

Southern Lepidopterists'
Society
and
**ASSOCIATION FOR
TROPICAL LEPIDOPTERA**
2023 Annual Meeting



McGuire Center for Lepidoptera and Biodiversity

Florida Museum of Natural History, University of Florida,
Gainesville, Florida
13 – 15 October 2023

Front Cover: Pink Star Moth, *Derrima stellata* (Noctuidae), Florida, Suwannee Co., 11-12 April 2008, Charles V. Covell, Jr. Image by Deborah L. Matthews.

**FALL MEETING OF THE SOUTHERN
LEPIDOPTERISTS' SOCIETY AND THE
ASSOCIATION FOR TROPICAL
LEPIDOPTERA
OCTOBER 13-15, 2023**

McGuire Center for Lepidoptera and Biodiversity Conference Room, Florida
Museum of Natural History, University of Florida, Gainesville, Florida

Local Arrangements

Meeting Coordinators:

Deborah L. Matthews, Keith R. Willmott, John F. Douglass

Organizing Committee: Bob Belmont, Laura Gaudette, Riley Gott,
John F. Douglass, David Fine, Deborah L. Matthews, David M.
Plotkin, Jeffrey Slotten, Andrei Sourakov, Jon D. Turner, Nancy
Turner, Keith R. Willmott

Banquet/Lunch/Breaks:

Ada Neal, Marcela Diaz Zamora, Sofia Nogales, and Isabel Cacacho

Collecting Coordinator:

Bob Belmont

Group Photograph:

Andrei Sourakov

Collection Access:

Andrei Sourakov

Program:

Deborah L. Matthews, Keith R. Willmott

Technical Support:

David M. Plotkin, Andrei Sourakov, Keith R. Willmott

Evening Program:

Bill Berthet, James K. Adams, and Charles V. Covell, Jr.

Registration:

Marcela Diaz Zamora, Sofia Nogales, and Isabel Cacacho



Schedule of Events

Friday, October 13

3:00 – 5:00 pm: **Registration/Check-in**, Powell Hall Lobby (museum main entrance), Florida Museum of Natural History, UF Cultural Plaza, University of Florida.

5:30 pm: RSVP in advance to Bob Belmont (bbelmont@ufl.edu) for local collecting opportunities at Split Rock Conservation Area. Bucket or bait traps must be set up before dark. This area is only accessible from the main ungated entrance to the preserve along 20th Avenue at the east corner of Bob's Portofino community.

6:00 – 9:00 pm. Reception at the home of Bob and Becky Belmont, 1839 SW 65th Drive, Gainesville. Those wishing to collect/photograph at Bob's sheet may stay until 11:00 pm. All participants must sign a general release form for the preserve and Belmont residence. Please RSVP to dlott@flmnh.ufl.edu.

Saturday, October 14

Please follow the signs and enter the McGuire Center through the north staircase entrance or side door volunteer entrance before 10am. Main entrance doors may be used after 10am.

8:00 – 8:45: **Registration and reception.**

MORNING SESSION

Moderator: J.D. Turner

Technical Support: Andrei Sourakov

8:50 **Opening remarks:** J.D. Turner (ATL Executive Director), David Fine (SLS Chairman).

9:00 – 9:20: **Megan Neal**

“Microscopic Digitization of the McGuire Center Slide Collection”

9:25 – 9:45: **David Fine**

“Life History of *Chlorostrymon maesites*”

9:50 – 10:10: **Andrei Sourakov**

“Coral Trees of Los Angeles and the Moths that Attack them”

10:15 – 10:30: BREAK

10:30 – 10:50: **Riley Gott**

“A partial life history of a Central American *Dalla* Mabille, 1904 (Hesperiidae: Heteropterinae)”

10:55 – 11:15: **Aidan Bloch**

“Clarifying the Ecuadorian *Pedaliodes asconia/pollonia* Species Group”

11:20 – 11:45: **James K. Adams**

“Eleanor Adams, my Ultimate Mentor in my Study of Lepidoptera”

11:50: **Group Photo**, McGuire Center north stairs - outside.

12:00 – 1:25: **Lunch** at McGuire Center (Subway courtesy of Ada Neal).

12:10 – 1:25 **ATL business meeting**, room 200

AFTERNOON SESSION

Moderator: Keith R. Willmott

Technical Support: David M. Plotkin

1:30 – 1:50: **Nick Homziak**

“DeLuca Lepidoptera Survey: 2023 Season Progress”

1:55 – 2:15: **Lance Durden**

“Moth diversity at Canoochee Sandhills Wildlife Management Area, southeastern Georgia, USA”

2:20 – 2:40: **Hugh McGuinness**

“Recent Discoveries in the Genus *Aethes* (Tortricidae)”

2:45 – 3:00 BREAK

3:05 - 3:25: **Ivone de Bem Oliveira**

“Optimizing genomic-based strategies to guide conservation for imperiled insect species”

3:30 – 3:50: **Richard L. Brown**

“Male Sex Scales of Gelechiidae and Tortricidae”

3:55 – 4:15: **Marc Minno**, Douglas M. Fernández, and Yosiel Álvarez, “New Butterfly Discoveries in Western Cuba”

4:20 – 5:20: **Business Meeting**, Southern Lepidopterists’ Society

EVENING EVENTS

6:00 – 9:00: **BBQ**, Gainesville Woman’s Club, 2809 W. University Avenue.

Keith R. Willmott – Introductions
*Featured Speaker – Bill Berthet**
"Butterflies of Bhutan"

Door Prizes – Charles V. Covell, Jr. & James K. Adams

*William L. (Bill) Berthet has traveled around the world photographing butterflies since 2005 and is the present author of the digital collecting series in the *News of the Lepidopterists' Society*. He produced the book *Wildlife Habitat Gardening: Attracting N.E. Florida Pollinators* which gives ID tips for 32 species of butterflies including host and nectar trees, shrubs, and vines and includes 16 species of moths and 9 kinds of bees. Bill is a gemologist by profession and graduated from the Gemological Institute of America, Santa Monica campus, in 1979. He was a Fellow of the Gemological Association of Great Britain, a certified gemologist appraiser for the American Gem Society, and an AGS jewelry store owner for 30 years. He retired in 2013 and for the past decade has conducted numerous butterfly surveys in northeastern Florida working for FNAI, FFS, and other state agencies. Bill will share with us his most recent 20-day journey through Bhutan:

This kingdom is steeped in history, but our gaze is fixed on the future. This is our moment of evolution. Guardians of some of the world's most pristine, wild and sacred places – and of a rich, deeply rooted culture – we are steadfast as the cypress in our commitment to conservation. Our future requires us to protect our heritage and to forge fresh pathways for forthcoming generations. – Bhutan "Believe" Published by the Tourism Council of Bhutan 2022
<https://bhutan.travel/>

Come join Sonam, Tashita, and myself for a 20-day adventure up the Samdrop Jongkhar Highway looking for moths then crashing at the Linghar Lodge (owned by the ex-Home Minister, he loved throwing those dice! beating me soundly at backgammon) for three days hunting for *Bhutanitis ludlowi*, plus updated information on *Bhutanitis lidderdalii*, and *Teinopalpus imperialis*. Let's turn the corner just before Trashigang, heading west on the National Highway averaging around 15-20 mph on a narrow road cut out of rock with constant rain in the monsoon season, you don't care, as you pass Macaques, Langurs, countless water falls, pristine forest, and an old lady watching something on her cell phone snuggled in a blanket under a makeshift produce stand, arriving at Trogon Villa for a great night of nothing then on to Saling for butterflies in the morning. At Trongsa we turn south on the National highway towards Gelephu. We move on to the checkpoint at Tingtibi, just before the entrance to Royal Manas National Park. We have ginger tea

outside my cabin at Pantang Eco Lodge near a Great Hornbill in the morning and then fish for golden mahseer. On the next day we see the best numbers and diversity of butterflies this trip at the old farm road to Bkoka. The next day we visit the Golden Langur's salt lick landing at Four Boutique Hotel near the incredible Punaka Dzong, then head back to Pele La to check out *Parnassius hardwickii*, then heading back west through Evergreen, Oak, Rhododendron, Horse Chestnut, Laurels, Maple, Fir, Spruce, Larches, Hemlocks and Juniper forests to Dochu La, which, on a clear day, can offer panoramic views of the snow-laden giant Himalayas, some over 7,500m high. Then we head on to Paro, then south on the National Highway to Chasilakha looking for early emerging *B. lidderdalii*.



Ludlow's Bhutan Glory (National Butterfly) *Bhutanitis ludlowi*



Sonam
and
Tachila



Bill Berthet at Twin Falls below Pantang

Sunday, October 15

8:15 – 8:55: **Morning reception**, McGuire Center Conference Room

MORNING SESSION

Moderator: Riley Gott

Technical Support: Keith R. Willmott

9:00 – 9:20: **Marc Minno**

“Colombian Cloud Forest Butterflies and Moths”

9:25 – 9:45: **Brian Scholtens**

“The Moths of Spring Island, South Carolina”

9:50 – 10:10: **Jacob Bethin**

“A phylogenetic analysis of Acentropinae (Lepidoptera: Pyraloidea: Crambidae)”

10:15 – 10:30: BREAK

10:30 – 10:50: **Keith R. Willmott**

“In the footsteps of iNaturalists: contributions of citizen scientists to knowledge of Neotropical butterflies”

10:55 – 11:15: **Joe Martinez**

“Arctiinae or Arctiidae? - Harmonizing three different data sources to reveal a new and more stable classification”

11:20 – 11:40: **Nick V. Grishin**

“Genomic Screening as a Tool for Species Discovery”

Abstracts - Talks

Adams, James K., Dalton State College, Dalton, GA, USA
(jadams@daltonstate.edu).

“Eleanor Adams, my ultimate mentor in my study of Lepidoptera”

Eleanor R. Adams was first and foremost my mom. However, when she noticed I had an interest in Lepidoptera as early as 1 1/2 years of age, she decided to foster that interest and therefore became my first mentor. As my interest intensified, she continued to travel with me (including to many Lep Soc meetings) and participate in collecting and sorting specimens. She became quite an accomplished lepidopterist herself, although she wouldn't admit that. I hope you will enjoy this presentation celebrating the impact my mom had on my study of Lepidoptera!

Bethin, Jacob, and Akito Y. Kawahara, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, USA
(bethinj@ufl.edu).

“A phylogenetic analysis of Acentropinae (Lepidoptera: Pyraloidea: Crambidae)”

Pyraloidea are a megadiverse superfamily comprised of two families, Pyralidae and Crambidae. Even with 11,000 described species, many subfamilies of crambids remain understudied, including Acentropinae. Acentropines are the largest group of moths that have at least one life stage that lives in the water. However, few studies seek to understand the phylogenetic relationships of acentropines and are primarily based on morphology and behavior. The oldest analysis, being 70 years old, is the most recognized publication, but has been contested. Currently, no studies have attempted to create phylogenies using genomic datasets. We sought to test these hypotheses by

reconstructing a genus-level phylogeny of Acentropinae, by sequencing acentropines using target-capture genomic data. Our results show support for the 70-year-old phylogeny, as well as other previously hypothesized relationships.

Bloch, Aidan, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, USA (aidan.bloch@ufl.edu).

“Clarifying the Ecuadorian *Pedaliodes asconia/pollonia* Species Group”

Pedaliodes (Nymphalidae, Satyrinae) is a diverse genus of Andean brush-footed butterflies whose taxa can be difficult to distinguish. As such, the relationships between the various *Pedaliodes*, as well as their exact definitions, ranges, and distributions, are often poorly understood. Since early 2023, I have been working to clarify species relationships within the Ecuadorian *Pedaliodes pollonia/asconia* species complex using mtDNA analysis techniques. In addition to pre-existing specimens from the McGuire Center collections, I have gathered samples through fieldwork in Ecuador during summer 2023. Using mtDNA data from these specimens, I attempt to clarify the number of distinct species within the *Pedaliodes pollonia/asconia* complex, as well as their ranges and identifying characteristics. During my presentation I will discuss lab methods, fieldwork, and results to date.

Brown, Richard L., 480 Echols Rd., Starkville, MS, USA (moth@ra.msstate.edu).

“Male Sex Scales of Gelechiidae and Tortricidae”

Secondary sexual characters in Lepidoptera include specialized scales in males that are involved in producing and disseminating pheromones used in courtship. The three components of pheromone-producing systems include glands for scent production, structures for scent dissemination, and protective pockets for these structures. Examination of these structures with scanning electron microscopy has revealed a wide range of ultra-

structural differences of scent producing systems in selected species of Gelechiidae and Tortricidae.

de Bem Oliveira, Ivone, and Jaret C. Daniels, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, Gainesville, FL, USA (idebem.oliveira@ufl.edu).

“Optimizing Genomic-based Strategies to Guide Conservation for Imperiled Insect Species”

Conserving genetic diversity is a key priority for biodiversity management. Inbreeding and loss of genetic diversity can significantly impact population fitness and its ability to adapt to novel conditions (*i.e.*, climate change, invasive species, or diseases). The use of genomic tools allows for the accurate estimation of critical information for the conservation of natural populations. At the Daniels lab, we are working on methodologies to optimize obtaining genetic data for genetic diversity estimates in imperiled insect species. We aim to design genomic-based strategies to guide conservation based on the use of non-destructive genetic sampling. In this talk, we will present updates on the optimization of the genomics protocol and preliminary results on its application for two imperiled butterfly species and one bee.

Durden, Lance A.¹, James K. Adams and Brian G. Scholtens,
¹Dept. of Biology, Georgia Southern University, Statesboro, GA, USA (ldurden@georgiasouthern.edu).

“Moth diversity at Canoochee Sandhills Wildlife Management Area, southeastern Georgia, USA”

An ongoing moth survey was initiated in 2020 at the newly designated Canoochee Sandhills Wildlife Management Area in Bulloch County, southeastern Georgia, USA. Light traps, light sheets, bait traps and pheromone traps have been set in a variety of habitats including sandhill, flatwoods, cypress wetlands, tupelo swamps, creeks and longleaf pine-wiregrass, covering all months of the year. To date, 603 species of moths have been recorded including some rarely encountered species for the

region or globally. These include *Prochalia pygmaea* (Psychidae), *Undulambia striatalis* (Crambidae), *Macaria coortaria*, *Nemoria outina* (Geometridae), *Baltodonta broui* (Notodontidae), *Apantesis doris*, *Neoplynes eudora*, *Dasychira leucophaea*, *Sigela eoides*, *Ozarba nebula*, *Catocala orba* (Erebidae), *Lithophane laceyi*, *Bagisara brouana*, *Chaetagleae rhonda*, *Sideridis ruisa* and *Photedes carterae* (Noctuidae). A few additional species appear to be undescribed.

Fine, David, 4110 NW 12th St. Coconut Creek, FL, USA
(davidf@calvaryftl.org).

“Life History of *Chlorostrymon maesites*”

Chlorostrymon maesites has long been one of the most elusive butterfly species in South Florida. Until recently, only fragments of its life history have been verified. In June of 2023, however, that would all change. Seagrape tree (*Cocoloba uvifera*) has now been confirmed as the native larval host plant and in a few short weeks 10 colonies were discovered within a few miles of my home in Broward County, Florida. I was able to find wild larvae feeding on the blooms of the Seagrape and reared some of them through to adult from eggs laid in captivity by wild-caught females. This presentation will take the listener through the discovery process as well as the life cycle of this species with some amazing photographs of all stages.

Gott, Riley J., Deborah L. Matthews, and Jacqueline Y. Miller, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, USA (rgott@floridamuseum.ufl.edu).

“A partial life history of a Central American *Dalla* Mabille, 1904 (Hesperiidae: Heteropterinae)”

Dalla Mabille, 1904, is a genus of 66 species of skipper butterflies found from central Mexico, south throughout the Andean region. The first *Dalla* life history is reported for *Dalla ramirezi* Freeman, 1969, from specimens collected at Reserva Biología Monte Uyuca, Francisco Morazán, Honduras feeding

on an introduced Asian bamboo during the second and third authors' Lepidoptera surveys. Although the phylogenetic backbone of the skipper butterflies has gained clarity over the past decade, a disparity of knowledge remains regarding immature stages, with a lack of published life history information including, but not limited to, morphological characters of larval instars and pupae, foodplant breadth, parasitoids, and temporal distributions. The discovery of *D. ramirezi* immatures provides guidance for future field work that will reduce the knowledge gap of early-stage biology in the subfamily Heteropterinae.

Homziak, Nicholas T., McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, USA (nhomziak@ufl.edu).

“DeLuca Lepidoptera Survey: 2023 Season Progress”

The DeLuca Preserve is a 27,000-acre parcel of land in Central Florida donated to the University of Florida in 2020 and is managed for conservation, research, teaching, hunting, and cattle ranching. The property has a wide variety of habitat types, including xeric scrub, prairie, pastureland, cypress domes, and citrus groves. A project was initiated in 2022 to survey the Lepidoptera fauna of the Preserve. Here, I present progress toward this goal and some eventful moments that took place along the way. The 2023 field season improved sampling across the DeLuca Preserve, particularly in the pastureland in the Northwest quadrant, cypress domes, and the habitat between US 441 and the Florida Turnpike. Additionally, potential replacement ballasts for the popular 15w fluorescent BioQuip bucket traps were tested.

Martinez, Jose I.¹, Nicolas J. Dowdy², B. Christian Schmidt³, Nicholas T. Homziak¹, David M. Plotkin¹, Christian Couch¹, Taylor Pierson¹, YiMing Weng¹, Jacqueline Y. Miller¹, Akito Y. Kawahara¹. ¹McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, USA (joemartinez@ufl.edu); ²Department of Zoology, Milwaukee Public Museum, Milwaukee, WI, USA, ³

Agriculture and Agri-food Canada, Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, ON, Canada.

“Arctiinae or Arctiidae? - Harmonizing three different data sources to reveal a new and more stable classification”

The Arctiinae (Tiger Moths) are a cosmopolitan group and the largest subfamily of Noctuoidea, with ~11,000 species, and is somewhat controversially placed as one of the 18 subfamilies of Erebidae based only on genetic data. This new classification consequently lacks definition based on morphological characters, creating a gap in knowledge of the evolutionary history due to the lack of apomorphies. Therefore, we bridge three different philosophical approaches (museomics, phylogenomics, and morphomics) in order to begin decoding the evolutionary history of tiger moths. We sequenced 625 loci from 57 Tiger Moth specimens using anchored hybrid enrichment target capture. In addition, we added published genome and transcriptome data from 27 additional arctiines, and 58 outgroups representing all other erebid subfamilies and noctuoid families. We performed maximum likelihood and multi-species coalescent analyses, and our resulting phylogenies indicate that the subfamily Arctiinae should be elevated to family status (Arctiidae, stat. rev.), also including the subfamilies Pangraptinae, Herminiinae, and Aganainae. Forty-four morphological characters were used to support our reclassification. These results show the necessity to continue working on the entire family Erebidae. Also, this work highlights the importance of the use of museum collections as the source to answer evolutionary questions.

McGuinness, Hugh, National Museum of Natural History, Washington, DC, USA (hdmcguinness@gmail.com).

“Recent Discoveries in the Genus *Aethes* (Tortricidae)”

The genus *Aethes* (Tortricidae) has long been problematic because of its large number of species that are simultaneously similar in appearance and highly variable in phenotype. Genitalic dissection is necessary for certain diagnosis in many cases. In

addition, many new species are thought to be lurking in the genus. In this talk, I shall discuss progress I have been making in diagnosing and circumscribing species through the use of dissections, citizen science websites -- especially iNaturalist -- and DNA barcodes. I will be focusing on those species most likely to be encountered in the southeastern U.S.

Minno, Marc C., 600 NW 35th Terrace, Gainesville, FL, USA
(marccminno@gmail.com).

“Colombian Cloud Forest Butterflies and Moths”

More than 3,600 species of butterflies have been reported from Colombia. On January 13-21, 2023, I led a small group to the Department of Antioquia, Colombia. This is a mountainous region with lush cloud forests and other habitats. We visited parks in and near Medellín including the Medellín Botanical Garden, Cerro Nutibara, and Piedras Blancas Ecological Park, but spent most time in natural areas, ecological reserves, and coffee plantations near Jardín. Butterflies, moths, and birds observed will be discussed.

Minno, Marc C.¹, Douglas M. Fernández, and Yosiel Álvarez,
¹600 NW 35th Terrace, Gainesville, FL, USA
(marccminno@gmail.com).

“New Butterfly Discoveries in Western Cuba”

On June 14 through June 27, 2023, we searched for butterflies in western Cuba from Havana to the Sierra del Rosario Biosphere Reserve (Las Terrazas, Soroa), La Güira, Viñales, and Guanahacabibes Peninsula National Parks as well as other sites. Conditions were droughty and butterflies were only abundant in a few places. At a karstic ridge system known as Escaleras de Jaruco located about 15 miles (25 kilometers) southeast of Havana we found several uncommon to rare butterflies, including *Pyrisitia larae*, *Calisto disjunctus hersheyi*, *Telegonus anausis anausis*, *Panoquina corrupta*, *Burnius crisia*, and a new record for Cuba which will be published in an upcoming issue of Tropical Lepidoptera Research. We also found a population of

Calisto bradleyi near La Palma and documented the immature stages of *Libytheana motya* and *Antillea pelops anacoana*. Overall, we observed about 92 species of butterflies.

Neal, Megan X., James E. Hayden, and Deborah L. Matthews, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, Gainesville, FL, USA (mxiumei.neal@ufl.edu)

“Microscopic Digitization of the McGuire Center Slide Collection”

Many Lepidoptera species have a distinctive external morphology that helps identify them. However, cryptic and plain-colored species can be difficult to determine, particularly amongst microlepidoptera. In addition to DNA sequencing, lepidopterists use genitalia dissection and subsequent analysis of unique chitinized and sclerotized features to facilitate identifications. The McGuire Center has a collection of over 19,000 genitalia slides, contributed by McGuire staff and donors over many generations. This talk will demonstrate the process by which these slides are digitized, including an overview of the tools used to capture and edit high-resolution images of lepidopteran genitalia. The ultimate goal of amassing a digitized collection for public availability will also be discussed with specific focus given to where and how the images can be accessed.

Scholtens, Brian G., 710 New Market Dr., Mt. Pleasant, SC, USA

“The Moths of Spring Island, South Carolina”

I surveyed the moths of Spring Island by sampling once a month over the entire year of 2021. Samples were taken with UV light traps and at a MV light sheet. All moths from all samples were prepared, labeled, and identified. In total, 827 species were found from 8378 individuals. Chao2 and Chao1 estimators put the total expected number of species at about 1040-1090. This is comparable to other extensive surveys in the Southeast with

comprehensive sampling. This is interesting because Spring Island was designed as an ecologically friendly development, and the species total shows that, for Lepidoptera, they are maintaining typical species diversity. It would be very interesting to compare the species diversity in more typical suburban and urban developments to get a better feeling for the overall impact of these, more intensive habitat modifications.

Sourakov, Andrei, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, USA (asourakov@flmnh.ufl.edu).

“Coral Trees of Los Angeles and the Moths that Attack Them”

I have been working on moths known as Erythrina Stem Borers (*Terastia*: Crambidae), which turned out to be several similar species with similar biologies found around the world. Recently, these moths have become a major horticultural pest in southern California, where *Erythrina* (aka Coral Trees) are used as landscaping trees. In Florida, where conditions are favorable, the moth is very common on the native *E. herbacea* (aka Coral Bean), and so, as anyone who tries to grow exotic Coral Trees here will soon discover, the moth makes it impossible to grow. In my talk, I will address why the moth suddenly became a pest in California. I will also address the damage by another Lepidoptera species to the trunks of mature Coral Trees there.

Willmott, Keith R., McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, USA (kwillmott@flmnh.ufl.edu).

“In the Footsteps of iNaturalists: Contributions of Citizen Scientists to Knowledge of Neotropical Butterflies”

The recent dramatic growth of web-based platforms for sharing images of nature, such as iNaturalist, provides opportunities not only to connect with other naturalists, but also to fill long-standing gaps in our knowledge. Those with expertise in Lepidoptera can contribute significantly through helping identify images, at multiple taxonomic levels. Records in iNaturalist are

typically accurately georeferenced, help to increase sampling intensity, especially in under-studied regions, and provide insights into species interactions. I discuss several projects that have benefited from records posted in iNaturalist, including mapping species richness in *Adelpha*, a survey of Cristalino Lodge in Brazil, the discovery of new species, and improvements in understanding of butterfly distributions in western South America.

Zhang, Jing, Qian Cong, and **Nick V. Grishin**, UT Texas Southwestern Medical Center, 5323 Harry Hines Blvd., Dallas, TX, USA (grishin@chop.swmed.edu).

“Genomic Screening as a Tool for Species Discovery”

Traditionally, visual screening of specimens for wing pattern differences and comparing genitalia dissected for many specimens have been used to spot and discover new species of Lepidoptera. When used cautiously, COI barcoding can further indicate potential new species, including cryptic ones. Whole genomes represent their organisms and can be used to detect gene flow and gene exchange between populations and species, and therefore, are particularly suitable to assess the reproductive barriers for species delimitation. Coupled with the sequencing of primary type specimens to associate existing names with sequenced populations, we apply genomic analysis to search for new butterfly species. Highlights of this ongoing study will be presented with the emphasis on species from the USA.

Abstracts - Posters

Please take an opportunity to view posters in the Center’s hallways. Several new posters are on display from recent conferences. Four numbered posters are new for this meeting.

Poster 1:

Kawahara, Akito Y.¹, Jose I. Martinez¹, David M. Plotkin¹, Amanda Markee^{1,2}, Violet Butterwort¹, Christian D. Couch¹, Emmanuel F.A. Toussaint^{1,3}

¹McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida; ²School of Natural Resources and Environment, University of Florida; ³Natural History Museum of Geneva, Geneva, Switzerland.

“Mezcal Worm in a Bottle: DNA and Morphological Evidence Suggest a Single Moth Species”

Mezcal is a distilled Mexican alcoholic beverage consumed by many people across the globe. It was not until the 1940–50s that the mezcal worm, also known as the “tequila worm”, was placed inside bottles of non-tequila mezcal before distribution. These bottled larvae increased public attention on mezcal, especially in Asia, Europe, and the United States. Despite these larvae gaining global interest, their identity has largely remained uncertain other than that they are larvae of one of three distantly related holometabolous insects. We sequenced the COI gene from larvae in different kinds of commercially available mezcal. All larval DNA that amplified was identified as the agave redworm moth, *Comadia redtenbacheri*. Those that did not amplify were also confirmed morphologically to be the larva of this species.

Poster 2:

Kawahara, Akito Y.^{1,2}, Caroline Storer¹, Ana Paula S. Carvalho¹, David M. Plotkin^{1,2}, Fabien Condamine³, Mariana P. Braga⁴, Emily A. Ellis¹, Ryan A. St Laurent^{1,5}, Xuankun Li^{1,6}, Emanuel Toussaint^{1,7}, Kelly M. Dexter¹, Amanda Markee¹, Rebecah Messcher¹, Riley J. Gott¹, Nicholas T. Homziak¹, Jose I. Martinez¹, Pablo Sebastian Padron^{1,8}, Vaughn Shirey^{1,9}, Andrei Sourakov¹, Andrew D. Warren¹, Keith R. Willmott¹, Jesse W. Breinholt^{1,10}, Marianne Espeland^{1,11}, Leslie Ries⁹, Robert P. Guralnick¹¹, Naomi E. Pierce¹², David J. Lohman¹³

⁴Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden; ⁵Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, DC, USA; ⁶Department of Entomology, College of Plant Protection, China Agricultural University, Beijing 100193, China; ⁷Department of Entomology, Natural History Museum of Geneva, Geneva,

Switzerland; ⁸Entomology Laboratory, Museo de Zoología, Universidad del Azuay, Cuenca, Ecuador; ⁹Department of Biology, Georgetown University, Washington, DC, USA; ¹⁰Florida Museum of Natural History, University of Florida, Gainesville, FL, USA; ¹¹Leibniz Institute for the Analysis of Biodiversity Change, Zoological Research Museum Alexander Koenig, Bonn, Germany; ¹²Department of Organismic and Evolutionary Biology and Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA; ¹³Biology Department, City College of New York, City University of New York, New York, NY, USA.

“A Global Phylogeny of Butterflies Reveals Their Evolutionary History, Ancestral Hosts and Biogeographic Origins”

Butterflies are diverse, charismatic, and are thought to have evolved with plants and dispersed throughout the world in response to key geological events. However, these hypotheses have not been extensively tested because a comprehensive phylogenetic framework and datasets for butterfly larval hosts and global distributions are lacking. We sequenced 391 genes from nearly 2,300 butterfly species, sampled from 90 countries and 28 specimen collections, to reconstruct a new phylogenomic tree of butterflies representing 92% of all genera. Our phylogeny has strong support for nearly all nodes and demonstrates that at least 36 butterfly tribes require reclassification. Divergence time analyses imply an origin ~100 million years ago for butterflies and indicate that all but one family were present before the K/Pg extinction event. We aggregated larval host datasets and global distribution records and found that butterflies are likely to have first fed on Fabaceae and originated in what is now the Americas. Soon after the Cretaceous Thermal Maximum, butterflies crossed Beringia and diversified in the Palaeotropics. Our results also reveal that most butterfly species are specialists that feed on only one larval host plant family. However, generalist butterflies that consume two or more plant families usually feed on closely related plants.

Poster 3:

Sourakov, Andrei, and Jodie V. Johnson

McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, USA (asourakov@flmnh.ufl.edu).

“Correlation of Pyrrolizidine Alkaloids in *Crotalaria* Host Plants with Chemistry of their Herbivore, the Bella Moth (*Utetheisa ornatrix*)”

Chemical ecology of the Ornate Moth (*Utetheisa ornatrix*) is intimately connected to its host plants in the genus *Crotalaria*. To understand the effect of exotic host plant introductions on biology of native moths, we tested if the pyrrolizidine alkaloids (PAs) in plants affect the chemistry of the Bella moths reared on them. We characterized these PAs, which were also present in different amounts in different body parts with the wings having the higher concentration. PAs in eggs, larvae and adult moths reflected the PAs from the specific host plant on which the larvae fed, and, during the blind test, based upon identification of the major PAs in moth specimens, it was possible to identify the host plant on which they were reared.

Poster 4:

Sourakov, Andrei, Matthew J. Standridge, Kristin Rossetti, and Jaret C. Daniels

McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, USA (asourakov@flmnh.ufl.edu).

“Transformations of Atala: Effects of heparin on wing pattern development of the Atala Butterfly, *Eumaeus atala*”

Eumaeus atala's normal coloration, both of its brightly colored caterpillars and adult butterflies, is famous among lepidopterists and butterfly enthusiasts. In this study, injections of heparin at the early pupal stage caused a radical transformation of the wing pattern, in the first demonstration of heparin-induced phenotype alteration in Lycaenidae. Changes in wing pattern ranged from slight to dramatic, depending on the dose of this sulfated polysaccharide that was administered. The predominant effect

was on the iridescent blue pattern elements of the hindwings. These experiments allowed us to propose that the markings of *Atala* belong to one or another symmetry systems, which shed light on the homologies of pattern elements present on the wings of this beautiful iconic Florida butterfly, within the framework of the Nymphalid Ground Plan and of other works on lycaenid wing patterns.



