

## PROGRAM LOCAL ARRANGEMENTS

**Meeting Co-Chairs:** Thomas C. Emmel and Jacqueline Y. Miller

**Website and Registration Coordinator:** Nancy C. Turner

**Organizing Committee:** Charles V. Covell, Jr., Jaret C. Daniels, Thomas C. Emmel, James E. Hayden, John B. Heppner, Akito Y. Kawahara, Jacqueline Y. Miller, James B. Schlachta, Andrei Sourakov, Keith R. Willmott, Jon D. Turner, Nancy Turner, Andrew D. Warren

**Field Trip Coordinators:** Jane Blanchard, Orland Blanchard, Charles V. Covell, Jr., Marc C. Minno, Lary Reeves, Jeff Slotten, and Tom Neal

**Meeting Logo, T-shirts, Photography:** Andrei Sourakov

**Session Moderators:** William Conner, Peter J. Eliazar, Jaret C. Daniels, James E. Hayden, Akito Y. Kawahara, Jonathan Pelham, J. D. Turner, and Keith R. Willmott

**Collection Access:** Andrew D. Warren and Andrei Sourakov

**Transportation:** Thomas C. Emmel, James B. Schlachta, Ian K. Segebarth, and Craig L. Segebarth

**Technical Support:** Christine M. Eliazar, Peter Houlihan, Delano S. Lewis, Deborah L. Matthews, Jacqueline Y. Miller, James B. Schlachta, Craig L. Segebarth, Ian K. Segebarth

**Registration:** Elena Ortiz, Mindy Conner, Nancy Turner, Cassandra Romero, Margarete Romero, and Joanna McCaffrey

**Door Prizes:** Charles V. Covell, Jr.

**Sponsors:** Alachua County Tourist Development Council, BioQuip Products, Inc., Florida Museum of Natural History, McGuire Center for Lepidoptera and Biodiversity, and Division of Sponsored Research, University of Florida, Florida Biodiversity Foundation, Charles V. Covell, Jr., Thomas C. Emmel, and Jacqueline Y. Miller

## **SUMMARY CALENDAR OF EVENTS**

### **Wednesday, June 26<sup>th</sup>**

- Registration
- Special Educational Seminar for Young Entomologists
- Tour of UF Entomology and Nematology Department

### **Thursday, June 27<sup>th</sup>**

- Registration
- Field Trips
- Tour of McGuire Center
- Executive Council/Committee Meetings
- Vendors
- Welcome Reception and Mixer

### **Friday, June 28<sup>th</sup>**

- Microlepidoptera Symposium
- Contributed Papers
- Silk Textile Exhibit
- Vendors
- Special Session: Nearctic Notodontidae
- Conservation Symposium
- Business Meeting, Southern Lepidopterists' Society
- Southern Barbeque

### **Saturday, June 29<sup>th</sup>**

- Neotropical Symposium
- Student Papers
- Contributed Papers
- Book Signing
- Vendors
- Business Meeting, Association for Tropical Lepidoptera
- Annual Banquet

### **Sunday, June 30<sup>th</sup>**

- Contributed Papers
- Business Meeting, Lepidopterists Society
- Tour of McGuire Center

## SCHEDULE OF EVENTS

### Wednesday, June 26<sup>th</sup>

**1:00pm-5:00pm:** Registration, Powell Hall Gallery, Florida Museum of Natural History.

**3:30pm:** Special Educational Seminar for Young Entomologists, Room 1031, Entomology and Nematology Building – David L. Wagner “A backyard: Florida’s amazing caterpillars and their survival strategies”

**4:30pm:** Tour of UF Entomology and Nematology Department, led by Stephanie Stocks and Rebecca Baldwin, meet in Room 1031 following Educational Seminar.

### Thursday, June 27<sup>th</sup>

**7:30am–8:30am:** Early distribution of pre-paid registration packets, Hilton Hotel Convention prefunction area.

**8:00am:** Vendor set up, Hawthorne Room, Hilton Hotel Convention Center. Vendors open Thursday 12:00pm to 5:00 pm. Friday and Saturday 7:00am to 5:00 pm.

**8:15am:** Pick up prepaid lunches (with ticket) for day field trips and divide into groups for collecting/ watching and carpools, south parking lot, Hilton Hotel Convention Center.

**9:00am:** Departure for day field trips, south parking lot at Hilton. **Group 1**, collecting trip, Gulf Hammock and vicinity, Levy County; **Group 2**, observation/ photography only.

**10:00am-4:30pm:** Registration, Hilton Hotel Convention Center.

**10:00am–4:00pm:** Lepidopterists’ Society Executive Council meeting, Board Room, Hilton Hotel Convention Center.

**2:00pm:** Tour of McGuire Center, led by Jacqueline Y. Miller; meet in lobby near front desk of Powell Hall, Florida Museum of Natural History.

**5:15pm–7:30pm:** Welcome Reception and Mixer (light hors d'oeuvres), Powell Hall, Butterfly Rainforest Gallery.

**6:30pm:** Pick up prepaid night snack for collecting trip, Rainforest Gallery. Pre-arrange/confirm car pools for night collection trip.

**7:30pm:** Meet carpools and depart for night collecting trip to Paynes Prairie. South parking lot, Hilton Hotel Convention Center. You may depart earlier or later on your own if you have already signed a field trip waiver and checked in with Charlie Covell for gate entry instructions.

### **Friday, June 28<sup>th</sup>**

**7:00am-5:00pm:** Registration, prefunction area outside the Century Ballroom.

**7:00am-7:30am:** Poster Set up, Century Ballroom, Hilton Hotel Convention Center. Posters will remain on display throughout the meeting.

**7:15am-8:00am:** Continental breakfast, Century Ballroom.

**7:55am-8:15am:** Announcements, introductions, welcome and opening statements, Jacqueline Y. Miller, Thomas C. Emmel and Douglas S. Jones.

#### **MICROLEPIDOPTERA SYMPOSIUM**

Moderators: Akito K. Kawahara and James E. Hayden

**8:15am-8:30am:** Richard L. Brown, Sangmi Lee, and Jeffrey Barnes “Asa Fitch and his contributions to microlepidoptera” – abstract 006

**8:30am-8:45am:** Andrei Sourakov “On the biology of moths that feed on the coral bean in Florida” – abstract 056

**8:45am-9:00am:** David Bettman and Christopher C. Grinter “The Colorado Microlepidoptera Survey” – abstract 003

**9:00am-9:15am:** James E. Hayden and Richard Mally “Review of the *Leucinodes* group (Crambidae: Spilomelinae)” – abstract 021

**9:15am-9:30am:** Donald Wright and Todd M. Gilligan “Molecular phylogeny and revised classification of *Eucosma* Hübner and related genera” abstract 063

**9:30am-9:45am:** Jae-Cheon Sohn\* and Donald Davis “Lyonetiidae, a roguish child of Yponomeutoidea: what we know about them?”– abstract 055

**9:45am-10:00am:** Deborah L. Matthews “Florida plume moths: some recent discoveries and a synopsis of the known fauna”– abstract 037

**10:00am-10:15am:** Jean-François Landry, Vazrick Nazari, Jeremy R. deWaard, Marko Mutanen, Carlos Lopez Vaamonde, Peter Huemer, and Paul D.N. Hebert “Thirty intercontinental colonizations revealed by DNA barcoding of Holarctic microlepidoptera”– abstract 032

**10:15am-10:30am:** Daniel Rubinoff, William Haines and Akito Y. Kawahara “Deciphering diversity in Hawaii’s most diverse moth group (*Hyposmocoma*)”– abstract 051

**10:30am-10:45am:** BREAK

\*student paper

## CONTRIBUTED PAPERS

Moderator: J. D. Turner

**10:45am-11:00am:** Jacqueline Y. Miller, Lee D. Miller, and Michael A. Ivie “A new lepidopteran fossil from the Canyon Ferry Reservoir deposit in southwestern Montana (Lepidoptera: Nymphalidae: Satyrinae) – abstract 039

**11:00am-11:15am:** John V. Calhoun “The Dodge Family: an enduring tradition of entomology”– abstract 008

**11:15am-11:30am:** Trevor J. Steele\* “Observations on parasitism and population structure of three species of *Hemileuca* (Saturniidae) in Texas”– abstract 057

**11:30am–11:45am:** Richard S. Peigler “Current status of wild silks in Africa and Asia”– abstract 046

**11:55am:** Group Photo, outside Hilton Hotel

**12:00am-2:45pm:** Richard S. Peigler and Stacy Huber, silk textile exhibit, Century Ballroom

**12:00pm-1:30pm:** LUNCH (on your own). A discounted buffet lunch is available at Albert’s Restaurant (Hilton) with tickets purchased from the registration desk.

SPECIAL SESSION: NEARCTIC NOTODONTIDAE

**1:30pm-2:00pm:**

James S. Miller “Diversity of Prominent Moths (Notodontidae) in North America”– abstract 040

David L. Wagner “Larvae of North American Notodontidae”– abstract 060

Jennifer L. Bundy\* “Life history notes on *Ursia noctuiformis*”– abstract 007

CONSERVATION SYMPOSIUM

Moderator: Jaret Daniels

**2:00pm-2:15pm:** John Shuey “Butterfly communities respond to restoration in the Mata Atlantica”– abstract 054

**2:15pm-2:30pm:** Marc C. Minno “Climate change and southeastern U.S. island faunas: butterflies of Cumberland Island, Camden County, Georgia”– abstract 041

**2:30pm-2:45pm:** Ernest H. Williams “Three butterfly responses to climate change”– abstract 061

**2:45pm-3:00pm:** Peter R. Houlihan, Mark E. Harrison, Nicholas C. Marchant, and Susan M. Cheyne “Butterflies amidst the modern era of exploitation on Borneo: their diversity, ecology, and conservation”– abstract 022

**3:00pm-3:15pm:** BREAK

**3:15pm-3:30pm:** Peter Van Zandt, Grant Gentry, Cameron Budzius, Grant Williams, Sarah Martin, Benjamin Hunt, and Richard Brown “The influence of an urban heat island on moth phenology in Birmingham, Alabama”– abstract 064

**3:30pm-3:45pm:** Jaret Daniels, Emily Saarinen and Justin Saarinen “The impact of tropical cyclones, invasive species and drought on an endangered South Florida butterfly”– abstract 015

**3:45pm-4:00pm:** Lincoln Brower “State of monarchy”– abstract 005

**4:00pm-4:15pm:** Matthew D. Thom\* “Pupation behavior of the frosted elfin butterfly, *Callophrys irus* Godart: consequences for mortality by fire for litter and soil dwelling organisms”– abstract 058

**4:15pm-4:30pm:** Sandra Koi\* “New and revised life history of *Eumaeus atala* (Lepidoptera: Lycaenidae)”– abstract 030

#### BUSINESS MEETING

**4:30pm-5:00pm:** Southern Lepidopterists’ Society, Century Ballroom

#### EVENING EVENT

**6:15pm:** Southern Barbeque, Kanapaha Botanical Gardens (see map in back of program). We will have lights set up for moth collecting but will need to be outside the gate by 11:00pm. Shuttles will depart from the Hilton south parking lot starting at 5:45pm.



## **Saturday, June 29<sup>th</sup>**

NEOTROPICAL SYMPOSIUM  
Moderator: Keith R. Willmott

**7:15am-8:00am:** Continental breakfast, Century Ballroom.

**7:55am-8:00am:** Announcements, Jacqueline Y. Miller.

**8:00am-8:15am:** Keith R. Willmott “Mapping and interpreting patterns of species richness in neotropical butterflies”– abstract 062

**8:15am-8:30am:** Curtis J. Callaghan “A biogeographic study of the origin and evolution of the Chacoan Subregion fauna, as indicated by butterflies of the family Riodinidae (Lepidoptera; Rhopalocera)” – abstract 009

**8:30am-8:45am:** Blanca Huertas “The Riodinidae at BMNH: modernising the 200 year+ old collections and why scale matters”– abstract 023

**8:45am-9:00am:** Jason P. W. Hall “Wing pattern evolution and mimicry in the Riodinidae: an example from the Nymphidiina”– abstract 020

**9:00am-9:15am:** Albert Thurman “Collecting butterflies, moths, and insects in Panama, 1975-2012”– abstract 059

**9:15am-9:30am:** BREAK

STUDENT PAPERS\*  
Moderator: William Conner

**9:30am-9:45am:** Dale Halbritter\* and Jaret Daniels “Integrating historical biogeography and ecology to explain the distribution patterns of pine butterflies (Lepidoptera: Pieridae)”– abstract 019

**9:45am-10:00am:** Marianne Espeland\* and Naomi Pierce “Molecular phylogeny based on 200+ genes and life history of the phyto-

predaceous genus *Lepidochrysops* (Polyommataini, Lycaenidae)”— abstract 017

**10:00am-10:15am:** Naoki Muto\* and Mamoru Watanabe “Eupyrene sperm migration in relation to the number of apyrene sperm transferred in the swallowtail butterflies”— abstract 043

**10:15am-10:30am:** Sandra R. Schachat\*, Jeffrey C. Oliver, and Antónia Monteiro “The evolution of serial homology: eyespot number evolution across wing surfaces of nymphalid butterflies”— abstract 052

**10:30am-10:45am:** Tatsuro Konagaya\* and Mamoru Watanabe “Factors affecting mating activity of virgin males on the sperm number produced in Japanese small yellow sulfur, *Eurema mandarina*”— abstract 031

**10:45am-11:00am:** David Plotkin\* “New species and new distribution records of Caribbean Geometrinae (Lepidoptera: Geometridae)”— abstract 047

**11:00am-11:15am:** BREAK

\* Student presenter in award competition. Additional student papers are included in preceding symposia.

#### CONTRIBUTED PAPERS

Moderator: J.D. Turner

**11:15am-11:30am:** Gregory Pohl “Of Lepidoptera and lists”— abstract 048

**11:30am-11:45am:** Eric H. Metzler “Chihuahuas are not the only critters from the Chihuahuan Desert”— abstract 038

**11:45am-12:00pm:** Leroy C. Koehn “Bait traps for Lepidoptera” – abstract 029

**12:00pm-1:30pm:** LUNCH

**12:45pm-1:30pm:** Book signing, Century Ballroom

CONTRIBUTED PAPERS  
Moderator: Peter Eliazar

**1:30pm-1:45pm:** Ian Kitching “Lepidoptera Species File: a community-editable taxonomic resource for a hyperdiverse group of charismatic insects”– abstract 028

**1:45pm-2:00pm:** Charles V. Covell, Jr. and Craig L. Segebarth “The Kentucky Lepidopterists: 40 years of field work and fellowship, with remarks and reminiscences”– abstract 014

**2:00pm-2:15pm:** William E. Conner, Nicolas J. Dowdy, and Aaron J. Corcoran “The bat-moth arms race”– abstract 012

**2:15pm-2:30pm:** J. Mark Scriber and Matthew Aardema “How fast can speciation occur? – Temporal isolation in recombinant homoploid *Papilio* hybrids”– abstract 053

**2:30pm-2:45pm:** Akito Y. Kawahara, Jesse Breinholt, Brian Leavell, Ian Kitching, and Jesse Barber “Anti-bat behavioral strategies and evolutionary routes in the escalation of the bat-insect arms race”– abstract 027

**2:45pm-3:00pm:** Steve Collins “Africa. Have you ever been there? – abstract 011

**3:00pm-3:15pm:** BREAK

**3:15pm-3:30pm:** Michael M. Collins and John E. Rawlins “Genetic Compatibility across a silk moth hybrid zone” – abstract 010

**3:30pm-3:45pm:** Kim Mitter, Robert W. Poole, and Charles Mitter “Phylogeny of the Corn Earworm Complex (Noctuidae: Heliothinae: *Helicoverpa* spp.) based on amplified fragment length polymorphisms (AFLP) and morphology”– abstract 042

**3:45pm-4:00pm:** Carlos Cordero, Blanca C. Hernandez-Mejia, James S. Miller, and Blanca E. Hernandez-Baños “The corpus bursae as a playing field for male-female coevolution in Lepidoptera”– abstract 013

**4:00pm-4:15pm:** Rod Eastwood, Paul J. Morris, Linda S. Ford, Brendan Haley, Naomi E. Pierce “Digitization of The MCZ Butterfly Collection”– abstract 016

#### BUSINESS MEETING

**4:15pm-4:30pm:** BREAK

**4:30pm-5:00pm:** Business Meeting, Association for Tropical Lepidoptera

#### EVENING EVENTS

**5:00pm-6:15pm:** Cocktails, prefunction area outside Century Ballroom.

**6:30pm-9:00pm:** Annual Banquet, special presentations, awards, and door prizes, Century Ballroom. Introductions, Andrew D. Warren.

William W. McGuire

“The Worldwide Impact of Lepidoptera and Museums”

James S. Miller

"Species Discovery: From the Andes of Peru to Your Own Backyard"

Todd Stout

“LepSoc 2014 Meeting in Park City, Utah”

## Sunday, June 30<sup>th</sup>

### CONTRIBUTED PAPERS

Moderator: Jonathan Pelham

**8:15am-9:00am:** Continental breakfast, Century Ballroom.

**8:55am-9:00am:** Announcements, Jacqueline Y. Miller.

**9:00am-9:15am:** Geoff Martin “The Lepidoptera collections at the Natural History Museum, London, UK”– abstract 035

**9:15am-9:30am:** Stephen C. Mason, Jr., Alain Maasri, and Jon Gelhaus “Grazing impacts on Mongolia’s butterfly fauna at Lake Hovsgol, Mongolia”– abstract 036

**9:30am-9:45am:** Oulimathe Paraiso, Richard Brown, Stephen Hight, Jim Carpenter, Trevor Smith and Ken Bloem “Status of the North American invasion of the Argentine cactus moth, *Cactoblastis cactorum*, and a biological control program against this invasive species”– abstract 044

**9:45am-10:00am:** Jesse Breinholt and Akito Y. Kawahara “Phylogenetic analysis of silk moths and relatives using transcriptomics”– abstract 004

**10:00am-10:15am:** Delano Lewis “Divergence times, historical biogeography, and diversification processes in the Neotropics: a total-evidence approach for the continental radiation of *Heracles* swallowtails”– abstract 034

**10:15am-10:30am:** Jerome Regier, Charles Mitter, Michael Cummings, Don Davis, Cyndy Parr, Susan Weller, Akito Kawahara, Jae Cheon Sohn, John Brown, Joaquin Baixeras, Andreas Zwick, and Adam Bazinet “Status report on the Leptree Molecular Phylogeny Project”– abstract 050

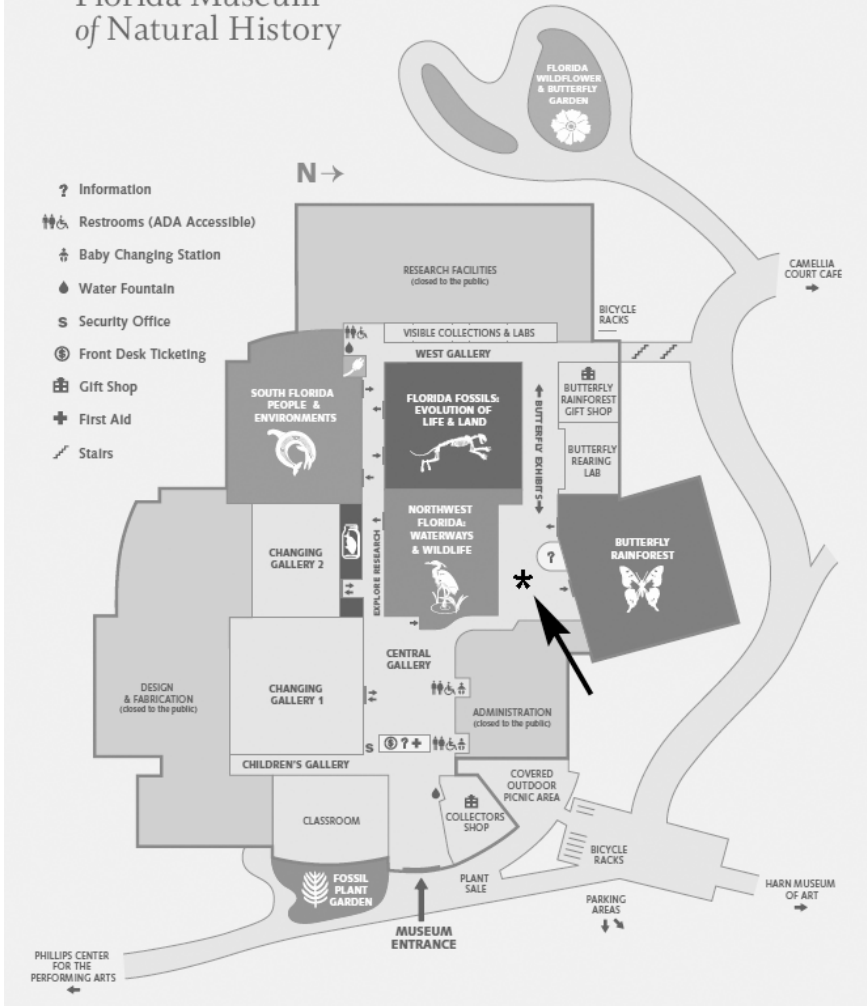
**10:30am-10:45am:** Blanca Huertas and Martin Honey “Past, present and future of storing Lepidoptera genitalia preparations (workshop)” – abstract 024

**10:45am-11:00am:** Todd M. Gilligan and Marc E. Epstein “Contributions to lepidopterology by William E. Miller” – abstract 018

**11:00am-12:00pm:** Business Meeting, The Lepidopterists’ Society

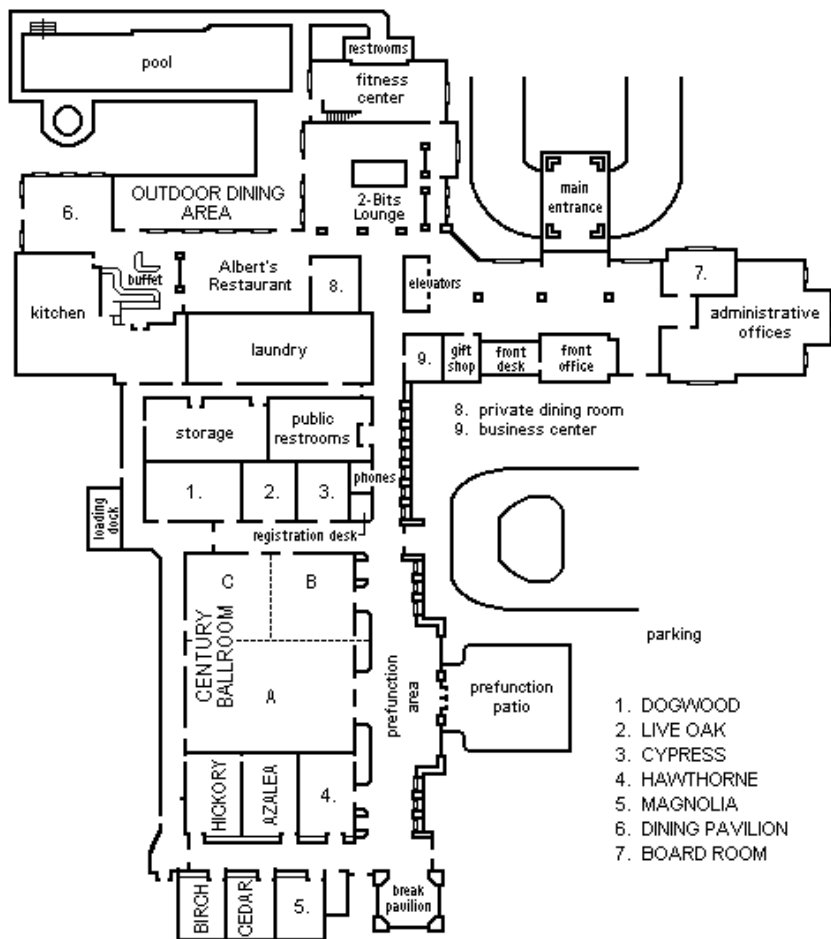
**2:00pm:** Tour of McGuire Center, Andrei Sourakov, meet in lobby near front desk of Powell Hall, Florida Museum of Natural History

# Florida Museum of Natural History



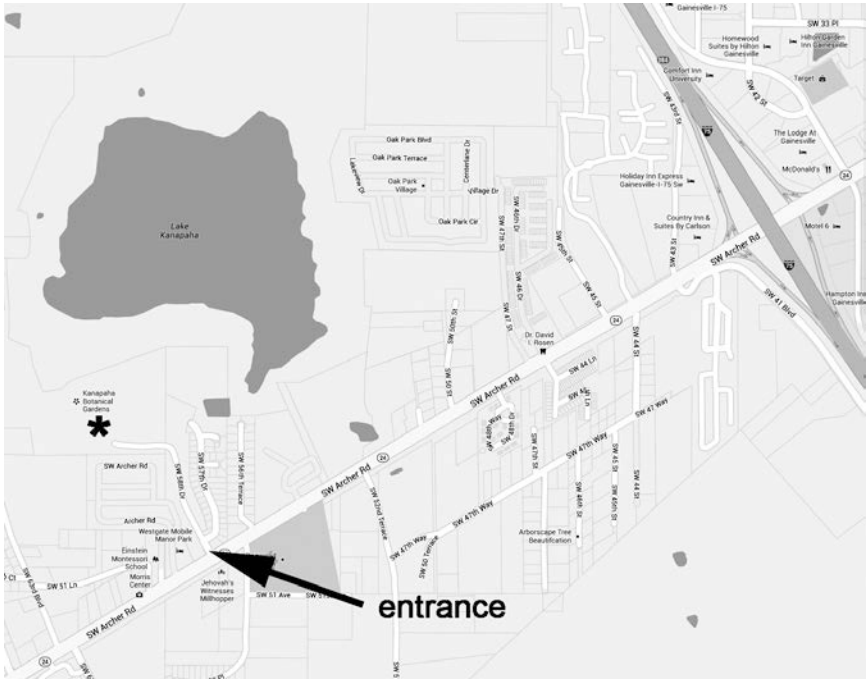
Location of Welcome Reception and Mixer, Powell Hall, Butterfly Rainforest Gallery. Enter museum through the main museum entrance on east side of building.

## HILTON GAINESVILLE / UNIVERSITY OF FLORIDA CONFERENCE CENTER MAIN LEVEL



All meeting sessions, business meeting and the Saturday Banquet will take place in the Century Ballroom. Vendors will be in the Hawthorne Room (4 on map). The Executive Council will meet in the Board Room (7 on map). We will meet outside at the prefunction patio to line up for the group photograph (Friday, 11:55am).





Location of Friday Southern Barbeque at Kanapaha Botanical Gardens:  
 4700 S.W. 58th Drive Gainesville, FL 32608. Entrance on S.W. Archer  
 Road (State Road 24) 1 mile west of Interstate 75 (exit #384)

## POSTERS

Jade Badon\* “The effects of anthropogenic land use on the distribution  
 of butterflies in Negros Oriental, Philippines” – abstract 001

Edward M. Barrows “Characteristics of flower-visiting, adult *Papilio  
 glaucus* (Eastern Tiger Swallowtails, Papilionidae)” – abstract 002

Chris Johns\* “Preliminary molecular phylogeny of the endangered  
 Hawaiian leaf mining moth genus *Philodoria*” – abstract 026

Qianju Jia\* and Akito Y. Kawahara “Systematics, host plants and life histories of *Phyllocnistis* species on citrus (Lepidoptera, Gracillariidae, Phyllocnistinae)” – abstract 025

Delano S. Lewis, James P. Cuda, and Bruce R. Stevens “A novel biorational pesticide: efficacy of Methionine against *Heraclides (Papilio) cresphontes*, a surrogate of the invasive *Princeps (Papilio) demoleus* (Lepidoptera: Papilionidae)” – abstract 033

Gordon Paterson, Geoff Martin, Theresa Howard, Rob Huxley, Darrell Siebert, Vlad Blagoderov, Steve Cafferty, Adrian Hine, Chris Sleep, Mike Sadka, Steve Brooks, Ian Kitching, Peter Wing, Elisa Cane, Flavia Toloni, Joanna Durant, Sara Albuquerque, Lyndsey Douglas, Gerardo Mazzetta, Malcolm Penn, and Victoria Carter “The Natural History Museum, London, UK: iCollections British and Irish Lepidoptera Project” – abstract 045

Francesca Ponce\* and Akito Kawahara “Molecular phylogeny of *Eumorpha* hawkmoths” – abstract 049

## ABSTRACTS

001 – Student Poster

**AUTHOR:** Jade Badon

**CONTACT:** Jade Badon (jadebadon@ufl.edu) McGuire Center, FLMNH, P.O. Box 112710, Gainesville, FL 32611

**TITLE:** The effects of anthropogenic land use on the distribution of butterflies in Negros Oriental, Philippines

**ABSTRACT:** Southeast Asian forests especially in the Philippines are already experiencing massive habitat loss due to anthropogenic land use. The need for conservation efforts in the country is inevitable to mitigate the loss of endemic species. The importance of distributional records is that they are the backbone for conservation plans and extensive research is needed to locate butterfly species. A survey was done in the province of Negros Oriental, Philippines to determine the effects of anthropogenicity on the distribution of butterflies. A total of

16 municipalities and cities with varying habitat modifications and alterations in their landscapes were surveyed. The fieldwork was conducted in the months of May to August, including 12-hours of daily fieldwork for 2 days in each area (Municipalities and Cities). We were able to locate isolated species of butterflies in areas with high anthropogenicity. The most important finding in the survey is that rivers and lakes provided the last resort for butterflies to thrive. Generalists have dominated the landscape while the specialist or territorial ones became range restricted. I found weak negative correlation when number of species was plotted against temperatures. Since the survey covered a much wider range, some areas have significant and non-significant results when species dissimilarity was compared. There were significant differences in species richness and diversity. The habitat heterogeneity caused by anthropogenicity has resulted in the differences in species community and distribution in 16 areas of Negros Oriental. The data that were gathered during the survey can be used for preliminary assessments, especially to those species that were distributed in isolation. Without distributional records, conservation efforts cannot proceed; therefore it is essential to have an idea on the locations of butterfly species to enhance conservation plans, especially in areas with high anthropogenicity.

002 – Poster

**AUTHOR:** Edward M. Barrows

**CONTACT:** Edward M. Barrows (barrowse@georgetown.edu) 5117 Wehawken Road, Bethesda, MD, 20816-2224

**TITLE:** Characteristics of flower-visiting, adult *Papilio glaucus* (Eastern Tiger Swallowtails, Papilionidae)

**ABSTRACT:** To investigate the characteristics of flower-visiting, adult *Papilio glaucus*, I individually marked 1,026 adults caught on flowers in a wooded, suburban neighborhood in the Metropolitan Washington, D.C., Area in the U.S., during six flight seasons. Black-morph and yellow-morph females comprised 28% of the butterflies. About 95% of the butterflies were not seen in the study area after their first days of capture and marking; however, one male periodically returned during 19 days. The butterflies showed a wide range of wing wear, and some individuals had lost parts of their legs, carried parts of spider webs, had

abdominal injuries, or a combination of these things. Tails were not usually the first parts of wings that were damaged.

003

**AUTHORS:** David Bettman and Christopher C. Grinter

**CONTACT:** David Bettman (david.bettman@dmns.org) Denver Museum of Nature & Science, 2001 Colorado Boulevard, Denver, CO 80205-5798)

**TITLE:** The Colorado microlepidoptera survey

**ABSTRACT:** Colorado is a very popular state for lepidopterists, but it has been 115 years since a checklist of all Colorado Lepidoptera (not just the butterflies!) has been published. Upcoming revisions of some of the macromoths of the U.S. are approximately doubling the number of known species, and some specialists estimate that less than 20% of North American micromoths are known to science. The time therefore seems right to focus intensively on Colorado's microlepidopteran fauna, especially given the dramatic changes in habitat and land use in the state over the last few decades. We report very preliminary results of the Colorado Microlepidoptera Survey, begun just three short months ago.

004

**AUTHORS:** Jesse Breinholt and Akito Y. Kawahara

**CONTACT:** McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, 32611

**TITLE:** Phylogenetic analysis of silk moths and relatives using transcriptomics

**ABSTRACT:** It has been presumed that the inclusion of next-gen sequence data into phylogenetic studies will lead to a drastic increase in resolution and node support. While support values tend to increase with the addition of loci, nodes can remain weakly supported. We used bombycoid moths, a traditionally difficult group to resolve inter-familial relationships, as a model to test how codon position and saturation might influence resolution and node support in a large, next-gen dataset. We generated six new transcriptomes and combined these with available genomes and EST data to create a 19 taxon, 938-gene transcriptomic dataset (1,210,419 bp). Maximum likelihood, parsimony, and species tree analysis using gene-tree parsimony resulted in

topological congruence as well as high support. The third codon position was saturated and phylogenetic analysis of this position alone supported a completely different, misleading sister group relationship. We conducted a RADICAL analysis to assess the number of genes needed to fix difficult nodes. One such node needed a total of 850 genes, but only needed 250 when synonymous changes were removed. While transcriptomics can provide the power needed to resolve many difficult phylogenetic relationships, the importance of assessing the effect of synonymous substitutions and third codon positions in next-gen datasets still remains.

005

**AUTHOR:** Lincoln Brower

**CONTACT:** Lincoln Brower (brower@sbc.edu) P.O. Box 2850 Cub Creek Road, Rosseland, VA

**TITLE:** State of monarchy

**ABSTRACT:** The numbers of overwintering monarch butterflies in Mexico hit an all time low during the winter of 2012-2013. I will discuss likely causes and potential mitigations.

006

**AUTHORS:** Richard Brown<sup>1</sup>, Sangmi Lee<sup>2</sup>, and Jeffrey Barnes<sup>3</sup>

**CONTACTS:** <sup>1</sup>Mississippi Entomological Museum, Box 9775, Mississippi State, MS 39762; <sup>2</sup>Hasbourck Insect Collection, Box 874501, Arizona State University, Tempe, AZ 85287; <sup>3</sup>University of Arkansas Arthropod Museum, 319 Agriculture Bldg., Fayetteville, AR 72701

**TITLE:** Asa Fitch and his contributions to microlepidoptera

**ABSTRACT:** In 1854 Asa Fitch became the first salaried, professional entomologist in the United States when he accepted an appointment as the Entomologist for the New York State Agricultural Society. During his career as the state entomologist, he proposed 51 specific and subspecific names for Lepidoptera, of which 29 were in microlepidopterous families. Many of his descriptions were based on adults reared from plants of agricultural or forestry importance, and thus include several well known species. However, in the description of *Anacamptis robiniella*, he described the adult of a gelechiid, the leaf mine of one genus of gracillariid, and the larva of a second genus of

gracillariid. The contributions of Fitch to taxonomy of microlepidoptera and the resolution of the description of a species based on three genera in two families are reviewed.

007 – Student Paper

**AUTHOR:** Jennifer Bundy

**CONTACT:** Jennifer Bundy (jennifer.bundy@southwestmoths.org)

**TITLE:** Life history notes on *Ursia noctuiformis*

**ABSTRACT:** A review of life history observations of *Ursia noctuiformis* includes new documentation of larval morphology, larval behavior, and host plant relationship.

008

**AUTHOR:** John V. Calhoun

**CONTACT:** John V. Calhoun (bretcal1@verizon.net), 977 Wicks Drive, Palm Harbor, FL 34684

**TITLE:** The Dodge Family: an enduring tradition of entomology

**ABSTRACT:** The brothers Edgar A. Dodge and George M. Dodge studied insects during the late 19th and early 20th centuries. They corresponded and exchanged countless specimens with many prominent entomologists. Their younger brother, Charles F. Dodge, collected insects to a lesser extent. The Dodges obtained specimens primarily where they resided in Illinois, Nebraska, Missouri, and California. Edgar's son, Ralph E. Dodge, collected moths, mostly in Nebraska and California. George described 17 taxa of Lepidoptera and Orthoptera.

009

**AUTHOR:** Curtis J. Callaghan

**CONTACT:** Curtis J. Callaghan (curtiscallaghan@yahoo.com) P.O. Box Casa Pica Pau, Floresta de la Sabana, Cra 7 237-04, Bogotá, Colombia

**TITLE:** A biogeographic study of the origin and evolution of the Chacoan Subregion Fauna, as indicated by butterflies of the family Riodinidae (Lepidoptera; Rhopalocera)

**ABSTRACT:** The purpose of this study is to examine the history of the Chacoan subregión, a diagonal of dry savanna formations extending from Northeastern Brazil to central Argentina to determine whether it is

a natural biotic region with its own history, or simply complementary to the Amazon and Atlantic forests, as postulated in various recent publications.

The methodology involved the study of 45 taxa in 10 genera of butterflies of the family Riodinidae that inhabit open vegetation formations in the Chacoan subregion. Panbiogeographic methods were used to identify individual tracks for the study taxa, and PAE (Parsimony Analysis of Endemism) with PCE (progressive elimination of characters) to define general tracks and nodes. These were compared with historical geologic and climatic data of the subregion to determine correlations with the Panbiogeographic results. The sequence of historical events was tested using primary and secondary Brooks Parsimony Analysis.

The principal conclusion was that the results show high correlation with Cenozoic geologic and climatic events from the Oligocene to the present, suggesting a historic division of the provinces comprising the Chacoan subregion distinct from that currently accepted and that the subregion, as well as other South American open formations such as the Colombian Llanos and Sabanas of Venezuela and Roraima constitute natural formations with a history distinct from the Amazon and Atlantic forests.

010

**AUTHORS:** Michael M. Collins and John E. Rawlins

**CONTACT:** Michael M. Collins (michaelmerlecollins@comcast.net)  
Carnegie Museum of Natural History

**TITLE:** Genetic compatibility across a silk moth hybrid zone

**ABSTRACT:** We used experimental hybridization to reveal the genetic fine structure of a hybrid zone in *Hyalophora*. Females from specific transect sites are most compatible with males from their local population, and in mid-zone are fully fecund and fertile, unlike lab hybrids from widely separated parental populations. A hybrid sink was discovered, located in a density trough thought to be the result of a rain shadow. The hybrid sink may partially isolate the mid-zone region, allowing selection to optimize genetic compatibility among hybrid genotypes. The “tension zone” model of a hybrid zone is discussed in

light of these findings. Introgressive hybridization seems to have played an important role in the evolution of the genus *Hyalophora*.

011

**AUTHOR:** Steve Collins

**CONTACT:** Steve Collins (scollins@iconnect.co.ke), African Butterfly Research Institute (ABRI)

**TITLE:** Africa. Have you ever been there?

**ABSTRACT:** Some of the Lepidoptera goings on in Africa are surveyed, from taxonomy, to life histories to ecology — things that we have not seen in other world areas for you to help explain.

012

**AUTHORS:** William E. Conner, Nicolas J. Dowdy, and Aaron J. Corcoran

**CONTACT:** William E. Conner, Department of Biology, Wake Forest University, Winston-Salem, NC 27106

**TITLE:** The bat-moth arms race

**ABSTRACT:** The coevolution of bats and moths has been studied for over 50 years. The story began with the evolution of bat sonar for tracking nocturnal prey. Moths countered with ears tuned to the high frequency of bat echolocation and with evasive action through directed turns, loops, spirals, drops and power dives. Tiger moth (Lepidoptera: Erebidae, Arctiini) produce anti-bat sounds. In some species the sounds advertise moth toxicity, in others they mimic the sounds of toxic species, and in still others they jam the sonar signals of the bats. We have recently taken our laboratory studies of bats and tiger moths back to the field where we use high-speed videography and high frequency microphone arrays to document the bat-moth arms race in 3D.

013

**AUTHORS:** Carlos Cordero, Blanca C. Hernandez-Mejia, James S. Miller, and Blanca E. Hernandez-Baños

**CONTACT:** Carlos Cordero (cordero@ecologia.unam.mx), Instituto de Ecología, Universidad Nacional Autónoma de México, Mexico City

**TITLE:** The corpus bursae as a playing field for male-female coevolution in Lepidoptera



**ABSTRACT:** We discuss the idea and evidence that the corpus bursae (CB) is a “playing field” for sexual coevolution. During and after copulation, male-female interactions take place in the CB that affect the reproductive success of both sexes and could result in the evolution of reciprocal adaptations. We discuss some of these interactions and the natural history of male and female traits that probably evolved as a result of such interactions. The examples considered are (a) direct contact between the inner lining of the CB and endophallus armature (cornuti), and (b) physical and chemical interactions between the CB and the ejaculates contained in it. (Financial support: PAPIIT-UNAM IN208413.)

014

**AUTHORS:** Charles V. Covell, Jr. and Craig L. Segebarth

**CONTACT:** Charles V. Covell (ccovell@flmnh.ufl.edu) McGuire Center, FLMNH, P.O. Box 112710, Gainesville, FL 32611

**TITLE:** The Kentucky Lepidopterists: 40 years of field work and fellowship, with remarks and reminiscences

**ABSTRACT:** The value to the science of lepidopterology of regional societies is demonstrated by nearly 40 years of collecting specimens and data on over 2,500 species of moths and butterflies in Kentucky. Activities and results of this effort, plus benefits to its members and the public, are reviewed, with images of notable meeting and field activities.

015

**AUTHORS:** Jaret C. Daniels, Emily Saarinen, and Justin Saarinen

**CONTACT:** Jaret C. Daniels (jdaniels@flmnh.ufl.edu) McGuire Center, FLMNH, P.O. Box 112710, Gainesville, FL 32611

**TITLE:** Tales of disturbance: the impact of tropical cyclones, invasive species and drought on an endangered South Florida butterfly

**ABSTRACT:** The Miami blue (*Cyclargus thomasi bethunebakeri*) (Lepidoptera: Lycaenidae) was once locally common across much of the south Florida mainland south through the Florida Keys to the Dry Tortugas. Over the last several decades, the taxon's overall geographical distribution and numerical abundance have been severely reduced to the point where only a few isolated extant populations now exist. We conducted a detailed study a single Lower Keys metapopulation and

chronicle how the effects of repeated large and small-scale disturbance events resulted in its slow decline and ultimate extirpation.

016

**AUTHORS:** Rod Eastwood<sup>1</sup>, Paul J. Morris<sup>1,2</sup>, Linda S. Ford<sup>1</sup>, Brendan Haley<sup>1</sup>, and Naomi E. Pierce<sup>1</sup>

**CONTACTS:** <sup>1</sup>The Museum of Comparative Zoology, Harvard University, 26 Oxford St, Cambridge, MA 02138 USA; <sup>2</sup>Harvard University Herbaria, 22 Divinity Ave, Cambridge MA 02138

**TITLE:** Digitization of the MCZ Butterfly Collection

**ABSTRACT:** The Butterfly collection at the Museum of Comparative Zoology has some 200,000 specimens and, like many natural history collections, data are not readily accessible. We have designed a rapid data capture protocol that gains efficiency by separating specimen handling from data capture, through imaging both labels and specimens and then capturing label data from the images. We include machine readable barcodes encoding current determination, higher taxonomy, drawer placement, and specimen number, with failover to OCR. Encoded fields are machine parsed, and then images are presented to data entry personnel and entomologists for the remaining data capture and enhancement.

017 – Student Paper

**AUTHORS:** Marianne Espeland and Naomi Pierce

**CONTACT:** Marianne Espeland (mespeland@fas.harvard.edu), Museum of Comparative Zoology, room 401c, 26 Oxford street, Cambridge, MA 02138

**TITLE:** Molecular phylogeny based on 200+ genes and life history of the phyto-predaceous genus *Lepidochrysops* (Polyommagini, Lycaenidae)

**ABSTRACT:** More than 99.99% of the 200 000 described Lepidoptera are phytophagous, but around 450 species are aphytophagous and feed mainly on other insects or their secretions. Aphytophagy is most common in the butterfly family Lycaenidae where it has evolved independently several times, mostly as single species in otherwise phytophagous clades. One exception is the afrotropical genus *Lepidochrysops* (*Euchrysops* section, Polyommagini) with 137 species, all assumed to be predaceous on ant brood or fed by trophallaxis. Little is

known about their life history, the relationships among the five genera in the section, and about the relationships among species within *Lepidochrysops*. I apply next generation sequencing techniques to sequence 200-500 loci per specimen and use these to construct a robust phylogenetic hypothesis for the *Euchrysops* section.

018

**AUTHORS:** Todd M. Gilligan and Marc E. Epstein

**CONTACTS:** Todd M. Gilligan (tgilliga@gmail.com), Colorado State University, Bioagricultural Sciences and Pest Management, 1177 Campus Delivery, Fort Collins, CO 80523; Marc E. Epstein, Plant Pest Diagnostics Branch, California Department of Food and Agriculture, 3294 Meadowview Road, Sacramento, CA 95832

**TITLE:** Contributions to lepidopterology by William E. Miller

**ABSTRACT:** William E. "Bill" Miller (1930-2013) contributed to the study of Lepidoptera for over six decades. After obtaining M.Sc. and Ph.D. degrees from Ohio State he served as Project Leader for the U.S. Forest Service from 1956-1982. He finished his career as a professor in the in the Minnesota Department of Entomology, where he generously contributed to teaching, mentoring, and service for more than 20 years. Dr. Miller authored more than 130 publications, primarily on the Olethreutinae (Tortricidae), but also on other topics such as body size, correlations between adult feeding and oviposition, and many others. Bill was a dedicated life member of the Lepidopterists' Society. He served on the Executive Council, as Journal editor, and as Memoir editor. He received one of the Society's highest honors, the William D. Winter Service Award, in 2007. We were privileged and thankful to have the talents, contributions, and scholarly spirit of William E. Miller. His legacy will live on in his publications, students, and friends.

019 – Student Paper

**AUTHORS:** Dale Halbritter and Jaret Daniels

**CONTACT:** Dale Halbritter (dhalb001@ufl.edu) Department of Entomology and Nematology, University of Florida, Gainesville, FL 32611

**TITLE:** Integrating historical biogeography and ecology to explain the distribution patterns of pine butterflies (Lepidoptera: Pieridae)

**ABSTRACT:** Attaining a mechanistic understanding of biodiversity patterns remains one of the greatest challenges for ecologists. This research will examine factors that potentially shape the distributions of two allopatric butterfly species: *Neophasia menapia* and *Neophasia terlooii* (Lepidoptera: Pieridae). The first objective is to quantify the genetic variation within each species, identify genetically isolated populations, and to estimate the time of divergence between species and isolated populations. The second objective is to determine the palatability of each species to birds and to investigate the potential for mimicry in adult female *N. terlooii*. The final objective is to determine the minimum temperature tolerances of each species during the overwintering egg stage. Results of this research will provide an insight to the historical conditions under which these species diverged and the contemporary ecological factors that are maintaining their non-overlapping ranges.

020

**AUTHOR:** Jason P. W. Hall

**CONTACT:** Jason P. W. Hall (halljrios@yahoo.com) Smithsonian Institution

**TITLE:** Wing pattern evolution and mimicry in the Riodinidae: an example from the Nymphidiina

**ABSTRACT:** Wing pattern evolution in the family Riodinidae is examined through the lens of the large subtribe Nymphidiina (c. 160 spp.). After more than 15 years of study, a monograph of this group has been completed (c. 900 pp.; to be published in the coming months), which includes a comprehensive morphology-based phylogenetic hypothesis for the entire tribe (c. 320 spp.). This cladogram is used as the foundation for a discussion on the evolution of sexual dimorphism, non-mimetic wing patterns, and mimicry in the Nymphidiina. I have identified seven main mimetic wing pattern types in the Nymphidiina, and each of the corresponding mimicry rings is examined. The evolution of female wing patterns in the mimetic genus *Setabis* is discussed in detail.

021

**AUTHORS:** James E. Hayden and Richard Mally

**CONTACTS:** James E. Hayden (James.Hayden@freshfromflorida.com), FDACS-DPI, 1911 SW 34th Street, Gainesville, FL 32608; Richard Mally (Richard.Mally@senckenberg.de) Senckenberg Natural History Collections, Museum of Zoology, Königsbrücker Landstraße 159, D-01109, Dresden, Germany

**TITLE:** Review of the *Leucinodes* group (Crambidae: Spilomelinae)

**ABSTRACT:** The *Leucinodes* group comprises a few genera of pyraloids that feed on Solanaceae. Some species are crop pests, and diversity is greatest in the New World. Focusing on North America and the Caribbean, we restrict the Nearctic fauna to *Neoleucinodes*, *Lineodes*, and *Atomopteryx*, excluding *Udea* and *Lamprosema*. We provide diagnostic characters for the adults and immature stages, behavioral notes, and known distributions.

022

**AUTHORS:** Peter R. Houlihan<sup>1,2,5</sup>, Mark E. Harrison<sup>2,3</sup>, Nicholas C. Marchant<sup>2</sup>, and Susan M. Cheyne<sup>2,4,5</sup>

**CONTACTS:** <sup>1</sup>Department of Biology and McGuire Center for Lepidoptera & Biodiversity, Florida Museum of Natural History, University of Florida, USA; <sup>2</sup>The Orangutan Tropical Peatland Project, Center for the International Cooperation in Sustainable Management of Tropical Peatlands, University of Palangka Raya, Indonesia; <sup>3</sup>Department of Geography, University of Leicester, UK; <sup>4</sup>Wildlife Conservation Research Unit (WildCRU), Department of Zoology, Oxford University, UK; <sup>5</sup>Barito River Initiative for Nature Conservation and Communities (BRINCC), Murung Raya, Indonesia

**TITLE:** Butterflies amidst the modern era of exploitation on Borneo: their diversity, ecology, and conservation

**ABSTRACT:** Borneo, the third largest island in the world, harbors some of the most intricate tropical ecosystems on the planet. Once a vast impenetrable expanse of rainforest, the Borneo of today is imperiled by habitat conversion to palm oil plantations, logging, and gold and coal extraction. Over the past five years, our research and conservation efforts concerning the butterflies of Borneo have focused on understanding the island's complex diversity and seasonality, while also

establishing protocols for continued biodiversity monitoring. Working with communities and universities across Indonesian Borneo, our studies utilize butterflies to assess habitat quality, explore long-term trends in community ecology, and aim to ensure the future preservation of endemic species. With this in mind, Peter Houlihan will present our ongoing multifaceted projects on Bornean butterflies.

023

**AUTHOR:** Blanca Huertas

**CONTACT:** Blanca Huertas (B.Huertas@nhm.ac.uk) Life Sciences Department, Natural History Museum London, SW7 5BD, UK

**TITLE:** The Riodinidae at BMNH: modernising the 200 year+ old collections and why scale matters

**ABSTRACT:** The Riodinidae (Metalmarks) is one of the most fascinating butterfly families containing c 1300 species, mostly distributed in the tropics but represented in Europe. This family is a poorly studied group and the BMNH collection has more than half of the types of all species in this family, meaning it is the most important collection of this group in the world. A large scale project was set up to re-organising the circa of 75,000 specimens kept originally in a collection of more than thousand drawers last curated in 1950s. The Metalmark's project was completed last year, taking approximately 650 full time working days to produce a state of the art Riodinidae collection, stored in 750 new drawers, catalogued and fully accessible to all researchers. The challenges of this and other current curatorial projects of large scale are discussed too.

024

**AUTHORS:** Blanca Huertas and Martin Honey

**CONTACT:** Blanca Huertas (B.Huertas@nhm.ac.uk) Life Sciences Department, Natural History Museum London, SW7 5BD, UK

**TITLE:** Past, present and future of storing Lepidoptera genitalia preparations (workshop)

**ABSTRACT:** There appears to be no global standard for storing genitalia preparations. This workshop will provide the opportunity for a discussion with curators and collection keepers on the importance of genitalia preparations and best practices for storage of these small but

very important structures. The session will be led by staff of the Natural History Museum (BMNH), probably one of the world's largest genitalia collections with c. 25,000 vials and more than 200,000 slides. Vial preparations are simpler to produce and storage in glycerol allows the 3D structure to be permanently visible whilst slides are more complex to prepare but structures are safely protected and more accessible to study [easier to make comparisons, photographs, etc.]. The discussion is open to all in favour or against each method.

025 – Student Poster

**AUTHORS:** Qianju Jia and Akito Y. Kawahara

**CONTACT:** Qianju Jia (qianjujia@ufl.edu) McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, 32611

**TITLE:** Systematics, host plants and life histories of *Phyllocnistis* species on citrus (Lepidoptera, Gracillariidae, Phyllocnistinae)

**ABSTRACT:** The pheromone specific for citrus leafminer (*Phyllocnistis citrella*, CLM) is currently used for monitoring moth density, timing of insecticide sprays, and correlation to leaf damage assessments. The pheromone traps would be most useful if they were species specific. In 2011 and 2012, bucket traps loaded with CLM lure were placed at various locations and distances from citrus (commercial groves and Okaloacoochee Slough) in Collier and Hendry Counties, Florida. Multiple species of *Phyllocnistis* were found in the presumably CLM-specific pheromone traps. Samples of moths were collected, separated by morph type, and sent to the Kawahara lab for PCR. Preliminary analysis of the Cytochrome Oxidase subunit 1 (CO1) gene shows that there are at least five species are attracted to traps, three of them are described species (*Phyllocnistis insignis*, *Phyllocnistis citrella* and *Phyllocnistis vitegenella*) while the other two are possibly new species. Our study will identify or describe the unknown species by using both morphological and molecular data. A deeper understanding of relationships among species in this genus will be achieved through phylogenetic systematics. The research is broadly applicable to agriculture because it may reveal that there is more than one species of *Phyllocnistis* feeding on citrus and can provide the basic taxonomic information for the developing of a

more specific pheromone which will be beneficial for monitoring, controlling and effective quarantine of Citrus Leafminer.

026 – Student Poster

**AUTHOR:** Chris Johns

**CONTACT:** Chris Johns (johns.chris.a@gmail.com) McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, 32611

**TITLE:** Preliminary molecular phylogeny of the endangered Hawaiian leaf mining moth genus *Philodoria*

**ABSTRACT:** The leaf mining moth genus *Philodoria* includes 30 poorly studied species, endemic to the Hawaiian Islands. Most species are monophagous, feeding internally within the leaf of a single plant species, but the genus is known to feed on as many as 12 different plant families. Approximately 75% of the group's host plants are threatened or endangered (IUCN 2012), making these moths particularly vulnerable. A comprehensive systematic treatment has not been conducted in over thirty years, and the systematics, phylogenetics, and conservation status of many of these moths remains largely unknown. In this talk, we will present preliminary data from recent systematic and phylogenetic work on *Philodoria* and discuss future plans to study the biogeography of the group.

027

**AUTHORS:** Akito Y. Kawahara<sup>1</sup>, Jesse Breinholt<sup>1</sup>, Brian Leavell<sup>2</sup>, Ian Kitching<sup>3</sup>, and Jesse Barber<sup>2</sup>

**CONTACTS:** <sup>1</sup>McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, 32611;

<sup>2</sup>Department of Biology, Boise State University, Boise, ID, 83725;

<sup>3</sup>Department of Entomology, The Natural History Museum, London, UK

**TITLE:** Anti-bat behavioral strategies and evolutionary routes in the escalation of the bat-insect arms race

**ABSTRACT:** Bat-insect interactions date back millions of years, and the shared evolutionary history between echolocating bats and nocturnal insects have resulted in a suite of unique defensive strategies. Tiger moths have escalated the arms race by beaming ultrasonic response signals back at bats. In tiger moths, these sounds have been shown to



warn bats of bad taste, function in acoustic mimicry complexes and jam bat biosonar. We will discuss our recent discovery that hawkmoths also produce ultrasound in response to bat attack. Unlike tiger moths, hawkmoths are not chemically defended, only males produce ultrasound and the structure of the sound-producing organ varies greatly across the family. This raises the prospect that anti-bat ultrasound production may be linked to multiple additional behavioral strategies, including cross-family acoustic mimicry, advertisement of physical defenses and/or evasive flight; and that hawkmoth ultrasonic reply to bat attack has multiple independent evolutionary origins. We will consider data from three main technical approaches: 1) high-speed filming experiments of bat-moth interactions in the lab, 2) playback of bat echolocation attacks to moths in the field and 3) construction of an evolutionary tree built on molecular (DNA) data that we are using to examine the historical transitions of anti-bat ultrasound production.

028

**AUTHOR:** Ian Kitching

**CONTACT:** Ian Kitching (i.kitching@nhm.ac.uk), The Natural History Museum, Cromwell Road, London, SW7 5BD

**TITLE:** Lepidoptera Species File: a community-editable taxonomic resource for a hyperdiverse group of charismatic insects

**ABSTRACT:** For decades the 'Card Index' created and maintained (until 1982) by the Natural History Museum, London has been one of the most valuable go-to global resources for Lepidoptera names and synonymies. In 2003 the Card Index was digitised and made available on the web as 'LepIndex' accessible through NHM's website. Despite the lack of consequent updates for two decades, LepIndex was widely considered the most complete online database of Lepidoptera names and as such was fed into other online global resources such as Species2000, CoL and EoL. Over the decade since LepIndex was created the resource's limitations and errors have become abundantly clear. In 2011 we therefore started the lengthy process of cleaning up and updating LepIndex with the ultimate aim of moving the resources to a more user-friendly and accessible (editable) platform. We are in a position to migrate the updated and up-to-date database to Species Files with the aim (hope) of engaging the international Lepidopterists

community in the continuous maintenance of an unique taxonomic resource.

029

**AUTHOR:** Leroy C. Koehn

**CONTACT:** Leroy C. Koehn (Leptraps@aol.com) 3000 Fairway Court, Georgetown, KY 40234

**TITLE:** Bait traps for Lepidoptera

**ABSTRACT:** I will review the history of Lepidoptera bait traps and discuss how to use them, their various types, designs, construction and material. Live catch types and kill type bait traps will be covered as well as the bait – sweet, sour, and downright revolting.

030 – Student Paper

**AUTHOR:** Sandra Koi

**CONTACT:** Sandra Koi (sandyk@ufl.edu) University of Florida, Entomology/Nematology Department & McGuire Center for Lepidoptera and Biodiversity

**TITLE:** New and revised life history of *Eumaeus atala* (Lepidoptera: Lycaenidae)

**ABSTRACT:** Southeast Florida is part of the Caribbean archipelago and a biodiversity hotspot for conservation priorities, with many endangered species precinctive to the Lower Peninsula. The tropical butterfly *Eumaeus atala* Poey 1832 (Lepidoptera: Lycaenidae), once considered extinct, has made a significant population increase in southeast Florida during the past thirty years, but is considered “Imperiled” by the State of Florida because of its unpredictable crash-eruption cycles, isolated colonies and high vulnerability to stochastic weather events. Published papers that mention life history traits contain numerous discrepancies and conjectures. This research clarified disagreeing reports, filled in critical gaps in our understanding and documented unknown aspects concerning its life history, ultimately helping develop best management practices for this and other pine rockland taxa, such as Bartram’s Hairstreak (*Strymon acis*).

031 – Student Paper

**AUTHORS:** Tatsuro Konagaya and Mamoru Watanabe

**CONTACT:** Tatsuro Konagaya (kyokoku@hotmail.co.jp) Shibasaki 68-37-102, Tsukuba, Ibaraki Pref., Japan

**TITLE:** Factors affecting mating activity of virgin males on the sperm number produced in Japanese small yellow sulfur, *Eurema mandarina*

**ABSTRACT:** Low mating activity of male *Eurema mandarina* after emergence has been observed in summer generations. In the laboratory, spermatophore size transferred and the numbers of eupryne and apryne spermatozoa in the spermatophore were increased with age of the virgin males. During 2 weeks after emergence, virgin males continued to increase the ejaculates including both types of sperm. Because females mate multiple throughout her lifespan, the younger males less than 2 weeks old may suffer disadvantageous for sperm competition against the older ones due to so small spermatophore transferred. Therefore, low mating activities of younger males have a waiting strategy until the accumulation of the full-size for ejaculation and full number of sperm in his reproductive organs.

032

**AUTHORS:** Jean-François Landry, Vazrick Nazari, Jeremy R. deWaard, Marko Mutanen, Carlos Lopez Vaamonde, Peter Huemer, and Paul D. N. Hebert

**CONTACT:** Vazrick Nazari (nazariv@agr.gc.ca), Agriculture and Agri-Food Canada, Eastern Cereal and Oilseed Research Centre, C.E.F., Ottawa, Ontario K1A 0C6, Canada

**TITLE:** Thirty intercontinental colonizations revealed by DNA barcoding of Holarctic microlepidoptera

**ABSTRACT:** This study reports 30 species of Lepidoptera that are newly recorded from both Europe and North America. Their Holarctic distributions were initially detected through DNA barcode analysis, and subsequently confirmed by morphological examination. When possible, the origin and status of each species (introduced, overlooked Holarctic species, or unknowingly re-described) is discussed, and it is morphologically diagnosed and illustrated. The species involved include Tineidae: *Scardia amurensis* Zagulajev, *Triaxomera parasitella* (Hübner), *Nemapogon cloacella* (Haworth), *Elatobia montelliella* (Schantz), *Tinea svenssoni* Opheim; Gracillariidae: *Caloptilia suberinella* (Tengström), *Parornix betulae* (Stainton); *Phyllonorycter maestingella* (Müller);

Yponomeutidae: *Paraswammerdamia albicapitella* (Scharfenberg), *P. conspersella* (Tengström; Plutellidae: *Plutella hyperboreella* Strand; Lyonetiidae: *Lyonetia pulverulentella* Zeller; Autostichidae (Symmocinae): *Oegoconia deauratella* (Herrich-Schäffer), *O. novimundi* (Busck); Blastobasidae: *Blastobasis glandulella* (Riley), *B. maroccanella* (Amsel), *B. tarda* Meyrick; Depressariidae: *Agonopterix conterminella* (Zeller), *Depressaria depressana* (F.); Coleophoridae: *Coleophora atriplicis* Meyrick, *C. glitzella* Hofmann, *C. granulata* Zeller, *C. texanella* Chambers, *C. vitisella* Gregson; Scythrididae: *Scythris sinensis* (Felder & Rogenhofer); Gelechiidae (Gelechiinae): *Altenia perspersella* (Wocke), *Gnorimoschema jalavai* Povolný, *Scrobipalpa acuminatella* (Sircom), *Sophronia gelidella* Nordman; Choreutidae: *Anthophila fabriciana* (L.) Tortricidae (Olethreutinae): *Phiaris bipunctana* (F.). Prior oversight of these cases of faunal overlap has led to the redescription of several species. Five new synonyms are proposed: *Blastobasis glandulella* (Riley, 1871) = *B. huemeri* Sinev, 1993, syn. nov., *B. tarda* Meyrick, 1902 = *Neoblastobasis ligurica* Nel & Varenne, 2004, syn. nov., *Coleophora atriplicis* Meyrick, 1928 = *C. cervinella* McDunnough, 1946a, syn. nov., and *C. texanella* Chambers, 1878 = *C. coxi* Baldizzone & van der Wolf, 2007, syn. nov. and = *C. vagans* Walsingham, 1907. Lectotypes are designated for *Blastobasis tarda* Meyrick and *Coleophora texanella* Chambers. Type specimens were examined where pertinent to establish new synonymies.

033 – Poster

**AUTHOR:** Delano S. Lewis, James P. Cuda, and Bruce R. Stevens

**CONTACT:** Delano S. Lewis (delano.lewis@ncu.edu.jm) Northern Caribbean University

**TITLE:** A novel biorational pesticide: efficacy of Methionine against *Heraclides (Papilio) cresphontes*, a surrogate of the invasive *Princeps (Papilio) demoleus* (Lepidoptera: Papilionidae)

**ABSTRACT:** The Southeast Asian citrus-feeding butterfly *Princeps (Papilio) demoleus* (L.) was recently introduced into the Americas, causing an imminent threat to citrus production and ornamental flora. The human nutrient amino acid methionine has been shown by us to disrupt amino acid modulated ion transport systems in caterpillars and other insect larvae that possess an alkaline midgut. *Heraclides (Papilio)*

*crephontes* was bioassayed as a United States Department of Agriculture permitted surrogate of the Florida quarantined *P. demoleus* to test the potential efficacy of methionine. Larvae were allowed to feed ad libitum on wild lime plants with leaves treated with methionine or proline. Methionine caused 100% mortality in first through fourth instars in a time- and dose dependent manner, as determined by probit analysis whereas proline was not toxic. Wild lime host plants did not exhibit phytotoxicity with methionine treatments during a 14 d test period. It is concluded that methionine is an effective larvicide against *H. crephontes*, and therefore may be a candidate environmentally safe biorational pesticide for use against invasive *P. demoleus* in the Americas.

034

**AUTHOR:** Delano S. Lewis, Shinichi Nakahara, Felix A.H. Sperling, Adam M. Cotton, Akito Y. Kawahara, and Fabien L. Condamine

**CONTACT:** Delano S. Lewis (delano.lewis@ncu.edu.jm) Northern Caribbean University

**TITLE:** Divergence times, historical biogeography, and diversification processes in the Neotropics: a total-evidence approach for the continental radiation of *Heraclides* swallowtails

**ABSTRACT:** Explaining how Neotropical diversity has assembled and evolved over time is a challenging issue in biogeography and ecology. Different hypotheses on the origin and diversification of this biodiversity have led to better understand its distribution patterns and diversity dynamics. However, integrative studies including molecular and morphological data for a complete sampling of species-rich Neotropical group are essentially lacking resulting in a poor comprehension of the processes governing the biodiversity through space and time. Here, a total-evidence phylogenetic approach is used to reconstruct evolutionary history for the *Papilio* subgenus *Heraclides*. Namely, two mitochondrial genes and one nuclear gene were sequenced and 133 morphological characters of larvae and adults (external and genitalia) were coded. Both maximum parsimony and Bayesian analyses reconstructed robust and well-resolved phylogenies. Molecular dating and biogeographic analyses inferred an early Miocene origin. The time-calibrated tree is best explained by a museum model of diversity in

which both speciation and extinction rates remained variables through time. Eventually, we inferred a slight slowdown in diversification rate since the early Pleistocene, probably attributable to the glaciation events. By assessing both continental and fine-scale biodiversity patterns, this study brings new findings to elucidate spatio-temporal macroevolutionary processes within the Neotropical Region.

035

**AUTHOR:** Geoff Martin

**CONTACT:** Geoff Martin (g.martin@nhm.ac.uk) Natural History Museum, London, UK

**TITLE:** The Lepidoptera collections at the Natural History Museum, London, UK.

**ABSTRACT:** The collections at the NHM are amongst the largest in the world (10,000,000 specimens) and certainly the most type rich (125,000 primary Types). Whilst familiar to many, the collections have undergone considerable changes in the last few years prompted by the move into a new building in 2009 which allowed a complete reorganisation of the collections. I will be presenting an update of the collections including an overview of the collection organisation, current staff working on the collections and their research and projects. In particular I will outline how digitisation is making the collection much more accessible to the research community.

036

**AUTHORS:** Stephen C. Mason, Jr.<sup>1</sup>, Alain Maasri<sup>2</sup>, and Jon Gelhaus<sup>3</sup>

**CONTACTS:** <sup>1</sup>Curatorial Assistant, The Academy of Natural Sciences; <sup>2</sup>Post-doctoral Researcher, The Academy of Natural Sciences; <sup>3</sup>Curator, The Academy of Natural Sciences; Stephen C Mason, Jr. (mason@ansp.org) 1900 Benjamin Franklin Parkway Philadelphia, Pennsylvania 19103

**TITLE:** Grazing impacts on Mongolia's butterfly fauna at Lake Hovsgol, Mongolia

**ABSTRACT:** Overgrazing in Mongolia, a country with a strong tradition of nomadic pastoralism, can have impacts on butterfly communities through direct trampling and eating resulting in reduction of host plants of caterpillars and nectar sources and vegetative protection for adult

butterflies. Mongolia has a diverse butterfly fauna of close to 400 known species, and this diversity and abundance is a factor in ecotourism. This study was designed to determine if overgrazing might be impacting the butterfly communities at Lake Hovsgol National Park. In July of 2012, baseline data was collected by using Pollard Walk transects were set up in three tributary valleys of Lake Hovsgol, to assess diversity and abundance of butterflies in comparable vegetative communities with differing levels of grazing intensity. Streamside meadows were surveyed at lower, middle, and upper sections of each stream drainage. Timed observations were carried out twice a day along two different 100 meter transects. To quantify grazing impact on vegetation, along each transect one meter plots were examined. In addition, qualitative butterfly surveying was conducted at each site to measure diversity of all species in all habitats. The analysis of the Pollard Walk census in relation to grazing intensity and vegetation characteristics will be presented.

037

**AUTHOR:** Deborah L. Matthews

**CONTACT:** Deborah Matthews (dlott@flmnh.ufl.edu), McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL, 32611

**TITLE:** Florida plume moths: some recent discoveries and a synopsis of the known fauna

**ABSTRACT:** An annotated checklist of Florida Pterophoridae in 1990 included 32 species. Counting questionably established species and recurring agricultural importations, 42 species are currently known from Florida. An overview and summary of recent updates to the fauna will be presented. Specific developments include description of new species, additions to the fauna, recent identifications, nomenclature changes, new life history information, and population updates.

038

**AUTHOR:** Eric H. Metzler

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**TITLE:** Chihuahuas are not the only critters from the Chihuahuan Desert

**ABSTRACT:** The Chihuahuan Desert, North America's largest desert, scarcely enters the southwestern US. Even without iconic Joshua trees of the Mojave Desert or Saguaro cacti of the Sonoran Desert, the Chihuahuan Desert is the most biologically diverse in NA; yet the moth fauna is poorly known. Descriptive and faunistic lepidopteran works in the Chihuahuan Desert by US workers are recent (Blanchard, Bordelon, Ferguson, Franclemont, Knudson, and Metzler). No descriptive and faunistic lepidopteran works exist for the Chihuahuan Desert in Mexico. Metzler's studies to detect and describe new species for the National Park Service in the small New Mexican portion of the Chihuahuan Desert found many endemic species. More than 20 are in the highly specialized habitats of the gypsum white sands desert. In consultation with Ed Knudson, several other undescribed Chihuahuan Desert endemics from western Texas were found to occur in southern New Mexico.

039

**AUTHORS:** Jacqueline Y. Miller<sup>1</sup>, Lee D. Miller<sup>1</sup>, and Michael A. Ivie<sup>2</sup>

**CONTACTS:** <sup>1</sup>McGuire Center for Lepidoptera and Biodiversity, University of Florida, Gainesville, FL; <sup>2</sup>Michael A. Ivie, Plant Sciences and Plant Pathology, Montana State University, Bozeman, MT

**TITLE:** A new lepidopteran fossil from the Canyon Ferry Reservoir deposit in southwestern Montana (Lepidoptera: Nymphalidae: Satyrinae)

**ABSTRACT:** Luikhart et al. (1995) discovered and CoBabe et al (2002) published a detailed report of an insect and plant Lagerstaate from a Tertiary lake deposit along the Canyon Ferry Reservoir in southwestern Montana. The wide diversity of excellent quality Oligocene fossils includes representatives of 37 families of insects and more than 40 plant taxa. Among the insect fossils was well preserved forewing of a satyrine butterfly (Lepidoptera: Nymphalidae: Satyrinae). A comparative analysis of extant taxa indicated that this specimen should be placed in the genus *Lethe* and was recently described as *Lethe montana*. The diagnostic features and evolutionary implications of this new fossil will be discussed.



040

**AUTHOR:** James S. Miller

**CONTACT:** James S. Miller (hairmuler@gmail.com), 5465 S Ingleside Ave, Chicago, IL, 60615

**TITLE:** Diversity of Prominent Moths (Notodontidae) in North America

**ABSTRACT:** Franclemont (1983) and Lafontaine & Schmidt (2010) listed 137 species of Notodontidae for the North American fauna. Research for the Prominent Moth fascicle - to be published in the "Moths of North America" series - has revealed 188 notodontid species occurring north of the US-Mexico border, a surprising amount of unrecognized diversity in a group of moths that are relatively large-bodied, conspicuous, and easy to collect. Despite nearly a century of intensive moth collecting by a legion of lepidopterists, new notodontid species have been recently discovered in regions such as the Great Basin, West Texas, and Southeastern Arizona. Even California and Florida have produced some hidden gems. More new and/or unrecognized species undoubtedly remain to be found across the United States and Canada.

041

**AUTHOR:** Marc C. Minno

**CONTACT:** Marc C. Minno (marc.minno@gmail.com) Eco-Cognizant, Inc. 600 NW 35<sup>th</sup> Terrace, Gainesville, FL 32607

**TITLE:** Climate change and southeastern U.S. island faunas: butterflies of Cumberland Island, Camden County, Georgia

**ABSTRACT:** The Lepidoptera of barrier islands in the southeastern U.S. are very poorly known, yet these places are likely to be greatly influenced by sea level rise and other climate change effects. I searched for butterflies on Cumberland Island, Camden County Georgia on 26 days between June 26, 2010 and September 21, 2012. I also used bait traps on several occasions. I found 68 species of butterflies. The most abundant species was *Eurema daira* with at least 1,583 adults observed. Other common species were *Agraulis vanillae*, *Panoquina panoquin*, *Phoebis sennae*, *Phyciodes phaon*, *Pterourus palamedes*, *Eurytides marcellus*, and *Junonia coenia*. About 25% of the fauna is of tropical affinity. Some migratory species were only ephemerally present.

042

**AUTHORS:** Kim Mitter, Robert W. Poole, and Charles Mitter

**CONTACT:** Kim Mitter (kmitter@umd.edu), University of Maryland

**TITLE:** Phylogeny of the Corn Earworm Complex (Noctuidae: Heliothinae: *Helicoverpa* spp.) based on amplified fragment length polymorphisms (AFLP) and morphology

**ABSTRACT:** The circum-global genus *Helicoverpa* contains 19 species including several highly destructive agricultural pests. Previous studies of morphology and of protein-coding nuclear gene sequences had left the phylogeny of these species largely unresolved. We collected AFLP data (1895 fragments) on 84 specimens representing ten *Helicoverpa* species and two species of *Australothis*. Phylogenetic analyses strongly support monophyly for each species and conflict only slightly with morphology-based hypotheses. The first lineage to diverge contains two Hawaiian island endemics. Next are the Australian *H. punctigera* plus the South American *gelotopoeon* and *atacamae*. The most advanced lineages comprise *H. fletcheri* (Africa) plus *assulta* (Africa/Asia/Australia) on one hand, and a second group that includes *H. zea* (the New World corn earworm), *hardwicki* (Australia), and *armigera* (the Old World budworm).

043 – Student Paper

**AUTHORS:** Naoki Muto and Mamoru Watanabe

**CONTACT:** Naoki Muto (l8v9.mtnk@gmail.com), University of Tsukuba, Amakubo3-7-5, Tsukuba, Ibaraki Pref., Japan

**TITLE:** Eupyrene sperm migration in relation to the number of apyrene sperm transferred in the swallowtail butterflies

**ABSTRACT:** During a copulation, male butterflies transfer a single spermatophore containing two types of sperm, eupyrene and apyrene sperm. After copulation, both types of sperm migrate from the bursa copulatrix to the spermatheca. The role of apyrene sperm assisting the migration of eupyrene spermatozoa was examined. The number of sperm in each type in the spermatophore of the swallowtail butterflies, *Papilio xuthus* and *P. protenor*, showed that *P. protenor* male transferred more eupyrene and less apyrene sperm than *P. xuthus* male. However, the number of each sperm type arrived at the spermatheca was not different in both species. Eupyrene spermatozoa of *P. protenor* in the

spermatheca was more active than that of *P. xuthus*, suggesting that eupyrene spermatozoa could migrate with less help of apyrene sperm.

044

**AUTHORS:** Oulimathe Paraiso, Richard Brown, Stephen Hight, Jim Carpenter, Trevor Smith and Ken Bloem

**CONTACT:** Oulimathe Paraiso

(oulimathe.paraiso@freshfromflorida.com) Division of Plant Industry, FDACS, 1911 SW 34th St. Gainesville, FL 32608

**TITLE:** Status of the North American invasion of the Argentine cactus moth, *Cactoblastis cactorum*, and a biological control program against this invasive species

**ABSTRACT:** Discovery of *Cactoblastis cactorum* Berg (Pyralidae, Phycitinae) in Florida raised concern for the damage this insect will cause to native species of *Opuntia* cactus. The moth has spread rapidly along the Atlantic coast past Charleston, SC, and along the Gulf coast into Louisiana. Host range studies determined that most populations of *Opuntia* spp. in North America are at risk of being reduced in size, and that negative population impacts are likely. With the cessation of efforts limiting the spread of *C. cactorum*, population management strategies, such as biocontrol, have been initiated. An Argentine parasitoid, *Apanteles opuntiarum* (Braconidae), was introduced into Florida quarantine for host specificity tests on native US Lepidoptera. The braconid appears host specific in Argentina and is an important mortality factor.

045 – Poster

**AUTHORS:** Gordon Paterson, Geoff Martin, Theresa Howard, Rob Huxley, Darrell Siebert, Vlad Blagoderov, Steve Cafferty, Adrian Hine, Chris Sleep, Mike Sadka, Steve Brooks, Ian Kitching, Peter Wing, Elisa Cane, Flavia Toloni, Joanna Durant, Sara Albuquerque, Lyndsey Douglas, Gerardo Mazzetta, Malcolm Penn, and Victoria Carter

**CONTACT:** Geoff Martin (g.martin@nhm.ac.uk) Natural History Museum, London, UK

**TITLE:** The Natural History Museum, London, UK: iCollections British and Irish Lepidoptera Project

**ABSTRACT:** Butterflies are the iconic emblem of summer and the countryside. Records of their occurrence are seen as useful indicators of the state of the environment. Within museum collections there is a considerable volume of useful data reflecting the distributions over time of the UK's butterfly and moth populations. iCollections' British and Irish Lepidoptera project aims to fully digitise and make available specimen data in the Natural History Museum's collections of butterflies, macromoths and micromoths.

046

**AUTHOR:** Richard S. Peigler

**CONTACT:** Richard S. Peigler (peigler@uiwtx.edu) University of the Incarnate Word, 4301 Broadway, San Antonio, TX 78209 USA

**TITLE:** Current status of wild silks in Africa and Asia

**ABSTRACT:** A few Saturniidae, Lasiocampidae, and Notodontidae have been exploited for their silk for centuries, in some cases millennia, in Africa and Asia. India and China now actively promote these industries. Sanyan silks (*Anaphe* and *Epanaphe*) were lost in Nigeria by 1970s from over-exploitation. Landibe silk (*Borocera*) continues with a few women's coops in Madagascar. Tasar silk (*Antheraea paphia*) was over-exploited in recent decades, so that India now imports more than 90% of the tussah silk (*Antheraea pernyi*) that China produces, to substitute for tasar. In India, muga silk (*Antheraea assamensis*) continues to struggle, but eri silk (*Samia ricini*) production is expanding in several Asian countries and Ethiopia. Silks from *Attacus atlas* and *Cricula trifenestrata* have been grown and marketed in Java since the 1990s.

047 – Student Paper

**AUTHOR:** David Plotkin

**CONTACT:** David Plotkin (dmp215@msstate.edu) Mississippi Entomological Museum Box 9775, Mississippi State MS 39762

**TITLE:** New species and new distribution records of Caribbean Geometrinae (Lepidoptera: Geometridae)

**ABSTRACT:** The Geometrinae, commonly known as emerald moths, are a diverse group of Lepidoptera with over 450 Neotropical species. However, Caribbean Geometrinae have received relatively little attention compared to the Geometrinae of Central and South America.

A review of Greater Antillean, Lesser Antillean, and Lucayan Geometrinae was conducted, using material from museums and private collections, in order to more accurately assess the species richness. Nine new species of Caribbean Geometrinae were described in five genera, including *Nemoria* and *Synchlora*. Twelve species were found to have expanded ranges, for a total of twenty-nine new island records. Half of these new records were for Hispaniola, specifically the Dominican Republic. The species richness of Caribbean Geometrinae is greater than previously thought, as is the distribution of many individual species.

048

**AUTHOR:** Gregory Pohl

**CONTACT:** Gregory Pohl (gpohl@nrcan.gc.ca) Natural Resources Canada, 5320 - 122 St., Edmonton AB T6H3S5 CANADA

**TITLE:** Of Lepidoptera and lists

**ABSTRACT:** A checklist of over 5000 species of Lepidoptera occurring in Canada has been compiled, based on 100+ years of taxonomic publications, regional lists, and specimen data in selected collections. A byproduct of that list is a new electronic catalog of the Lepidoptera of North America, that was compiled to provide a nomenclatural framework for the Canadian list. It was created by extracting all new names and taxonomic changes from the literature published since the last comprehensive North American list, published 30 years ago. This new North American checklist is being made available on the Moth Photographers Group website; we invite experts in the Lepidopterists' community to take on a leadership role in maintaining the list, according to their particular areas of expertise.

049 – Student Poster

**AUTHORS:** Francesca Ponce and Akito Kawahara

**CONTACT:** (francescavponce@ufl.edu) McGuire Center, FLMNH, P.O. Box 112710, Gainesville, FL 32611

**TITLE:** Molecular phylogeny of *Eumorpha* hawkmoths

**ABSTRACT:** The hawkmoth genus *Eumorpha* (Sphingidae) includes 26 strikingly colored species that are restricted in distribution to the New World. While they are often perceived as staples of Neotropical hawkmoths, little is known of their phylogenetic relationships. We

constructed a preliminary molecular phylogeny with four genes (CAD, EF1-alpha, Wingless, and COI) totaling 3789 base pairs. Maximum Likelihood analyses (ML) were conducted with RAxML, and Bayesian analyses in MrBayes. Analyses were conducted on individual genes and on the concatenated three-gene dataset. Results indicate that the genus *Eumorpha* is monophyletic with strong support and that there are several well-supported relationships that were previously unknown.

050

**AUTHORS:** Jerome Regier<sup>1</sup>, Charles Mitter<sup>1</sup>, Michael Cummings<sup>1</sup>, Don Davis<sup>2</sup>, Cyndy Parr<sup>2</sup>, Susan Weller<sup>3</sup>, Akito Kawahara<sup>4</sup>, Jae Cheon Sohn<sup>1</sup>, John Brown<sup>5</sup>, Joaquin Baixeras<sup>6</sup>, Andreas Zwick<sup>7</sup>, and Adam Bazinet<sup>1</sup>

**CONTACTS:** Charles Mitter (cmitter@umd.edu), <sup>1</sup>University of Maryland, <sup>2</sup>Smithsonian Institution, <sup>3</sup>University of Minnesota, <sup>4</sup>University of Florida, <sup>5</sup>U.S. Department of Agriculture, <sup>6</sup>University of Valencia, <sup>7</sup>State Museum of Natural History, Stuttgart

**TITLE:** Status report on the Leptree Molecular Phylogeny Project

**ABSTRACT:** With enormous help from the LepSoc community, the Leptree project has published a “backbone” phylogeny estimate for Lepidoptera based on 483 species, representing 115 families and 303 subfamilies, sequenced for up to 19 genes (14.8 kb). We are also conducting separate analyses on each major superfamily or set of superfamilies, using an additional 400+ species sequenced for 5 genes, and publishing these in collaboration with group experts. Support is generally strong within superfamilies, and along the “backbone” up to the base of Apoditrysia. In contrast, with notable exceptions, backbone node support is weak throughout Apoditrysia. In an attempt to resolve this rapid radiation, we are now re-examining relationships across the advanced ditrysiid superfamilies using data from whole-transcriptome RNA-Seq.

051

**AUTHORS:** Daniel Rubinoff, William Haines and Akito Kawahara

**CONTACT:** Daniel Rubinoff (rubinoff@hawaii.edu)

**TITLE:** Deciphering diversity in Hawaii's most diverse moth group (*Hyposmocoma*)

**ABSTRACT:** The cosmopterigid moth genus *Hyposmocoma* is endemic to Hawaii and contains well over 350 species. These include the world's only snail-eating and SCUBA- diving lineages. Recent phylogenetic work suggests that *Hyposmocoma* may be one of the oldest groups in Hawaii, and thus able to reveal broader themes of biogeography and speciation over 15 million years.

052 – Student Paper

**AUTHORS:** Sandra R. Schachat, Jeffrey C. Oliver, and Antónia Monteiro

**CONTACT:** Sandra R. Schachat (schachatsr@si.edu) Smithsonian Institution

**TITLE:** The evolution of serial homology: eyespot number evolution across wing surfaces of nymphalid butterflies

**ABSTRACT:** How do traits become repeated in a body to create serial homologues? Nymphalid butterflies display enormous variation in the number of eyespot serial homologues. Ancestral state reconstructions show that eyespots originated once in this family, near the base of the Nymphalidae, on the ventral surfaces of the posterior wings. We posited that following their origin, eyespots may first have colonized the same position on the anterior wing (contra-wing movement), or they may have colonized the same position on the dorsal surface of the same wing (contra-surface movement). The first type of movement requires the eyespot gene regulatory network to be activated in response to novel wing identity cues, whereas the second type of movement requires the network to be activated in response to novel wing surface cues. The eyespot of the M1 wing cell, which was one of the first eyespots to appear, eventually colonized all four wing surfaces of certain nymphalid taxa. Correlation analysis using Pagel's 1994 method shows that this M1 eyespot appeared on the ventral surface of the anterior wing (contra-wing) in some taxa, and on the dorsal surface of the posterior wing (contra-surface), in mostly non-overlapping taxa. These eyespot duplications occurred numerous times, in multiple subfamilies. The most recent colonization, of the dorsal anterior surface, took place multiple times independently via contra-surface movement in the subfamilies Satyrinae, Nymphalinae, Cyrestinae, Biblidinae, and Limenitidinae. We conclude that eyespots, after they originated on one wing surface, duplicated and colonized other wings

and surfaces multiple times independently. The most recent eyespot movements were into positions with novel wing and surface identities.

053

**AUTHORS:** J. Mark Scriber and Matthew Aardema

**CONTACT:** J. Mark Scriber (scriber@msu.edu), Michigan State Univ. and McGuire Center for Lepidoptera and Biodiversity

**TITLE:** How fast can speciation occur? – Temporal isolation in recombinant homoploid *Papilio* hybrids

**ABSTRACT:** Divergence of *P. canadensis* and *P. glaucus* from each other was approximately 580,000 years ago, compared to divergence of their hybrid species, *P. appalachiensis*, (less than 100,000 years ago; Kunte et al. 2011). Using various interspecific lab hybrids and backcrosses, significant behavioral, physiological, ecological, and genetic divergence in recombinant hybrid offspring (from the parental species) could be produced within a few generations, including adult phenotypes (or morphospecies) of the hybrid mountain swallowtail butterfly species, *P. appalachiensis*. Interspecific LF hybrids are univoltine with a post-diapause emergence delay (pdd; Ording et al. 2010) which is Z-linked with obligate diapause (od+), and may serve as a “speciation gene (Scriber 2011). Strong divergent natural selection from thermal constraints on voltinism seems to have produced reproductively isolated LF recombinant hybrids, or incipient species, on the cooler side (and the hybrid species, on the warmer side) of the thermally-defined historical hybrid zone, perhaps in a few decades rather than many centuries.

054

**AUTHOR:** John Shuey

**CONTACT:** John Shuey (jshuey@tnc.org) 620 E Ohio St., Indianapolis, IN 46202

**TITLE:** Butterfly communities respond to restoration in the Mata Atlantica

**ABSTRACT:** The Mata Atlantica is a global biodiversity hotspot but is critically threatened by agricultural and urban conversion. At the Guaraqueçaba Reserve, aggressive forest restoration has been implemented to restore forest connectivity in a large block of forest and



reduce threats to ecological integrity. We sampled butterfly communities in these restorations and adjacent control plots (native forest and open pastures) using heavily modified Pollard Transects and bait traps to determine if restoration benefited invertebrate communities. Preliminary results indicate that butterfly communities respond quickly to changing conditions in restorations, and may be on a slow trajectory towards recovery.

055 – Student Paper

**AUTHORS:** Jae-Cheon Sohn and Donald Davis

**CONTACT:** Jae-Cheon Sohn (jsohn@umd.edu) Department of Entomology, University of Maryland, College Park, MD 20742

**TITLE:** Lyonetiidae, a roguish child of Yponomeutoidea: what we know about them?

**ABSTRACT:** Lyonetiidae is a group of leaf mining microlepidopterans that include several pest species such as *Lyonetia clerkella* (Linnaeus) and *Perileucoptera coffeella* (Guérin-Méneville). The family had long been associated with tineoids, until Kyrki (1984) found its association with Yponomeutoidea. Lyonetiidae includes 32 genera and 204 described species (van Nieukerken et al., 2011) in two subfamilies, Lyonetiinae and Cemiostominae. The grouping of these two subfamilies was based on few putative synapomorphies (Kyrki, 1990; Dugdale et al., 1998), which have been contradicted by recent molecular studies (Mutanen et al., 2010; Sohn et al., 2013; Regier et al., 2013). Further, Sohn et al. (2013) found that three previously supposed lyonetiid genera, *Philonome*, *Euprora* and *Corythophora*, are actually Tineidae. All these new findings are revised by morphological accounts. Lyonetiidae include at least 16 genera which have never been studied since the original description. We briefly review the poorly known Lyonetiidae, especially from the New World, with the hope that future studies may resolve their true identity, and the problems involved in the phylogenetics and host association evolution of Lyonetiidae.

056

**AUTHOR:** Andrei Sourakov

**CONTACT:** Andrei Sourakov (asourakov@flmnh.ufl.edu) McGuire Center, FLMNH, P.O. Box 112710, Gainesville, FL 32611

**TITLE:** On the biology of moths that feed on the Coral Bean in Florida

**ABSTRACT:** The life histories of the erythrina leafroller, *Agathodes designalis*, and the erythrina stem-borer, *Terastia meticulosalis* from north central Florida are described. Competition among larvae of these crambid moths led to ecological niche partitioning. Both species feed on the coral bean, *Erythrina herbacea*, and each species occupies different parts of the plant and different plants in the ecosystem. Oviposition, larval behavior and morphology are consistent with adaptation for resource partitioning. Both species are multivoltine and their life history varies between generations, suggesting adaptation to environmental conditions. The co-evolution of these moths with the genus *Erythrina* is proposed. Another moth - erythrina leafminer, *Leucoptera erythrinella* (Lyonetiidae) - also uses coral bean as its hostplant, utilizing it so that interspecific competition with the abovementioned crambids is minimal.

057

**AUTHOR:** Trevor J. Steele

**CONTACT:** Trevor J. Steele (tsteele@student.uiwtx.edu) Department of Biology, University of the Incarnate Word, 4301 Broadway, San Antonio, Texas 78209-6397 USA

**TITLE:** Observations on parasitism and population structure of three species of *Hemileuca* (Saturniidae) in Texas

**ABSTRACT:** Field and lab observations were made for three species of *Hemileuca* in Texas. *Hemileuca grotei* and *H. peigleri* are endemics to central Texas, and larvae were collected on *Quercus fusiformis* in April and May. Mature larvae of *H. chinatiensis* were collected in March in western Texas on *Condalia ericoides*. Parasitoids included the braconid *Cotesia electrae* and the tachinids *Belvosia bifasciata*, *Chetogena* spp., and *Exorista mella*, providing three previously unpublished host/parasitoid records and a case of multiple parasitism. Populations of all three species were observed to be highly localized, and ranged from high to low levels.

058

**AUTHOR:** Matthew D. Thom

**CONTACT:** Matthew D. Thom (mthom@ufl.edu) Department of Entomology and Nematology, University of Florida

**TITLE:** Pupation behavior of the frosted elfin butterfly, *Callophrys irus* Godart: consequences for mortality by fire for litter and soil dwelling organisms

**ABSTRACT:** The disturbance caused by fire is highly influential in shaping, promoting, and sustaining certain successional stages, and is a major contributor to the dynamic nature of most terrestrial ecosystems. The frosted elfin, *Callophrys irus* is a rare and imperiled butterfly that inhabits oak-pine barrens and savannahs in North America where fire is a major disturbance force. The ability of *C. irus* to avoid the lethal or sub-lethal effects of fire was investigated in both lab and field studies using *Eumaus atala* as an experimental surrogate. Survival of at least 50% to successful adult eclosion occurred at peak temperatures between 42-44°C. The results suggest management using fire should only occur in a portion of an area, be rotated between years, and be a fast moving fire.

059

**AUTHOR:** Albert Thurman

**CONTACT:** Albert Thurman (albert214@aol.com) 5138 E Tunder Cir

**TITLE:** Collecting Butterflies, moths, and insects in Panama, 1975-2012

**ABSTRACT:** I will outline my 35+ years of collecting butterflies, moths, and insects in various areas in Panama, including recent trips that I am conducting for the University of Fla/McGuire Center, and where we have discovered new species. I will also discuss a novel attractant/lure for *Morpho* butterflies that I discovered by chance.

060

**AUTHOR:** David L. Wagner

**CONTACT:** David L. Wagner (david.wagner@uconn.edu) University of Connecticut, Storrs, CT 06269-3043

**TITLE:** Larvae of North American Notodontidae

**ABSTRACT:** DLW will provide an overview of the larval stages of North American Notodontidae, emphasizing their varied external morphology

and life histories. Special emphasis will be placed on cases where phenotypic evolution of larvae appears to be outpacing that of the adults. Structural, life history, and behavioral characters of special taxonomic or phylogenetic value will be highlighted.

061

**AUTHOR:** Ernest H. Williams

**CONTACT:** Ernest H. Williams (ewilliam@hamilton.edu), Dept. Biology, Hamilton College, Clinton, NY 13323

**TITLE:** Three butterfly responses to climate change

**ABSTRACT:** The earth's climate is changing, and several species I have been studying are showing strong responses. Six populations of the western checkerspot *Euphydryas gillettii* died out during a 20-year period as their meadows dried from rising temperatures, a change that led to a loss of host plants and nectar sources. Based on citizen science records compiled by the Massachusetts Butterfly Club, Massachusetts lycaenids are emerging significantly earlier than they were 27 years ago, with the advance being greater for spring-emerging elfins than it is for summer-emerging hairstreaks. Finally, the monarch overwintering phenomenon is being altered by rising temperatures, too. As other researchers have found, the effects of climate change on butterflies can be significant and widespread.

062

**AUTHOR:** Keith R. Willmott

**CONTACT:** Keith R. Willmott (kwillmott@flmnh.ufl.edu) McGuire Center, FLMNH, 3215 Hull Rd., Gainesville, FL 32611

**TITLE:** Mapping and interpreting patterns of species richness in neotropical butterflies

**ABSTRACT:** The Neotropical region has the world's richest butterfly communities, and understanding and explaining spatial patterns of species richness are of theoretical interest to biogeographers and practical interest to biodiversity conservationists. However, such research is hindered by often inadequate distribution data, which may be alleviated to some extent by distribution modeling. I discuss some of the issues of modeling Neotropical butterfly distributions, illustrated with three genera of Ithomiini, and examine resulting patterns of

species richness. Climate variables and source area explain only part of the pattern in ithomiine species richness, and I briefly review a recent study of latitudinal gradients in east Andean butterflies which might shed light on some of the factors which must also be considered in understanding gradients in Neotropical butterfly diversity.

063

**AUTHORS:** Donald J. Wright<sup>1</sup> and Todd M. Gilligan<sup>2</sup>

**CONTACT:** <sup>1</sup>3349 Morrison Avenue, Cincinnati, OH 45220, <sup>2</sup>Bioagricultural Sciences and Pest Management, Colorado State University, 1177 Campus Delivery, Fort Collins, CO 80523

**TITLE:** Molecular phylogeny and revised classification of *Eucosma* Hübner and related genera

**ABSTRACT:** *Eucosma* is the largest genus in the Tortricidae, consisting of 298 described species. Its circumscription and that of the closely related genera *Pelochrista*, *Phaneta*, and *Epiblema* have long been matters of confusion. Prior to the mid-1920's, assignment to one or the other of these taxa was largely arbitrary due to a lack of clearly defined generic concepts. Here we present the first study to examine the monophyly of *Eucosma* and related genera using a molecular phylogenetic framework. We find that the *Eucosma/Pelochrista* group splits into three lineages: a new genus of Pinaceae-feeding species formerly assigned to *Eucosma*, a refined notion of *Eucosma* that is consistent with Palearctic usage and includes current North American *Phaneta*, and a refined concept of *Pelochrista* that is distinguishable from *Eucosma* based on female morphology.

064

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**TITLE:** The influence of an urban heat island on moth phenology in Birmingham, Alabama

**ABSTRACT:** In recent human history there has been an unprecedented amount of urbanization, which is having negative effects on many different parts of ecosystems worldwide. One effect of urbanization is

the dome of hot air, the Urban Heat Island (UHI), that forms above large cities from trapped radiation that is reemitted in the evening. This UHI has been shown to advance spring phenology of plants, but its effect on invertebrates has not been examined. Since higher temperatures can influence the development rates of ectotherms, the UHI should accelerate the phenology of moth emergence in warmer urban areas compared to more rural sites. The effect of the UHI on emergence times was studied using biweekly trapping of moths from three sites along an urban to rural gradient in Birmingham, Alabama. Hourly temperature readings from programmed sensors confirmed the presence of a UHI from June-August of 2012 at these sites. We counted all individuals of 10 focal species that were the most common moths found at all three sites. Two of these species, *Heterocampa obliqua* and *Nadata gibbosa*, had advanced flight phenology at the urban site than at the most rural site, and no species emerged earlier at the rural sites. Our results suggest that the UHI is present in Birmingham and that it is capable of influencing phenology of moths.

## NOTES

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