Volume 59, Number 1 Spring 2017

NEWS OF THE LEPIDOPTERISTS' SOCIETY

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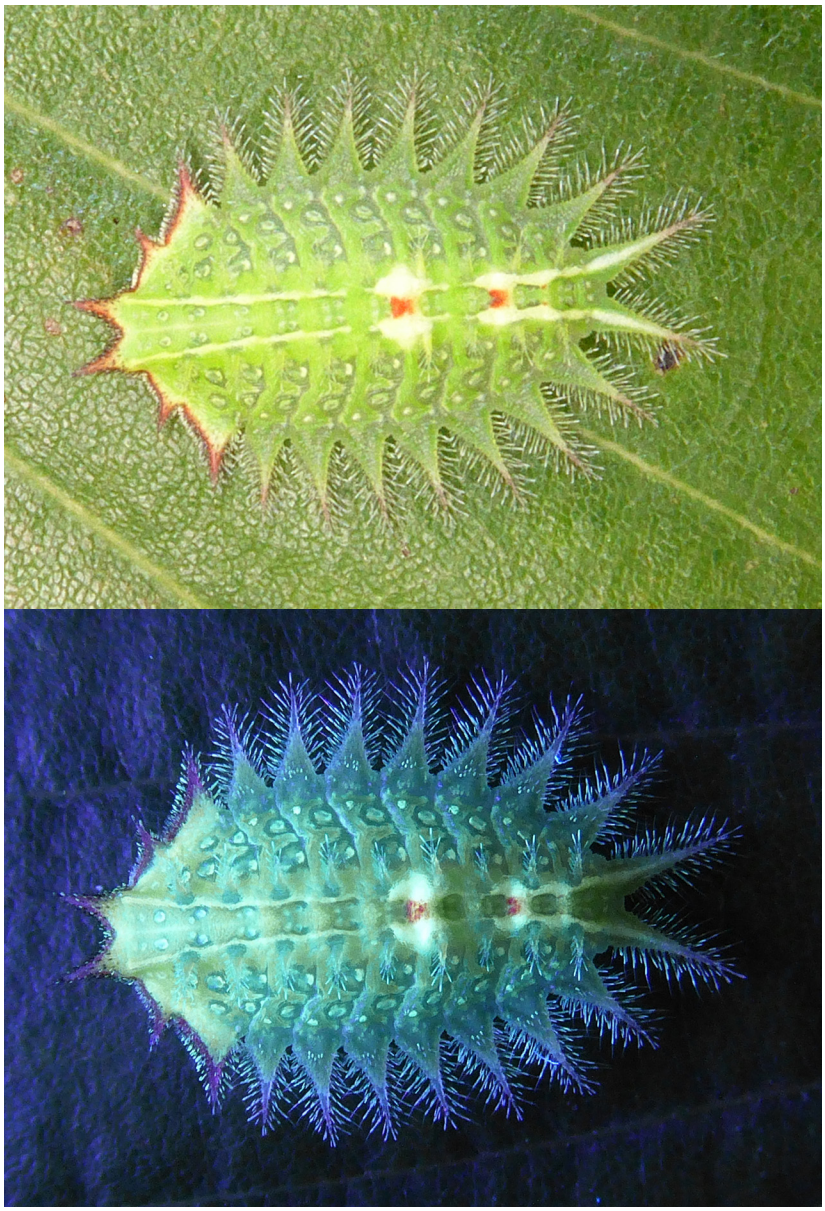

NEWS OF THE LEPIDOPTERISTS' SOCIETY

Volume 59, Number 1
Spring 2017

The **News of The Lepidopterists' Society** (ISSN 0091-1348) is published quarterly by The Lepidopterists' Society, c/o Chris Grinter, The California Academy of Sciences, 55 Music Concourse Drive, San Francisco, CA 94118, and includes one or two supplements each year. The **Season Summary** is published every year as Supplement S1 and is mailed with issue 1 of the News. In even numbered years a complete **Membership Directory** is published as Supplement S2 and is mailed with issue 4 of that volume of the News. Please see the inside back cover for instructions regarding subscriptions, submissions to, and deadline dates for, the News.

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Front Cover:

Crowned Slug Moth Caterpillar (*Isa textula*), found via UV light in East Brunswick, NJ, Sept. 21, 2016; top: normal light; bottom: UV. Taken with a Panasonic Lumix DMC ZS-40, by David Moskowitz (see related article, pg. 42).

Digital Collecting:

The Moths of Fraser's Hill, Malaysia I

David Fischer

12 Byarong Ave, Mangerton, NSW 2500, AUSTRALIA **dfische5@csc.com**

Fraser's Hill is a small village situated at 1200m elevation in the Titiwangsa Mountains. This site is about 100 km north of Kuala Lumpur. Fraser's Hill is a premier mothing site in Southeast Asia with a staggering diversity of species. A visitor can expect to see 400 or more species after a few nights of effort. Families such as Crambidae, Geometridae and Erebidae are well represented along with smaller numbers of species of Drepanidae, Lasicampidae, Notodontidae, Nolidae, Saturniidae, Sphingidae, Uraniidae and others. The moths are generally medium to large in size and include the gigantic Atlas Moth. Micro moths such as the Gelechioidea are relatively uncommon. Many species are also remarkable due to their vibrant colours and patterns.

Fraser's Hill is an easy destination to reach from the international airport. Most of the journey progresses along a fast toll road that crosses Kuala Lumpur and heads north towards Ipoh. Eventually, the toll road is left at Tanjung Malim. From there, the route follows a small road that winds through hill forest of dipterocarps/bamboo and heads from Kuala Kubu Bharu inland towards Raub. These sites at lower elevational forest are not far from Fraser's Hill and they can easily be accessed for a few hours of mothing at night.

Lower elevational forest, below Fraser's Hill

The road towards Raub eventually reaches the derelict hill station known as "The Gap". From here, Fraser's Hill is reached by following a one-way road up a steep hillside for 8 km. The habitat on the hill is different from that along the road through the foothills. Dipterocarps are gone and replaced by oaks, laurels and rhododendrons. Clouds often envelope the hilltops so branches of trees are laden with mosses, orchids and other epiphytes.

Mid-elevational forest, near Fraser's Hill

The place to stay is the "Really Wild Place". Stephen and Salmia are the hosts and both are wonderful cooks. They moved to this old mansion from the 1950s and turned it into a BnB for nature lovers. Stephen is a former BBC nature photographer and is now keen on moth photography. He puts out one or two moth sheets each night and uses heat lamps or black lights to attract moths. In addition, he has a mobile generator that he uses for the guests when visiting sites in the lower hill forest or at other sites on the hill away from his house.

"Really Wild Place," at Fraser's Hill

The extreme diversity of moths on the hill is probably the result of a number of factors. Fraser's Hill is surrounded by pristine mountain rainforest. Rainforests in Malaysia are considered to be among the oldest in the world so there has been lots of time for divergence and specialization. The mountain habitats have outlying populations of birds

from the Himalayas so it is likely that moths show a similar pattern. Peninsular Malaysia was once part of "Sundaland". During the ice ages, the sea level was lower and the peninsula was joined with Sumatra, Borneo and other islands. Moths no doubt dispersed at those times but then became isolated once the sea levels rose and islands formed once again. This sort of expansion and contraction of ranges might also have resulted in sufficient divergence for the development of new species over time. Of course, another reason for the diversity of moths at Fraser's Hill is the proximity of different habitats ranging from oak/laurel forest on the upper slopes to dipterocarp/bamboo forests in the lower foothills.

Fraser's Hill is a "must visit" site for anyone who is interested in photographing moths of Southeast Asia.

Expect two more articles on the Bombycoidea & Noctuoidea of Fraser's Hill in upcoming issues of the Lep Soc News.

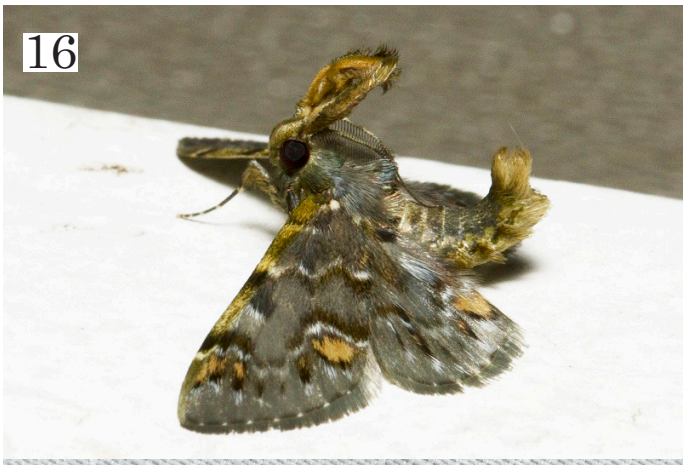
Lecithoceridae:
1. *Tisis charadraea*

Limacodidae:
2. *Scopelodes unicolor*;
3. *Parasa pastoralis*;
4. *Hampsonella dentata;*
5. *Parasa darma*;
6. *Cania* sp.

Cossidae:
7. *Cossus kinabaluensis*;
8. *Cossus cinereus;*
9. *Xyleutes persona*;
10. *Xyleutes strix*;
11. *Xyleutes mineus*;
12. *Xyleutes lutescens*

Larger threads on the sheets are 5 mm apart.

Metarbelidae: 13. *Metarbela* sp.; **Thyrididae**: 14. *Herdonia* sp.; 15. *Epaena* sp.



Pyraloidea: 16. *Coenodemus* nr. *dudgeoni*; ; 17. *Lista haraldusalis*; 18. *Hypanchyla* sp.; 19. *Sacada* sp.; 20. *Actioblepsis rubida*; 21. *Lixa productalis*
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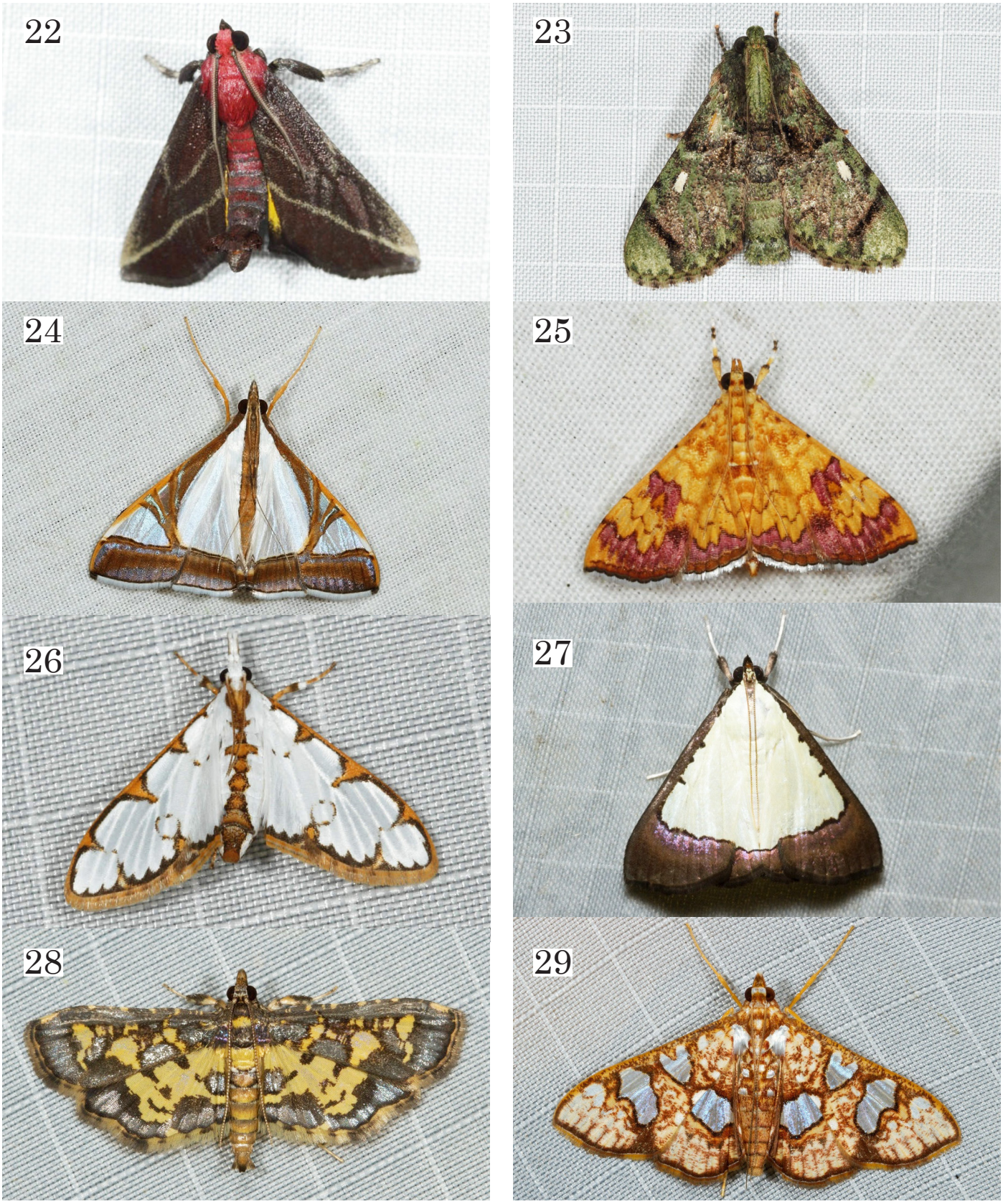
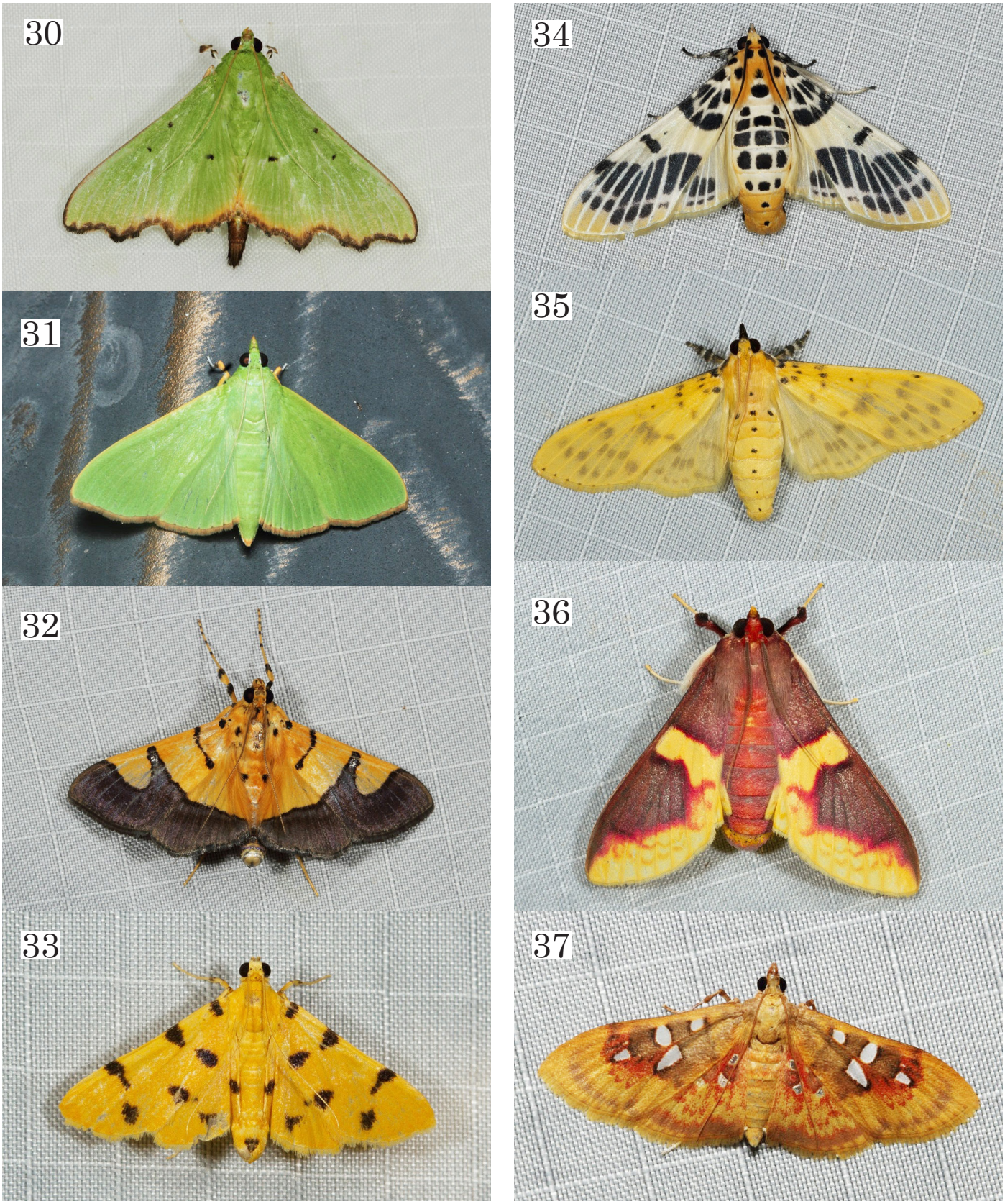


Pyraloidea: 22. *Toccolosida rubriceps*; 23. Pyralid sp.; 24. *Agrioglypta* nr. *eurytusalis*; 25. *Isocentris filalis;* 26. *Cirrhochrista* nr. *annulifera*; 27. *Pitama* sp.; 28. *Eurahyparoides bracteolalis*; 29. *Glyphodes canthusalis.* Larger threads on the sheets are 5 mm apart.



Crambidae: 30. *Parota* sp.; 31. *Parota* sp.; 32. *Endocrossis flavibasalis*; 33. *Xanthomelaena* sp.; 34. *Pachynoa spilosomoides*; 35. *Pachynoa* sp.; 36. *Pachynoa purpuralis*; 37. *Sameodes pictalis*
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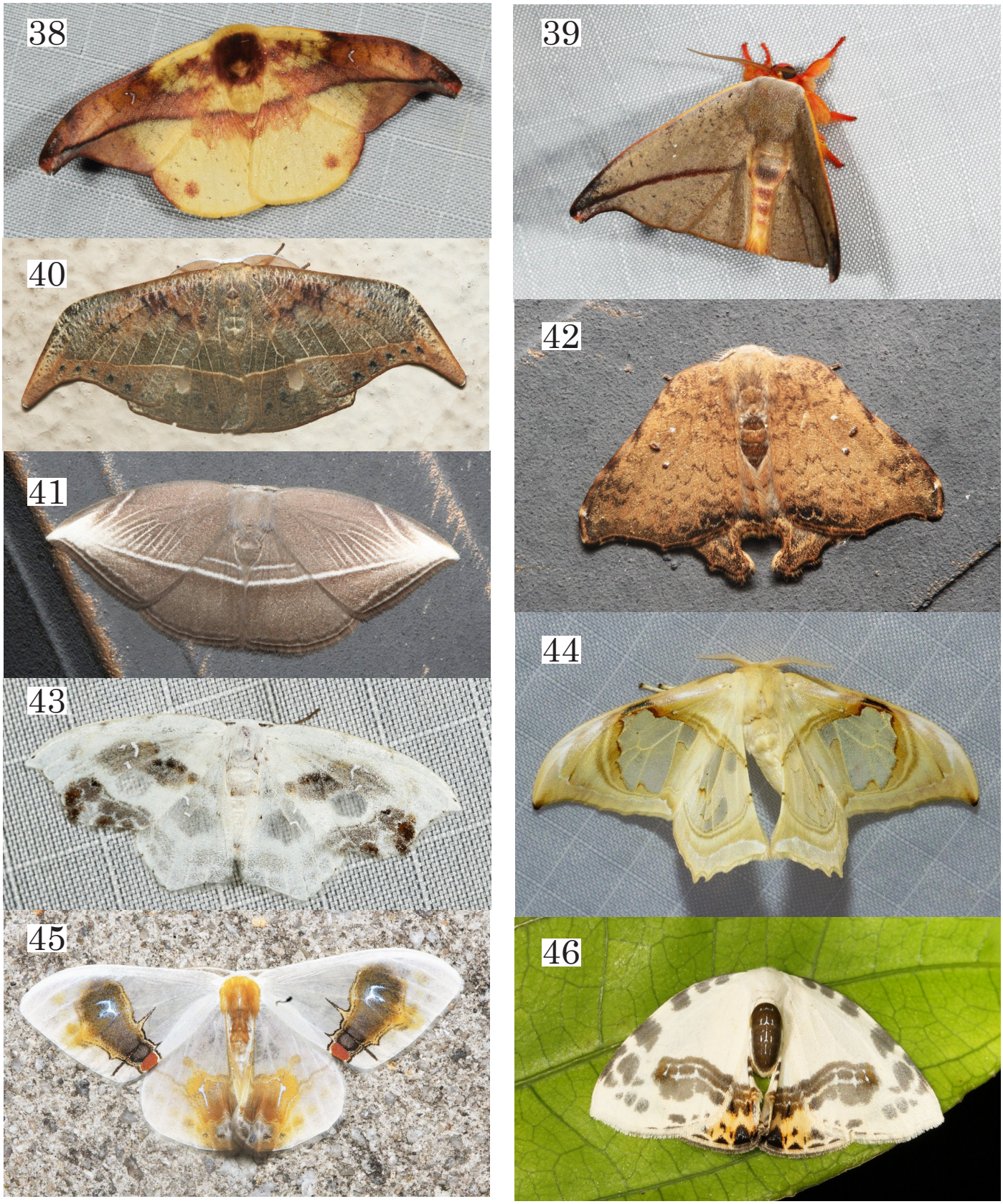
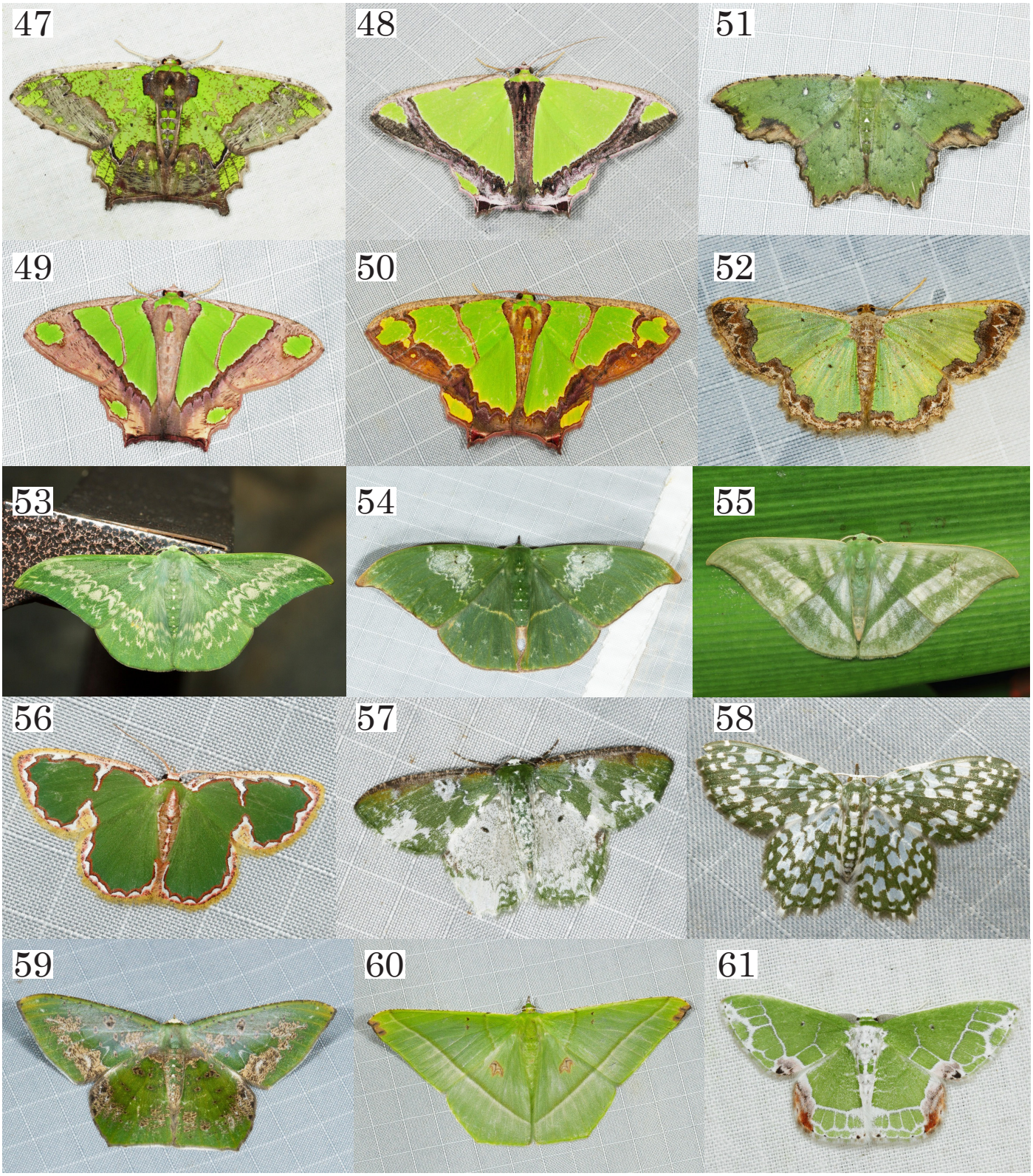


Drepanidae: 38. *Oreta obtusa*; 39. *Oreta insignis*; 40. *Canucha specularis*; 41. *Microblepsis leucosticta*; 42. *Thymistida* sp.; 43. *Leucoblepsis renifer*; 44. *Macrauzata melanapex*; 45. *Macrocilix maia* (note "flies" on forewings investigating "bird poop" on hindwings); 46. *Sewa orbiferata*. Larger threads on the sheets are 5 mm apart.



Geometridae: 47. *Agathia codina*; 48. *Agathia laetata*; 49. *Agathia quinaria* or *largita*; 50. *Agathia* sp.; 51. *Dooabia* nr. *puncticostata*; 52. *Zamarada* sp.; 53. *Tanaorhinus malayanus*; 54. *Tanaorhinus rafflesi*; 55. *Mixochlora vittata*; 56. *Comostola chlorargyra*; 57. *Eucyclodes albisparsa*; 58. *Berta* sp.; 59. *Chloroglyphica xeromeri*; 60. *Ornithospila esmeralda*; 61. *Uliocnemis* nr. *partita*
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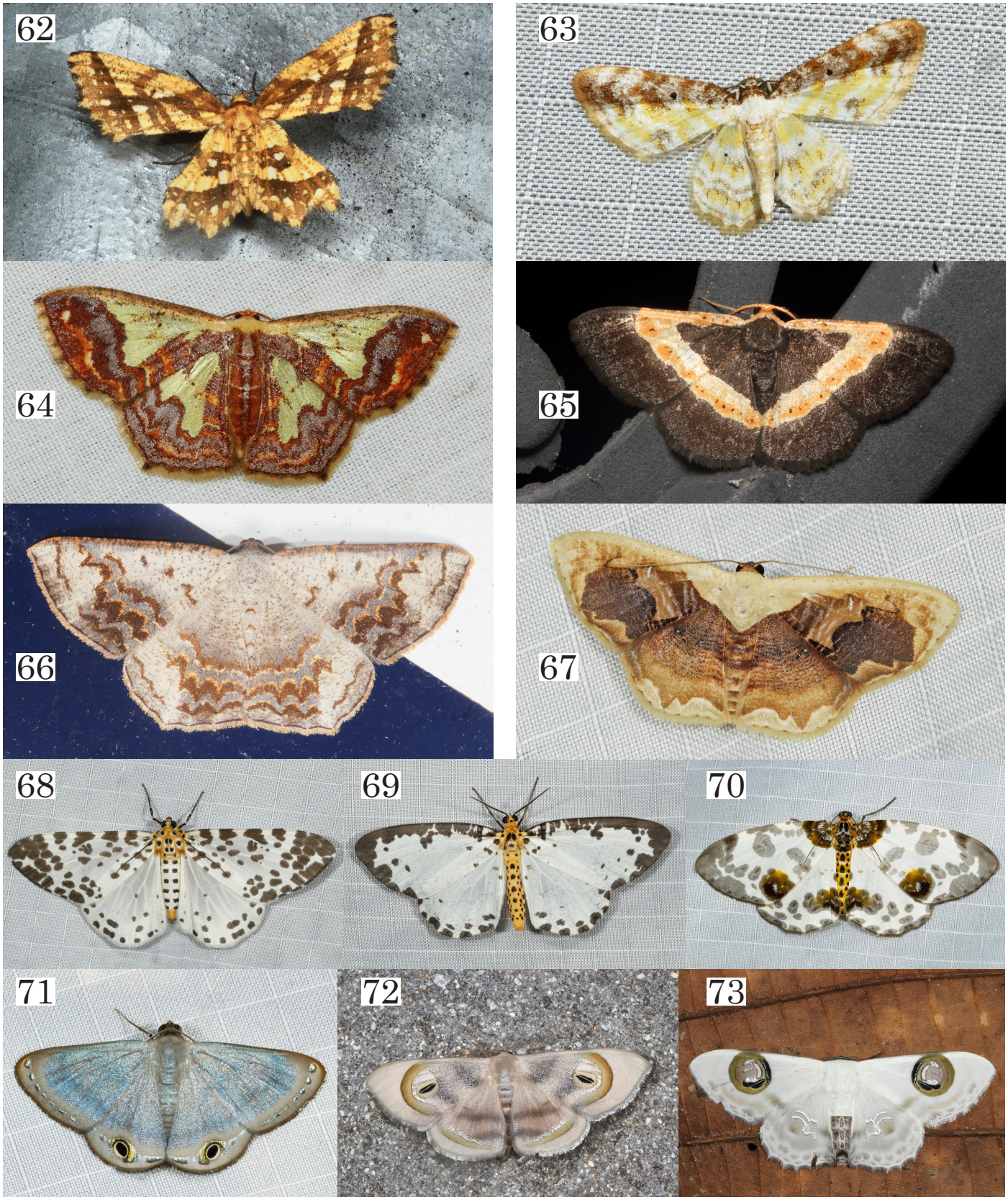
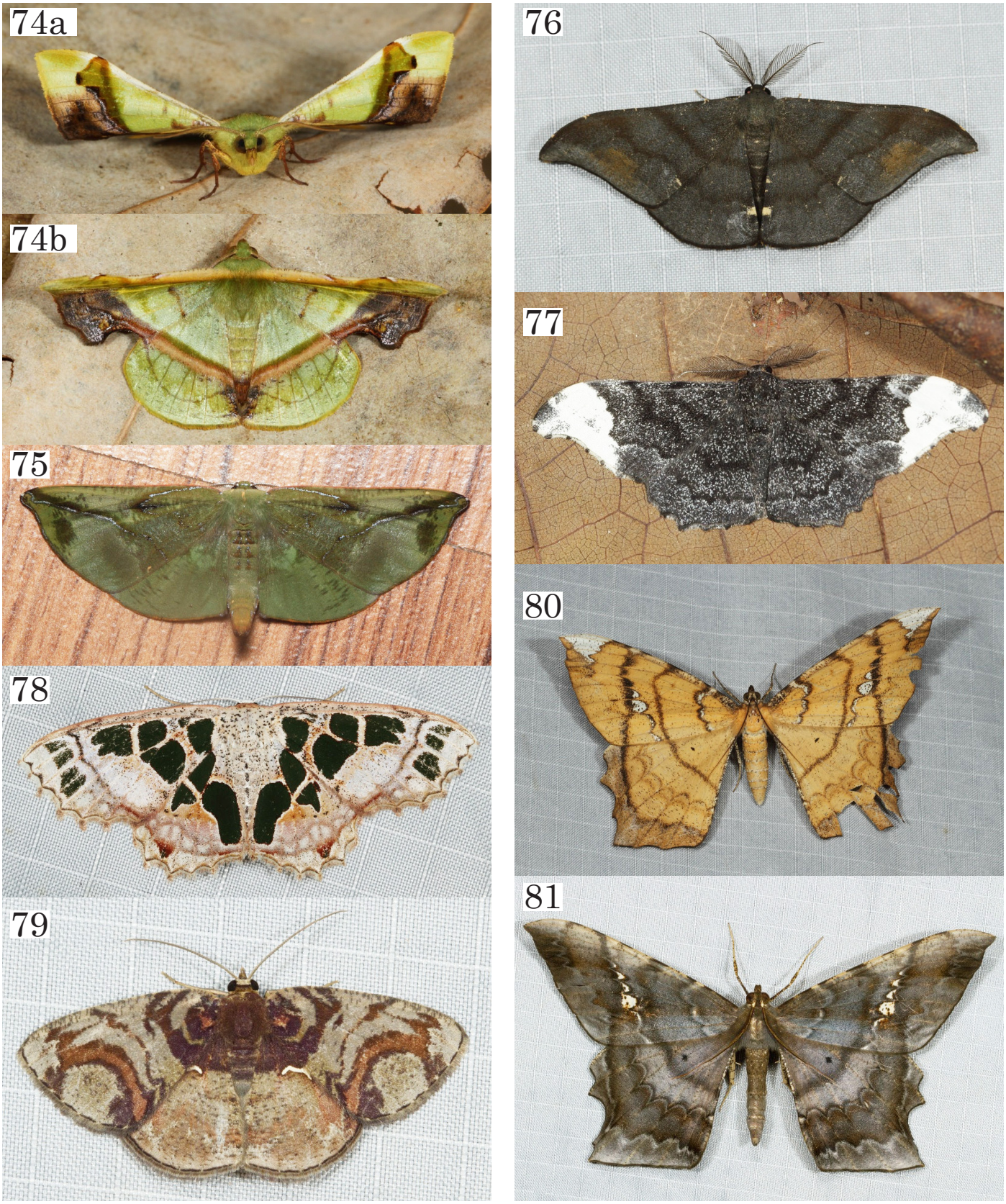


Geometridae: 62. *Fritillerinnys clatharia*; 63. *Acolutha flavivitta*; 64. *Peratophyga xanthyala*; 65. *Peratophyga trigonata*; 66. *Cassyma chrotadelpha*; 67. *Lipomelia subusta*; 68. *Dilphodes xanthura*; 69. *Abraxas* sp.; 70. *Abraxas niphonibia*; 71. *Tasta* sp.; 72. *Problepsis achlyobathra*; 73. *Problepsis plenorbis*. Larger threads on the sheets are 5 mm apart.



Geometridae: 74a./b.. *Fascellina plagiata*; 75. *Omiza lycoraria*; 76. *Hyposidra tallaca*; 77. *Hyposidra apioleuca*; 78. *Antitrygodes divisaria*; 79. *Astygisa* sp.; 80. *Amblychia angeronaria*; 81. *Amblychia infoveata*
Larger threads on the sheets are 5 mm apart.

Two *Papaipema* life histories discovered

Anthony E. McBride[1] and James R. Wiker[2]

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[2]20240 Big Oak Avenue, Greenview, IL 62642 **papaipema@aol.com**

On June 23, 2016, the first author found several larvae of the genus *Papaipema* Smith (Noctuidae) mining petioles and stems of buckbean (*Menyanthes trifoliata* L. var. *minor* Raf., Menyanthaceae) in a peatland complex in Roseau County, Minnesota. McBride accompanied Kyle Johnson on this trip, and after Johnson was alerted to the discovery, the two found additional larvae in this plant on June 23 and 24. An adult male of the borer moth, *Papaipema aweme* Lyman, was discovered in this peatland by Kyle Johnson in September 2014. McBride and Johnson searched here for the larva of this very small *Papaipema* during both July 2015 and June 2016, concentrating their efforts on plant species that were small in stature yet had substantial stems to support a boring larva and on plant species that fit the general distribution of the moth's few recorded localities.

McBride had checked several buckbean plants during the 2015 visit and found some stems mined by a small micromoth larva, possibly a tortricid. Again on the 2016 trip, evidence of the micro was still found in these plants, but persistence in checking and re-checking all possible plant species that could support a *P. aweme* larva was rewarded, and the first larva of this species was discovered in a wilted buckbean petiole. Most *P. aweme* larvae caused slight wilting of the host; some plants had yellowed leaves, and white, sawdust-like frass was often visible adjacent to bore holes in the plant stems (Figs. 1A and 1B). Many infested buckbean plants were found in standing water, with only their tops above the water level. Some larvae that had started boring in outer leaf petioles apparently abandoned the plant once the pith within the petiole was consumed, and likely drowned, as there was no way for the larva to enter another part of the plant to continue feeding without first entering the water. Larvae that first enter the terminal meristem are not affected by water, and are able to continue boring down into the crown and even into the rhizome to complete their development. Buckbean is widespread in wetland habitats in the northern United States and in Canada, and also occurs in Eurasia, though *P. aweme* must have additional habitat requirements as it has only been found in a limited area within the plant's total range. Even at this particular Minnesota site the host plant ranges widely through various mesic microhabitats, though *P. aweme* larvae are very localized there.

These larvae from buckbean were immediately recognized by McBride as being unique, especially when compared with larvae of congeners that are known from the site. Other *Papaipema* found at the peatland include *P. appassionata* (Harvey), *P. nepheleptena* (Dyar), and *P. unimoda* (Smith) (Kyle Johnson pers. comm.). The larva of *P. aweme* is shown as a partially grown ultimate instar in Fig. 1C and as a mature, paler ultimate instar in Fig. 1D. The larva in Fig. 1C was the largest larva found during the June 2016 effort; the rest were earlier instars. The most conspicuous characters of *P. aweme* larvae are the continuous, pale dorsal and subdorsal stripes (in most members of the genus, the subdorsal stripes are broken on the first four abdominal segments) (Wagner et al., 2011). In addition, minute pinacula and very pale overall coloration (even in early instars) set the larvae of *P. aweme* apart from other *Papaipema* larvae that have three continuous stripes, including *P. cataphracta* (Grote) and *P. cerina* (Grote).

P. aweme larvae were introduced into potatoes, as most *Papaipema* are easily reared on alternate foods, especially when collected as older larvae (Schweitzer et al., 2011). The larvae bored into and consumed the potatoes at first, but after two days many ceased feeding, some exiting the potato and crawling about the rearing container. The larvae were transferred into crowns and rhizomes of buckbean plants where they resumed feeding and completed their development. The length of mature larvae was 30 - 31mm (n=9).

Growth of these larvae was rapid, as would be expected in a *Papaipema* with a northern distribution. Additional adaptations to northern habitats with short growing seasons also set this species apart from congeners. *Papaipema* routinely aestivate for a few weeks to two months or longer as mature larvae during late summer, especially in southern areas, as a strategy to delay adult emergence until the fall flight period (Schweitzer et al., 2011). *P. aweme* is unique as it does not appear to aestivate as a larva. All reared larvae pupated 7 to 9 days after feeding activity had ceased, which is an unusually short prepupal period for the genus. In addition, the pupal period was very short, lasting only 17 to 18 days. Most species in this genus eclose after a pupal period of about 28 days (Eric Quinter, pers. comm.). According to Decker in his 1931 work on *P. nebris* (Guenée), the average pupal period for this species when reared outdoors was 25 days, with warmer temperatures hastening pupal development. In the present study, *P. aweme* larvae were reared indoors at a constant temperature of 21°C; it is unknown how long the pupal period would be under average field conditions.

The pupa is of the normal type for the genus, with the thoracic section wider than the abdominal section (Fig. 1E). This shape would normally suggest that the mature larva exits the plant and pupates in soil as do most species in the

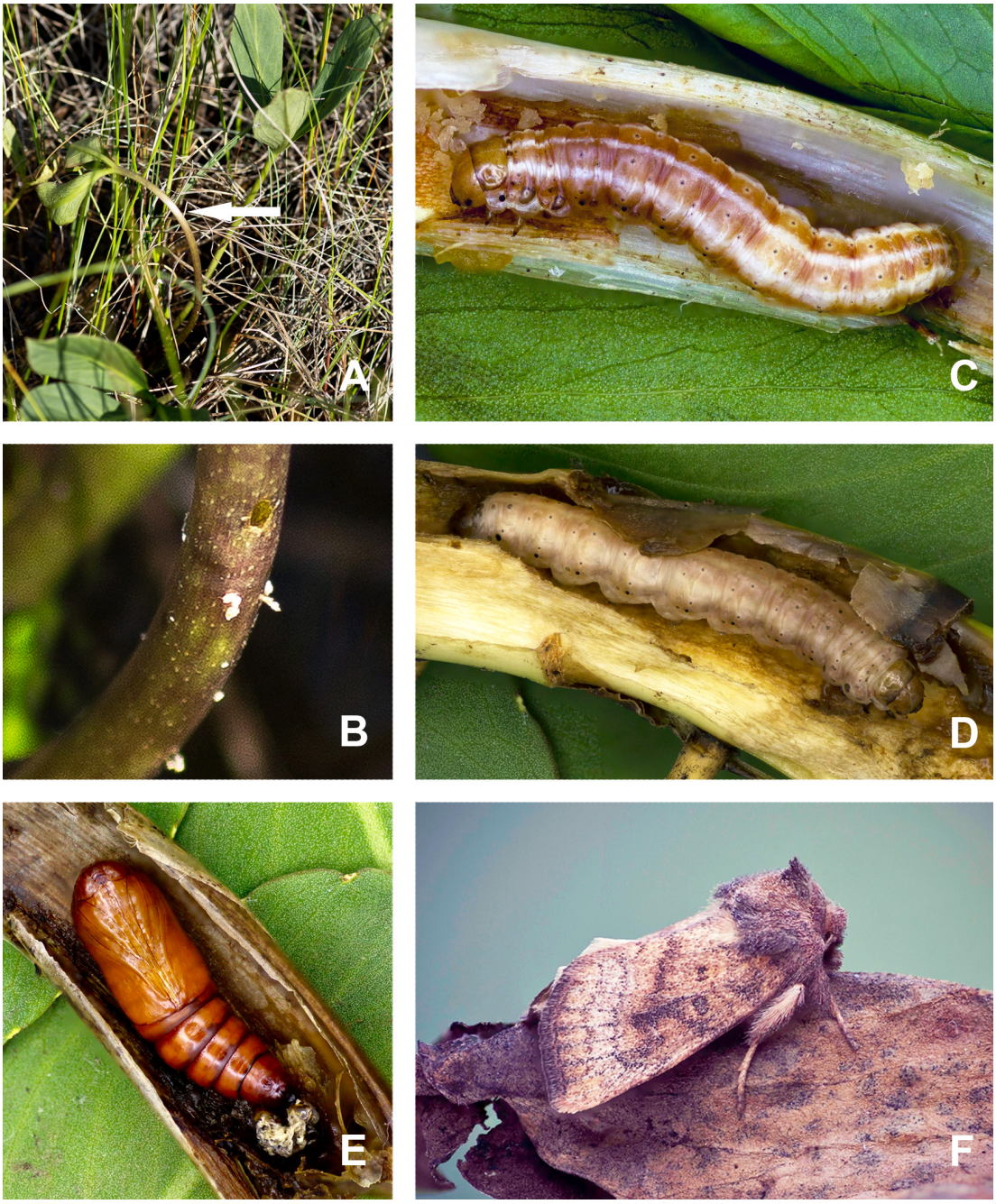

Figure 1. *Papaipema aweme* and host plant from Roseau County, Minnesota. A) bored and wilted petiole of buckbean, *Menyanthes trifoliata*, B) magnified view of the same petiole showing bore opening and frass, C) early ultimate instar with continuous dorsal and subdorsal stripes and small pinacula, D) mature ultimate instar with muted markings, E) pupa within host burrow, F) adult male on dead leaf of host plant.

genus. *Papaipema* whose larvae pupate in the host gallery typically have elongate, cylindrical pupae (Eric Quinter, pers. comm.). However, none of the mature *P. aweme* larvae abandoned the plant but pupated within it, either in the stem burrow or tucked into a leaf sheath along the stem. Some larvae produced pads of silk and chewed plant material to cover the exit opening prior to pupation. It is likely that the larva of *P. aweme* pupates within the host plant in the wild as well, since buckbean is often growing in standing water where soil or another suitable substrate would not be accessible.

The larva in Fig. 1C produced the first reared adult of this species, a male, on July 24, 2016 after 17 days as a pupa (Fig. 1F). For the photograph, the moth was positioned on a dead *Menyanthes* leaf, upon which it was cryptic. Most of the reared moths emerged in mid-August, which is the normal peak flight period for the adult.

Special thanks to Kyle Johnson for his efforts in finding new localities for this elusive moth species, and also to Dwayne Badgero and Eric Quinter for their companionship on earlier searches for this larva at other sites since 2011.

The second author has been searching for the key to the life history of this next moth for more than two decades. Since this species has not yet been formally described and there is little information available about the moth, a summary of the history of its discovery is included here.

In 1971, friend and colleague of both authors, Eric L. Quinter, began in earnest a study and survey of *Papaipema* that was initiated by his discovery of a new species in this genus from Pennsylvania. Quinter then began examining moth collections across the country and contacting *Papaipema* enthusiasts, gathering data on life histories, flight seasons, and distribution. In 1972 the late Bryant Mather of Clinton, Mississippi sent Quinter every *Papaipema* specimen from his collection. In this group were two entities that were unknown to Quinter:

several specimens of *Papaipema* new species [#4, Quinter MS], and one specimen of another large, distinctive species that is being covered here, *Papaipema* new species [#5, Quinter MS].

This first new species #5 specimen was collected on October 11, 1972 in Warren County, Mississippi near the town of Bovina at an Interstate 20 weigh station. Mather routinely stopped here to see what moths had accumulated around the mercury vapor lights at the station. On this night, he collected a large, clay-colored noctuid that had characteristics of *Papaipema*, and he included this moth in his shipment to Quinter. A second specimen of this moth was collected in 1975 by William "Bill" Black, Jr. of Paducah, Kentucky. Black told both Quinter and Wiker it had been collected near one of the creeks by his father's farm near Paducah. After this second specimen was caught, nearly twenty years elapsed before another individual of this new species was found.

On May 25, 1994 in Wayne County, Missouri, while searching for moth larvae feeding on giant cane, *Arundinaria gigantea* (Walter) Muhl., Quinter found a *Papaipema* larva in a new, eight-inch tall cane culm. This larva was similar to that of the stalk borer, *Papaipema nebris*, with only the dorsal stripe crossing the darkened first four abdominal segments. Upon rearing this larva to an adult, Quinter was surprised when a moth emerged that matched those caught years earlier by Mather and Black. The following spring, on April 19, 1995, while beating cane to find moth larvae and examining a sheet full of leaf debris, Quinter again found a *Papaipema* larva. This larva, found crawling up his pants leg, was similar to but smaller than the larva collected the previous year. When it emerged from its pupa, it became the fourth known specimen of this new species.

While numerous adults of this species were collected at light by Black, Quinter, Wiker, and others over the next 20 years, searches in culms and rhizomes of cane during this same period by Quinter, Wiker, and (since 2011) by Anthony McBride, failed to produce additional larvae of this species. Quinter eventually was convinced that the host plant must be something other than cane growing in this forested river bottom habitat - perhaps a tree. Although Wiker and McBride continued to search in cane, other plants found growing adjacent to canebrakes were also searched for larvae. Wiker and McBride made several trips to Missouri to known localities for this species during June to hunt for larvae and also during the adult flight period in October, hoping to find some clues to help solve the mystery. In addition, eggs were obtained from light-captured females and the resulting larvae were reared on artificial diets such as carrots and potatoes. Amazingly, one adult female collected in 2015 produced over 1,430 ova during a ten day period (moths in this genus typically produce only a few hundred eggs). It was noted that newly hatched larvae climbed and then suspended themselves on a strand of silk, which indicated they might disperse through the forest to find appropriate host plants by ballooning.

In late June 2016, after his trip to Minnesota and the discovery of the larva of *Papaipema aweme*, McBride drove south to Illinois and met Wiker to begin another search for *Papaipema* new species #5. Bill Black, Jr. joined the effort and led the search on June 29 to several sites, this time in western Kentucky, where several adults of this new species had been previously found. Cane at one site in Graves County was common along a creek bank, and Black directed us to a particular patch where "quite a few" adults had been caught. This canebrake had a large vine growing through and over it, forming a dense canopy which shaded the cane. The vine growing over the cane was woolly pipevine (*Aristolochia tomentosa* Sims). Black remarked that light traps placed under this "canopy" often captured adults of the new species. As they searched the area, Wiker and McBride separately discovered gall-like swellings in the thicker, lower stems of the pipevine, which they noted were similar to those formed by larvae of *Papaipema circumlucens* (Smith) in common hop (*Humulus lupulus* L.). Wiker and McBride discussed the possibility of the gall supporting a moth larva, and noticed that pipevine was common along the creek banks. Farther down the creek, Wiker found a slightly swollen section of pipevine about 1.5m off the ground. On the vine was a small bore hole (Fig. 2A) with frass visible along its lower edge. The vine section was taken to McBride and Black where it was split open to reveal a *Papaipema* larva.

This larva was similar to larvae of new species #5 reared previously by Wiker and McBride, and also had characters that matched sketches of this species previously drawn by Quinter. This larva exhibits coloration typical of the genus, with whitish longitudinal stripes. The dorsal stripe is continuous, and the subdorsal stripes are broken on abdominal segments 1 - 4 (Fig. 2C). The larva resembles that of many congeners such as *Papaipema nebris* and *P. baptisiae* (Bird); however, as Eric Quinter noted after finding larvae in the 1990s, the dorsal pinacula on the ninth abdominal segment are fused and are not broken by the dorsal stripe as in many other species. Previously, larvae reared in the laboratory on artificial diets obtained lengths of over 50mm; however, many of these larvae produced adults that were smaller than those caught in the wild at lights. The average length of fully mature, wild larvae is unknown at this time.

Wiker and McBride spent the morning of the following day searching a locality in Calloway County, Kentucky for larvae in pipevine and found several abandoned galls from previous seasons (Fig. 2B) before McBride left for eastern Kentucky to conduct work on other species of *Papaipema*. The galls varied in diameter and length. Some galls were almost unnoticeable, causing only a slight swelling of the vine (Fig. 2A), while others were large (Fig. 2B). The gallery within these galls was between 100mm and 170mm in length, and in most cases the diameter of the

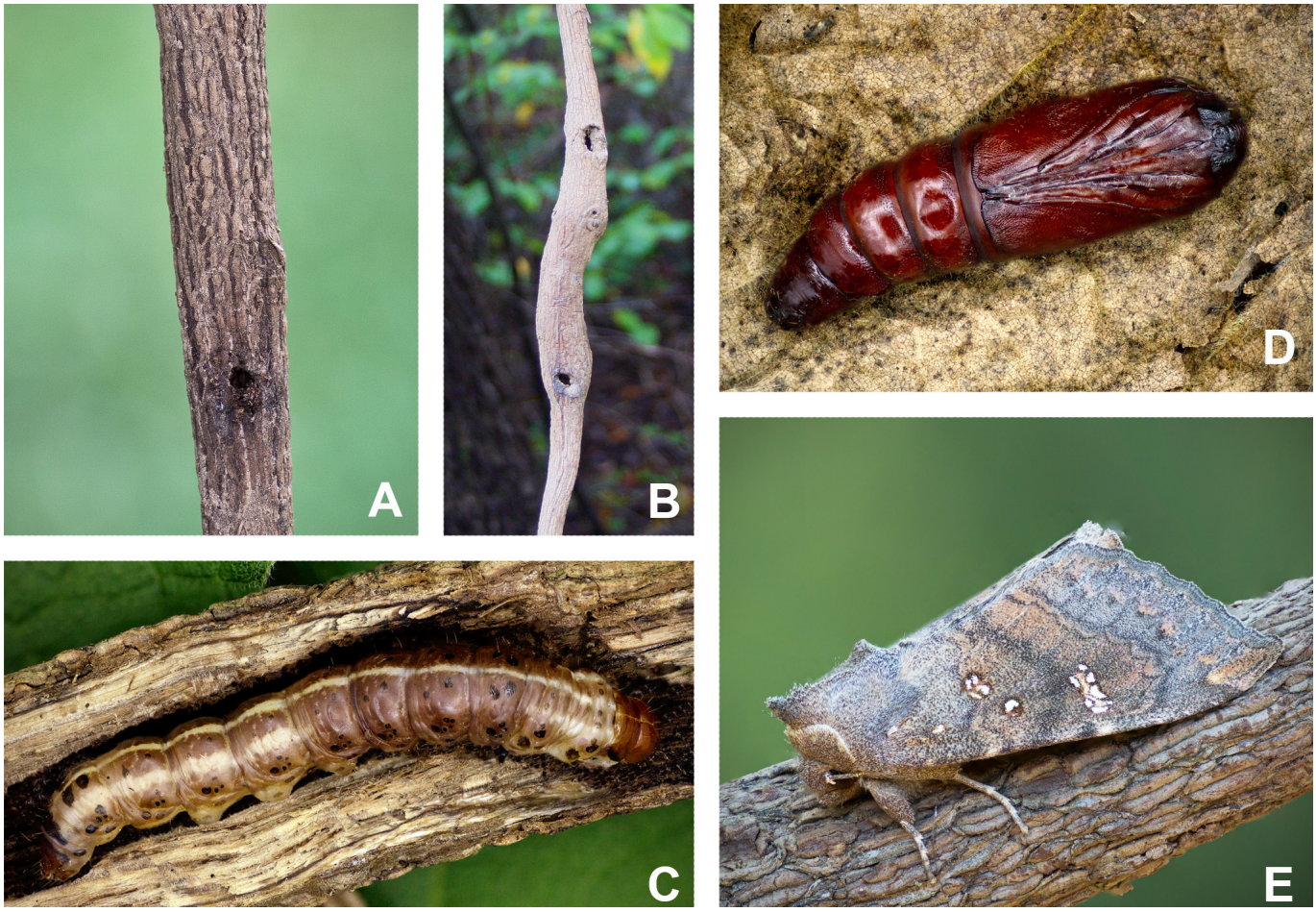

Figure 2. *Papaipema* sp. 5 and host plant from Graves County, Kentucky. A) bore opening in *Aristolochia tomentosa*, B) abandoned gall from a previous season, with frass opening below and exit opening above, C) larva with continuous dorsal stripe, in burrow, D) pupa, E) adult female on stem of woolly pipevine.

gallery was not large enough for the larva to turn around within it. It is likely most larvae enter the vine, burrow in one direction through the gall, and emerge at maturity from the opposite end of the gall by creating a second opening (Fig. 2B). Galls were found from ground level to a height of 2m, though galls can likely be found at greater heights since these vines grow 10 to 15 meters into the tree canopy. Unlike in hops, where new vines grow from the roots every season, the thick, woody stems of pipevine persist for many seasons. Since these vines take several years to grow to a diameter large enough to support a larva, care should be taken when retrieving larvae so that minimal damage is done to the plant.

Wiker continued searching for larvae with Black at the site of the original larval discovery in Graves County. That afternoon another gall occupied by a larva was found, and two larvae were located on July 1, bringing the total number of larvae found to four. In the wild, larvae likely feed in the galls until late July or early August and then aestivate for one month before pupation. Pupation in this species occurs in soil (Fig. 2D), and the adults emerge in early to mid-October after a pupal period of at least 28 days (Fig. 2E).

Special thanks to Bill Black, Jr. for many years of pursuing this species and diligently documenting sites of occurrence, which eventually led to the discovery of its larval host. Special thanks also to our friend Eric Quinter for starting this project many years ago and for his knowledge, encouragement, support, and companionship over the years with the genus *Papaipema* and with this species. Thanks to Eric Quinter and Terry Harrison for reviewing this article.

All photographs in this article by Anthony McBride.

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Announcements:

The 66th Annual Lep Soc Meeting

The 66th annual meeting of the Lep Soc will be held from Sun. July 30 - Tues. Aug. 1, 2017 at the Marriott University Park in Tucson, Arizona. This event is hosted by Dept. of Ent. of the College of Ag. and Life Sciences, U of A.

Online registration and abstract submission is open at **https://lepsoc2017.eventbrite.com.** Registration includes facility fees and the BBQ. Hotel accommodations can be made at the Marriott University Park for a discounted rate (**https://goo.gl/CMZrpx**). Onsite registration check in begins on Sat., July 29, at 4 PM followed by a reception with a no-host bar at Gentle Ben's restaurant next door to the Marriott. Registration check in will continue on Sunday morning with the conference beginning around 10 AM. The BBQ will be on Sunday evening (price included in registration) and the Banquet will be on Tuesday evening (additional ticket purchase). Additional information will be posted and disseminated on the Lepidopertists' Society Website, Facebook and Twitter accounts. Please email **meeting@lepsoc.org** with any questions or concerns.

For full announcement, see News of the Lep Soc, Winter 2016, Vol 58:4, 198-199.

Bryant Mather [Travel] Award

The Awards Committee is now accepting applications from Society Members for the 2017 Bryant Mather Award(s) for travel to the Lepidopterists' Society meeting at The University of AZ, Tucson, July 30 - Aug.2, 2017. **We would like to award two or three stipends to partially cover meeting-related expenses.** Applicants are to be judged on need for the award (i.e., lack of sufficient resources to travel to the meeting without the award) and acceptance of their proposed presentations. Applicants can include any member wanting to attend and present at the meeting (the award is not limited to students).

Please submit a brief (500 words maximum) application summarizing your need for the award, together with a detailed budget and proposed title of your presentation/poster to president John Calhoun at **bretcal1@verizon.net** by April 30, 2017. Winners will be selected by the Awards Committee and notified by May 15, 2017. Recipients will be reimbursed by the Treasurer after the meeting.

Season Summary will mail with summer News; still accepting photographs for covers

You can still submit photos for the front or back covers of the Season Summary, as delivery has been delayed until summer, to James K. Adams (**jadams@daltonstate.edu**). Photos can be live or spread specimens, but **MUST** be of a species actually reported in the Summary for 2016.

Lepidopterists' Society Statement on Diversity, Inclusion, Harassment, and Safety[1]

During the Executive Council (EC) Meeting on 6 July 2016 in Florissant, Colorado, it was proposed that the Lep Soc adopt a Statement on Diversity. This is important to help our members feel safe during Society events, and provide the necessary means to resolve situations should they occur. The following statement was approved by the EC on 13 November 2016.

"The Lepidopterists' Society values diversity among our membership, just as we value diversity within the biological communities we study. We welcome into our Society and encourage the participation of all individuals who are interested in Lepidoptera regardless of age; gender; gender identity; sexual orientation; race; ethnicity; cultural background; nationality; religion; physical or mental ability; professional status; opinions on collecting, observing, and photographing; and all other characteristics and activities that make our members unique.

"The Lepidopterists' Society is dedicated to providing a safe, hospitable, and productive environment for everyone attending our events. We therefore prohibit any and all intimidating, threatening, or harassing conduct during these events. Harassment includes, but is not limited to: offensive gestures or verbal comments; the sending or sharing of offensive images, videos, emails, texts, or voicemails; deliberate intimidation; stalking, following, harassing photography or recording; sustained disruption of talks or other events; inappropriate physical contact; and unwelcome attention. Participants asked to stop any harassing behavior are expected to comply immediately. This policy applies to all event speakers, staff, volunteers, exhibitors, and attendees.

"The Society may take any action it deems appropriate in dealing with an event participant who engages in harassing behavior, ranging from a simple warning to expulsion from any Society sponsored events to loss of membership in the Society.

"If you are being harassed, if you notice that someone else is being harassed, or if you have any other concerns, please do not hesitate to contact the Society's designated ombudsperson, who will work with the appropriate Society leadership to resolve the situation. The designated ombudsperson will always be identified by name in the event's program book, along with their contact information. If needed, the Society will also help participants get in touch with convention center/hotel/venue security or local law enforcement, and otherwise assist those experiencing harassment, to enable them to feel safe for the duration of our events."

[1]Based in part on the Entomological Society of America's Statement on Diversity & Inclusion and Code of Conduct

-- John V. Calhoun, President

Lepidoptera Short Courses, Eagle Hill, Steuben, Maine, May - July, 2017

Microlepidoptera: Identification, Anatomy, Microdissection, and Ecology, May 28 – June 3, 2017

Jason Dombroskie (**jjd278@cornell.edu**) will be teaching a weeklong seminar on Microlepidoptera this summer. This lab-intensive course will systematically cover all of the families of microlepidoptera from Micropterigidae to Mimallonidae in the United States and Canada. The focus will be on identification characters for each family and most of the major subfamilies and tribes through talks rich in photos and examination of specimens. Overall natural history will be covered with special focus on ecologically and economically important species. There will be practical training on collecting methods, pinning techniques, and genitalic dissection along with a discussion of larval rearing techniques. The course is scheduled to run from the 28th of May to the 3rd of June, 2017. For more information, go to https://www.eaglehill.us/programs/nhs/seminar-flyer-pdfs/2017%20Dombroskie.pdf

Moths and Butterflies (Lepidoptera): Identification, Specimen Preparation and Taxonomy June 25 – July 1, 2017

Hugh McGuinness and Bryan Pfeiffer will be teaching a weeklong seminar on Lepidoptera this summer. The course, which is titled "Moths and Butterflies: Identification, Specimen Preparation and Taxonomy," will emphasize identification of macrolepidoptera; the current state of taxonomy in Lepidoptera; the techniques used for observing, studying and surveying butterflies and moths; and various aspects of Lepidopteran conservation. Each day will include a lecture topic, lab work and plenty of field time, both during the day and at night. Because we have two instructors we have a lot of flexibility in the nature of the course and we plan to adapt the course depending on the interests of the students. The course is scheduled to run from the 25th of June to the 1st of July, 2017. For more information, go to https://www.eaglehill.us/programs/nhs/seminar-flyer-pdfs/2017%20McGuinness%20Pfeiffer.pdf.

Eagle Hill is a wonderful biological station with great food and ample accommodations set on hillside in coastal Maine about 1 hour from Bar Harbor in Steuben, Maine.

See:**https://madmimi.com/p/89f219?fe=1&pact=172220-135616947-7501261478-5349027e9d0f7-30b8bd64a09b51f41ca602dccc** for more information on these and other insect related courses for this year.

Society of Kentucky Lepidopterists

The Society of Kentucky Lepidopterists is open to anyone with an interest in the Lepidoptera of the Great State of Kentucky. We are a very active organization. Annual dues are $15.00 for the hard copy of the news; $12.00 for electronic copies only.

The society typically schedules three+ field trips yearly. The currently scheduled Spring field trip is April 21-23, to areas of the Daniel Boone National Forest in McCreary Co. Accomodations will be in Whitley City. If you would like to attend, contact Loran Gibson at 859-384-0083 or **1stkymothman@gmail.com**. The summer and fall trips have yet to be scheduled.

The annual meeting has yet to be scheduled but will be in November at the University of KY, Lexington.

To join the Society of Kentucky Lepidopterists, send dues to: Les Ferge, 7119 Hubbard Ave., Middleton, WI 53562.

The Southern Lepidopterists' Society invites you to join

The Southern Lepidopterists' Society (SLS) was established in 1978 to promote the enjoyment and understanding of butterflies and moths in the southeastern United States. With the beginning of another year we are seeking to broaden our membership. Our chairman, John Douglass, has planned an exciting spring field trip to the central panhandle of Florida, April 28 - May 1 (Fig. 1), centered around the city of Marianna. Permits for collecting will be arranged; both collectors and photographers are encouraged to attend. Additional meeting details will be posted at http://southernlepsoc.org in early March. Contact John Douglass if you need more information at 419-450-7245 or **jfdouglass7@gmail.com**.

Regular membership is $30.00. Student and other membership categories are also available. With the membership you will receive four issues of the SLS NEWS. Our editor J. Barry Lombardini packs each issue with beautiful color photos and must-read articles. SLS conveniently holds its annual meeting, in Sept. or Oct., with the Association for Tropical Lepidoptera at the Florida Museum of Natural History, McGuire Center for Lepidoptera and Biodiversity in Gainesville. The SLS web page (http://southernlepsoc.org/) has more information about our group, how to become a member, archives of SLS NEWS issues, meetings and more.

Please write to me, Marc C. Minno, Membership Coordinator, at **marc.minno@gmail.com** if you have any questions. Dues may be sent to Jeffrey R. Slotten, Treasurer, 5421 NW 68th Lane, Gainesville, FL 32653.

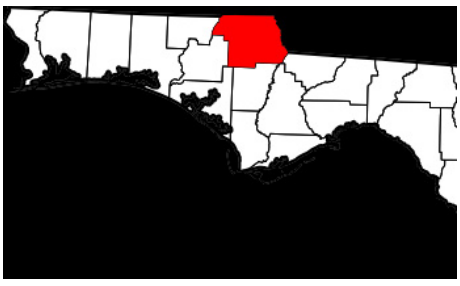

Fig. 1. Jackson County (in red), site of planned SLS spring 2017 field meeting in the panhandle of Florida.

Research Expedition to Peruvian Amazon

The Alliance for a Sustainable Amazon (ASA), a non-profit organization working in the southeastern Peruvian Amazon, is pleased to announce openings on a **Lepidoptera research expedition during summer 2017**.

The expedition is part of a long-term research project sponsored by the Florida Museum of Natural History and the Alliance for a Sustainable Amazon to investigate the basic biology, distribution, ecology, and conservation status of Lepidoptera in the southeastern Peruvian Amazon.

Expedition members will receive hands-on instruction in field methods that facilitate biological research in the tropics. Expedition members will gain knowledge and skills in the following areas:

- Field methods in the study of tropical Lepidoptera
- Tropical ecology and biology of key Amazonian plant and animal groups
- Amazonian plant and animal identification
- Off-trail and backcountry navigation
- Canopy access (tree climbing) and sampling techniques (canopy trapping)
- Major conservation challenges facing the study region and the broader Amazonian ecosystem
- Survival issues facing indigenous Amazonian cultures

DATES: **May 23 – June 6, 2017**

LOCATION: Las Piedras River basin, Madre de Dios, Peru

REGISTRATION: **Open until April 30, 2017**. Space is limited, so we recommend applying early.

FEE: **$2,500**

WEBSITE: **www.sustainableamazon.org/lepexp2017**

HOW TO REGISTER:
Fill out the application form at **http://www.sustainableamazon.org/lepexp17-register**
For general inquiries please contact us at **info@sustainableamazon.org**

Geoff Gallice, Ph.D. President, ASA, Research Associate in Lepidoptera, Florida Museum of Natural History

PayPal is the easy way to send money to the Society

For those wishing to send/donate money to the Society; purchase Society publications, t-shirts, and back issues; or to pay late fees, PayPal is a convenient way to do so. The process is simple: sign on to www.PayPal.com, and navigate to "Send Money", and use this recipient e-mail address: **kerichers@wuesd.org**; follow the instructions to complete the transaction, and be sure to enter information in the box provided to explain why the money is being sent to the Society. Thanks!

Sixth Annual (Inter)National Moth Week - July 22-30, 2017

This Year's Spotlight -- Tiger Moths (Erebidae)

The sixth annual (Inter)National Moth Week (NMW) is being held July 22-30 around the world. NWM is a global event and last year there were more than 450 participating locations in all 50 states and 42 countries. Since its inception in 2012, there have been events in 74 countries. NMW encourages "moth-ers" of all ages and abilities to learn about, observe, and document moths in their backyards, parks, and neighborhoods. The event is open to anyone, anywhere around the world. Surveys, moth-watching and educational events have been held throughout Europe, Asia, Africa, South, Central, and North America.

NMW recognizes that late July may not be ideal for mothing everywhere around the world and also encourages events and participation at any other time that will be productive. We are also considering adding a second Moth Week in January/February for areas where July is winter and would appreciate feedback on timing. For all events currently falling outside the July Moth Week, simply register those dates and locations on the website and we will be sure to spotlight them as well.

NMW shines a much-needed spotlight on moths and their ecological importance as well as their incredible biodiversity. Through partnerships with major online biological data depositories such as BAMONA, Project Noah, BugGuide, Encyclopedia of Life, Discover Life, Biodiversity Bhutan, DiversityIndia, Moth Photographers Group, LepiMap – Atlas of African Lepidoptera, and iNaturalist, NMW encourages participants to record moth distribution, submit data and photographs and to provide information on other aspects of their life cycles and habitats.

Participants submitted more than 10,000 moth records and held thousands of moth nights in backyards, inner cities and some of the most remote places on Earth. Many of these were attended by the public and by families and children that have never been exposed to moths or Lepidoptera survey methods. The NMW Flickr group now has over 70,000 moth images.

NMW 2017 is designated "The Year of the Tiger Moth" to encourage participants to look for and learn about these fascinating moths. Tiger moths are in the Arctiinae subfamily of the Erebidae.

NMW is always interested in partnering with organizations and can spotlight events through our website and Facebook pages. For more information about NMW and to register a location at any time of the year please visit **www.nationalmothweek.org**. To contact us about the event, please reach out to Dave Moskowitz at **dmoskowitz@ecolsciences.com**

Results of the 2017 Election

President-elect:	Brian Scholtens	346 (3 "No" votes)
	Write-in (Paul Opler)	1
Vice-Presidents:	Annette Aiello (Panama)	292
	Michael M. Collins (U.S.A.)	323
	Jean-Francois Landry (Canada)	273
	Hector A. Vargas (Chile)	160
	Write In	0
Executive Council Members-At-Large:	Jeffery E. Belth	188
	Jeffery S. Pippen	285
	Reginald Webster	255
	David M. Wright	298
	Write in	0

Julian Donahue Honorary Life: Yes -- 360; No --7

Constitutional amendments:

Article IV, section1:	Yes -- 245; No -- 9
Article IV, section 2:	Yes -- 245; No -- 9
Article IV, section 3:	Yes -- 248; No -- 6
Article VI, section 2:	Yes -- 242; No -- 11
Article VII, Meetings, section 3:	Yes -- 246; No -- 8
Article X:	Yes -- 243; No -- 10

Julian Donahue received 98% "yes" votes, well above the 80% required to achieve Honorary Life Member status. Congratulations, Julian! All the Constitutional amendments passed, exceeding the 2/3 or greater level of support from those voting. Three hundred and eighty-seven members voted in this election.

Respectfully submitted, Dr. Michael Toliver, Secretary.

The Lepidoptera Course, 8 – 16 August 2017

The Lepidoptera Course is back in 2017 at the Southwestern Research Station (SWRS) in the Chiricahua Mountains of SE Arizona (2 ½ hour drive from Tucson). With its extensive series of Sky-Island mountain ranges, SE Arizona has the highest Lepidoptera diversity in the US. With low desert scrub oak and mixed oak-pine woodland, lush riparian, juniper, Douglas fir, and mountain meadow habitats all within a 40 minute drive from the station, the SWRS is an ideal location from which to sample this diversity (of both habitats and species).

The focus of the Lep Course is to train graduate students, post-docs, faculty, and serious citizen-scientists in the classification and identification of adult Lepidoptera and their larvae. Topics to be covered include an extensive introduction to adult and larval morphology with a focus on taxonomically important traits, extensive field work on both adults and larvae, collecting and curatoral techniques, genitalic dissection and preparation, larval classification, and general issues in Lepidoptera systematics, ecology, and evolution.

At present, the projected staff include John Brown (Smithsonian), Richard Brown (Mississippi State), Jennifer Bundy (University of Arizona), Chris Grinter (The California Academy of Sciences), Sangmi Lee (Arizona State), Ray Nagle (University of Arizona), and Bruce Walsh (University of Arizona).

Details and an application form can be found online at http://research.amnh.org/swrs/education/lepidoptera-course. Deadline for applications are 1 July 2017. For further inqueries please e-mail Bruce Walsh at jbwalsh@u.arizona.edu, or Erinn Enriquez at **aenriquez@amnh.org.**

Mailbag -- Collins response to Dupuis and Sperling

Continued from p. 27

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Conservation Matters: Contributions from the Conservation Committee

Rarity and apparent or false rarity

David L. Wagner[1] and James K. Adams[2]

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Any collector can relate a tale of how they discovered a species to be common that their colleagues perceived to be rare or is presented as such in the literature. Likewise many of the species that are protected on state and sometimes federal lists are there because they are rarely collected or otherwise encountered. This article is meant as a cautionary tale — an accounting of phenomena we know that have led entomologists or conservation biologists to believe a species to be rare when in fact it is reasonably common, what we will call apparent or false rarity.

Perceptions of rarity (as opposed to actual ecological or evolutionary rarity) are almost always subjective, colored by personal experiences, shaped by special events, e.g., encountering (and remembering) a species as abundant in banner years, rather than in the intervening years when population numbers are low and a colony is most vulnerable to extirpation or likely to suffer depletion of genetic diversity. Spatial scales greatly affect personal perceptions of rarity. Consider the instances where a species is regionally (or even globally) rare but locally abundant at the sites where it is found. A biologist living near one or two such colonies might regard the species as common, whereas someone reviewing occurrence data for an update of the IUCN Red List (**http://www.iucnredlist.org/**) could consider the same animal critically imperiled. To us the global perspective has greater gravitas — despite the local abundance of *Fernaldella georgiana* (Fig. 1) during multiple generations, *its place* is small, limited to one archaic dune system in east-central Georgia (Covell et al. 1984). A further note on local single-season abundances: the average invertebrate population goes through dramatic year-to-year fluctuations in abundance. A colony that appears common in a boom year (in vertebrate demographic currency) could in fact be highly vulnerable, because invertebrates must weather stochastic fluctuations in weather and many-fold, year-to-year differences in pathogen, parasitoid, and predation pressures.

For the purposes of this article we adopt the NatureServe rankings (Table 1) and roughly equate rarity as being imperiled (evolutionarily; ranking as G1 or G2 taxa). We use apparent or false rarity to denote those cases where a species is demographically or ecologically more abundant and less vulnerable than commonly perceived. This is not to say that common or even abundant species cannot be vulnerable to extinction. Paradoxically, one of North America's most abundant insects, the Rocky Mountain Locust (*Melanoplus spretus*), was perhaps the first New

Figure 1. *Fernaldella georgiana* is an endemic of the Ohoopee Dune system in Georgia, some 90 miles inland from the coast. The foodplant is Woody Goldenrod (*Chrysoma pauciflosculosa*), which is local but rather widely distributed on the coastal plain from North Carolina to Mississippi — as is often the case, the moth is decidedly more restricted in range than its foodplant. Where the moth is found, it can be common in the adult stage, with moths in every month from late March to September. (Photo: JKA.)

World insect species whose demise was documented. According to Riley et al. (1880) the insect's largest swarms covered a "swath equal to the combined areas of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont." One swarm that occurred in 1875 is believed to be "the largest congregation of animal life in recorded history." It measured 1,800 miles long and 110 miles wide. The "torrent of insects eclipsed the sun for five days, becoming a super-organism composed of 3.5 trillion locusts" (Lockwood 2001, 2005). The range-wide demise of the Passenger Pigeon was nearly as cataclysmic. The catastrophic collapse of the once hyperabundant *Alabama argillacea* (Noctuidae) provides a classic case for lepidopterists (Wagner 2009).

We do service for those trying to protect species to distinguish true rarity (and vulnerability) from apparent rarity, in that conservation dollars and energies are always limited, and likely to be more so now that we have entered the Anthropocene and what could prove to be our planet's sixth great extinction. We also seek to remove from protection taxa that are appreciably more widespread or abundant than generally understood. Such is especially important in those instances where apparently rare taxa become the

Table 1: NatureServe Conservation Status Rankings: G Ranks represent a taxon's global rank. The same system applies to states/provinces, yielding SX, S1, S2…S5 ranks. See also **http://explorer.natureserve.org/nsranks.htm**.

Rank	Definition
GX	**Presumed Extinct** (species) — Not located despite intensive searches and virtually no likelihood of rediscovery. **Eliminated** (ecological communities) — Eliminated throughout its range, with no restoration potential due to extinction of dominant or characteristic species.
G1	**Critically Imperiled** — At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2	**Imperiled** — At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3	**Vulnerable** — At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
G4	**Apparently Secure** — Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5	**Secure** — Common; widespread and abundant.
GU	**Unrankable** — Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. Whenever possible, the most likely rank is assigned and the question mark qualifier is added (e.g., G2?) to express uncertainty, or a range rank (e.g., G2G3) is used to delineate the limits (range) of uncertainty.
G#G#	**Range Rank** — A numeric range rank (e.g., G2G3) is used to indicate the range of uncertainty in the status of a species or community. Ranges cannot skip more than one rank (e.g., GU should be used rather than G1G4).

focus of litigation, mitigation, and land use decisions, and wrongfully draw our attentions and resources away from genuinely imperiled entities that could be well-served by conservation efforts.

Contrary to claims of some, true demographic or biological rarity and vulnerability are as real for insects as they are for vertebrates and plants. Those insects that have gone extinct, such as the Lotis Blue (*Lycaeides argyrognomon lotis*) or the Sthenele Satyr (*Cercyonis s. sthenele*) in the US, went through a period of vulnerability before they blinked out. The 26 Endangered lepidopterans on the USFWS Endangered Species List (**http://ecos.fws.gov/ecp0/pub/SpeciesReport.do?groups=I&listingType=L&mapstatus=1**) appear as a group to be imperiled entities deserving of listing (and the concomitant benefit of conservation efforts, dollars, and scientific study) but maybe not all: a number appear to be poorly differentiated population segments [e.g., see Dupuis and Sperling 2016, and discussion below of *Euproserpinus*]. Multi-year mark-recapture studies of Edith Checkerspots (*Euphydryas editha*) at Jasper Ridge by Ehrlich et al. and Mormon Metalmarks (*Apodemia mormo*) at Antioch, California by Richard Arnold documented declines and demographically perilously low population numbers of both butterflies. State lists, on the other hand, often have had less vetting and consequently sometimes include species that warrant more scrutiny — species we would argue whose rarity (and vulnerability) is more apparent than real. Unwarranted taxa that are receiving legal protection undermine the credibility of endangered species legislation, and are a principle motivator for this article.

In Table 2, we list a number of ecological, behavioral, morphological, and taxonomic phenomena that can render a species difficult to detect, and consequently to be perceived as biologically rare and in need of protection, when additional data would show the entity to be less vulnerable than commonly regarded. Any one of the factors in Table 2, considered individually, could explain a paucity of records in collections or occurrence databases. Most seasoned Lep Soc members could generate examples of their own, and we suspect that there would be little overlap across our listings. The most seldom encountered taxa are often those where two, three, or more of these factors come into play in a single entity. *Lithophane* illustrate the problem: they often fly very late or very early in the season, a few are only weakly attracted to lights, none feed at flowers, and many are unreliable visitors at bait. At the time Charles Covell and Eric Metzler described *Lithophane joannis* in 1992, the species was not represented in any major North America collection. Yet, this buckeye-feeding species can be exceedingly abundant at bait in some Appalachian woodlands (but almost never at light) (Metzler and Covell 1992) and as a

Figure 2. *Gazoryctra lembertii* is a moth that has been a *Holy Grail* of sorts for those interested in ghost moths for more than a century. Less than ten specimens are known. Chris Grinter, Ron Wielgus, and DLW have spent many hours searching for the moth, but never purposefully found it even at known locations. Presumably, they all expected as much — after all, it is a hepialid — their exceptional life histories and distributions make them among the most elusive of all Lepidoptera. One day-flying species on Mount Hood, Oregon flies so fast that it is difficult to follow with the human eye, and it would not even be recognized as a moth by most casual observers. (Photo: Chris C. Grinter, California Academy of Sciences.)

Table 2. Behavioral, ecological, morphological, and taxonomic phenomena that lead to the perception of biological or demographic rarity in Lepidoptera. Examples are meant to be illustrative and relatively familiar — no doubt, we have overlooked even better examples. Family names are not given for butterflies. NA = North American.

Ecological Phenomena	**Examples**
Denizens of inhospitable habitats	Many arctic-alpine taxa; wetland taxa: e.g., some *Lithophane*, *Acronicta perblanda* and *A. sinescripta* (Noctuidae); *Zale perculta* (Erebidae); and *Hemileuca griffini* (Saturniidae).
Larvae subterranean (especially if dietary generalists), subcortical, or otherwise difficult to sample	*Gazoryctra* (Hepialidae); some *Apamea*, *Copablepharon*, and other sand-tunneling noctuids.
Highly specialized hostplant associations and or hostplant philopatry	*Fernaldella georgiana* (Geometridae); *Papaipema aweme* and other *Papaipema*; cane-feeding apameines; some *Schinia* and stiriines (all Noctuidae); *Euphydryas phaeton*.
Specialized soil requirements (e.g., for pupation)	*Cucullia speyeri* and many other *Cucullia*, *Derrima stellata,* and areniphilic *Sympistis* (Noctuidae); *Euproserpinus* (Sphingidae); and taxa with sand-dwelling larvae (see above).
Non-plant biotic dependency	Lycaenids that require a specialized ant attendant
Inclement weather flyers — e.g., taxa that preferentially fly in rains and/or heavy fogs	Some *Papaipema* (Noctuidae); *Gazoryctra* (Hepialidae); a few tropical damselflies and *Pleocoma* beetles are most active during rains.
Behavioral Phenomena	**Examples**
Diurnal moths (especially if flight activity is temporally restricted to narrow period — see below)	*Eupropserpinus*, most *Proserpinus*, and to some degree *Sphinx luscitiosa* (Sphingidae); *Eupseudomorpha brillians* (agaristine noctuid); nearly all NA zygaenids; a few NA lithosiine arctiines (Erebidae); many arctic-alpine taxa; *Hemileuca* and NA *Saturnia*.
Ephemeral or diel-limited flights: late or early season species; taxa w/ matutinal flights — collectively phenomena that limit sampling efficacy and intensity by collectors and other biologists	Many xylenines (Noctuidae) fly late in fall; *Paleacrita merricata* (Geometridae) in late winter; matutinal activity in some *Elachista* (Elachistidae) and *Cicinnus* (Mimallonidae). Most hepialids have narrow diel activity window, often at dusk.
Canopy-active taxa	*Erora laeta*, *Satyrium favonius*, and other hairstreaks. Some clubtail dragonflies.
Nocturnal moths not or only weakly attracted to light	Some *Acronicta*, *Lithophane*, and *Ufeus* (Noctuidae) and many others.
Non-nectar feeding adults or species that only sporadically visit nectar resources	Micropterygids; many xylenine noctuids; *Habrodais grunus*, *Hypaurotis crysalus*, *Erora laeta*, and other hairstreaks.
Non-feeding adults (which means they can't be collected at a food resource. Moreover they tend to be short-lived and less prone to long-distance movements.)	Cossids, hepialids and several saturniid groups (e.g. *Hemileuca*, *Anisota*, and NA *Saturnia*).
Morphological Correlates	**Examples**
Rudimentary mouthparts	See above (non-feeding adults).
Smaller size	Smaller species less easily observed, attracting the attention of fewer lepidopterists, e.g., nolids, acanthopteroctetids, many other microlepidopterans.
Non-descript to human eye	Mundane taxa tend to be undercollected and thus underrepresented in collections.
Taxonomic Issues	**Examples**
Taxonomically cryptic taxa, where recognition of apparently rare taxa require dissection or are so phenotypically similar as to confuse most workers. These problems are often compounded in larger genera. Likewise, taxa that are so mundane that most collectors/listers/watchers choose to ignore them, seem to be plagued with greater taxonomic uncertainty. A third problematic situation occurs when one species is greatly outnumbered by an abundant congener, such that collectors frequently stop looking for the less common species… the "needle in a haystack" problem	*Sympistis forbesi* rare in collections because it cannot be distinguished from *Sympisitis* (*Adita*) *chionanthi*; *Amphipoea interoceanica* often misidentified as *A. americana* (Noctuidae); *Catocala umbrosa* commonly confused with *C. ilia* (Erebidae). Genera/lineages with many challenging ID problems include *Cucullia*, *Euxoa* and *Sympisti*s (all Noctuidae), many nolids, and some phycitine pyralids

caterpillar (Wagner 2006). *Lithophane leeae* is a spectacular pinion (Noctuidae) with rosy hindwings. The first and only known adult was collected by Bruce Walsh on 14 June, 2007 in the Chiricahuas. While the moth could in fact be globally rare and ranked as a G1 species (Table 1), our guess is that it is one of several pine-feeding *Lithophane* that is but weakly attracted to light, often flies on nights too inclement for most moths, and inhabits remote areas of southeastern Arizona — and thus, eluded collectors until Walsh took his specimen. We suspect that larval surveys in late spring into July would be a more reliable survey method, especially once the moth's preferred hosts have been identified. The ghost or hepialid moth *Gazoryctra lembertii* (Fig. 2) is nearly as rare…or is it? The adults are non-feeding, occur above timberline, fly late in season (presumably at great speed like many other *Gazoryctra*), and only rarely has it been taken at light (perhaps incidentally). It is so rare that it is not even known if the moth is primarily diurnal (as are most alpine *Gazoryctra*) or nocturnal.

Moths that live in expansive wetlands are often undersampled. Access to appropriate habitat can be the greatest limitation: roads are often lacking, footing can be treacherous, and in some instances, appropriate habitat is only accessible by boat. Mosquitoes, alligators, and cottonmouths can be other deterrents. Eric Quinter has discovered no less than five new genera and perhaps 15 species of noctuids that were either considered rare or unknown by immersing himself in the canebrakes of the Southeast. *Zale perculta* (a large, distinctive erebid) has historically been very rare in collections — but in blackwater swamps of the Southeast, the magnificent caterpillar (Fig. 3) can be relatively common in the spring on Climbing Fetterbush (*Pieris phillyreifolia*). The rarity of several southeastern moths may be because their larvae are cypress specialists or feed on other hosts that grow in wetlands. Such is likely the case for *Acronicta sinescripta* and *A. perblanda*, with their rarity compounded by the fact their adults appear to be only weakly attracted to lights. Kyle Johnson and Tony McBride recently broke the life history of one of eastern North America's *rarest* moths, *Papaipema aweme*. Kyle discovered a colony of the moth in a remote northern Minnesotan expansive peatland with interspersed spring-fed (calcareous) fens in September 2014. When Tony McBride visited Johnson's colony in midsummer 2016, it didn't take him more than three or four hours to discover a larva of *P. aweme* feeding in the stems of Buckbean (*Menyanthes trifoliata*) — following his discovery, the two were able to locate another thirty larvae over the course of the next 24 hours (McBride and Wiker 2017, this issue; Tony McBride pers. comm.). According to McBride, this species' rank will likely be changed from G2 to G3/G4 as a result of the new discoveries.

The phenomenon of apparent rarity is well illustrated by those species that are almost never encountered without using female sex pheromones or attractive synthetic lures. Over our aggregate sixty years of collecting, we have netted fewer than four dozen sesiids feeding at flowers or sitting on vegetation. This number of sesiids could easily be matched in a day by a person monitoring a dozen backyard pheromone traps in any wooded region of eastern North America. And many of the common sesiids that are surely breeding in our neighborhood have never been encountered by us, over the course of decades of yardwork, walks, and other outdoor activities. Likewise the tethering of unmated female saturniids and other moths typically yields greater numbers of male moths than other collecting methods, and may produce the only moths seen at a locality when population numbers are modest. And while luring with calling (pheromone-emitting) females (Fig. 4) works for nearly all moths, it can be the only game in town for surveys of diurnal, non-feeding species where light

Figure 3. *Zale perculta* is a rare moth in collections. Only a handful lepidopterists can ever claim to have seen one. It is a denizen of cypress swamp interiors from southern South Carolina and southern Georgia, through the northern half of Florida. The Okefenokee Swamp might be this species' epicenter — there it is common but primarily so miles in from its outer boundaries (Eric Quinter pers. comm.). The spectacular larvae can be spotted from meters away — but you will need a boat or boardwalk to find them. (Photo: David Almquist, Florida Natural Areas Inventory.)

Figure 4. Calling female of *Hemileuca maia*. Both *Hemileuca maia* and *lucina* are state-protected in Connecticut: known populations are small and some of the wetlands inhabited by *H. lucina* are inaccessible. The preferred sampling technique for surveys is to use tethered or caged, broadcasting (virgin) females to confirm the presence of either moth — males are believed to be attracted from distances >1/4 mile when winds and temperatures are favorable. European moth collectors are known to have used virgin females to lure male moths for more than 175 years and likely their use goes back to the initial discoveries and writings of Jean-Henri Fabre. Photo : Michael W. Nelson, Mass. Wildlife.)

Figure 5. *Eupseudomorpha brillians* beautifully illustrates how a species that is often locally common can be as rare as hen's teeth in collections: it flies very early in spring when few other insects are active; when winds, rains, and cold temperatures have foiled many a collector's best laid plans. It is entirely diurnal, a strong flyer, and its distribution is limited to some of the most sparsely populated regions of the southern Great Plains. Because males often hilltop, they can be scarce even where the foodplant (and later larvae) are common. Ed Knudson, the person who has logged more hours collecting in Texas than anyone else alive, has never taken an adult. (Photo: Troy Hibbitts.)

trapping and net-collecting at flowers, bait, or mud do not provide viable alternatives.

Diurnal moths, such as the sesiids and saturniids already mentioned, provide many instances of apparent rarity, especially when tied to other factors in Table 2. The agaristine noctuid *Eupseudomorpha brillians* (Fig. 5) is illustrative: it flies in February to mid-April in a rather uninhabited area of the southern Great Plains. However, searches of stands of sundrops (*Calylophus* spp.) in April often will produce larvae of this handsome insect. The saturniid *Hemileuca griffini* (non-feeding as adults; see back cover) was not discovered until 1974 (Tuskes, 1978), undoubtedly because the moths fly late in the summer in a desolate region of southern Utah and northern Arizona dominated by the larval foodplant, Blackbrush (*Coleogyne ramosissima*). By September there is little foliage on the plants and temperatures during the early afternoon flight time often climb into the upper 90's. We cannot imagine a lepidopterist willingly sampling this landscape unless the existence of the moth was already known. The moth is among few resident lepidopterans on the wing in September and October in this habitat, and yet it can be common in a good year. There are six species of *Proserpinus* in North America. All are scarce in collections but the five diurnal species can be exceedingly elusive. The number of collectors that have seen more than two of the Nearctic's six species in the wild can be counted on one's fingers. *P. vega*, among the rarer of the lot in institutional collections, is not rare as a larva if one knows when and where to look (Fig. 6).

Temperate canopy-dwellers provide underappreciated cases of apparent rarity. Shapiro (1974) regarded the Oak Hairstreak (*Satyrium favonius ontario*) to be one of the rarest Northeastern butterflies. Holland (1931) thought the Oak Hairstreak to be so infrequent that he felt the butterfly might be an aberration of a more common hairstreak. Its scarcity is mysterious in that its host, oak, is one of the most abundant plants across the butterfly's range. Moreover, many records are from seemingly unspecialized habitats that include disturbed openings next to oak woodlands and semi-wooded suburban habitats. Gagliardi and Wagner (2016) speculate its rarity, and that of several other hairstreaks, including *Erora laeta*, *Callophrys hesseli*, and *C. lanoraieensis* may be because the adults defend territories and mate at heights too high to be regularly encountered by butterfly watchers. The western *C. johnsoni* is likely another example. Even species that are known to be secure such as *Satyrium liparops* and *Parrhasius m-album* may be canopy animals that are much more common, meters above the ground, than is generally appreciated. Wagner and Gagliardi (2015) go on to suggest that many of these canopy hairstreaks are feeding on honeydew and other non-floral resources (Fig. 7), such that they cannot be accurately censused by ground-level searches of flowers, like most other butterflies. The extreme rarity of several eastern gomphids (clubtail dragonflies), e.g., *Ophiogomphus anomalous* and *O. howei*, is also thought to be related to their arboreal perching behaviors. Even along rivers where exuviae can be found in abundance, few adults of either species have been seen or captured by Northeastern entomologists.

Figure 6. *Proserpinus vega* is among the rarest North American insects in collections. It was one of only two resident hawkmoths that Jim Tuttle was unable to find and rear for his wonderful treatment of our sphingid fauna (Tuttle 2007). Ironically, DLW found this species to be common just two hours from Tuttle's Tucson residence and only minutes from the homes of Noel McFarland and Ron Wielgus, two of southeastern Arizona's most storied and accomplished lepidopterists. DLW stumbled on the stunning larvae feeding on a low-growing *Gaura* that is often overtopped by grasses and other plants. Subsequent visits by other collectors to the area the following summer yielded another three-dozen larvae, and additional larvae every year since (and no adults — except those baited by calling virgin females). The larva figured is believed to represent a penultimate instar. (Photo: DLW.)

Figure 7. *Hypaurotis crysalus* feeding at *Callirhytis* pip gall on *Quercus rugosa*, growing downslope from the butterfly's host oak and preferred perching and mating station, *Quercus gambelii*. This is one of two Nearctic Hairstreaks, the other being the Golden Oak Hairstreak (*Habrodais grunus*) that shuns flowers. The importance of non-floral sugar resources such as hemipteran honeydew, gall exudates, extrafloral nectaries, and other sugar-rich resources to the nutrition of Lepidoptera is largely unknown and as a consequence, its importance, underappreciated. (Photo: Ken Kertell.)

While much of the above tries to differentiate between true rarity and apparently rarity, in some taxa the two can get spaghettied together and make it difficult for even the most informed lepidopterists and conservationists to agree on an entity's status. Because of the detection uncertainty with most *Proserpinus*, it is not known if any of our six North American species are vulnerable and worthy conservation targets. Likewise, there are significant data gaps relevant to the conservation of our North American *Euproserpinus*. New colonies are still being discovered, and no one can say with certainty how many species/population segments are contained within the genus, and, as a result, which are most imperiled (Rubinoff et al. 2015). Both *E. phaeton* (Fig. 8) and *E. euterpe* appear to be complexes of 2-3 geographically distinct entities, some of which are almost certainly G1 or G2 entities. As is too often the case, there is an urgent need for a modern molecular characterization of the genus, so that our conservation efforts can be legitimately (scientifically) prioritized. Cases such as these are not uncommon and may require concerted efforts (data and study) to determine the actual status of the species investigated.

Ours is not meant as a comprehensive account of false rarity but as a cautionary tale about common phenomena that make it difficult for biologists to disentangle "true demographic rarity" from cases of apparent rarity due to detection or censusing difficulties. In virtually all cases, a better understanding of a species' life history will help those charged with the conservation of biodiversity to make informed decisions. In several instances above, an emphasis on caterpillar demographics would be more resource-efficient and meaningful than survey numbers based on difficult-to-detect adults. But in other taxa, a pupal stage that is more easily encountered than other stages or a better understanding of adult diel activity patterns could be crucial to the collection of reliable census data. The take-home messages are uncomplicated: more knowledge is better, life history studies are essential, and those making lists of imperiled species should footnote those taxa where the basic biology (and taxonomy) of a candidate species remains poorly known.

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Figure 8. Although *Euproserpinus phaeton* is the most frequently encountered member of the genus, it is still difficult to find without an understanding of the moth's behavior. The adult flies early in the year (March and April) in southern California, and will come to flowers, but it is wary and an entire afternoon in the right habitat checking flowers may result in zero to just a couple of sightings. Late in the afternoon, as temperatures drop, however, the moths settle into divots in the sandy soil where they are reasonably camouflaged, but easy to encounter, sometimes in numbers. Early morning visits work equally well — the moths hold their positions until the first direct rays of sunlight fall upon their bodies. (Photo: JKA.)

The Mailbag . . .

Speciation, hybridization & conservation: the conundrum of the 'incipient species'. A response to Dupuis & Sperling

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In their recent article in the News, Dupuis & Sperling (2016) describe the difficulty faced by conservationists in choosing which taxa to protect, a decision made (ironically) more difficult by the power of modern molecular systematics to quantify biological diversity. The public will, expressed through various agencies, values some species because they are rare, iconic natural history symbols; in other cases the species may be endemic to a unique region or plant community, so that protecting the one protects the other. Some species are valued because they have "intrinsic objective characteristics like genetic or evolutionary distinctiveness" (Dupuis & Sperling 2016). In an earlier paper Rubinoff & Sperling (2004) advocate protecting "phylogenetically distinct taxa, since long branches represent more evolutionary time than bush phylogenies". 'Long branches' represent divergence since the acquisition of reproductive isolation. Their point is well-taken, since a cold, objective viewpoint would stress that a local population (let us say, of a butterfly), feeding on a unique hostplant in an unusual habitat might be an example of fascinating adaptations, but in the broad view might represent only part of a panorama of such geographic variation in a non-threatened, wide-ranging species. The policy of favoring for legal protection only phylogenetically distinct taxa reflects both a knowledge of genetics and evolution, but also a political appreciation of the limits of public support for funding efforts to preserve biological diversity. **My point here is that conservation policy based on a 'long branch' philosophy will favor perhaps the least interesting class of what we call 'species'.**

For the evolutionary biologist interested in speciation, the quest for an 'incipient species' involves catching populations in the act of evolving effective reproductive isolation from closely related taxa. Speciation, as the basic process generating biological diversity, is central to evolutionary theory, and is undergoing a resurgence of research due to advances in genomics and molecular systematics. From an academic point of view, preserving incipient species would seem to be a worthy conservation goal.

Incipient species typically express newly acquired, genetically-based traits that might be subtle and inconspicuous but which nevertheless promote geographic or ecological isolation, potentially reducing below some threshold level gene exchange with closely related taxa. (See Sperling (2003) and Mallet (1995, 2001) for modern definitions of the "biological species concept".) Such "speciation genes" are not under selection for their role in reproductive isolation *per se,* but for ecological traits (seasonality, flight times, novel plant community association, etc.) that coincidently serve an isolation function. These populations have the potential to pursue independent evolutionary paths; as incipient species they are the newly minted units of biological diversity. The Ozark swallowtail, *Papilio joanae*, as described in the article by Dupuis & Sperling (2016), fits this description. Another example would be the Bog Buckmoth, a *Hemileuca* sp. (see cover of 2017 Season Summary) feeding on a novel host in bogs in the Great Lakes region (Legge et al. 1996, Pryor 1998, Scholtens & Wagner 1994, Tuskes et al. 1996). In spite of unusual life history traits, presumably recently evolved post-Pleistocene, Rubinoff & Sperling (2004) found little divergence in the mitochondrial COI gene with respect to the widespread eastern *H. maia*, and so by this yardstick little justification for its current legal protection. Reproductive isolation between the Bog *Hemileuca* and *H. maia* has not been adequately studied.

One of the best, well-studied examples of what I would call "incipient" species are the three *Callophrys* (= *Mitoura*) hairstreak butterflies (*nelsoni, muiri,* and *siva*), found in the California Coast Range, the Cascades, and the Sierra Nevada foothills, ringing the Central Valley. The adults are so similar that their taxonomy has been in dispute, but adult phenotypes are associated with specific larval hosts in the Cupressaceae (juniper, cypress, incense cedar). Among the three, differences in both allozymes and mitochondria genes are on the order of variation typically seen *within a single species* (Nice & Shapiro 2001), and lab hybridization found no loss of fitness in F_1 hybrids (Forester 2005). The interpretation is that these three diverged very recently as modern plant community zonation was established at the end of the Pleistocene. Reproductive isolation results from slight seasonal differences in adult flight times, a small altitudinal separation of the hosts, and by the habit of females to perch and mate in close association with their specific host plants (see summary, Collins 2007).

The conundrum is that those taxa of most interest to the student of speciation are precisely those *least amenable* to quantitative diagnosis or identification by molecular systematics. At early stages of speciation the traditional gene markers used in cladistic analysis show little divergence from related taxa. With molecular systematics we measure changes in specific standard markers, shared by all taxa in our sample, and usually assumed to be selectively neutral. (Neutrality is important because selection on a given gene would likely affect its rate of change; cladistics and molecular clock models are predicated on a stochastic rate of change affecting all branches equally over long time intervals.) For incipient species, we would ideally like to measure variation in those genes

(probably many, unlinked loci) controlling behavior or other complex traits under selection for their adaptive qualities.

How are we to recognize incipient species? Careful natural history observations are essential in first detecting taxa and populations in the early stages of speciation. These species are likely to be somewhat isolated, living in a unique habitat, probably using a novel plant as a larval host or exhibiting other unusual life history adaptations, and perhaps exhibiting subtle but distinctive wing patterns. Incipient species are also likely to occupy either Ice Age refugia (*P. joanae*), or regions recently colonized following the Pleistocene (the Bog *Hemileuca*). Following initial field work, molecular systematics can then be used to better understand phylogenetic and taxonomic relationships to closely related taxa.

Convincing a government agency to protect a suspected incipient species will be a hard sell, but one worth pursuing for carefully selected cases. One approach might be to evaluate a candidate as an indicator species whose abundance is a measure of the health of a plant community.

In addition to the species status/conservation dilemma, the other main topic in the Dupuis & Sperling (2016) article concerned the importance of hybridization in the evolution of species in the *Papilio machaon* complex. This fascinating topic is treated in detail in the parent *open-access* paper by Dupuis & Sperling (2015). In fact**, research on the role of hybridization in speciation is undergoing a renaissance** (Arnold 1997, 2006; Endler 1998), and I would like to add the following remarks to supplement the discussion of hybridization in the *News* article.

Many in our Society will remember when natural hybridization used to be seen as "bad", as a threat to the integrity of a species' "co-adapted genome", as a natural consequence of the gradual nature of speciation yet also a waste of gametes pending selection against sterile or otherwise unfit hybrids. Such selection should theoretically lead to the "perfection" or "reinforcement" of isolating mechanisms, at which stage speciation would be complete. (This concept was strongly defended by our Societies' cofounder, Charles Remington, see Collins 1996.) In spite of intensive research few convincing examples of reinforcement have been found in nature. Pre-mating isolation probably arises more often as a consequence of natural history adaptations (flight time/season, fine-tuning mate recognition signals, etc.) coincidentally serving an isolation role (see *Callophrys* example above).

With the advent of molecular tools in systematics, hybridization (long understood to be important in plants) is now known to be common in animals. Hybridization and introgression are seen as mechanisms providing natural selection with a source of genetic variation in the evolution of novel adaptations. In addition to examples in the *machaon* group, hybridization is important in the evolution of mimicry systems in *Heliconius* (Martin et al. 2013), in *Grammia* tiger moths (Schmidt & Sperling 2008), *Limenitis* Admiral butterflies (Mullen et al. 2008), and in speciation in tiger swallowtails (Kunte et al. 2011). Nearly all populations of *Hyalophora* saturniids, from the Bitterroot Range to the Pacific Northwest, are either hybrid zones or are affected by introgression from hybrid populations (Collins 1997, Collins & Rawlins 2013; Fetzner, Collins, Rawlins *in prep*.).

Federal protection policy for wild hybrid populations, while recognizing them as natural phenomena, remains ambiguous and under review. Haig & Allendorf (2006) describe hybridization as the "double-edged sword of conservation biology". On the one hand hybridization can pose a threat to the integrated genome of a threatened or endangered species through introgression. On the other, hybridization, if carefully managed, might be a means to replenish loss of genetic variability in very small populations. The complexity of the subject, and the need for case-by-case evaluation, has stalled implementing a written policy. Not discussed in the review by Haig & Allendorf (2006) is the intrinsic scientific value of hybrid zones, which biologists see as natural laboratories to study speciation. Hybrid zones are also often associated with unique ecotones, many with a history of response to changing climate since the last Ice Age.

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Probable last instar larvae of *Opoptera staudingeri mexicana* (Nymphalidae, Satyrinae, Brassolini)

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The genus *Opoptera* Aurivillius includes eight relatively slender-bodied, diverse butterflies that range from Mexico to southernmost Brazil, plus an undescribed taxon from Peru (Penz 2009, **http://fs.uno.edu/cpenz/opoptera.html**). It was initially described as a subgenus of *Opsiphanes* Doubleday, but later elevated to full generic rank by Stichel (1902) along with *Catoblepia* Stichel and *Selenophanes* Staudinger. *Opoptera* adults are either crepuscular (five soberly colored species), the typical behavior for brassolines, or diurnal (three boldly patterned species), a much more unusual habit reportedly shared with only *Dasyophthalma* Westwood and two *Caligo* Hübner (Penz and Heine 2016, Casagrande and Mielke 2000). Enigmatic *Opoptera staudingeri* Godman & Salvin, the sole Central American representative, is a distinctive, high-elevation Brassolini for which Casagrande (1982) erected the monotypic genus *Mimoblepia* based upon tibia, valva, and wing characteristics; however, a holistic analysis by Penz (2007) argues convincingly against maintaining *Mimoblepia* as separate. Poorly known *O. s. mexicana* J. & R. G. de la Maza is said to be distributed from the Mexican state of Chiapas to Guatemala (**http://www.butterfliesofamerica.com/t/Opoptera_a.htm**), the holotype being collected at 1800 meters (**http://butterfliesofamerica.com/opoptera_staudingeri_mexicana_types.htm**). Besides the description of *O. s. staudingeri*'s immature stages and foodplant from Costa Rica by DeVries (1987, excerpted below), nothing else can be found in the literature or online regarding the juvenile biology of any *Opoptera*.

In December 2009, I was excited to discover a photograph uploaded to the popular image-hosting website Flickr that showed a stunning brassoline caterpillar (Fig. 1). It was encountered in the Sierra del Merendón of Cusuco National Park (**https://opwall.com/wp-content/uploads/2012-Cusuco-Status-Report.pdf**), a cloud forest in northwest Honduras adjacent to the Guatemalan border. Being familiar with the majority of Brassolini larvae, I quickly eliminated all possible genera except *Opoptera* and *Selenophanes*, which were unknown to me then. The photographer was contacted, replying that the caterpillar was "roughly 2.5-3 inches long" and resting on *Chusquea*, a bambusoid member of the grass family (Poaceae). Learning the approximate size was important, as final-instar *Opoptera*, in agreement with adults, should be smaller relative to those of *Selenophanes* (**http://fs.uno.edu/cpenz/opoptera.html**, **http://fs.uno.edu/cpenz/selenophanes.html**). Thus given the location and habitat, coupled with larval appearance (process of elimination), size, and likely food-plant, *O. s. mexicana* was strongly implied.

Fig. 1: Probable midsize last-instar *Opoptera staudingeri mexicana* on *Chusquea*, dorsolateral view. Cusuco National Park, Honduras; photographed June 14, 2009. © Andrew Snyder, used with permission.

I next emailed the data and my conclusion to Dr. Carla Penz, University of New Orleans, who stated the following during several exchanges: "Wow! What a gorgeous caterpillar! Phil [DeVries] does not have a slide of *staudingeri*, unfortunately. I read the description in his book* with your picture in front of me, and there are some differences. However, I agree with your process of making an "intelligent guess". I never understood why *O. s. mexicana* was described as a subspecies because it seems very different to me. The type of *mexicana* came from higher elevation than the Costa Rican *staudingeri* material I have at hand. I did say this before but I will say it again, it is one of the most beautiful brassoline caterpillars I have ever seen."

We all lead busy lives, so fast forward to May 2016 when I again chanced upon another photo of an identical larva (Fig. 2), this time posted on a Facebook group. It was also found in Cusuco National Park on *Chusquea* six years earlier at about 1500 meters, and accompanied by a close-up image of its striking head capsule (Fig. 3). This latest caterpillar, which was mistakenly called *Caligo* sp., was noticeably more mature in both appearance and size, the "whole body approx. 4 inches long".

Fig. 2: Probable late last-instar *Opoptera staudingeri mexicana* on *Chusquea*, dorsolateral view. Cusuco National Park, Honduras; photographed June 24, 2010. © Jonathan Kolby, used with permission.

Fig. 3: Probable last-instar *Opoptera staudingeri mexicana*, frontal view of head capsule. Cusuco National Park, Honduras; photographed June 24, 2010. © Jonathan Kolby, used with permission.

Despite repeated search attempts and queries, I have yet to corroborate the occurrence of presumably crepuscular *O. s. mexicana* in Cusuco National Park, nor were these two larvae reared to confirmed adults. Nevertheless, the above circumstantial evidence is too compelling to go unpublished any longer.

* Per DeVries 1987, page 252 . . .

Opoptera* [*staudingeri*] *staudingeri

Hostplant: *Chusquea* (Poaceae)

Early stages: Mature larva—body pale green with fine brown lines on the dorsum; dorsal midline brown with a thickened area bordered by yellow; tails red-brown; head capsule cream-brown with a conspicuous "moustache" near the mandibles; epicranium has two large pointed horns, which are black and rough, with many fine hairs, and the black descends down the face to the mandibles; a pair of lateral horns are cream with black tips; face has a red inverted V on the suture lines. (Devries, 1987, pg. 252).

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Life history of *Aguna metophis* (Latreille) (Hesperiidae)

Berry Nall

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Aguna metophis (Latreille) (Hesperiidae), commonly known as Tailed Aguna, is a medium-large neotropical skipper occasionally found in south Texas (Fig. 1). The first specimen reported from the U. S. was collected by Mike Rickard in Hidalgo Co. in September, 1969 (McGuire and Rickard, 1972). Apart from a single individual found in Uvalde County in 2006, all the Lepidopterists' Society records of the species are from Hidalgo and Starr counties in the lower Rio Grande Valley (Lep-Soc-SS, 2015).

Figure 1: Fresh adult *Aguna metophis*.

MATERIALS AND METHODS

On June 26, 2015, the author netted a female *Aguna metophis* at his residence in Starr County as it was nectaring on Duranta (*Duranta erecta* L., Verbenaceae). The female was confined in a netted cage (30cm x 30cm x 30cm) with cuttings of Mexican Orchid Tree (*Bauhinia mexicana* Vogel, Fabaceae). By the following day 10 ova had been produced; at that point the skipper was released. Two eggs were deposited individually on leaves of the host plant. The other eight were deposited in pairs on the netting of the cage.

On the same day that this female was released, a second female was photographed in the yard resting on the underside of a leaf of Bougainvillea (*Bougainvillea* sp. Comm. ex Juss., Nyctaginaceae). Examination of the photo showed that two ova had been deposited on the leaf. These were located and collected (Fig. 2), but they proved to be infertile and soon collapsed.

Seven ova from the confined female eclosed 3-4 days after they were deposited. *Bauhinia* cuttings do not keep well in water. Therefore, most of the larvae were kept in 40-dram vials; their nests were not disturbed but the remaining leaves were changed daily. A small seedling plant was available; two caterpillars were placed on it in a netted container. One of these died after a week, so having live food did not seem to provide a great advantage.

Four larvae survived to the final instar. The first caterpillar died while pupating. Due to concern that low humidity was a factor in the death, daily misting was begun. The remaining larvae pupated successfully. Two adults emerged and were released; for some reason the final butterfly emerged successfully but then died. That specimen is intended to be deposited at the University of Connecticut Insect Museum (UCMS).

The process used to obtain the size measurements reported in this article is as follows: ova and larvae were photographed beside a ruler that provided scale. Distances were determined from the photographs in pixels and then converted to millimeters. Since the larvae always rested with the head turned back toward the torso, the body length was estimated by drawing and measuring a series of line segments along the dorsum.

DESCRIPTION OF IMMATURE STAGES

Ovum (Figs. 2-3). White, hemispherical; 12-13 strong vertical ribs, crossed by numerous weak horizontal ribs, terminating in flattened circle around micropyle. Diameter 0.95-1.0 mm (n=4); height 0.84-0.91 mm (n=2). Flattened circle turning red as ovum develops; as with a band around its middle.

First instar (Fig. 4). Head very dark brown, smooth, flattened. Collar reddish-brown, darker dorsally. Body yellow-green.

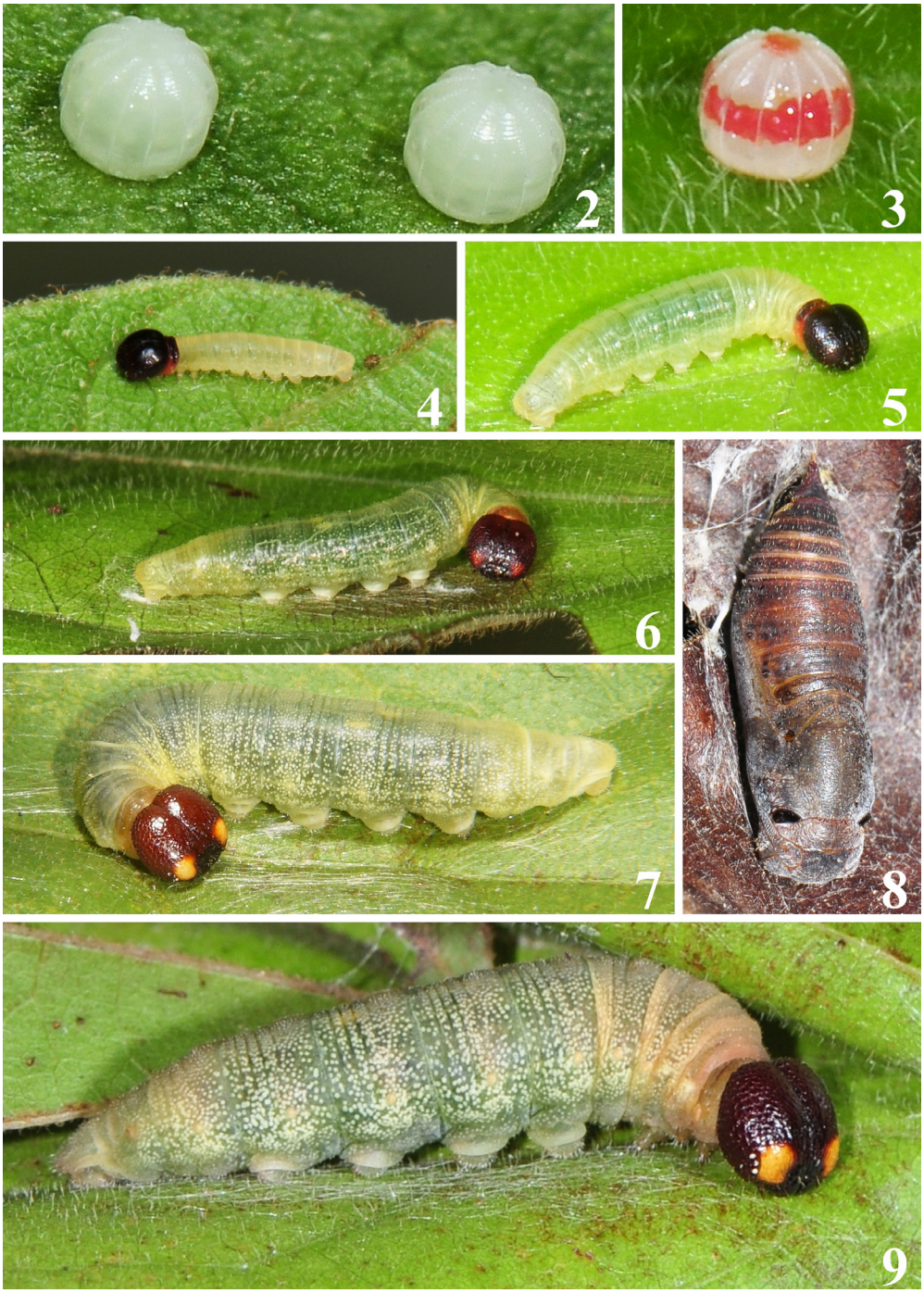
Second instar (Fig. 5). Head and collar as first instar. Body yellow-green in anterior and posterior segments; middle segments translucent green. Speckled with tiny off-white spots; tracheae visible through skin.

Third instar (Fig. 6). Head with red false eyespots; white stemmata. Collar brown. Middle segments of body deeper green; spotting stronger; very faint spiracular stripe. Testes of male larvae visible through skin.

Fourth instar (Fig. 7). Head bifurcated; false eyespots yellow. Collar light brown. Body olive green, heavily spotted; otherwise as previous instar.

Fifth instar (Fig. 9).Similar to previous instar. Length 25.5-25.8 mm (n=3; a fourth specimen smaller, at 20.5 mm).

Pupa (Fig. 8). Blunt head with large black false eyespots; wing casings darker brown than abdominal segments; short white setae; head and ventrum powdery.



Figures 2-9: Immature stages of *A. metophis*. **Fig. 2)** Paired ova (infertile), on *Bougainvillea*; **Fig. 3)** developing ovum on *Bauhinia*; **Fig. 4)** first instar; **Fig. 5)** second instar; **Fig. 6)** third instar; **Fig. 7)** fourth instar; **Fig. 8)** pupa; **Fig. 9)** fifth instar.

DISCUSSION

The confined female deposited two ova singly on leaves of the host plant, and eight in pairs on the sides of the cage. The unconfined female deposited a pair of eggs off-host. One wonders what provoked the latter behavior; also, if it is significant that the ova were placed singly when on leaves of the host plant and in pairs when not.

The larvae exhibited behavior typical of many skippers: the first instars cut a section of leaf and folded it over to form a nest; later instars either folded a leaf or sewed two leaves together. Larval development was highly variable: the first entered pupation on July 29; the last, three weeks later, on August 22. Adults emerged 9-10 days after pupating.

Along with *Aguna metophis*, *A. claxon* (Evans) and *A. asander* (Hewitson) can be found in south Texas (Pelham, 2016). *Bauhinias* are common in ornamental landscaping throughout the region. Mike Rickard (pers. comm.) has found larvae of the more common *A. asander* several times, and it is not unlikely the other two species will also breed here. In at least the latter stages of development, it should be fairly easy to distinguish the three species by the head capsules. *A. metophis* has a uniformly-colored head capsule with false eyespots. Photographs of larvae of *A. asander* and *A. claxon* reared by Janzen & Hallwachs (2010) show that the head capsule of *A. claxon* lacks false eye spots, while that of *A. asander* is distinctly two-toned (the lobes are brown, while the frontal area between the false eyespots blackened).

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Rearing the Silver Emperor in Arizona: *Doxocopa laure* life history

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In the late summer and early fall of 2015 several Silver Emperor (*Doxocopa laure)* adults were observed south of Tucson in the Santa Rita mountain range (Madera Canyon).

This area is roughly 32 kilometers north of the Mexico national border and east of the Santa Cruz river drainage, a known northward migrant butterfly passage. The elevation is approximately 1117 meters above sea level, with habitat of the upper Sonoran desert. This is an area of mesquite grasslands interspersed with dry canyon bottoms. There are many hackberry trees and shrubs.

A female *D. laure* was captured on November 1, 2015 for egg laying and life cycle study (see Fig. 14 for reared female from this female).

D. laure is largely a Mexican species, its habitat being subtropical wooded areas. *D. laure* ranges south to Venezuela, Cuba, and Jamaica. From Mexico it has strayed northward into the southwestern United States, having been recorded in southern Arizona and southern Texas.

METHODS AND MATERIALS:

Expected Host

Hostplants are expected to be trees or shrubs (Cannabaceae) of desert hackberries. These include *Celtis spinosa var. pallida* (Torr.) M.C. Johnston, and in Mexico the similar *C. iguanaea.*

According to SEINET, **swbiodiversty.org/seinet/,** hackberries are "Shrubs, to 3 m; crowns rounded. In deserts, canyons, mesas, washes, foothills, thickets, brush-land, and grassland near gravelly or well-drained sandy soil; 1000-1300 m; Ariz., Fla., N.Mex., Tex.; Mexico; Central America; South America (to n Argentina). *Celtis pallida* is closely related to *C. iguanaea* (Jacquin) Sargent from Mexico"

RESULTS:

Rearing

On November 1st the live female was caged with *Celtis spinosa* var. *pallida* and *Celtis reticulata* cuttings for oviposition. On Nov. 4 ova were seen on the edges of *C. s. pallida* leaves. A few days later a thorough search revealed 32 ova, mostly singles (one stack of six), all on the upper side edges of C. s. *pallida* leaves. *C. reticulata* was ignored by the female and no attempt was made to feed it to larvae.

OVUM (Fig. 1,2).

Ova are vertically ridged, oval with a chartreuse top quarter, and an incomplete black stripe above a darker green base.

LARVAE:

The larvae developed quickly with misting and partial screening with cellophane to hold humidity, since *pallida* cuttings become stiff in 24 hours in low humidity. Keeping them warmer than house temperature with direct sunlight through the window helped also. The larvae rested like *Asterocampa* larvae, with their "face" flat against the substrate, either the top of a leaf or the side of the container.

First instar (Fig. 3)
The head is smooth, bi-lobed and brown. The body of the neonate is chartreuse; after feeding it darkens to green like all the other stages. (Fig. 4) On November 12 first instar larvae emerged and began feeding on *pallida* leaves.

Second instar (Fig. 5)
The larvae have a hard-to-see yellowish spiracular line, below which the body is paler and bluish. From the 2nd instar on larvae have a pair of "antlers" and pairs of spots. The largest pair of spots look like sunglasses.

Third instar (Fig. 6)
Note the differences in head capsule in the images.

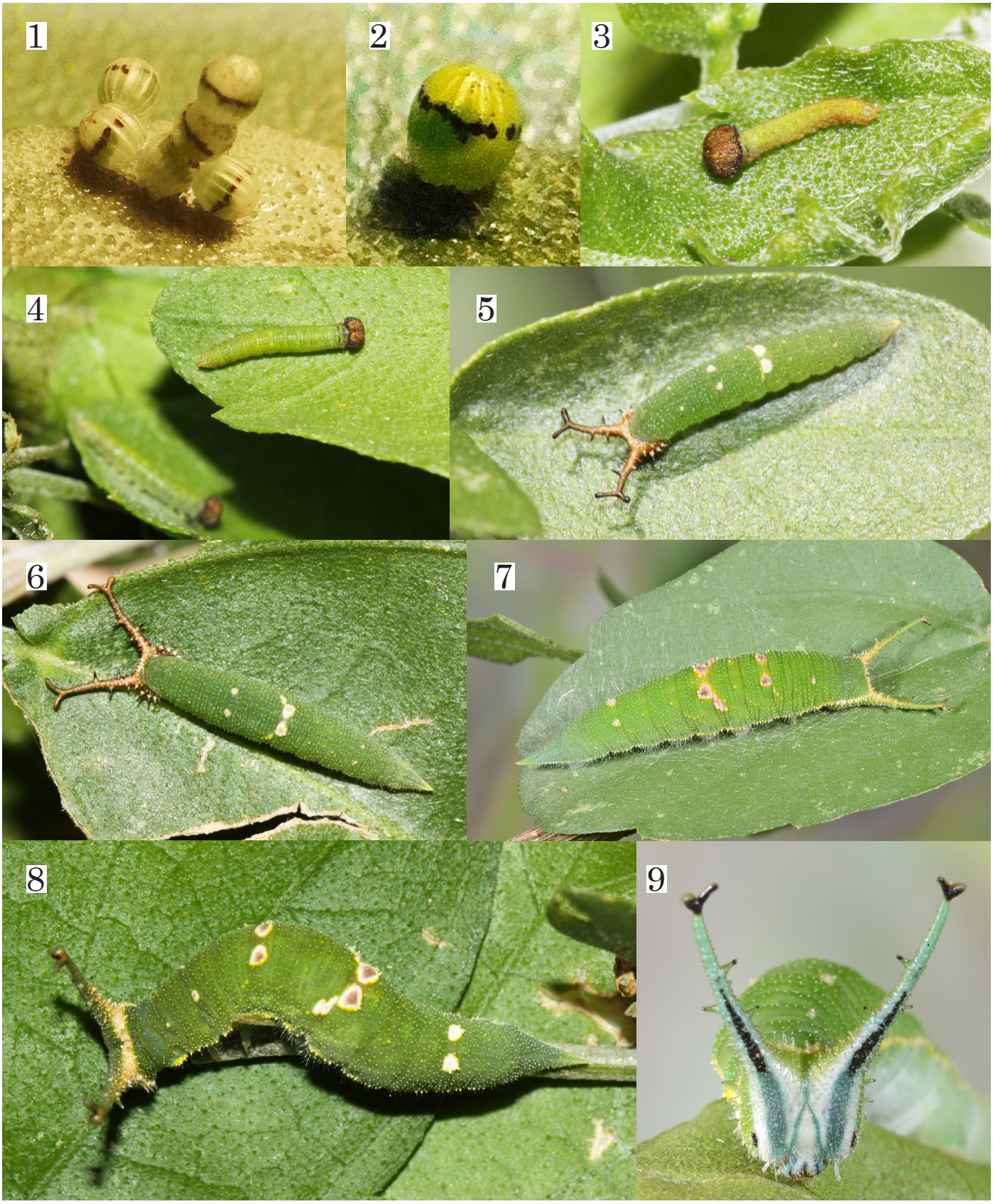
Fourth instar (Fig. 7)
The antlers are proportionately longer and the head is mostly yellow.

Fifth instar (Fig. 8)
The second through fifth instar larvae are similar sporting long antlers on the head (Fig. 10). The face of the fifth instar larva is mostly white and blue, with a black dash in the lower half of the curved antlers and with black tips (Fig. 9).

(Note that Brock submitted a back view, with face toward substrate in "**Field Guide To Butterflies of America**".)

NOTES:

Brown in "**Jamaica And Its Butterflies**" gives a detailed description of a *laure* larva found in Mexico by Comstock and Vazquez ("1960" pp 410-412); Brown's description is translated from the Spanish in Comstock and Vasquez.



Figures 1 - 9, immature stages of Doxocopa laure. **1 & 2)** Ova; **3)** early first instar larva; **4)** late first instar larvae; **5)** second instar larva; **6)** third instar larva; note the somewhat longer "antlers"; **7)** fourth instar larva; **8)** fifth (last) instar larva; **9)** last instar head view. (photo credits: 1 & 2 - Fred Heath; 3-6, & 8 - Jim Brock; 7 & 9 - Dave Wagner)

In Scott, "**The Butterflies of North America**" the larva is well described except for his "clear green powdered white" which we did not observe.

PUPA:

The pupae are plain green (Fig. 12) or may have white striations (Fig. 11). Here the conical head horns are visible. These figures show the dorsal "shark-fin" and top edge of abdomen with a browned foliage appearance. This is a clear mimicry of leaf damage.

The first pupation happened on December 6. Pupation was in leaves or on twigs. Chrysalids reached 31 mm in length.

ADULTS:

The first adult eclosed December 22, 16 days after pupation. The first female eclosure was December 24 at 9:54 am. Wings were expanded in 4 minutes. On the 27th a female eclosed at 10:00 am. 24 hours earlier the sex was clear due to the FW pattern showing through the chrysalis skin. The last adult emerged on January 17. (This was presumed to be due to indoor rearing conditions.)

D. laure resembles a small *Adelpha eulalia,* but adult *D. laure* do not voleplane, or glide, as *Adelphas* do. Personal observations show *D. laure* beating their wings continuously! Kilian Roever observed *laure* males perching territorially.

Reared females normally had pale blue trimming of the median white band. The field caught one I have does not show this. All males show bright iridescence when viewed at the correct angle. (Fig. 13) (Bruce Taubert used photo stacking to produce this sharp image at an angle.)

NOTES ON ILLUSTRATED ADULTS:

In Brown, **"Jamaica and Its Butterflies**" a female is illustrated dorsally showing no pale blue trimming of the median white band. The text reads correctly, "the basal portions of the males shimmered with bluish reflections as the insect turned in flight".

In Scott, **"The Butterflies of North America"** a male shows no iridescent blue as it is seen perpendicular to the viewer. In Howe, "**The Butterflies of North America**" incorrectly shows a male with iridescent blue on the right side, in perpendicular view, which does not happen unless wings are tilted.

Garwood, **"Butterflies of Mexico and Central America"** correctly shows a live male with iridescence of the angled right side and a female with some light blue along median white band.

Brown, "**Butterflies of Northeastern Mexico**", shows dark, hard to see iridescence on a male and a female with no light blue next to the median white band.

Kaufman, "**Butterflies of North America (Kaufman Focus Guides),** has a female without light blue and a male too perpendicular to show iridescence clearly.

PREVIOUS RECORDS:

There were 11 sightings for *Doxocopa laure* in 2015, in comparison to only 11 total prior to 2015!

The earliest *D. laure* were found by Kilian Roever (personal communication): four in Leslie Canyon, one in Rucker Canyon, Chiricahua Mountains; four in Guadalupe and Cottonwood Canyons, Peloncillo Mountains in 1981 to 2003.

The single 2014 record by Kim Garwood was a female nectaring on seep willow (*Bacharis salicifolia*) on Procter Road, Madera Canyon. (Photographed by Willie Sekula).

In 2015 eight sightings were on or near desert broom (*Bacharis sarathroides*) beside Madera Canyon road, or in Florida Wash just to the east. This area has many large *C. pallida* shrubs. Also in 2015 one female was seen on mud in the Chiricahua Mountains, one reported by Cheri Williamson in Bisbee (Aug. 5th photo on lantana); also one on rabbit-brush (*Ericameria nauseosa*) in the Patagonia Mountains as the first Santa Cruz county record.

Empress Leilia*, (Asterocampa leilia)*, also a *C. s. pallida* feeder, flies early in the spring and is present in all months. But *D. laure* has never been seen here outside of fall. If *D. laure* were able to withstand the freezing winter temperature it could also fly as does *A. leilia*.

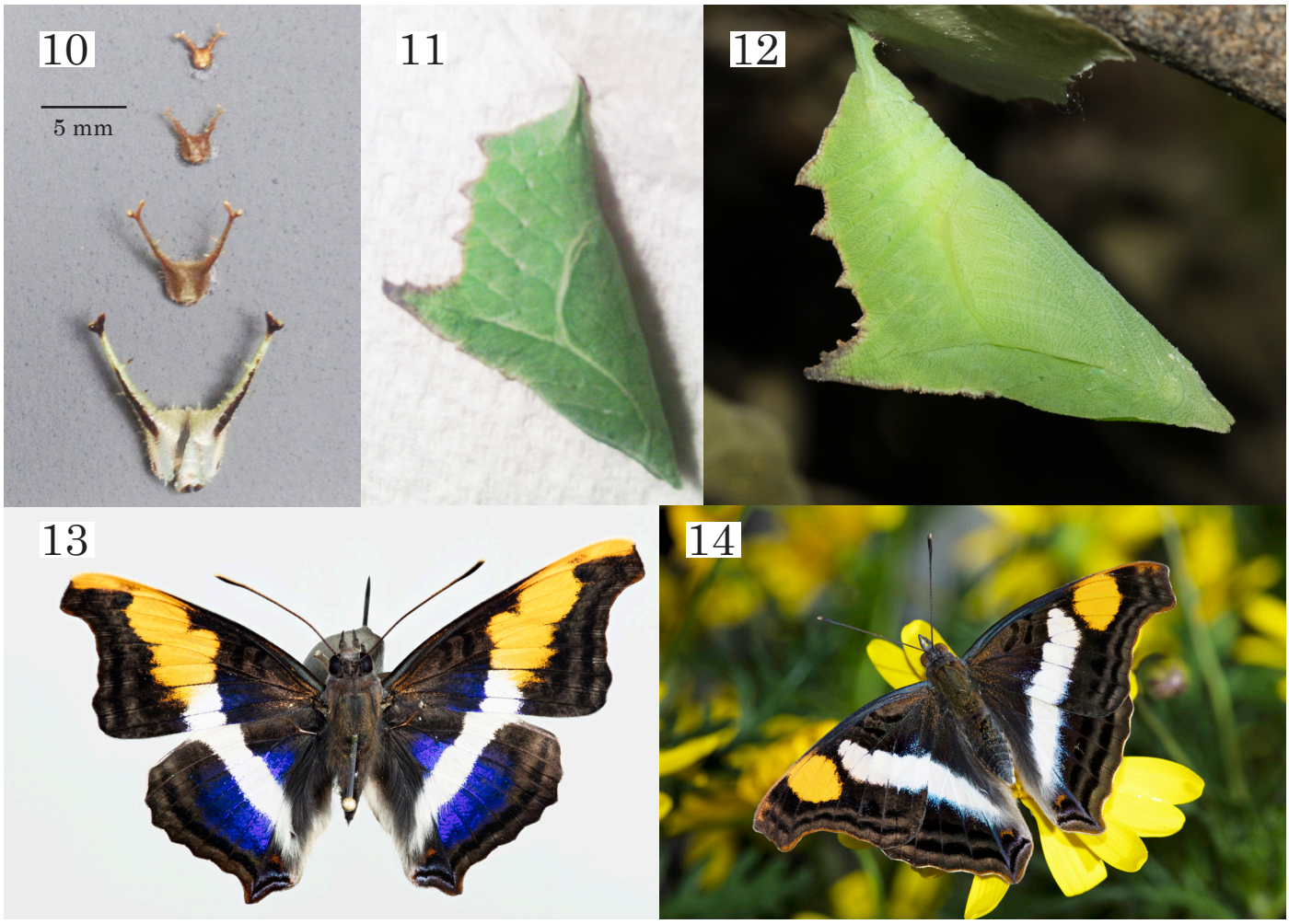
OTHER ARIZONA 2015 INFLUX HIGHLIGHTS:

Several long-term Arizona lepidopterists were surprised by the extensive 2015 influx of multiple species.

Richard Bailowitz (author of Annotated Checklist of Arizona Butterflies) characterized it as "astounding". Even Jim Brock was impressed with *Arawacus jada* "flying in fresh condition and good numbers."

Other examples:

Chlorostrymon simaethis and *Strymon istapa* were common. Other hairstreaks included *Hypostrymon critola*, *Strymon bebrycia*, *Strymon bazochii*, *Cyanophyrs miserabilis* and *Ministrymon azia*. *Appias drusilla*, *Pyrisitia dina westwoodii*, *Eurema daira*, *Pyrisitia nisa*, *P. lisa* and *E. boisduvaliana* were in good numbers. *Aguna asander*, *Proteides mercurius*, *Eunica monima*, *Myscelia cyananthe skinneri*, *Mestra amymone*, *Marpesia petreus*, *Siproeta stelenes*, and *Heliconius charitonia* were seen. *Anartia jatrophae* had "a persistent flight in California Gulch from 24 Oct to 12 Nov 2015" (Bailowitz). Species are clearly moving north.



Figures 10 - 14. **10)** Series of head capsules, second through fifth instar larvae; **11 & 12)** pupae; **13)** angled view of spread adult male, showing the iridescent color of the hindwings; **14)** reared adult female. (photo credits: 10-11 - Doug Mullins; 12-14 - Bruce Taubert)

Acknowledgements:

Gratitude and thanks for help goes to Rich Bailowitz, Jim Brock, Kilian Roever, Fred Heath, Bruce Taubert and Dave Wagner. The author thanks Bill Beck for a little prodding. The author accepts full responsibility for any errors in this paper!

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Membership Updates -- address changes

Continued from p. 37

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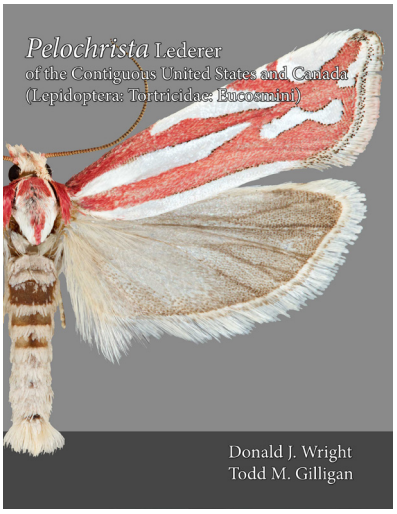
Books

The Wedge Entomological Research Foundation (WERF) proudly announces publication of its newest fascicle in the Moths of North America series: "*Pelochrista* Lederer of the Contiguous United States and Canada (Lepidoptera: Tortricidae: Eucosmini)" by Donald J. Wright and Todd M. Gilligan. The book will be published by May, 2017. The retail price is $90.00, however the WERF is offering an early-bird-special discounted price of $80.00 (plus shipping and handling) for all orders received by August 1, 2017. Please go the WERF's website www.wedgefoundation.org for details on ordering books from the WERF. Several of your favorite retailers of entomology books will also have copies available. The book, ISBN 978-0-933003-20-0, is 376 pages, 48 colored plates, 70 monochrome plates, hardbound



The aim of the Marketplace in the **News of the Lepidopterists' Society** is to be consistent with the goals of the Society: "to promote the science of lepidopterology...to facilitate the exchange of specimens and ideas by both the professional and the amateur in the field,..." Therefore, the Editor will print notices which are deemed to meet the above criteria, without quoting prices, except for those of publications or lists.

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No mention may be made in any advertisement in the **News** of any species on any federal threatened or endangered species list. For species listed under CITES, advertisers must provide a copy of the export permit from the country of origin to buyers. **Buyers must beware and be aware.**

with dust jacket, and 8.75" x 11.25" approximate dimensions. The contents include 168 species accounts, descriptions of 15 new species, and 18 new synonymies are proposed. Diagnostic morphological features useful in species identification are emphasized and illustrated with 720 color adult images and 945 detailed genitalia drawings. This is the companion volume to the *Eucosma* book published in 2015. Orders and payment can be sent directly to Kelly Richers, 9417 Carvalho Court, Bakersfield, CA 93311. Do not forget August 1, 2017 for the discounted price! 591

The following fascicles of the MONA series are for sale: 6: Pt.1; 7: Pt.1; 13: Pts. 1A, 2A, 1B, 2B; 15: Pt.5; 20: Pts. 1, 2A, 2B; 21; 26: Pt.1. I am asking for $35 each except 15 Pt.5 for which I am asking $65. Also, the Guide to the Olethreutine Moths of Midland North America (Tortricidae) for $10. I want to make sure mothers get these immaculate issues. Contact: Larry Line, 6827 Redberry Road, Clarksville, MD 21029; **mothmanlarry@gmail.com**. 584

Field Guide to Eastern Moths, 2005 edition, $30; and *Butterflies and Moths (Lepidoptera) of Kentucky*, 1999, $20. Both postpaid in the US; postage extra outside. Send checks to Charles V. Covell Jr., 207 NE 9th Ave., Gainesville, FL 32601-4378 U.S.A. 591

Research

Wanted: Observations, photos, specimens of larvae and adults of *Lophocampa roseata* and the Spotted Tussock Moth, *Lophocampa maculata* from all areas of North America, recent or old data. Records from Alaska and northern Canada, the desert SW, southern Appalachians and Pacific Coast are especially needed to define range. Records of early or late season observations are particularly valuable. All larval and adult photographs are useful, especially if they show unusual patterns of coloration. Specimens are desired for future genetic analysis. Contact Ken Strothkamp, Portland State University (**kstrot2@pdx.edu**) for more information on the project. 591

Membership Updates

Chris Grinter

Includes ALL CHANGES received by 10 February 2017. Direct corrections and additions to Chris Grinter, **cgrinter@gmail.com.**

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Book Reviews

PETERSON FIELD GUIDE TO MOTHS OF NORTH-EASTERN NORTH AMERICA, by David Beadle and Seabrooke Leckie. 611 pages, 11.5 cm × 18.5 cm, soft laminate cover; ISBN 13: 978-0-547-23848-7; $29.00; Houghton Mifflin Harcourt, Boston; Publication date: April 2012.

Some misidentifications and other errors in the Beadle and Leckie moth field guide.

The Beadle and Leckie (2012) Peterson Field Guide to Moths has been previously reviewed (Adams and Peigler 2013) and I agree with that review but offer some additional criticisms. This book will obviously facilitate identification of hundreds of species, including Microlepidoptera, to species or at least to genus. However, it could very easily have been much improved had the authors consulted mid-late 20th and 21st century literature and had experts check their illustrations. Some of the genuine live images show interesting postures (e.g. Abbott's sphinx, many micros). However, as is often apparent from the antennae, many images are from dead or immobilized collected moths that are not in natural resting postures, but are set to conceal the hindwings. Occasionally one can see where protruding antennae have been cropped off (I hope electronically). Actually, among most species with useful identification characters on the hindwings, these are usually partially visible on active or disturbed moths, e.g. at bait, at flowers, flying around a light, or when flushed in the daytime, as illustrated on many apparently alive Smerinthinae, *Grammia* and *Catocala*, among others. In a few groups, identifications are made unnecessarily difficult or not readily verifiable because important hindwing characters are concealed, e.g. in some *Apantesis, Virbia*, *Phragmatobia, Catocala*, *Schinia, Leucania*, and *Anicla.* Genuine images of living resting moths would be much more life-like if legs were shown (as in Lymantriinae, many Notodontidae etc., but not on *Catocala, Lithophane* and many other Noctuidae.).

This book contains at least 26 misidentified illustrations and others that are questionable. Some would really require checking genitalia to be sure. Some errors are in genuinely difficult genera such as *Datana* and *Dasychira*, but I found only one in *Papaipema*, and none in *Acronicta*, *Zale* or Herminiinae which are also difficult groups. Inexplicably there are six misidentifications in *Catocala* (which I double checked with Larry Gall), five involving easy common species. A friend's kid quickly informed me that the two *Catocala residua* were some other species before I had even looked. Due to another misidentification that she suspected, *C. palaeogama* which is very often the first or second most commonly encountered species of large underwing moth (80-100% in s. NJ in 2015) where hickories occur, is not actually illustrated.

Here's my list. I am confining my comments to macros. I omit most questionable identifications. In all cases I am assuming colors are accurate, based on the overall quality of illustrations. I probably missed some errors, in part because the pictures on the right page are labeled with the generally unfamiliar and unused English name. For example, two moths on page 467 are obviously not *Lithophane petulca*, but I initially missed that they are not "Wanton Pinions".

This book should not be used as a foodplant reference due to abundant errors for non-polyphagous species. Important accurate foodplant references that were readily available as of 2005-2010, but that the authors apparently did not consult, include the entire MONA series to date,

Book identification	Correct identification	Errors	Note
GEOMETRIDAE			
Lobocleta ossularia	Right is a *Scopula*, probably *S. inductata*, left is correct.	1	
Eufidonia discospilata	Male is incorrect. Female is probably correct since it does seem to have reduced eyes.	1	Genitalia probably would be needed with male.
Macaria notata	*Macaria aemulataria* (large, probably spring, specimen).	1	Note color.
Tacparia atropunctata	*Tacparia detersata*	1	
Tacparia detersata	*Tacparia atropunctata*	1	
Besma endropiaria	*B. quercivoraria* female	1	
NOTODONTIDAE			
Datana	*D. angusi* is *D. drexelii. D. contracta* is probably *integerrima*.	1-3	*D. ministra* and *D. drexelii* are correct. The *D. integerrima* is quite dark but may be correct. Note lack of yellowish anywhere on forewings of supposed *D. contracta*.
Symmerista spp.	No way to be sure, but *S. canicosta* looks likely to be *leucitys*.	0-2	*S. canicosta* and *S. albifrons* are not usually separable without genitalia, *S. leucitys* sometimes is.

Book identification	Correct identification	Errors	Note
EREBIDAE			
Dasychira pinicola	*D. plagiata.*	1	Range almost entirely wrong. See MONA. Great Lakes and east coast.
Dasychira basiflava	Male at left is *D. plagiata*.	1-2	Male at right is very questionable without checking genitalia.
Cisthene packardi	*Cisthene plumbea*	1	
Apantesis phalerata	*A. carlotta* (?complex)	1	Note black costa, dingy thorax, and thin lines.
Catocala residua	Both are *C. angusii.*	2	
Catocala obscura	Both are *C. residua.*	2	HW fringe should have been shown.
Catocala subnata	Difficult to be sure without hindwing, but probably ok.	0-1	
Catocala semirelicta	*Catocala unijuga.*	1	These two can be difficult.
Catocala palaeogama	Definitely not *C. palaeogama*. I'm aware of other opinions, but mine is northern female *C. neogama.*	1	Hindwings would confirm or rule out *neogama* (or *communis*).
NOCTUIDAE			
Syngrapha alias, S. abstrusa	Uncertain without checking genitalia.	0-2	The stigma characters given are only for rough sorting. See MONA.
Schinia lynx	I suspect *S. obscurata*, but with HWs concealed, probably no way to be certain.	0-1	Several southern species have similar fore-wings.
Lithophane petucla	Both are *L. hemina.*	2	
Lithophane innominata	Left is *L. bethunei*, right is correct.	1	
Pyreferra hesperidago	*Pyreferra pettitii.*	1	These two are not similar.
Papaipema aerata	Definitely incorrect, probably *P. nelita.*	1	There are no known modern specimens of *P. aerata*!
Leucania multilinea	Definitely incorrect, looks like *L. phagmatidicola* to me.	1	Hindwing might have been useful.
Lacinipolia laudabilis	Not dissected so uncertain. Males of *L. explicata* often very similar to this image. Males of *L. laudabilis* usually have less black in median area.	0-1	*L. implicata* is correct. No comment on *L. explicata*. See Georgia Lepidoptera website for good images of male *L. laudabilis* and female *L. explicata.*
Mamestra curialis	Right is *Spiramater lutra.*	1	
Protorthodes oviduca	Right is *Orthodes cynica.*	1	
Anicla lubricans	Probably cannot be positively identified as illustrated without size, hindwings, or genitalia.	0-1	Size will usually separate *illapsa* from the larger *lubricans* and *sullivani*.
Euxoa velleripennis	Some other *Euxoa*. Hindwings might have been diagnostic.	1	*E. velleripennis* FW is nearly black, MONA female is about as light as they get. Also FW lines are not defined with black on this image.

Rings et al. (1992), Handfield (1999), Wagner et al. (2001), and Wagner (2005), to mention a few. Erroneous or very dubious old records pointed out by Wagner (2005) for several Notodontidae and Sphingidae and even long-ago debunked foodplants from the wrong family for *Catocala clintoni* (elm), *C. robinsoni* (oak), *C. piatrix* (ash), and *C. similis* (pecan), and *Allotria elonympha* (hickory, walnut) are resurrected. Most foodplants for Juglandaceae-feeding *Catocala* could have easily been stated accurately from Rings et al. (1992), but some are partially incorrect as given.

Adams and Peigler (2013) discuss a few of the over 50 highly inaccurate ranges. Here are a few more. The "common" *Agrotis malefida* is unknown from about 99% of the mapped range (see MONA). *Syssphinx bicolor* does not occur regularly north of the Carolinas or perhaps southwest VA in and east of the mountains. The brown spring form of *Nemoria bistriaria* is not confined to the far north, being common in southern PA. As currently (dubiously) recognized, *Spilosoma dubia* is absent from most of the mapped range, barely getting into the USA from the north, but what is supposedly the same species occurs disjunctly on the coastal plain from NC to FL. *Acronicta*

lanceolaria ("S. Canada and n. U.S.") occurs in coastal plain MA, NJ, NC, and FL. The range for *Fagitana littera* is similar to that shown for *Papaipema speciosissima*. *Chaetaglaea cerata*, "possibly" in the US, was described from PA and Forbes (1954), the most basic reference they ignored, already had records from MA. *C. cerata* also occurs locally in NH, CT, NY, OH, MI, and WI that I know of offhand. *Lacinipolia laudabilis* and *Anicla lubricans* are not verified as far northeast as mapped. About 20 Noctuidae are incorrectly shown as absent in the coastal plain and piedmont from southern NJ southward. Some don't go much farther south, but *Lithophane patefacta* (as currently recognized) is widespread south to Georgia and the Gulf states.

If the authors try again I hope they will consider including **the scientific** names on the illustration pages, consistently show hindwings where these are useful for identification, have experts check all identifications, consult modern literature for ranges and especially foodplants. Finally, the authors missed a great opportunity to suggest better English names rather than perpetuate those deservedly in general disuse for decades or even over a century. Three very similar *Feltia* species on page 513 are two darts and a cutworm. One or the other, please!

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Dale Schweitzer, 1761 Main St., Port Norris, NJ 08349.

Mi Guia de Mariposas del Valle de La Paz (My Butterfly Guide of Valley of La Paz). Juan Fernando Guerra Serrudo, Ariel Fernando Guerra Cazon, and Yael Asuncion Guerra Cazon. 2013. Universidad Tecnologica Boliviana, La Paz. 142 pp. $60 US.

There is very little in print on the butterflies of Bolivia, a remarkably diverse country embracing 20,000-foot volcanoes, lowland tropical jungles, and the deeply-dissected canyons known as *yungas* that harbor some of the highest biological diversity on the planet. The most important butterfly resource is on-line: <danske-natur.dk/bolch001.htm>. This book is an intensive and copiously-illustrated faunistic treatment of the La Paz Valley and vicinity, ranging in elevation from 2400 to 5000 meters above sea level and embracing a mixed high-Andean and lowland Neotropical fauna of 58 species. It describes the ecology of the region, including developed areas as well as wildlands, with capsule descriptions of the vegetation (more than 900 plant species are recorded regionally!). There is introductory material on butterfly life cycles, anatomy, and behavior. All of this is very professionally presented and comparable to the best First World field guides in quality.

The heart of the book, however, is the species accounts, all of which are illustrated with some of the finest butterfly photographs from Nature ever published. They include the first life-history information ever published on most of the species, with photos of the eggs, larvae and pupae and of the confirmed host plants and their habitats. Because many of the species are widespread in the High Andes, this information will be of interest far beyond the La Paz Valley, and will contribute to an eventual synthesis on the origins, evolutionary history and biogeography of the Andean fauna. And all of this is fully accessible to English readers, because everything in the book is presented in Spanish, English, and the indigenous language Aymara! (The commonest Aymara word for "butterfly" is *pilpintu*. It's the same in the other common Andean language, Quechua. If you intend to study high-Andean butterflies, it's a word worth remembering.)

One caveat: The host plants of the Pierids *Phulia nymphula, Pierphulia nysias,* and *Infraphulia illimani*

are identified in the text as Rosaceous plants of the genus *Lachemilla,* locally called *sillu-sillu.* This struck me as exceedingly strange, as no Pierid is known otherwise to feed on Rosaceae, and I have reared members of this lineage, including *P. nymphula,* on Brassicaceae, which is "normal" in this group. On the other hand, members of the Andean Pierine genera *Tatochila* and *Hypsochila* feed on papilionaceous legumes in many cases, and some may feed on Valerianaceae. (The host plants attributed to the other Pierines in this book are correct, including the rosette crucifer *Aschersoniodoxa* for *Pierphulia rosea annamariea.*) What to make of this? Fortunately, I know my Andean rosette plants pretty well, and the photos identified as *Lachemilla* aren't. They are all rosettes of one or another *Lepidium* (Brassicaceae), which is a routine host of *P. nymphula* in Peru and Chile. The authors have not reared *Infraphulia illimani*, only secured eggs. Because *Infraphulia* are restricted to the high-altitude bogs known as *bofedales,* I do not believe their hosts are either Brassicaceae or *Lachemilla.* I have been unable to identify the apparent fruit on which the photographed egg was laid. I followed *I. madeleinea* for days without ever seeing an egg laid. Help! There may be other such errors, but I'm not competent to spot them.

As of this writing, this book does not have a distributor in the US (nor does it have an ISBN number!). It can be purchased from the senior author (e-mail **ferguerrafideo@yahoo.com)** or from the firm Libros Andinos <Incabook.com>. The price fluctuates, so inquire!

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Moth eye fungus

Clifford D. Ferris

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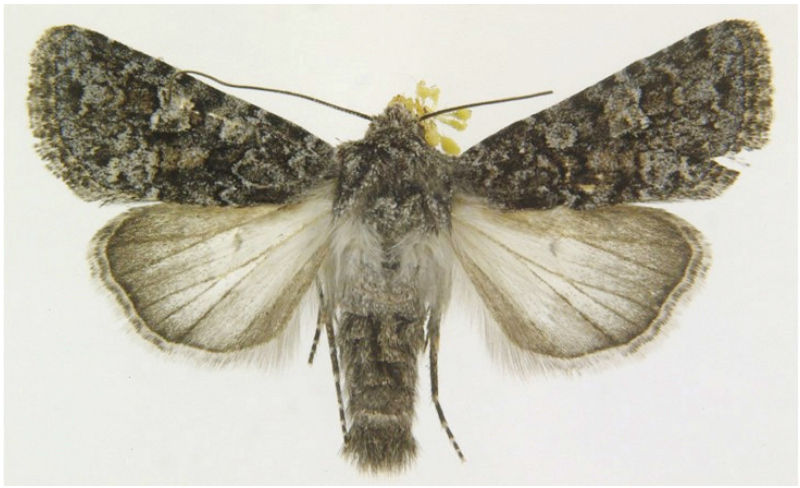

Although fungal infestations in moths have been recorded in the tropics, until the 2016 field season I had not seen this condition in North American moths during six decades of collecting. I encountered infested moths at two sites north of Silver City in the Pinos Altos Mts., Grant Co., New Mexico in late August, 2016. Only infected noctuids were found representing three genera/species: *Apamea geminimacula* (Dyar); *Lacinipolia umbrosa* (Smith); *Pseudanarta pulverulernta* (Smith). The fungus was identified as in the *Cordyceps tubercuata* group, by Joseph Spartola, Dept. of Botany and Plant Pathology, Oregon State University, Corvallis OR. Spores of this fungus land on an insect and the fungal mycelia then grow though the exoskeleton where they spread throughout the body. When mature, the fruiting body of the fungus breaks through the exoskeleton growing a stalk with the terminal asci (sacs) containing the spores, which then disseminate to produce new infections. The fungus normally takes neuro-control of the host leading to death and the emergence the fruiting body. Apparently when the moths were killed by the ethyl acetate fumes in my UV-light traps, the fungus was prompted to erupt. At first I thought that the moths had collected pollen grains from flower visitation.

In the accompanying photo, at the left is *L. umbrosa* from Pine Flat (7225'); on the right is *A. geminimacula* from Cherry Creek Canyon (6800'). *P. pulverulenta* was also taken in Cherry Creek Cyn., while infected *Apamea* were found at both sites.

Caterpillar hunting with a UV flashlight

David Moskowitz

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Caterpillar hunting is fun, challenging, and very addictive. Many species are highly cryptic using color, pattern, shape and posture, or a combination of these, to hide in plain sight. Daytime searches can lead to wonderful discoveries of difficult to find cryptic or camouflaged species but can be frustratingly time consuming or unproductive. Nighttime searches with an incandescent or LED flashlight can also illuminate caterpillars but are often as equally challenging as daytime searches. But UV light may level the playing field a bit. Last summer, after seeing incredible photographs of caterpillars taken under UV light posted by Ken Childs on the Caterpillar Identification of North America Facebook page and by Samuel Jaffe on The Caterpillar Lab Facebook page, I purchased a UV flashlight with 51 ultra-bright 395 nm ultraviolet LED lights. My attempts to find caterpillars with this flashlight were largely unproductive. I suspect it was because the light wasn't very bright and didn't cast the UV light very far or wide. I subsequently purchased a flashlight with 100 higher radiant intensity ultraviolet (InGan) LED lights (385nm-395nm) and the results were much better. This light was noticeably brighter and clearly spread the light over a wider area. I used this light in the late summer and fall and found numerous caterpillars (as well as cocoons, chrysalises, adult butterflies, and many other insects) with ease. The UV light either caused the caterpillars to fluoresce with fantastic bright coloration or highlighted white markings that were very evident against the background vegetation. Although highly unscientific, I did try comparing daytime searching with nighttime searches using the UV flashlight and the results were dramatically different. After finding numerous caterpillars at night with the UV flashlight, I searched the same areas during the day and did not find a single caterpillar. A few nights later, I revisited the same locations and searched with the UV flashlight, and once again had excellent success easily finding many caterpillars. These results suggest that using UV light to search for caterpillars (and possibly other life stages) may have great utility for surveys, particularly for difficult to find or highly cryptic species. Regardless of the survey potential, nighttime searches with a UV flashlight are certain to uncover a hidden world and lead to many sleepless nights hunting for caterpillars.

1. Spicebush Swallowtail (*Papilio troilus*), EB, Sept. 15, iPhone 6 images; 2. Common Buckeye pupa (*Junonia coenia*), Chatham, NJ, Oct. 4; 3. Silver-Spotted Skipper (*Epargyreus clarus*), EB, Sept. 24; Panasonic Lumix DMC-ZS40 for images 2 & 3. EB = East Brunswick, NJ. All images 2016.

4. Small-Eyed Sphinx (*Paonias myops*), EB, Oct. 2; 5. Streaked Sphinx (*Protambulyx strigilis*); Orlando, FL, Sept 27; 6. Blinded Sphinx (*Paonias excaecatus*), SB, Sept. 22; 7. Snowberry Clearwing moth (*Hemaris diffinis*), EB, Sept. 21; 8. Io moth (*Automeris io*), Monroe, NJ, Sept. 21; 9. Polyphemus moth (*Antheraea polyphemus*), SB, Sept. 15. All images with Panasonic Lumix DMC-ZS40 except iPhone 6 for image 6. EB/SB = East/South Brunswick, NJ. All images 2016.


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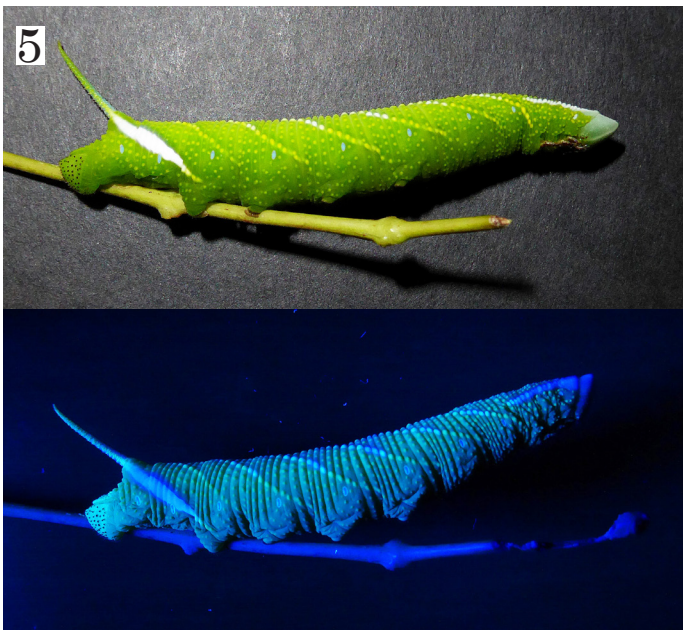
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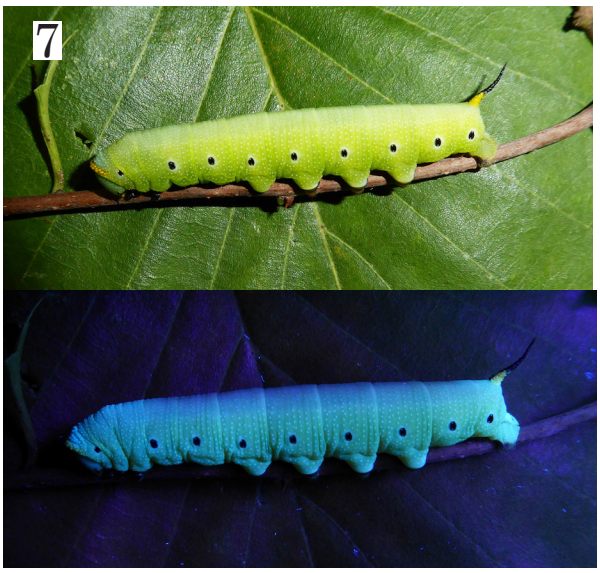
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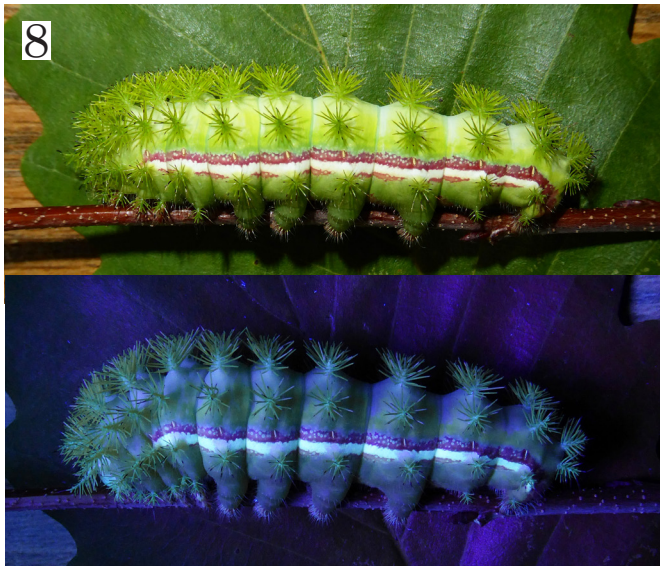
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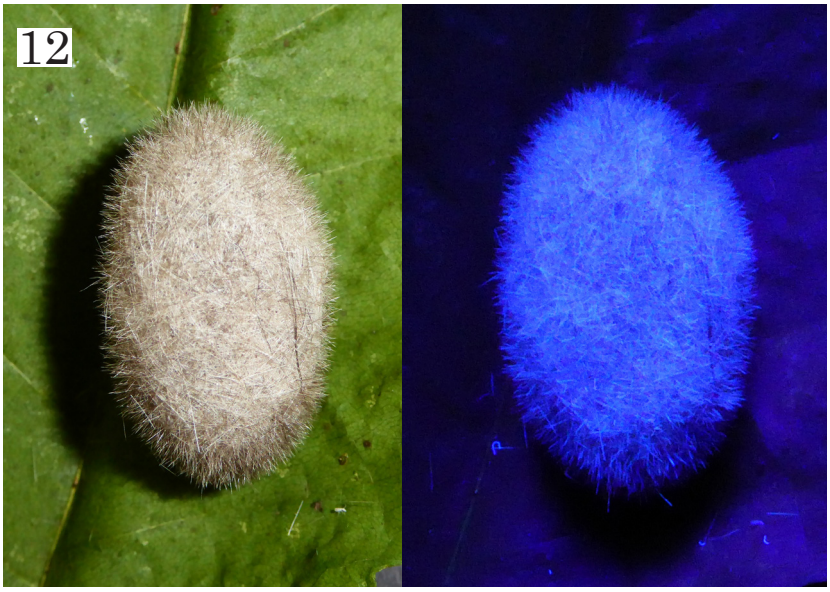

10. Yellow Bear Caterpillar (*Spilosoma virginica*), East Brunswick Butterfly Park, East Brunswick, NJ, Sept. 20; 11. Banded Tussock Moth (*Halysidota tessellaris*), Davidson's Mill Pond Park in South Brunswick, NJ, Sept. 16; 12. Hickory Tussock Moth cocoon (*Lophocampa caryae*), Nellysford, Virginia, Oct. 9; 13. Spiny Oak Slug (*Euclea delphinii*), caterpillar found by Scott McDonnell, Blairstown, NJ, Sept. 24; 14. Black Swallowtail pupae (*Papilio polyxenes*), caterpillars collected mid-Oct. to mid-Nov., East Brunswick Community Garden, East Brunswick, NJ (images 10./11./14. taken with iPhone 6; images 12./13. taken with Panasonic Lumix DMC-ZS40). All images 2016.

Metamorphosis

June at her 90th birthday party.

After a 10-year struggle with Parkinson's disease & dementia, **June Daus Preston** passed away peacefully on January 13, 2017 with family, friends and her beloved husband Floyd by her side.

June was born June 16, 1923 in Los Angeles to Paul Harold Daus and Daphne Fortney Daus of Los Angeles, California. While in high school and during the first two years of college, she served as a Girl Scout counselor. In September 1941, she entered UCLA, majoring in astronomy. While a sophomore and later as a junior, she published two papers on the orbit of the newly discovered ninth satellite of Jupiter. In April of 1943, while a sophomore at UCLA, she met her future husband, Floyd Preston. She transferred to Berkeley to complete her astronomy degree and upon graduating in June of 1945, she returned to Los Angeles where she married Floyd on July 8, 1945.

They honeymooned in Yosemite where she took up Floyd's butterfly collecting passion which became a joint avocation pursued together for the rest of their 71 year marriage.

Within a month of returning from their honeymoon, World War II ended and they moved to Ann Arbor, MI where Floyd pursued his Master's in Chemical Engineering. While at Ann Arbor, June worked in the lens design section of Argus Camera, on the soon to be produced C3 Model. They returned to southern CA where Floyd worked at Standard Oil of CA as a research engineer. Their first child, Carl Bruce Preston, was born in Whittier in 1949. In January 1951, the family moved to State College, Pennsylvania where Floyd started on his doctorate in petroleum and natural gas. Their second child, Harold Wayne Preston, was born there in 1951. The family moved to Lawrence, KS in 1955 where Floyd had accepted a position as assistant professor of petroleum engineering. That year, their third son, Donald Floyd Preston was born. In 1958, their fourth son, Steven Dean Preston, was born. Shortly after Floyd was appointed associate professor of petroleum engineering, the family moved to Caracas, Venezuela in 1959 where Floyd had accepted a two-year appointment as an adviser to the Venezuelan Oil Ministry. While in Caracas, June served as a cub scout den mother and later back in Lawrence. The family's return to the United States in January of 1961 turned out to be the adventure of their lives as they were taken hostage for two weeks by Portuguese Nationalists when the cruise ship the family was on, the Santa Maria, was hijacked. Fortunately, for the Preston family, the adventure ended safely in Recife, Brazil.

Once back in Lawrence, their lives quickly returned to normal. June became active in Plymouth Women at Plymouth Congregational church as well as the local chapter of the social sorority, Beta Sigma Phi. She joined the Green Thumb Garden Club of which she was still a member, though inactive, at the time of her death. In 1981, Floyd accepted a Fulbright Senior Lectureship in petroleum engineering at the University of the West Indies in Trinidad, and they moved to Trinidad for the year. Upon their return to Lawrence in 1982, June was appointed Editor of "NEWS of the Lepidopterists' Society" where she served for nine years. Her outstanding service and leadership for the Lepidopterists' Society earned her the John A. Comstock award. The Preston family was honored by a butterfly recently named for them, "Anthocharis julia prestonorum" commonly known as the Western Colorado Orangetip. While Floyd was teaching, their summers were taken up with family travel including searching for butterflies to add to their growing collection. Upon Floyd's retirement in 1991, they travelled extensively throughout the United States, including Alaska and Canada. They also made short trips to Mexico, Ecuador, Brazil and Spain.

At the honeymoon start, there were 400 specimens in the collection; 4,000 by the time Floyd retired in 1991. The collection was nearly 100,000 at the time of donation to the McGuire Center for Lepidoptera and Biodiversity at the University of FL in Gainesville in 2010. McGuire Center representatives said, "The Lepidopera collection assembled by June & Floyd Preston is without doubt one of the most significant collections of North America species ever assembled. It not only represents two lifetimes of passionate pursuit of North America butterflies, but it represents the best possible example of a thorough and well organized collection. And its incredible organization is a large part of why it is so important to the scientific community. They should be extraordinarily proud of their incalculable contributions to the science of Lepidopterology."

In 2007, June was diagnosed with Parkinson's disease. Their last year of travel was 2008.

June is survived by her husband, Floyd W. Preston; 4 sons, Bruce Preston (Linda), Fort Collins, CO, Harold Preston (Kathy) Carrolton, TX, Donald Preston (Bobbie Chapman) Kenmore, WA, Steven Preston (Sonia) Port Orchard, WA; 6 grandchildren; and 8 great grandchildren. June was preceded in death by her parents and sister, Lorel Lu.

In lieu of flowers memorials may be made in her name to Parkinson's Disease Foundation (Albert Lea, MN) or Racial Justice Fund at Plymouth Congregational Church and may be sent in care of Warren-McElwain Mortuary. Online condolences may be posted at **warrenmcelwain.com**. *[Submitted by Floyd W. Preston]*

Formative Experiences:

Mike Toliver

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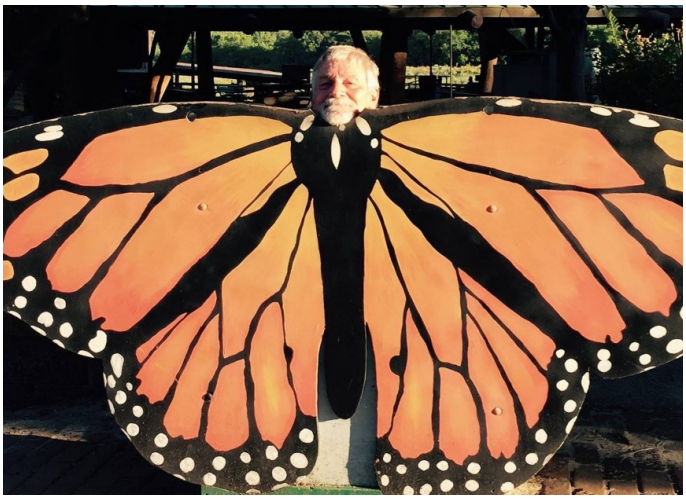

I started collecting butterflies in 1956, at the age of 6, when I saw a puddle club of *Papilio multicaudata* at the street corner near my house in Albuquerque, New Mexico. I hopped off my bike and caught one with my fingers (I still have it) and it was off to the races. My parents encouraged me in this passion in many ways, but especially in helping me make contact with experienced Lepidopterists. The first of these was F. Martin Brown. My great-aunt Nellie worked for the printing company that was printing *Colorado Butterflies* and she would send me offprints of each section as it was published. I wrote to "Brownie" and soon we made a trip to Colorado Springs to meet him (Mike Fisher was there as well, beginning a friendship that persists to this day). Brownie encouraged me to join the Lepidopterists' Society, so at the age of 13 (1963) I joined, and I can safely say my life was dramatically changed by that simple act.

I was one of only 3 Lepidopterists in New Mexico at the time, and the Membership Directory served as an arrow directing visiting lepidopterists to make contact with me, including Kilian Roever, John Hessel and Dick Holland. Dick moved to New Mexico in 1964 and together we explored many remote areas of the state. I also connected with Kent Wilson, who lived in Santa Fe at the time, and he and I hiked across the Sangre de Christos re-discovering *Colias scudderii ruckesi*.

As I became more professional in my collecting (helped immensely by Don Eff, among others), my contacts grew. I carried on a lively correspondence with other great Lepidopterists including Harry Clench and Alexander Klots. Through these mentors, I decided that a life studying butterflies was for me.

However, by the time I graduated high school in 1967, I was so sick of school that the last thing I wanted to do was go to college. Instead, I joined the U.S. Marine Corps and went off to Viet Nam. My first scientific paper was published in the *Journal* while I was in Viet Nam (Kilian Roever and Brownie helped me a great deal by reviewing it before it was sent off). Harry Clench encouraged me to collect as much as I could in Viet Nam, but I was fairly tentative in this endeavor at least in part because being in a Marine infantry battalion in a war zone is not the safest place to be waving a buttefly net! However, my fellow Marines found out about my passion and would come to me with helmets full of butterflies they had caught with their hands. Most of those butterflies now reside in the British Museum or the Illinois Natural History Survey.

After I got back, I was now convinced that a career in the Marine Corps was not for me (sorry, Stan Nicolay!) and that college was a better alternative. I went to the University of New Mexico after my release from active duty, in January of 1970. There I met Dr. Clifford Crawford, the resident entomologist. Dr. Crawford and the other biology faculty were instrumental in shaping my scientific growth. Dr. Crawford also introduced me to Dr. Dan Jennings, an entomologist with the U.S. Forest Service and soon I had a job as Dan's assistant. We traveled all over Arizona and New Mexico, studying various forest pests. Dan worked closely with Dr. Bill Miller at the University of Minnesota because of their shared interest in those little tiny moths us butterfly folk call "micros".

I applied to a number of graduate schools before I graduated from UNM, and the University of Wisconsin and the University of Illinois offered me assistantships. Illinois beat out Wisconsin, so in August of 1973 I found myself in Champaign-Urbana. My thesis adviser there was Dr. James Sternberg, helped by Dr. Gilbert Waldbauer. Under their guidance, I tested the effect of generalist bird predators on the survival of mimetic butterflies and moths. One of the most important figures in my graduate experience was Dr. W. R. Horsfall – a world expert in mosquitoes who could safely be called "a curmudgeon". Other graduate students feared his courses, because he didn't soften his criticisms and he demanded the best from his students – no excuses. He'd been a captain in the U.S. Army in WWII and with his entomological knowledge was able to bring new malaria cases in his unit in the South Pacific down to a trickle. I suppose because of my military experience, he and I connected in a way that other students did not. He went on to recommend me to the City of Urbana to head their St. Louis encephalitis prevention program in 1976.

In 1977, I hobbled into the entomology office on crutches (bum knee) and noticed a really cute girl working as a new secretary. "Hmmm" I thought, "she seems really nice". And she was – eventually we cemented our relationship and have been happily married for over 36 years. Peg (that really cute girl) has been working at layout editor for the *Journal* for the last 10 years. Whoever thought studying butterflies was a good way to meet your life partner?

After my graduation with my Ph.D. in entomology in 1979, I taught a course in insect ecology at the University of Illinois, with the help of one of my graduate student friends, Art Weis. Then the jobs dried up. I'd envisioned myself working at a major museum as their "butterfly guy", but those jobs sadly were not available. So, I worked at the Illinois Natural History Survey as a curatorial assistant under Dr. George Godfrey and John Bouseman. That money dried up, so off I went to kill mosquitoes in Macon County, Illinois. In the meantime, my friend Art Weis was teaching at Eureka College. He got a fellowship to study goldenrod gall flies at Bucknell University, so he called me up and said "Mike, I think you'd like teaching at Eureka". Frankly, teaching was the farthest thing from my mind, but anything seemed better than killing mosquitoes. I applied, and the rest – as they say – is history. I had a long teaching career at Eureka College (35 years) and both Peg and our daughter got their undergraduate education (free!) at the college. Although I only taught entomology once at Eureka College, I used what I had learned as a Lepidopterist in my teaching in almost all of my biology courses. Some of the work my students and I did formed the basis for papers I presented (with those students as co-authors) at various annual meetings of our Society. Peg and I developed a web site in the early days of the internet dealing with the natural history of Lake Eureka (http://ww1.eureka.edu/emp/toliver/Natural%20History/index.html), which included information on 55 species of butterflies we've observed over the years.

None of this would have happened (well, the Marine Corps probably would have) if not for my joining this Society in 1963. That simple act changed my life dramatically for the better. I cannot thank enough the Society and all those folks in it who have served as my mentors and friends. Any of you reading this who are not members, please consider what joining this Society can do. It's one of the smartest things I ever did.

Another confused hairstreak pair.

Female Juniper Hairstreak (*Callophrys g. sweadneri*) mating with a male Oak Hairstreak (*Satyrium favonius favonius*).

In Volume 58, Number 3 page 137, Steven Glynn had provided a picture of a Female Juniper Hairstreak (*Callophrys g. gryneus*) mating with a male Coral Hairstreak (*Satyrium titus*) July 11th. This reminded me of a different but not un-similar pairing I came across near Brooksville, Hernando County, Florida this spring, (April 17, 2016) as well. My wife and I had made the trip to Brooksville because of the early spring hairstreaks there that come to large flowering "sparkleberry" (*Vaccinium arboretum*) shrubs. Its not uncommon for the spectacularly marked Florida hairstreak species to come down from taller trees to nectar, like Banded (*S. c. calanus*), Striped (*S. l. floridensis*), Oak (*S. f. favonius*), White-M (*Parrhasius m-album*) and others too like Juniper, Red-banded, and Gray for instance. At this time I was walking down a two-track dirt lane through fairly old-growth trees in Withlacoochee State Forest just north of town. There were *J. silicola* (Southern Red Cedar) along the road, the known host for *C.g. sweadneri* as well as all other manner of large oaks. Perhaps a half mile along the road there was a very busy patch of sparkleberry, and I noticed the paired couple about four feet off the ground. Both butterflies are quite the sight!

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True versus apparent rarity -- Wagner and Adams

Continued from p. 25

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Wagner, D. L. and B. L. Gagliardi. 2015. Hairstreaks (and other insects) feeding at galls, honeydew, extrafloral nectaries, sugar bait, cars, and other routine substrates. American Entomologist 61: 160-167.

Revisiting the lectotype of *Lycaena melissa* (Lycaenidae), with additional remarks

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Scott et al. (2016) attempted to designate a replacement lectotype for the nominal taxon *Lycaena melissa* W. H. Edwards, 1873, which they named using its current combination, *Plebejus melissa*. Not only does their article contain inaccurate and misleading information, I respectfully disagree with their historical and technical analysis. This topic has probably received more attention than it deserves, but I would like to offer some much-needed clarification. Warning to readers: this is a lengthy and tedious discussion. It may cause intense drowsiness.

In summary, *Lycaena melissa* (Melissa blue butterfly) was described by Edwards (1873) from "many specimens taken in Colorado by Mr. Mead, in the summer of 1871." Although William H. Edwards also possessed specimens from Nevada and Arizona, it is implied that his description was based solely upon those collected by Theodore L. Mead in Colorado. Scott et al. (2016) argued that the lectotype of *L. melissa* designated by Brown (1970) is invalid because it does not represent the nominotypical subspecies, *Plebejus m. melissa*. Rather, they identify it as *P. m. pseudosamuelis*, which was originally described by Nabokov (1949) as *Lycaeides melissa pseudosamuelis*. According to Scott (2006) and Scott et al. (2016), this is easily resolved by accepting a specimen of *P. m. melissa*, figured as a "type" by Holland (1931, Pl. 66, fig. 17), as an earlier lectotype. Holland's lectotype would therefore supersede that of Brown. I previously disagreed with this idea because of Holland's irregular recognition of type material and his lack of intent to single out unique, name-bearing types (Calhoun 2015a). In response, Scott et al. (2016) "intentionally and deliberately" designated the same specimen figured by Holland (1931) as the lectotype of *L. melissa*. This redundant designation is intended to safeguard the lectotype status of this specimen, even if Holland's (1931) alleged designation is rejected. In association with this specimen, Scott et al. (2016) also "intentionally and deliberately" proposed a type locality of "Denver, Colorado" to replace "Tinytown" (=Tiny Town), Jefferson Co., Colorado, which Scott (2006) previously suggested.

For the reasons given below, I maintain that only the lectotype designated by Brown (1970) is valid per the International Code of Zoological Nomenclature (ICZN 1999). Although adherence to the Code is not mandatory, zoologists voluntarily apply its quasi-legal rules to avoid the chaos that would result if the naming of animals were unregulated (ICZN 2016). The provisions of the Code are carefully designed to foster a consensus in name usage and promote nomenclatural stability.

Lectotype of Brown (1970). Simply stated, a type specimen links an organism to a name. In the absence of a holotype, a lectotype is selected from among existing syntypes, which constitute the series of specimens that were consulted by the original author to describe a new species or subspecies. Once designated, the lectotype is held as the objective standard of reference for that named species or subspecies. Scott et al. (2016) concluded that the lectotype of *L. melissa* designated by Brown (1970) is invalid because "it obviously does not belong to the *melissa* taxon clearly described in the original publication." They consider this lectotype (Fig. 1a) to represent the subspecies *P. m. pseudosamuelis*, rather than *P. m. melissa*. However, this kind of problem does not automatically invalidate a lectotype, and there is an established protocol to manage such discrepancies.

First, it is important to understand why F. Martin Brown chose one particular syntype over all others to serve as lectotype. The ICZN Code in force when Brown designated this lectotype in 1970 included Recommendation 74A, which advised that when designating a lectotype "a zoologist should in general act consistently with, and in any event should give great weight to, previous valid restrictions of the taxonomic species, in order to preserve stability of nomenclature" (ICZN 1964). With minor alteration, this recommendation is still part of the Code (ICZN 1999). As demonstrated by Calhoun (2015a), Brown attempted to remain consistent with the previous restriction of this taxonomic species as established two decades earlier by Nabokov (1949), who considered "typical" *melissa* to be a high-elevation taxon. Ironically, Nabokov's opinion was influenced by the earlier studies of Mead's travels by Brown (1934).

In 1968, Brown searched for a suitable lectotype of *L. melissa* among syntypes that originated from the collections of Edwards and Mead, which are deposited at the Carnegie Museum of Natural History (CMNH). Brown (1970) noted that those syntypes included "both true *melissa* from high altitudes and the better known atypical form from lower elevations in Colorado." Assisted by the lycaenid expert Harry K. Clench, Brown ultimately selected a male specimen from a locality mentioned by Mead ([1876]): the vicinity of Twin Lakes, Lake County, Colorado. This is the only high-elevation locality definitely represented among Mead's specimens at CMNH. The specimen is dated "7-11" in Mead's handwriting (Calhoun 2015b). Brown (1955) previously concluded that on 11 July 1871 Mead was at Twin Lakes, where he possibly

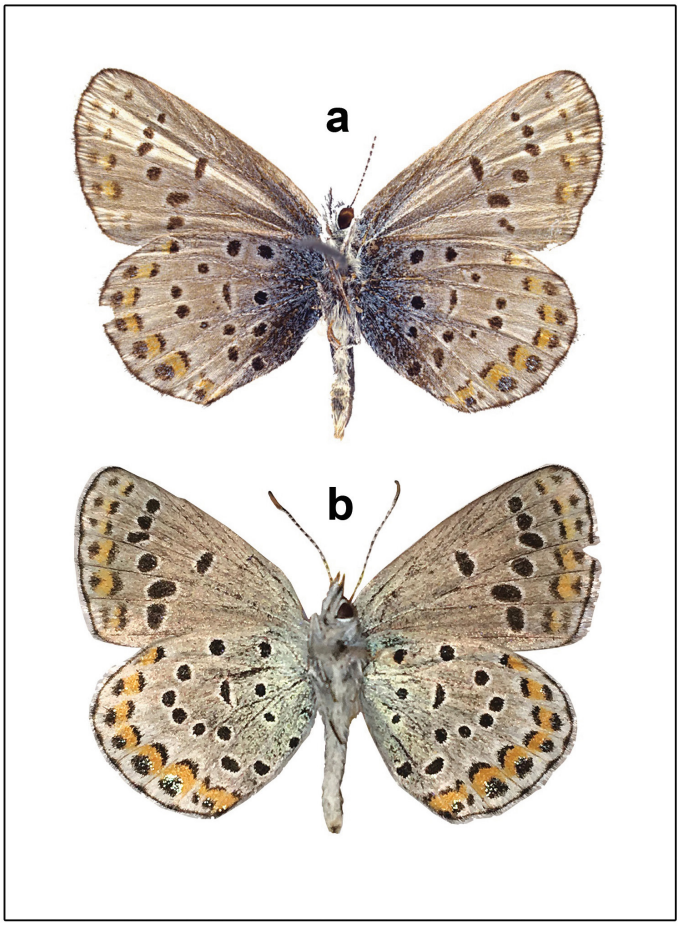

Fig. 1. Specimens of *P. melissa* (ventral) from Twin Lakes, Lake Co., CO. a) Lectotype male of *Lycaena melissa* designated by Brown (1970), 11.vii.1871, leg. T. L. Mead (CMNH). b) Topotype male, 5.vii.2016, leg. J. V. Calhoun.

ascended La Plata Peak. This explains why Brown (1970) suggested that the lectotype was "possibly taken on La Plata Peak, one of the massifs flanking the valley leading to Independence Pass from Twin Lakes." As it turns out, La Plata Peak is located only a few miles south of the type locality of *L. m. pseudosamuelis*.

Scott et al. (2016) suggested that Brown, possibly driven by "competitive or negative feelings" towards Nabokov, intentionally selected a lectotype of *L. melissa* to synonymize Nabokov's *pseudosamuelis*. It is obvious, however, that Brown simply recalled his prior research on Mead when he attempted to determine where the specimen had been collected. Brown evidently realized the problem this created when preparing the entry on *L. melissa* for Miller and Brown (1981), which treated *pseudosamuelis* as a junior subjective synonym of the nominotypical subspecies. By that time, Brown was convinced that Mead had collected the lectotype somewhere on La Plata Peak. We now know that Mead never collected butterflies on La Plata Peak, nor did he travel that far west of Twin Lakes (Calhoun 2015a). Based on Mead's personal journal, I clarified the type locality of *L. melissa* as "Twin Lakes, along the eastern side of Lower Twin Lake (the eastern lake), Lake County, Colorado" (Calhoun 2015a). On 5 July 2016, I collected *P. melissa* along the shore of Lower Twin Lake, in the same general area where Mead captured the male lectotype on 11 July 1871. The lectotype is considerably rubbed and dull, but it agrees with the phenotype of *P. melissa* that occurs at Twin Lakes (Fig. 1b).

Scott et al. (2016) claimed that "Brown himself in Miller & Brown (1983) rejected his own lectotype by restoring *pseudosamuelis* as a valid subspecies." This is not possible based on the chronology of the manuscript for Miller and Brown (1983). Ferris (1989) confirmed that, due to publication delays, the list by Miller and Brown (1983) actually represents an *earlier* edition of the text for Miller and Brown (1981). The checklist by Hodges (1983), which incorporated the butterfly section by Miller and Brown (1983), was based on "the state of published and unpublished knowledge available to the authors to the end of 1978." Brown therefore made the decision to synonymize *pseudosamuelis* sometime between 1978 and 1981. This contradicts the allegation by Scott et al. (2016) that Brown intentionally synonymized *pseudosamuelis*, given that he continued to treat it as a separate subspecies for at least eight years after designating the lectotype of *L. melissa*.

I am unaware of any comparative studies between the Twin Lakes population of *P. melissa* and those attributed to *P. m. pseudosamuelis*. Scott (2006) merely speculated on the phenotype found at Twin Lakes, suspecting that it is "mostly like low-altitude *melissa*" (which does not appear to be true). Even the status of *pseudosamuelis* is very poorly understood (Scott 2006, 2008a; Scott et al. 2016). Nonetheless, if Scott et al. believe that the lectotype of *L. melissa* represents *P. m. pseudosamuelis*, they should submit supporting evidence to the International Commission on Zoological Nomenclature and follow the procedure given in Article 75.6 of the Code: "When an author discovers that the existing name-bearing type of a nominal species-group taxon is not in taxonomic accord with the prevailing usage of names and stability or universality is threatened thereby, he or she should maintain prevailing usage [Art. 82] and request the Commission to set aside under its plenary power [Art. 81] the existing name-bearing type and designate a neotype" (ICZN 1999). As part of this process, Scott et al. would propose a specimen to serve as the neotype of *L. melissa*. If, after a public comment period, the ICZN ultimately rules in favor of this case, then the neotype would replace Brown's lectotype as the primary type of *L. melissa*. The name *L. m. pseudosamuelis* would also be conserved, as it is threatened by the older name *L. melissa*. This process preserves the status quo in name usage, while offering the means to correct a perceived discrepancy in compliance with the Code.

Holland (1931). Brown's (1970) lectotype of *L. melissa* remained uncontested for nearly 40 years. On the advice

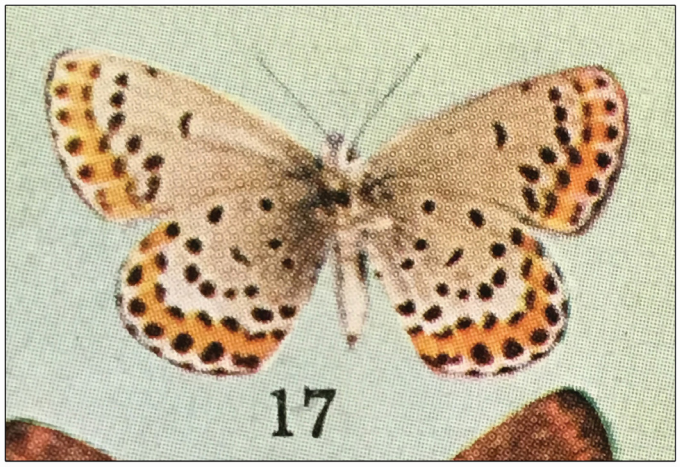

Fig. 2. Invalid lectotype of *Lycaena melissa* (ventral) as figured by Holland (1931, Pl. 66, fig. 17).

of N. G. Kondla, Scott (2006) argued that Holland's (1931) identification of a female *melissa* on Plate 66 (Fig. 2) as a "type" represents a valid lectotype designation, thereby invalidating Brown's subsequent lectotype. This claim was reiterated by Scott et al. (2016). Although this would provide a convenient means to avoid petitioning the ICZN to set aside Brown's lectotype, an author's casual identification of a specimen as "type," without clarification, is not a valid lectotype designation.

Article 74.5 of the Code specifies that "In a lectotype designation made before 2000, either the term 'lectotype', or an exact translation or equivalent expression (e.g. 'the type'), must have been used or the author must have unambiguously selected a particular syntype to act as the unique name-bearing type of the taxon." The strict interpretation of this provision requires that Holland (1931) must have identified the female *melissa* on Plate 66 as "the type" to reflect his recognition of that specimen as the unique type. Instead, he vaguely identified it as "type" without explanation. The use of the expression "type" does not, in and of itself, demonstrate that an author considered a given specimen to represent a unique, name-bearing type. This is addressed by Article 72.4.7 of the Code: "The mere citation of 'Type' or equivalent expression, in a published work other than that in which the nominal species-group taxon is established . . . is not necessarily evidence that a specimen is or is fixed as any of the kinds of types referred to in this Chapter." For lectotype designations prior to 2000, simply figuring a specimen with a "type" caption is not enough (Welter-Schultes 2013). Scott et al. (2016) remarked that I "complained several times" in Calhoun (2015a) about Holland's lack of intent to designate a unique name-bearing type of *L. melissa*. I would not say that I complained, but the idea is basically correct.

Evidence of intent is an important factor to consider when assessing potential lectotype designations. This is contrary to Scott et al. (2016), who insisted that an author's intent "cannot be used to decide old lectotypes, because it is not operational; we cannot read people's minds." First of all, this is counterintuitive to their underlying premise that Holland (1931) "singled out" the specimen of *melissa* on Plate 66, as this would require a conscious act on the part of Holland. Second, an author's intent is the very essence of Article 74.5 of the Code. This is clearly demonstrated by the phrase "unambiguously selected" within this provision. By definition, selection represents an intentional act. Even the term "designation" connotes an intentional act as defined in the glossary of the Code: "The nomenclatural act of an author or the Commission in fixing, by an express statement, the name-bearing type of a newly or previously established nominal genus, subgenus, species, or subspecies." At its most basic, a lectotypification represents a nomenclatural act, with the word "act" signifying a deliberate action or deed. The unambiguous act of an author to segregate a particular specimen distinguishes a lectotype designation from a mere citation. In this sense, even an author's use of the phrase "the type" may not be adequate. In the opinion of Francisco Welter-Schultes (a Commissioner of the ICZN), an author could have used the term "'the type," but "must unambiguously have made clear that one of several syntypes was selected to act as the unique name-bearing type" (Welter-Schultes 2013). Quoting a former commissioner of the ICZN, Braby et al (2011) observed that Article 74.5 of the Code may be interpreted to mean that old lectotype designations must be "intentional, unambiguous and based on a single or unique type specimen." Grieshuber and Worthy (2006) said it best: "[I]f the intentions of the author are ignored in such cases, a huge amount of inadvertent and questionable lectotype designations would be created; this cannot be in the interest of stability as the Zoological Code demands."

At this point, some remarks about Holland's *The Butterfly Book* are in order. All 48 plates of the first edition of this book (Holland 1898) were reproduced in the revised edition (Holland 1931), which also included 29 additional plates. Whereas the photographic images for Plates 1-48 are the same, the legends and printed numbers differ to varying degrees. Scott et al. (2016) asserted that Holland did not identify many specimens as "type" on the first 48 plates in the revised edition because "he did not figure many types in the 1898 book." Actually, a large number of purported types were figured on these plates.

Holland (1898) mentioned his reliance on types in the first edition of his book: "So far as possible I have employed, in making the illustrations, the original types from which the author of the species drew his descriptions." He resolved to "illustrate the book profusely, using so far as possible the types or identical specimens on which Edwards and others had founded their descriptions" (Holland 1915a). Despite his use of supposed types for illustrations, Holland cited only 19 in the text of the first edition. Just one of these specimens was identified as "type" on the plates (Pl. 30, fig. 19), though it is not really a type (Brown 1970). Another specimen, figured as a type on the same plate (Pl. 30, fig. 33), is not identified as such in the text. Holland's failure to

identify types in the first edition of his book prompted criticism from reviewers: "The scientific value of the illustrations would have been enhanced if the species figured from the original types had been indicated" (Anonymous 1899).

Perhaps in response to critics, Holland reported in the text of the revised edition of *The Butterfly Book* that no fewer than 160 types were figured on these same 48 plates, yet he identified only seven specimens as types on the plates themselves. Without explanation, one of the two specimens identified as a type on Plate 30 in the first edition was not so marked on this plate in the revised edition. Although nine other figures in the revised edition are identified with "type" captions on these plates, they lack corresponding references in the text. In addition, four other specimens that were figured on the first 48 plates of Holland (1931) are not identified as types, even though they were previously recognized as types in Holland's *The Butterfly Guide* (Holland 1915b). Holland's disproportionate recognition of types on the first 48 plates in the revised edition of *The Butterfly Book* is obvious when we compare the number of type references in the text to the number of figures identified as types on the 77 plates. Only four percent are marked on Plates 1-48, versus nearly 80 percent on Plates 49-77. Perhaps this was an oversight on Holland's part, or it was a publisher's mistake which was too costly to rectify.

Regardless of the reason, there is no implied significance in the fact that two so-called types of *L. melissa* on Plate 31 of Holland (1931) lack type captions, while the female on Plate 66 is marked "type." In the text, Holland referred to all three of these figured specimens as "types." Like other supposed type specimens that were not marked as "type" on the first 48 plates, he offered no justification for this discrepancy. Incidentally, Scott et al. (2016) distorted my previous comments when accusing me of making the claim that Holland (1931) "just did not go back and redo the legends of the original plates 1-48." I actually wrote, "In only a few instances did he go back and add 'type' captions to the original 48 plates" (Calhoun 2015a).

Holland's purpose for figuring types was straightforward. He did so in an effort to preserve a record of their existence, by having them "accurately figured, put upon the printed page, sent forth in editions so large that in future ages the record will be preserved, somewhere at least, in the libraries of the world" (Holland 1929). For the revised edition of *The Butterfly Book*, he explained that his intention was to "give figures of the types, or typical specimens, of all the species, which have been described or found to occur in Boreal America, many of which were not included in the earlier imprints of the book" (Holland 1930). It was not his goal to single out unique types. As a matter of fact, Holland (1929, 1930) criticized the unnecessary fixation of types by other authors, making it unlikely that he would have done so without explanation. Moreover, his definition of "type" was very broad, resulting in modern confusion over his usage. Scott (2008b) recognized 75 lectotype "designations" in Holland's books, while Pelham (2008) acknowledged 51, including that for *L. melissa*. After carefully reconsidering the Code, Pelham (2016) now accepts only two designations by Holland, both for taxa described by Holland himself. As for *L. melissa*, Pelham (2016) recognizes the lectotype of Brown (1970).

Lectotype of Scott et al. (2016). If Scott et al. (2016) were confident that Holland (1931) had previously designated a valid lectotype, then I fail to understand the need for this redundant designation. Nevertheless, they justified their selection of lectotype by citing Brown (1970), who, they claim, had recognized this specimen as a syntype of *L. melissa*. Although Brown (1970) initially stated that all but one of the three specimens figured as *L. melissa* in Holland (1931) "are based on syntypes" (one is misidentified), he cautiously referred to the female depicted on Plate 66 as "presumably syntypical" without elaboration. This is the specimen that Scott et al. (2016) re-designated as the lectotype following the alleged designation of the same specimen by Holland (1931). Obviously, Brown could not firmly establish that this specimen was a syntype. From the collection of W. H. Edwards, it is undated and simply labeled "*Melissa* ♀ / Col^{o}" [Colorado] in Edwards' hand (Brown 1970). The label does not include a "type" inscription, nor does it mention Mead's name or the year "71" like many other specimens from Edwards' collection that originated from Mead's 1871 expedition (Calhoun 2015b). Edwards sold or exchanged most of Mead's material in his possession prior to selling his collection to W. J. Holland (Calhoun 2015a). Edwards could have received this specimen from another correspondent between February 1873 (when he drafted his description of *L. melissa*) and February 1886 (when he sent his Lycaenidae to Holland). Also, Edwards personally collected butterflies in Colorado from late June to mid-August 1894, mostly around Glenwood Springs, Garfield County. His correspondence reveals that he sent additional specimens to Holland during the late 1890s. Having copied and studied Edwards' correspondence during the 1960s, Brown was acutely aware of these facts. *Plebejus melissa* is common and widely distributed in Colorado, increasing the chances that this specimen was collected by someone other than Mead. Of course, the provenance of this specimen is less important given Brown's (1970) valid lectotype, which supersedes that of Scott et al. (2016).

If Scott et al. ultimately request that the ICZN set aside the lectotype of Brown and designate a neotype, I urge them to abandon the specimen figured by Holland (1931) in favor of a specimen from Mead's collection. The most suitable choice is a male at CMNH, which was listed as a syntype by Brown (1970, pg. 374, no. 4a). It is the only specimen from the collections of Edwards or Mead that can be attributed to Denver, Colorado, with any certainty. Although missing antennae, it is otherwise in very good

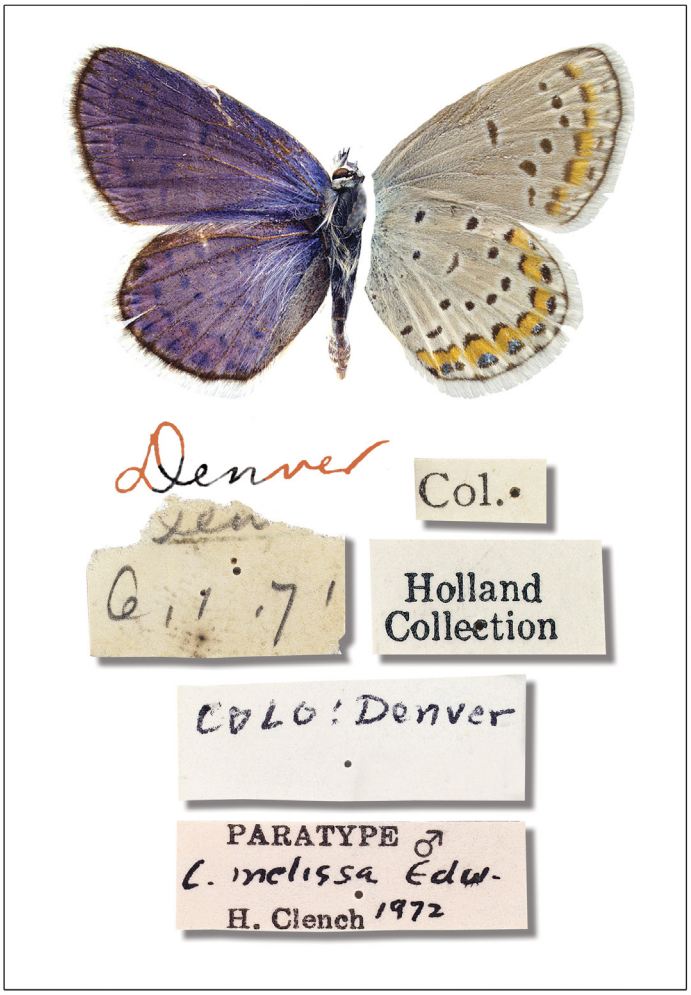

Fig. 3. Male *Plebejus melissa*, dorsal (left) and ventral, collected by T. L. Mead, with its labels and dated clipping from Mead's field envelope (CMNH); 1.vi.1871, Denver, Denver Co., CO. An example of Mead's handwritten "Denver" is shown above the clipping (portion missing from the clipping is shown in orange).

condition (Fig. 3). The specimen bears a small clipping from Mead's field envelope, dated "6.1.71" in his hand. On 1 June 1871 Mead collected butterflies along the South Platte River in Denver (Calhoun 2015a). At the top of the clipping is what appears to be a fragment of Mead's notation "Denver," where only a portion of his looping upper case "D" and lower case "en" are present (Fig. 3). Included among the four labels affixed to this specimen are "COLO: Denver" in the hand of F. M. Brown, and a "paratype" label prepared by H. K. Clench in 1972. The small label reading "Collection / T. L. Mead" mentioned by Brown (1970) is missing.

Additional remarks. In an effort to invalidate Brown's lectotype of *L. melissa*, with the idea that he intentionally selected a specimen of the wrong taxon, Scott et al. (2016) stated that the Code "requires that a lectotype be designated from syntypes belonging to the taxon described in the original publication." As I have demonstrated, Brown selected a lectotype in an attempt to remain faithful to the contemporary restriction of the name *Lycaena melissa*. This specimen was identified by Mead as "*Lycaena* 1." The letters of W. H. Edwards, which Brown had thoroughly examined, reveal that Edwards considered Mead's specimens of "*Lycaena* 1" to represent *L. melissa* (Calhoun 2015a). The fact that Scott et al. (2016) now consider this specimen to represent a different taxon does not invalidate its status as the lectotype of *L. melissa*.

Scott et al. (2016) claimed that "the requirement to designate any kind of type in an original description only appeared in the ICZN Code in 1931." In truth, the requirement to designate a type to accompany the description of a species-level taxon did not appear until the current edition of the Code. Prior to that, the Code incorporated only recommendations to this effect. In the fourth edition of the Code (ICZN 1999) it became a requirement that descriptions after 1999 "must include the fixation of a holotype . . . or syntypes" (Article 72.3). As explained in the introduction to this edition, the principle of name-bearing types "was introduced into the rules for genus-group names with effect from 1931, and the obligation to explicitly fix name-bearing types for new species-group taxa is introduced only in the present edition."

Finally, Scott et al. (2016) mentioned that "the word lectotype only appeared in the Code in 1958-1960." The term lectotype was actually introduced into the Code in 1948 during the Thirteenth International Congress of Zoology (Hemming 1950a, dos Passos & Grey 1965). Although a revised Code was not published until 1961, it was understood that conclusions from the 1948 Congress were to be considered as though the revised Code "were already published and in force" (Hemming 1950b). Even so, the term lectotype was originally proposed decades earlier by Schuchert & Buckman (1905), and it was included in *The Entomological Code* by Banks & Caudell (1912). Numerous lectotypes were designated in zoological publications during the first half of the twentieth century, including many for Lepidoptera prior to 1950 (e.g. Klots 1942, dos Passos & Grey 1947).

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3. Color and B+W graphics should be good quality photos suitable for scanning or, as indicated above, preferably electronic files in TIFF or JPEG format at least 1200 x 1500 pixels for interior use, 1800 x 2100 for covers.

4. Typed copy, double-spaced suitable for scanning and optical character recognition. Original artwork/maps should be line drawings in pen and ink or good, clean photocopies. Color originals are preferred.

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Material for Vol. 59 and 60 must reach the Editor by the following dates:

	Issue	Date Due
59	2 Summer	May 12, 2017
	3 Fall	August 15, 2017
	4 Winter	Nov. 15, 2017
60	1 Spring	Feb. 15, 2018

Be aware that issues may ALREADY BE FULL by the deadlines, and so articles received by a deadline may have to go in a future issue.

Reports for Supplement S1, the Season Summary, must reach the respective Zone Coordinator (see most recent Season Summary for your Zone) by Dec. 15. See inside back cover (facing page) for Zone Coordinator information.

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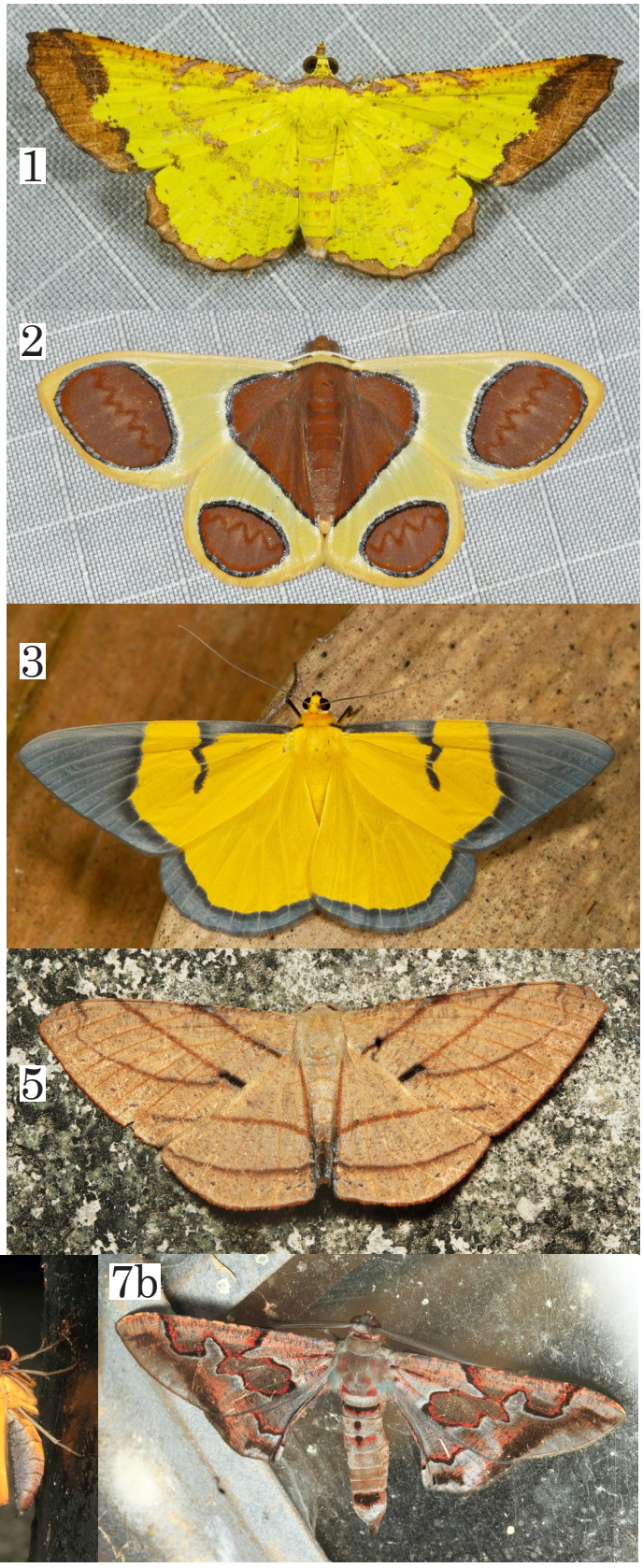
Hemileuca griffini is restricted to Blackbrush (*Coleogyne ramosissima*; in picture) scrub communities of southern Utah and northern Arizona. At the adult flight time in late August and early September, temperatures in the early to mid-afternoon when the moths are flying may be in the high 90's, and the grayish appearance of hillsides covered by leafless blackbrush gives the impression of habitat truly inhospitable to life. The moth can be common at this time, when most lepidopterists would ignore this habitat (Photo: James K. Adams, near Bitter Springs, Coconino Co., Arizona, early September; see related article on page 20)



Geometridae: 1. *Corymica latimarginata*; 2. *Plutodes malaysiana*; 3. *Celerena signata* 4. *Dalima subflavata*; 5. *Dalima patularia*; 6. *Ourapteryx picticaudata*; 7. *Hypochrosis binexata*: a. underside, b. upperside; (see related article, pg. 3). Larger threads on the sheets are 5 mm apart.