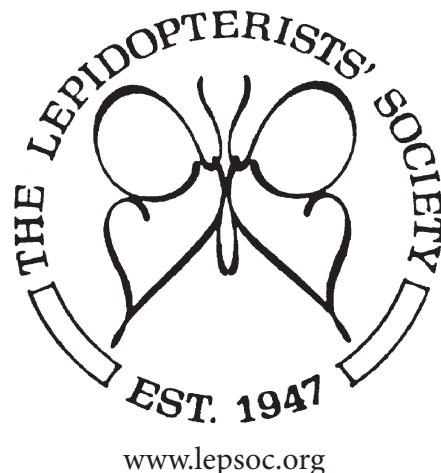

NEWS OF THE LEPIDOPTERISTS' SOCIETY

Volume 63, Number 4

Winter 2021



Inside:

***Remarkable endemism
of moths in White Sands
National Park***

***Life history of *Satyrium
polingi****

***Movements of *Euploea*
on Palawan Island***

***More European Common
Blues in the U.S.***

***Observations of juvenile
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***Butterflies of Southern
Thailand***

***Brazilian Lep paintings by
Paul-André Robert***

***2020-2021 megadrought
effects on AZ butterflies***

***Membership Updates,
Announcements, Market-
place . . . and more!***



NEWS OF THE LEPIDOPTERISTS' SOCIETY

Volume 63, Number 4
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The Lepidopterists' Society is a non-profit educational and scientific organization. The object of the Society, which was formed in May 1947 and formally constituted in December 1950, is "to promote internationally the science of lepidopterology in all its branches; to further the scientifically sound and progressive study of Lepidoptera, to issue periodicals and other publications on Lepidoptera; to facilitate the exchange of specimens and ideas by both the professional worker and the amateur in the field; to compile and distribute information to other organizations and individuals for purposes of education and conservation and appreciation of Lepidoptera; and to secure cooperation in all measures" directed towards these aims. (Article II, Constitution of The Lepidopterists' Society.)

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.

Periodicals Postage paid at San Francisco, CA and at an additional mailing office (Lawrence, KS).

POSTMASTER: Please send address changes to **News of The Lepidopterists' Society**, c/o Chris Grinter, The California Academy of Sciences, 55 Music Concourse Drive, San Francisco, CA 94118.

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ISSN 0091-1348

Editor: James K. Adams

Front Cover:

Two-tailed swallowtail (*Papilio multicaudata*), Arizona's State Butterfly, is usually well represented on Arizona butterfly counts. It was a no show on the Patagonia Butterfly Count this year—presumably a victim of the 2020-2021 megadrought. See article on page 202. Photo: Doug Danforth.

Follow up sightings of *Polyommatus icarus* in the United States

Bryan Pfeiffer

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As predicted in an article describing the first known records of *Polyommatus icarus* in the United States (Barrington and Pfeiffer 2021), this lycaenid also turned up for the first time in New York State in September of 2021.

On 4 September 2021, my colleague Josh Lincoln and I visited four roadside sites around Rouse's Point and Champlain, New York, each with *Lotus corniculatus* (Birdsfoot Trefoil) and other potential host and nectar plants in bloom. We easily found and photographed *P. icarus* flying in good numbers at three of the sites. At each site, *P. icarus* showed strong fidelity to *L. corniculatus* for ovipositioning and nectaring (although it nectared on other plants as well).

Judging by the relative abundance of *P. icarus* during this expedition, it appears that this multi-voltine butterfly had established itself in New York prior to 2021. These sightings in all likelihood represent an extension of the population resulting from the introduction of *P. icarus* near Montreal. We also located a new site in northwestern Vermont, where the first U.S. record of *P. icarus* was recorded on 5 September 2020.

Although it is not native to North America, this blue is photogenic and good company in weedy roadsides as other flying leps begin to wane in early September. My three images here came from a roadside ditch located at 44.9916, -73.4130. An extremely convenient site for observation of *P. icarus* in New York would also be among the *Lotus*

corniculatus at an abandoned shopping mall (44.9839, -73.4619) off Interstate 87 west of the village of Champlain.

Reference

Barrington, D. and B. Pfeiffer. 2021. *Polyommatus icarus* (European Common Blue) expands into the United States. *News of the Lepidopterists' Society*. Vol. 63(3): 108-109

Correction: The proper name of the airport near Montreal where *P. icarus* was first discovered in 2005 is Montréal-Mirabel International Airport (Aérocité Internationale de Mirabel) (YMX). It was incorrectly identified in the fall 2021 issue of *News of The Lepidopterists' Society* 63(3).



Polyommatus icarus, underside (for location, see text).

Top: *Polyommatus icarus*, male; bottom: *P. icarus*, female; (for location, see text).

The remarkable endemism of moths in White Sands National Park

Eric H. Metzler

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In 2006 the US National Park Service (NPS) invited me to conduct a long-term study of the moths in White Sands National Monument (redesignated by Congress as White Sands National Park in 2019). The primary purposes of the study were to compile an inventory of moths in habitats within and immediately adjacent to the gypsum dunes and to describe and publish species new to science. White Sands National Park (WSNP) protects 298 km² (40%) of the world's largest snow-white gypsum dune geologic formation. For comparison purposes, if the gypsum dunes in NM was the size of a postcard, the world's second largest gypsum dune formation would be the size of a postage stamp on the postcard. The dune field is located in the northern Chihuahuan Desert in south central New Mexico's Tularosa Basin (Fig. 1). The remainder of the



Figure 2: *Euxoa pleuritica* (Noctuidae). Normal dark form on top, White Sands 'white' form on bottom. The white sands form is consistently smaller, as shown. (Eric H. Metzler photograph).

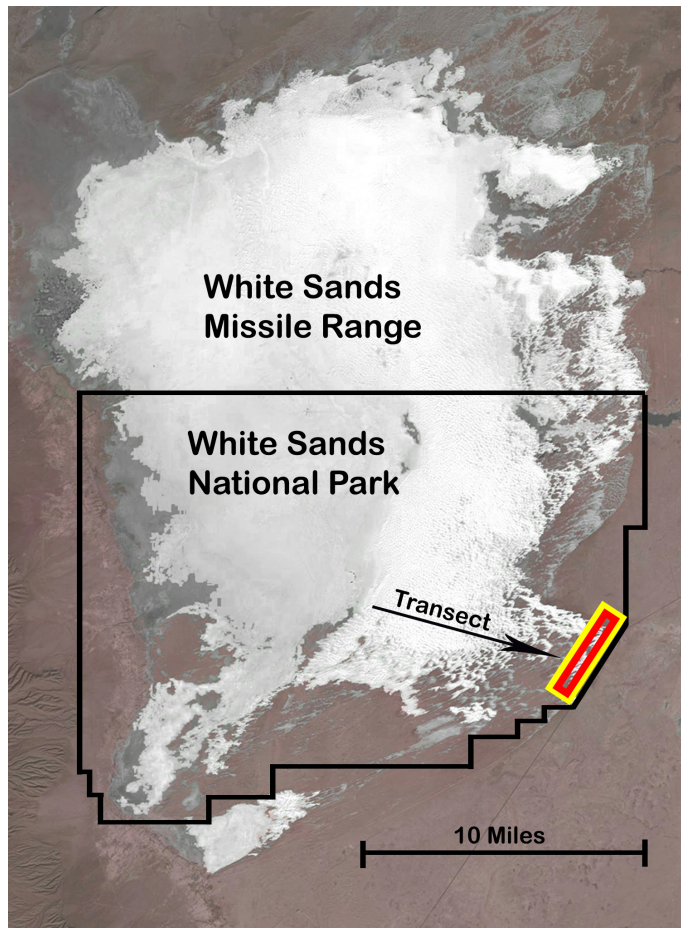


Figure 1: Map of the white sands gypsum dunes formation in southcentral NM. The study site is delineated by the yellow and red rectangle. (Eric H. Metzler photograph).

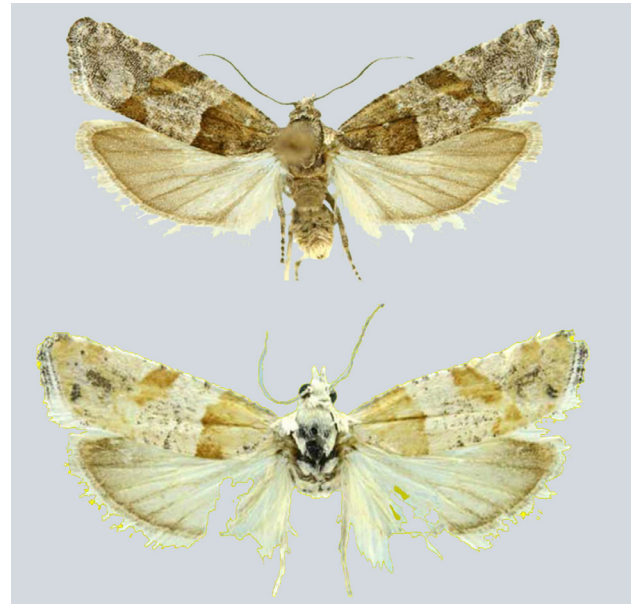


Figure 3: *Eucosma columbiana* (Tortricidae). Normal dark form on top, White Sands 'white' form on bottom. The difference in size appears to be inconsistent. (Eric H. Metzler photograph).

dune field is within the US Army's top secret White Sands Missile Range. Of the 25-million-year history of the Tularosa basin, the gypsum dunes geologic formation, known as White Sands, is \approx 8,000 years old. The dune field is a series of dunes reaching up to 10 meters high and separated by interdune areas nearly exposing the basin floor. The dunes are not sand, rather they consist of gypsum crystals, and unlike sand, they become smaller as the wind tumbles the crystals throughout the dunes; eventually the talcum-like crystals are lifted into the air and blown away. The dunes are held in place by ground water that wicks up to within several inches of the surface of the highest dunes.



Figure 4: A selection of six interdune areas along the transect illustrating the varieties of floras in each area. (Eric H. Metzler photographs).

At first glance most of the white gypsum dunes appear bleak and devoid of animal life, however a closer look reveals many species and subspecies of animals (vertebrates and invertebrates) that are endemic to the gypsum dunes. Previously described insects unique to the dunes include *Ammobaenites phrixocnemoides arenicolus* (Strohecker) (Orthoptera), and *Daihinoides hastiferum larvale* (Strohecker) (Orthoptera). Some species are variable in color, and individuals collected on the white substrate at the Park are pale, "white" forms, when compared to nearby populations that do not live in the dunes. These animals include *Cibolecris parviceps arida* (Brunner) (Orthoptera). Some species of Lepidoptera exhibit the same dark versus pale characteristics (figs. 2 & 3). Other vertebrate and invertebrate animals, such as *Olla v-nigrum* (Mulsand) (Coleoptera), are seemingly adapted to life in the white dunes by their permanent white color, or apparent lack of color thus able to take advantage of the white sands substrate, and some other animals, such as a lycosid spider (Araneida), maintain their pigment and use

elements of the environment or secrete a waxy substance to appear white and blend into the substrate.

The calcium rich chemistry of the gypsum crystal soil is unlike any other soil, and the plants in the dunes adapted by altering their response to the calcium rich soils and exhibiting dissimilar chemical signatures, especially calcium, and microbes associated with plants in the dunes when compared to the same species of plants outside the dunes. Other findings indicate the genetics of some plants in the dunes are altered thereby affecting water retention of the plants and subsequently provide additional water for larvae eating plants in the dunes. The unusual ecology would seem to be a petri dish for mutations of herbivores, such as lepidopterans. The floras of the interdune areas, some are only a couple hundred meters apart separated by high dunes, are different from one interdune area to the next (Fig. 4), thus the moth fauna can be markedly different in each interdune area.



Figure 5: David Bustos, WSNP Resources Program Manager (left), and Eric H. Metzler (right) with one of the kill-type traps used in the study of moths in the Park. (Patricia A. Metzler photograph)

Prior to this study of moths, few insects were collected in the dunes. Results of past entomological research in the gypsum dunes are Stroud (1950), who listed 452 species of insects, including 20 species of lepidoptera, all are considered to be widespread in southern New Mexico, and Strohecker (1947), who described 2 species of colorless camel crickets endemic in the gypsum dunes.

Methods and Materials:

A transect 2.4 km long and 300 m wide (0.72 km²) with 12 discrete sample sites was established along the southeastern edge of the dunes (Fig. 1). Four hundred eighty discrete sampling events (4 samples per month, 12 mo./yr.) were completed in the first 10 years of the study. All four traps were set on the same night ensuring direct comparisons between the traps on any given night. Sampling continues in selected, proven to have the greatest diversity, sample sites. Night flying insects were collected in kill-type black-light traps (Fig. 5). Because of the arid conditions in the dunes, it was necessary to use wet sponges in the traps to prevent the specimens from becoming too brittle to handle (Fig. 6). Lepidopterans were sorted from the samples, and selected specimens were saved for further examination. All other insects and animals from the traps were placed in 95% ethanol and deposited in the Museum of Southwestern Biology at the University of New Mexico (UNM), Albuquerque, NM. Most retained species of Lepidoptera were dissected and/or DNA bar coded to confirm identifications. Following necessary work-up, all retained lepidopteran specimens were deposited in the Arthropod Museum at New Mexico State University (NMSU), Las Cruces, NM, Museum of Southwestern Biology, UNM, Albert J. Cook Arthropod Research Collection, Michigan State University (MSU), East Lansing, MI, U.S. National Museum of Natural History (Smithsonian), Washington, DC, or the voucher collections at WSNP. When I was aware of ongoing research, such as the study on Eucosmiini by D. J. Wright and T. M. Gilligan, I made a special effort to retain and prepare specimens for them. I retained all specimens of Acrolophidae for D.

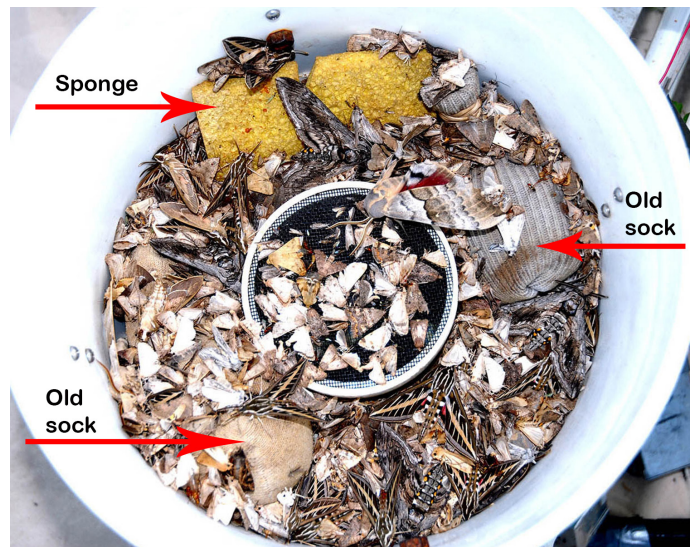


Figure 6: Contents of a trap after a night of sampling. The old socks contained the killing agent. Two moist sponges were placed in each trap to delay desiccation of the specimens. (Eric H. Metzler photograph).

R. Davis, all specimens of Blastobasidae for D. Adamski, and Coleophoridae for J.-F. Landry. In September 2020, there was a large influx of *Helicoverpa* sp. I retained all the specimens and sent them to T. M. Gilligan for analysis by the USDA in Ft. Collins, CO.

Because of the bulk of moth specimens collected, up to more than 1,000 specimens in a single trap, I was unable to retain most of the very small lepidopterans, notably Gelechioidea, Tineoidea, and Pyraloidea. Several specimens of Coleophoridae are on loan from MSU to Jean-François Landry and specimens of Blastobasidae are loaned to David Adamski by MSU.

Results:

Approximately 650 species of moths were identified, and \approx 400 species are unidentified in pro-tem drawers in my personal laboratory. Data from the study indicate that \approx 54 species of moths, \approx 8.3% of the identified species from the gypsum dunes, are endemic in the dunes. Thirteen new species of lepidoptera from the study were described (Table 1) (figs 7 - 20). A preliminary list of recorded species was published in Metzler (2019). Eleven of the described new species of lepidoptera are endemic in the gypsum dunes. Each year of field work reveals more undescribed and apparently endemic species. I estimate about 60 of the species are undescribed; their status as endemics will be established with further research.

Two students, Savannah B. Porter and Carolin L. Scott-Tracey, from NMSU, enrolled for NMSU special studies courses, taught by me in my personal laboratory. Each student became familiar with historical and contemporary literature. They used keys and literature to identify the specimens. They dissected many specimens and prepared

Table 1. List of moths (Lepidoptera) described as new species from White Sands National Park.. Endemic species are noted by *. [Alphabetical order by family; then by genus; than by species.]

Cossidae

* *Givira delindae* Metzler, 2017

Gelechiidae

* *Chionodes bustosorum* Metzler, 2016

* *Chionodes hodgesorum* Metzler, 2014

Noctuidae

* *Aleptina arenaria* Metzler & Forbes, 2011

* *Euxoa lafontainei* Metzler & Forbes, 2009

* *Protogygia whitesandsensis* Metzler & Forbes, 2009

* *Schinia poguei* Metzler & Forbes, 2011

Sympistis sierrablanca Metzler & Scott-Tracey, 2019

Scythrididae

* *Areniscythris whitesands* Metzler & Lightfoot, 2014

* *Arotrura landryorum* Metzler, 2016

Tortricidae

Cochylis yinyangana Metzler & Forbes, 2012

* *Eucosma gypsumana* Metzler & Porter, 2018

* *Eucosma metzleri* Wright, 2014

Eugnosta brownana Metzler & Forbes, 2012

Citations (for Table):

- Metzler, E.H. 2014. The Lepidoptera of White Sands National Monument 6: A new species of *Chionodes* Hübner, [1825] (Lepidoptera, Gelechiidae, Gelechiinae) dedicated to Ronald W. Hodges and Elaine R. Snyder Hodges in the year of Ron's 80th birthday. *J. Lepid. Soc.* 68: 80–84.
- . 2016. The Lepidoptera of White Sands National Monument, Otero County, New Mexico, USA 11. A new species of *Arotrura* Walsingham 1888 (Scythrididae), another iconic species from the Monument. *J. Lepid. Soc.* 70:194–200.
- . 2017a. The Lepidoptera of White Sands National Monument, Otero County, New Mexico, USA 9. A new species of *Givira* Walker (Cossidae) named in honor of Delinda Mix, including a list of species of Cossidae recorded from the Monument. *Zookeys* 655:141–156.
- . 2017b. The Lepidoptera of White Sands National Monument, Otero County, New Mexico, USA 8. Description of the female of *Protogygia whitesandsensis* Metzler and Forbes, 2009 (Noctuidae: Agrotini). *SHILAP Revta lepid.* 45: 207–211.
- Metzler, E.H., D. Bustos, & G.S. Forbes. 2009. The Lepidoptera of White Sands National Monument, Otero County, New Mexico, USA 1. Two new species of Noctuidae (Lepidoptera, Noctuinae, Agrotini). pp. 47–62. *In* B. C. Schmidt and J. D. Lafontaine, (eds.), *Contributions to the Systematics of New World Macro-moths*. *Zookeys*. 9. 134 pp.
- Metzler, E.H., & G.S. Forbes. 2011a. The Lepidoptera of White Sands National Monument, Otero County, New Mexico, USA 2. Rediscovery and description of *Sparkia immacula* (Grote, 1883) (Noctuidae, Noctuinae, Hadenini). pp. 117–123. *In* B. C. Schmidt, & J. D. Lafontaine (Eds.). *Contributions to the Systematics of New World Macro-moths* III. *Zookeys*. 149. 161 pp.
- . 2011b. The Lepidoptera of White Sands National Monument, Otero County, New Mexico, USA 3. A new species of *Aleptina* Dyar, 1902 (Lepidoptera, Noctuidae, Amphipyriinae, Psaphidini). pp. 125–133. *In* B. C. Schmidt, and J. D. Lafontaine (eds.), *Contributions to the Systematics of New*

World Macro-moths III. *Zookeys*. 149. 161 pp.

- . 2011c. The Lepidoptera of White Sands National Monument, Otero County, New Mexico, USA 4. A new species of *Schinia* Hübner, 1818 (Lepidoptera: Noctuidae: Heliothinae). pp. 135–144. *In* B. C. Schmidt, and J. D. Lafontaine (eds.). *Contributions to the Systematics of New World Macro-moths* III. *Zookeys*. 149. 161 pp.
- . 2012. The Lepidoptera of White Sands National Monument 5: Two new species of Cochylini (Lepidoptera, Tortricidae, Tortricinae); a new species of *Carolella* Busck, 1939 with a key to the species and brief comments on the genus, and a new species of *Cochylis* Treitschke, 1829 with brief comments on the genus. *Zootaxa* 3444: 51–60.
- Metzler, E.H., & J.-F. Landry. 2016. The Lepidoptera of White Sands National Monument, Otero County, New Mexico, USA 10. A remarkable new white species of *Chionodes* Hübner (Gelechiidae). *Zootaxa* 4109: 372–380.
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- Metzler, E.H., & C.L. Scott-Tracey. 2019. The Lepidoptera of White Sands National Monument, Otero County, New Mexico 12; the description of *Sympistis sierrablanca* (Noctuidae: Oncocnemidinae) another white species from the gypsum dunes. *Insect Systematics and Diversity*. 3(1): 1; 1–6.
- Wright, D.J. 2014. Four new Eucosmini (Tortricidae) from southwestern United States. *J. Lepid. Soc.* 68(3): 191–196.



Figures 7 & 8: *Givira delindae* Metzler, 2017; *Chionodes bustosorum* Metzler, 2016 (Eric H. Metzler photographs).

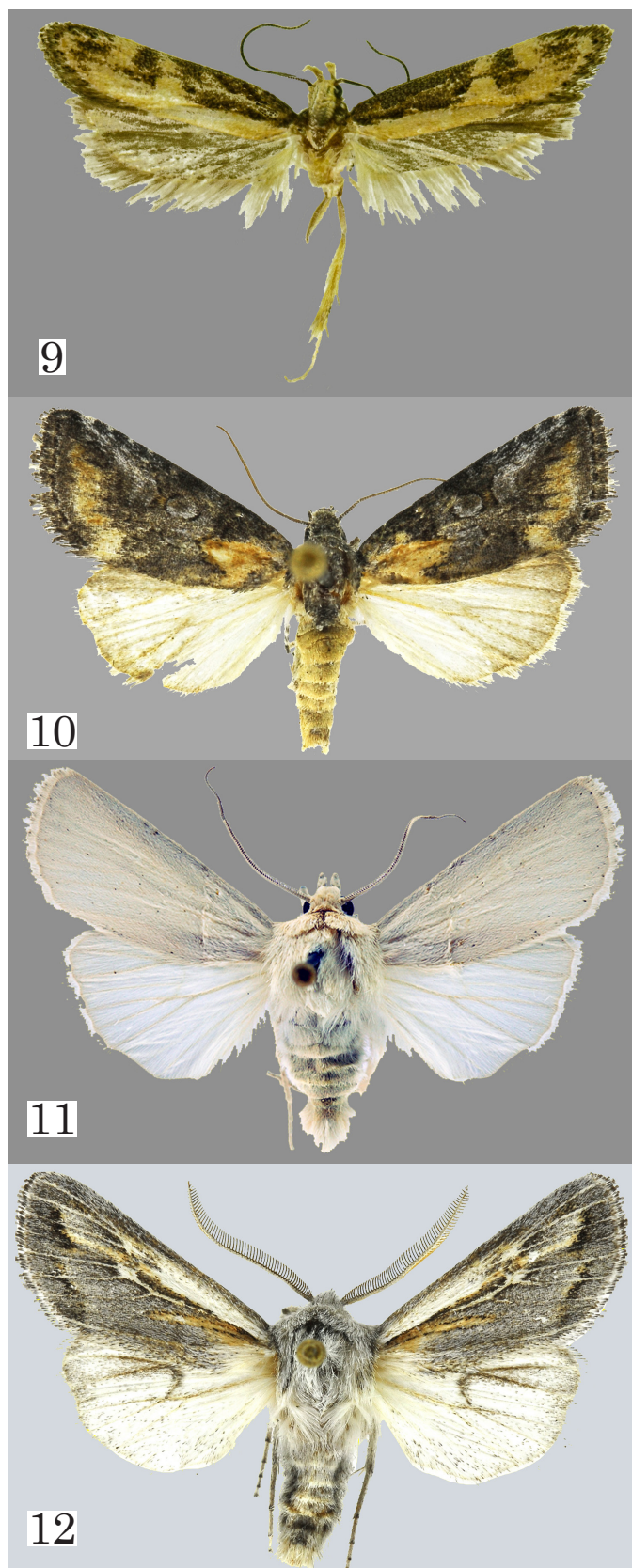
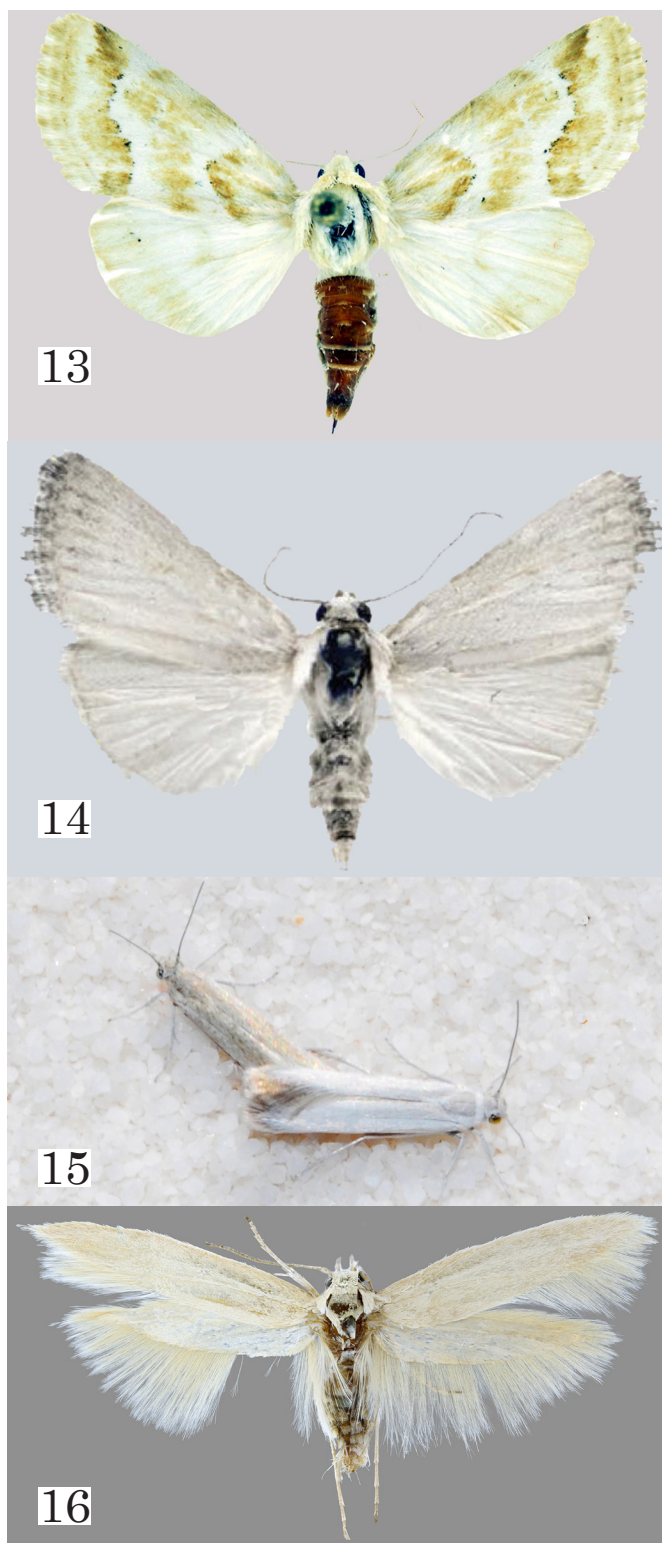


Figure 9: *Chionodes hedgesorum* Metzler, 2014. Figure 10: *Aleptina arenaria* Metzler & Forbes, 2011. Figure 11: *Euxoa lafontainei* Metzler & Forbes, 2009. Figure 12: *Protogygia whitesandsensis*



Metzler & Forbes, 2009. Figure 13: *Schinia poguei* Metzler & Forbes, 2011 (9 - 13: Eric H. Metzler photographs). Figure 14: *Sympistis sierrablanca* Metzler & Scott-Tracey, 2019 (Carolyn Scott-Tracey photograph). Figure 15: *Areniscythriss whitesands* Metzler & Lightfoot, 2014. White male in copula with darker female on the gypsum soil, early morning. (David L. Lightfoot photograph). Figure 16: *Arotrura landryorum* Metzler, 2016 (adapted from a Jean-François Landry photograph).

slides with genitalia. They made photographs and used Photoshop® CS6 to prepare illustrations. They selected names for the new species. I coached them, and they did all the work. They are coauthors on the published papers (Metzler and Porter 2018, Metzler and Scott-Tracey 2019). Unfortunately, another student, Gary Morrill, had his special studies course interrupted by the COVID-19 pandemic. Gary wants to return someday to complete his lepidopteran studies. The students are referred to me by faculty from NMSU, and I recommended a letter grade.

One result from Porter's study showed that pupae of *E. gypsumana* can apparently remain in diapause for long periods of time. The number of specimens of adults was consistently small until 2015 when more than 100 specimens were collected (Fig. 21). The phenomenon of extended diapause of lepidopterans in arid conditions was previously reported by Powell (2001).

Conclusions:

No other single location of similar size with homogeneous soils, i.e. 0.72 km², in North America is reported to have

more endemic species of moths. The rapid rate of speciation is potentially high given that the gypsum dunes formation is \approx 8,000 yrs. old. Historic and current isolation of the gypsum dunes formation and/or potential natural selection imparted by the gypsum soil may explain the moth endemism. However phylogenies of gypsum soil endemic moths and their relatives are needed to understand the association and speciation rates of the endemic moths. Some considerations may include: 1) The gypsum dunes formation is an ecological island—at least enough of an island that 2) Predators may have selected for adults that are well camouflaged in the habitat during day light hours (accounting for the convergence across many taxa for 'white species'). 3) The gypsum sand itself may be a unique habitat for some larval/pupal life stages, e.g. in southern Ohio, *Stiria rugifrons* (Noctuidae) larvae are sensitive to soil chemistry and/or morphology (Metzler unpublished data). 4) The gypsum sand creates unique co-evolutionary conditions between larvae and host plants. 5) Plants are genetically and physiologically adapted to the unique soil conditions—which may in turn create selective pressure on moths.

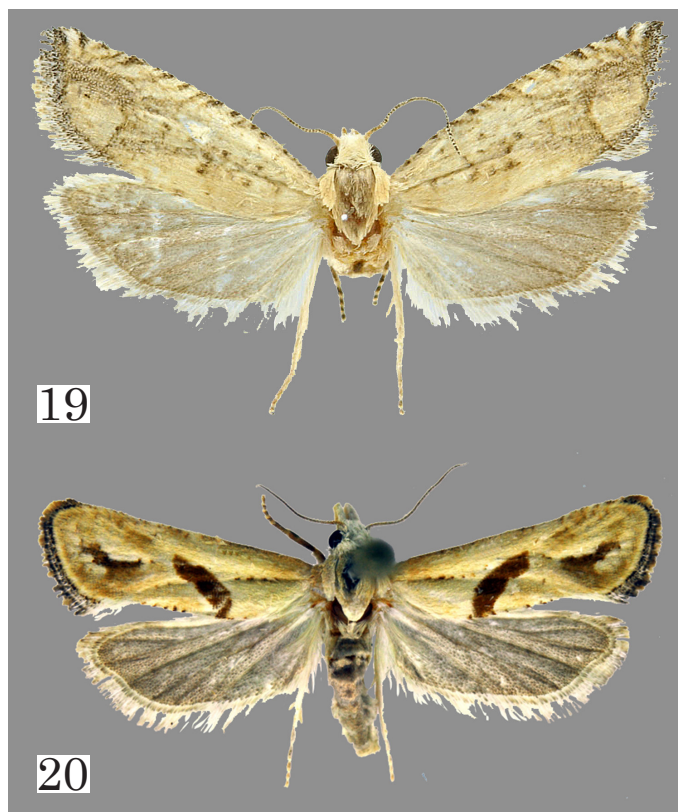
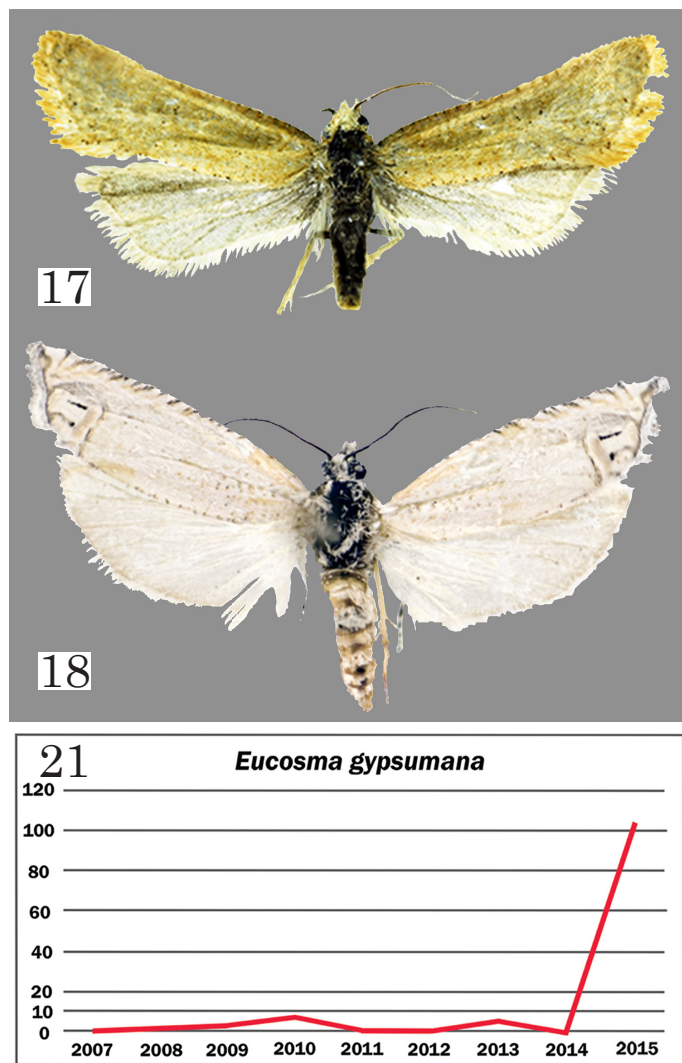


Figure 17: *Cochylis yinyangana* Metzler & Forbes, 2012 (Eric H. Metzler photograph). Figure 18: *Eucosma gypsumana* Metzler & Porter, 2018 (Savannah B. Porter photograph). Figure 19: *Eucosma metzleri* Wright, 2014 (adapted from a Donald J. Wright photograph). Figure 20: *Eugnosta brownana* Metzler & Forbes, 2012 (Eric H. Metzler photograph). Figure 21: Temporal emergence data of *Eucosma gypsumana* in WSNP. (Graph by Savanna B. Porter and Eric H. Metzler).

Discussion:

The study of Lepidoptera at White Sands National Park was projected to last ten years, from 2007 through 2017. Because of the unusual physical and biological qualities of the New Mexico white gypsum dunes, I was especially aware of the possibility of finding undescribed species. After the first year of the study, the number of undescribed species exceeded expectations, and the sample site outside the dunes was abandoned. Gregory S. Forbes, Ph.D., who specializes in Asilidae (Diptera), participated in the first two years of the study. Specimens collected by Forbes are deposited in the Arthropod Museum at NMSU.

Bolstered by the findings of endemic species of moths, WSNP refers to the gypsum dune field as the Galapagos of North America.

I'm often asked about trades for specimens from WSNP. All specimens from any unit of the NPS belong to the NPS and may be placed on long term loan to institutions. Personal possession is not allowed, and I am required to donate all specimens to one of the institutions I listed. I'm also asked about obtaining a permit to collect in a unit of the NPS. The answer depends on the willingness of each NPS unit to consider the proposed research. I found these eight items to be helpful; 1) An application from a researcher with a good record of research and publication of results, 2) A research plan with a specific purpose other than to collect, 3) A begin date and an end date, 4) Clearly stated deliverables, 5) Repositories of all collected specimens defined and with prior arrangements (not all institutions want to receive specimens from the NPS), 6) A track record of providing written reports, 7) Agreement that all documents, files, and photographs are the property of the NPS, 8) A track record of following through, IOW getting things done. The NPS tells me many applicants fail to meet these few commitments, thus it should not be surprising if an application from an unknown source is subjected to extra scrutiny.

Informal discussions with staff from White Sands National Monument informed me the results of my moth studies piqued the interest of U.S. Senator Martin Heinrich as he considered legislation to redesignate the National Monument as a National Park. In December, 2019, at a celebration after the president signed the legislation naming the US' newest national park, I talked to Senator Heinrich about my discoveries of new species of moths in the gypsum dunes. The Senator told me that when he was a student in Albuquerque, NM, he was keenly interested in insects. He went on to say he had a large insect collection and he won several blue ribbons at the NM State Fair in Albuquerque. We never know the impacts of our research on Lepidoptera.

Acknowledgments:

Several executives from the NPS were instrumental in supporting and promoting this study of moths. The NPS granted

permits to take samples of moths and provided access to areas normally closed to the public. I especially thank David Bustos, Resources Program Manager at WSNP for getting things done. MSU's Albert J. Cook Arthropod Research Collection, NMSU's Arthropod Collection, UNM's Museum of Southwestern Biology, and the U.S. National Museum of Natural History (Smithsonian) agreed to be repositories for specimens collected during the study. J.D. Lafontaine and J.-F. Landry facilitated obtaining DNA barcodes and they facilitated publishing several of the new taxa. Representatives from research collections provided insect pins, alcohol, and research consultation. D. Adamski, J.W. Brown, R.L. Brown (FL), R.L. Brown (FL), C.V. Covell, Jr., D.R. Davis, P. Gentili-Poole, T.M. Gilligan, P.Z. Goldstein, C.E. Harp, R.W. Hodges, E.C. Knudson, J.D. Lafontaine, J.-F. Landry, J.S. Miller, V. Nazari, P.A. Opler, M.G. Pogue, R.M. Poole, B.C. Schmidt, M.A. Solis, D.L. Wagner, and D.J. Wright provided expert identification assistance. Patricia A. Metzler faithfully accompanied me on many collecting trips to the Park. She accompanied me on long driving trips to Washington, DC, Cincinnati, Ohio, Houston, Texas, Ottawa, Ontario, and other locations for the purposes of this research, and she contributed financially to the research. The Western National Parks Association, Tucson AZ, the El Paso Zoo Conservation Committee, El Paso TX, Terrestrial Invertebrate Taxon Advisory Group, Seattle WA, and the Northern Group, the Rio Grande Chapter, the Sierra Club, Santa Fe NM contributed funding for this study. Instrumental funding came from Cooperative Agreement P17AC01465 between the Department of the Interior National Park Service and Michigan State University, Project Title: Inventorying Endemic Insects at White Sands National Monument. Anthony I. Cognato, Ph.D., Director of the Albert J. Cook Arthropod Research Collection at MSU managed the federal funds. This research depended on the excellent collaboration of these fine individuals.

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The watercolors of Brazilian butterflies by Paul-André Robert -- a dream eclosing after 60 years

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Figure 1. Paul-André Robert accompanied by his wife, Madeleine Robert-Favre, in Switzerland, 1961 (soon before his trip to Brazil).

In the fall of 1961, the Swiss painter Paul-André Robert arrived in Brazil to spend a period visiting his family. During this stay, he painted 27 watercolor plates of Brazilian butterflies and moths. The paintings are remarkable for their accuracy and fidelity to the details of wing color and pattern of the represented species. They were intended to be part of a book that was never published. Although Robert's watercolors are now available online, they remain largely unknown to people

interested in butterflies and moths, including the first two authors of the present article, and this would have been the end of this story until a few months ago.

Paul-André Robert (Fig. 1) was born on November 10, 1901 in Le Ried-sur-Bienne and passed away August 20, 1977 in Orvin (both on Switzerland). He inherited the talent of his father, Léo-Paul Samuel Robert (1851-1923), his grandfather, Aurèle Robert (1805-1871), and his great uncle, Louis Léopold Robert (1794-1835), all painters and part of a traditional family of francophone artists from the region of La Chaux-de-Fonds, Switzerland. Besides being known for his realistic paintings of still lifes, landscapes and portraits, Paul-André showed a passion for nature already in his earliest drawings (Fig. 2). During his lifetime, Paul-André Robert published more than 10 books as illustrator, author or both on natural history, with emphasis on the European fauna and flora.

The recognition for his commitment to natural history came in 1973, when Paul-André Robert was awarded the title of *Doctor honoris causa* by the *Université de Neuchâtel* (Switzerland) for his studies of dragonflies published in the book *Les Libellules (Odonates)* (The Dragonflies, Robert, 1958). This book remains an important reference for the

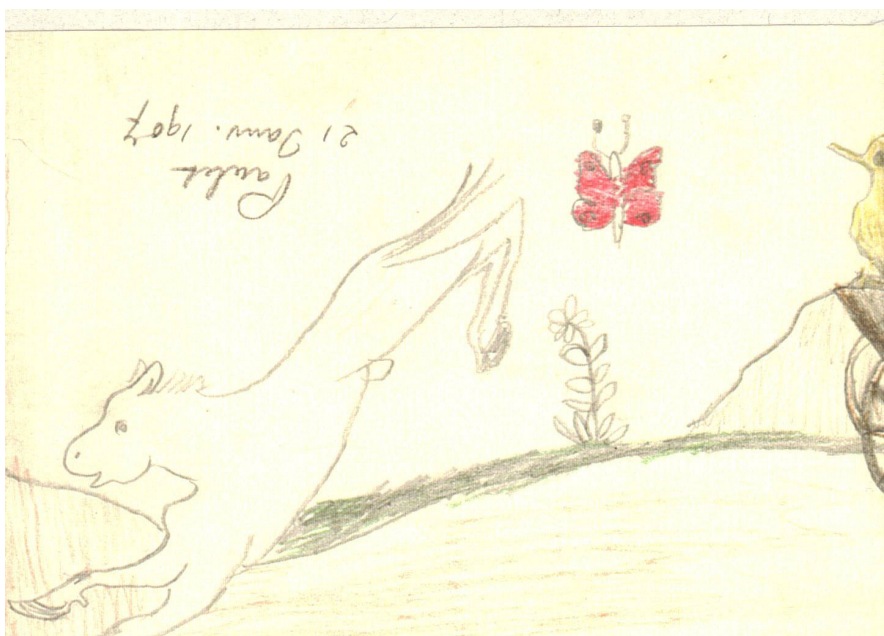


Figure 2. Hand drawing by Paul-André Robert at the age of five (January 21, 1907); note the fluttering red butterfly. All early drawings by Paul-André were certified (with name and date) by his father, Léo-Paul Robert. Image digitized by Anne-Elisabeth Reichen-Robert and reproduced with permission.

natural history of European dragonflies, and his unpublished monograph on European dragonfly naiads, a continuation of the previous book, was published posthumously (Brochard, 2018). Regarding the Lepidoptera, Paul-André Robert published the book *Les papillons dans la nature* (Butterflies and Moths in Nature, Robert, 1934). In its 405 pages, the author described the habitats, host plants, immature stages and behaviour of 64 species of European Lepidoptera (34 butterflies and more than 30 moths), each accompanied by a detailed watercolor, usually displaying different postures observed in life.

Back to our beginning. The incursions of Paul-André in the Brazilian fauna and flora started in October, 1961, when he arrived to visit part of his family living in the city of São Paulo (at that time already one of the biggest urban centers in Brazil (IBGE 1961)), but also planning to illustrate a book on tropical flowers and a second one on butterflies and moths. During the first two months in São Paulo, Paul-André traveled by bus to the Botanical Gardens almost every day (a one hour trip in each direction) to

observe and illustrate tropical plants. The result was the book *Fleurs tropicales* (Tropical Flowers) (Bernardi & Robert, 1966), for which Paul-André produced 32 watercolors and 20 ink drawings of flowers of tropical species of plants. After this period, Paul-André stayed at a farmstead near the small town of Arthur Nogueira, where he remained from January 10 to February 17, 1962. We do not know whether Paul-André had any prior indication of the suitability of this locality for observing butterflies and moths, but it was the starting point for his ambitious project of illustrating species of Brazilian butterflies and moths. For this, he obtained improvised insect nets manufactured by Mr. Conrado Alberto Fierz (the person in charge of the farm) and the support of several boys that were eager to catch and bring him various common butterflies and moths found in the region. Besides insect nets, Paul-André also mentioned using baits (unfortunately, the nature of this bait is unknown).

Paul-André was very meticulous in reproducing the colors, wing patterns and morphological details of each species, as stated in a letter to his editor, part of which is translated below:

“When I read the first page of the book on caterpillars, I noticed that you announced another one about Butterflies entitled: *Les Papillons dans la Nature*. It's true that this is the title that we have discussed, and if there is no way to change it, it doesn't matter. However, as I made progress in the work of watercolors, I am increasingly impressed by the difference between the living butterfly in its natural pose (this is the pose that I always choose), and the [pinned] spread butterfly as it is usually represented. The difference is sometimes unbelievable. In front of one or another butterfly, which I know from collections or books, I am suddenly amazed when I find it alive in the pose for which it was created. For this reason, I've been wondering for some time now if I should not propose to you, as a title, “*Les Papillons vivants*” [Living Butterflies]. If I didn't communicate this idea to you sooner, it was because I didn't think you would announce this title anytime soon. So, I hasten to do it now, even though I think it's too late.”

In this passage, it is clear that Paul-André was concerned about capturing the posture and movements of the butterflies and moths in life, which is impossible to achieve only by observing preserved museum specimens. Thus, his quest for perfection and attention to detail explains why the watercolors and drawings of tropical flowers and butterflies were all produced during his stay in Brazil.



Figure 3. *Morpho epistrophus epistrophus* (Fabricius, 1796). Original title: *Morpho laertes*, watercolor on paper – 1962 – Dimensions: 20 x 16 cm (object No. SR 1992.0455). Nouveau Musée Bienne (reproduced under permission).

From his stay in Arthur Nogueira, Paul-André produced a total of 27 watercolors illustrating 16 species of butterflies (one of the plates included two species) and 12 moths (one as a caterpillar), and two examples are shown in Figs. 3 and 4. After returning to Europe, Paul-André contacted his editor (Delachaux & Niestlé), who was still interested in publishing a book on tropical butterflies and moths. Unfortunately, the project was never concluded; neither he nor his editor managed to enlist a Lepidoptera specialist to write the text to accompany the plates. After Paul-André's death, all unpublished material on Brazilian butterflies became property of the Robert Foundation and has been on loan to the Nouveau Musée Bienne (NMB - Biel, Switzerland) since 2012. All watercolors are today available online as part of the "Fondation Collection Robert" (<https://www.nmbiel.ch/index.php?lang=fr&id=32>). Unfortunately, some of the Lepidoptera watercolors of European butterflies are not included. They were sold by Paul-André to support himself and are now possibly displayed on the walls of some homes in Europe.

Recently, Béatrice R. V. Costa, coauthor of this article, contacted the butterfly research group at the University of Campinas (LABBOR - <https://www2.ib.unicamp.br/labor/site/>) to present Robert's watercolors of Brazilian butterflies and to evaluate the possibility of publishing a book with these plates, a plan suspended 60 years since the illustrations were finished. While the plans for publishing such a book are still embryonic, the present article is a first step towards publicizing Paul-André Robert's watercolors of butterflies and moths – thanks to the ease of contact between people offered by current technology, which led to the meeting of the authors of the present note. The complete collection of plates will surely appeal not only to the community of scientists and amateur lepidopterists interested in tropical butterflies and moths, but also to the lovers of artistic representations of nature.

Acknowledgements

The initiative to bring to attention the life and art of Paul-André Robert started with the contact of his granddaughter, Beatrice R. V. Costa, with Augusto Rosa, member of the LABBOR (Lepidoptera research group) in Campinas, Brazil. We thank Bernadette Walter and the Nouveau Musée Bienne (Switzerland) for permission in the use of the two watercolors here illustrated. AVLF thanks CNPq for a fellowship (304291/2020-0). Special thanks to Carla Penz, Thomas Lewinsohn and Marianne Elias for revising and improving the final version of the manuscript. AHBR thanks the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brazil (CAPES) - Finance

Code 001. We thank Carlos Mielke for help with identification of the moths, including the one illustrated here.

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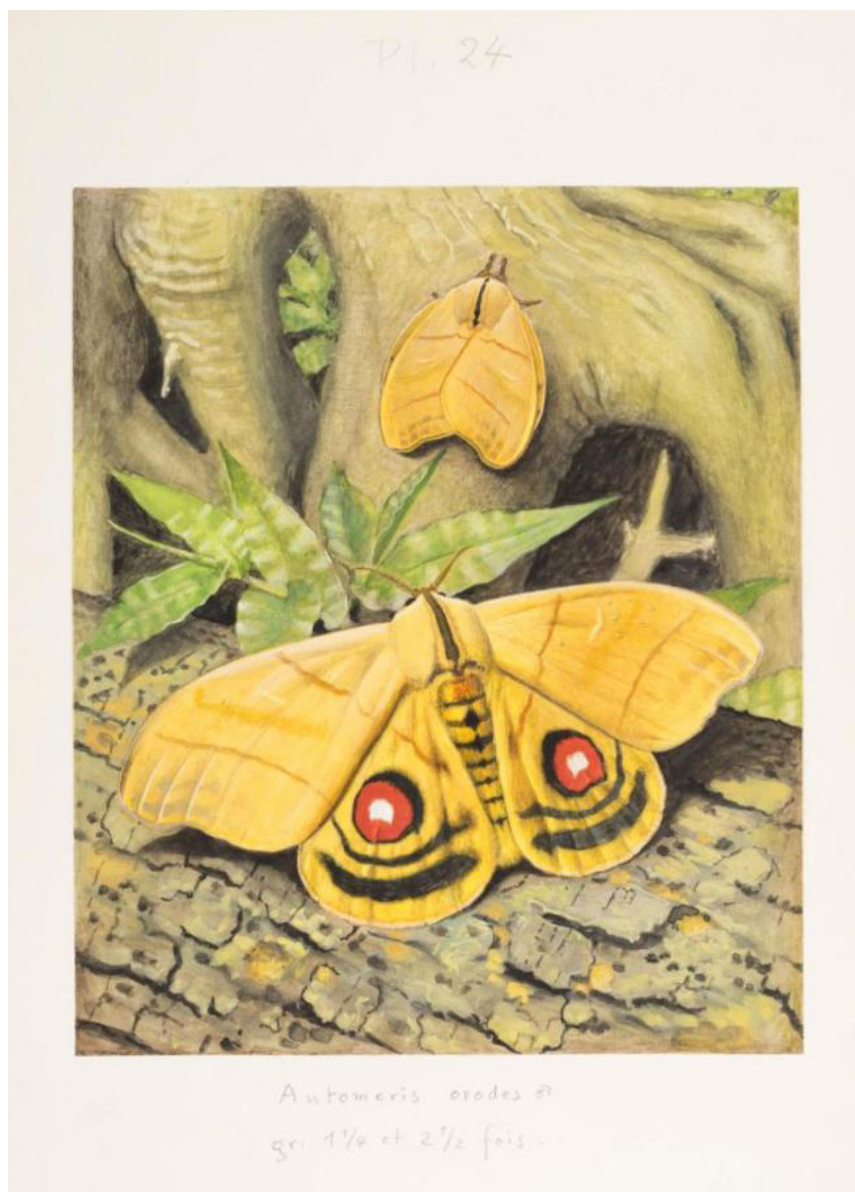


Figure 4. *Hyperchiria incisa incisa* Walker, 1855. Original title: *Automeris orodes*, watercolor on paper – 1962 – Dimensions: 20 x 16 cm (object No. SR 1992.0469). Nouveau Musée Bienne (reproduced under permission).

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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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The 300 page-long ebook is published in English and Spanish, and it is free to access and download on the website <https://www.butterflycatalogs.com> or in ResearchGate (if you are a member).

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The authors,
Kim Garwood, Juan Guillermo Jaramillo, Indiana Cristóbal Ríos-Malaver and Blanca Huertas 634

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Equipment

BioQuip Products, Inc

Christopher J Fall, V.P.- General Manager

Dear Members of the Lepidopterists' Society,

We are writing to inform you that the Fall family has made the difficult decision to sell BioQuip Products, Inc. Our family has owned and operated the company since 1956 when it was purchased from Dr. Rudi H. T. Mattoni by Richard P. Fall. We have invested a combined 180 years of our lives in BioQuip with the charge of supporting the science of entomology on all levels. We do not have a third generation to replace us and need to find a new owner(s) who will be dedicated to nurturing and growing the company, as we have, keeping BioQuip intact.

We are asking the membership to help us locate a suitable buyer(s) for the company. This is a sensitive issue, and we want to do all we can to keep BioQuip providing all the high quality equipment and supplies that entomologists need worldwide. We also want to thank the membership for all the support and loyalty you have demonstrated over the past 65 years of Fall family ownership.

Most Sincerely, Chris, Louise and Ken Fall

FOR SALE: LEPTRAPS LLC

After 32 years of designing, fabricating and marketing globally, I would like sell Leptraps LLC and retire. I would like to collect Lepidoptera and travel. The business includes all the drawings, inventory, and some equipment. I operated the company from my home.

To successfully manage Leptraps LLC you must have knowledge of Insects, especially Lepidoptera. You must have design skills, knowledge of Sheet Metal and machining, plastics and electronics (12VDC & 120VAC & 220/208 VAC). Leptraps LLC is a well known global company. Leptraps LLC has sold product into Canada, South America, Australia, South Pacific, Asia, Europe and every state in the United States. Leptraps LLC has also sold product into Greenland, Iceland and many countries that are poorly known. The price is \$125,000 USD, or make me a reasonable offer.

Leroy C. Koehn, Leptraps LLC, 126 Greenbriar Drive, Aurora, OH 44202; Tel: 502-542-7091, e-mail: leptraps@aol.com indefinite

Miscellany

Tony Roberts, a continuous Lep. Soc. member since 1956 with a concentration from 1987-2010 on the moth, and in particular the post-glacial microlepidopteran, fauna of immediate coastal Down East Maine, seeks suggestions, inquiries, requests regarding residual lab equipment, reagents, 20th century micro-photographic and drawing

paraphernalia, fiberoptics, slides, pins, pith for double-mounts, drawing aids, etc. and, most important, an extensive library of North American books, offprints and copies of North American papers on same, PLUS many scarce Holarctic titles. Kindly contact: Michael A. "Tony" Roberts at maroberts@maineline.net, if interested in any of the above. 641

Moths of North America Fascicles for sale including the two out of print volumes. I have all but the three most recently published. Sale of complete set including the two out of print issues is \$999 plus the cost of book rate shipping. The list price is \$1615 not including the two out of print issues. Hopefully my price is a bargain. I will e-mail the list of fascicles to those interested.

Also, Cornell forty-eight drawer insect cabinet for sale (\$600) and drawers (\$25 each) plus shipping pending distribution of insects and my speed of rapidly declining health from multiple myeloma. I am continuing Lepidoptera research as long as able, but my time and functionality are becoming more limited. Please contact me to plan. Additional 25 draw cabinet, drawers, and other equipment is pending sale, and I will be downsizing more equipment and books to be listed later. If you live close or not, you are welcome to visit to look through my library and equipment or e-mail me if interested in my library for more information.

Ranger Steve (Mueller), Ody Brook Nature Sanctuary, 13010 Northland Dr., Cedar Springs, MI 49319-8433, 616-696-1753. Odybrook@chartermi.net 641

Research

Eric Metzler is looking for any persons who collected moths in the Ouachita Mountains or knows of moths collected in the Ouachita Mountains, a mountain range in western Arkansas and southeastern Oklahoma. Together with the Ozark Plateaus, the Ouachitas form the U.S. Interior Highlands. The highest natural point is Mount Magazine, in Arkansas, at 2,753 feet. If you can help with information about moths collected in the Ouachita Mountains please contact Eric Metzler at: ehmetzler@metzler.app or PO Box 45, Alamogordo NM 88311-0045. Thank you. 634

Research Request: I am preparing with Daniel Handfield (also a member) volume 2 of our book on «Les Papillons du Quebec» that will treat the so called Microlepidoptera. We are close to completing the plates. For that purpose, we wish to obtain a few aquatic females of *Acentria ephemerella* (Lepidoptera:Pyralidae) to be able to show the fin-like wings in this species. As such, we need some fresh material.

We have not been able to catch females locally and are asking the membership for help in obtaining specimens. We are willing to purchase specimens, but would, of course, accept donations. Please contact: Louis Handfield at lscal@netrover.com 634

Digital Collecting:

Butterflies of southern Thailand: Krung Ching Nat'l Park south to Bang Lang Nat'l Park along the Malaysian border

Bill Berthet

12885 Julington Road, Jacksonville, FL 32258

bergems@comcast.net



Map of Thailand

This article is based on a butterfly photography holiday from June 26 to July 7, 2017, organized by Antonio Giudici of thaibutterflies.com. Around 1300 species with an additional 300 subspecies of butterflies are found in Thailand.

Southern Thailand is on the Malay Peninsula, bounded to the North by the Kra Isthmus. The western part has steep coasts. The east side is dominated by river plains.

THAN TO - BETONG BUTTERFLY TRIP



Southern Thailand -- very southern part of the peninsula, with localities visited for this article.

Running through the middle are several mountain chains, the highest being Khao Luang at 1835m. The limestone of the west coast has been eroded into many steep singular hills including the "James Bond Island" in Phang Nga Bay, featured in the movie "The Man with the Golden Gun."

To save on transportation costs and other factors I organized two butterfly photographing holidays back to back when I was in this part of the world. After this trip I flew to Vladivostok in Far Eastern Russia (see 62 (2): 51-59). I flew Delta from Jacksonville, FL to Atlanta, GA, then Korean Air for the 17 plus hour flight from Atlanta to Bangkok. The next morning I flew Thai Smile for the 1½ hour flight south to Hat Yai.

Antonio was waiting at the airport for the 4½ hour drive Southwest to Betong on the Malaysian border. The entrance to the city has several large symbols that represent Thai, Malaysian, and Muslim cultures. While in Betong we stayed at the Happyland Hotel.



Happyland Hotel in Betong

The next couple of morning's our breakfast was at the local noodle house, sitting outdoors watching the world pass by.

On our way to Bang Lang National Park on the border of Malaysia, we stocked up for lunch and snacks at the "most calories per square foot" 7-Eleven. There are around 12,000 of these stores in Thailand, second most in the world only to Japan, at around 21,000 stores. Bang Lang is mostly tropical rain forest known for its great variety of plant species, and is the habitat of many rare animals such as Sumatran Rhinoceros, Tapir, and Helmeted Hornbills. The next couple of days we worked a narrow rain forest 5-



Banglang National Park

kilometer trail (700m) ending at a shallow water stream. We also visited the Chulaporn 10 section of the National Park.

One of the first butterflies observed was the very fast, erratic flying lycaenid *Simiskina pharyge*, with blue markings that glowed in the early morning sun. Along the way we got lucky with an in focus click of the small Lycaenidae *Pithecopus corvus* taking off from a pink flowered nectar source. We also saw the quirky-moving riordinid *Abisara saturata kausambioides*. A very small butterfly was zipping around in a shady area almost faster than the eye could see, but patience paid off when *Catapaecilma major* finally landed long enough for this click. At the end of the trail we zig-zagged our way down the slope, snagging the skipper *Pyroneura derna*, before ending at a bolder strewn, shallow water stream that kept us busy photographing bugs for the next couple of hours. For some of the clicks you had to lay



Top row: *Simiskina pharyge*, *Pithecopus corvus*, *Abisara saturata kausambioides*. Bottom row: *Catapaecilma major*, *Pyroneura derna*.



down in the shallow water for the right position. Clicks here included the stunning *Symbrenthia hypselis sinis*. Many of the butterflies were mineralizing, such as *Caleta elna*, *Odontoptilum pygela*, *Graphium sarpedon*, *Polyura athamas*, *hebe*, and *jalysus* along with the pierid *Prioneris thestylis*. My favorite was the very long tailed *Lamproptera meges* that would continually quiver when nervous, though it finally settled down for a good image.

The next morning after a noodle soup breakfast Antonio picked up a couple of friends, for the one hour drive to Telekom, a 32 km mountain a peak about 800m high, known for Lycaenidae. Along the highway one of his friends had a hot spot for *Heliophorus epicles*. Antonio's friends know this spot well and led us to several trees that had a number of hairstreaks flying. The trouble was that they were zipping around the tree tops. For the next several hours we waited for them to come down low enough to take pictures. Hairstreaks from this spot included *Mantoides gama*, *Manto hypoleuca*, the really long tailed *Neocheritra amrita*, and *Semanga superba deliciosa*.

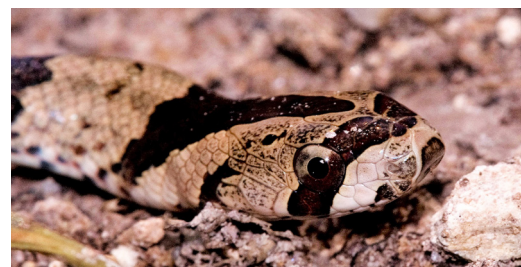
Top row: *Symbrenthia hypselis sinis*, *Caleta elna*, *Odontoptilum pygela*. Second Row: *Polyura athamas*, *P. hebe*, *P. jalysus*. Bottom row: *Graphium sarpedon*, *Lamproptera meges* (upper- and undersides), *Prioneris thestylis* (under *L. meges*).



Top row:
Heliophorus
epicles (under-
and uppersides),
Mantoidea gama.
Bottom row:
Manto hypoleuca,
Neocheritra
amrita, *Semanga*
superba deliciosa.

We found the Brown Kukri Snake, *Oligodon purpurascens* near the road, and, besides the snake, took clicks of *Terinos terpander robertsia*, *Athyma nefte*, and the satyr *Mycalesis anaxias*.

On our drive back to Betong we stopped at Kunoong cha-nong, a short shady shrubby lined trail leading to a large jagged rock formation with dripping water. The ruby eyed skipper *Matapa cresta* was zipping around, landing to feed on bird scat for a good click. Others in the area included the Yamfly *Loxura atymnus fuconius*, the ringlet *Ragadia makuta siponta*, and the colorful nymphalid *Cethosia biblis* (see page 183).



Brown Kukri Snake, *Oligodon purpurascens*.



Top row: *Terinos terpander robertsia*, *Mycalesis anaxias*, *Ragadia makuta siponta*. Second Row: *Athyma nefte*, *Matapa cresta*, *Loxura atymnus fuconius*.



Top row: *Eooxylides tharis*, *Thamala marcianna*, *Sinthusa malika*.
Bottom row: *Yasoda pita*, *Cheritra freja*.

In the morning we drove about ½ hour to the Betong Winter Flower Garden, a tranquil retreat filled with various flowers hidden amongst lush green hills. Antonio and I ended up at a tree filled shady area at the top of a 980m hill. Following a short shrub lined trail, we noticed a number of moderately dark small butterflies zipping around with some landing in light gaps. This area was a lycaenid hotspot. Clicks included *Eooxylides tharis*, *Thamala marcianna*, *Sinthusa malika*, *Yasoda pita*, and the very long tailed bouncy flight of *Cheritra freja*.

Later that day we were working a flower filled hedgerow and almost tripped on a Brown Trap Door Spider burrow. Common prey for these spiders includes crickets, moths, beetles, and grasshoppers taken near the entrance of the burrow. Predators include birds, bandicoots, centipedes,

scorpions, parasitic wasps and flies. Near the burro, I photographed *Delias descombesi* nectaring on a nearby Lantana bush, and a white skipper. Searching the Butterflies of Thailand book to ID this skipper, I found the Hesperidae section starting at page 768. I looked, looked and bam(!), there it was. *Iton semamora* on the last skipper page in the book (pg. 909). Mild frustration led to success!



Brown Trap Door Spider burrow.



Delias descombesi

Iton semamora





Left: A tapped Sharinga Rubber Tree (*Hevea brasiliensis*). Above: Thanto Forest Park habitat.

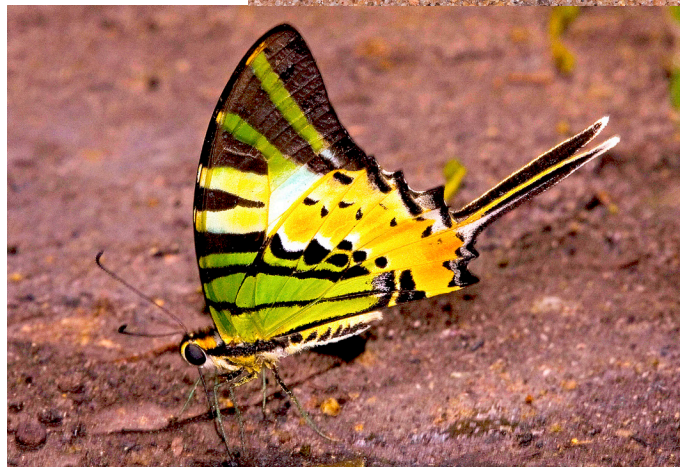
On the way back to Betong, we passed a rubber tree plantation. *Hevea brasiliensis* or the Sharinga rubber tree is not a native species to Thailand, the first being planted in 1899 by a Thai-Chinese investor. Currently Thailand is the world's largest producer of rubber that is used in more than 40,000 products. Rubber is extracted by tapping or making incisions into the bark, allowing the latex to drip down into buckets before the cut seals and clots. Rubber trees grow to heights of 100 to 130 feet, can live up to 100 years, and have notoriously invasive root systems. Each tree produces around 19 pounds of rubber per year. Trees are around 6-7 years old before tapping, and may be tapped for over 25 years. The Alliance Rubber Company requires around 700,000 rubber trees per year to meet demand.

About an hour and a half from Betong we drove to the Thanto Forest Park section of Bang Lang Nat'l Park. We hiked a several kilometer trail to Thanto waterfalls. Antonio had a filtering system he sometimes used when scooping up local creek-stream water to drink; not me, I stuck to bottled water.

Trails were mostly flat, fairly dry, and easy to navigate. The weather was hot and muggy, so we sweated a lot. Several swallowtails were mineralizing, including the bright green and yellow colored *Graphium antiphates alcibiades* and *Papilio nephelus sunatus*.

Antonio spotted the really snazzy looking Pink Orchid Mantis, *Hymenopus coronatus*. This species mimics parts of the orchid flower. The four walking legs resemble flower petals, with a pair of toothed arms for grasping prey such as foraging butterflies, small insects, crickets, flies, fruit flies, beetles, and other small insects. This mantis has the ability to change colors between pink and brown. The camouflage helps to deceive potential predators. Females are much larger than males.

Right and below, top to bottom: *Papilio nephelus sunatus*, *Graphium antiphates alcibiades*, and the Pink Orchid Mantis, *Hymenopus coronatus*.





Top row: *Thaumantis klugius lucipor*, *Neorina lowii*, *Castalius rosimon*. Second row: *Ideopsis gaura perkana*. Third row: *Parantica aspasia*. Fourth row: *PentHEMA darlisa merguia*.

area, just below a tall communications tower, where the road is bordered by a variety of flowers. Antonio splashed some bait on the road. After a while he got excited when the uncommon large satyrine Yellow Kaiser *PentHEMA darlisa merguia* female started to circle around the bait. This beautiful butterfly finally landed on the bait but was very skittish on our approach and flew away. In the meantime we walked up and down the road photographing the paper thin winged danaine *Ideopsis gaura perkana*, *Parantica aspasia*, the lycaenid *Castalius rosimon*, and the striking pattern of the satyrine *Lethe europa*.

We drove up to the tower, that had a roof covered structure underneath looking for Awls, but none were observed. There were a number of birds with nests underneath the roof top. Heading back down the road *PentHEMA darlisa merguia* had settled on the bait, allowing us both ventral and dorsal shots. That night we celebrated with a cold beer and a very good Thai food dinner.

Along the darker portions of the trail we found morphine *Thaumantis klugius lucipor*, and the satyrine Malayan Owl *Neorina lowii neophyta*.

We left very early the next morning, driving from Betong north for 7 hours to Khao Ramrome Mountain (1351m). This area features a cloud forest. We worked the 1000m

Still in Peninsular South Thailand, we headed over to Nam Tok Yong National Park in a group of mountains with an average height of around 600m that is an important watershed area that serves the people living in the area. The mountains are rich in iron and wolfram (another name for tungsten). The area has great looking habitat



Top row: *Choaspes subcaudatus*, *Caleta roxus*, *Drupadia ravindra moorei*.
Second row: *Euthalia dunya*, *Melanocyma faunula*.

with narrow up and down trails. Adrenalin started flowing when I observed the coeliadine *Choaspes subcaudatus* fluttering around in a shady moist area. Further along the trail I got clicks of *Caleta roxus*, the six tailed *Drupadia ravindra moorei*, *Euthalia dunya*, and the favorite for the day, the morphine *Melanocyma faunula*.

My last two days were spent at Krung Ching Waterfall. Krung Ching means nestled in the mountains. The falls are located in Khao Luang National Park in Nakhon Sri Thammarat. The nine-tier fall originates from Krung Ching stream in the plain of Krung Ching Bay. The third tier is known as “Naan Fon Saen Ha” meaning heavy rain.

The narrow, fairly easy 3.7 kilometer trail (at 275m) ending at the falls has very good habitat. Along the way I noticed about 20 feet off the trail a large butterfly drying its wings just after emerging from the chrysalis. Antonio was ahead on the trail. I yelled to him to come back. We had trouble getting the butterfly out in the open, but with team work we finally succeeded. The flash captured the intense bluish purple colors of this very fresh *Zeuxidia amethystus*.

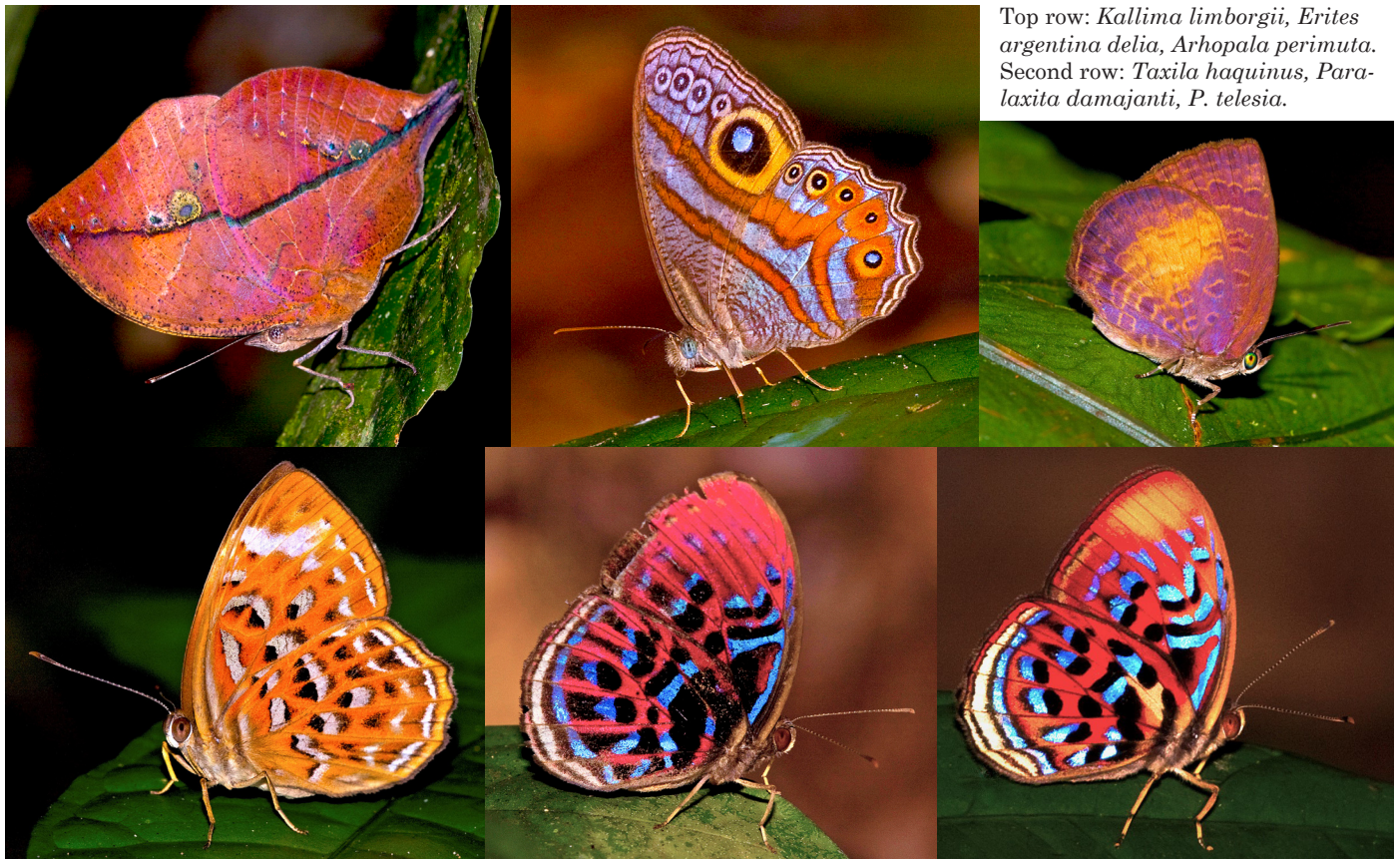
Other keepers for the day are *Kallima limborgii*, *Arhopala perimuta* (a spectacular but very skittish butterfly that needed a very slow stealth like approach get a click) and *Erites argentina delia*. Additional exciting observations



Krung Ching waterfall area.



Zeuxidia amethystus



Top row: *Kallima limborgii*, *Erites argentina delia*, *Arhopala perimuta*.
Second row: *Taxila haquinus*, *Paralaxita damajanti*, *P. telesia*.

include the three Harlequin's *Taxila haquinus*, *Paralaxita damajanti*, and the stunning multi colored *Paralaxita telesia*. To get the click of *telesia*, I had to follow its erratic very quick, quirky low-flying movements through thick brush as it would land briefly then fly off again. Finally about 25 feet off the trail, this butterfly landed long enough for a decent photo. Backing out of the thick brush I slipped on a rock causing my flash unit to be crushed but luckily caused no damage to the camera. I always carry an extra flash, camera body, and lens just in case something like this happens. The last butterfly, the Blue Yam *Drina maneia* female, is a very rare sighting in Thailand, and Antonio was really excited when he pointed it out.

Right: *Drina maneia*. Below: Antonio Giudici and the author, Bill Berthet.



That night we both celebrated a successful trip and made plans for a future trip for Northern Thailand Butterflies. I caught a flight back to Bangkok, and proceeded on to Far Eastern Russia for the next butterfly photographic holiday.

Sources:

The 944 paged Butterflies of Thailand 2012 2nd English Revised Edition authored by Pisuth EK-Amnuay was quite helpful for information and IDs. I also got help from numerous internet sites

Shout out to Antonio Giudici and Adam Cotton for their knowledge and expertise helping to ID butterflies and review text.



The fire this time: the Coast Range burning

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God gave Noah the rainbow sign; No more water, the fire next time. – Spiritual

On August 6, 2020, according to investigators, a 32-year-old woman went on a date with a man she had met on-line. She was never seen again.

In the early morning of August 16 an unusual complex of dry nocturnal thunderstorms spawned by the remains of Tropical Storm Fausto moved over northern California, producing over 11,000 lightning strikes that ignited 376 known fires—many of which merged in the North Coast Ranges to form what was called the LNU Fire Complex (LNU standing for “Lake-Napa [counties] Unit”). Among them they burned 192,000 acres (777 km²), destroyed 1491 structures and damaged 232 more, killed 6 people and injured 5 more. The complex constituted the fourth-largest wildfire in modern California history. Nocturnal thunderstorms are common in the tropics but rare in mid-latitudes; the physics driving them differs from the usual convective storms triggered by solar heating. We knew they were coming and the threat they posed, but no one envisioned the scope of the destruction to come.

On August 18 what was called the Markley Fire broke out near the Markley Cove Resort on Lake Berryessa and quickly merged with the others. This fire was not sparked by lightning. It raced upslope to the Blue Ridge (the crest of the Napa-Vaca Hills) and thence south along the spine, following Blue Ridge Road. A separate prong, possibly ignited from Mix Canyon, jumped to Pleasants Valley Road, which runs north-south in the fault valley between the Vacas and the low English Hills to the east. By 11:30 PM on the 18th the fire had spread more than 13 miles southward, prompting mandatory evacuations and threatening the western edge of the city of Vacaville. The entire area was closed to the public.

By early September the last hot spots had cooled. Watching videos taken in familiar places, I knew that my Gates Canyon site, whose butterfly fauna I had monitored since 1974, had to be a near- or complete loss. My first instinct was to survey the damage myself, but that was impossible; I had to wait.

On September 2 the missing woman’s body was found near Markley Cove and her date was arrested and charged with her murder. After an 8-month investigation the Solano County District Attorney charged him at the end of April 2021 with setting the Markley Cove Fire in an inept attempt to cover up the murder. He was further charged with the murders of the two fatalities of the fire, one in

Pleasants Valley and one in the English Hills.

On September 25 Kathy Keatley Garvey of the U.C. Davis Entomology Department, who lives in Vacaville, was allowed to reconnoiter the canyon and e-mailed me a batch of pictures confirming my initial judgment: Gates Canyon was basically gone. The only part that was spared was the ranchland at the very base—ironically, the area where most of the naturalized weeds and “weedy” Valley butterflies occur. The endemic vegetation was gone; ripgut, foxtail and Bermuda buttercup soldiered on.

The season was nearly over. I did not go to the canyon myself. Friends had lost their homes and all their possessions; losing a long-term study site was painful for me but paled in significance next to their losses.

The winter of 2020-2021 was very dry, with less than 50% of the 10-year average rainfall throughout the region. One of the reasons I originally chose Gates Canyon as a permanent study site was the fact that the topography wrung out roughly twice as much rain as fell on Vacaville, down on the flats. That resulted in a very rich flora and fauna, especially on the north-facing side of the canyon. My source of rainfall data for the canyon was my emeritus colleague Wes Weathers, who lived halfway up the canyon and had his own rain gauge. The entire Weathers homestead was lost. There was only one serious storm in the entire winter. My best guess was that it gave the canyon about 3” of rain in 48 hours, which, as it turned out, was enough to trigger mud- and rockslides, but nothing catastrophic.

On April 14 former UCD student Rob Fernau was visiting me and we decided to reconnoiter the canyon. It was a lovely day—75F and sunny with some fair-weather cumulus and a 5-15 mph sea breeze, strongest near the ridgetop. It was a perfectly good butterfly day, but we saw only 2 *Callophrys dumetorum*, 1 hilltopping *Papilio zelicaon*, and 1 *Vanessa cardui* all day. Typically we would have seen 20-some species, and many of the commonest, including *Coenonympha tullia californica* and *Battus philenor*, were missing.

The bottom third of the canyon was least affected by direct burning, but nothing at all was flying there. Alamo Creek was completely dry, as is rarely seen before September or October. The annual grasses were drying; the usual late-spring weeds (*Brassica nigra*, *Calendula*, *Oxalis pes-caprae*) were still in bloom. The earlier-spring weedy flora (*Brassica kaber*, *B. campestris*, *Raphanus*, and the native *Amsinckia*) were done or nearly so.



Gates Canyon after the fire

In the middle third of the canyon the burn covered 70-85%. Most understory perennials were back, including *Dentaria*, *Angelica*, and biscuitroot (*Lomatium*). *Nemophila*, *Salvia spathulifolia*, and various ferns were back but reduced in abundance. The uncommon perennial lupine was doing well but not yet flowering; *Eriophyllum* and *Wyethia* were

just starting, with just a little *Lithophragma* still in bloom. There were very heavy blooms of Chinese Houses, perennial vetch (*Lathyrus*, on both N- and S-facing slopes), and Golden Fairy Lantern (*Calochortis amabilis*—the flowers unusually small). Most of the large trees appeared dead, but small oaks and California Bay (*Umbellularia*) with stem diameters under 3" often showed regeneration from the base. *Ceanothus* was all dead. Poison Oak, *Baccharis* and *Aristolochia* were regenerating happily. In the higher reaches of the canyon there was some intermittent flow in the creek, with small pools—roughly early-autumn conditions.

In the chaparral zone manzanita, tasselbush and *Ceanothus* showed no regeneration, but chamise, chaparral pea (*Pickeringia*), yerba santa, *Baccharis*, and many scrub oaks (*Quercus berberidifolia*) were growing vigorously. There was no general post-fire bloom of annuals, only a very localized flush of the usually-scarce *Streptanthus glandulosus* – the usual host plant of both *Pontia sisymbrii* and *Euchloe hyantis*, but neither was seen. Indian Paintbrush (*Castilleja*) was in bloom but had no melitaeine larvae. The most striking element in the vegetation was an unprecedented massive bloom of Death-Camas (*Zygadenus*). This plant is regularly visited by longhorned moths (*Adela*) but none were seen. The rather rare umbel *Lomatium repostum* was in bloom, along with a few individual *Lathyrus* and *Helianthella*.

I returned on June 16 accompanied by Stephanie Penn and Gary Ge. We did an extensive reconnoiter, driving up Gates Canyon, along Blue Ridge Road, and down Mix Canyon, covering about 3.5 times the area of my Gates study site. The weather was again fine: 88-95F, mostly clear (a few cirrus), light wind. Things were very different. An enormous amount of regeneration by woody plants was afoot. Some large oaks were sprouting from branches high in the canopy; some bay laurels were sprouting all along their trunks. Manzanita and tasselbush were now regenerating vigorously. *Baccharis*, yerba santa, chamise, toyon, mountain mahogany and scrub oak were all stump-sprouting. On Blue Ridge Road is the only known colony of Leather Oak (*Quercus durata*) on a non-serpentine soil (here it's on sandstone), and they, too, survived. In bloom were *Monardella*, *Castilleja*, *Helianthella*, *Grindelia*, one *Barbarea* and a couple of Golden Fairy Lanterns. A couple of surviving Buckeye trees (*Aesculus*) still had a few flowers. Quite a bit of *Eriogonum nudum* survived, but there was no trace of its associated *Lycaena gorgon*. *Angelica* was in seed and we found numerous *Papilio zelicaon* larvae feeding on the infructescences, ranging from 2nd to 4th instars; we also found dead small larvae that had been parasitized by the Braconid *Cotesia*. The basal half of Alamo Creek was completely dry but the upper half actually had more water than it had in April, and Horsetails (*Equisetum*) were lush there. We found a classic fire-following plant, Whispering Bells (*Emmenanthe penduliflora*, Hydrophyllaceae) in good bloom. It can remain dormant in the seed bank for decades until germination is stimulated by fire—not by heat, but

by volatile chemicals in smoke! I had never seen it in the Vacas before. The other vegetation surprise was huge tangles of bright orange dodder (*Cuscuta* sp.) parasitizing the regenerating shrubs and looking for all the world like garish knots of Silly String.

There were many more butterflies than in April, but only 10 of the 18 species seen were in my study site. Here is the list; species marked * were seen in Gates Canyon itself; numbers are totals counted all day. The species are listed in order seen, not taxonomic order:

*Colias eurytheme** 10; *Papilio rutulus* 1*; *Satyrium sylvinum* 3*; *Junonia coenia* 3*, including a female ovipositing on *Plantago lanceolata*; *Pieris rapae* 11*; *Battus philenor* 5*; *Plebejus acmon* 10*; *Phyciodes mylitta* 1*; *Ochlodes agricola* 3*; *Erynnis tristis* 2*; *Coenonympha tullia californica* 1; *Adelpha californica* 1; *Satyrium californicum* 1; *Erynnis propertius* 3 (second brood); *Papilio zelicaon* 1; *Papilio eurymedon* 1; *Erynnis*, probably *persius* since associated with *Lotus crassifolius*, 2; *Heliopterus ericetorum* 1 female. – 18 species, 60 individuals. This would actually be a fairly normal mid-June tally in my Gates Canyon study site alone! Keep in mind how much additional territory we covered. At Gates, the number of species for this calendar week from 2011 through 2020 varied from 12 on vi.24.18 to 26 on vi.15.17, with a mean number of 19 species. For individuals, the range was 64 on vi.23.16 to 122 on vi.15.17, with a mean of 84.

The general distribution of *Pieris rapae* and *Colias eurytheme* was striking and surprising, since neither is a routine summer breeder in the chaparral zone. *P. rapae* has only a few roadside *Hirschfeldia incana* as potential hosts; *C. eurytheme*, only *Lotus crassifolius* and perhaps *L. scoparius*. Both species seemed to be moving in a hurry and were presumably dispersing through the habitats where we encountered them.

We counted only 25 individuals of the 10 species in Gates Canyon proper. Most individuals of most of those species were seen elsewhere on the trip.

How quickly can the Gates Canyon fauna recover? Our June trip showed that many of the species seemingly extirpated in the canyon are still within relatively short dispersal distances to it, and hence able to recolonize if host plants are available. We will probably resume biweekly monitoring next year, if circumstances permit. The only species that is almost certainly lost to the fauna is the California Dog-Face, *Zerene eurydice*, which to our knowledge bred only in a small tributary canyon with a stand of the host, *Amorpha californica*. This plant has no known fire resistance. It does not stump-sprout and the whole stand burned.

An earlier version of this article was posted on my Web site, butterfly@ucdavis.edu.



Gates Canyon plant regeneration after the fire



Gates Canyon plant regeneration after the fire, with significant dodder clump visible.



Gates Canyon plant regeneration after the fire. Resprouting oak growth from the base of the tree.

Announcements:

Call for Season Summary Records

The Season Summary database is on the Lepidopterists' Society home page (<http://www.flmnh.ufl.edu/lepsoc/>). The value of the online database increases as your data gets added each year. Please take the time to consider your 2020 field season and report range extensions, seasonal flight shifts, and life history observations to the appropriate Zone Coordinator. They and their contact information appears on the inside back cover of the "News". The states covered by each zone are in the (most recent) Season Summary. Some Coordinators have changed, and some are in the process of changing, so look closely in this issue. Please have your data to the Zone Coordinator(s) no later than **December 31, 2021**.

Most records are important. Reports of the same species from the same location provides a history. However, do not report repeated sightings of common species. Report migratory species, especially the direction of flight and an estimated number of individuals. Again, all of these records may be useful in the future. BE AWARE that some of these types of records will go IN THE DATABASE, but may NOT appear in the printed Season Summary.

Season Summary Spread Sheet and Spread Sheet Instructions

The Season Summary Spread Sheet and Spread Sheet Instructions are available on the Lepidopterists Society Web Site at http://www.lepsoc.org/season_summary.php. The Zone Coordinators use the Season Summary Spread Sheet to compile their zone reports. Please follow the instructions carefully and provide as much detail as possible. Send your completed Season Summary Spread Sheet to the Zone Coordinator for each state, province or territory where you collected or photographed the species contained in your report.

Photographs for Front and Back Covers

Please submit photos for the front or back covers of the Season Summary to the editor of the News, James K. Adams (jadams@daltonstate.edu). Photos can be of live or spread specimens, but **MUST** be of a species that will actually be reported in the Season Summary for this year.

Brian Scholtens and Jeff Pippens, Co-Chief Coordinators for the Season Summary. (see contact information inside back cover).

Lep Soc Statement on Diversity

This is available at any time, should you need to know at: <https://www.lepsoc.org/content/statement-diversity>

Searching The Lepidopterists' Society Season Summary on SCAN

Brian Scholtens and Jeff Pippen

Part of what we are now doing as a society is contributing all our Season Summary records to SCAN (Symbiota Collections of Arthropods Network), a larger effort to assemble and make available occurrence records of insects and other arthropods to the greater scientific community and the public in general. Each year we now upload all of the submitted Season Summary records to this site. In addition, several years of back records are also hosted here, and we hope to continue adding past years as that is possible.

Now that our Season Summary is available online, we provide below a simple set of instructions about how to use the SCAN database to search our available records. This process is easy, but not immediately obvious when you start exploring the site. To get started you can go directly to the SCAN site using the link below, or you can access it through The Lep Soc webpage using the link under Season Summary. Then just follow the set of instructions below to access, search and download any data from the Season Summary. The first two instructions set up the search feature to search only the Lepidopterists' Society records. If you would like to include other databases, you can select them in addition to our database. Have fun and explore a bit. There are lots of interesting datasets on the site, including quite a few from major and minor collections as well as some important personal collections. Have fun exploring our data and those in the other databases.

- 1) Go to: <https://scan-bugs.org/portal/collections/index.php>
- 2) Click on Select/Deselect All to deselect all databases
- 3) Scroll to near the bottom of the list and select Lepidopterists' Society Season Summary
- 4) Go back to the top and click on Search
- 5) Choose whatever criteria you would like and tell to complete search
- 6) Records will be displayed
- 7) Click on the icon in the upper right if you would like to download records
- 8) Click on appropriate choices – this will download comma separated or tab separated data, which can be compressed or not
- 9) Click Download Data

PayPal -- the easy way to send \$ 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. 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!

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. As always, we are seeking to broaden our membership. Regular membership is \$30.00. Student and other membership categories are also available. With 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. 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. Sloten, Treasurer, 5421 NW 69th Lane, Gainesville, FL 32653.

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. Annual dues are \$15.00 for the hard copy of the News; \$12.00 for electronic copies. The annual meeting is held each year in November, at the University of Kentucky, Lexington. Be looking for information in the next SKL Newsletter about this year's meeting as virus protocols may require a different format, as it did last year. Also, follow the Society's facebook page (<https://www.facebook.com/societykentuckylep/>) for announcements of this and potential field trips.

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

The Association for Tropical Lepidoptera

Please consider joining the ATL, which was founded in 1989 to promote the study and conservation of Lepidoptera worldwide, with focus on tropical fauna. Anyone may join. We publish a color-illustrated scientific journal, *Tropical Lepidoptera Research*, twice yearly (along with a newsletter), and convene for an annual meeting, which may change venues and times year by year as the ATL often shares a venue with the Southern Lepidopterists' Society, as well as The Lepidopterists' Society, for their meetings. Dues are \$95 per year for regular members in the USA (\$80 for new members), and \$50 for students. Regular memberships outside the USA are \$125 yearly. See the troplep.org website for further information and a sample journal. Send dues to ATL Secretary-Treasurer, PO Box 141210, Gainesville, FL 32614-1210 USA. We hope you will join us in sharing studies on the fascinating world of tropical butterflies and moths.

Lep Soc Statement on Collecting

The Lepidopterists' stance on collecting is discussed fully in The Lepidopterists' Society Statement on Collecting Lepidoptera. This is available online at: <https://www.lepsoc.org/content/statement-collecting>

Mix Family Award for Contributions in Lepidoptera

In honor of Nancy, John, Lin, and Joe Mix, the Lepidopterists' Society is pleased to announce the establishment of the "Mix Family Award for Contributions in Lepidoptera." This award will be used to honor an amateur lepidopterist (someone not professionally employed as an entomologist) who has contributed the most to the field of Lepidoptera in the view of the Awards Committee. Outstanding short-term or long-term accomplishments will be considered, and may include contributions to outreach and education, collaboration with colleagues, novel research and discoveries, building an accessible research collection, or leadership within the Society. Nominations are allowed from any member of the Lepidopterists' Society and the nominee must also be a member of the Society in good standing.

This annual award is funded by a very generous monetary donation from Steve Mix that is designated specifically for this award. Award recipients will receive a check for \$1,000 and a plaque that will be presented at the banquet at the Annual Meeting of the Lepidopterists' Society. The award will be presented to a single recipient, and any person who receives the award is not eligible to be nominated again for at least 5 years. It is estimated that the initial donation will be sufficient to sustain this award for at least 20 years. In the event that the award fund is reduced to the point where the award cannot be sustained, the Executive Council will determine if the award will continue.

Wedge Entomological Research Foundation Student Award

The Wedge Entomological Research Foundation (WERF) was founded to promote the study of insects, their evolution and diversity, and in particular to research and publish information on the moths of North America. WERF's flagship publication is the *Moths of America North of Mexico* (MONA) series, now in its 50th year, of which many fascicles are available for free in PDF form at http://wedgefoundation.org/publications_paypal.asp. The Foundation has recently initiated an award program for students. This Student award is up to \$1,000 per year, and can be used for expenses related to the study and conservation of moths, butterflies, and related insects (e.g., travel to meetings, field station room/board, biosystematics research costs, etc.). High school, undergraduate, and graduate students are eligible. WERF is especially committed to supporting underserved groups. A one page (500 word) project description with an indication of how the funds will be used must be

(Continued on page 142)

submitted by **15 April 2022**. The application should be accompanied by a resume or curriculum vitae, and a letter of recommendation from the student's major professor or academic advisor. Please email all application materials to the committee chair, David Wagner, at david.wagner@uconn.edu. Preference will be given to proposals that focus on Lepidoptera. Completion of a 350-word summary of project findings, with one to two appropriate images, is required by 31 December of the award year. Support from WERF should be acknowledged in relevant presentations, publications, web products and similar deliverables.

The Ron Leuschner Memorial Fund for Research

The 2022 cycle of the Ron Leuschner Memorial Fund for Research on the Lepidoptera is now open for applications. Each year, the Society will fund up to 3(+) grants for up to \$500 each to undergraduate or graduate students depending on merit. Applicants must be members of the Lepidopterists' Society. Applications are due January 15, 2022. The application form is posted on the Lep Soc website at <https://www.lepsoc.org/content/awards>, a brief (500 word maximum) proposal, and a letter of recommendation or support from the student's academic advisor or major professor. Additional information about the research fund or a copy of the application can also be obtained by writing to Dr. Shannon Murphy (see immediately below). Submit all of the above to Shannon

Murphy at Shannon.M.Murphy@du.edu. Snail mail applications should be sent to Shannon Murphy, Associate Prof., Boettcher West 302, Dept. of Biological Sciences, University of Denver, 2050 E. Iliff Avenue, Denver, Colorado 80208. Successful applicants will be notified by March 15. The review committee consists of members of the Lepidopterists' Society, including the previous year's successful candidates (who are thus not eligible for a new award in the subsequent year's competition). Award recipients will be expected to produce a short report for the committee at the conclusion of their year of funding, which summarizes the positive impact of the award on their research. Recipients must also acknowledge the Fund's support in any publications arising out of the funded work.

This year the Lepidopterists' Society gave three students awards from the Ron Leuschner Memorial Fund for Research on the Lepidoptera. The three awardees were: 1) Christopher Halsch, a PhD student from the University of Nevada, Reno for their proposal entitled "The interactive effects of pesticide exposure and climate change on a widespread butterfly", 2) Anna Farre I Orteu, a PhD student from the University of Cambridge for their proposal entitled "The evolution of wing pattern mimicry in *Hypolimnas* butterflies" and 3) Sushant Potdar, a PhD student from the University of Arkansas for their proposal entitled "Response of butterflies to their predatory bird calls". Each student received \$500 to support their research project.

Most MONA Fascicles Now Available as Freely Downloadable PDFs!



The Wedge Entomological Research Foundation (WERF) recently completed a project to make digitally available all published *Moths of America North of Mexico* as PDFs with full text search capability, and is pleased to offer these for download on its website at: http://wedgefoundation.org/publications_paypal.asp

Fascicles published prior to 2015 were physically scanned since "born digital" high resolution copies were unavailable; those fascicles are free. Born digital PDFs were available for the four most recently published fascicles (9.4 *Eucosma*, 2015; 9.5 *Pelochrista*, 2017; 22.1A Notodontidae, 2018; 25.4 Noctuidae, 2020). These four PDFs can be purchased and downloaded at a sliding discount compared to the corresponding print versions, based on the number of years since publication. For additional information please contact WERF's Managing Director, Kelly Richers (kerichers@wuesd.org).

Bequest from the estate of Floyd Preston

Floyd Preston, who recently passed, has left \$5000 to The Lepidopterists' Society from his estate. His commitment to the study of butterflies continues even after his death.

Corrections to Fall 2021

The following correction was provided by Adam Cotton:

The bottom two photos on the back cover are of *Terinos atlita teuthras* from Sri Phang Nga National Park in Phang Nga province, Thailand. The caption indicates that 'This is from central Thailand, not far south of the region covered by the Berthet article.' Phang Nga is in SOUTHERN Thailand, very near Phuket, and 1500km (1000 miles) south of the area covered by Bill Berthet's article. It is not very far north of the area covered in Bill's second article (in this issue) on Southern Thailand.

This mistake was my fault (James Adams) for not checking a map of Thailand properly!!



Jorge Llorente-Bousquets

KARL JORDAN MEDAL AWARD RECIPIENT 2021: JORGE LLORENTE-BOUSQUETS

Jorge Llorente-Bousquets' research on Mexican butterflies has had a great impact on biodiversity, taxonomy and biogeography over the past three and a half decades. Together with his established research group, he has assembled the most important institutional collection of Lepidoptera in addition to Siphonaptera. Jorge's research is highly regarded by his colleagues and peers, most notably for the series of books that he has edited and published, and for the numerous taxonomic distribution studies he has completed in numerous languages. The research published by Jorge for studies in Mexico and on Mexican butterflies has been cited in over 2,500 publications and forms the reference base for studies in Mexico and Mesoamerica. Briefly, Jorge has directed 49 graduate and undergraduate theses and has published 142 papers about half of which focus on Lepidopteran biodiversity and biogeography. As noted, at least 123 of his papers and 34 popular articles have been cited in over 2,500 publications. In addition, together with his research group, he has participated in the construction of the largest curatorial, taxonomic, and bibliographic reference data base in Latin America. Jorge has received a number of prestigious awards and served in numerous official roles: 1) National Researcher, Level 3, Sistema Nacional de Investigadores de Mexico since 1985; 2) International Coordinator of the Red Iberoamericana de Biogeografía, y Entomología Sistemática CYTED (Ciencia y Tecnología para el Desarrollo) 2002-2006; 3) Vice President of the Lepidopterists' Society, 1993-1994; 4) Vice-President and founding member of the Sociedad Mexicana de Lepidopterología; 5) Coordinator of the Zoology Museum at the Department of Sciences, UNAM, 1978-1991; and 6) Awards of Special Distinction in 1989 and 2003 from UNAM, for excellence in teaching. The Karl Jordan Medal was established to recognize original research in the fields of systematics, taxonomy, biology, phylogenetics, natural history and biogeography of Lepidoptera. Jorge Llorente-Bousquets' research, especially on Mexican butterflies but also on Central and South America, is exceedingly significant. It is for all of the above that the 2021 Committee recognizes Jorge Llorente-Bousquets with the Karl Jordan Medal.

Reduction of Lep Soc page charges continued

Due to the continuing COVID-19 pandemic, The Journal of the Lepidopterists' Society will continue reduced page charges for members to \$25 USD per page. This policy will remain in effect for the duration of Fiscal Year 2022 (July 1, 2021 – June 30, 2022). If you are an author and/or a member that has a paper already in lay-out, or has a paper that has been accepted but not-yet-published, the Editor will automatically up-date your page charge assessment. Questions regarding this approach to reducing financial burden for members should be sent to the Editor directly at KSummerville@drake.edu.



Cethosia biblis, Kunoong cha-nong trail, near Betong, Betong district, Yala province, Thailand, early July, 2017, photo by Bill Berthet (see related article, page 168).

Easter April 2021: a “chocolate” caterpillar surprise -- *Satyrium polingi* (Barnes & Benajamin, 1926)

Bill Beck

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(photos by the author unless otherwise indicated)



Final Instar *Satyrium polingi* larva. I had never guessed a Poling's hairstreak caterpillar would look like this! Did you?

Now I've had my share of chocolate Easter eggs and chocolate Easter bunnies, but a chocolate caterpillar for Easter 2021? Come on now, aren't *Satyrium* caterpillars all green? You can see that *Satyrium polingi* larvae are definitely “chocolate”!

Look back into 2020:

Bill Dempwolf (Austin TX) has an interest in west Texas hairstreaks, and so do I! *S. polingi* were often in discussions I had with Bill D. and with Jim Brock (Tucson AZ). Jim is another keen aficionado of west Texas butterflies. Though found in most butterfly guidebooks and references, there seemed few specifics about the *S. polingi* life cycle. We could find no pictures or descriptions for *S. polingi* larvae! In 2020 with Jim Brock's encouragement we (consciously or unconsciously) aligned our efforts, and got busy to document the *S. polingi* life stages.

Methods:

Spring of 2020 was a banner year for *S. polingi*, at least in some Texas locations. Bill D. got a head start! Bill reported a spring trip to southwest Texas where he found an abundance of *S. polingi* roadside, around oak trees and nectaring on milkweed. He saw many individuals and even mated hairstreak pairs. Wanting to raise a brood he collected a few females for eggs, and he was successful in obtaining eggs. His area had experienced a reasonable rain-fall season, and the hairstreaks had taken notice.

I made a couple trips to Texas forthwith to try and repeat Bill's success. In late April 2020 I too caged several females with the local host tree, gray oak (*Q. grisea*). The cage was kept indoors. Host plant and a few nectar flowers were set up in water to keep them as fresh as possible. In addition to plants, diluted 1:10 honey water was refreshed on a pad for butterfly food use. The caged females (in both cases) oviposited on twigs having rougher bark and or near new growth twig joints, and they seemed more attracted to branches with plant new growth or acorns.

Overwintering eggs:

Satyrium hairstreaks oviposit in spring/summer; the eggs diapause thru winter until hatching the following spring. There are environmental trigger(s) that “restart” the development process so that the eggs hatch at exactly the time for the very best food source for hatchling caterpillars. Bill overwintered eggs just outside his house on his porch, Austin being similar to the local *S. polingi* needed climate. On the other hand, in Tucson, I decided to put eggs into a refrigeration mode (refrigerator literally), to make sure they had a cool winter to address diapause needs.



Left: Poling's Hairstreak egg; did you expect the pink/plum color? Below: *S. polingi* hatchling.





Left to right: being Tended by Ant, April 4; late 1st instar; first "Chocolate" larva (2nd instar), April 3; 2nd instar compared to 1st instar.

On into 2021: Breaking Diapause:

Keeping an eye on his *S. polingi* eggs, Bill saw his first hatching the last week of March 2021! The first Poling's larva (OF COURSE I was envious!). The tiny instar is a reddish/plum color, with a long set of light colored setae as it emerges from the egg. By happenstance my wife Jane and I were just leaving Tucson in our RV (for Florida), driving thru west Texas at this **exact time**; and decided to take a day to check the area where *S. polingi* adults were the previous spring. (I had just removed my *S. polingi* eggs from the refrigerator when leaving Tucson, taking them with us). I thought we'd be too early to see any caterpillar activity. The *Q. grisea* in the Texas area had just barely started to bud and grow catkins. However lo and behold we found several small BROWN caterpillars feeding on the buds! This gave me MY very FIRST eyeballs on a *S. polingi* caterpillar! We found 1st and 2nd instar larvae.

We had never seen *S. polingi* larvae, so we were happy to see that the larvae we found matched with Bill D's pictures (proof of ID). We took the time to return the next day and found more larvae. We took three "wild" larvae with us and stocked up some oak for food. A productive way to find larvae was to look for ants on oak limbs. Often an activity of ants would expose a larvae location. It seemed the *S. polingi* 1st instar larvae were "facultatively" tended by ants, which is some cool news too! Bill D. was able to have Alexander Wild identify these ants as *Liometopum luctuosum*. Later instars develop a large and active dorsal nectary organ (DNO), undoubtedly maintaining a close relationship with ants.

Host and feeding:

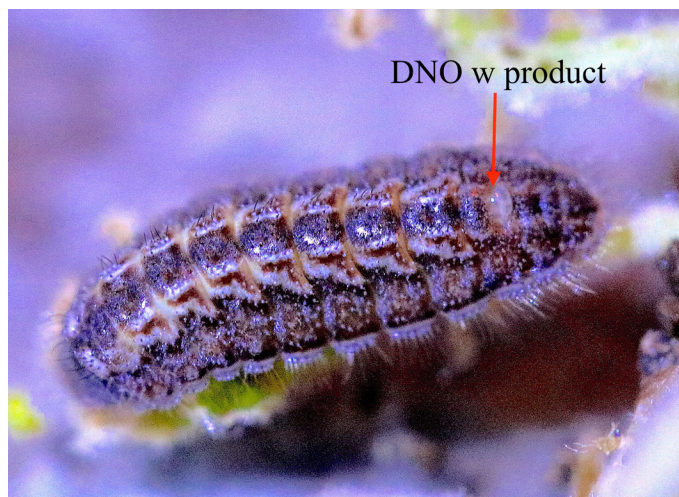
We lucked out traveling thru Texas just as the larvae were emerging...so that we could collect *Q. grisea* host plant

to feed them. As you see in the pictures, these were bare limbs, with leaf or catkin buds just in "burst" mode.

Bill Dempwolf did not have *Q. grisea* at his house, so he substituted a neighbors' *Q. virginiana* (leaves). Unfortunately, Bill D's larvae seemed to have issues using the live oak leaves, and many larvae died; only a few made it through.

Our eggs from Tucson starting hatching April 8th. By day four after the first hatching, one could see the larvae were molting. Though still quite small, they had grown immensely and changed to the 2nd instar shape we'd found in the field. With day eight came third instar, again a change in color (darker) and new setae. They grew quickly with both size and appetite.

After thirteen days there were last instars, which, though similar in appearance, continued to get very much larger.



Early 3rd instar, with active dorsal nectary organ.



Above, top to bottom: late 3rd instar larva; 2nd and 4th instar larvae; 4th instar larva "losing" pigmentation.

Above, top to bottom: prepupa day 16; fresh pupa with skin cast day 23; "aged" pupa ventral side.

As last instars, after a couple days of feeding, they "traveled" around, not eating, just before pre-pupation. Interestingly they lose or "remove" almost all the pigment of the larval pattern on the last day! Would this be the time in the wild when they crawl down the trunk of the oak tree and find a pupation site on the ground in duff, as has been documented for other oak hairstreaks? We should find out. In the pre-pupal state, they shrink in length, lose most of their external shape, and become a yellow-green oval.

Next comes the pupal stage after another skin-change. With pupae preparing to eclose to adult, the wing area visible thru the pupal skin got noticeably darker almost overnight as the wing membrane was pigmented. You can see the difference.

Once eclosed out of the pupal skin (almost an instant move), the adult finds a place to rest vertically, and there expand its wings for opening and hardening. This also happened quickly, 10 or 12 minutes at most, to full wing extension. Once fully open, the butterfly would rest for a couple hours before movement and flight.

Background and Observations:

S. polingi was described in 1926 (1). Of interest is a delightful article from 1962 of a successful and challenging trip

(Reinthal and Kendall) collecting *S. polingi* in west Texas (2). An *S. polingi* subspecies (*organensis*) was described in 1980 from the Organ Mountains near Las Cruces, New Mexico (3). Research work was done for this New Mexico subspecies in 2012 in efforts to establish its range and status (4). There was work done on egg shape ("Chorionic Sculpturing in Eggs") which included the *S. polingi* eggs in '81 and '84 (5)(6). And though *S. polingi* larvae were not included, Ballmer & Pratt had the closely similar *S. auretorum* larvae in their classic study that is worth checking out (7)!

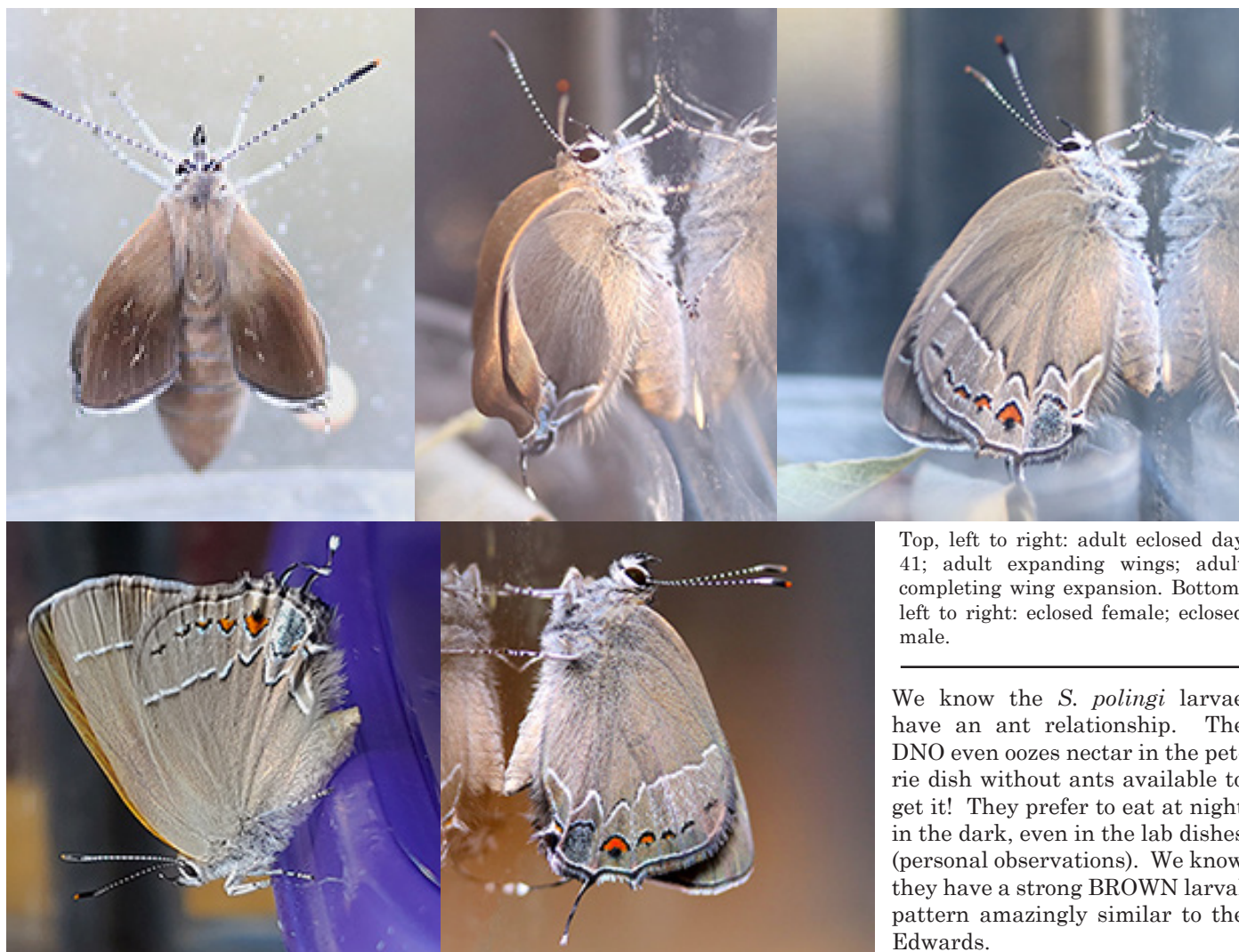
The Poling's Hairstreak is an oak-associated hairstreak in the Trans-Pecos area of west Texas, New Mexico, and WAY into Mexico. Specimens have been collected far down in Mexico; for example, in 1971 Robert K. Robbins

collected specimens in Hidalgo, Zimapan, Tamazunchale 20.73667 -99.38806 (8); that is 600 miles south of the Big Bend of Texas. It would seem its range is largely south of the US border.

From DNA work the closest *S. polingi* siblings in *Satyrium* in "young to old branches" are, *S. favonius* and *S. ilavia*, then *S. auretorum* and then *S. polingi* (Zhang et al.) (9) (see plates page 189).

Behaviorally I've observed adult *S. polingi* seem very typical to other oak associated *Satyrium*. For instance, males holding strategic mate-watching positions on host/trees, though often leaving the perch to chase or patrol quickly around the local area, quickly return to the perch. Females are usually much less obvious. Female adults move slowly but more continuously, traveling through bushes, crawling around host tree limbs looking for good egg sites.

Both *S. polingi* sexes used white and yellow flowers, on plants having active blooms at locations near their colony. I have personally documented both *S. ilavia* and *S. favonius* "sipping" oak honeydew and bet *S. polingi* does too. A study of "Northern Oak Hairstreak" *S. favonius ontario* showed that oak hairstreaks may be well provided for on oak honeydew alone (10)!



Top, left to right: adult eclosed day 41; adult expanding wings; adult completing wing expansion. Bottom, left to right: eclosed female; eclosed male.

We know the *S. polingi* larvae have an ant relationship. The DNO even oozes nectar in the petrie dish without ants available to get it! They prefer to eat at night in the dark, even in the lab dishes (personal observations). We know they have a strong BROWN larval pattern amazingly similar to the Edwards.

WHY THE BROWN LARVAE?

Oak associated *Satyrium* typically have green late instar larvae, or so I thought! Why are *S. polingi* larvae shades of brown? Does this make sense for a larva that hosts in oak trees? It must be an acquired trait with an evolutionary advantage?

Here is an interesting thought:

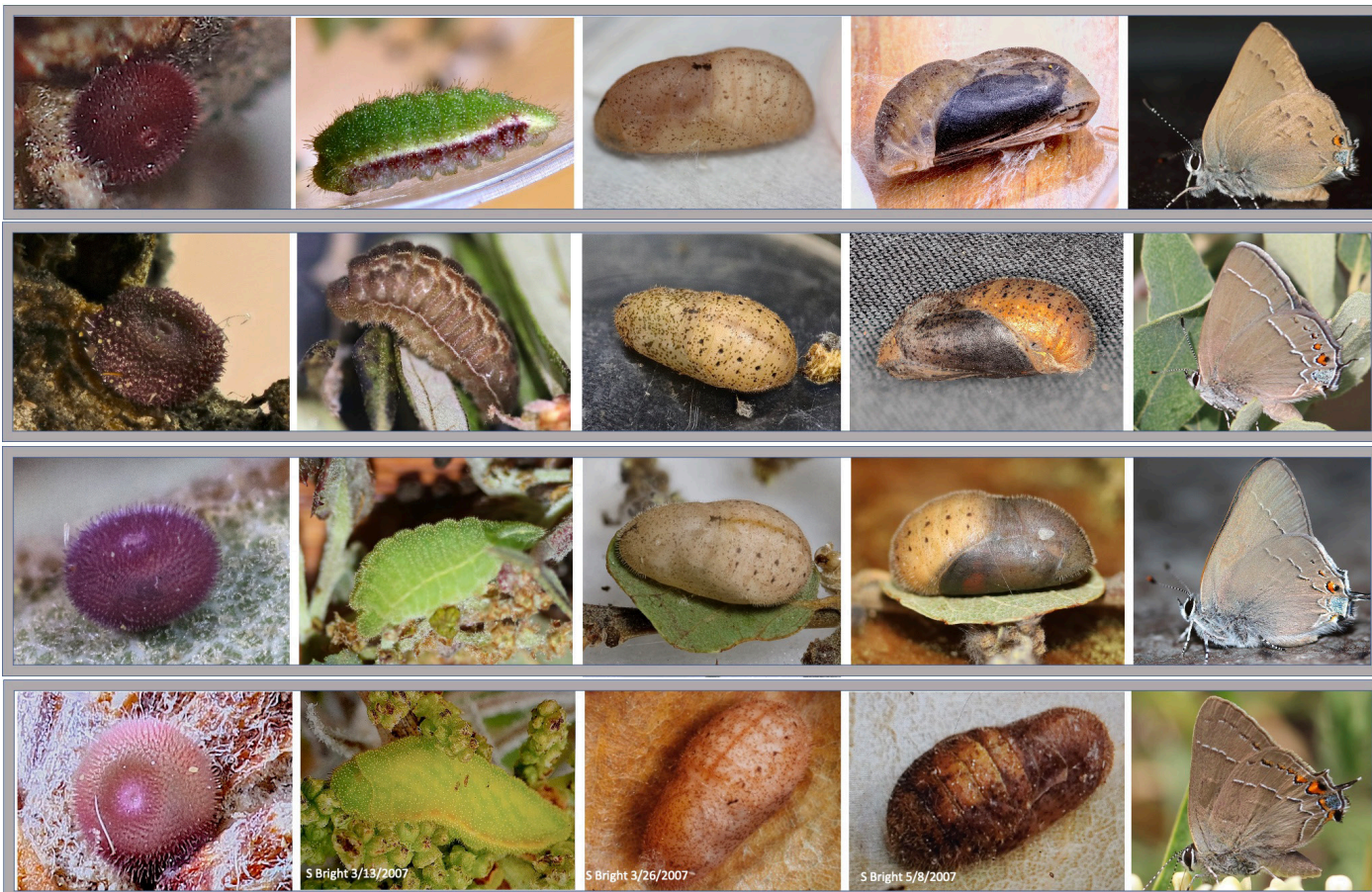
The Edwards hairstreak (*S. edwardsii*) is a *Satyrium* in the phylogeny near Hickory (*S. caryaevorus*) and Banded (*S. calanus*) Hairstreaks. The striking behavioral uniqueness of *S. edwardsii* is their symbiotic relationship with ants. Larvae feed at night, and ants escort them down to underground chambers during the day and back up at night (11). NOW if you were going up and down oak trees in the dark, and or underground....would it not be camouflaged if the larvae were a very dark brown? AND you guessed it, *S. edwardsii* larvae are brown with similar color and patterns that we see for *S. polingi*. (We also know that *S. californica* larvae are unusual in their dark brown color, but there is little information on them.)

Could we postulate that if we study in more depth, we may find a similar or parallel niche? What do you think?? Maybe or maybe not! Can't wait to learn and find out.



S. Bright 4/26/2021

Edward's hairstreak (*Satyrium edwardsii*) larva (photo by Sara Bright)



Life cycle comparisons between related species: top -- *Satyrium auretorum*, second row -- *S. polingi*; third row -- *S. ilavia*; bottom -- *S. favonius*.



Adult comparisons between related species (males and females): top, left -- *Satyrium auretorum*, top, right -- *S. polingi*; bottom left -- *S. ilavia*; bottom, right -- *S. favonius*.

I had lots of help! Thanks to Bill Dempwolf for being out in front of this larval effort (and sending photos!), for locations and encouragement to Jim Brock, for ant informa-

tion to Alexander Wild, for discussions and email exchanges with Steve Cary and Robert Robbins. And thanks for needed *S. favonius* and *S. edwardsii* photos to Sara Bright!

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3. gbif.org/species/5714812
4. mothphotographersgroup.msstate.edu/species.php?hodes=4333
5. en.wanweibaike.com/wiki-Satyrium%20polingi

S. polingi Taxon Identifiers:

Wikidata: Q16758462
 BioLib: 703088
 BOLD: 300120
 iNaturalist: 230444
 ITIS: 777828
 NCBI: 2753056

Membership Updates

Chris Grinter

Includes ALL CHANGES received by November 14, 2021. Direct corrections and additions to Chris Grinter, cgrinter@gmail.com.

New Members: *Members who have recently joined the Society, e-mail addresses in parentheses. All U.S.A. unless noted otherwise. (red. by req. = address redacted by request)*

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Notes concerning the migration of *Euploea* (Lepidoptera: Nymphalidae: Danainae) on Palawan Island, Philippines

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Abstract: This paper describes the possible migration of *Euploea* (Lepidoptera: Nymphalidae: Danainae) based on the observations on the eastern coast of Palawan Island, Philippines.

Key words: *Euploea*, migration, Palawan, Philippines
Introduction

Many animals migrate to escape harsh environmental conditions or take advantage of seasonally available food resources before the organism or its direct descendants return to the initial location. Migration differs from dispersal because the former is always active (self-directed), whereas the latter is often passive. In addition, dispersal is usually unidirectional (Cloudsley-Thompson 1988; Dingle and Drake 2007). Some insects migrate over one or more generations (Dingle 1996), and the annual migration of the monarch butterfly (*Danaus plexippus*) from the eastern United States and Canada to overwintering sites in Mexico has been well studied (Calvert & Brower 1986). The Painted Lady butterfly, *Vanessa cardui* (Shields 1992), perhaps the most widely distributed butterfly on the planet, migrates over multiple generations in response to seasonal changes (Stefanescu *et al.* 2013; Talavera & Vila 2017; Stefanescu *et al.* 2017), wind currents (Stefanescu *et al.* 2007), and other factors.

At least 568 species of butterflies are known to migrate (Chowdhury *et al.* 2021), including many *Euploea* F species. In Brunei, *Euploea crameri* Lucas 1853; *E. algea* Godart 1819; *E. sylvester* Fabricius 1793; *E. radamanthus* Fabricius 1793; *E. mulciber* Cramer [1777]; *E. eyndhovii* C. & R. Felder [1865]; and *E. phaenareta* Schaller 1785 (Orr 1992) have been recorded migrating. In Taiwan, species including *E. tulliolus* Fabricius 1793, *E. mulciber*, *E. eunice* Godart 1819, and *E. sylvester* migrate (Wang & Emmel 1990) from the north of the island to the south to spend the winter. *Euploea core* Cramer [1780] and *E. sylvester* in India are also known to migrate (Kunte 2005). There are 13 species of *Euploea* in the Philippines including 2 endemics (Treadaway 2012; Treadaway and Schroeder 2012), but no prior reports of butterfly migration.

Evidence of migration and future research

Large numbers of *Euploea* butterflies have been observed flying in the same direction southwest from northern

Palawan towards the central region of the island (Treadaway pers. comm. 2017); these were likely *E. swainson* Godart [1824] (ssp. *butra* Staudinger 1889 occurs in Palawan, Cuyo, Calamian, and Dumaran), *E. midamus* Linnaeus 1758 (ssp. *clorinde* Staudinger 1889 occurs in Palawan), or *E. eyndhovii* (ssp. *distinctissima* Fruhstorfer 1911 occurs in Palawan). This behavior is similar to observations of other migratory butterflies by Shapiro (1986) and Burwell *et al.* (2011). Most of the sightings and observations were on the eastern part of Palawan, either on land or at sea (around 2 km from the nearest shore), and *Euploea* were recently observed in March 2021 within a 1-kilometer radius of El Nido. There have been no attempts to make observations south of El Nido. The *Euploea* butterflies were observed nectaring, and no oviposition was observed, although the life history of *Euploea swainson* was documented in a nearby area by Badon & Apolonio (2020) from a single caterpillar.

Although migration has been observed in many other Danaini butterflies around the world, it is unclear whether this mass movement constitutes one-way dispersal or true migration in which adults fly to a destination before they or their descendants return to the starting location. Mass, unidirectional movement has been observed in some butterfly species including *Catopsilia pomona*, the Lemon Migrant, and are thought to occur when an outbreak of a single species overwhelms the available host plants in a given area, prompting what is believed to be a mass exodus in search of new oviposition sites, often aided by the wind (Dingle *et al.* 1999). Since most migrations involve movement to escape cold weather and Palawan is tropical year-round, the motivation to migrate (*Zugunruhe*) may stem from biotic drivers, such as host plant searching or escape from predators. According to Hu *et al.* (2018), factors such as mass and wing beats may influence the migratory capabilities of insects. Further observations or experiments may extend knowledge of movement patterns and their likely causes in the Danaini of the Philippine islands.

Acknowledgements

The author would like to thank Jason Roy B. Apolonio and Jamie Dichaves for their information about the *Euploea* butterflies in El Nido Palawan. I would also like to thank David J. Lohman for his comments and suggestions in improving this paper.

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Figures 1-2. *Euploea* butterflies nectaring en masse in El Nido, Palawan; *Euploea* butterflies flying and feeding along roadside

(See back cover for an additional Figure)

Casual observations on the juvenile biology of *Faunis phaon* (Nymphalidae: Satyrinae, Amathusiini), a poorly understood Philippine endemic butterfly

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The nymphalid butterfly *Faunis phaon*, henceforth appropriately called the Philippine Faun, occurs only in the Philippines with the main exception of Palawan and neighboring small islands (Aoki et al., 1982). Although said to be common across most of its range (Treadaway & Schroeder, 2012), its forest-dwelling habits and cryptic appearance undoubtedly contribute to the scarcity of sightings and information about its life history. Indeed, apart from what was presented for the first time by Igarashi & Fukuda in 1997, the below observations represent only the second such concerted attempt to expand our scientific knowledge of this secretive butterfly.

Faunis phaon was reared inside a large netted enclosure at Mafe's Butterfly Garden Café (14°35'26.8"N 121°36'58.4"E), a popular local hangout located in Real municipality, Quezon province, Luzon island, Philippines. Treadaway & Schroeder (2012) record six subspecies of *F. phaon* for the country, two of which are found on Luzon: nominate *F. p. phaon* in the north and on the Babuyan Islands, and *F. p. pan* – the subject of this report – in the south and on the adjacent islands of Polillo, Marinduque, and recently Catanduanes (Aoki et al., 1982; Mape et al., 2021).

As stated above, the account in Igarashi & Fukuda (1997) constitutes our only understanding of this endemic species, until now. Thus, to more widely publicize the findings of that second author, Haruo Fukuda, who spent many weeks as a guest at the University of the Philippines, Los Baños, documenting the immature stages of numerous nearby butterflies, the following modified summary of his salient points is provided. It should be noted that the source of Mr. Fukuda's livestock was Mount Makiling, which is 67 km from the subject study site and represents the same subspecies, *F. p. pan*.

Hostplant: *Caryota cumingii* (Arecaceae).

Adult behavior: Flies near the ground in sparsely wooded, sunny areas and forest fringes; often perches on fallen leaves; prefers rotting fruits and does not visit flowers. A female was witnessed to oviposit on a three-meter-tall palm, taking five minutes to lay a group of eight closely spaced

eggs on the undersurface of a frond (Fig. 1); oviposition occurred at midday, but probably at dusk on sunny days.

Ova: Spherical, shiny white, 1.4 mm in diameter; surface covered with minute many-sided polygons with concave centers; prior to hatching, a brown latitudinal "ripening ring" appears (Fig. 1); duration 6-7 days.

Larvae: After eating their eggshells, the hatchlings began feeding on the edge of a frond and occasionally elsewhere; gregarious in all instars, at times splitting into smaller groups; first instar pale yellow, later becoming white, duration 5-6 days; second instar length 14 mm, duration not recorded; third instar duration 4 days; fourth instar duration 8-9 days; fifth (last) instar body length 57 mm (Fig. 1), duration 10-11 days.

Prepupae: Duration 1 day.

Pupae: Green with paler green spiracles; length 32-33 mm, width 11 mm, height 10-11 mm (Fig. 1); duration 13-14 days.

Resulting imagoes: Forewing length ♂ 34-36 mm (Fig. 1), ♀ 40-44 mm.

For the enjoyment of their patrons and visitors, Mafe's Café, which sits in a jungle-like area 100 m from the beach, has an adjacent butterfly garden filled with flowers that features live adults from the surrounding forest. It was into this netted large enclosure that a three-foot-tall coconut palm (*Cocos nucifera*, Arecaceae) was transplanted from outside in January 2021 which, unbeknownst to everybody, harbored one or more clusters of *F. phaon* eggs. When 25 or so caterpillars were first noticed on 3 April 2021, the biggest measured approximately 35 mm long (Fig. 2) and seemed to be in the early half of their final instar. The maturing larvae quickly consumed all of the coconut palm, then moved over to the closest leaf, a banana (*Musa* sp., Musaceae), and also a ti plant (*Cordyline fruticosa*, Asparagaceae), both readily eaten. Note the utilization of three different monocot families, a foodplant trait common in the genus *Faunis*, while related genera in the tribe Amathusiini feed upon a wide variety of these and other

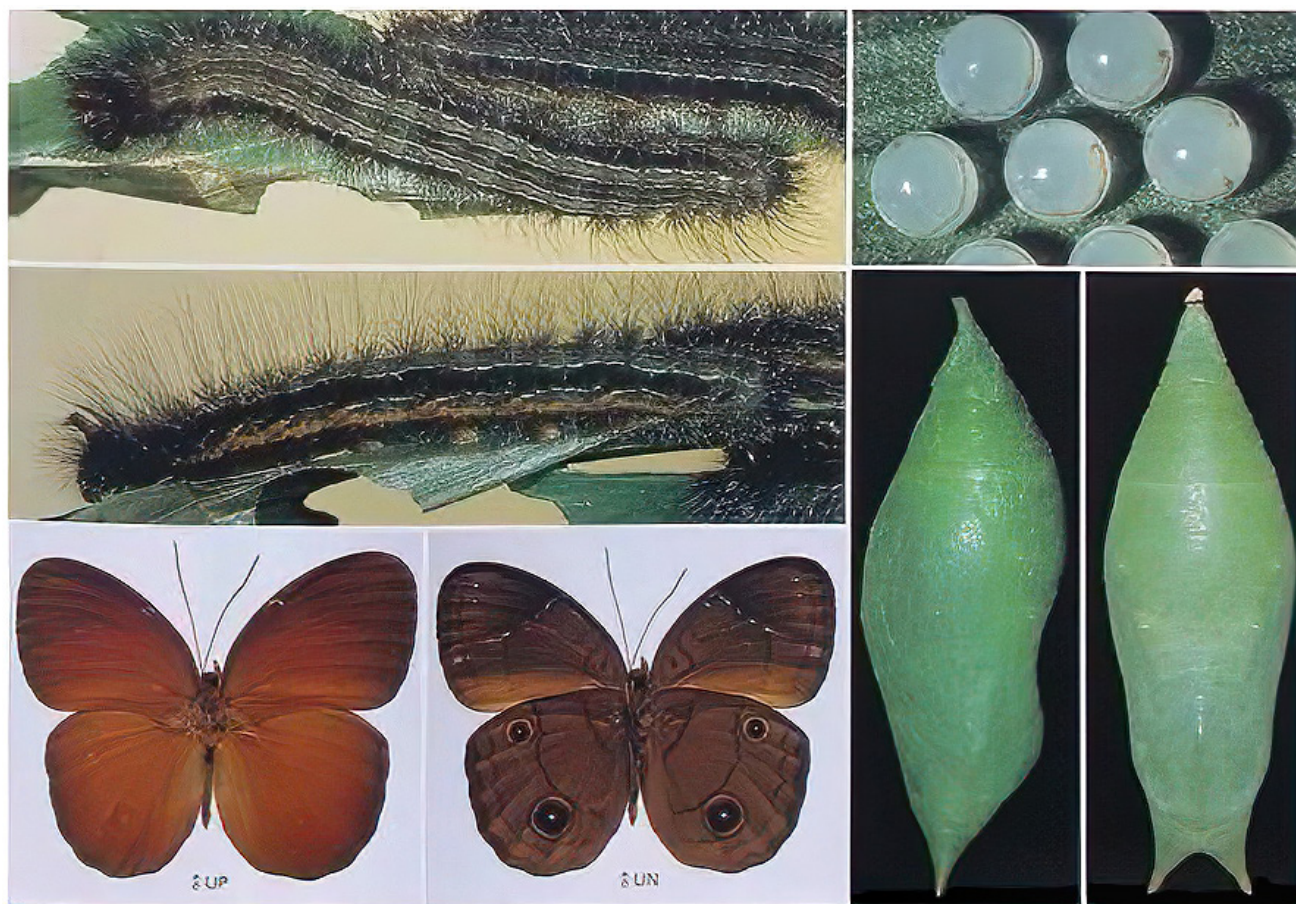


Fig. 1. *Faunis phaon pan* ex Igarashi & Fukuda (1997), Plate 131, reproduced with second author's permission.



Fig. 2-5. *Faunis phaon pan* early last instars on *Cocos nucifera* (Arecaceae), 7 April 2021, ~35 mm; *F. phaon pan* late last instar on *Cocos nucifera* (Arecaceae), 27 April 2021, 55+ mm; *F. phaon pan* late last instar on *Musa* sp. (Musaceae), 27 April 2021, 55+ mm; *F. phaon pan* damaged adult at Mount Labo, Camarines Norte, Luzon, Philippines, 4 Sept. 2017, Lèx Maranan, used with permission. Figs. 2-4 by Mariano Feurtado.

monocots plus one gymnosperm (KVV, pers. data). To prevent likely predation by ants, a number of the caterpillars were subsequently transferred to an indoor glass case where they continued to grow on freshly cut host leaves placed in containers filled with water, the largest larvae reaching a soon-to-pupate body length on 20 April 2021 of 55 mm, with the head "horns" and "tails" making for a total length of 60 mm. There they remained, pupating mostly on the glass lid covering the secure case beginning on 21 April 2021, with the first adult emerging on 1 May 2021. Unfortunately, due to business priorities and time limitations, no further rearing observations or quality photos were recorded for the chrysalises (but see Fig. 1) or resultant imagoes (but see Fig. 5).

Judging from the pictures of caterpillars taken with a Samsung Galaxy S10e cellphone, early last instars (Fig. 2) appeared uniformly blackish gray in color with numerous white dorsal and lateral longitudinal lines, long white body hairs that were especially dense on the thoracic segments, orangish spiracular spots, pale brown true legs and prolegs, shiny black head capsule, two well-developed brown "horns" with paler bases that were topped with several short black "spines", and two pointed tiny "tails". Late final instars looked very much the same (Figs. 3 & 4), except that

the dorsal and lateral longitudinal lines became brownish, as did the long body hairs, and the orangish spiracular marks were now more prominent. In comparison, Igarashi & Fukuda (1997) reported the abdomen of mature larvae as being dark green with whitish green longitudinal lines. Upon eclosion, all adult butterflies were released outside into the large netted enclosure where they lived for a maximum of about seven days, being very active in the morning and flying low to the ground and always together. No mating or ovipositing behaviors were seen.

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Floyd W. Preston (1923 - 2021) In Remembrance

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It's over 1000 miles from Los Angeles to Lawrence, KS but my summer travel plans over the years usually included a stopover to visit a fellow native Angeleno and educator, Floyd Preston and his wife, June. We became personally acquainted during the late 1970s and they always sent me their annual December holiday greetings together with a lengthy family newsletter. Along with their seasonal collecting outcomes, I was also informed when and how they planned to declutter their home.

By 2018, I remember thinking that, by this date, they must have collected everywhere in western North America where there are butterflies. Two more itinerant collectors you probably have never met, assuredly earning them the privilege of having two butterflies named for them (*Lycaena mariposa junia* and *Anthocharis julia prestonorum*). They were seemingly inseparable and were among the most personable, outgoing folks that I've had the pleasure of knowing.

Admittedly, though, I was never convinced that Floyd knew as much about butterflies as June and so I occasionally wondered if this perceived inequality might have led

to occasional domestic strife. Their absence from among us has already become noticeable in the Season Summaries. Perhaps in another world or dimension there are butterflies for both Floyd and June to collect. Under my shaded patio overhang in September, a single Monarch butterfly, instead of visiting my backyard milkweed, flew back and forth in front of me, as if beckoning me to follow or chase it. I would like to think that it contained Floyd's spiritual being, attempting to guide me to a good collecting spot in my own neighborhood. I hesitated, however, and remained seated. If this collecting spot turned out to be poor, Floyd's spirit would most likely have moved on by the time I got there. No matter, though...

Floyd and June are not really gone if they are remembered.



Notes on the correlation between the sightings of *Heliconius charithonia* in the east and passage of tropical cyclones in 2020

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Introduction

Heliconius charithonia (zebra heliconian, zebra longwing, zebra) is a butterfly of medium size with wings black but accented with distinctive yellow/light green horizontal stripes. Flight is shallow/fluttery and usually within 10-12 feet of the ground. The species is classified within the family Nymphalidae, subfamily Heliconiinae, tribe Heliconiini. Taxonomists currently recognize as many as 459 species and subspecies within the tribe—commonly referred to as “heliconians.” Many members are so charismatic that they have become standard features in butterfly conservatories, aka “butterfly houses” or “vivaria.” The tribe is exclusively Neotropical, i.e. the frost-free land masses in the Western Hemisphere. Heliconians are often referred to as “passion-flower butterflies” because of their exclusive reliance on plant species known as passionflower vines (*Passiflora* spp.) for reproductive hosts. These butterflies have three additional exceptional traits: (1) longevity (upwards of nearly one year), (2) the ability to learn the exact positions of their food and host plants, and return to them repeatedly, and (3) the ability to ingest not only nectar but pollen for nutrition.

H. charithonia has the most northern limit of species within the tribe Heliconiini. According to Opler and Krizek (1984) “The Zebra occurs from the extreme Southeast and southern Texas south through the West Indies and Central America to Venezuela and Peru. In the eastern United States, the species is resident in peninsular Florida and the Keys. Occasionally, emigrants will establish breeding populations in coastal South Carolina, southern Georgia, and along the Gulf, but these are usually killed by freezing winter weather. Vagrants have been found in Illinois, Missouri, and Arkansas.”

Since as early as 1863, there have been sightings of this butterfly from western, eastern, and southern Louisiana (LA). Furthermore, the species has been sighted in southern Mississippi (Ocean Springs) and Alabama. In addition, Walter Inglis Anderson (WIA) (1903-1965), the iconic Ocean Springs artist/naturalist, included *H. charithonia* as one of the eleven species illustrated in his famous linoleum-wood block butterfly prints—an indication that *H. charithonia* may be a permanent resident in southern Mississippi (see Ross a, b, Ross, 2021).

As a life-long resident of southern LA with a strong interest in native (and introduced) butterflies, *H. charithonia*

has always piqued my curiosity. In 2015 I decided to initiate research on the possible occurrence of the butterfly along the Gulf Coast. [See my previous articles, Ross 2016a, 2016b.] Bottom line: Although two host plants—*Passiflora incarnata* and *P. lutea* are well established native species throughout the entire region, *H. charithonia* apparently does not maintain permanent populations in Louisiana, Mississippi, or Alabama. Instead, the butterfly species should be regarded as an opportunistic colonizer that periodically moves northward from established breeding colonies in peninsular Florida and perhaps even from Caribbean islands farther south. Furthermore, I hypothesized that this northward immigration might easily be facilitated by the passage of late season tropical storms and hurricanes. In the fall of 2020, I was able to amass important data to support that hypothesis.

Data

The year 2020 provided excellent data to reinforce my earlier hypothesis. Besides being traumatized with the COVID-19 pandemic, the Gulf and East coasts of the United States were slammed by no less than 12 named tropical weather systems. The coastline of the Gulf of Mexico was hit hardest. For example:

1. Tropical Storm Cristobal, June 7, southeastern LA
2. Hurricane Hanna, Category 1, July 25, Padre Is., Texas
3. Hurricane Sally, Category 2, August 16, Mobile Bay, Alabama/Pensacola, Florida
4. Tropical Storm Marco, August 24, mouth of Mississippi River, Louisiana
5. Hurricane Laura, Category 4, August 27, Cameron, LA
6. Tropical Storm Beta, September 21, Matagorda Peninsula, Texas
7. Hurricane Delta, Category 2, October 9, Creole, LA
8. Hurricane Zeta, Category 2/3, October 28, Cocodrie, Louisiana

The following tropical cyclones impacted the Atlantic East Coast:

1. Tropical Storm Bertha, May 27, Charleston, South Carolina
2. Tropical Storm Fay, July 10, New Jersey
3. Hurricane Isaias, Category 1, August 3, Ocean Isle Beach, North Carolina
4. Tropical Storm Eta, November 8, Florida Keys



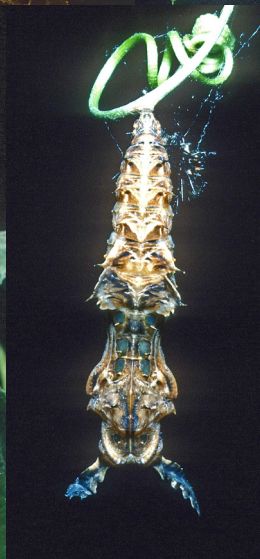
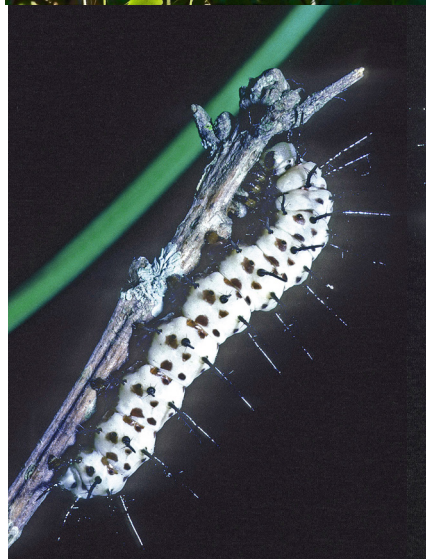
Adult on dwarf palmetto leaf (*Sabal minor*). Baton Rouge, LA, Oct. 1993 (photo by Gary N. Ross)

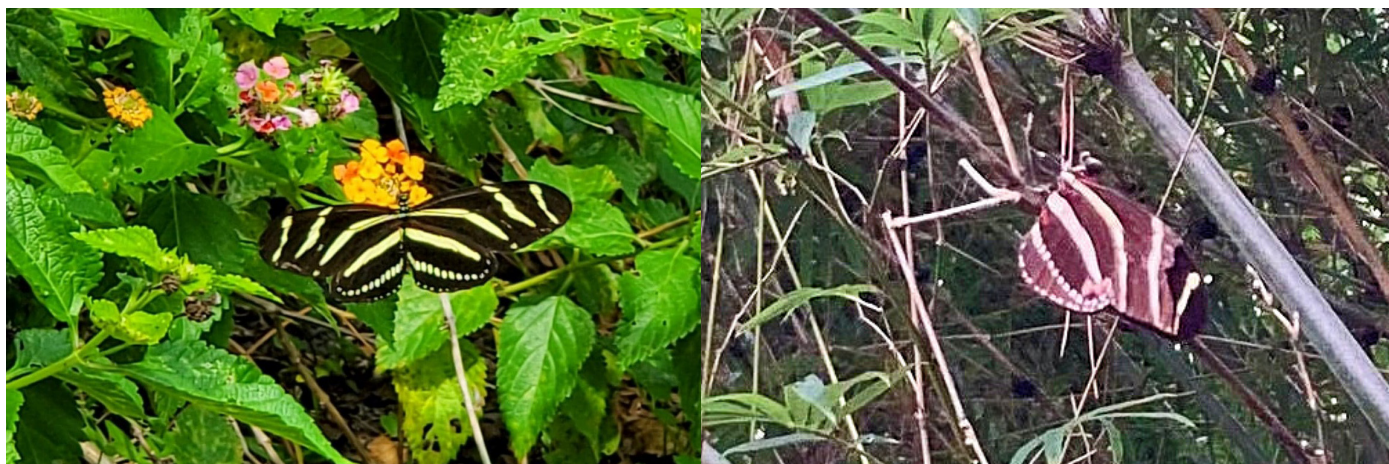
Understandably, the maelstrom of wind, rain, and flood water associated with these severe weather events caused extensive to catastrophic damage to not only human communities but to local environments as well. Louisiana, with five separate landfalls—including two within only a little more than a two-week period—was particularly impacted. And when it comes to insects that rely on air currents for mobility and dispersal (butterflies, for example), alterations in distribution should be anticipated.

Case Number 1. September 11, 2020. **Mississippi.** Peter Wade Anderson (b.1975), son of James Anderson (b. 1942), grandson of Peter Anderson (1901-1984), and grand nephew of Walter Inglis Anderson (1903-1965), is a contemporary potter at SHEARWATER POTTERY LTD. in Ocean



Life cycle of zebra heliconian (*Heliconius charithonia*). Top, left to right: *Passiflora lutea* (yellow passionflower), a native, small-flowering vine that serves as a host for *H. charithonia*, hanging from pine tree on Anderson state, Oct. 13, 2015; large blossom of *Passiflora incarnata* (purple passionflower) a native host for *H. charithonia*, on Anderson estate, October 13, 2015; eggs on purple passionflower (*Passiflora incarnata*). Baton Rouge, LA, Jan. 1997. Bottom, left to right: mature larva on *P. incarnata*. Baton Rouge, LA, Jan. 1997; mature and second instar larvae on *P. incarnata*, Baton Rouge, LA, Jan. 1997; chrysalis on twig, Baton Rouge, LA, Jan. 1997; adult gathering nectar and pollen on Mexican flame vine (*Senecio confusus*), Baton Rouge, LA, Jan. 1997 (all photo by Gary N. Ross).





Left: adult on bush lantana on grounds of SHEARWATER POTTERY, Anderson estate, Ocean Springs (Jackson Co.), MS, Sept. 11, 2020 (photo by Peter Wade Anderson). Right: Female egg-laying on an ornamental passionflower on residential property. Slidell (St. Tammany Parish), LA, Sept. 12, 2020. (photo by Delores Tousinau).

Springs (Jackson County, Mississippi). The venue is the ancestral estate of the celebrated Anderson artists. I had consulted with Peter during my 2015 research in Ocean Springs. On September 11, 2020, Peter Wade Anderson forwarded me several photographs of a *H. charithonia* nectaring on a red and yellow lantana (*L. camara*) bush that was growing outside the pottery shed in which he worked. Anderson noted that “The butterfly had been visiting the plant for several days during the past week or two.” Sure enough, the photographs were of *H. charithonia*. The fact that Hurricane Sally had made landfall just east of Ocean Springs on August 16 seemed to be more than a simple coincidence.

Case Number 2. September 12. **Louisiana.** Delores Tousinau posted on the website “Louisiana Butterflies and Moths” (www.facebook.com/groups/ButterflyEnthusiasts/) that she observed a zebra heliconian in her yard in Slidell (St. Tammany Parish), LA near I-12 in the extreme south-eastern sector of the state. She also stated that she had “ten passionflowers growing throughout her yard.”

Case Number 3. September 2020. **North Carolina.** The Fall Issue of *Southern Lepidopterists' News* (Editors, 2020), records the following sightings of *H. charithonia* in North Carolina. Both are from the Piedmont:

North Carolina

Polk County (southwestern): August 12
Rutherford County (southwestern): August 29

Case Number 4. **North Carolina and South Carolina.** December 2020 and March 2021. The Winter Issue (Volume 42:4) and Spring issue (Volume 43:1) of *Southern Lepidopterists' News* (Editors, 2020) record the following: In the December 2020 issue, there is a comment by Harry Le-Grand of Raleigh (regional reporter for *News*) about sightings of *H. charithonia* in North Carolina: “...following up

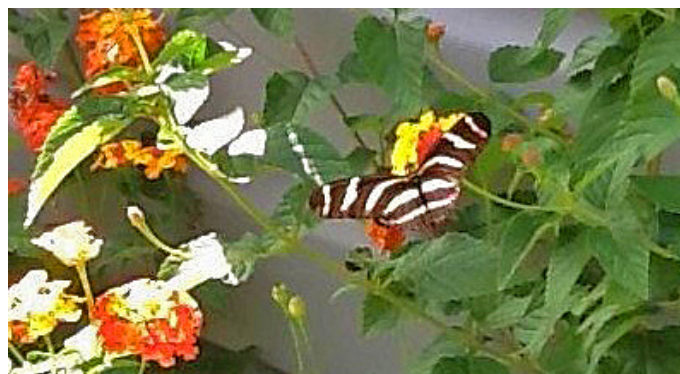
on the two surprising reports from the southwestern Piedmont in summer, there was a remarkable outbreak of this stray into the western half of the state, and it is clear that a small breeding population had been established in this region and in upstate South Carolina.” And in a personal note: “We had a huge number of records in NC in 2020—about 22 records, normally we have 0. Most of these, of course, were in yards and gardens by people who aren’t butterflyers.”

In *NABA Butterfly Counts 2020 Report*, there is an additional note for a sighting in Charleston Co., SC.

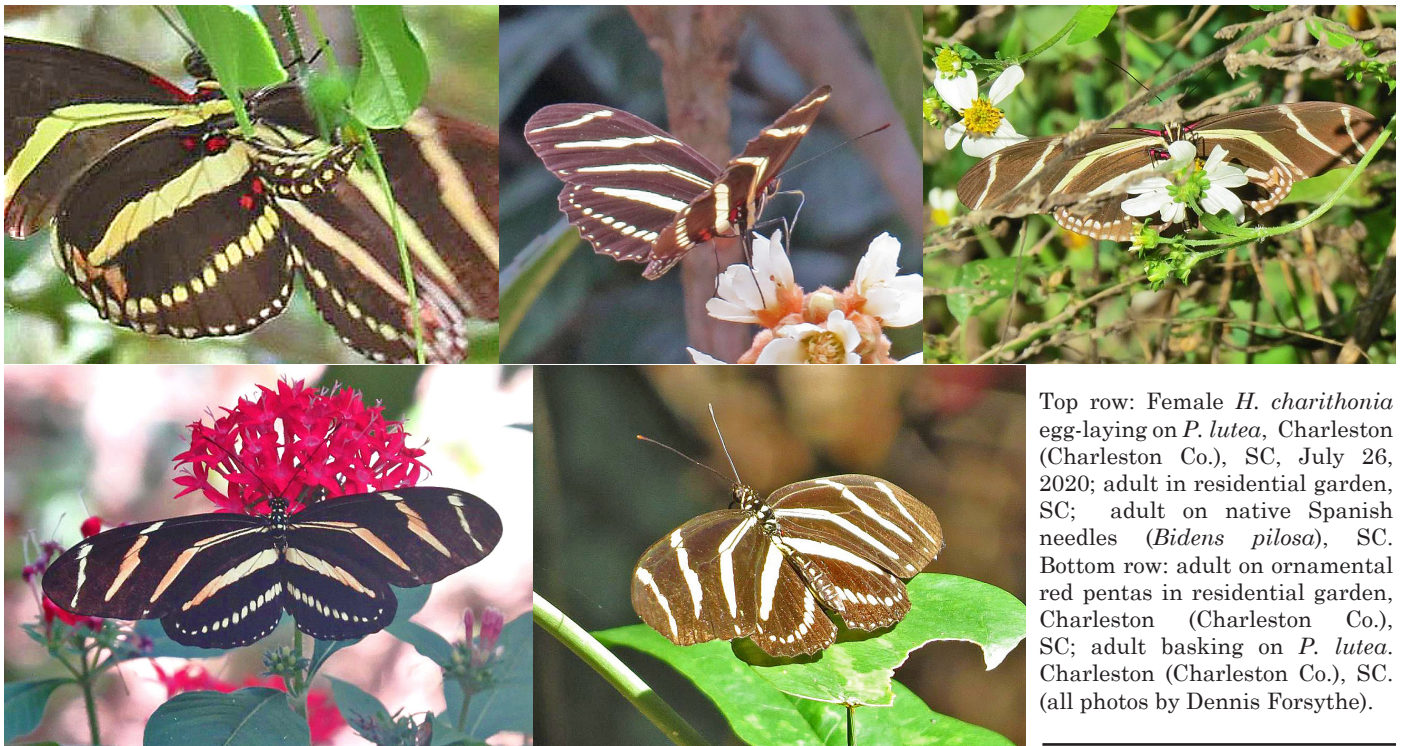
Specific records for North Carolina and South Carolina are:

North Carolina

Catawba County (western): October 12
Forsythe County (north central): October 29
Gaston County (south central): October 26
Guilford County (north central): October 21
Harnett County (central): November 7, 8
Madison County (extreme western): October 23 27
Scotland County (southern): November 10;
Union County (south central): October 26, 30



Adult on bush lantana (*L. camara*) in residential garden. Guilford Co., NC, Oct. 21, 2020. (photo by Charles Cameron).



Top row: Female *H. charithonia* egg-laying on *P. lutea*, Charleston (Charleston Co.), SC, July 26, 2020; adult in residential garden, SC; adult on native Spanish needles (*Bidens pilosa*), SC. Bottom row: adult on ornamental red pentas in residential garden, Charleston (Charleston Co.), SC; adult basking on *P. lutea*, Charleston (Charleston Co.), SC. (all photos by Dennis Forsythe).

A note by Harry LeGrand indicated: "The two Madison County records provided the first ever for the state's mountain region."

South Carolina

Abbeville County (northwest): August 18
 Aiken County (western): October 18
 Charleston County (southeast/coastal): August 4, 9, 11, 21, 27, 28; September 5, 6 (NABA), 10, 12, 14; October 14, 27; November 6, 14, 21, 22; December 13, 31
 Jasper County (southeast/coastal): September 21
 Richland County (central): October 2
 Spartanburg County (northwest): October 14

In addition, Brian Scholtens (South Carolina regional reporter for *News*) remarked (personal communication) that "*H. charithonia* is a common late summer and fall migrant here. This summer it was especially common and appeared well into the mid and upper part of the state. The last one I saw was on about Nov 7."

Case Number 5. **Georgia.** In 2021, both Spring and Summer issues of *American Butterflies* ("Hot Seens" for Fall 2020 and Winter 2020-2021 by Michael Reese) contain several reports of *H. charithonia* from Georgia. Photographs were included for most.

In *NABA Butterfly Count 2020 Report*, there is an additional sighting in DeKalb County and another sighting in McIntosh County.

Specific records are below.

Georgia

Calhoun County (southwest): October 19 (20 individuals). Roy Cohutta
 Cherokee County (northwest): October 20 (1 individual). Vicki DeLoanch
 Clarke County (east-central): November 27 (1 individual), Athens. Photograph only.
 DeKalb County (north-central): September 11 (5 individuals), Stone Mountain Park (NABA 2020 report); October 13 (1 individual), Adrianna McLaughlin; October 27 (1 individual), Toco Hills. Photograph only
 Dougherty County (southwest): November 23 (5 individuals); December 11 (3 individuals). Roy Cohutta
 McIntosh County (southeast, coastal): July 25 (4 individuals), Harris Neek National Wildlife Refuge (NABA 2020 report); December 24, (1 individual). John and Nancy Crosby

I have not included sightings posted for Florida because breeding populations of *H. charithonia* are known to occur throughout most of the central and southern sectors of the state. I think, however, that it is important to note that in the *NABA Butterfly Count 2020 Report* the editor noted that *H. charithonia* was recorded "on each of the 34 counts." These included Florida Caverns State Park, Jackson Co. (1 individual) and Apalachicola River Wildlife and Environmental Area, Franklin Co. (41 individuals)—both in the state's northern panhandle, and Big Bend Wildlife Management Area, Taylor Co. (17 individuals) in north-western FL.

Discussion/Conclusion

To me, the appearances of individuals of *H. charithonia* in summer and fall in Georgia, Louisiana, Mississippi, North Carolina, and South Carolina and even the northwestern sector of Florida (all geographies generally regarded as too cold to sustain breeding populations for the species), is not coincidental. I theorize that the butterflies were “strays” (along with probably other un-recorded individuals) transported by strong wind systems originating in more southern geographies that then moved northward and westward—even beyond coastal environs. Natural dispersal, of course, at the time when populations are peaking is a factor that should be considered. Patently, historic collections indicate that the species has a history of extended excursions. But natural geographical dispersions are not generally to the extent as documented in 2020. I am of the following opinion: (1) the unusual number of powerful wind systems generated by tropical storms and hurricanes in 2020, and (2) the species' natural tendencies to move northward and eastward during the later part of the year, provide the most reasonable explanation for the unusual extra-Florida sightings of *H. charithonia* in late 2020. With the warming of the climate, however, the northern Gulf coast might easily prove to be a more favorable long term habitat for the charismatic tropical/subtropical butterfly species. I would not be surprised if *H. charithonia* soon establishes permanent breeding colonies there.

[POSTSCRIPT: In 2021, the northern Gulf coast was again impacted severely by a tropical weather system. Hurricane Ida, a Category 4 hurricane with 150 mph winds, slammed into south/central LA at Port Fourchon (south of the community of Houma), on Sunday August 29 as the state's second most disastrous cyclone. Ironically, the date was the sixteenth anniversary (Sunday August 29, 2005) of Hurricane Katrina, Louisiana's most costly cyclone. After making landfall, Ida quickly downgraded to a Category One hurricane, and then two days later, to a tropical storm. However, its forward motion slowed upon landfall. As a result, the area between New Orleans and Baton Rouge as well as the coasts of MS, AL, and FL (all in the more massive eastern sector of the cyclone) were impacted with counterclockwise bands of wind and rain for several days. That pattern funneled air over much of the northern Gulf Coast from as distant as peninsula FL, the Keys, and even the Caribbean isles. Shortly thereafter, *Heliconius charithonia* was spotted at several non-breeding localities on the northern Gulf coast. Below are the records to date (November 8) that I was able to compile. Because the LA and MS sites are in relative close proximity, all sightings might not be of different individuals. All records except one are supported with photo documentation).

1. July 26: Wilmington (New Hanover Co.) North Carolina (coastal southeastern sector of state). Photographed at Airlie Gardens by Mark Kosiewski. Reported in *Southern Lepidopterists' News*, September (Vol. 43:3), page 300.

2. September 5: Lacombe (St. Tammany Parish), extreme southeastern LA, one individual that remained at least through October 3. Reported by Miriam Davey. Locale is near the Big Branch National Wildlife Refuge in which *Passiflora lutea* is native.

3. September 6-9: Slidell (St. Tammany Parish), extreme southeastern LA (venue is about 12 miles northeast of Lacombe). Reported by Delores Tousinau from same rural residence as in 2020. One female was sighted ovipositing on an ornamental *Passiflora*. Several larvae hatched, pupated, and eclosed. An adult was sighted on October 10--possibly an eclosed adult from the earlier in situ generation.

4. September 20 and October 15: Covington (St. Tammany Parish). Reported by Lorri Quinn. One to two individuals nectaring on Mexican sunflower (*Tithonia*).

5. September 23 and October 11: Mandeville (St. Tammany Parish). Reported by Trina Ridaught Drury. One to two nectaring on lantana.

6. October 1: Ocean Springs, MS (Jackson Co.), coastal MS (locale is approximately 60 miles east of Slidell, LA). Reported by Peter Wade Anderson on the property of SHEARWATER POTTERY, LTD. and nectaring on the exact lantana bush as reported in 2020.

7. October 10: Mandeville, LA (St. Tammany Parish), north shore of Lake Pontchartrain (locale is approximately 8 miles west-northwest of Lacombe, LA). Reported by Bruce Howard from his garden where an individual was nectaring on the flowers of a red *Pentas*.

8. October 16: New Orleans East, LA (Orleans Parish). Reported by James W. Beck and Linda Kingsland while birding.

9. October 27: Slidell, LA (St. Tammany Parish), home of Barbara Gravois.

10. October 30: Slidell, LA (St. Tammany Parish), home of Gay Saucier.

11. October 31: Slidell, LA (St. Tammany Parish), home of Cassie Crawford.

These records are additional support for my theory that posits a connection between eastern range extensions of *H. charithonia* and extreme summer/fall tropical weather systems.]

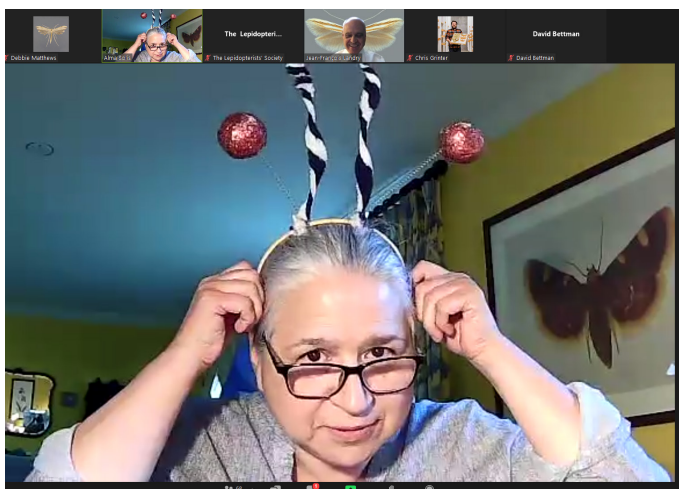
ACKNOWLEDGEMENTS

I thank all who contributed their time and expertise to this multi-year project. But I especially am indebted to the following:

Peter Wade Anderson, Ocean Springs, MS, for his continued interest in butterflies on the grounds of SHEARWATER POTTERY, LTD., and for granting permission to use his photographs; Dennis M. Forsythe, Ph.D. and his wife, Donna, Charleston, SC, for their documentation of butterflies in their home state and for granting permission to use photos from their butterfly surveys; Brian Scholtens, Ph.D., Charleston, SC for comments regarding his personal observations of *H. charithonia* throughout SC in 2020, and for his coordinating the quarterly SC State Report for SLS NEWS; Charles Cameron, Greensboro, NC for comments regarding his personal observations of *H. charithonia* throughout NC in 2020, and for his permission to use his photograph; Delores Tousinau, Slidell, LA, for granting permission to use a photo from her garden and for data on continued sightings on her property; Mirriam Davey, Lacombe, LA, for data on sightings on her property; Bruce Howard, Mandeville, LA, for data on sightings on his property; Lorri Quinn, Covington, LA, for data on sightings on her property; Trina Ridaught Drury, Mandeville, LA, for data on sightings on her property; James W. Beck and Linda Kingsland, Marrero, LA, for data on a sighting while on a birding fieldtrip in New Orleans East; Barbara Gravois, Gay Saucier, and Cassie Crawford, Slidell, LA, for data on sightings on their property.

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With the “magic” of the virtual world, Alma Solis, outgoing president, was able to pass the ceremonial antennae to incoming president Jean-François Landry. Congratulations to Jean-François!

2021 Lep Soc Meetings Images and Award Winners

The virtual Lep Soc meeting in August of 2021 was certainly a different experience for some of us attending, but the up-side was that many people from across the globe could attend the meeting, whereas if it had been in person they would not have been able to come. We had a large number of student presentations and posters, and it was good to see the younger generation so well represented.

The winners of the Harry K. Clench talk awards for best student presentations were as follows. First place went to Malia Olson for her talk "The dispersal of microbes among and within flowers by butterflies." There was a tie for second place, with both Audrey Mitchell and Emily Geest receiving the award. Audrey's talk was "The influence of host plants on the immunology of the Fall Webworm", and Emily's talk was "Eastern greater fritillaries' potential distributions using ecological niche models."

For the Alexander B. Klots student poster awards, first place went to Nitin Ravikanthachari's poster "Persistence of maladaptation between a specialized butterfly and an exotic lethal host plant", and second place went to Kata Pásztor's poster "Change of body mass and thorax width with age in a natural butterfly population." Congratulations to all the winners!

For a look at this year's entire meeting program, please go to the website at lepsoc.org.



Above: some of the award winners. Left, top: one view of the virtual meeting screen; bottom: Brian Scholtens, one of the meetings organizers. Thanks to everyone that made the meeting happen!

Conservation Matters: Contributions from the Conservation Committee

The 2020-2021 megadrought and southeastern Arizona's butterflies

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Tree rings allow dendrochronologists to reconstruct climate conditions for the American West over the past 1200 years. The West's current megadrought clocks in as the second worst sustained drought over that period. And if droughty conditions persist, even for just a few more years, the current drought will easily surpass the previous record holder that withered much of the American West through the late 1500s. Presently, more than 52 percent of the West is experiencing exceptional or extreme drought (US Drought Monitor 2021; <https://droughtmonitor.unl.edu/>; see Fig. 8). Over the past two years, millions of manzanitas, junipers, and oaks have died from water stress across the Southwest. Wildfires consumed more than 6.5 million acres in the US this year; another 10 million acres went up in smoke in 2020. South of the border, Mexican ranchers suffered devastating cattle losses due to lack of forage prior to the onset of the 2021 monsoon.

Southeastern Arizona has the highest butterfly and moth diversity north of Mexico. For more than a century lepidopterists have gravitated to Arizona during the monsoon to collect, photograph, and watch butterflies by day and moths by night. On good nights, moths and other insects can be so plentiful at lights that one is well advised to wear ear plugs and tight fitting clothing, and even then, visits to the sheet may mean a dash into the light and equally hasty retreat, to reduce the chances that small moths will end up in your eyes, nose, or clothes. Heightened caution is warranted when blister beetles are present. During the peak of the monsoon, mercury vapor light-sheets will often attract more than 75 saturniids and roughly equal numbers of sphingids, many dozens of notodontids, and countless noctuids and erebids. The annual butterfly count centered in Patagonia, Arizona, often yields the highest species richness for any US location. Most single-day counts over the past 38 years have yielded totals in the neighborhood of 80 or more species of butterflies, with a high of 103 species in 2001.

Tucson had its driest year on record in 2020: just over four inches of rain fell. Nearly three-quarters of the state was in exceptional drought

through June of 2021. That all changed with the arrival of the monsoon: over eight inches of rain fell in Tucson in July, making it the city's wettest month on record. Mount Lemmon in the Santa Catalina Mountains recorded an astonishing 42 inches across the monsoon months of July, August, and September. The deserts and mountain ranges of Southeastern Arizona greened—the region was wonderfully verdant (Fig. 1). Many insects rebounded, some in fantastic numbers. To the gardener and casual



Fig. 1 Guindani Canyon, Whetstone Mountains, Cochise County, Arizona: December 2020 (above) and August 2021 (below).

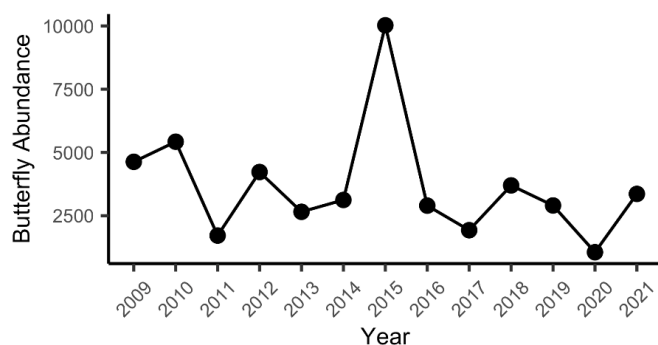


Fig. 2. Patagonia Butterfly Count numbers (2009-2021).

observer butterflies appeared to be having a great season, much better than anyone had seen in Tucson in more than a year and a half. Sulphurs by the dozens winged about gardens.

On the Patagonia count, butterfly numbers had tripled from 2020's low of 1136 to 3421 (Fig. 2). Not so bad. But not so fast. A closer look at the numbers tells a different story—the story that motivated this column. Only seven species of butterflies, all dispersive in nature, accounted for 83% of the Patagonia count's butterflies in 2021: the cloudless sulphur (*Phoebis sennae*), orange sulphur (*Colias eurytheme*), sleepy orange (*Abaeis nicippe*), marine blue (*Leptotes marina*), American snout butterfly (*Libytheana carinenta*), queen (*Danaus gilippus*), and variegated fritillary (*Euptoieta claudia*). The totals for these seven and other dispersive/eruptive species are shown in Fig. 3 (teal line). Many of these were flying in from Mexico to take advantage of the abundance of new vegetation that stretched from horizon to horizon.

Only 56 butterfly species were seen on the Patagonia count in 2021 (Figs. 4, 5)—the second lowest total in four decades. Residents—taxa that had to endure the 2020-2021 drought—tanked. Hesperids fell off a cliff; lycaenids dropped in number and kind; swallowtails took a southward dip. The two-tailed swallowtail (*Papilio multicaudata*; see front cover), Arizona's state butterfly and a surety on the count, wasn't seen. The region's rich guild of *Amblyscirtes*

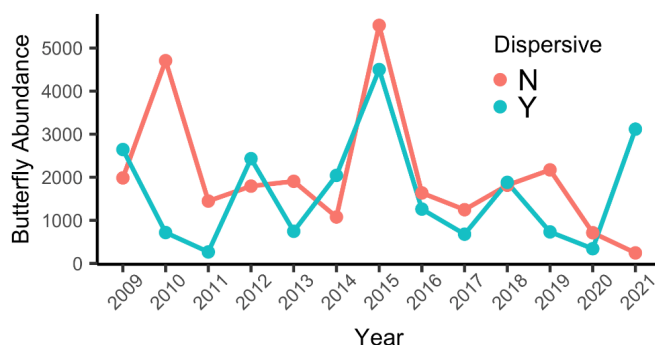


Fig. 3. Patagonia Butterfly Count numbers (2009-2021): dispersive species (teal) and non-dispersive resident taxa (orange).

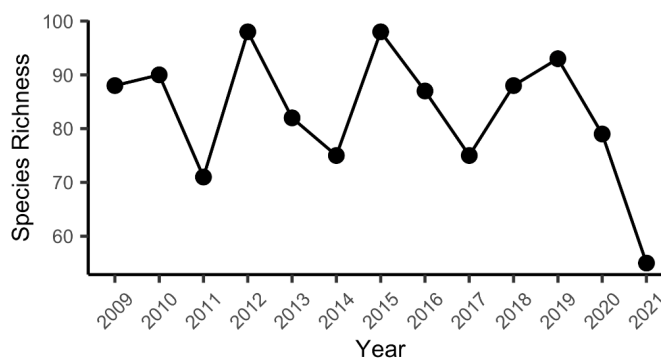


Fig. 4. Patagonia Butterfly Count species (richness) (2009-2021).

roadside skippers was all but absent. The tiny checkerspot (*Dymasia dymas*) (Fig. 5), one of southern Arizona's most ubiquitous and conspicuous insects, fared even worse. Over most of the previous 37 counts, hundreds of adults had been recorded. This monsoon yielded only a single tiny checkerspot on the day of the count. The many-spotted skipperling (*Piruna aea*) (Fig. 5), sometimes seen by the hundreds, was completely absent. For it and others, the 14-month megadrought had been catastrophic.

DLW went to southeastern Arizona and southwestern New Mexico three times in 2021 to collect and photograph caterpillars. Despite the abundance of new growth and lushness of the countryside, caterpillar numbers and

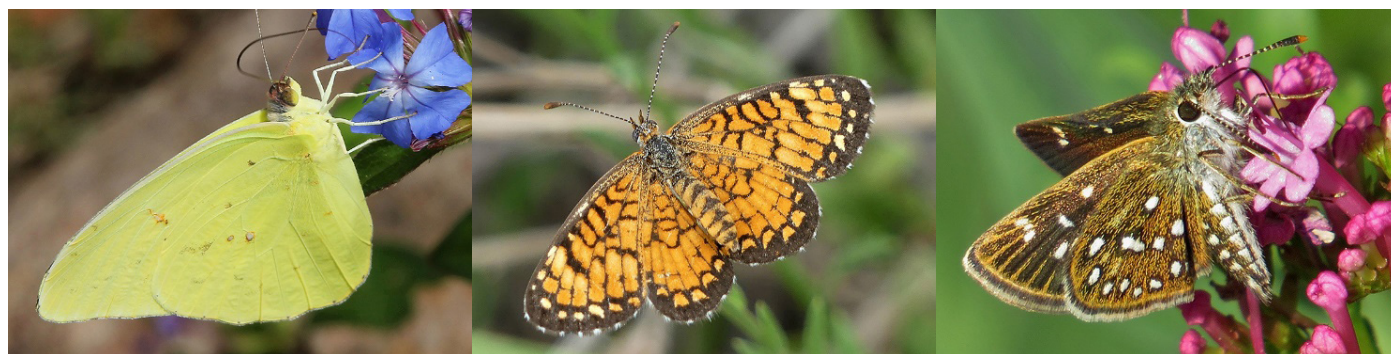


Fig. 5. Dispersive species, here represented by this male cloudless sulphur (left), accounted for a high percentage of individuals on this year's count. In contrast, most resident nymphalids, e.g., tiny checkerspot (middle), fared poorly. And one of the great strengths of this Count, the hesperiids, exemplified by this many-spotted skipperling (right), did worst of all, many species being totally absent. All photos were graciously shared by Doug Danforth (Bisbee, Arizona).

species richness were lower than he had seen in 14 years of collecting in SE Arizona. Numbers were particularly depressed across low-elevation sites, where many of the caterpillars that landed on the beating sheet proved, disappointingly, to be crop pests (plusiine semi-loopers, corn earworms and kin) or dispersive species from the south (e.g., erebids, especially *Melipotis*). Regular and uncommon residents were down in number or missing.

In October 2021, we queried others with a long record of insect study in the region. Bruce Walsh wrote that the drought of 2020 yielded “a massive crash in both moth species diversity and moth total biomass, which was more prominent at lower elevation locations (below 5000 feet) relative to collecting sites above 6000 feet (which also experienced a notable loss of diversity and numbers). The exceptionally wet 2021 summer monsoon resulted (at low elevation locations) in a massive explosion in total numbers, but only a marginal (at best) improvement in biodiversity.” Dan Duran, who has been to Willcox Playa nine times since 2002 to sample tiger beetles, felt abundances were less than 5% of normal, and reported “that the uncommon and rare species could not be found at all.” Cliff Ferris passed through Southeastern Arizona on a three-week collecting trip beginning in late August. He shared this: “With the exception of the white-lined sphinx (*Hyles lineata*) (common), sphingids were virtually absent. One each recorded of one-eyed sphinx (*Smerinthus cerisyi*) and Salicet sphinx (*S. saliceti*), and five worn [tobacco hornworms] (*Manduca sexta*). Most of the later season notodontids were absent from my traps. In general, all of the species that pupate in the soil were either absent or in very low numbers. The several species of *Abagrotis* [Noctuidae] that are normally common (and sometimes a nuisance in my traps because of their volume) were nearly absent.” Pat Sullivan has been running blacklights at his home in Ramsey Canyon in the Huachuca Mountains year-round for the last nine years—more than 3000 nights. He summarized the past two summers as devastating to the moths, beetles, other insects, and likely the insectivores that feed on the bounty of monsoon insects. The reports from Robert Behrstock, Jim Brock, Ken Osborne, and John Palting, relate similar assessments.

As with nearly all things in nature, there was a mixture of winners and losers. Many species started to come back; a few had banner years. With time, and favorable winter and monsoonal precipitation, things could bounce back—virtually all taxa would be expected to have pockets and refugia from which they could rebound. Robert Marquis and his students have been studying the caterpillar fauna of Missouri oaks for 40 years. They have documented several population crashes following hard spring freezes and extended summer droughts,

and in each instance populations returned to previous numbers after a lag of four to five seasons (without further climatic perturbations). Recovery took time.

Many of the reports of global insect decline have been anchored to data examining insect biomass and or abundance estimates that lacked species-level resolution, and thus details about the winners and losers. The results of the 2021 Patagonia Butterfly Count underscore the importance of collecting species-level data. An assessment based on butterfly numbers might give one great hope, especially relative to a finding that more than two dozen species of resident butterflies had all but been replaced by a handful of sulphurs and other eruptive species, or that many of the region's more ecologically specialized, univoltine species had been replaced by a set of dispersive, multigenerational species, adept at exploiting areas with abundant new growth.

More troubles lie ahead for the region's biota. The National Weather Service tells us that La Niña conditions, which equate to a drier, warmer winter, will persist in the American Southwest well into 2022. Long-term models are ominous. Climate change and warming of the planet will exacerbate the droughty conditions across much of the West. Winter rains in particular will be diminishing (Fig. 6)—a change that will drive major biotic changes across the American Southwest through the decades ahead.

A compounding stressor for both plant and insect life is the unsustainable water demands of agriculture, mining, and peopling of the American Southwest. Each decade the water table is lowered, streams get tapped dry (and those that still hold water are registering more zero-flow

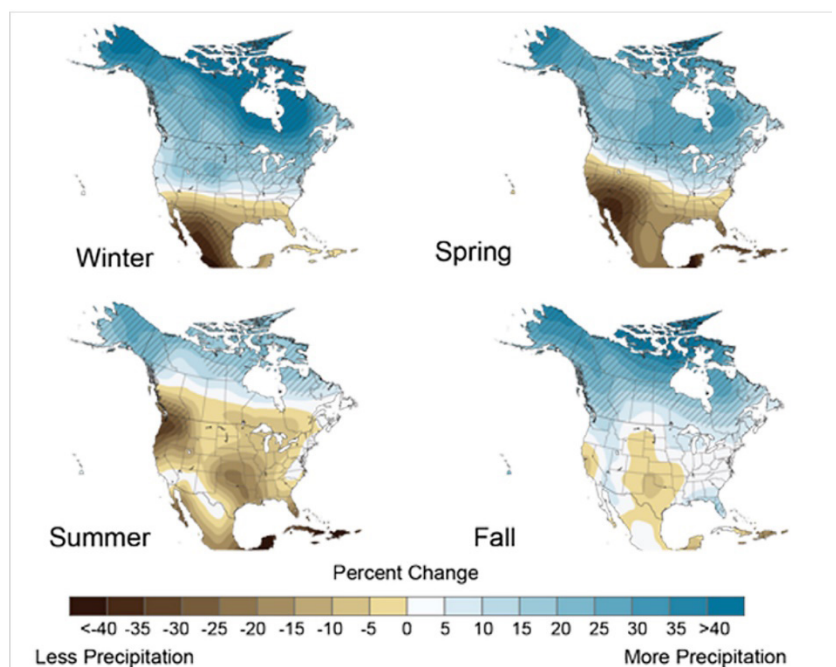


Fig. 6. Projected change in North American precipitation by 2080-2099 (US Global Change Research Program).



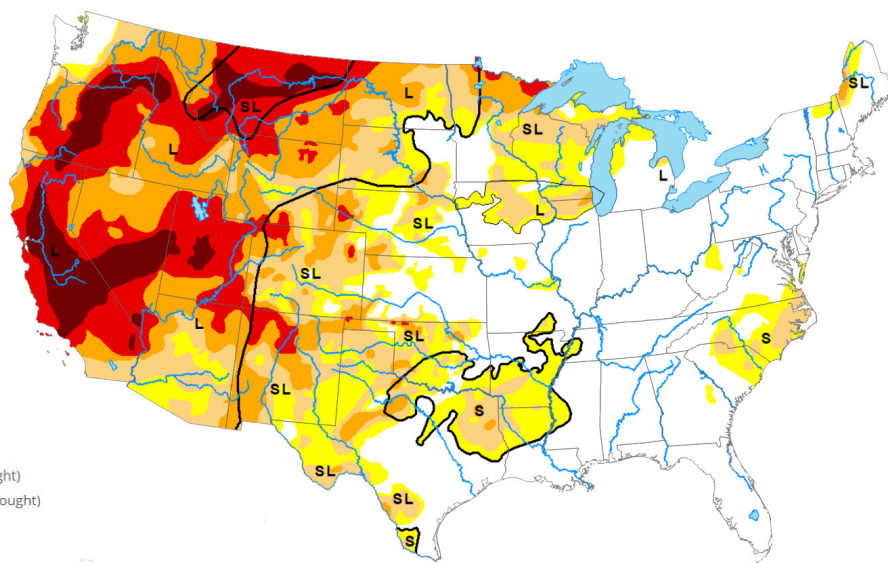
Fig. 7. Elegant trogon. This magnificent bird eats fruit through much of the year, but while on nest turns into an insect hunter. The large caterpillars of saturniids and sphingids make for preferred forage. This individual appears to have captured a last-instar *Datana* (Notodontidae). Photo by James Beissel.

days), and aquifers are chronically overexploited. While not as evident as the above-ground effects of droughty conditions, lowered soil moisture levels are surely exacting an unmeasured toll on hostplants and the below-ground diapausing stages of butterflies, moths, and other insects.

While most butterfly counts and moth collectors sample only a few days or weeks each year, resident and migratory insect-feeding vertebrates “sample” across entire field seasons and years. Their energetic demands for insect fodder are sharply elevated while raising young. Goatsuckers are thought to be especially fond of moths. Cuckoos, trogons (Fig. 7), orioles, tanagers, vireos, and warblers are caterpillar hunters, and thus may make good proxies for the status of local insect populations. Likewise bats are highly dependent on lepidopteran biomass, so their population trends might have much to say about the status of insect numbers in the West. Certainly, it would be worthwhile for members of our Society to work more closely with vertebrate biologists to get a sense of how the effects of the current drought are cascading through the region’s food webs.

Fig. 8. Drought intensity in the U.S. What is clear from this image is that the American southwest (and west in general) is in a significant, sustained period of drought, and relief may not be coming soon.

Intensity and Impacts



It’s hard not to worry. We continue to pump more CO₂ into the atmosphere. Human activities have emitted some additional 375 billion tonnes of carbon into the planet’s atmosphere since the onset of the Industrial Revolution. Levels of methane—a vastly more potent greenhouse gas—are twice those of pre-industrial times. Phoenix and Tucson continue to populate. Last year Phoenix vaulted to the fastest growing large city in the United States. To think that Arizona’s biodiversity would sail unscathed through such changes defies reason.

What’s to be done? Efforts to acquire lands and conservation easements will help buffer the American Southwest’s rapid population growth. Properties and lands with topographic and hydrological complexity will have special value as biotas are reshuffled by climatic changes. Downsizing lawns, xeriscaping, and re-wilding yards with native vegetation could generate much habitat even within towns and cities. Great benefits would be expected to follow from environmentally friendly legislation: e.g. mandating minimal stream flows, curbing pesticide use (especially for cosmetic purposes), and regulating or taxing water usage. All of us could take steps to reduce our carbon footprints or purchase carbon offsets (visit <https://terrapass.com/>). Demographic data for the region’s insects are lamentably scarce: we need more butterfly counts, iNaturalist postings, and effort-based faunistic studies. Community science projects offer great promise. Several exciting pollinator protection programs are underway that will create and protect habitats that will benefit a sweep of insects, as well as many of the region’s plants and animals.

Climate change is regarded by many to be humanity’s greatest challenge. After the drought of 2020-2021, we suspect many butterflies and moths would echo this sentiment were they to have a voice in our affairs, and urge all of those in our Society to fight climate change: with our science, our teachings, and our professions, in both our work and non-work lives.

Membership

The Lepidopterists' Society is open to membership for anyone interested in any aspect of lepidopterology. The only criterion for membership is that you appreciate butterflies and/or moths! To become a member, please send full dues for the current year, together with your current mailing address and a note about your particular areas of interest in Lepidoptera, to:

Kelly Richers, Treasurer
The Lepidopterists' Society
9417 Carvalho Court
Bakersfield, CA 93311

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| | |
|---|----------|
| Active (regular) | \$ 45.00 |
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| Student | 20.00 |
| Sustaining | 60.00 |
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Students must send proof of enrollment. Please add \$5.00 to your dues if you live in Canada/Mexico, \$10.00 for any other country outside the U.S. to cover additional mailing costs. Remittances must be in U.S. dollars, payable to "The Lepidopterists' Society". All members receive the **Journal** and the **News** (each published quarterly). Supplements included in the **News** are the Membership Directory, published in even-numbered years, and the Season Summary, published annually. Additional information on membership and other aspects of the Society can be obtained from the Secretary (see address inside back cover).

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Requests for missed or defective issues should be directed to Chris Grinter. Please be certain that you've really missed an issue by waiting for a subsequent issue to arrive.

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Requests for Memoirs of the Society should be sent to the Publications Manager, Ken Bliss (address opposite).

Submissions of potential new Memoirs should be sent to:

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Submission Guidelines for the News

Submissions are always welcome! Preference is given to articles written for a non-technical but knowledgeable audience, illustrated and succinct (under 1,000 words, but will take larger). Please submit in one of the following formats (in order of preference):

1. Electronically transmitted file and graphics — in some acceptable format — via e-mail. Graphics/figures should be at least 1200 x 1500 pixels/inch² for interior use, 1800 x 2100 for covers.
2. Article (and graphics) on disk or thumb drive in any of the popular formats/platforms. Indicate what format(s) your disk/article/graphics are in, and call or email if in doubt. The InDesign software can handle most common word processing software and numerous photo/graphics software. Media will be returned on request.
3. Color and B+W graphics; should be high quality images suitable for scanning. Original artwork/maps should be line drawings in pen and ink or good, clean photocopies. Color originals are preferred.
4. Typed copy, double-spaced suitable for scanning and optical character recognition.

Submission Deadlines

Material for upcoming volumes must reach the Editor by the dates below:

| | Issue | Date Due |
|------|--------|-------------------|
| 64 1 | Spring | February 12, 2022 |
| 2 | Summer | May 12, 2022 |
| 3 | Fall | August 15, 2022 |
| 4 | Winter | November 15, 2022 |

Be aware that issues may ALREADY BE FULL by the deadlines, and so articles received close to a deadline may have to go into 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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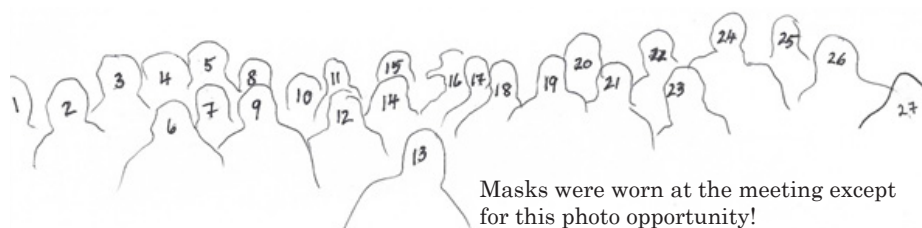
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Euploea butterflies nectaring *en masse* in El Nido, Palawan, the Philippines. See related article by Badon on page 190.



High Country Lepidopterists' Meeting at Westminster Butterfly Pavilion, CO, Oct. 9th, 2021



Masks were worn at the meeting except for this photo opportunity!

1. Morna McGraw, 2. Shirhan Hershcovich, 3. Larry Crowley, 4. Sarah Triplett, 5. Eric Olsen, 6. Pam Piombino, 7. Jean Morgan, 8. Christian Nunes, 9. Jan Chu, 10. Adrian Carper, 11. Mira Broughall, 12. MaryAnn Friedman, 13. Chuck Harp, 14. Sam Wright, 15. Ikigai Weh, 16. Jeff Stephenson, 17. Chris Friedman, 18. Linda Hardesty, 19. Amy Yarger, 20. Joe Krieg, 21. JoAnn Johnson, 22. Mark Nelson, 23. Christina Nimmo, 24. Steve Heinz, 25. Greg Penkowsky, 26. Paul Opler, 27. Evi Buckner-Opler (photographer)