The 65th Annual Meeting of The Lepidopterists' Society

Florissant, Colorado
6-10 July 2016

Hosted By:

McGuire Center for Lepidoptera & Biodiversity

The Nature Place

The International Biodiversity Foundation

The Lepidopterists' Society Pacific Slope Section

High Country Lepidopterists

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Photo Credits: Front Cover – Pikes Peak, Todd Gilligan; Colorado Hairstreak (*Hypaurotis cyrsalus citima*), Andy Warren; Mead's Sulphur (*Colias meadii meadii*), Andy Warren; Arctic Blue (*Agriades glandon rustica*), Ian Segebarth; Back Cover – The Nature Place, Ian Segebarth; Mexican Metalmark (*Apodemia mejicanus*), Andy Warren; Melissa Blue (*Plebejus melissa melissa*), Ian Segebarth.

PROGRAM LOCAL ARRANGEMENTS

Meeting Chairs: Thomas C. Emmel and Jacqueline Y. Miller

Organizing Committee: John Calhoun, Shelly Churchill, Charles V. Covell, David Bettman, Thomas C. Emmel, Todd Gilligan, Rob Jolly, Jacqueline Y. Miller, James B. Schlachta, Andrei Sourakov, and Andrew D. Warren

Field Trip Coordinators: Charles V. Covell, Jr., Thomas C. Emmel, Peter Eliazar, Chuck Harp, Andrei Sourakov

Group Photo: Andrei Sourakov

Session Moderators: David Bettman, Thomas C. Emmel, Christi Jaeger, Geoff Martin, Megan McCarty

Technical Support: Christine M. Eliazar, Deborah L. Matthews, James B. Schlachta, Ian K. Segebarth

Registration: Shelly Churchill, Jacqueline Y. Miller

Door Prizes: Charles V. Covell, Jr.

Vendors: BioQuip; Leptraps, LLC; Mariposa Press; International Biodiversity Foundation, Inc.

SUMMARY CALENDAR OF EVENTS

Wednesday, July 6th

- Registration (all day)
- Executive Council Meeting
- Butterfly field trips (local – all day)
- Visit to Florissant Fossil Quarry (afternoon)
- Welcome Reception and Mixer (evening)

Thursday, July 7th

- Registration (all day)
- Contributed Papers (morning)
- Student Papers (afternoon)
- Vendors (all day)
- Moth field trip (evening/night)

Friday, July 8th

- Contributed Papers (all day)
- Vendors (all day)
- Group Photograph (morning)
- Barbeque (evening)
- Moth field trip (evening/night)

Saturday, July 9th

- Contributed Papers (morning)
- Featured Speaker (afternoon)
- Business Meeting (afternoon)
- Vendors (all day)
- Annual Banquet (evening/night)

Sunday, July 10th

- Onsite butterfly observation/collecting (all day)
- Off-site butterfly field trips (all day)
- Onsite Nature Place recreational facilities (all day)
- Moth field trips (evening/night)

SCHEDULE OF EVENTS

Wednesday, July 6th

9:00am–5:00pm: Registration, The Nature Place Lodge, upper level

10:00am–5:00pm: Executive Council Meeting - location TBA

2:00 pm: Meet to carpool for visit to Florissant Fossil Quarry

5:00pm–6:00pm: Welcome reception, The Nature Place Lodge

6:00pm–7:00pm: Dinner, The Nature Place Lodge

Thursday, July 7th

7:00am–5:00pm: Registration, The Nature Place Lodge, upper level.

7:00am: Vendor and poster presenter set up, Nature Place Sportsplex. Posters will remain on display through Saturday evening. See individual vendors for available hours.

7:30am–8:30am: Breakfast, The Nature Place Lodge

MORNING SESSION
Moderator: Thomas C. Emmel
Presenters in bold

8:35am–8:55am: Assemble in Sportsplex, welcome, opening statements and introductions, overview and history of The Nature Place - **Thomas C. Emmel, John Calhoun, Rob Jolly**

9:00am–9:20am: John Hyatt, Lance Durden, **Brian Scholtens**, and **James K. Adams** – "The moth fauna of Sapelo Island, Georgia" – abstract 022

9:25am–9:45am: Neil Cobb, **Jennifer M. Zaspel**, et al. (27 Participating Institutions) – "Lepidoptera of North America Network (LepNet): Documenting Diversity in the Largest Clade of Herbivores" – abstract 008

9:50am–10:10am: Vazrick Nazari and Genevieve von Petzinger – "Lepidoptera in The Upper Paleolithic Age" – abstract 030

10:15am–10:30am: BREAK

10:35am–10:55am: Qian Cong and **Nick V. Grishin** – "On many uses of COI DNA barcodes" abstract 09

11:00am–11:20am: Stephen R. Steinhauser, **Jacqueline Y. Miller**, and Nick V. Grishin – "Review of the West Indian *Astraptes xagua* (Lucas) Complex (Hesperiidae: Eudaeminae)"– abstract 036

11:25am–11:45am: Todd M. Gilligan – "Tortricidae described from Loveland, Colorado by Walsingham in 1895"– abstract 018

11:50am–12:10pm: Andrew D. Warren, Shinichi Nakahara, Vladimir A. Lukhtanov, Kathryn M. Daly, Clifford D. Ferris, Nick V. Grishin, Martin Cesanek and Jonathan P. Pelham – "A new species of *Oeneis* from Alaska, United States, with notes on the *Oeneis chryxus* complex (Lepidoptera: Nymphalidae: Satyrinae)"– abstract 038

12:15pm–1:15pm: LUNCH

AFTERNOON SESSION
Moderator: Christi Jaeger

1:30pm–1:50pm: Julia L. Snyder*, Alberto Zilli, and Jennifer Zaspel – "An Overview of the Systematics of the Vampire Moth Genus, *Calyptra* Ochsenheimer (Erebidae: Calpinae)" – abstract 033

1:55am–2:15pm: Crystal Klem*, Alberto Zilli, and Jennifer Zaspel – "A Preliminary Phylogeny of the Fruit-piercing Moth Genus *Eudocima*

Based on Morphological Data (Lepidoptera: Erebidae: Calpinae)"– abstract 023

2:20pm–2:40pm: **Timothy J. Anderson*** and Jennifer M. Zaspel – "Biology, Behavior and Larval Morphology of the Painted Lichen Moth, *Hypoprepia fucosa* (Erebidae: Arctiinae: Lithosiini)"– abstract 001

2:45pm–3:05pm: Mayra C. Vidal* and Shannon M. Murphy – "Variation of Host Plant Use by the Two Types of Fall Webworm (*Hyphantria cunea*, Erebidae)"– abstract 037

3:10pm–3:15pm: BREAK

3:20pm–3:40pm: Jade Aster T. Badon* – "The Effects of Typhoons on the Diversity and Population Biology of Butterflies on Negros Island, Philippines: Phase 1"– abstract 002

3:45pm–4:05pm: Elizabeth Barnes* – "Competition and Community Interactions of Two Web Building Caterpillars: The Western Tent Caterpillar (*Malacosoma californicum*) and the Fall Webworm (*Hyphantria cunea*)"– abstract 003

4:10pm–4:30pm: Peter R. Houlihan* – "Orchid Pollinator Ecology, Coevolution, and Conservation: From Darwin's Predicted Hawkmoth to Caribbean Ghosts" – abstract 021

4:35pm–4:55pm: Qian Cong, Jinhui Shen, Andrew D. Warren, Dominika Borek, Zbyszek Otwinowski, and **Nick V. Grishin** – "What Complete Genomes Tell Us About Speciation in *Phoebis* (Pieridae)"– abstract 010

*student paper

EVENING EVENTS

6:00–7:00pm: DINNER, The Nature Place Lodge.

7:15pm: Meet for transport to local offsite moth collecting locations.

Friday, July 8th

7:30am–8:30am: Breakfast, The Nature Place Lodge.

8:35am–8:40am: Assemble in Sportplex, announcements.

MORNING SESSION
Moderator: Megan McCarty

8:45am-9:05am: Andrei Sourakov, David Plotkin, Akito Y. Kawahara, Lei Xiao, Winnie Hallwachs, and Daniel Janzen – "Two Different Patterns of Haplotype Divergence, Biology, and Taxonomy of the *Erythrina*-feeding Crambid moths" – abstract 034

9:10am-9:30am: David Bettman – "New and Interesting Micro-lepidoptera of Colorado" – abstract 004

9:35am–9:55am: Eric H. Metzler – "Anecdotal Remarks on the Ecology of Moths at White Sands National Monument" – abstract 028

10:00am–10:20am: Thomas C. Emmel – "Overwintering Monarch Colonies of Central Mexico: From Discovery to Present Threats" – abstract 014

10:25am: GROUP PHOTO, location TBA

10:45am–11:55am: Ian Segebarth and **Peter Houlihan** "Nature Photography Workshop" – abstract 032

12:00pm–1:00pm: LUNCH, The Nature Place Lodge

AFTERNOON SESSION
Moderator: Geoff Martin

1:15pm–1:35pm: Qian Cong, Jinhui Shen, Dominika Borek, Robert K. Robbins, Paul A. Opler, Zbyszek Otwinowski, and **Nick V. Grishin** –

"Conundrums of North American *Calycopis* (Lycaenidae) solved by complete genomics" – abstract 011

1:40pm–2:00pm: David Lees – "DNA Barcoding Reveals a Largely Unknown Fauna of Gracillariidae Leaf-mining Moths in the Neotropics"– abstract 026

2:05pm–2:25pm: **Todd M. Gilligan**, Luke R. Tembrock, Norman B. Barr, and Roxanne E. Farris – "Molecular-based Initiatives to Support the Identification of *Helicoverpa armigera* (Hübner) in the New World" – abstract 017

2:30pm–2:50pm: Diego R. Dolibaina, Olaf H. H. Mielke & Mirna M. Casagrande – "Phylogeny of the Pantropical Genus *Celaenorrhinus* Hübner, [1819] (Hesperiidae: Pyrginae)" – abstract 016

2:55pm–3:10pm: BREAK

3:15pm–3:35pm: Eduardo Carneiro, Olaf H. H. Mielke, Mirna M. Casagrande, Konrad Fiedler – "Phylogenetic Measurements Reveal Complementary Information on Trans-continental Assemblage Structure of Neotropical Grassland Insects Than Species Composition" – abstract 007

3:40pm–4:00pm: Alessandro Giusti – "Re-organizing the Slug Moths (Limacodidae) Collection of the NHM, London: Challenges, Outcomes & Future Value" – abstract 019

4:05pm–4:25pm: Christopher C. Grinter – "Collection Management Online: Curating Data with Symbiota" – abstract 020

4:30pm–4:50pm: Deane Bowers and Peri Mason – "Localization of Defense Chemicals in Two Checkerspot Butterflies (*Euphydryas*, Nymphalidae)" – abstract 005

EVENING EVENTS

6:00pm–7:00pm: Barbeque, The Nature Place Lodge.

7:15pm: Meet for transport to local offsite moth collecting locations.

Saturday, July 9th

MORNING SESSION
Moderator: David Bettman

7:30am–8:30am: Breakfast, The Nature Place Lodge.

8:35am–8:40am: Assemble in Sportplex, announcements.

8:45am–9:05am: Gareth S. Powell, Julia L. Snyder, Timothy J. Anderson, Eugenio H. Nearns, and Jennifer M. Zaspel – "The Purdue Entomological Research Collection with Comments on the Lepidoptera Holdings" – abstract 031

9:10am–9:30am: Geoff Martin – "The Lepidoptera Collections at the Natural History Museum, London, UK" – abstract 027

9:35am–9:55am: Charles V. Covell – "The Moth Collections at the McGuire Center: Sources, Composition and Development, with Special Reference to the Inchworm Moths (Geometridae)" – abstract 012

10:00am–10:20am: Andrei Sourakov – "Lepidoptera as Tools for Informal Science Education" – abstract 035

10:25am–10:40am: BREAK

10:45am–11:05am: Lars Crabo, Paul Hammond, Merrill Peterson, Jon Shepard, and Richard Zack – "Pacific Northwest Moths: A Regional Database-driven Website" – abstract 013

11:10am–11:30am: Glenn S. Morrell – "Yukon Collecting History and the Impact of the Dempster Highway" – abstract 029

11:35am–11:55am: Leroy C. Koehn – "Bait traps: New Designs and How, When, and Where to Use Them and Be a Better Baiter!" – abstract 024

11:55am–12:10pm: Leroy C. Koehn – "Traveling with Light Traps and Batteries" – abstract 025

12:15pm–1:15pm: LUNCH, The Nature Place Lodge

AFTERNOON SESSION
Moderator: Thomas C. Emmel

1:30pm-1:50pm: Marc E. Epstein – "World Phylogeny of Limacodidae: from Harry Dyar's Law (1899) to Total Evidence (2016)" – abstract 015

1:55pm-2:00pm: BREAK

2:00pm–3:00pm: Keynote speakers – **Sam Johnson** and **Rob Jolly** – "Geology and Flora of Florissant"

3:05pm–3:15pm: BREAK

3:15pm: Business Meeting, The Lepidopterists' Society

EVENING EVENTS

5:00pm–6:00pm: Banquet Reception & Book Signing, The Nature Place Lodge

6:00pm–7:00: Annual Banquet, The Nature Place Lodge

7:10pm: Assemble in Sportsplex for evening program

John Calhoun & **Kathleen L. Prudic** – "Legendary Amateur Lepidopterists of the Past, and Initiatives to Encourage Contributions from Today's Citizen Scientists" – abstract 006

Presentation of John Comstock Award

Presentation of student awards

John Calhoun – Preview of LepSoc 2017, Middle Tennesse University

Charles V. Covell – Door Prizes

Sunday, July 10th

7:30am–8:30am: Breakfast & self-serve selection/preparation of bag lunches.

8:45am: Meet and assemble carpool groups for field trips.

6:00pm–7:00 pm: DINNER, The Nature Place Lodge

ABSTRACTS – POSTERS

P01

AUTHORS: Jaret C. Daniels, Matthew Standridge, Geena Hill, and Jonathan Bremer

CONTACT INFORMATION: McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, 3215 Hull Road, Gainesville, FL 32611-2710, jdaniels@flmnh.ufl.edu

TITLE: Collaborative Efforts to Help Conserve Schaus' Swallowtail (*Heraclides aristodemus ponceanus*) (Lepidoptera: Papilionidae)

ABSTRACT: The federally endangered Schaus' Swallowtail (*Heraclides aristodemus ponceanus*) is large, iconic butterfly precinctive to south Florida. Currently limited to the remaining fragments of tropical hardwood hammock in the northern Florida Keys, it is one of the rarest butterflies in the U.S. and the only listed member of the Papilionidae. Although small numbers occur on Key Largo, the core of the extant population resides on the islands of Biscayne National Park. Since 2011, extensive efforts led by the Imperiled Butterflies of Florida Workgroup have focused on determining the current status and range-wide occupancy of the taxon to help inform immediate and future management and conservation actions. Resulting collaborative, multi-agency/organization surveys over the past few years revealed extremely depressed population numbers, with a low of only four individuals found range-wide in 2012. In response, the U.S. Fish and Wildlife Service authorized the take of individual butterflies into captivity for the purpose of establishing a head-starting program and assurance laboratory colony. Organism reintroductions were initiated in 2013 by the University of Florida and have resulted in hundreds of individuals released back into the wild and a documented rebound in numbers through 2015. Additional late season surveys conducted in August and September over subsequent years have recorded adults suggesting that *H. aristodemus ponceanus* is actually bivoltine.

P02 – Student Poster (Science Fair Project)

AUTHOR: Logan Locasio[1] and Andrei Sourakov[2]

CONTACT INFORMATION: [1]Lincoln Middle School, Alachua Co., Florida, loganloc@gmail.com; [2]McGuire Center, FLMNH, P.O. Box 112710, Gainesville, FL 32611, asourakov@flmnh.ufl.edu
TITLE: Influence of Temperature and Diet on Development of Bella Moth, *Utetheisa ornatrix*
ABSTRACT: The caterpillars of *Utetheisa ornatrix*, the Ornate Bella moth, feed on host plants in the genus *Crotalaria*, which, in Florida, encompasses 4 native and 10 introduced species. In the laboratory, *U. ornatrix* larvae developed faster and resulted in larger adults, when raised on *Crotalaria incana* vs. *Crotalaria lanceolata.* In the wild, this can potentially give a selective advantage to individuals that develop on *C. incana*. A constant temperature of 60°F (15.6°C) caused *U. ornatrix* to develop twice as slowly as it did at 72°F (22.2°C), but it was sufficiently high for successful development. Regardless of the rearing conditions and the host plants used in the laboratory, male larvae developed slightly more slowly than female larvae. This translated in their emerging from the pupae later than the females.

P03
AUTHOR: Eric H. Metzler
CONTACT INFORMATION: PO Box 45, Alamogordo, NM 88311, MetzlerE@MSU.edu
TITLE: Collecting Moths leads to New Discoveries, Conservation, and Preservation of Moths
ABSTRACT: The world is losing species at an alarming rate. Based on percentage of species of plants and animals, the insects, most of which which remain to be discovered, named, and studied, pay the highest price. Moths, as herbivores and at about 8.5% of animals on Earth, are excellent indicators of habitat health. (Shuey et al. in Am. Midland Nat. 2012). In Ohio collecting and naming new moth species from special habitats led to land owner awareness and management to protect the habitat and its dependent species. In northwestern Indiana, and in southwestern Ohio, The Nature Conservancy used data from moth collecting to guide management decisions for habitat restoration. In Ohio and Indiana new habitat dependent species of moths were discovered and named. In southern New Mexico, a recently initiated study of moths from a long protected yet unstudied White Sands

National Monument led to discovery of the highest concentration of endemic moths in North America (Metzler in J. Asian. Pacific. Biodiv. 2014).

P04 – Student Poster

AUTHORS: Carolina Moreno[1], Susan J. Weller[2], Timothy J. Anderson[3], Nick J. Dowdy[4], Akito Y. Kawahara[5], & Jennifer M. Zaspel[6]

CONTACT INFORMATION: [1]Universidade Federal de Goiás, Brazil, s.moreno.carol@gmail.com; [2]University of Nebraska State Museum, Lincoln, Nebraska, susan.weller@unl.edu; [3]Purdue University, West Lafayette, Indiana, ander472@purdue.edu; [4]Wake Forest University, Winston-Salem, North Carolina, njdowdy@gmail.com; [5]University of Florida, Gainesville, Florida, kawahara@flmnh.ufl.edu; [6]Purdue University, West Lafayette, Indiana, jzaspel@purdue.edu

TITLE: Phylogeny and Evolution of Communication Systems in Tiger Moths (Lepidoptera: Erebidae: Arctiinae)

ABSTRACT: Arctiinae is a diverse subfamily of Erebidae, with around 11,000 described species worldwide. This subfamily is an ideal radiation for examining the evolution of complex communication systems and defensive strategies in insects. Ongoing research suggests these behaviors (i.e., pharmacophagy and acoustic aposematism) have evolved multiple times in tiger moths. While recent phylogenetic hypothesis of Arctiinae supported the monophyly of the subfamily, there is still a lack of support for some of the subtribes and generic groups therein. This study addresses the lack of support for these clades by adding 25 species from Brazil representing 20 genera from six subtribes. Data were analyzed in a likelihood framework. The resulting expanded phylogeny of approximately 120 tiger moth species is presented and new implications for interpreting the evolution chemical and acoustic defenses are discussed.

ABSTRACTS – ORAL PRESENTATIONS

001 – Student Paper

AUTHORS: Timothy J. Anderson and Jennifer M. Zaspel

CONTACT INFORMATION: Department of Entomology, Purdue University, 901 W. State Street, West Lafayette, IN 47907-2089, ander472@purdue.edu

TITLE: Biology, Behavior and Larval Morphology of the Painted Lichen Moth, *Hypoprepia fucosa* (Erebidae: Arctiinae: Lithosiini)

ABSTRACT: Lithosiini is a diverse and cosmopolitan lineage of tiger moths that is well known for its close associations with lichenized fungi as larvae. This radiation is comprised of at least 3,000 species and is thought to have evolved early in tiger moth evolutionary history. Unlike some of the more derived tiger moth lineages, little is known about chemical and acoustic defensive strategies in lithosiines. In an effort to better understand the biology, origins of lichenivory, and behaviors in these moths, we sampled specimens from the painted lichen moth, *Hypoprepia fucosa* and conducted rearing experiments for three generations. Major findings include characterization of previously undescribed morphology for the species, documentation of feeding behaviors, observations of novel defensive behaviors, and chemical analysis of putative defensive fluids from larvae. We discuss the significance of these findings in the context of tiger moth phylogeny and the evolution of chemical defense.

002 – Student Paper

AUTHOR: Jade Aster T. Badon

CONTACT INFORMATION: McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, Florida, USA, jadebadon@ufl.edu

TITLE: The Effects of Typhoons on the Diversity and Population Biology of Butterflies on Negros Island, Philippines: Phase 1

ABSTRACT: The Philippines is experiencing an average of 20 typhoons annually and the direct and indirect effects on the country's biodiversity, including Lepidoptera as flagship species, are currently unknown. The first phase of my dissertation research commenced in the field in 2016. I will present the preliminary approach undertaken to

date. This phase deals with training and teaching local field assistants on how to conduct a catch-release method and identify butterfly species using my butterfly field guides. The chosen field sites for the study, the terrains and potential hazards, and initial butterfly census results will be presented.

003 – Student Paper
AUTHOR: Elizabeth Barnes
CONTACT INFORMATION: Department of Biological Sciences, University of Denver, F. W. Olin Hall, Room 102, 2190 E. Iliff Ave., Denver, CO 80208, elizabeth.barnes@du.edu
TITLE: Competition and Community Interactions of Two Web Building Caterpillars: The Western Tent Caterpillar (*Malacosoma californicum*) and the fall webworm (*Hyphantria cunea*)
ABSTRACT: Competition is one of the fundamental structuring forces in most communities, yet its role has historically been controversial in herbivorous insects. I study host-plant mediated competition between two locally abundant herbivorous insects: Western tent caterpillars (*Malacosoma californicum*) and fall webworms (*Hyphantria cunea*). Tent caterpillars feed on chokecherry early in the spring and fall webworm feed on the same plant species in the late summer. I will present my initial results on competition between fall webworm and western tent caterpillars, intraspecific interactions between generations of western tent caterpillars, and the summer-long effects of western tent caterpillars on arthropod community on chokecherry. My initial results suggest that: competition between fall webworm and tent caterpillars may be density dependent; tent caterpillars may avoid using trees with spring tent caterpillar damage as oviposition sites; and the presence of tent caterpillar tents on a tree in mid and late summer may increase the density of spiders and other predators. My results suggest that western tent caterpillars have a strong impact on chokecherry arthropod community well after they have pupated.

004
AUTHOR: David Bettman

CONTACT INFORMATION: Department of Zoology, Denver Museum of Nature & Science, 2001 Colorado Boulevard, Denver, CO 80205-5798, David.Bettman@dmns.org
TITLE: New and Interesting Microlepidoptera of Colorado
ABSTRACT: The microlepidopteran fauna of Colorado is still far from fully explored. The primitive moth family Acanthopteroctetidae is here confirmed for the state, with two species present (*Acanthopteroctetes aurulenta* and *A. bimaculata*) on the Colorado Front Range. Many additional microlep taxa will be discussed and illustrated, documenting new state records, probable introductions, new life history data, and more.

005
AUTHORS: Deane Bowers and Peri Mason
CONTACT INFORMATION: CU Museum of Natural History and Department of Ecology and Evolutionary Biology, University of Colorado Boulder, CO 80309, deane.bowers@colorado.edu
TITLE: Localization of Defense Chemicals in Two Checkerspot Butterflies (*Euphydryas*, Nymphalidae)
ABSTRACT: Distribution of defense compounds in the bodies of chemically defended insects is likely to affect both their efficacy as defenses and their costs. We examined the distribution of sequestered iridoid glycosides in two *Euphydryas* species, *E. phaeton* and *E. anicia,* and found that the pattern of localization of these compounds differed between the two species. Although concentrations were quite high and similar in the heads and thoraces of the two species, the relative concentrations in wings and abdomens were quite different. *Euphydryas anicia* had relatively high IG concentrations in their abdomens and low IG concentrations in their wings, whereas the reverse was true in *E. phaeton*. We interpret these results in light of two hypotheses regarding where sequestered chemicals should be localized: 1) that they should be found in wings, which would allow non-lethal sampling by predators; and 2) that their distribution is constrained by the distribution of tissue types to which sequestered compounds bind. We also offer the third hypothesis, that costs of storage may differ among body parts, and that the localization of compounds may reflect a cost-reduction strategy.

006

AUTHORS: John V. Calhoun[1] & Kathleen L. Prudic[2]

CONTACT INFORMATION: [1]977 Wicks Drive, Palm Harbor, FL 34684, bretcal1@verizon.net; [2]Entomology, University of Arizona, Forbes 410, Tucson, AZ 85721, klprudic@gmail.com

TITLE: Legendary Amateur Lepidopterists of the Past, and Initiatives to Encourage Contributions from Today's Citizen Scientists

ABSTRACT: Many notable lepidopterists were not formally trained entomologists, nor did they make a living studying insects. Although their pursuits were considered leisurely, these amateurs greatly influenced our understanding of Lepidoptera since the beginning of the field. Several extraordinary individuals, who lived between the late 18th and early 20th centuries, epitomized the spirit of the citizen scientist. The contributions of today's nonprofessional researchers are even more significant, as new platforms are developed to enable instantaneous sharing and retrieval of information. Here we will talk about and demo two online programs: iNaturalist and eButterfly. Both are designed to serve the needs of citizen scientists in terms of data storage, management and sharing. iNaturalist is designed for all things in the natural world while eButterfly is focused on butterflies. Both programs serve as strong connectors within citizen science communities and beyond positively influencing biodiversity research and conservation policy in real time.

007

AUTHORS: Eduardo Carneiro[1], Olaf H.H. Mielke[1], Mirna M. Casagrande[1], Konrad Fiedler[2]

CONTACT INFORMATION: [1]Laboratório de Estudos de Lepidoptera Neotropical, Departamento de Zoologia, Universidade Federal do Paraná. Caixa Postal 19020, 81531-980 Curitiba, Paraná, Brasil, eduardo.carneiro@ufpr.br; [2]Department of Botany & Biodiversity Research, Faculty of Life Sciences, University of Vienna, Rennweg 14, A-1030 Vienna, Austria

TITLE: Phylogenetic Measurements Reveal Complementary Information on Trans-continental Assemblage Structure of Neotropical Grassland Insects than Species Composition

ABSTRACT: Neotropical grassland habitats are particularly interesting ecosystems because they show a variety of physiognomies, whose composition is not singly related to one unique bedrock type, soil composition, altitude, or narrow suite of climate factors, but rather depends on a combination of many of these factors. South American grassland ecosystems have been shaped by a complex mixture of historical and ecological drivers, whose implications affected directly on the community structure of the fauna found in these habitats. Comparing phylogenetically informed with species-based approaches in macro-ecological studies therefore has the potential to reveal different patterns in assemblage structures, if species co-occurrences are not only driven by interactions in ecological time, but also carry signals of environmental filtering through phylogenetic conservatism. Using species x matrix of skipper butterflies, common groups are found associated with grasses and/or forbs grasslands. The present investigation tests hypotheses correlating ecological/phylogenetic measurements of assemblage structure to climatic, landscape, biogeographical and geological factors, using the exceptional hostplant associations of skippers, whether with monocots or dicots, expecting different life traits to affect community similarity in different grassland habitats. Species lists deemed sufficiently complete to allow a first large-scale analysis of insect assemblages inhabiting these unique ecosystems. As expected, different measurements revealed different aspects of species composition in our macro-ecological assessment. Phylogenetic measures of community relationships were far superior in extracting information of how climate, biogeography and geological basin contributes to structure grassland herbivore assemblages, thus corroborating that many ecological trends cannot be comprehensively understood without taking phylogenetic relationships into account. Phylogenetic structure of grassland skipper assemblages was clearly clustered in most cases, with significant higher values related to the more specialized monocot feeders. These findings corroborate the expectation of a deep evolutionary trend influencing species co-occurrence of grassland herbivores, reflected by its distinct historical origins and climate-related expansions and contractions during last glacial cycles.

008

AUTHORS: Neil Cobb, Jennifer M. Zaspel, et al. (27 Participating Institutions)

CONTACT INFORMATION: Project PI: Neil Cobb, Merrian-Powell Center for Environmental Research, Northern Arizona University, 617 S. Beaver St., Flagstaff, AZ 86011, Co-PI and Presenting Author: Jennifer M. Zaspel; Director, Purdue Entomological Research Collection, 901 W. State Street, West Lafayette, IN 47907, Purdue University, jzaspel @purdue.edu

TITLE: Lepidoptera of North America Network (LepNet): Documenting Diversity in the Largest Clade of Herbivores

ABSTRACT: With up to 15 million specimens, Lepidoptera are one of the most abundant insects in museum collections in North America, but fewer than 5% are digitized. The Lepidoptera of North America Network (LepNet) comprises 27 research collections that will digitize 1.7 million specimen records and integrate these with over 1 million existing records. This project will also digitize 58,524 larval vial records with host plant data, marking the first significant digitization of larvae in North American collections. Resulting images will enhance remote identifications and promote systematic, ecological, and global change research. Ultimately, data for a broad range of studies, including the evolutionary ecology of Lepidoptera and their host plants, especially in the context of global change processes affecting biogeographic distributions will be generated.

009

AUTHORS: Qian Cong, and Nick V. Grishin

CONTACT INFORMATION: Howard Hughes Medical Institute, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, Texas, USA 75390-9050, grishin@chop.swmed.edu

TITLE: On Many Uses of COI DNA Barcodes

ABSTRACT: A specimen on a pin is not just what you see. Behind its colorful shell there hides DNA that can be extracted and sequenced, no matter how old it is. Tapping into the holdings of collections worldwide, we routinely obtain mitochondrial DNA COI barcodes from specimens collected up to 200 years ago. Discovery of new species that are frequently cryptic and overlooked, association of present-day

specimens with ancient primary types that are damaged or lack diagnostic characters, and association of sexes in species with marked sexual dimorphism are possible with COI barcodes and bits of extra evidence. Examples of how barcodes help us solve long-standing taxonomic questions and correct published misconceptions will be discussed.

010

AUTHORS: Qian Cong, Jinhui Shen, Andrew D. Warren, Dominika Borek, Zbyszek Otwinowski, and Nick V. Grishin
CONTACT INFORMATION: Howard Hughes Medical Institute, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, Texas, USA 75390-9050, grishin@chop.swmed.edu
TITLE: What Complete Genomes Tell Us About Speciation in (Pieridae)
ABSTRACT: For more than two centuries, taxonomists relied on phenotypes to argue about species boundaries. For several decades, a couple of gene markers gave us a glimpse at the genotype to add to phenotypic characters. Today, with recent advances in technology, we can routinely sequence complete genomes of dozens of specimens and see what butterflies are made of. Theoretically, the genotype (i.e., complete genome) is all we need to know to understand the phenotype. Putting theory to practice, we obtained complete genomes of many *Phoebis sennae* specimens across its distribution: from California and Florida to Caribbean Island and Chile with Brazil. Reviewing this genomic landscape, we found prominent divergence of some populations, extreme homogeneity of others, suture zones, and island-hopping. Questions to discuss: Can a species be non-monophyletic? Can we use complete genomes to define species boundaries? Do we need to look at phenotypes at all?

011

AUTHORS: Qian Cong, Jinhui Shen, Dominika Borek, Robert K. Robbins, Paul A. Opler, Zbyszek Otwinowski, and Nick V. Grishin
CONTACT INFORMATION: Howard Hughes Medical Institute, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Dallas, Texas, USA 75390-9050, grishin@chop.swmed.edu

TITLE: Conundrums of North American Calycopis (Lycaenidae) Solved By Complete Genomics

ABSTRACT: *Calycopis cecrops* and *C. isobeon* are notoriously difficult to tell apart. Wing patterns are similar, genitalia are really close, and COI DNA barcodes are not separable. Are they really species or merely weakly defined subspecies? Complete genomes revealed that the two species diverged strongly, in 20% of their proteins, and do not hybridize much in the areas of sympatry. Introgression between the two species is minor (<3%) and ancient. Genomes show that unusual Texas populations with black spots and no red caps near ventral hindwing tornus are *C. isobeon* that experienced recent but limited (<3%) introgression from *C. cecrops*. We found a number of eastern USA specimens that look like *C. cecrops*, but their COI barcodes differ by 2.6% from both *C. cecrops* and *C. isobeon*. Are they the third, and new, *Calycopis* species in the US? Complete genomic comparison gave a confident answer to this question.

012

AUTHOR: Charles V. Covell

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

TITLE: The moth collections at the McGuire Center: sources, composition and development, with special reference to the inchworm moths (Geometridae)

ABSTRACT: Since opening in 2004 the McGuire Center's holdings of moths and butterflies have increased tremendously, building on the collections of the Allyn Museum of Entomology, collections in several departments of the University of Florida, and the Florida State Collection of Arthropods Lepidoptera. Major collections have been bequeathed, donated or purchased; and their curation has required a major effort. While working on many moth families, the author's main interest has been building the North American and neotropical Geometridae representation. The current status of holdings in this family is discussed, with a history of the diverse sources of specimens.

013

AUTHORS: Lars Crabo[1], Paul Hammond[2], Merrill Peterson[3], Jon Shepard[2], Richard Zack[1]

CONTACT INFORMATION: [1]Washington State University, Pullman WA; [2]Oregon State University, Corvallis OR; [3]Western Washington University, Bellingham, WA; Lars Crabo, 724 14th St., Bellingham WA 98225, lcrabo@nwrads.com

TITLE: Pacific Northwest Moths: A Regional Database-driven Website

ABSTRACT: The history, production, layout, and functionality of the Pacific Northwest Moths website (pnwmoths.biol.wwu.edu) are presented. The site includes 1236 macromoth species of the northwestern United States and British Columbia (all families except Geometridae). The site is organized into three major sections: Species Fact Sheets, field-guide-style Photographic Plates, and a matrix-based Identification Key designed for non-experts. The site's interactive dot maps and phenology graphs draw from a database of nearly 100,000 records and can be manipulated easily by nine filters. Each species account features detailed identification and natural history information tailored to the area of coverage, as well as high-resolution dorsal and ventral images. Plans for future taxonomic expansion will be discussed.

014

AUTHOR: Thomas C. Emmel

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TITLE: Overwintering Monarch Colonies of Central Mexico: From Discovery to Present Threats

ABSTRACT: Since their discovery on January 2, 1975, the overwintering colonies of the eastern North American migratory Monarch butterflies in the mountains of central Mexico have amazed millions of people around the world, and hundreds of thousands of human visitors have stood in silent awe at the opportunity to personally visit the cathedral-like fir forests of these high elevations where the monarchs fly and stay each winter. The story of the discovery of the dozen or so present Mexican colonies and their unbelievable numbers has many tangled threads, where today they face threats from many sources that could

end the migratory phenomenon in the near future. This presentation will attempt to summarize the recent research on both the biological phenomena and the threats that make the Monarch's survival of such current interest to mankind.

015

AUTHOR: Marc E. Epstein
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TITLE: World Phylogeny of Limacodidae: from Harry Dyar's Law (1899) to Total Evidence (2016)

ABSTRACT: Lesser known than Harrison G. Dyar's Law of Geometric Growth of 1890 is what I refer to as Harry Dyar's Law from 1899. He considered slug caterpillars (Limacodidae) to have a woolly common ancestor similar to the puss moths (Megalopygidae). Therefore, the hairiest of limacodids, such as the monkey slugs (*Phobetron*), were considered the most primitive. In his series, "The life histories of the New York slug caterpillars" Dyar concluded that *Phobetron* was at the base of the same branch of the phylogeny as spiny, nettle caterpillars, and the other branch, being the smooth and cryptically marked caterpillars such as the skiff moth and the button slugs. Although Dyar's hypothesis is plausible, results from my work in 1996, subsequent molecular studies I collaborated on (LepTree and Weller & Zaspel), and now preliminary results using total evidence (with Dupont and Solovyev) are showing otherwise. Curiously, Dyar was so convinced that hairy limacodid caterpillars were the precursor of the spiny ones that he didn't let his own observations of early instar behavior or morphology convince him to place the 'hairys' with the 'smooths' on the proper branch.

016

AUTHORS: Diego R. Dolibaina, Olaf H. H. Mielke & Mirna M. Casagrande
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TITLE: Phylogeny of the Pantropical Genus *Celaenorrhinus* Hübner, [1819] (Hesperiidae: Pyrginae)

ABSTRACT: *Celaenorrhinus* Hübner, [1819] is the richest and the only pantropical genus of Hesperiidae. While morphological structures are used to establish its monophyly, recent studies based on molecules have suggested the genus as a paraphyletic lineage. Thus, the objectives of the present study were to test the monophyly of *Celaenorrhinus* and of its continental species groups, and to hypothesize scenarios of the evolution of the secondary sexual characters through a phylogenetic approach based on morphology. A total of 74 species were selected for the analysis, 69 representing the ingroup, and 163 characters were circumscribed. *Celaenorrhinus* was recovered as a paraphyletic lineage, as well as its American and African species group. The origin of the male's abdominal scent pouches, the main morphological character used to delimit the genus, was properly used for the new delimitation of *Celaenorrhinus*. This approach allowed us to re-establish the genus *Apallaga* Strand, 1911 for the continental African species, as well as a new genus was found to include exclusively continental African species. Thus, the African fauna of *Celaenorrhinus* was reduced to a small continental group plus few species from Madagascar. The following relationship between the genera was recovered: (*Alenia* (*Triskelionia* ((*Eretis* + *Sarangesa*) (*Pseudocoladenia* ((Gen. Nov. + *Apallaga*) *Celaenorrhinus*))))). The evolution of the sexual secondary characters is discussed.

017

AUTHORS: Todd M. Gilligan[1], Luke R. Tembrock[2], Norman B. Barr[3], and Roxanne E. Farris[4]

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TITLE: Molecular-based Initiatives to Support the Identification of *Helicoverpa armigera* (Hübner) in the New World

ABSTRACT: The Old World bollworm (OWB), *Helicoverpa armigera* (Hübner), is one of the most important agricultural pests in the world. This species was first discovered in Brazil in 2013, and it has been subsequently found throughout South American and the Caribbean. In

June and July, 2015, three specimens of *H. armigera* were captured in Florida representing the first detections of this species in the continental U.S. Diagnosis of *H. armigera* in the New World is problematic because of its similarity to *H. zea* – this creates not only great difficulty with identification, but also the possibility of *armigera-zea* hybrids leading to introgression of new resistance genes into wild populations of *H. zea*. In 2015, two separate rapid molecular assays were developed to detect and diagnose *H. armigera* using real-time PCR. Here we detail these assays and also discuss future molecular-based initiatives that will be used to support the USDA's Strategic Management Plan for Old World bollworm.

018

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TITLE: Tortricidae Described from Loveland, Colorado by Walsingham in 1895

ABSTRACT: Thomas de Grey, 6th Baron Walsingham (1843–1919) was one of the premier world experts on microlepidoptera in the late 19th and early 20th centuries. His massive private collection consisted of moths from around the world that he had collected himself, as well as those sent to him by other collectors. He was considered the authority on North American Tortricidae following his collecting expedition to northern California and Oregon in 1871–72, and subsequent publication of Nearctic "types" in the British Museum in 1879. North American collectors continually sent him tortricid specimens to identify and describe—one such collector was William G. Smith, an ornithologist living in Loveland, Colorado. Smith provided Walsingham with a substantial number of tortricids collected in Loveland, and Walsingham described more than 20 new species in 1895 from this material. Several of these species are the most recognizable Tortricidae found in Colorado.

019

AUTHOR: Alessandro Giusti

CONTACT INFORMATION: Department of Life Sciences, Natural History Museum (Darwin Centre 2, 2nd floor North), Cromwell Road, SW7 5BD, London, a.giusti@nhm.ac.uk
TITLE: Re-organizing the Slug Moths (Limacodidae) Collection of the NHM, London: Challenges, Outcomes & Future Value
ABSTRACT: Even though we know that well organized museum collections are crucial for assisting and simplifying works of taxonomic revisions, historically, many of the least appealing groups of organisms have been both taxonomically and curatorially neglected in museum's collections. This often creates a vicious cycle of prolonged neglect. The family Limacodidae is one of these long-term forgotten groups; but not for long, as I have recently finished re-organizing the limacodids collection of our Museum. In this talk I will give a brief overview of the process of re-housing the entire collection of limacodids in our Museum, describing the various challenges, positive outcomes encountered during the task, and the potential usage of a better organized collection for the future.

020
AUTHOR: Christopher C. Grinter
CONTACT INFORMATION: 1816 S. Oak Street, Champaign IL 61820. Illinois Natural History Survey, Prairie Research Institute at the University of Illinois, Champaign, IL 61820-0904, cgrinter@illinois.edu
TITLE: Collection Management Online: Curating Data with Symbiota
ABSTRACT: The Symbiota Collections of Arthropods Network (SCAN) currently hosts 20 million specimen records and is growing daily. A brief overview of this online-only software will be presented, along with a discussion on the relevance to the Society. Integration of observation networks into SCAN (most importantly iNaturalist), coupled with funding of recent NSF Lepidoptera proposals, creates a critical opportunity for the Society to collaborate with the citizen science community and modernize our Season Summary data.

021 – Student Paper
AUTHOR: Peter R. Houlihan
CONTACT INFORMATION: Department of Biology, University of Florida, Gainesville, FL 32611 and McGuire Center for Lepidoptera and

Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL 32611-2710, (phoulihan@ufl.edu)
TITLE: Orchid Pollinator Ecology, Coevolution, and Conservation: From Darwin's Predicted Hawkmoth to Caribbean Ghosts
ABSTRACT: For more than 150 years, biologists have been captivated by the ecology and evolution of Darwin's orchids. However, despite their charismatic appearance, little is known regarding the pollination biology of these long spurred orchids. While pollination syndromes suggest hawkmoth pollination, very few species actually have known pollinators. This critical information gap is of grave concern as many species, confined to islands or fragmented habitats, are listed as endangered. A comprehensive understanding of the pollination ecology of these species is crucial to enact appropriate conservation measures that will ensure the survival of these orchids and their pollinators. I will discuss my ongoing research regarding these orchids, with a particular focus on the ghost orchids of the Caribbean (*Dendrophylax* spp.).

022
AUTHORS: John Hyatt[1], Lance Durden[2], Brian Scholtens[3], and James K. Adams[4]
CONTACT INFORMATION: [1]Kingsport, TN, jkshyatt @centurylink.net; [2]Georgia Southern University, Statesboro, GA, ldurden @georgiasouthern.edu; [3]College of Charleston, Charleston, SC, scholtensb @cofc.edu; [4]Dalton State College, Dalton, GA, jadams @daltonstate.edu
TITLE: The Moth Fauna of Sapelo Island, Georgia
ABSTRACT: As very little work has been done on the lepidopterous fauna of barrier islands along the SE U.S. coast, the first author, working with the aid of the Sapelo Island National Estuarine Research Reserve (SINERR), the Department of Natural Resources, and the University of GA Marine Institute, initiated the current moth survey work on Sapelo Island in 2011. Sapelo Island is a barrier island along the southeast coast of Georgia, midway between South Carolina and Florida in McIntosh Co. It is the fourth largest of the barrier islands of Georgia, with an area of approximately 25¾ mi^2. The island has a surprising variety of habitats (although very little elevation!), including beach and dune habitats, salt marshes, natural and artificial fields, forested and stream habitats. Now

in its sixth year, the project has topped 900 moth species, including around 70 moths (mostly micros) recorded from Georgia for the first time. The moth list includes about 50 more macros than micros, although there are more micros still waiting to be identified. At least one species new to science has been discovered, a noctuid in the genus *Sympistis*. We will give you a photographic tour of both the habitats and some of the more interesting moths that have been encountered on the island.

023 – Student Paper

AUTHORS: Crystal Klem[1] , Alberto Zilli[2] , Jennifer Zaspel[3]

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TITLE: A Preliminary Phylogeny of the Fruit-piercing Moth Genus *Eudocima* Based on Morphological Data (Lepidoptera: Erebidae: Calpinae)

ABSTRACT: Fruit-piercing moths in the genus *Eudocima* are distinctive due to their bright coloration and significant pest status. There are at least 44 *Eudocima* species, which are cosmopolitan, and can be found throughout the New World tropics, Asia, Africa and Australasia; they have been noted as severely damaging pests in these regions as early as 1869. Many consider the current *Eudocima* classification as artificial, and there are many suspected species complexes. Despite this, no comprehensive phylogeny or revision of the genus exists. In this study, a preliminary phylogenetic analysis of *Eudocima* [Erebidae: Calpinae] is conducted using morphological characters. The resulting data matrix is analyzed using maximum likelihood in conjunction with parsimony. Results suggest that *Eudocima* is paraphyletic, with several strongly supported clades found within the genus. A more natural grouping of the nominal taxon *Eudocima* could be achieved by the designation of new genera, which take into account these phylogenetic relationships.

024

AUTHOR: Leroy C. Koehn

CONTACT INFORMATION: Leptraps LLC, 3000 Fairway Court, Georgetown, KY 40324, leptraps@aol.com

TITLE: Bait Traps: New Designs and How, When, and Where to Use Them and Be a Better Baiter!

ABSTRACT: The Slotted Pan, Tropics Upward and Kill Type are three new designs. The Slotted Pan is very effective and virtually escape proof. The Tropical Upward uses the upward movement of butterflies towards light as a means of trapping butterflies into a bright area at the top of the trap cylinder. A Kill Type Bait Trap. This design allows the user to set out the trap and leave it unattended for several days. Virtually every insect that enters the trap will be killed. A great bait trap for collecting winter moths in more temperate climates. How to make and use a very good bait. How long the bait will remain effective and how to prevent other critters, ants and mice, from gaining access to the bait.

025

AUTHOR: Leroy C. Koehn

CONTACT INFORMATION: Leptraps LLC, 3000 Fairway Court, Georgetown, KY 40324, leptraps@aol.com

TITLE: Traveling with Light Traps and Batteries

ABSTRACT: Traveling with light traps and batteries can be time consuming and very frustrating. Batteries must be charged while driving and must be safely stowed in the vehicle. Ethyl Acetate must be managed with care. Polypropylene Bottles should be used and then properly and securely stored. Discipline is mandatory for a great Light Trap experience. How to manage Batteries, Ethyl Acetate, and Traps maintenance will be explained in detail.

026

AUTHOR: David Lees

CONTACT INFORMATION: Department of Life Sciences, Natural History Museum, Cromwell Road, South Kensington, SW7 5BD, david.lees @nhm.ac.uk

TITLE: DNA Barcoding Reveals a Largely Unknown Fauna of Gracillariidae Leaf-mining Moths in the Neotropics

ABSTRACT: Higher taxa often show increasing species richness towards tropical low latitudes, a pattern known as the latitudinal biodiversity gradient (LBG). A rare reverse LBG (with greater richness towards temperate high latitudes) is exhibited by Gracillariidae leaf-mining moths, in which most described species occur in northern temperate areas.
We carried out the first assessment of gracillariid species diversity in two Neotropical regions to test whether the relatively low tropical species diversity of this family is genuine or caused by insufficient sampling and a strong taxonomic impediment. 516 specimens (larvae and adults) were DNA barcoded in French Guiana and Ecuador. Bold Index Numbers and another automated method for species delineation were used to estimate diversity. Alpha diversity exceeded that of any known temperate gracillariid fauna, with up to 108 candidate species for one site (of which nearly 60% singletons) and a lower estimated bound of 240 species. The proportion of described: undescribed species was estimated after visual comparison with types of 83% of described species. This suggests that at least 85% of species collected as adults are undescribed. The LBG for gracillariid moths is an artefact of insufficient sampling and a strong description deficit.

027

AUTHOR: Geoff Martin
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TITLE: The Lepidoptera Collections at the Natural History Museum, London, UK

ABSTRACT: The collections at the Natural History Museum, London 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 reorganization of the collections. I will be presenting an update of the collections including an overview of the collection organization, current staff working on the collections and their research and projects. I will also outline the current challenges facing staff and the collections.

028

AUTHOR: Eric H. Metzler

CONTACT INFORMATION: Adjunct Curator of Lepidoptera at Michigan State University, P.O. Box 45, Alamogordo NM 88311, metzlere @msu.edu

TITLE: Anecdotal Remarks on the Ecology of Moths at White Sands National Monument

ABSTRACT: My study at moths at White Sands National Monument began in the winter of 2006 – 2007. In February and March 2007 *Protogygia whitesandsensis*, then unnamed, was not uncommon. During the years 2006 through 2014 White Sands National Monument experienced unusually dry conditions – it was considered a severe drought. Many new species of moths were collected and several were described. The Spring of 2015 was unusually wet, even for the desert of the Monument. When I looked for moths in April, May, and June 2015, I was confronted with several species of moths never before seen in the Monument, 5 of them are new species. By the way *Protogygia whitesandsensis* was only seen once again. Jerry Powell published a series of papers showing the extreme longevity of moth pupae in deserts between rainfalls. I make an unsupported leap of faith that the same principle is active in White Sands National Monument.

029

AUTHOR: Glenn S. Morrell

CONTACT INFORMATION: P.O. Box 147, Stratton, Maine 04982, woodsskier@hotmail.com

TITLE: Yukon Collecting History and the Impact of the Dempster Highway

ABSTRACT: Collecting in Canada's western Arctic was very limited until the completion of the Dempster Highway. This has resulted in the relatively recent discovery of over 25 new species of moths and butterflies primarily in the Ogilvie and Richardson Mountains. This large number has been exemplified by the Beringian range expansion of many species during the last glaciation. This presentation explores the type locality habitats for species found along the Dempster Highway documenting the many species found in them.

030

AUTHORS: Vazrick Nazari[1] and Genevieve von Petzinger[2]

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TITLE: Lepidoptera in the Upper Paleolithic Age

ABSTRACT: The origins of modern art are generally thought to date back to early Upper Paleolithic period, ~45,000 BCE. The magnificently decorated Chauvet cave in France (32,000 BCE), the earliest known of the great painted caves in Europe, and many subsequent sites testify for the artistry of the early hunter-gatherer cultures. The Paleolithic people often chose to represent the large herbivores that they hunted, including bison and aurochs, ibex and all varieties of deer. Other animals, most commonly horses, mammoths, Rhinos, snakes etc were also depicted. But beside these easily identifiable animals, numerous abstract signs and symbols exist on Paleolithic cave walls that have proven a challenge to decipher. Insects are always thought to be missing altogether in Paleolithic art, with the earliest unambiguous depictions of insects (a butterfly) recorded from the Neolithic (>10,000 BCE). Here we argue that the conspicuous absence of Lepidopteran imagery from Paleolithic literature may be explained by the difficulties associated with the correct interpretation of some of the geometric symbols (aviforms and tectiforms), by which the Paleolithic people may have tried to represent butterflies and moths in their rock art.

031

AUTHORS: Gareth S. Powell, Julia L. Snyder, Timothy J. Anderson, Eugenio H. Nearns, and Jennifer M. Zaspel

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TITLE: The Purdue Entomological Research Collection with Comments on the Lepidoptera Holdings

ABSTRACT: The Purdue Entomological Research Collection (PERC) is the largest and most important collection of insect specimens in the state of

Indiana. The PERC has acquired numerous historical collections of great significance to the systematic entomology community, including Lepidoptera. Despite the importance of its holdings, the PERC has remained underutilized by, and in some cases inaccessible to, scientists and other professionals from outside of Purdue. As part of a recent collection-wide assessment and survey for current digitization and electronic expansion projects, we conducted an inventory of the butterfly and moth holdings in the PERC. Our findings suggest a significant portion of the PERC Lepidoptera holdings is of regional significance, with a vast majority of the material originating from the Midwest. Recent expansion efforts will broaden the geographic scope of the Lepidoptera collections at Purdue, and ongoing digitization efforts will increase its accessibility to the scientific community.

032

AUTHORS: Segebarth, Ian K. and Peter R. Houlihan

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TITLE: Nature Photography Workshop

ABSTRACT: Grab your camera and join McGuire Center's expert photographers, Ian Segebarth (www.isegebarthphotography.com) and Peter Houlihan (http://www.peter-houlihan.com/), for an informal question and answer session as we walk around the Nature Place grounds. We will talk about different kinds of equipment, scene composition, lighting, making the most of point and shoot cameras, ideal settings for SLR cameras, video, and general tips for macrophotography.

033 – Student Paper

AUTHORS: Julia L. Snyder[1], A. Zilli[2], Jennifer Zaspel[3]

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[3]Department of Entomology, Purdue University, 901 W. State Street, West Lafayette IN, jzaspel@purdue.edu
TITLE: An Overview of the Systematics of the Vampire Moth Genus, *Calyptra* Ochsenheimer (Erebidae: Calpinae)
ABSTRACT: The genus *Calyptra* Ochsenheimer is known for its unique combination of obligate fruit piercing and facultative blood feeding as adults. These moths are distributed throughout all continents except Antarctica and South America, with one species occurring in North America. The recent Lepidoptera classification has resulted in the placement of *Calyptra* in the family Erebidae. Within *Calyptra,* the taxonomic status of some species remains unclear, resulting in the need for a comprehensive phylogeny. In this study, relationships among *Calyptra* species were reconstructed with a preliminary tree in order to assess phylogenetic signal and identify important morphological characters for clade diagnosis. Additional morphological analyses were then conducted to reexamine a subspecies complex within the genus. This was due to historical disagreement regarding the status of *Calyptra minuticornis novaepommeraniae* (Strand) and *C. minuticornis minuticornis* (Guenée). The resulting analysis provided clear evidence to synonymize the subspecies.

034
AUTHORS: Andrei Sourakov, David Plotkin, Akito Y. Kawahara, Lei Xiao, Winnie Hallwachs, and Daniel Janzen
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TITLE: Two Different Patterns of Haplotype Divergence, Biology, and Taxonomy of the *Erythrina*-feeding Crambid Moths
ABSTRACT: Members of two species complexes in the family Crambidae feed on ornamental and medicinal plants of the genus *Erythrina* (Fabaceae), commonly known as coral beans and/or coral trees, in tropical and subtropical regions worldwide. *Erythrina* leaf-rollers (genus Agathodes) and *Erythrina* borers (genus Terastia), although different ecologically and phenotypically, are sister genera. Each is represented by several very similar species. In this study, morphology and DNA barcoding data of a number of populations throughout the geographic range was analyzed, and taxonomy was revised.

035

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TITLE: Lepidoptera as Tools for Informal Science Education

ABSTRACT: After 12 years in operation, the McGuire Center for Lepidoptera and Biodiversity became well known for its collections, research and exhibits. It is less known for, but nevertheless is very active in, promoting the natural sciences among young people. This presentation shares some of the highlights of my personal experiences of using Lepidoptera as an educational tool while working with school and undergraduate students. The work entails: advising on science projects, overseeing junior volunteers in Lepidoptera collections, and planting butterfly gardens in local schools.

036

AUTHORS: Stephen R. Steinhauser†[1], Jacqueline Y. Miller[1], Nick Grishin[1,2]

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TITLE: Review of the West Indian *Astraptes xagua* (Lucas) Complex (Hesperiidae: Eudaeminae)

ABSTRACT: The genus *Astraptes* Hubner includes some very showy, robust bodied skippers that are geographically distributed throughout the southern U.S., Central and South America in addition to the West Indies including the Bahamas. This genus is distinguished by the costa fold on the male forewing and the antennae extending along approximately half of the forewing length with tails on the hindwing absent in the six species present the West Indies. *Astraptes xagua* (Lucas) is one of the more interesting species with two subspecies listed and another to be described. Although Steinhauser and J.Y. Miller

completed a review of *Astraptes* based on the original decriptions, type specimens and genitalic characters, the advent of molecular phylogenetic analysis provides further insight into the current status of the *Astraptes xagua* complex.

037 Student Paper

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TITLE: Variation of Host Plant Use By the Two Types of Fall Webworm (*Hyphantria cunea*, Erebidae)

ABSTRACT: Insect herbivores are one of the most diverse groups known and are responsible for many ecological and ecosystem services. Although we do not completely understand the drivers of their diversification, diet breadth, natural enemies and host plant use greatly influence divergence among insect populations and speciation. Local adaptation to host plant species can lead to divergent selection and possibly speciation. Fall webworm (FWW; *Hyphantria cunea*, Erebidae) is a highly generalist species in the larval stage, feeding on >600 plant species over its geographic range. There are two types of FWW, black and red-headed larvae, which vary in host plant use. In the eastern US, black-headed larvae frequently feed on box elder (*Acer negundo*) and green ash (*Fraxinus pennsylvanica*), while in Colorado red-headed larvae rarely use these plants, even though they both occur here. We tested the performance of red-headed FWW from Colorado and black-headed FWW from the eastern US by rearing them on two good quality hosts [chokecherry (*Prunus virginiana*) and narrow leaf cottonwood (*Populus angustifolia*)] and two bad quality host plants (box elder and green ash) from Colorado. We found that they differ in performance, suggesting that the populations are locally adapted to different host plant species.

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TITLE: A New Species of *Oeneis* from Alaska, United States, with Notes on the *Oeneis chryxus* Complex (Lepidoptera: Nymphalidae: Satyrinae)

ABSTRACT: *Oeneis tanana* A. Warren & Nakahara was recently described from the Tanana River Basin in southeastern Alaska, USA. This new taxon belongs to the core group of *Oeneis* and is apparently closest to *O. chryxus* by morphology, including its larger size and similarity of the female genitalia. In wing patterns and COI mitochondrial DNA barcode sequences, it is reminiscent of *O. bore*. A review of *O. chryxus* subspecies suggest that some may be better treated as species-level taxa, including *O. c. altacordillera*, found mainly in Colorado, near and above treeline. Evolutionary scenarios within the *chryxus* complex of taxa will be discussed.

MEETING ATTENDEES

Adams, James
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