were recently published (I leave the contents to the next section). My next research will be a biogeographical approach to the oecophorid lineage and related higher taxa by using molecular dating. I hope we will meet and discuss an interesting hypothesis of gelechioids in the near future.



Don't forget conferences taking place in 2017..



20th European Congress of Lepidopterology + Gelechioid Symposium

April 24th - 30th, 2017,
Podgora, Croatia

<http://sel2017.conferenceatnet.com>

Lep Soc Annual Meeting

July 30th - August 1st, 2017,
Tucson, U.S.

<https://www.eventbrite.com/e/annual-meeting-the-lepidopterists-society-tickets-28867088238>



Ron Hodges elected to President Emeritus of the Wedge Entomological Research Foundation



Ron Hodges (left) with Don Lafontaine
in 2012.
Photo by Ron Hodges

Eric Metzler

The Board of Directors of the Wedge Entomological Research Foundation (WERF) is pleased to announce that Founding Member and Immediate Past President Ronald W. Hodges (Ron) was elected to the position of President Emeritus of the Foundation. Ron is the first person to receive this honor. The nomination and election was conducted at the Board's Annual Meeting at Colorado State University in September 2015, and Ron was presented with a plaque inscribed with the names of the Directors at its Annual Meeting in Washington, DC on November 18, 2016. The Board of Directors invites all lepidopterists to join in congratulating Ron on this achievement.

Ron was instrumental in organizing the Foundation in 1973 and served in various positions over the past 43 years. He was Assistant Treasurer, Treasurer, Managing Director, President, and Editor-in-Chief for many years during his tenure. Ron's diligence, hard work, dedication, and devotion to the Wedge Entomological Research Foundation and its flagship publication series, the *Moths of America North of Mexico*, won him the Thomas Say Award from the Entomological Society of America in 1990 and the Karl Jordan Award from The Lepidopterists' Society in 1997. Ron was elected as an Honorary Life Member of The Lepidopterists' Society in 2004.

In his new position as President Emeritus, Ron remains as a member of the Board of the Directors of WERF. Eric H. Metzler was recently elected as President of the Board.

Ron Hodges and the WERF thank the many individuals and institutions who supported the organization over the years, both as subscribers and Patrons of the Foundation. Interested persons can join as Patrons for a one-time donation at the current rate of \$2,000 and Patrons are recognized in all future publications of the Foundation. Please consider a financial contribution this year to support the mission and activities of The Wedge Entomological Research Foundation; all contributions are tax deductible. For further information contact Eric H. Metzler, P.O. Box 45, Alamogordo, NM 88311, metzlere@msu.edu Additional information about the Foundation is at <http://www.wedgefoundation.org> where you can order WERF publications, learn about the Foundation's history, and discover what it offers interested lepidopterists and the public.

Some results of my study of the Afrotropical Gelechiidae

Oleksiy V. Bidzilya

In 1995 Wolfram Mey kindly proposed that I study the Gelechiidae from the Brandberg massif in Namibia. This study resulted in a list of species recorded from this place (Bidzilya, 2007). In ten subsequent years I have been coming back to African Gelechiidae from time to time, mainly by sorting the collection in the Museum für Naturkunde, Berlin. In 2012 and 2015 I visited Ditsong Museum of the Natural History in Pretoria, which is better known as the Transvaal Museum of South Africa (TMSA). This museum is the most important depository of type specimens of Gelechiidae of southern Africa (Fig. 1). Most of the types of Edward Meyrick and A. Janse are kept there. During the same time I accepted the propositions of Leif Aarvik and David



Fig. 1. Ditsong Museum of Natural History (former Transvaal Museum), Pretoria.

All photos (unless otherwise stated) by Oleksiy V. Bidzilya



Fig. 2. Asante-Sana.

Agassiz to study the Gelechiidae from Kenya, Tanzania and Uganda. Jurate and Willy de Prins kindly made available their rich collection of material from Africa for my study during my second visit to the Natural History Museum in London in 2015.

As a result of this study, the genera *Athrips* and *Parapsectris* were revised (Bidzilya, 2010) and the new genus *Armatophallus* Bidzilya was established for five species distributed from India to South Africa (Bidzilya, 2015). Four new genera and fifteen of the most common and abundant

species were described in the book “Basic pattern on Lepidoptera diversity in southwestern Africa” (Mey, 2011). Recently, the genus *Aphanostola* Meyr. was revised in collaboration with Wolfram Mey and David Agassiz (Bidzilya et al., 2016). Based on material obtained by D. Agassiz in Kenya since 1998, we reviewed the Gelechiidae with larvae that are associated with *Acacia* (Agassiz & Bidzilya, 2016). Now I am focusing on the chapter on Gelechiidae for the book devoted to the Lepidoptera diversity in the private game farm “Asante-Sana” situated in the escarpment east of Graaff-Reinet (RSA) (Fig. 2). I visited this place in the Eastern Cape Province in 2012 together with Wolfram Mey and Martin Kruger (Fig. 3). The next goal is to provide a revision of Gnorimoschemini in the Afrotropical region in the coming years.

Below I would like to share my suggestions about our current knowledge on subfamilies/tribes/genera-groups of the Afrotropical Gelechiidae.

Apatetrini. Of about thirteen genera, ten are monotypic, others comprise few species only. The South African genera *Filisignella* Janse, *Curvisignella* Janse, and *Ischnocraspedus* Janse are known from females only, hence their current taxonomic positions are rather provisional. Most of the undescribed species belong to *Apatetris* Stgr. Genera *Anomologa* Meyr. and *Euryctista* Janse are very likely to be congeneric and should be revised with the description of several new species. The opposite sex, mainly the females, remains unknown for many species. Some species are rather distinctive externally and in their genitalia (Fig. 4). The generic assignments of some species remain unclear (Fig. 5).

Pexicopiini. Eight genera contain eleven described and many undescribed species. Many genera are monotypic or are comprised of only a few species. Considerable differences in the female genitalia are not supported by the differences in the male genitalia, which are moderately simple and rather similar among Afrotropical Pexicopiinae. At present the diagnoses of genera are often based on single genitalic or external characters of unclear taxonomic significance. This fact considerably hampers



Fig. 3. “In beer veritas”

Fig. 4. (above left) *Cerofrontia griseotincta* Janse. Adult and male genitalia. Namibia, leg. W. Mey



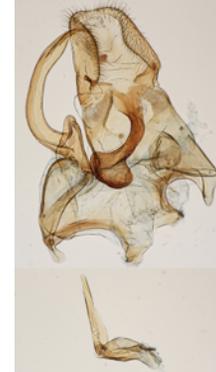
Fig. 5. (above right) The Apatetrini species (adult and male genitalia) with unclear generic assignment. Kenya, leg. and coll. D. Agassiz



Fig. 6. (below left) The unknown genus related to *Monochroa*, RSA, leg. W. Mey



Fig. 7. (below right) Adult and the male genitalia of unknown genus related to *Monochroa*, RSA, leg. W. Mey



both the description of new species and introduction of new genera. The generic revision with DNA-data should provide an improved resolution of the situation.

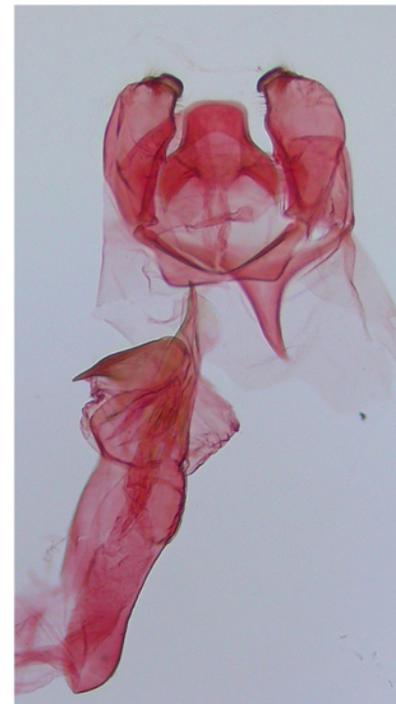
Anomologinae. The tribe comprises at least ten genera with more than 60 described species.

Ornativulva Gozm., *Metzneria*

Z. and *Pyncostola* Meyr. also occur in the Palearctic region. In spite of the fact that *Tamarix* is rather common in the arid regions of Africa, *Ornativulva kalahariensis* Janse is the only species of the genus that feeds on this host in the Afrotropics. *Metzneria* also is not diverse contrary to the Palearctic region. *Pyncostola* is the most diverse genus of the tribe at least in southern Africa. The genus was revised by Janse, who listed 35 species in it. However, undescribed species can often be found in the collections. Several rather prominent undescribed genera related to *Monochroa* Hein. are known from Namibia and Republic of South Africa (Figs. 6, 7).



Aristoteliinae. A very species-rich tribe which comprises about fourteen genera with more than 70 described species. *Acutitornus* Janse and *Leuronoma* Meyr. were partially revised. Most of other genera of this tribe except for *Aristotelia* Hbn. are monotypic. The current generic assignment of many *Aristotelia*-species is still unclear. Two very unusual species of unclear generic assignment are known from South Africa (Figs. 8, 9).



Thiotrichini. *Polyhymno* Chamb. is very diverse in the Afrotropics. Janse listed 24 species for southern Africa. However, a

Fig. 8. (above) The male genitalia of unknown genus, RSA, leg. W. Mey

Fig. 9. (below) The male genitalia of unknown genus, RSA, leg. W. Mey



number of undescribed species are known from Eastern and Central Africa (Figs. 10, 11).

Gelechiini. About sixteen genera with more than 120 species in southern Africa. Many species remain undescribed within *Tricerophora* Janse and *Khoisa* Bidz. & Mey. *Schizovalva* Janse is the most speciose genus of the tribe, and one of the most species-rich unrevised genera of southern African Gelechiidae in the whole (45 species are listed for southern Africa). A lot of undescribed *Schizovalva* species are kept in the collections. The genitalia characters of *Schizovalva* are often very similar, causing problems in separation of externally similar species. A revision of the genus seems hardly possible without DNA study.

Litini. This rather species-rich tribe is represented by twelve genera and about 35 species in southern Africa. A number of species remains undescribed. Several new genera must be established. On the other hand, the group of genera related to *Teleiodes* Sattler (*Neotelphusa* Janse, *Pithanurga* Meyr.) must be revised and probably synonymized with each other. The most important, unresolved problem is the genus *Telphusa* Chambers, 1872. Nine species described in this genus are known from females only, but their correct generic assignments have to be clarified when the males are discovered.



Fig. 10. (left) *Polyhymno* sp., Tanzania, leg., coll & photo L. Aarvik

Fig. 11. (right) *Polyhymno* sp., Tanzania, leg., coll & photo L. Aarvik

Gnorimoschemini. About 60 species and 6 genera are included. Closely related to the Palearctic fauna, but much more diverse. Most of the species to be described are from the genera *Ephysetris* Meyr. and *Scrobipalpa* Janse. Rather unusual species of *Microlechia* Triberti can be found (Fig. 12). *Scrobipalpa portosanctana* Stt, *S. traganella*, *M. rhamnifolia* Ams. & Hering, *M. chretieni* Turati, *O. subdiminutella* Stt. and other “Palearctic” Gnorimoschemini are rather common in southern Africa. Within *Scrobipalpa* the most unclear is the *S. incola*-group of species. The species of this group comprise five closely related taxa with larvae that feed on Solanaceae. Some of them are considered as pests of eggplants and other cultivated Solanaceae. I suggest that *S. biljurshi* Pov. and *S. asiri* Pov. from Saudi Arabia may be conspecific to some taxa from this group, e. g. *S. concreta* Myer. and *S. incola* Meyr. I presume that *Scrobipalpa vicaria* (Meyrick, 1921) should be considered as a junior synonym of *S. geomicta* (Meyrick, 1918), but additional material must be studied to justify this suggestion.

Anacampsini. *Stomopteryx* Hein. and *Syncopacma* Meyr. are the first genera to be revised. Several additional new species from the *Mesophleps gigantella*-group are represented in the collection from Eastern Africa. One new species related to *Mesophleps* Hbn. may represent a new genus (Fig. 13).



Fig. 12. *Microlechia* sp. n. Adult and male genitalia. Namibia, leg. and coll. C. Wieser



Fig. 13. Adult and the genitalia of unknown genus related to *Mesophleps*.



Chelariini. Most of the species in this tribe are divided between *Helcystogramma* Z., *Hypatima* Hbn. and *Anarsia* Z. A large number of undescribed species are known from the first two genera. *Anarsia* has been studied quite satisfactorily in southern Africa, whereas many new species are known in other regions. On the other hand, I suggest that the current concept of the genus *Anarsia* comprises at least two groups of species that differ considerably in the male genitalia. The type species of the genus, *A. spartiella* Schr. belongs to the group, characterized by the presence of modified scales at the tip of the valvae and the absence of a gnathos in the male genitalia. The second group (*A. gravata* Meyr., *A. carbonaria* Meyr. and others) share characters such as a well-developed hook-shaped gnathos, valvae not bearing modified scales at the apex, and the right valva that is broader than the left valva. These differences are sufficient to justify the establishing of a separate genus for the members of the second group of species.

Dichomeridinae. This is a very diverse and speciose group. The number of undescribed species within the largest genus, *Dichomeris* Hbn., is difficult to estimate, especially in Eastern and Central Africa (Figs 14, 15). In general, Dichomeridinae from southern Africa are better known than those from the rest of the Afrotropical region. At least half of the species in the collections of D. Agassiz and L. Aarvik from Eastern Africa are undescribed. Our knowledge of Gelechiidae from Central Africa is very fragmented and restricted to descriptions of several new taxa and records of pests of crops. The real level of species diversity can hardly be estimated. However, the analysis of material collected by Jurate and Willy de Prins in Cameroon, DR Congo and other countries suggest a considerable number of new species especially in Litini, Chelariini and Dichomeridinae.

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Fig. 14. (left) *Dichomeris* sp., Tanzania, leg., coll. & photo L. Aarvik
 Fig. 15. (right) *Dichomeris* sp., Tanzania, leg., coll. & photo L. Aarvik

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Compiled by Maria Heikkilä

Articles dealing with pest or biocontrol issues are not included. Please, see I.N.G.A. issues n. 5 for other articles published in 2015: http://mississippientomologicalmuseum.org.msstate.edu/Researchtaxapages/Lepidoptera/Gelechioidea/INGA_newsletter.html

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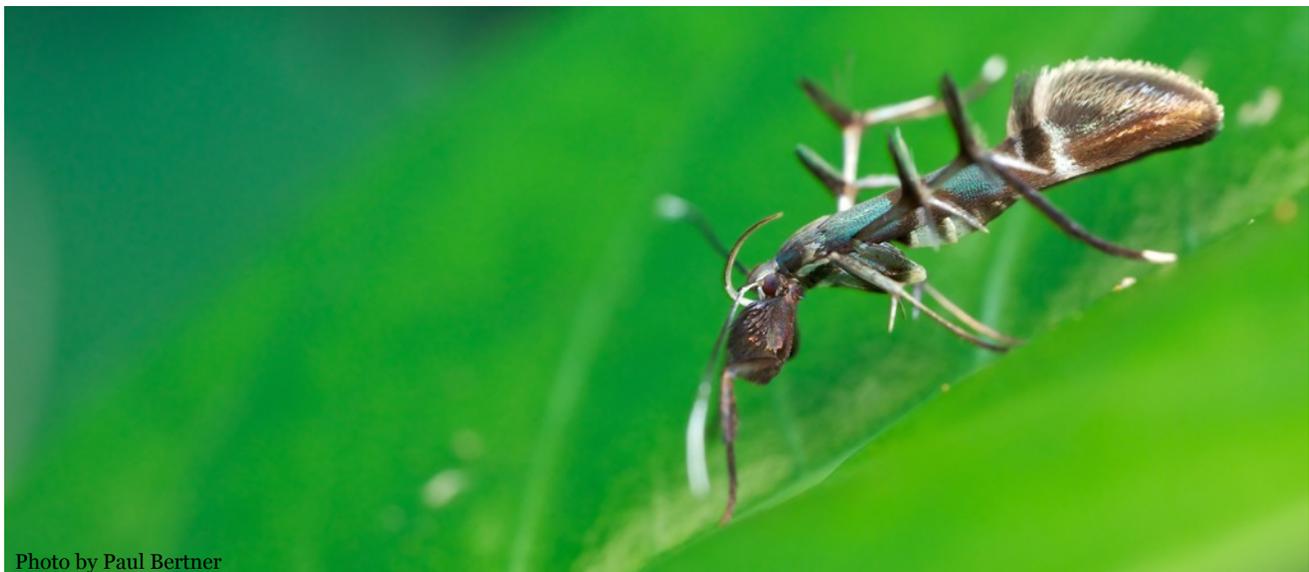


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I.N.G.A. is an annually distributed electronic newsletter with its main focus on different aspects of the superfamily Gelechioidea. Subscription and all contributions are free of charge. All opinions presented here are authors' own and do not represent an official opinion of the newsletter. Guidelines for submission and previous issues of I.N.G.A. can be found from the newsletter's website: http://mississippientomologicalmuseum.org.msstate.edu/Researchtaxapages/Lepidoptera/Gelechioidea/INGA_newsletter.html

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ISSN: 2328-370X (online)