

NEWS

OF THE

LEPIDOPTERISTS' SOCIETY



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NEWS OF THE LEPIDOPTERISTS' SOCIETY

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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.)

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Front Cover:

Eubordeta flammea (Geometridae, Ennominae), Papua, 10 miles east of Wamena, along Sompam River, nearly 2000m, early October 2018. Image by Bill Berthet, see related article on page 159 (facing page).

Digital Collecting:**Butterflies of Papua, Indonesia**

Bill Berthet

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This article is based on the following butterfly photographic holidays: 09-28 to 10-08-2018 Wamena – Baliem & Pass Valley Papua and 10-09 to 10-19-2018 Manokwari – Arfak Mountains W. Papua. These trips were organized by Adrian Hoskins, and the butterfly guide was Robi from Sulawesi.

Over four decades ago I visited the main library in downtown Jacksonville, Florida. I located the Lepidoptera section in which I found a coffee table book boasting life size images of various Ornithoptera from Irian Jaya, and later perused “The Illustrated Encyclopedia of the Butterfly World” in color by Paul Smart, dreaming one day about observing this genus in their natural habitat.

In late 2003 I became friends with Jan Pasternak, who shared stories of his 30 year odyssey in Papua New Guinea and Indonesia in a search to unravel the secrets of mystical Ornithoptera. Jan is the author of “Fluttering Encounters in the Amazing Archipelago” first published in January 2000. Early in 2004 Jan was making arrangements for me to join him on another trip, but unfortunately, because of poor health, this trip was cancelled.

Finally in 2018, effervescing with excitement and sense of adventure our international group took flight from London to Jakarta, continuing to Jayapura, on Garuda Indonesia Airlines, ending with a one hour flight on Wings Air to Wamena, Papua, Indonesia.

The Eastern half of the second largest island in the world, New Guinea, is the independent state of Papua New Guinea, that declared and recognized its independence from Australia in 1975. The Western half of New Guinea includes the provinces of Papua, where Wamena, Baliem and Pass Valleys are located, and West Papua, where Manokwari and the Arfak Mountains are found in the Bird's head Peninsula that is part of the largest island country in the world, Indonesia. Climate around Baliem Valley is a cooler version of tropical rainforest due to its high elevation of 1550m. December to April are the months with the most rain.

Arriving at Wamena airport David Lamdon (another participant) and I were immediately greeted by an elder from a local tribe wearing a penis gourd wanting to pose for pictures, expecting a “tip” for his services. (Editor's Note: although Bill provided an image of this moment, I chose not to include it here. I'll use “bad lighting” as my excuse . . .)

After exchanging US dollars into Indonesian Rupiah (IDR) we all crashed at a comfortable hotel in Wamena that was our base for the next week. Dropping off our luggage around noon, we hopped into two 4 wheel drive trucks stopping around 7 miles North of Wamena, which was not very good habitat, but we did score *Dicallaneura amabilis*, a butterfly in the Riodinidae family. We also got our first *Delias*, *Delias a. aruna* (a member of the *D. belisama* group) whose antenna is densely covered with bright white scales. The flight of this butterfly is direct and quite rapid, occasionally flying through town gardens and sometimes settling on the uppersides of the leaves of low-growing trees.

After a local food buffet dinner we met our “handler” Bernard, a regional, highly recognized and respected member of the Dani tribe. You could always tell when he was around, as his teeth were chattering constantly. Bernard was in charge of obtaining permission from tribal elders to walk on their land where we would be photographing. He told us a bit about their culture, what to expect behavior wise, and was with us at all times making sure our visit here ran smoothly. He suggested keeping several packs of cigarettes on us to give to some of the tribal elders while out in the field -- this came in handy on several occasions. Bernard and his brother are pictured on the next page.



Dicallaneura amabilis (left), *Delias a. aruna* (right)



Bernard (left), Bernard's brother (right)

2,400m with some species existing as high as 3,600m. Some species are restricted to particular peaks and mountain ranges. Most *Delias* exhibit little sexual dimorphism, and bear a thick fur like covering of long thoracic hair-scales, that aids in heat conservation, and to fly more efficiently in the cooler temperatures found at higher elevation. The larvae feed on various mistletoes (Loranthaceae and the related family Santalaceae).

The next morning, after breakfast, we headed North for the 1 ½ hour drive on a paved, two lane, up and down, winding road, arriving around 10:00 am at the 2174 m high Abagima River in Baliem Valley. The weather was cool and partly cloudy. Arriving first on the trail I was greeted by 3 *Delias t. toxopei* that quickly flew away. At that moment I was thinking this was going to be a very memorable day. *D. toxopei* is part of the *eichhorni* group which has remarkably diversified aposematic wing markings.



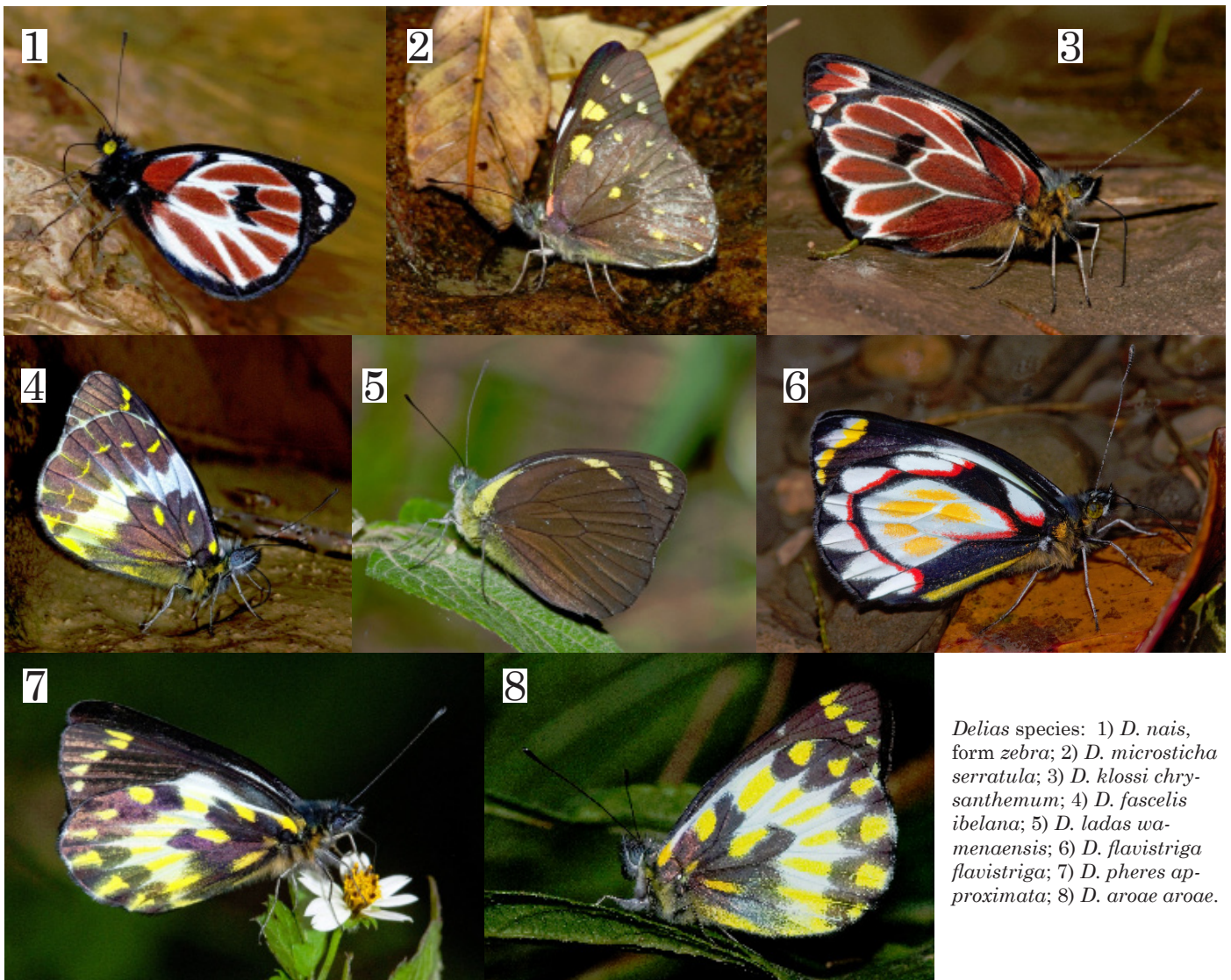
Delias toxopei toxopei

The genus *Delias* is a group in the family Pieridae, extremely popular with collectors, that ranges throughout the Indo-Australian Region from Sri Lanka and India, through South-Asia and Indonesia, to New Guinea, the Bismarks, Australia (not Tasmania), the Solomans, New Caledonia and New Hebes. At around 255 species, *Delias* is the largest genus of butterflies in the world. Around 141 listed species are endemic to, or otherwise found in New Guinea, where many occur in elevations exceeding



Abagima River habitat

Delias are all rather similar in their habits. When flying over open areas of grassland their flight tends to be fast and direct. When visiting flowers they constantly flap their wings, very rarely settling long enough for you to get a good photograph. Males can be found imbibing mineralized water on the damp sand of creek banks, or in smaller shady rivulets choked with leaves, sometimes with their legs in the water. During sunny periods they fly out of the canopy of trees, following the watercourses in forested areas, then settle on the ground when the sky becomes overcast. It is always a joy observing the white colors of fluttering adults against a dark forest background.



Delias species: 1) *D. nais*, form *zebra*; 2) *D. microsticha serratula*; 3) *D. klossi chrysanthemum*; 4) *D. fascelis ibelana*; 5) *D. ladas wamenaensis*; 6) *D. flavistriga flavistriga*; 7) *D. pheres approximata*; 8) *D. aroae aroae*.

It was a real challenge photographing in the habitat around the Abagima River, walking in shallow cold water in a non-level stream with gravel, high boulders, and fallen timber, along with very very slippery moss and mud covered rocks at over 7,150 feet. At any moment you could slip and fall causing serious injury. At this site, puddling only commenced in fine or slightly cloudy weather, starting around 9:00 am and would cease if the clouds became persistent. Most butterflies disappeared around 1:30 pm.

Delias nais (form *zebra*), a member of the *bornemanni* group, was recently revised with three subspecies in Papua. It is not common. It visits flowers for nectar and mineralizes from damp sand and moist moss-covered rocks. *Delias microsticha serratula* is common and endemic to the Central Cordillera of mainland New Guinea. It is a member of the *stremani* group. *Delias klossi* is a member of the *bornemanni* group. Subspecies *chrysanthemum* is endemic to Daela, Lake Habbema, Korupun, Langda, Pass Valley, Silakma, Wamena, and Welesi. I've only observed this butterfly twice in 6 visits to this area. *Delias fascelis*

ibelana is a common variable species with 6 subspecies in Papua and one in Papua New Guinea. It is a member of the *geraldina* group/*fascelis* subgroup. *Delias ladas wamenaensis* is common, with at least six subspecies that represent this widely distributed species in Papua. At some localities the subspecies status is unclear. The Arfak subspecies is also rather peculiar in being widely separated from those in the Central Highlands. It is a member of the *chrysomelaena* group. *Delias flavistriga* is common and is an endemic species in Papua with two subspecies. Subspecies *flavistriga* is found at Habbema lake, Ibele, Langda, Pass Valley and several other locations. It is a member of the *iltis* group/*mesoblema* subgroup. *Delias pheres approximata* is a common species that was recently revised, endemic to Papua with two subspecies, with *approximata* found in Pass Valley. It is a member of the *geraldina* group/*aroae-pheres* subgroup. *Delias a. aroae* is one of two subspecies occurring in Papua which were recently revised. Subspecies *aroae* is distributed around the Baliem Valley and in the Star Mountains. It is a member of the *geraldina* group/*aroae-pheres* subgroup.



Argyreus hyperbius

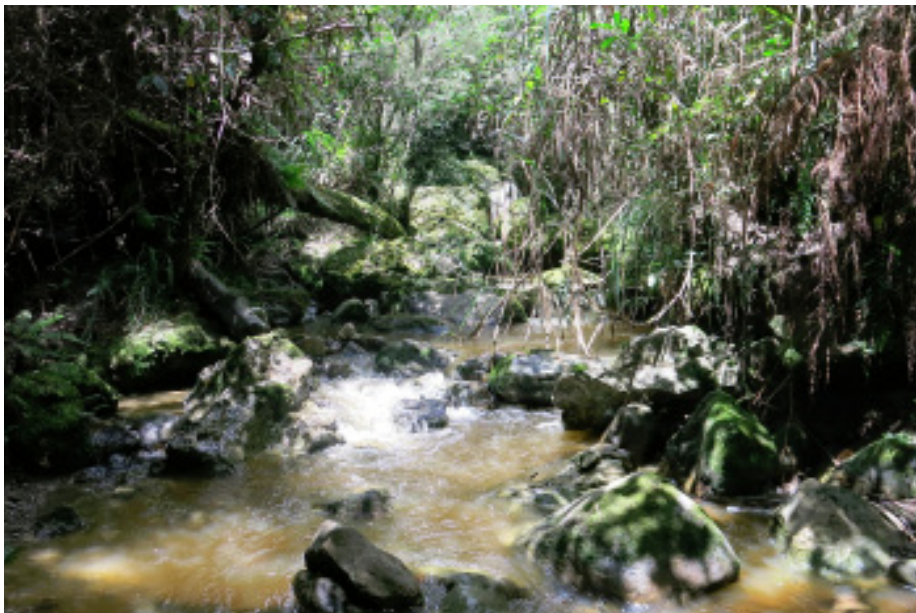
looked like a very hard area to work, but Robi (one of the guides) went ahead and scrambled around the large boulders then motioned for me to follow. He pointed out a stunning *Eubordeta flammea* (Geometridae, Ennominae) moth (see front cover).

Of all the river boulder hopping I have done this was potentially the riskiest for injury. One of the woman participants noticed my flash

Around 2:30 pm we slugged our way back to the van, happily reviewing our digitally captured treasures for the day during the ride back to our hotel in Wamena. After a restless night's sleep, and with full bellies, we headed for a fairly long hike up to the air garam "Saltwater Lake" at 1996 m about 10 miles east of Wamena. Bernard arranged with the local tribe to enter their property.

Our group was in a meadow following a very narrow trail with high grasses on either side. I stopped to get several clicks of the Fritillary *Argyreus hyperbius*. Reaching the trail base, we started the hour or so ascent through full canopy forested habitat. A group of Russian visitors passed by, several smoking cigarettes leaving a smelly trail behind. It was great habitat but with very few butterflies. Upon reaching the top, there was a local woman immersing several large banana leaves in the small pool of salt water. She processed the leaves to store salt that would be used later on in cooking. I stopped a bit down the trail at 1928m at the Sompam River flowing below the trail. It

being fired, and came down to join us, even though she was told it was too dangerous. About 20 feet away a fresh *Graphium weiskei* landed in a shaded area to mineralize. Normally this butterfly is very skittish, but this one settled quite nicely for several good clicks. The woman rushed over to get her clicks, slipped, and grabbed my shoulder pulling me into the water with her, causing the viewing screen on my camera to get scratched on a rock. We got up, and I made sure she was OK. I looked at her pretty pissed off from her inconsiderate actions, moreso because of her lack of apology. She simply went back to photograph the *weiskei*. Good karma is always important, but more so with a small group.



Above: Sompam River. Right, top to bottom: *Graphium weiskei*; *Delias leucias leucias*; *Delias argentata argentata*.

Just around the corner hidden in a shaded area we scored *Delias l. leucias*. *D. leucias* has three subspecies in New Guinea, of which two are endemic to Papua. It is a member of the *weisiki* group/*weisiki* subgroup. Several feet away in a similar shady area was a *Delias a. argentata*, endemic in the eastern Snow Mountains and the Baliem Valley. It is a member of the *bornemanni* group.

Driving back to our hotel in the late afternoon, we were stopped by a police car. Just ahead was a semi-truck that was badly damaged with a smashed windshield caused by tribal members throwing hundreds of 6 to 10 inch size rocks at the semi. The road was strewn with these rocks, that were taken from a nearby stone fence. On the other side of the truck stood a throng of tribal members, several police cars, and a white sheet over a body laying next to the road. We also noticed several wooden structures near the road were burned. Several days later I asked Bernard what all the commotion was about. Apparently members of one tribe were practicing "black magic" on several other tribes. They retaliated by stabbing several members of the other tribe to death. A mediator was brought in and fined the two tribes 100 pigs each and a large sum of money, to be given to the tribe that had their members killed.

The next morning we visited several acres of flowers that were similar to *Bidens alba*. In Florida this plant attracts numbers and diversity of pollinators. Adrian and I worked the area for over an hour, but there were strangely no butterflies. The last three days we observed around 22 species of butterflies which was not what I expected. However many of those seen were spectacular and some endemic to the area.

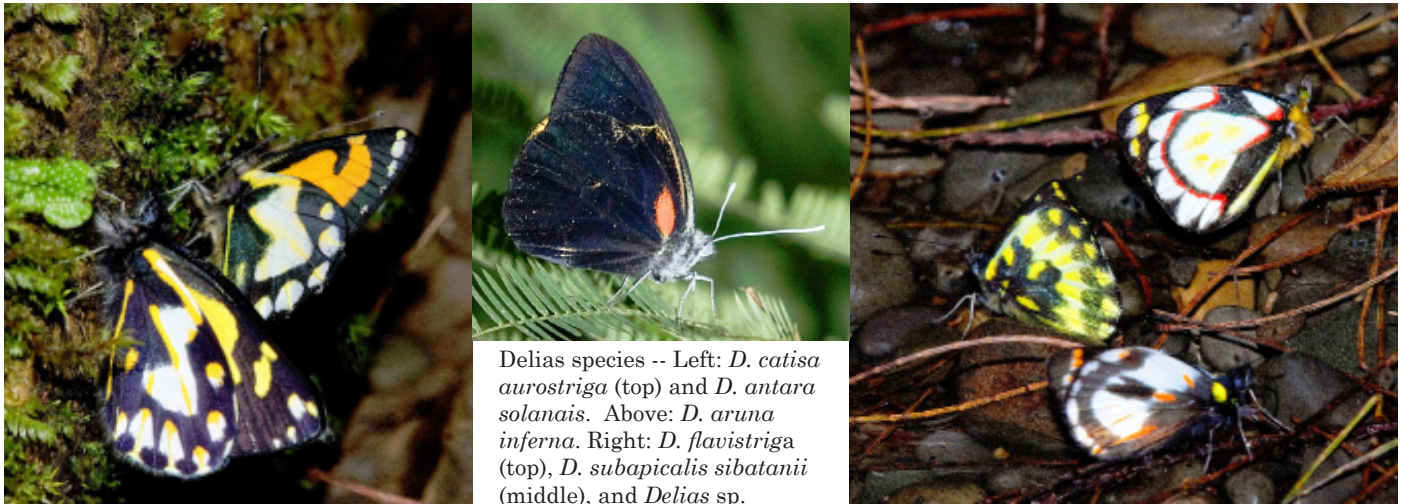
Eventually we headed over to the ritzy German built Baliem Valley Resort. On the way one of our vans got stuck in the mud, but finally with the help of over 1,150 pounds of grunt power, five guys were able to push it through the mud. Just before the entrance, an elderly local tribal member was selling authentic hand made "souvenirs". The architecture of the resort was well thought out, with the inside having a large collection of Papua tribal war shields. The back of the building has a large viewing deck with comfortable seating arrangements.

At around 1675m, Robi and I took off down a large hill, passed by a small creek then up and down another large hill, scoring the very skittish *Junonia villida* along the way and ending at another creek below. To find *Delias* you had to walk in the creek (as discussed before), sometimes in water that was chest high because of the dense vegetation on either side. After searching for several hours we located *Delias alepa orthobasis*, one of three subspecies in New Guinea. This species is a member of the *kemmuri* group. *Delias hapalina amoena* is one of six subspecies, of which four are restricted to Papua. This, like *D. leucias*, is a member of the *weisiki* group. One of my favorites that I only observed one time was *Delias neagra hypochrysis*. The species status of this taxon is in discussion; some consider it to be a subspecies of *D. meeki*. If *neagra* is indeed a good species, it is endemic to Papua. It is a member of the *niepelti* group. The image here was taken during a very heavy rainstorm.

Sopping wet, I got back to the resort, found a private area, undressed, wrung out my clothes, and put them back on, just in time for hot chocolate and a killer buffet.



1) *Junonia villida*; 2) *Delias alepa orthobasis*; 3) *Delias hapalina amoena*; 4) *Delias neagra hypochrysis*; 5) war shields at the Baliem Valley resort.



Delias species -- Left: *D. catisa aurostriga* (top) and *D. antara solanais*. Above: *D. aruna inferna*. Right: *D. flavistriga* (top), *D. subapicalis sibatani* (middle), and *Delias* sp.

The next couple of days we revisited the Abagima river site, where I got good clicks of *Delias t. toxopei*, an endemic species in Papua with four subspecies. *Delias catisa aurostriga*, a member of the *eichhorni* group, is one of at least five subspecies in Papua. *Delias antara solanais*, also a member of the *eichhorni* group, is uncommon and an endemic species found in the central mountain range of Papua. *Delias subapicalis* is a single species distributed in the central mountain range. In Papua subspecies *sibatani* is found in the Jayawijaya and Star Mountains, Wamena, and Pass Valley. It is a member of the *geraldina* group/*aroe-pheres* subgroup. *Delias aruna inferna*, a member of the *belisama* group, is a subspecies occurring in Papua. The subspecies of this species have a peculiar distribution. Subspecies *runa* crosses the area of ssp. *aruna*, while ssp. *inferna* overlaps the area of ssp. *aruna* (pg. 159) in Baliem Valley. Working various habitats for seven days I observed around 35 species of butterflies, not like some spots in the Neotropics where you would see more than ten times that!

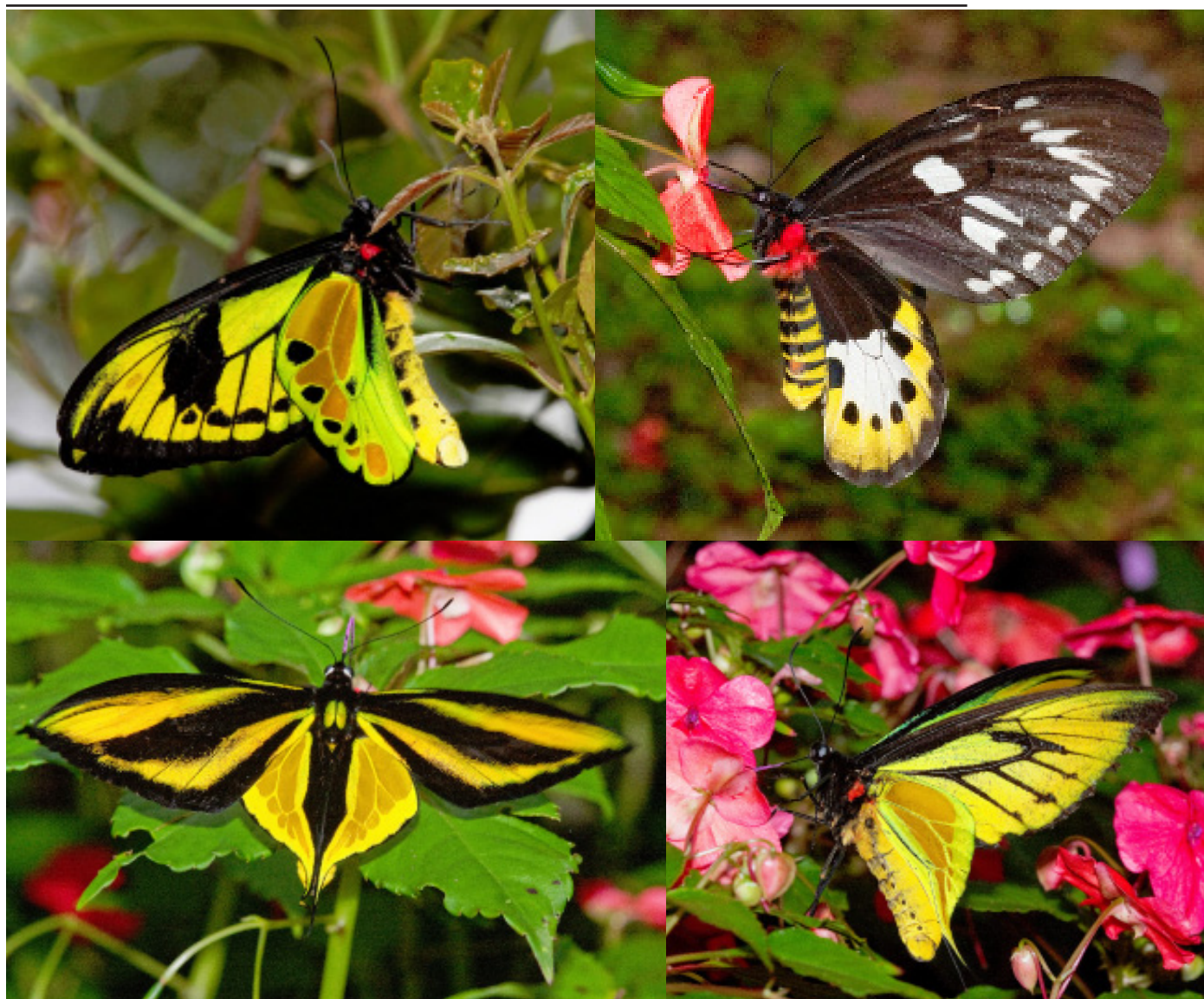
Our international group took a full travel day boarding a plane in Wamena to Jayapura, then taking another flight to Manokwari in the Birds head Peninsula, West Papua. Two vehicles met us for the 4 hour drive on a paved road that was off and on a muddy dirt road into the Arfak Mountains, arriving in the late afternoon at Papua Lorikeet Guest House around 1570m in elevation -- very basic with 7 rooms that share cold water washing areas and toilets, with a single table that seats 7 or so for meals. The food was cooked outdoors over an open fire -- when Robi was the "chef" the food was delicious, otherwise just OK. The 2 plus acre sight is owned by Hans Mandacan, a highly respected local who helped design and build a large garden with different colored *Impatiens* to attract all types of pollinators including 4-5 species of *Ornithoptera*.

The main attraction here was the Bird of Paradise, Western *Parotia*, and the Vogelkop Bower Bird, that makes a cone-shaped hut-like structure with an entrance usually propped up by two column-like sticks. The "front lawn" is cleared of debris and laid out with moss, that the male decorates with colorful flowers, fruit, shiny beetles, and other items of novelty value in order to attract the female, when mated the male plays no role in nesting or raising the young.

West Papua has a tropical very wet climate. It is wet all year, but has the least rain between August and early November. Our 8 day visit enjoyed about 3 days of good partly cloudy to sunny conditions with the other 5 days either raining or very cloudy. This habitat garden is not well known for butterflies but is one of the best places in the world to observe the 4-5 species of *Ornithoptera* that regularly come to nectar on the *Impatiens*. Ten feet from my room was a small deck where I would sit on a flimsy plastic chair. When sunny, starting around 7:15 am, up to 4 species of *Ornithoptera* would come soaring down from the high canopy to nectar on *Impatiens*, sometimes less than 15 feet away.



Impatiens at Papua Lorikeet Guest House

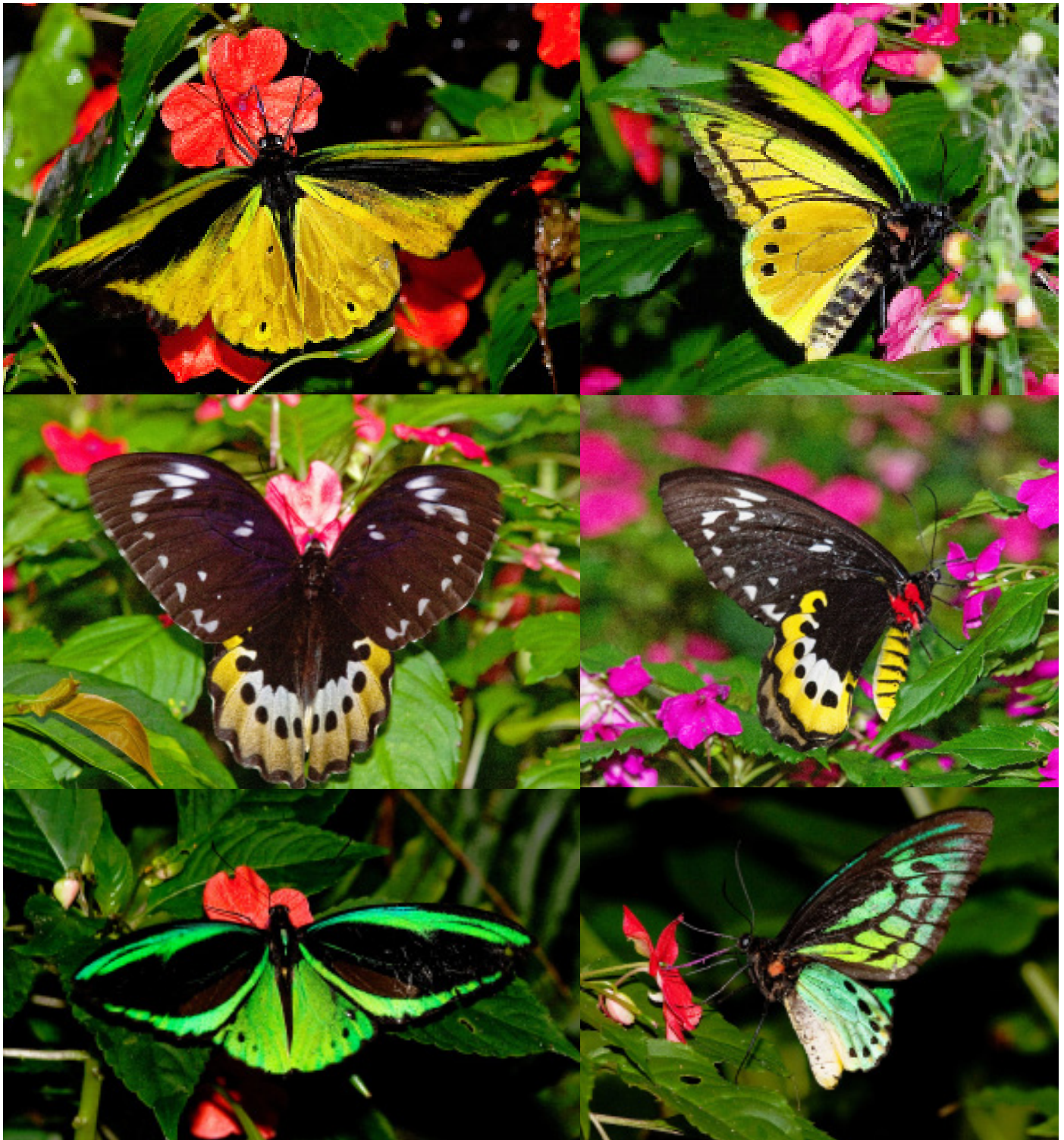


Ornithoptera spp., top: *O. tithonus misresiana*, left -- male, right -- female; bottom, *O. paradisea arfakensis*, male dorsal and ventral.



Courting *Ornithoptera tithonus misresiana*

Ornithoptera are large to extremely large, particularly females, which are phenotypically different than the males. The most common was *Ornithoptera tithonus misresiana* (see also back cover), a subspecies endemic to the Arfak Mountains. Most were quite fresh. One image shows the male showering the female with pheromones to entice her to mate (she declined). Next most common was *O. paradisea arfakensis* a subspecies endemic to Anggi Lakes and the Arfak Mountains; the other subspecies *O. paradisea chrysanthemum* is endemic to the lowlands around the Manokwari area. The males have reduced hindwings, but because of the very rapid forewing beats, their flight is not hindered. While nectaring, *arfakensis* never stop the very fast movement of their forewings, but just before they move to another location, there is a very slight change in the reduced hindwing being more exposed and open, giving you the best opportunity for a good photograph. Several times a day, males of *Ornithoptera*



Ornithoptera spp. Top: *O. goliath samson*, male; middle: *O. goliath samson*, female; bottom: *O. priamus poseidon*, male.

goliath samson, endemic to the West and N.E. areas of the Berau peninsula including the Arfak Mountains would fly rapidly, briefly stopping for nectar, then take off high into the canopy, making this species a real challenge to photograph. Females were only observed on a few occasions. I also observed *Ornithoptera priamus poseidon* males three times, quickly moving from flower to flower for

a short time before taking off not to be seen again that day.

One day we drove for over 2 hours along a sometimes very steep, very muddy road further into the Arfaks looking for the endemic *Ornithoptera (Schonbergia) rothschildi*, but bad weather and other factors prevented any observation of this unique butterfly.



1) Robi, one of our butterfly guides, walking the Sompam River; 2) Grocery store on a motorcycle; 3) *Delias dixeyi*; 4) *Ornithoptera tithonus misresiana* larva; 5) *Ornithoptera tithonus misresiana* pupa.

A bright sunny morning greeted us for a 20 minute drive, passing a man driving his “grocery store” motorcycle down the road, that led us to a long, heart pounding trail that ended with a plot of *Aristolochia* vines, and a grove of *Hibiscus* trees that we observed various birdwing butterflies nectaring on. Along the way a local found *Delias dixeyi*, an endemic species from the Arfak Mountains, belonging to the *kummeri* group.

Our native guide located the ova, larva, and chrysalis of *O. tithonus misresiana*, that produced many clicks from our group.

I left early with a guide and his adolescent son passing a local who was hunting and foraging, and a very young boy playing with a cell phone!

On the last night we had a celebratory dinner, and shared stories about ourselves, others, and the trip. The next morning we headed home, flying out at different times, as I headed to Jakarta to play tourist for the day. I only

photographed about 50 species of butterflies during the trip, but many were spectacular that I will remember the rest of my life.

I (Bill Berthet) am responsible for identification of the butterflies. The resources I used for this include *Ornithoptera*, by Bela von Knotgen; The Butterflies of Papua New Guinea, by Michael Parsons; Fluttering Encounters in the Amazing Archipelago, by Jan Pasternak; Butterflies of the Bukolo-Wau Valley, by Michael Parsons; A Monograph of the Birdwings Butterflies, by J. Haugum and A. M. Low; and Butterflies of the World Part 10, Plates and Text Pieridae 1, by Erich Bauer and Thomas Frankenbach

I also used several internet sites, including the excellent www.Papua-Insects.nl and www.delias-butterflies.fr. The Papua Insects Foundation was indispensable for information and identification of *Delias* Butterflies. Adrian Hoskins assembled a checklist of *Delias* observed on this trip.

Butterfly vicariance in Southeast Asia

John Grehan

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Southeast Asia is usually seen as a sort of intercontinental highway for organisms, and its inhabitants are thought to have come from somewhere else – usually mainland Australia or Asia (Lohman et al. 2011). This perspective reflects Darwin's (1859) idea that related taxa in different places (allopatric taxa) originally arose in a smaller geographic area or center of origin, either within the current range or somewhere else. Depending on various theoretical assumptions about the timing and location of differentiation, all sorts of dispersal pathways have been proposed and continue to be proposed to account for the geographic diversity of life on Earth.

In modern biogeography, results from two principle methods have been used to support Darwin's center of origin theory. These are molecular clock dating of clades and ancestral area analysis used to find the center of origin of a clade. Evidence from both methods has been widely presented in support of the view that most modern groups, including butterflies, have roamed about the world in recent times, and that dispersal – the ability to move about – is the key to understanding the evolution of allopatry. But there are major problems with both forms of evidence (Heads 2012).

Molecular divergence dating is almost always calibrated by using fossils. The fossil dates are extrapolated onto other taxa to produce predicted ages for them. These ages are treated as actual (even if approximate) or maximum dates. In Bayesian analyses, upper limits for a clade's age are imposed by stipulating an arbitrary range of values called priors. (The priors determine how much older than its oldest fossil a clade can be). But priors are usually set to preclude clade ages that are much older than the fossil ages. The trouble with this approach is that fossils can only provide a minimum age for a taxon (and assuming the fossil is correctly assigned to a group). This means that all molecular divergence dates are also minimums, regardless of any assertion to claim to the contrary (Heads 2012, 2014).

Fossil-calibrated molecular dates cannot constrain the potential upper limits of phylogenetic age or contradict earlier origins predicted from other lines of evidence. Some molecular studies have used island age to calibrate clade age, but island age is often uncertain and endemic taxa may be older than the islands they occupy, as found in some molecular studies. A less common molecular calibration method relates distributions to tectonic structures (e.g. transform fault, spreading ridge, subduction zone etc.) that coincide spatially with the clade distributions. This

method does provide an estimated actual date instead of a minimum. Precision of the tectonic age calibration will depend on the geological dating for each case and the potential for tectonic reactivation at different times (Heads 2012).

The technique of 'ancestral area analysis' (using, for example, dispersal-vicariance programs) interpret the spatial history of a group based on its phylogeny. In Hennig's (1966) early procedure, the geographic sequence of phylogeny is interpreted as the sequence of dispersal events. However, it could equally well represent a sequence of vicariance events in a widespread ancestor. Modern ancestral area programs also propose dispersal histories even in cases where there has been a history of sequential vicariance. For example, in a group with an area phylogeny: A (A (A + B)), the first three clades form a basal paraphyletic grade restricted to area A, while a more deeply nested clade is in area B. An ancestral area analysis will calculate that the group has a center of origin in A and dispersed from there to B. However, the phylogeny could just as well be the result of vicariance in an ancestor already widespread in both A and B, followed by local dispersal within area A (Fig. 1).

The evidence for the idea that chance dispersal explains allopatry, as generated in ancestral-area analysis, is as an artifact of the algorithm.

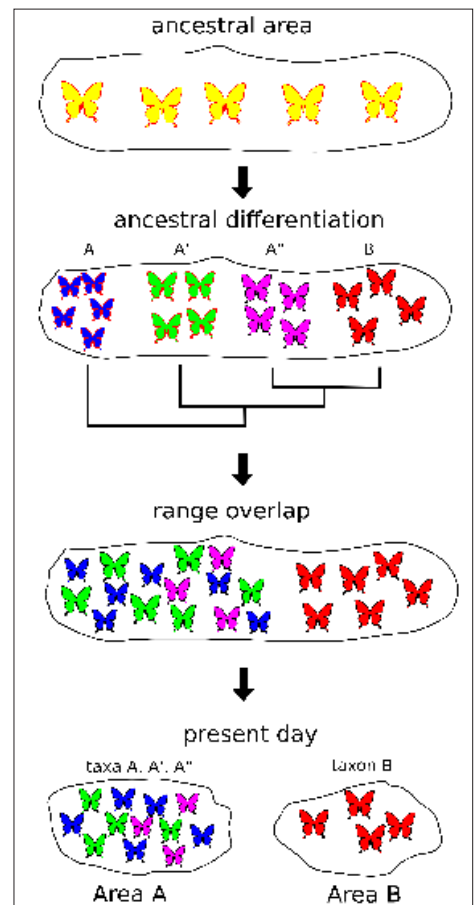


Fig. 1. Vicariance model to explain basal grade in area A (species A, A', A'') as the result of vicariance in a widespread ancestor followed by range expansion in Area A.

An alternative approach to butterfly biogeography does not search for a center of origin, but instead maps distributions and evaluates the degree of overlap or allopatry between sister taxa. Allopatry is consistent with local differentiation of a widespread ancestor by vicariance. Overlap between sister taxa indicates that there has been subsequent range expansion through ecological dispersal of one or more descendants. This approach was recently applied to the distributions of species in *Papilio* subgenus *Achillides* (Fig. 2) which have a total range including eastern Asia, Australia, and adjacent islands (Grehan 2019). The distribution comprises three widespread subclades and one localized monotypic clade of uncertain systematic status in southern India. Of the widespread distributions, two are reciprocally allopatric while the third overlaps each of the other two. This pattern is consistent with allopatric differentiation followed by range expansion that has not entirely obscured the original allopatry other than for the southern India species (Fig. 3). This model of allopatric differentiation implies that the common ancestor *already* occupied Asia, Australia, and the islands of Southeast Asia when differentiation of the modern groups began. Allopatric differentiation of the major subclades by vicariance was followed by some range expansion resulting in geographic overlap.

Each of the four widespread clades also shows evidence of allopatric differentiation along with some range expansion. For example, clade 3 comprises two subclades that are mostly allopatric (Fig. 4) and within each subclade the constituent species are entirely allopatric (Figs 5-6). This pattern is consistent with the ancestor initially differentiating by vicariance, perhaps in the vicinity of the Makassar Strait, followed by further allopatric differentiation within each clade rather than any of the allopatric taxa being derived from any other.

In Grehan (2019) I also reviewed tectonic structures whose distribution coincides with the phylogenetic breaks

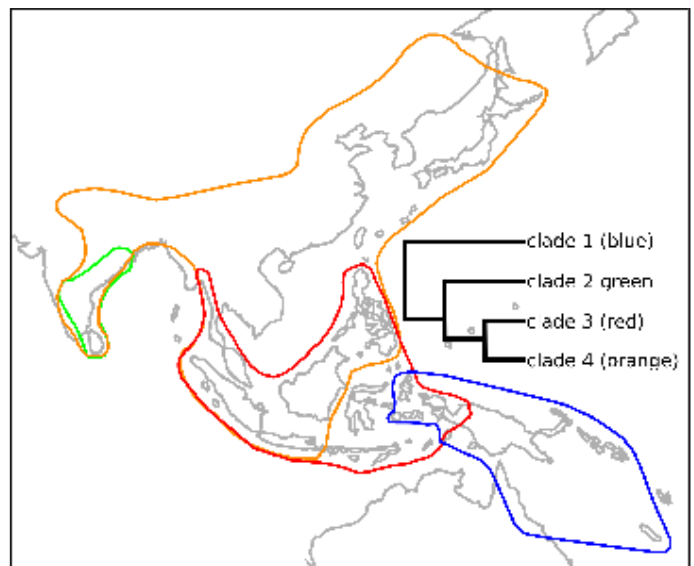


Fig. 3. Distribution of *Papilio* subg. *Achillides* and its four main clades. From Grehan (2019, fig. 2).

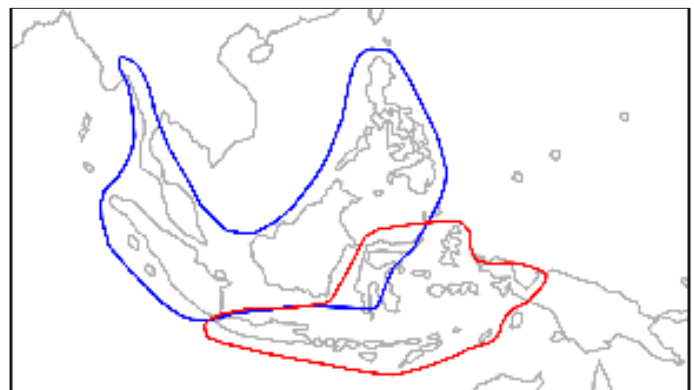


Fig. 4. Distribution of *Papilio* subg. *Achillides* Clade 3, with subclade 3a (blue) and subclade 3b (red). From Grehan (2019, fig. 4).

between allopatric clades. For example, *Papilio lorquianus* in clade 3b has its western boundary at the Moluccas archipelago (Fig. 6), a pattern also found in *Papilio ulysses*, the *Ornithoptera* birdwing butterflies, and a subclade of the butterfly genus *Pyrrhus*. The same Moluccas boundary is found in many plant and animal groups and may be the result of a 2000 km westward movement of this region along the northwestern edge of New Guinea since the early or mid Miocene (Heads 2014).



Fig. 2. a. *Papilio pericles*. Venilale, Timor Leste. <https://www.inaturalist.org/observations/3078771> Reproduced by permission of Stephen Kerany; b. *Papilio peranthus*. Bali, Indonesia. <https://www.inaturalist.org/observations/145583> Reproduced by permission of Mark Rosenstein.

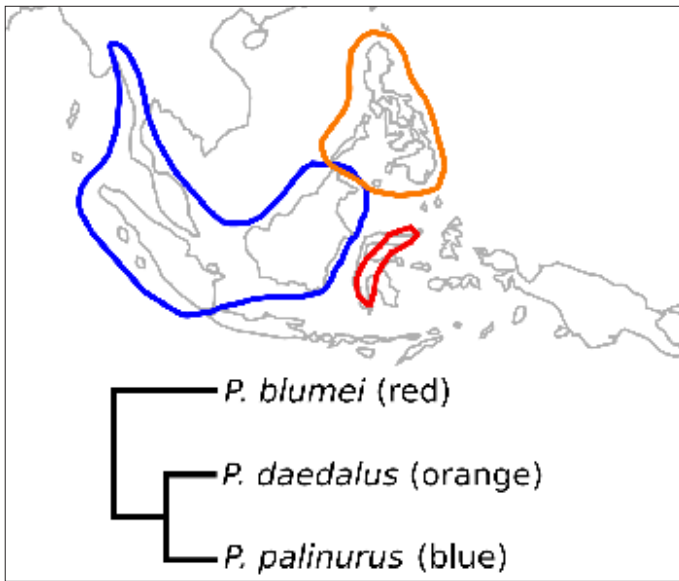


Fig. 5. Distribution of *Papilio* subg. *Achillides* Clade 3a, with three allopatric species. From Grehan (2019, fig. 5).

The other three species in clade 3b are also tectonically informative, as they come into close geographic proximity within the Sumba and Timor tectonic blocks (Fig. 7). These blocks meet at the Semau Fault which extends through the 20 km strait separating the islands of Alor and Wetar along the Inner Banda Arc. This strait also marks the boundary between the adjacent distributions of *P. peranthus* (east to Alor) and *P. pericles* (east to Wetar). The Semau fault is the result of the oblique stress between the Inner and Outer Banda Arcs and may date from their formation during the Miocene. Geological activity along this fault could have disrupted the ancestral range of these species during collision between the Australian margin and the Banda volcanic arc. The fossil calibrated ages of 7.38 Ma (4.84–

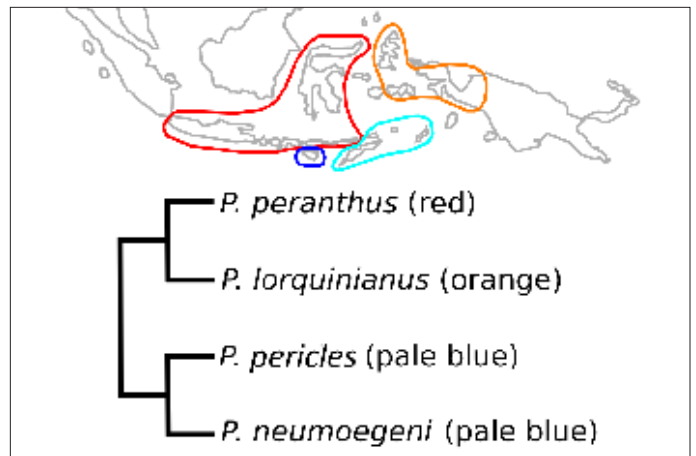


Fig. 6. Distribution of *Papilio* subg. *Achillides* Clade 3b, with four allopatric species. From Grehan (2019, fig. 6).

10.07) for *P. pericles*–*P. neumoegei* clade, and 9.28 Ma (6.69–12.04) for *P. pericles*–*P. lorquinianus* (Condamine et al. 2013) fall within geological estimates (e.g. Hall 2012) of a 15–7 Ma translocation of Sumba Island (*P. neumoegei*) and are close to or within the age of the oldest volcanic rocks on Wetar Islands at 12 Ma that represent only the oldest rocks so far sampled (Hinschberger et al 2005). The origin of the *Achillides* group is estimated by Condamine et al (2013) to be 21.27 Ma (18.14–24.45) whereas the biogeographic pattern suggests a much older origin. Since fossil calibrated ages are minimums there is no true conflict even where fossil-calibrated clade ages are younger.

This example shows that it is possible to analyze the biogeography of butterflies in relation to Earth history events. The results do not conflict with fossil-calibrated molecular dates as minimum estimates. The geographic mapping of phylogeny also avoids the potentially erroneous interpretation of phylogenetic sequence as either dispersal or vicariance.

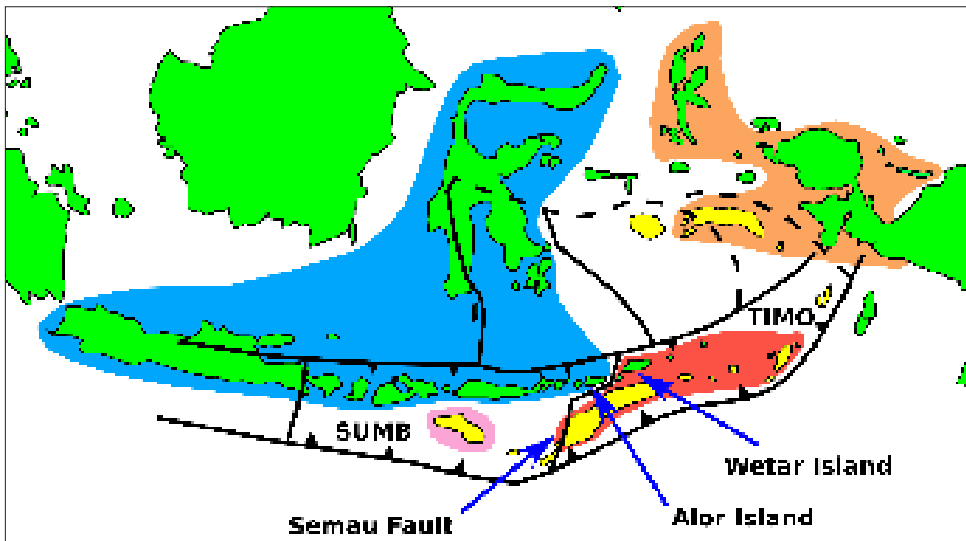


Fig. 7. Tectonics and the distribution of *Papilio* subg. *Achillides* Clade 3b: *P. peranthus* (blue shading), *P. lorquinianus* (pale brown shading), *P. neumoegei* (pink shading – Sumba Island) and *P. pericles* (dark brown shading). Black lines – major faults, barbed lines – subduction zones (barbs on over-riding plate), SUMB – Sumba tectonic block, TIMO – Timor tectonic block. Islands of the Outer Banda Arc in yellow. Modified from Grehan (2019, fig. 15).

The alternative approach used here stresses distributional details that are often overlooked when distributions are treated as the accidental byproducts of chance dispersal. Many taxonomic studies provide excellent distributional detail, but ancestral-area analyses often obfuscate distributional characteristics by reducing distribution to artificial and generalized areas. Fortunately, the study by Condamine et al (2013) included species distribution maps along with the phylogenetic results. This geographic and phylogenetic information indicates that even for vagile butterflies there is evidence

for the evolution of allopatry by vicariance rather than chance dispersal (Chiba 1988, Craw 1990, Heads 2014, 2019, Grehan 2019).

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Metamorphosis



Joan Evelyn Heitzman, 86, originally from Flint, Michigan and a longtime resident of Independence, MO, died on July 29, 2019. Joan was the daughter of Reinhart William Kramer and Verna Hazel Kramer (Beers).

Joan was married to Richard Heitzman for 62 years before his passing in 2013. They had three children; two sons, Roger and Robert; and a daughter, Brenda. Joan and Richard are the co-authors of a book about Butterflies and Moths of Missouri for the Missouri Conservation Department. Joan was a member of Idalia Society. She also co-authored another book with Richard about Polly's Pop. Joan graduated from William Chrisman High School in 1950. Joan spent a lot of time with her precious cat Glamorous.

She is survived by son, Robert and (wife Debi); daughter, Brenda; grandchildren, Melanie, Nathan, and (wife Andrea), Robert, Rica and (husband Mark), Ricky and (wife Nicole) and Jason; and ten great-grandchildren.

For cards or condolences, etc. please call 816-726-7478.

Membership Updates

Chris Grinter

Includes ALL CHANGES received by November 13, 2019. 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*

Gregory Greene: 909 N. Jerrie Ave., Tucson, AZ 85711 (greenecycle@hotmail.com)

Leah Jackson: [red. by req.] (lgjacks@ualberta.ca)

Stephen King: 432 Ridge Rd., Hamden, CT 06517 (sfk432x@gmail.com)

Noah J. Lampart: [red. by req.] (blackswallowtail1009@gmail.com)

Susan Morris: [red. by req.] (Susan@SarasotaButterflies.com)

Mirabai Moseley: [red. by req.]

Claudia Nunez Penichet: [red. by req.] (claununez199o@gmail.com)

Heather Rayburn: 96 Holland St., Asheville, NC 28801 (rayburnh@icloud.com)

Address Changes: *All U.S.A. unless otherwise noted.*

Daniel M. Glaeske: Box 89, St Victor, Saskatchewan CANADA S0H 3T0 (dmglaeske@sasktel.net)

David C. Iftner: 5 Teal Lance, Pittsfield, IL 62363-1971; new phone/email: (217)730-7500 (iftner@casscomm.com)

Leroy C. Koehn: 126 Greenbriar Dr, Aurora, OH 44202 (leptraps@aol.com)

Bryan Pfeiffer: 138 Main Street, Montpelier, VT 05602 (bryan@bryanpfeiffer.com)

Announcements:

The Southern Lepidopterists' Society

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. Slotten, Treasurer, 5421 NW 68th Lane, Gainesville, FL 32653.

Society of Kentucky Lepidopterists

The Society of Kentucky Lepidopterists (SKL) is open to anyone with an interest in the Lepidoptera of the great state of KY. Annual dues are \$15.00 for the hard copy of the News; \$12.00 for electronic copies. I highly encourage the membership to go the electronic route to save the society printing/ mailing costs. The annual meeting is held each year in Nov., at the Univ. of KY, Lexington. This year, Jason Dombroskie gave a scintillating talk on the natural history of KY Microlepidoptera. Be looking for a report in the next SKL Newsletter. Follow the Society's facebook page (<https://www.facebook.com/societykentuckylep/>) for announcements of this and other 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 usually in September, though that may change with the recent move to Spring for the SLS meeting in 2019, with whom we typically share a meeting. 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 trolep.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.

The Wedge Entomological Research Foundation Revises Categories of Financial Support

In 1989 the Wedge Entomological Research Foundation (WERF) created the financial contributor category of Patron to recognize persons and organizations donating \$2,000 in support of the Foundation's publication efforts, The Moths of North America series of monographs. Each Patron is recognized in every publication of the Foundation. Currently, there are eleven patrons.

The WERF is updating its categories of financial support. Until the year 2021, any person or organization desiring to become a Patron can pledge \$2,000 to be paid in full or in three annual installments (to be paid in full by 31 December 2021). Beginning in January 2021 the Foundation will introduce new categories of financial support; Platinum = \$10,000, Gold = \$5,000, and Silver = \$2,500. For all three levels of support, payments can be made in full or in three annual installments. Beginning in January 2021, the category of Patron will be closed, and all Patrons will be designated as Founding Patrons.

Founding Patrons, and contributors at the Platinum, Gold, or Silver level will be recognized in all future publications of the Wedge Entomological Research Foundation.

Please contact Kelly Richers, krichers@wuesd.org, for further information. Thank you for your continued support.

The Ron Leuschner Memorial Fund for Research

The 2020 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 2(+) 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 and must include submission of the application form (see the Lep Soc website at www.lepsoc.org), a brief (500 word maximum) proposal, and a letter of recommendation or support from the student's academic advisor or major professor. 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.

Call for Season Summary Records

You now have a 2018 Season Summary in your hands! So, rest assured that it has been resurrected, and will continue to be assembled each year going forward. As such, you need to get your 2019 records to your Zone Coordinators.

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 field season and report range extensions, seasonal flight shifts, and life history observations to the appropriate Zone Coordinator. They and their contact information, and the scope of their zone appears on the inside back cover of every issue of the "News".

Please have your data to the Zone Coordinator(s) no later than **December 31, 2019**. I know, you're still waiting for two years worth of records, but if you do it now you won't have to catch up later.

Most records are important. Reports of the same species from a 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. All submitted records will go IN THE DATABASE. However, only the more significant records will appear in the printed version of 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.

Photos for front and Back Covers AND for inclusion in the body of the SS

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.

Photos for inclusion in the body of the SS should be sent to Brian Scholtens at scholtensb@cofc.edu. Group gathering pictures are encouraged for the text, as the covers will be reserved for leps.

The 2017 Season Summary

At this time we are asking the Zone Coordinators to re-assemble your 2017 data as much as possible to send to Brian Scholtens to be incorporated into the 2019 Season Summary. Thank you for your diligence.

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!

New MONA Fascicles coming!

The Wedge Entomological Foundation is dedicated to producing volumes in the series "The Moths of North America (MONA)". Volumes are produced as authors complete them on an anticipated schedule (due to budgetary constraints) of one volume per year, if manuscripts are available.

The Wedge is pleased to announce that there are two more "in the pipeline" of the MONA series at this time. The first notodontid fascicle is already out. The Acronictinae volume is next, and following that is the second volume of the Notodontidae. Both of these should be in your hands in 2020.

Online collection of papers on latest research in Insect Morphology and Phylogenetics

There is a new collection of papers, published by the Entomological Society of America, from Insect Systematics and Diversity that may be of interest to readers of News of The Lepidopterists' Society. The collection, "Current Techniques in Morphology," brings together six papers illustrating cutting-edge research techniques in insect morphology and phylogenetics, including one paper focused on mouthpart remodeling in *Manduca sexta*. You can access the collection here: <https://academic.oup.com/isd/pages/current-techniques-in-morphology>.

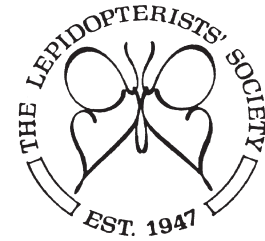
Lisa Junker, CAE / Director of Publications, Communications, and Marketing, Entomological Society of America, ljunker@entsoc.org

Increase in Late subscription fees

Notice of increase in late-fees. Due to ever increasing postage costs, international late-fees are increasing. The US will remain the same at \$10, Canada and Mexico will **increase to \$15**, and the rest of the world **increases to \$40**. This change will take place for the upcoming subscription year, and will be reflected on the upcoming dues notice mailing.



**The Lepidopterists' Society annual meeting –
Cullowhee, North Carolina
– June 16-19, 2020**



eligible for various awards including travel awards to help defray costs of meeting attendance (for those giving papers or posters) (<https://www.lepsoc.org/content/awards>). Our real strength

Please join us for the 69th annual meeting of the Lepidopterists' Society, to be held from Tuesday, June 16 – Friday, June 19, 2020 in Cullowhee, North Carolina. We will be meeting in conjunction with the Southern Lepidopterists' Society and the Tropical Lepidoptera Society. The meeting will be hosted by Western Carolina University and Dr. James Costa. WCU is the westernmost university in the UNC system, located in a valley between the Blue Ridge and Great Smoky Mountains. Started in 1889, it is a comprehensive university for 11,000 undergraduates and graduates. Dr. Costa has been in the Department of Biology at WCU since 1996 and the director the Highlands Biological Station since 2005. He has studied and published extensively on social behavior in caterpillars and is a Darwin scholar, recently recognized as a finalist for the AAAS/Subaru Prize for his book "Darwin's Backyard: How Small Experiments Led to a Big Theory."

is people! We are a supportive group of amateurs and professionals, collectors and photographers, students and retirees, all united around our mutual love for butterflies and moths.

Local hosts of the meeting are Jim Costa and Brian Scholtens. Please contact Brian Scholtens at 843-637-6224 or scholtensb@cofc.edu for questions or concerns. Hope to see you in Cullowhee this June!

**2020 ANNUAL MEETING OF THE
SOUTHERN LEPIDOPTERISTS' SOCIETY**

We encourage contributed papers and posters and will have a special trip for the BBQ and collecting to Highlands Biological Station. A welcome reception will occur on campus Tuesday evening. Main sessions and the Friday banquet will also be on campus, with housing conveniently located in Blue Ridge Hall on campus.

The 2020 Annual SLS Meeting will convene from 16-19 June (Tuesday through Friday) in conjunction with the Lepidopterists' Society and the Association for Tropical Lepidoptera on the campus of Western Carolina University (WCU) in Cullowhee, North Carolina. Field Trips will be organized for Tuesday (16 June). Talks will be scheduled for Wednesday through Friday (17-19 June). The Executive Council meeting of the Lepidopterists' Society is scheduled for Tuesday (16 June); the SLS business meeting will convene sometime during the Wednesday through Friday period. A barbecue will be arranged for Thursday evening at Highlands Biological Station (followed by blacklighting for anybody interested) and a banquet for Friday evening at WCU. Talks and meeting registration should be submitted via the Lepidopterists' Society meeting website which should be up and running soon. Housing reservations for the meeting will be arranged by WCU – more information to follow in the March 2020 Lep Soc and SLS Newsletters.

Online registration will be done through WCU. Look for links for registration and abstract submissions and additional details coming soon on the Lepidopterists' Society website.

Since Western Carolina University is located in the Appalachian Mountains, there is no direct way of travelling to Cullowhee. The closest airport is Asheville Regional Airport, in Asheville, NC. From here WCU is about 45 miles.

WCU is part of the University of North Carolina system. The picturesque campus is situated in the western North Carolina mountains at an elevation of about 2,100 feet (640 m) but elevations up to about 6,000 feet (1,829 m) are adjacently accessible by road. Great Smoky Mountains National Park, Pisgah National Forest and Nantahala National Forest are all within fairly close driving distance. Please plan to attend and present a talk.

If you would like to become a member of the Lepidopterists' Society, please visit <https://www.lepsoc.org/content/new-membership>. Membership gives you access to current and past issues of the Journal of the Lepidopterists' Society and the News of the Lepidopterists' Society. Members are also

Association for *Tropical Lepidoptera*



Pharmacophagus antenor
Madagascar

Lep.Soc.- So.Lep.Soc.- Assoc.Trop.Lep.
Combined meeting, 16-19 June 2020
Western Carolina University, N.C.

Above: Hand-colored copperplate engraving by F. P. Nodder (English, *The Naturalist's Miscellany*, 1794); the artist was appointed "botanic painter to her majesty" Queen Charlotte in 1785.

Corrections, Fall Issue of the News, 61(3)

Due to a miscommunication between the InDesign program I use to generate the News and the exported pdf, there were some duplicated images in the James Scott *Oeneis* article (pgs. 146-150). The correct images are presented, and an addendum added, by James Scott.

"The *Oeneis* paper by J. Scott (vol. 61(3): 146-150) lost seven photos (duplicates of other photos were published instead), which are given here (and note that the published *Oeneis alberta* "3rd stage" photo is really near-mature). Added here is a note on the nomenclature of *Oeneis chryxus*: After nine years of silence the ICZN Aug. 30 2019 ruled (opinion 2434 on case 3495, Bull. Zool. Nomenclature 76:141-143) that the name-bearing type of *Oeneis chryxus* is the male illustrated by Doubleday because it is the holotype by monotypy. That holotype is lost, therefore the neotype designated in 2014 by Scott from Colorado is now the valid name-bearing type."

Jason Piers Wilton Hall Awarded the Westwood Medal

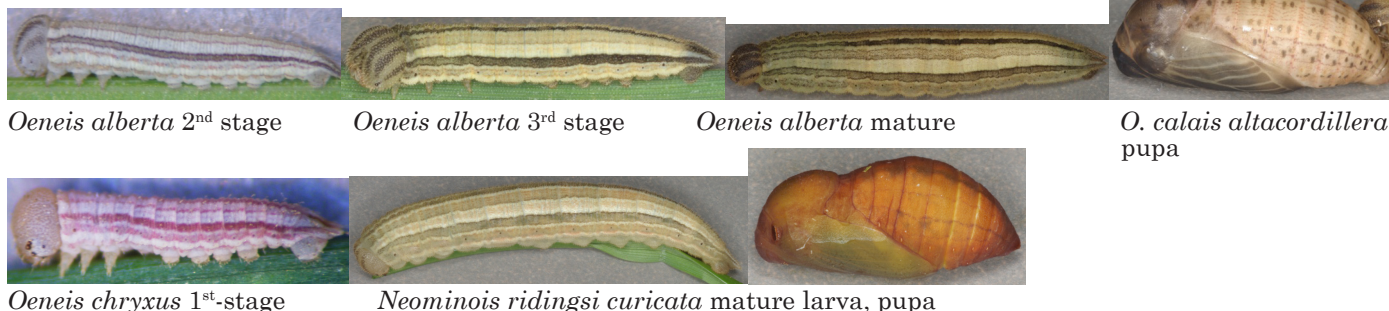
On August 21, 2019 Jason Hall was awarded the Westwood Medal and the Marsh Prize for the best comprehensive taxonomic work on a group of insects, or, related arthropods (including terrestrial and freshwater hexapods, myriapods, arachnids and their relatives). Typically, this is a taxonomic revision or monograph. It is open to authors from any country who demonstrate the highest standards of descriptive taxonomy. His was honored for his book "A Monograph of the Nymphidiina (Lepidoptera: Riodnidae: Nymphidiini) Phylogeny, Taxonomy, Biology, and Biogeography" published by the The Entomological Society of Washington, Washington, D.C., 2018, with funding from The National Science Foundation and The Entomological Society of Washington, 990 pages + 40 plates.



Jason Piers Wilton Hall, winner of the Westwood Award for his comprehensive taxonomic work on Nymphidiina.

Lep Soc Statement on Diversity, Inclusion, Harassment, and Safety

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



Oeneis alberta 2nd stage

Oeneis alberta 3rd stage

Oeneis alberta mature

O. calais altacordillera pupa

Oeneis chryxus 1st-stage

Neominois ridingsi curicata mature larva, pupa

LEPIDOPTERISTS' SOCIETY STATEMENT ON COLLECTING LEPIDOPTERA

Collecting moths and butterflies has historically been a part of many cultures worldwide. Collecting, rearing, observation, and photography are all affirmed by our inclusive Society to be legitimate activities, enabling both professional and avocational lepidopterists, individually and in cooperation, to pursue the scientifically sound study of Lepidoptera. It should be clearly stated that collecting is an essential part of many scientific studies, the knowledge from which in turn is very important in conservation of natural populations. Our responsibility to assess and preserve natural resources and to better understand and preserve biological diversity in perpetuity requires that we examine the practice of collecting Lepidoptera in order to better govern our own activities.

Our guidelines are based on these **premises**:

Lepidoptera make up one of the largest orders of insects and therefore are an important component of biological diversity.

Lepidoptera are conspicuous in their beauty and diversity, are well known scientifically, typically adapted to specific hostplants and plant communities, and thus frequently used as indicator groups in conservation programs.

The collection of Lepidoptera has value both as a personal educational activity as well as to society. Collecting is a means of introducing both children and adults to the natural world. Collecting plays an essential role in scientific studies, in theoretical biology as well as in conservation, protection of the environment and its resources, human health, and the world food supply.

Given the typically high reproductive and dispersal potential of Lepidoptera, responsible collecting is an educational activity that normally is not detrimental to the organism nor to the environment. In certain circumstances a population(s) of Lepidoptera may be vulnerable to over-collecting; for example, populations on small islands, populations greatly reduced in size due to habitat destruction, and those specifically adapted to unusual habitats (bogs, alpine zones, etc.). The collector should seek advice from appropriate regional experts and organizations and follow all local, state (or provincial), and federal guidelines for collecting.

Guidelines

Purpose of Collecting: Collecting is a valid activity that serves several primary goals:

1. As an educational activity to instruct and inspire students or the general public in an appreciation for the natural world.

2. To create a reference collection for study and appreciation, both as a private activity and within an institution.

3. To document regional diversity, frequency and abundance of species, and as voucher material for published records.

4. To document faunal representation in environments undergoing or threatened with alteration by humans or natural forces.

5. To participate in development of regional checklists and institutional reference collections.

6. To complement a planned research endeavor. Specimen collections with associated data are resources for scientific research including ecological, evolutionary and conservation studies. Specimens are the fundamental units for comparative study in all biological disciplines, vouchering morphological, behavioral, and molecular data.

7. To aid in dissemination of educational information.

8. To augment understanding of taxonomic and ecological relationships using characters not available in photographs, e.g., genitalia, molecular data.

9. To establish cultures for scientific and educational purposes.

Collecting Methods:

Collecting adults or immature stages should be limited to sampling, not depleting, the population concerned. Numbers collected should be consistent with the purposes outlined above. Where the extent and/or fragility of the population is unknown, caution and restraint should be exercised, particularly with regard to collecting females.

Data Sharing:

All data should be recorded, preserved in digital backup media as indicated, and made available to appropriate interested parties. We encourage all collectors to publish new or otherwise valuable observations or records in an appropriate print medium or on-line database, rather than just on a social media site. Both the Journal of the Lepidopterists' Society and the News of the Lepidopterists' Society (with its annual Season Summary), are excellent outlets for these data. Data from the Season Summary are permanently archived in an online database.

Live Material:

Rearing to elucidate life histories and to obtain series of immature stages and adults is encouraged, provided that collection of the rearing stock is in keeping with these guidelines.

Reared material in excess of need should be released only in the region of origin, and in suitable habitat.

Environmental Concerns:

Protection of the supporting habitat must be recognized as the critically essential means to protect a species.

Collecting should be performed in a manner such as to minimize trampling or other damage to the habitat or to specific hostplants.

Property rights and sensibilities of others must be respected.

Collecting must comply with regulations relating to publically controlled areas, to individual species, and to habitats.

Responsibility for collected Material:

All material should be preserved with all known data attached, and protected from physical damage and deterioration (e.g. due to light, molds, and museum pests).

Collections should be made available for examination by qualified researchers.

Collections or specimens, and their associated written or photographic records, should be willed or offered to the care of an appropriate scientific institution if the collector lacks space or loses interest, or in anticipation of death. It is a good idea to deposit duplicate specimens, if available, in several institutional collections as insurance in case of fire, floods, and other disasters.

Type specimens are name-bearing types, especially holotypes and lectotypes (a designated specimen in cases when the original author did not do so). Type specimens determine the use and application of names (nomenclature, including synonymy, homonymy, priority, availability, and validity of names). Type specimens must be deposited in appropriate scientific institutions.

Related Activities of Collectors:

All known data should be recorded with the specimen, including date, location (GPS coordinates with altitude if possible), collector, habitat, larval host plant or other plant associations, parentage of immatures, etc. Recording observations of behavior and biological interactions should be regarded as important as collecting specimens. Photographic records with full data are valuable and should accompany specimens.

Collecting should include permanently recorded field notes regarding habitat, conditions, and other pertinent information.

Education of the public regarding collecting and conservation, as reciprocally beneficial activities, should be undertaken whenever possible.

Traffic in Lepidopteran Specimens:

Collection of specimens for exchange or sale should be done only in accordance with these guidelines.

Reared stock of specimens for exchange or sale should be from stock obtained in a manner consistent with these guidelines, and so documented.

Mass collecting of Lepidoptera for commercial purposes and collection of specimens for creation of saleable artifacts are not included in the purposes of the Society and are discouraged.

Legal Considerations:

Collectors should comply with local, state or provincial, federal or national, and international laws and regulations that govern collecting and possession, commerce and exchange, import and export, and protection of species. Collections should comply with additional local, state or provincial, federal or national, and international laws and regulations governing live material.

[Submitted by M. Collins, A. Aiello, and B. Scholtens; modified and approved by Executive Council July 2019; Davis, CA]

The High Country Lepidopterists

The High Country Lepidopterists (HCL) just had their 30th annual one day Meeting at the Denver Museum of Nature & Science (DMNS). The High Country Lepidopterists' group has no officers, no dues, and meets once a year in fall in a rotation with five institutions (DMNS, University of Denver, University of Colorado at Boulder, Colorado State University, and the Butterfly Pavilion) to promote the study of Lepidoptera. Lepidopterists from the surrounding states, lay people as well as university professors, can exchange ideas, share information and their research efforts. HCL also provides a great opportunity for students to share their research projects. This year we even had a talk on Lepidoptera of Thailand with amazing images. We just need an email address to add anybody interested in joining HCL to receive the annual meeting invitation (Sarah Triplett: striplett@butterflies.org).

The next meeting will be in fall 2020 at the University of Denver. (See group photo, Back Cover).



Philippine Lepidoptera butterflies and moths, Inc. A new online resource for southeast Asian Lepidoptera

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The organization started as a Facebook page to reach more people in the country to post butterfly and moth photos. The members of the organization tried their best to identify the photos by doing online research, reviewing literature, and reaching out to experts. As more people have joined the group, more and more photos have been uploaded which also triggered the members of the organization to establish its website and also secured certification from the Securities and Exchange Commission (SEC) of the Philippines to become a legal entity of the country to be able to receive grants and funding to conduct Lepidoptera related studies in the country.

The organization helped international authors to publish the book *Field Guide to the Butterflies of The Philippine* by Peter B. Hardy and James M. Lawrence which was published in 2017, and the primary author's 2019 book entitled *The Butterfly Fauna of the Philippines. Volume 1: Papilionidae and Pieridae*. The organization also provided photos of butterflies taken from the wild to research projects dealing with phylogeny of Philippine or Asian butterflies.

New distributional records of butterfly species and subspecies have been documented by members of the organization and by other non-government organizations such as EcoDev Inc. (Catanduanes Sustainable Ecosystems Development, Inc), the Catanduanes Biodiversity, Habitat Bohol (a butterfly/wildlife sanctuary), and local people who just happened to photograph a new island record. Local people and students also helped document distributional records of butterflies and moths by posting photos from their backyard garden or during their hiking trips in the mountains of the Philippines. PhiLep has assisted several students in the country conducting their research projects or theses on the ecology of butterflies in various habitats. The identification of butterflies is usually done by referring descriptions from taxonomic publications or consultations from experts. Contributing photographers are also asked to take as many photos of the upperside and underside of the wings for easier identification, although some are difficult to identify and we usually identify them to the genus level until another expert examines them again. The organization definitely triggered people to participate in a simple documentation of Philippine Lepidoptera.

The need to document more species in the country paved way for the organization to establish its photography trips

around the country. The first trip was in The *Balinsasayao* Twin Lakes Natural Park in Sibulan, Negros Oriental which was attended by enthusiasts from the Philippines and Japan.

Please visit the website at <http://philepidoptera.wixsite.com/philep> to check more of the organization's vision and mission and recent photos of Philippine Lepidoptera.



Figure 1. *Eooxylides tharis tharisides* from Palawan, Philippines. Photo by Jojo De Peralta.



Figure 2. *Celarchus hermarchus hermarchus* from Negros Island, Philippines. Photo by Jade Badon.



Figure 3. *Unkana ambasa palawana* from Palawan, Philippines. Photo by Jojo De Peralta.



Figure 4. *Ragadia luzonia negrosensis* from Negros Island, Philippines. Photo by Jade Badon.



Figure 5. *Taenaris horsfieldii plateni* from Palawan, Philippines. Photo by Jojo De Peralta.



Figure 6. *Papilio demolion delostenus* from Palawan, Philippines. Photo by Jojo De Peralta.



Figure 6. *Arisbe doson nauta* larva from Luzon, Philippines. Photo by Leana Cristobal.



Figure 7. *Menelaides helenus hystaspes* from Luzon, Philippines. Photo by Jade Badon.



Figure 9. Official logo of the Philippine Lepidoptera Butterflies and Moths Inc. (PhiLep).

The Marketplace

IMPORTANT NOTICE to ADVERTISERS: If the number following your ad is "613" then you must renew your ad before the next issue if you wish to keep it in the Marketplace!

Equipment

FOR SALE: Light Traps: 12 VDC or 120 VAC with 18 inch vanes (15 & 32 Watt) and 24 inch (40 Watt). Rigid vanes of Stainless Steel, Aluminum, or Plexiglass. Rain Drains and beetle screens to protect specimens from damage.

Collecting Light: Fluorescent UV 15, 32 & 40 Watt. Units are designed with the ballast enclosed in a weather tight plastic enclosure. Mercury Vapor: 160 & 250 Watt self ballast mercury vapor with medium base mounts. 250 & 500 Watt self ballast mercury vapor with mogul base mounts. Light weight and ideal for trips out of the country.

Bait Traps: 15 inch diameter and 36 inches in height with a rain cloth top, green Lumite plastic woven screen, and supported with 3/16 inch steel rings. A plywood platform is suspended with eye bolts and S hooks. Flat bottom has a 3/16 inch thick plastic bottom that will not warp or crack. Bait container is held in place by a retainer.

Drawers: Leptraps now offers Cornell/California Academy storage drawers. Drawers are made of Douglas Fir, hard-board bottom and glass top. Finished in clear satin gloss varnish. A single card holder with pull or two card holder with a knob pull. Foam pinning bottom is available.

Price does not include shipping. If purchasing 20+ drawers, and you live within 350 miles from Georgetown, KY, I will meet you half way for delivery. Mastercard/Visa, Pay Pal, checks accepted.

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.

We now accept ads from any credible source, in line with the New Advertising Statement at the top of this page. **All advertisements are accepted, in writing, for two (2) issues unless a single issue is specifically requested.** All ads contain a code in the lower right corner (eg. 564, 571) which denotes the volume and number of the **News** in which the ad first appeared. **Renew it Now!**

Note: All advertisements must be renewed before the deadline of the

For more information visit: www.leptraps.com, or contact Leroy C. Koehn, Leptraps LLC, 126 Greenbriar Drive, Aurora, OH 44202; Tel: 502-542-7091, e-mail: leptraps@aol.com.
indefinite

(Speaking of Leptraps) **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 \$150,000 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.
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third issue following initial placement to remain in place.

Advertisements should be under 100 words in length, or **they may be returned for editing.** Some leeway may be allowed at the editor's discretion. Ads for Lepidoptera or plants must include full latin binomials for all taxa listed in your advertisement.

The Lepidopterists' Society and the Editor take no responsibility whatsoever for the integrity and legality of any advertiser or advertisement. Disputes arising from such notices must be resolved by the parties involved, outside of the structure of The Lepidopterists' Society. Aggrieved members may request information from the Secretary regarding steps which they may take in the event of alleged unsatisfactory business transactions. A member may be expelled from the Society, given adequate indication of dishonest activity.

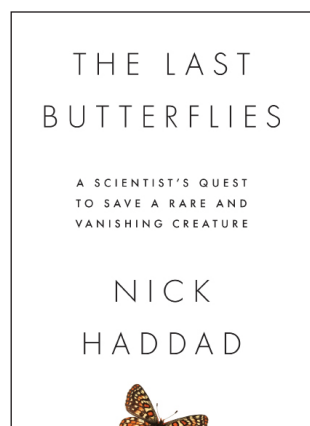
Buyers, sellers, and traders are advised to contact state department of agriculture and/or ppqaphis, Hyattsville, Maryland, regarding US Department of Agriculture or other permits required for transport of live insects or plants. Buyers are responsible for being aware that many countries have laws restricting the possession, collection, import, and export of some insect and plant species. Plant Traders: Check with USDA and local agencies for permits to transport plants. Shipping of agricultural weeds across borders is often restricted.

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

Publications

The Last Butterflies: A Scientist's Quest to Save a Rare and Vanishing Creature

by Nick Haddad



Most of us have heard of such popular butterflies as the Monarch or Painted Lady. But what about the Fender's Blue? Or the St. Francis' Satyr? Because of their extreme rarity, these butterflies are not well-known, yet they are remarkable species with important lessons to teach us. *The Last Butterflies* spotlights the rarest of these creatures—some numbering no more than what can be held in one hand. Drawing from his own first-hand experiences, Nick Haddad explores the challenges of tracking these vanishing butterflies, why they are disappearing, and why they are worth saving. He also provides startling insights into the effects of human activity and environmental change on the planet's biodiversity. A moving account of extinction, recovery, and hope, *The Last Butterflies* demonstrates the great value of these beautiful insects to science, conservation, and people. 613

WANTED: Part 1 (Satyrinae), Part 2 (Heliconiinae and Danainae), and Part 3 (Nymphalinae) of *The Butterflies of Colorado* by Michael S. Fisher (C. P. Gillette Museum Series). Will purchase entire Series (Parts 1-6) if necessary. Contact David C. Iftner at (217)730-7500 or iftner@casscomm.com. 614

Research

To all it may concern: Search Notice.

We are searching for a very mysterious moth species : *Aphomia fuscolimbellus* Ragonot (Lepidoptera, Pyralidae) (see fig 1). It was described in 1887 by Ragonot under the name of *Melissoblastes fuscolimbellus*, and the type locality given was «Amér. sep.». On the label of the type it is «Am. spt.» for «Amérique septentrionale» or «America septentrionalis». There is only one specimen known, actually in the Muséum National d'Histoire Naturelle, in Paris (France). The type is a male and it has a wingspan of 24mm. It was sent by Moeschler to Ragonot. We know that most of the specimens described by Moeschler from North America were coming from Labrador through the Moravian Missionaries. Was it the case with this specimen?

Nobody knows. The abdomen of the specimen seems to have been cut off. Was it for genitalic dissection purpose? In any case, no dissection was found in the Muséum in Paris (Patrice Leraut, pers. comm.).

According to Dr Alma Solis (pers. comm.), it could be a mislabeled specimen seemingly related to an Indo-Australian group of moths. But who knows? If North American, it could feed on dried materials, insects, etc., and it could be a late Autumn or an early Spring species. **SO**, if anybody has one or more specimens in collection that could be this species, from America or other countries, please contact urgently: **Louis Handfield, 845 de Fontainebleau, Mont-Saint-Hilaire, Québec, Canada J3H 4j2; e-mail: lscal@netrover.com; and phone: 450-467-8925** indefinite



Fig. 1 Type of *Aphomia fuscolimbellus* Rag. (image courtesy of Jean-François Landry).

WANTED: spread, high-quality (i.e., scaled, undenuded) specimens of *Halysidota tessellaris*, *H. harrisii*, and *H. cinctipes* for a study testing the efficacy of new methods of species delimitation. +50 individuals of each sex needed for each species. Specimens will be imaged, have their DNA sequenced, and have their genitalia dissected to confirm IDs. Recently collected specimens (<5-10 years old) preferred. Live specimens greatly appreciated, though not necessary. Donators will be acknowledged in any publications using data derived from specimens, unless they prefer to remain anonymous. For more information please contact Dr. Nick Dowdy of the Milwaukee Public Museum (njdowdy@gmail.com). indefinite



Schinia sanguinea, Fall Line Sandhills WMA, western section, Taylor Co., Georgia, Sept. 2, 2018, photo by James Adams.

***Ctenoplusia oxygramma* (Lepidoptera: Noctuidae) frequently recorded in Massachusetts using UniTraps baited with *Autographa gamma* pheromone lures**

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Abstract

Ctenoplusia oxygramma (Lepidoptera: Noctuidae) is a moth in the subfamily Plussinae. Prior records of this moth in Massachusetts are rare, despite its ubiquitousness in an enormous range throughout the Americas. This ecological note presents an additional 208 captures of this moth in the state of Massachusetts in the summer of 2017, and adds several county and month records. This note also highlights the use of bycatch from agricultural surveys as a novel method to survey for this species. Furthermore the capture frequency described herein suggests that this moth is breeding in the state of Massachusetts, and may have up to two generations per year in the state.

Keywords: agriculture, bycatch, Lepidoptera, *Ctenoplusia oxygramma*, Noctuidae, agricultural surveys

Introduction

Every season (from May to November) the Massachusetts Department of Agriculture (MDAR) through the United States Department of Agriculture's (USDA) Cooperative Agricultural Pest Survey (CAPS) conducts surveys for potential invasive and crop damaging insect pests. In 2017 the Massachusetts survey searched for the Old World Bollworm (*Helicoverpa armigera*), The Silver Y (*Autographa gamma*), and The Egyptian Cotton Leafworm (*Spodoptera littoralis*). In previous years of surveying for pests, the amount of non-target species, or bycatch was notable. Due to the prevalence of glue traps used for this survey, bycatch is often left unusable. In 2017, UniTraps or Universal Traps (AlphaScents, Inc., West Linn, OR) were the primary traps used to conduct this survey which left bycatch in usable condition. UniTraps are small, white and yellow, bucket traps with a lure holder and lid. Insects fly into the bucket and are dispatched by Vapor Tape (10% 2,2-dichlorovinyl dimethyl phosphate - DDVP). Bycatch was examined to help understand the presence of native insects, and their catchability based on the specific lure and trap combinations used.

This paper reports on the detection of *Ctenoplusia oxygramma* (Lepidoptera: Noctuidae) in large numbers (208 specimens) in Massachusetts using UniTraps. In the Global Biodiversity Information Facility (GBIF) database, there are currently a total of 514 records of *Ctenoplusia oxygramma* of which 448 records include GPS coordinates. These records show that *Ctenoplusia oxygramma* is a

widely dispersed species that occurs across the Eastern USA, parts of the Southwestern USA, as well as Central and South America. (GBIF species #1785331)

Previous records from Massachusetts are limited. These records are accumulated from various citizen science websites including Butterflies and Moth of North America (BAMONA), BugGuide (BG), and the compilation project MassMoths (MM):

September 20, 2016 – Hampshire Co. (BAMONA¹ #1103474)

September 22, 2016 – Hampshire Co. (BG² – Brian Klassanos)

October 8, 2017 – Hampshire Co. (BG² – Brian Klassanos)

October 13, 2016 – Middlesex Co. (BG² – Tom Murray)

There are records known from Nantucket Co., Dukes Co., Norfolk Co., and Suffolk Co., all records from these counties are between September 4th and October 23rd (MM³).

While this moth is not always known to breed in northern locales, it repopulates in some numbers each year. Examination of these novel records is helpful in understanding the seasonality and presence of this species. This survey was particularly interesting as *Ctenoplusia oxygramma* was not the target species, despite being recorded in such large numbers via bycatch. Lure sampling is a novel method for sampling for this species. Lure sampling for the pests *Autographa gamma* (AG) and *Helicoverpa armigera* (HA) were the detection method for *C. oxygramma*.

Methods

Traps for the 2017 CAPS survey were located at high-risk farms with corn crops, and high-risk nurseries. High-risk is defined as any location that is either a large agricultural grower and shipper, a location that receives multiple out of state/country shipments, or locations near high-risk shipping and travel areas like ports. Traps were set from May to November in the following counties, the number of traps per county follows in parentheses (Table 1): Barnstable Co. (2), Bristol Co. (5), Essex Co. (4), Hampden Co. (2), Middlesex Co. (5), Plymouth Co. (5), Suffolk Co. (1), Worcester Co. (4).

Table 1: Summary of Findings. This table displays how many traps were placed in each county, as well as how many individuals of *Ctenoplusia oxygramma* were recovered from each county. The last column is the average number of days the survey occurred per county.

County	# Traps	# Individuals	Average Survey Length (Days)
Barnstable	2	18	153
Bristol	5	90	157.2
Essex	4	17	138
Hampden	2	4	158.5
Middlesex	5	21	163.2
Norfolk	2	5	153
Plymouth	5	20	155.6
Suffolk	1	21	156
Worcester	4	12	153.25
TOTAL	30	208	

Traps were checked on a biweekly basis, the contents of each trap were placed in a glassine envelope, labeled with the trap number, collector, and date, and then brought back to the lab for identification. Samples were screened for potential target pest species, and bycatch was recorded. Bycatch was counted for number of individuals, and identified to genus or species level by the corresponding author. No target species were caught during the survey.

Herein, we present sample observations and findings from the larger survey dataset, the entirety of which will be published separately. Out of 208 records of this species, 207 were captured using AG lures and 1 captured with HA lure. The records obtained from this study should be considered supplementary to previous knowledge, and are noted to show that this moth is quite widespread across the state, and is likely established as a breeding resident. Each record added is below, all years should be considered to be 2017 for new records.

Records added from this survey (Table 2)

County	June	July	August	September	October	November
Barnstable		X	X	X	X	X
Bristol	X	X	X	X	X	X
Essex		X	X	X	X	X
Hampden				X		X
Middlesex			X	X	X	X
Norfolk			X		X	X
Plymouth		X	X	X	X	X
Suffolk			X	X	X	
Worcester		X	X	X	X	

Table 2: New county records are highlighted in red (Barnstable, Bristol, Essex, Hampden, Plymouth, Worcester). New month records are highlighted in blue (Middlesex - August and November; Suffolk - July).

Records of this species encompass the entire survey period from June to November. Figure 1 depicts the number of moths found per county in a heat-map. This indicates the raw number of individuals found per county. Table 1 presents a summary of the findings, with the number of traps, number of individuals, and average survey length per county.

Examining Figure 1 reveals that areas with the largest number of *C. oxygramma* are coastal areas. The trap locations in Bristol Co. were set quite close to the coast. While Figure 2 illustrates this with locations of the traps on a map, the locations are not exact. This is due to the regulations and restrictions set by the CAPS program: exact locations and names of sites cannot be published.

Records of *Ctenoplusia oxygramma* by County

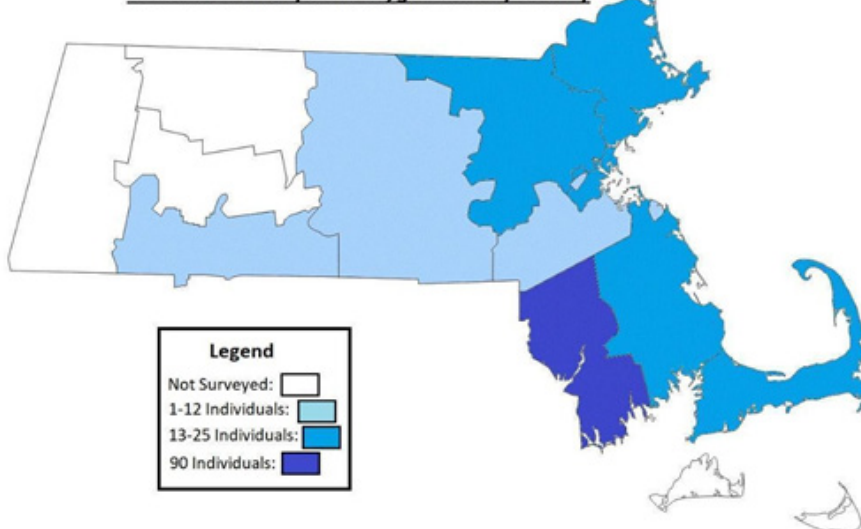


Figure 1: Number of *Ctenoplusia oxygramma* Individuals per County. A heatmap showing the number of individuals of *Ctenoplusia oxygramma* recorded during the survey period. Darker blue indicates more individuals recorded, whereas white is unsurveyed counties.

Seasonal Phenology and Generations Per Year

Traps were first deployed in late May and data was collected biweekly starting at the first trap checks on June 7th, 2017. The November records were verified by extremely fresh individuals, and in one case, a live moth that hadn't been killed by the pesticide strip used in the traps, indicating the individual flew into the trap that day, or the previous night. Individuals first peak in early July, then again in August and September. This is suggestive of two generations per year in Massachusetts. The first peak in early July likely indicates the first emergence of this moth, which coincides with many other native Plussinae noctuids (Figure 3A). The second peak starting at the end of August and continuing to the middle of September would agree with a second generation of this species (Figure 3B). A partial third generation, high abundance of late-season vagrants or

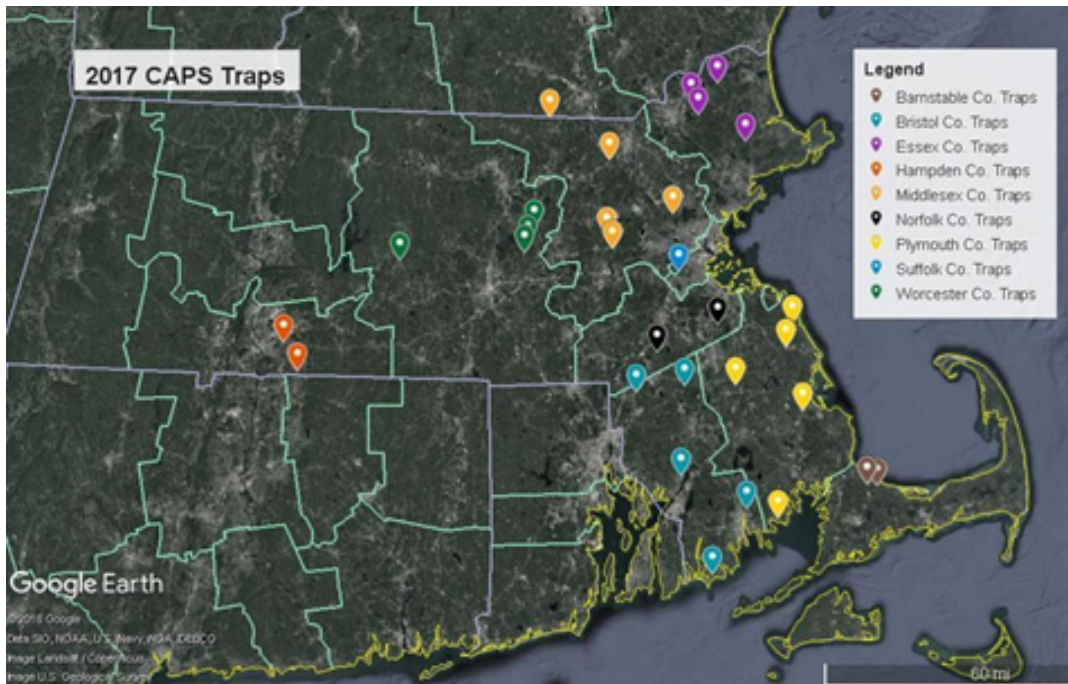


Figure 2: Trap locations in Massachusetts. A map showing the approximate survey locations in the state of Massachusetts per county. A total of 30 sites were surveyed, with each site having 4 different trap/lure combinations (*Autographa gamma*, *Helicoverpa armigera*, and *Spodoptera littoralis* lures were placed in UniTraps and *Chrysodixcus chalcities* lures were placed in White Delta Trap).

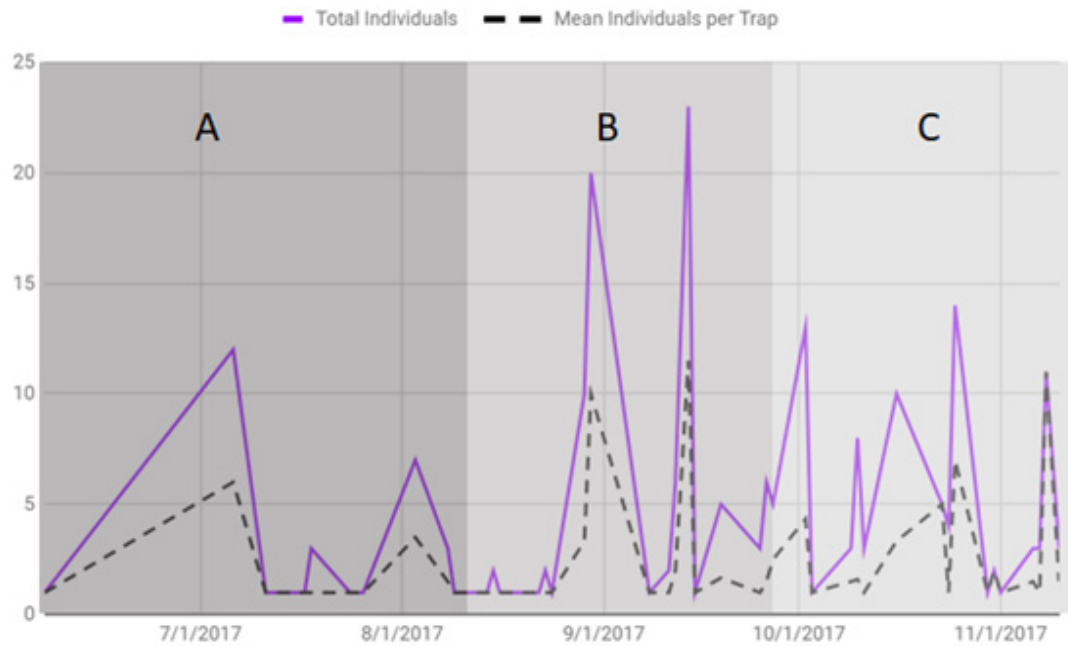


Figure 3: Frequency of *Ctenoplosia oxygramma* captured during the survey period. This chart was created by pooling the catch-data from all the traps each day. The purple line indicates the numbers collected. A peak indicates more moths were collected that day. The black dashed line indicates the mean number of individuals per date (total number of individuals divided by number of traps collected). Each letter and color represents a possible generation in the state. 3A - Proposed first generation defined by a peak recovery of 12 total individuals (mean 6 per trap) with two subsequent peaks of lower recovery. 3B - Proposed second generation defined by two peaks in recovery of 20 and 22 individuals (mean 10 and 11 per trap, respectively). These increased frequency of recovery relative to recovery observed in 3A, followed by a subsequent decline in recovery rate is consistent with a second generation. 3C - Recovery later in the season (October - November) could indicate a partial third generation or increased rate of vagrant individuals.

some combination thereof would account for the peak in October (Figure 3C). A live image of *Ctenoplosia oxygramma* and a specimen image from the survey is included for reference in Figure 4.

Taken together, these data strongly suggest that *Ctenoplosia oxygramma* is breeding in eastern Massachusetts counties, addressing an ongoing debate as to whether or not this moth is a resident in Northern States or a seasonal vagrant. Continual surveying for this moth in Eastern Massachusetts will confirm the findings presented here. Additionally, recovery of larvae of this species, especially in the beginning of the season (May-June), would bolster these observations.

During manuscript preparation over the 2019 season, this moth was captured an additional 3 times at light traps, once on August 27th in Norfolk Co., MA (Figure 4A) by the corresponding author, once on August 29th in Plymouth Co., by Steven Whitebread of MassMoths, and once on September 3rd in Middlesex County by the corresponding author (Table 3). Due to the low number of times this moth has been recorded at light, it is possible this species is not heavily attracted to light, but responds better to pheromone lures. Records pre-dating this study were primarily from late in the year (September and October), suggesting that the moths are much more prevalent late in the season and thus increasing the probability of stochastic capture at light traps.



Figure 4: Images of *Ctenoplusia oxygramma*. Image A is a live image of *C. oxygramma* recorded on August 27th, 2019 in Norfolk County, Massachusetts. Image B is of a specimen taken on October 2nd, 2017 in Suffolk County, Massachusetts during the survey period.



Table 3: Additional Records of *Ctenoplusia oxygramma* recorded during 2019. The record from Norfolk County was on August 27th, 2019 by Teá Kesting-Handly. The record from Middlesex County was on September 3rd, 2019 by Teá Kesting-Handly. The record from Plymouth County was on August 29th, 2019 by Steven Whitebread of MassMoths.

County	August	September
Middlesex		X
Norfolk	X	
Plymouth	X	

Moskowitz -- *Samia cynthia* in NJ

Continued from p. 204

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Ross -- Zuni butterfly carving

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Humans provide Southern Pearly Eye (*Enodia portlandia*) with a “Happy Hour” at an exotic Louisiana venue

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In March 2018, I began a sixteenth-month (2-6 days per month) ecological survey of the butterflies of Avery Island, Iberia Parish, south-central Louisiana. The venue is not a true island but a private 2,200-acre prehistoric salt dome squeezed up 165 feet above the surrounding coastal marshlands. Located only 92 miles southwest of my home in Baton Rouge, Avery Island was easy to access. The enigmatic landmass resonates with legendary luminaries: the McIlhenny and Avery families, best known for “TABASCO® Brand Pepper Sauce.” However, the island is also renowned for *Jungle Gardens*, a collection of historic native and exotic landscapes as well as a sizable communal nesting ground (rookery) for once endangered egrets and herons, the latter referred to as *Bird City*. Both the tabasco factory complex and the gardens are open to the public throughout the year, but remaining sectors of the island are off limits to outsiders. For my project, McIlhenny Company granted me special permission to travel about unaccompanied.

One of the more fascinating resident butterflies on the island is the southern pearly eye (*Enodia=Lethe portlandia*), family Nymphalidae (brushfoots), subfamily Satyrinae (satyrs). The species is reported to breed exclusively on switch cane (*Arundinaria tecta* and *A. gigantea*), types of bamboo within the family Poaceae (grasses). *A. tecta* originally formed extensive stands called canebrakes along river bottoms throughout much of the southeastern United States. According to field guides, the current geographical distribution of *E. portlandia* coincides directly with the current



Prospect Hill, high point (165 feet) of Avery Island, looking northward toward the lowland marshlands, sugarcane fields, and developed mainland. Autumn color is provided by native bald cypress tree planted decades earlier by a resident.

distribution of *Arundinaria*. In Louisiana, *E. portlandia* reaches its southern limit on Avery Island. In the past, *Arundinaria* cane was a staple within indigenous cultures, being used for house construction and furnishings, food, animal fodder, weapons, crafts, and even medicine. However, practices involved with farming and logging since colonial days have reduced canebrake habitat by as much as 98 percent—an important factor in the rapid extinction of both the Carolina parakeet (*Conuropsis carolinensis*) and the passenger pigeon (*Ectopistes migratorius*)—both noted by historians to be at the time, the most abundant bird species in North America.

[NOTE: Rank and file satyrs with lineages primarily in temperate and cold climes are usually mousy in appearance, low flyers, and conscript grasses and relatives (such as sedges) as hosts for reproduction. But the most noteworthy characteristics of satyrine butterflies are: 1) an enlarged basal part of forewing veins. Researchers recently at Carleton University (Ottawa, Ontario) have documented that these swollen basal forewing veins are responsible for the amplification of low-pitched sound, which endows the butterflies with a unique sense of hearing. Simply put, satyrines can hear the approach of predators—particularly those walking on ground debris; 2) numerous ocelli (eyespot) on their ventral wings that according to recent research in India and Poland has documented to deflect the attacks of ground predators such as lizards; 3) an inordinate attraction to plant juices, especially



Avery Island looms on the horizon across a southern Louisiana marshland. Flowering aquatic plant is native American/Yellow Lotus (*Nelumbo lutea*).

fermenting liquids, for nourishment instead of typical flower nectars. Insect physiologists theorize that the various carbohydrates and micronutrients in the fermenting fluids are involved with insect metabolism, especially reproductive. Whether or not ethyl alcohol is beneficial remains debatable. Whatever, numerous researchers have confirmed that alcohol does indeed have a calming effect on butterflies, often to the point of rendering the insects unable to fly. Furthermore, not only do the butterflies become intoxicated, i.e. “drunk,” they also become addicted, returning time and time again to a given cocktail. Managers of butterfly conservatories often exploit this trait by creating “banquet” tables positioned along walkways so visitors can experience their “Kodak Moment.”]

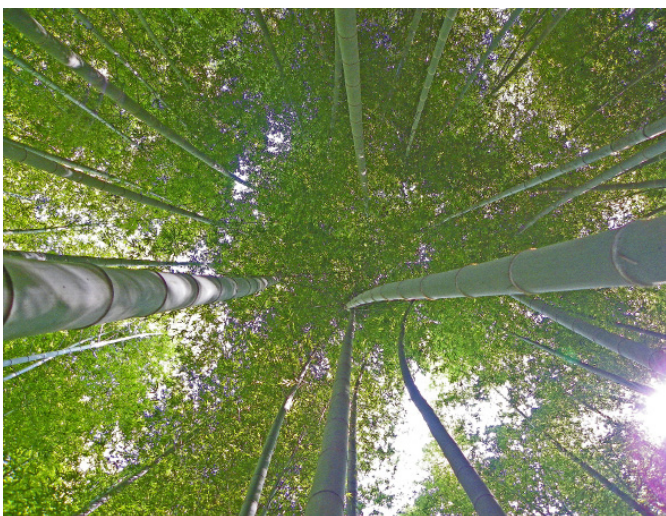
During my research on Avery Island I learned that *E. portlandia* was on the wing as early as mid March and remained so through November. Throughout my visits, I most often observed an individual or two flying along the margins of groves of several species of exotic clustering bamboo that formed dense thickets in *Jungle Gardens*. [The gardens were established in the early 1900s by the garden’s architect and much honored conservationist, Edward Avery McIlhenny (1872-1949). Initially McIlhenny imported at least 60 different varieties of bamboo to experiment on their potential use in the construction industry.] The butterflies were always skittish. When disturbed, an

individual would dart into the thick bamboo canes where the density of the vegetation combined with the butterfly’s cryptic coloration rendered the insects virtually undetectable. Because of the taxonomic relationship between native switch cane and exotic bamboos, I theorized that the pearly eyes had conscripted the exotic species for reproduction rather than search for the less common native *Arun-dinaria texta*. (Such substitutions between related host plants are not uncommon within the world of butterflies.)

The epicenter for the pearly eyes on the island proved to be a grove of moso bamboo (*Phyllostachys edulis*), a giant timber bamboo native to China. The grove covers approximately 1 acre of residential property located near the high point of the island (“Prospect Hill”). In the not-too-distant past, the grove was distinguished as the largest concentration of giant timber bamboo outside of China—visible in satellite imagery. Moso canes (culms) are characterized by a blue-gray powdery coating and immense size: 5-6 six inches in diameter, height of 80-90 feet. Individual canes can grow 15-18 inches during their spring growing season. Although the canes are dense, they did not inhibit me from walking amongst them—although, never in a straight line. Within a given period of 15 minutes or so, I could always spot 2-3 individual butterflies. Often, the pearly eyes were



Top left: Grove of the world’s largest timber bamboo named moso bamboo (*Phyllostachys edulis*). Canes/culms can grow to 5-6 inches in diameter, 80-90 feet in height. Top right: View of moso bamboo grove through a telephoto lens. Canes are coated with a distinctive bluish green powder. Bottom left: Garrie P. Landry, official botanist for McIlhenny Company, owner of Avery Island. Largest cane measured is 5.5 inches in diameter, approximately 90 feet in height. Bottom right: View of the moso grove from a ground perspective.



disturbed from their rest on ground litter or on the stalks of cane and trunks of one of the few hardwood trees, sweet gum (*Liquidambar styraciflua*), in particular. After disturbance, an individual would fly in an erratic fashion about 5-8 feet above the ground, but then disappear into a more congested area of the grove or into the neighboring 1-2 acres of "Madaka" bamboo (*Phyllostachys bambusoides*)—another titanic grass, but with canes that are greenish color and less robust those of *P. edulis*. Even though I walked slowly and quietly (at least I thought!), the pearly eyes reacted to my intrusion, no doubt testimony to what we now understand to be an acute sense of hearing (see earlier comments). As such I was unable to acquire any photographs.

During each of my monthly visits through November, I sighted only a few pearly eyes—an indication of a relatively low population. Then sightings ended. Worse still, I was informed that in mid February, the Gulf Coast

Chapter of the American Bamboo Society would be holding its 21st annual weekend convention on the island to honor its commitment to maintain the grove of giant timber bamboo. Imagine my initial shock: How would this human traffic affect the resident pearly eyes, which according to published literature, were now in their larval or pupal stage? But then I faced a conundrum: The grove had been assaulted for the previous 20 years, and yet the butterfly had endured. What was going on?

I timed my February return to the island to coincide with the meeting of the society: Saturday February 23. On point, sixty intrepid bamboo aficionados arrived from states as far away as Washington, Oregon, Texas, and Virginia, as well as the countries of Germany and Costa Rica. The brigade spent the day wielding machetes, chain saws, heavy shears, augmented with a powerful diesel wood chipper that spewed out debris that covered the ground

throughout much of the grove. The goal was to remove dead canes and to thin living canes. In the past, the procedures increased sunlight within the grove, which in turn seemed to stimulate new growth. In addition, the shredded bamboo deposited on the ground most likely provided organic nutrients and mulch that would retard the growth of unwanted new "weeds." As lagniappe, the increased openness of the grove facilitated visitation. And so, for nearly two days during my visit, the grove resonated with sounds of wood being attacked. In the end, approximately 50 percent of canes were removed.

I returned to the island in mid March. Walking within the enchanted bamboo grove was easy even though many new asparagus-type shoots had begun to emerge. But my biggest surprise involved the extant bases of the canes that had been cut, each just a few inches above the ground near the first node—a solid diaphragm-like struc-



Clockwise from top left: Members of the Gulf Coast Chapter of the American Bamboo Society thinning the moso bamboo grove; thinning increases light and chipped refuse furnishes organic fertilizer. Stack of cut sections of moso culms available as souvenirs to participants in grooming project. Moso grove following thinning on February 23, 2019, the 21st annual thinning. Bushy secondary growth of moso from root stock; the clumps remain compact, bushy, and probably egg-laying sites for female southern pearly eyes.



Top left: Base of a freshly cut culm. The cut is always an inch or so above the first node (solid diaphragm between the hollow inter-nodes). The remaining section collects water, sap, and debris that then ferments. The aroma attracts *Enodia* adults as well as a variety of small arthropods. Top right: Male *Enodia portlandia* resting for a few minutes near the base of a cut culm before flying in to imbibe from the brew from the “mini-still.” Bottom left: Single male *Enodia portlandia* feeding from the fermenting brew in the “mini-still.” The setup has an uncanny appearance to a fried egg, sunny-side up: white is froth from carbon dioxide, yellow is the actual color of the basal node. Bottom right: Pair of *Enodia portlandia* feeding at the “mini-still.”



ture that separates the hollow internodes. The procedure resulted in the creation of what is tantamount to a small “cup.” While most of these catch basins were dry, several contained a clear liquid that was perfuming the air with a strong and distinct aroma of stale beer. In addition, a white froth had accumulated along the rim of the reservoir. The white froth combined with the yellow-colored node bore an uncanny resemblance to a fried egg—sunny side up. Fruit flies, gnats, and yellowjackets were coming and going. All were tell-tale signs of yeast fermentation with its generation of carbon dioxide (the froth) and ethyl alcohol (the odor). My most reasonable explanation was that the bases of the cut living canes were collecting rainwater, organic debris, and sugar-laced sap that continued to rise from the viable roots. The result was the establishment of de facto “mini-stills” that now were attracting miscellaneous insects.

As I stooped along side one of the active bamboo basins to try for a photo, two slightly worn pearly eye butterflies homed in; both alighted on the ground about three feet away. After resting for a few moments (I suspect, to check for the potential movements or sounds of approaching predators such as lizards and skinks that inhabit the grove) the butterflies flew to the edge of the mini-still. Each butterfly immediately extended its proboscis into the brew. Feeding continued for about 10-20 minutes. Then the butterflies flew away in a labored fashion. In another 15 minutes or so, not two but three individuals returned,

landing a few feet away. As earlier, after a few minutes the trio flew to the same feeding station. Trying for good close-up snapshots, I moved in—slowly. One butterfly departed, but the remaining two seemed unbothered. On one occasion, I coddled one of the butterflies into a different position for a more balanced photo; there was not even a flicker of wings! The butterflies fed for approximately 20 minutes before departing, to return again and again throughout most of the day.

I remained within the grove until 4:30 PM. During that time pearly eyes repeatedly visited the same feeding station. And although I was able to locate at least a dozen additional active feeding stations, I witnessed no pearly eyes visiting. I suspect the butterfly’s population was so low that the only individuals present were habituated to the one station.

I rechecked the grove in April, May, and June. The fermentation stations remained active although the odor of yeast had abated. The most common visitors were now fruit flies, isopods (pill bugs/roly polies—*Armadillidium vulgare*), and harvestmen/daddy longlegs (Opilionids). Regrettably, no *Enodia* appeared at the stations. However, in June I observed three fresh males resting on the leaves of bush-type moso bamboos common on the slope of a ravine near the edge of the grove—an area that I suspect to be the major breeding refuge for the butterfly.

In short order, my thoughts crystallized. Here's my take. On Avery Island, *Enodia portlandia* is relatively uncommon but a consistent resident. The species has substituted exotic species of bamboo for their less common native host plant switch cane (*Arundinaria*). The butterfly species is particularly attracted to the tallest of the exotic canes: moso bamboo (*Phyllostachys edulis*). The annual thinning of the grove has unexpected advantages for *Enodia* butterflies: less impeded flights, additional, easily accessible sources of food and drink, and additional sites for oviposition. In particular, the base of the cut culms forms mini-catch basins that accumulate liquids that facilitate sugar/yeast fermentation. This results in the production of vital nutrients and alcohol, i.e., windfall feeding opportunities for the low-density butterfly. By contrast, although other groves of exotic bamboos on Avery Island also provide hosts for *Enodia* butterflies, those groves are so congested that the butterflies have difficulty in navigating within the closely-spaced culms, which in turn, minimizes potential sources of food. This restricts activities to the margins of the groves where sunlight and predation are higher. Such is not the case within the annually manicured moso grove. Thus, human activity within the habitat is beneficial for the island's *E. portlandia* population. Absent systematic thinning, I predict that the moso bamboo would become as congested as the groves of lesser bamboos throughout *Jungle Gardens*. As a result, that would trigger a significant reduction in the island's largest population of *E. portlandia*.

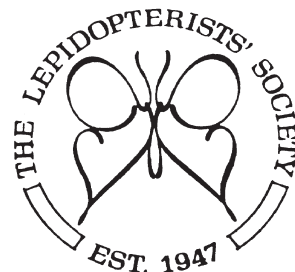
[NOTE: During my April visit to the moso bamboo grove I observed one male of the related Creole pearly eye (*Enodia creola*), and during my August visit, two males. But all other visits were unproductive.]

Acknowledgements

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Zuni butterfly carving added to collection

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Zuni refers to a Native American Tribe consisting of approximately 12,000 individuals. The Zuni, or *A:shiwí*, are an ancient, self-governing, and traditional Pueblo people officially located on the Zuni Indian Reservation (McKinley and Cibola counties) in northwestern New Mexico. The reservation is 37 miles south of Gallup and 11 miles east of the Arizona border; the reservation is encircled by the much larger and more familiar Navajo Nation. The population center is the Pueblo of Zuni (historically *Halona Idiwana'a* or “Middle Place”) located in the Zuni River basin, 6,300 feet in elevation. Ecologically, the area is a semi-arid grassland and piñon pine-juniper woodland. Precipitation is 12 inches per year, much of which falls as snow. The landscape within the reservation is punctuated by numerous picturesque mesas. Of these, the thousand-foot high *Dowa Yalone* (“Corn Mountain”) dominates. The mesa is sacred within the culture, and therefore, off limits to tourists.

Since 2003, I have been collecting fetishes/carvings, paintings, and jewelry, but primarily carvings. (A fetish is a small carving in various media that functions as a spiritual charm, amulet, or talisman.) Because the Zunis embrace a belief system (Animism) that accepts that all wild animals are endowed with a spiritual nature, subject matter for artistic expression is virtually boundless. Fetishes are believed to convey luck, power, protection, and good health to their owners. Put simply, fetishes are viable spirits in stone, and therefore, priceless assets to human beings. And although most Native American cultures throughout the Southwest have traditionally carved fetishes, the Zunis of New Mexico remain preeminent. (Zunis also create exceptionally fine jewelry of silver with turquoise and other semi-precious stones.)

Zunis craft both “ceremonial” or “true” fetishes and “commercial carvings.” The former are sanctified by a spiritual leader and reserved for ceremonial occasions. Commercial carvings, on the other hand, are not blessed but instead, are offered as *objets d'art*. To outsiders, however, the word “fetish” refers to any Zuni carving. Over the last decade+, “fetishes” have become more and more elaborate so that they are worthy of the term “fetish sculpture.”

Within Zuni culture, the butterfly (*Bu:lak'kya*) occupies a prominent position in spirituality, mythology, and art. Specifically, the butterfly is the earthly representation of Butterfly Maiden (*Bu:lak'kya E:lash'dok'ee*). It is Butterfly Maiden who brings rain—the life blood—to the land. In addition, the butterfly's metamorphosis is relevant to the Zuni belief of how their ancestors emerged into this world. The butterfly is a “power animal,” that is, a spiritual helper, companion, and guide that possesses qualities that

humans need in this world. Unlike other power animals such as bears, eagles, deer, and coyotes, butterflies are tied to beauty, balance, change, transformation (including healing), movement, and air. Butterflies are often referred to as “dancing flowers” and “air dancers.” According to Zuni tradition, butterflies make us feel better and become better individuals. Anyone who embraces the butterfly as a personal spirit usually exhibits a heightened sensitivity—including the wisdom to recognize when others are in a process of transformation. “Butterfly People” are noted for being charming, successful in business and love, and sensitive to air quality. Because I was the first butterfly scientist know to visit the pueblo, I was given the honored name *Nana Bu:lak'kya* (“Grandpa Butterfly”).

Most Zuni fetishes and carvings are made from natural stones, bone, antlers, shells, and even the wood of native juniper trees. More recently, several Zuni artisans, the husband and wife team of Farlan and Paulette Quam, for instance, have been experimenting with a new composite medium for carving: bowlerite—the man-made outer skin (coverstock) of a recycled bowling ball. Although relatively light in weight, bowlerite is quite sound since it is derived from the protective covering of bowling balls.

In June 2019, the Quams, who have crafted butterfly carvings for me in the past, created a unique multi-figure, multi-media carving that combines bowlerite with turquoise (a sacred stone). The carving features four small butterflies visiting a flower. (References on pg. 185)



“Flower with Four Butterflies.” Multi-figure, multi-media Zuni carving. Red bowlerite, blue turquoise, and silver wire. Dimensions: 2 x 2.5 inches including wire. Artists: Farlan and Paulette Quam (Pueblo of Zuni, NM). Date carved and acquired: September 2019. (see also Back Cover).

Conservation Matters: Contributions from the Conservation Committee**New studies shed light on western Monarchs and their conservation needs**

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Western monarchs gained a lot of attention over the past year after the overwintering population in California hit an all-time low. Less than 30,000 butterflies were estimated during Xerces' annual Western Monarch Thanksgiving Count in fall 2018, compared to nearly 200,000 butterflies the year before. If you look back to the 1980s, there were millions of butterflies clustering annually on the Pacific coast; today, less than 1% of that abundance remains. To put that in perspective, that is equivalent to the human population of Los Angeles shrinking to the size of Monterey, California over the course of a few decades. We simply do not know how small the migratory population can go before it fails.

Based on the troubling overwintering numbers, Xerces launched a *Western Monarch Call to Action* in early 2019. We developed the Call with input from many leading monarch researchers and advocates to help focus public attention on what individuals, organizations, and institutions can do to help. The solutions we present in the *Call to Action* draw on the best available science and echo the major themes of monarch conservation (planting native milkweeds—especially early emerging species in California, planting nectar plants, restoring overwintering sites, reducing pesticide use), if with a greater sense of urgency. As much as we might want to find a simple solution (e.g., if we just plant enough milkweed next year...), like so many wildlife conservation issues facing us today, there is likely no easy nor swift answer.

In situations like that of the western monarch, conservation and research must go hand-in-hand. We need to take significant steps towards the population's conservation now, while also working to answer the most relevant research questions in order to improve and refine our conservation approach, and find out if our efforts are actually increasing the population. On the research front, western monarch scientists and community scientists have been busy over the past year—getting out into the field (and diving deep into datasets) looking for monarchs and milkweeds, modeling what the future might look like, and, together, working to answer old questions and raising some new ones. Many of the new studies on western monarchs were recently published as part of the special issue of *Frontiers in Ecology and Evolution* titled "North American Monarch Butterfly Ecology and Conservation." (The online issue has been gradually published since May 2019 and these

papers are available for free at <https://www.frontiersin.org/research-topics/7657/north-american-monarch-butterfly-ecology-and-conservation>). Together, these and other recent studies contribute to our understanding of the western monarch population, including where monarchs and milkweeds occur, the habitats they rely on, the threats they face, and what actions are most likely to help the population recover.

So what have we learned about western monarchs over the past year?

The recent population crash occurred in late winter/early spring of 2018, but is a product of the population's decades-long decline.

Based on field studies and a Xerces' community science project, Pelton et al. (2019) show that western monarch numbers did not show unusually high overwintering mortality between Thanksgiving and New Year's counts in the winter of 2017-2018, but they did show much lower breeding success the following spring and summer of 2018. Something occurred between early January of 2018 and the first generation in California that led to the crash—perhaps late-season, heavy rains seen in March of 2018 or some other as-yet-unidentified effect. Hence, focusing on overwintering habitat restoration and increasing the availability of early emerging native milkweeds—especially in California where the first generation breeds—are likely two of the best strategies to help monarchs. These two strategies comprise a major focus of the Xerces Society's current western monarch conservation strategy.

But single-year population drops of this magnitude—while large—are not unheard of in western monarchs (or many other insect species). The deeper issue is that the population has been declining for decades. Another recent study (Crone et al. 2019) evaluated the threats that the population faces and, of the factors considered, concluded that a loss of overwintering habitat and pesticides (insecticides and herbicides) are more likely responsible for this long-term decline than broad climatic factors. However, the study concluded there are many, connected land use and climate drivers which are hard to completely untangle; in addition, the study's climate-related datasets did not necessarily capture climate change related weather extremes like winter storms. The authors conclude that we need to simultaneously work on protecting and restoring



Counterclockwise from top left: Showy milkweed growing in California; narrow leaf milkweed emerging in California; Monarch caterpillar feeding on swamp milkweed; (photos by Stephanie McKnight); planting native nectar and milkweed plants on a ranch in California (photo by Angela Laws).

on field surveys and data from the Western Monarch Milkweed Mapper (www.monarchmilkweedmapper.org), a database and community science project that Xerces developed with the Idaho Department of Fish and Game, Washington Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service. Two other studies focusing on Idaho and Washington are from the same collaborators. “Monarch butterfly distribution and breeding ecology in Idaho and Washington” by Waterbury et al. (2019)

monarch breeding and overwintering habitat *now* and also call for more studies to untangle which stressors, including climate change and land use factors, are the most responsible for the population’s current status.

Milkweed is widespread and found in diverse habitats across the West—including in the northern part of the monarch’s range.

Monarchs have dozens of milkweed species they can use to lay their eggs on, with different milkweeds specializing in the wide varieties of habitats and geographies—from deserts to meadows to riversides—found in the West. Dilts et al. (2019) developed habitat suitability models for breeding season monarchs and multiple western milkweed species, showing which geographic areas are most suitable for each species and monarchs overall. This research comes out of a multi-year partnership between the University of Nevada-Reno, US Fish and Wildlife Service-Pacific Region, and the Xerces Society. The models were developed based

offers a detailed picture of the distribution and breeding patterns of monarchs in the northern part of the western monarch’s range, based on extensive field surveys over two years. A second study out of Idaho (Svancara et al. 2019) used the same modeling approach as Dilts et al. (2019), but applies a finer-scale look at milkweed and monarch distribution in Idaho as well as forecasting distribution under climate change. They conclude that in the future, some areas will become more suitable for certain milkweed species, while others will become less so, but the total amount of breeding habitat for monarchs will likely remain roughly stable or even increase slightly.

Milkweed availability may be most limited in the spring, when monarchs need it most.

A study by Yang and Censer (2019) from northern California looked at the “Seasonal windows of opportunity in milkweed–monarch interactions.” By studying monarchs’ use of milkweed over the breeding season for

three years, they concluded that monarchs may be most limited by milkweed quantity in the spring. This supports the findings of Pelton et al. (2019) and other previous studies which have suggested that the late winter and early spring are the time periods when monarchs are most vulnerable and the population is the smallest. This is why planting more early-emerging native milkweeds (e.g., *Asclepias californica*), especially in California, may be a more effective conservation strategy than planting later-emerging species. Monarchs typically leave overwintering sites in February, yet most milkweed species do not emerge from the ground before April.

Western monarchs need our help or we may risk losing the migration.

A final study, by Voorhies et al. (2019), modeled monarch overwintering population scenarios into the future to estimate the probability that the eastern and western monarch's migrations last for another 50 years. This study was authored by many of the US Fish and Wildlife Service staff who are conducting a Species Status Assessment to inform the Service's decision on whether or not to list the monarch under the federal Endangered Species Act. A decision is expected in December 2020. The models presented in this study were based on both previously published literature of threats and expert opinion. They created "best-" and "worse-case scenarios" (as well as intermediate scenarios) which vary based on how threats like overwintering habitat loss, pesticide use, and climate change effects might worsen (or improve) conditions for monarchs in the future. They also considered how conservation efforts, such as major milkweed and nectar restoration projects, restoring overwintering sites, and other actions might affect monarch population growth. For the western population, they set their "quasi-extinction threshold" (point at which the migration may collapse) between 20,000 and 50,000 butterflies. Across this range, the probability of quasi-extinction for the western monarch's overwintering population reached 99.99% in the next 50 years, even in a "best" future scenario. They concluded that "further protecting overwintering grounds and nectar resources could cause a large and positive population response by the species." For context, the eastern migratory population had an estimated quasi-extinction risk of 25-75% based on an extinction threshold of 0.05 to 0.61 hectares of forest in Mexico occupied during the winter season. It is important to note that these quasi-extinction thresholds are relatively subjective—with less than 30,000 monarchs observed in the western population last fall, we are already testing the lower end of this range.

The good news is that monarchs are resilient—part of the beauty of being a migratory, multi-generational butterfly is that their numbers can rebuild over the summer if the weather (and the overwintering and the spring milkweed) is good. But they cannot do this alone anymore—we need massive, coordinated efforts across the West. We need to protect and restore their overwintering sites, protect and

plant climate-change resilient habitat (including early emerging native milkweed species and abundant nectar), and reduce or eliminate pesticides—especially systemic, persistent insecticides (e.g., neonicotinoids). We also need to address the causes of climate change, which threaten many species of insects, including monarchs. We need individual and collective action to save western monarchs and along the way, we will benefit the many other butterflies, bees, and other insects as well as the plants, the birds, and even the people that make up our wild and human communities.

The value of community science

Many of these new research papers relied on data collected as part of community science projects, underscoring how invaluable volunteers are to the conservation of monarchs.

Do you want to get involved with community science? If you live in the U.S. west of the Rocky Mountains, contribute your observations of monarchs and milkweeds to Xerces' Western Monarch Milkweed Mapper (www.monarchmilkweedmapper.org); if you live in the U.S. east of the Rocky Mountains, contribute to Monarch Joint Venture's Monarch Larva Monitoring Project (<http://mlmp.org>). In Canada, check out Mission Monarch (www.mission-monarch.org); if you're in Mexico, we encourage you to contribute to Naturalista (www.naturalista.mx). We also recommend reporting all sightings of monarchs to Journey North (<https://journeynorth.org/monarchs>). For volunteers who want to collect more detailed breeding season data, check out Monarch Joint Venture's Integrated Monarch Monitoring Program (<https://monarchjointventure.org/immp>).

Want to do more for western monarch conservation? Check out <https://xerces.org/monarchs/western-monarch-conservation> to learn more.

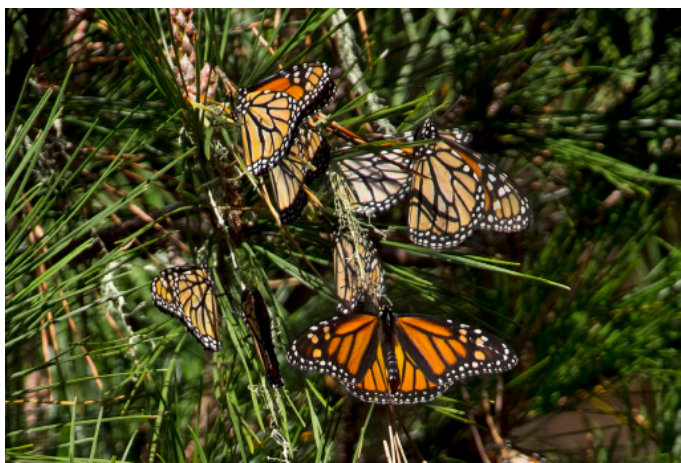
Acknowledgements

Thank you to all of the community science volunteers who contribute data to Xerces' Western Monarch Thanksgiving Count and the Western Monarch Milkweed Mapper. Thanks also to fellow Xerces' staff: Stephanie McKnight, Scott Hoffman Black, and Sarina Jepsen and our many research and conservation partners as well as members.

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Monarchs overwintering in coastal California (photo by Carly Voight, The Xerces Society)



Monarchs overwintering in Pacific Grove, California (photo by Carly Voight, The Xerces Society)

Gall Book Review -- Pyle's Magdalena Mountain

Continued from p. 205

G. Evelyn Hutchinson and the acclaimed author and lepidopterist Vladimir Nabokov. Others have but tissue-thin pseudonyms, and the intrepid among you will no doubt unmask them either by shared real-life knowledge, or by connecting dots via the Acknowledgements and Author's Notes. Therein Pyle issues the traditional disclaimer "Most players are either wholly de novo... or composites loosely based on real people. Their names are different, and I have felt no compulsion to treat their models accurately, only kindly." Kindly for sure I agree, yet the insider clues are rife and the models are frequently correct right down to the endearing minutiae.

Double spoiler alert! The more readily deduced include, for example, Professor Freulich, at the Rocky Mountain Biological Laboratory and driving a Stanford University van; Francie Chan and her art studio sequestered in one of the twin towers of Yale's Osborn Zoological Laboratory; Noni Blue, Cambridge-bound contemporary Yalie and amorous interest of James Mead; and Carolinus Bagdonitz and his Flying Circus, careening around in a Toyota station wagon dubbed the Nordic Green Aphid. And, of course,

George Winchester, the omnipresent, just riff on rifles for a moment. James Mead is certainly a stand-in for the cumulative life journeys of the author and his contemporaries. But it is also true that Pyle makes an entrance more or less as himself late in the novel, sporting a Panama hat, piloting an oversize male *E. magdalena* lure across the talus, and traveling the Front Range in an old maroon Volkswagen bus. In this Michael Heap there is more than a passing resemblance.

The storylines of the novellas spiral toward one another as Part Two progresses, and the event horizon ultimately captures them all in the nexus of chapter 38, wherein it all comes crashing down in a wild and woolly denouement on the literal Magdalena Mountain. *Magdalena Mountain* is a page-turner, and you can count on one hand (finger?) how many page-turners focus on lepidopterological subjects. Where else might you expect to be regaled by the teachings of an enclave of monks who worship nature, and bear the literary specific epithets of Oberon, Attalus, Xerces, Sylvanus, Abraxas, Polyxenes and Ajax? So go get it, you won't be disappointed.

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Opinion: the future of monarch migration in light of its past

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Monarchs have received much publicity lately as species that are increasingly being portrayed as threatened or endangered by the media. As a result, many of my friends outside of entomological circles who are normally indifferent to this field have asked me for my opinion on the matter.

I have recently been leading annual tours to Mexican overwintering sites. In February 2018, the numbers of monarchs were low. There appeared to be just a few rather small clusters on a few trees. It was cold and there was little activity, which added to the sense of a species-level decline. This was in stark contrast to my visit 14 years prior when monarchs filled the air and covered some trees so thoroughly as to obscure their outline.

When I made the trip again in February 2019, there were more monarchs in this location than any local could remember. The clusters were huge and there were seemingly thousands of them. Only a small percentage of butterflies were on the wing, but they still engulfed us on all sides, making for a surreal experience. Their numbers seemed much higher than in 2004, and they were lower down the mountains than they normally are. Monarchs visit streams to stay hydrated on warm days and especially so before taking off for their journey north. Water was available, and monarchs covered it with black-and-orange magic carpets that would lift off and flow in the air downhill along the streams.

Since insect populations can grow exponentially if unchecked, their numbers from one generation to the next are extremely unpredictable. There may be general trends, but from one year to the next and even from one decade to the next, it is difficult to make confident predictions. Differences in rainfall in any given year or month can spell dramatically different rates of hostplant germination, which is closely tied to the proliferation of larvae, and warmer winter weather can reduce mortality among adult insects. Sometimes factors affecting predators, parasitoids, bacteria and viruses may indirectly decrease insect mortality and lead to a population explosion, or the contrary may occur. If we have learned anything from our attempts to manage pest species of insects, it is that sometimes we achieve the exact opposite of our intentions, and that it is not easy to predict the future population dynamics of any given species.

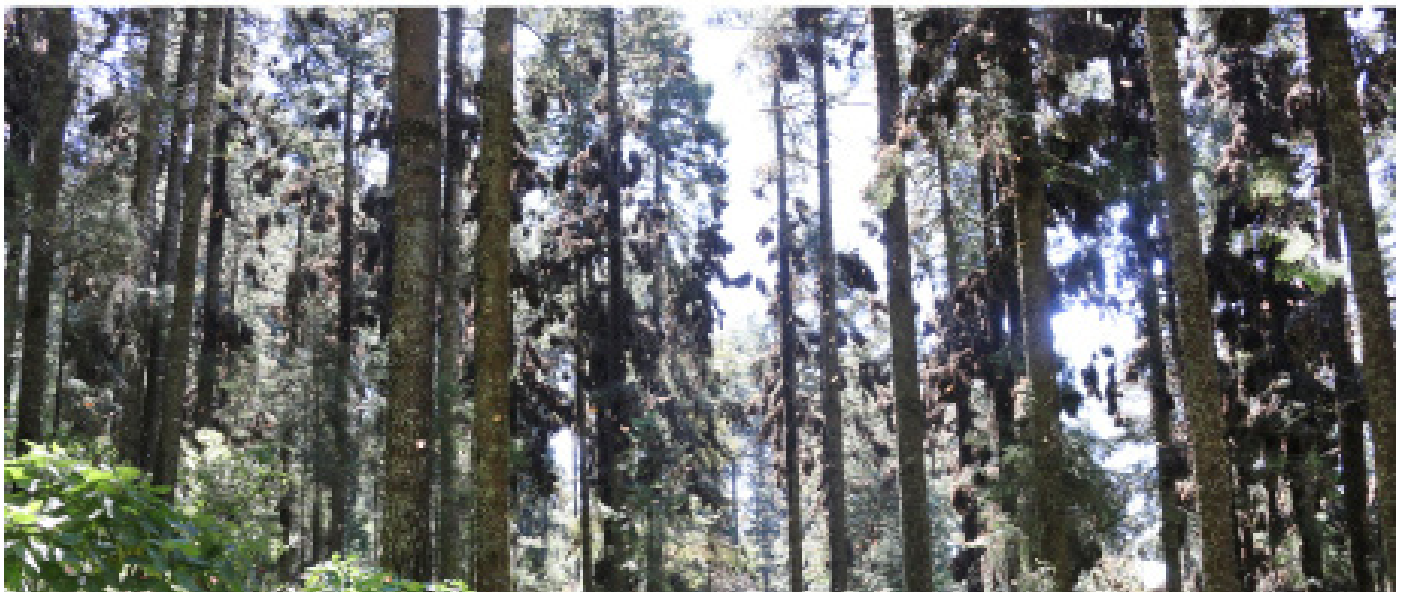
As to understanding the future of Monarchs, we should, I think, look to their past, as we probably should also do when we think about the future of our own civilization. Monarch mass migration in the eastern United States, as

we know it now, is very possibly a result of massive deforestation caused by humans during the 19th century, which opened new habitats for milkweeds. The migration probably still existed in some form before that, but more likely in a more modest form, similar to what is observed in the western United States. Monarchs, as a species, seem to be very flexible when it comes to their behavior. Their sheer numbers and the widespread nature of their migratory and resident populations around the world ensures that there is sufficient genetic variation for natural selection to work its wonders. As proof, one can cite the development of regular migrations in Australia, which was documented over the course of less than two centuries. During this span of time, monarchs there underwent physiological adaptations to carve out a niche very different from the environments that they inhabit in the New World.

Currently, the Mexican side is doing a fairly good job of preserving overwintering sites, thanks, in great part, to the efforts of the late Lincoln Brower and other conservationists. While jumpstarting these conservation efforts relied on a partnership between conservationists, government, and the local people, they have been faithfully sustained by locals because of the benefits that the monarchs bring to their communities through ecotourism. It seems that similarly, in the eastern part of the United States, we should rely on the goodwill and willing participation of the public in concert with conservationists and land managers, rather than enforcement, to stimulate efforts to preserve the migration phenomenon. I am not a "Monarch Expert," but I hope that my thoughts on the subject may help to stimulate yours.

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Top (left) Monarchs ‘recharging’ in a sunny spot before continuing on their way down the mountain; **(right)** Monarchs drinking water by the bathroom of the visiting center. **Middle:** Monarchs drinking from a stream. **Bottom:** Monarch clusters on Oyamel Fir trees. All at El Rosario colony, Michoacán, Mexico. Photos by Andrei Sourakov.

Hyalophora cecropia X H. columbia yields stunning hybrid

Tor Hansen

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From livestock furnished by Gardiner Gregory of Castine Maine, I received several live cocoons via our transaction from “marketplace” in the Lepidopterist Society News. In 1987 I noticed an ad for exchange or purchase, and corresponded with him regarding my progress in rearing Cecropia larvae to cocoons that would in time yield stunning hybrids. As a result in letters, Gardiner informed me that he was having good luck cross breeding *H. cecropia* X *H. columbia*! True to form the following pictures showed a resplendent hybrid, bearing traits of both donors. But true to the differences in their DNA, and the genome, the hybrids would not last but for several generations if that.

H. columbia might thrive in Canada wherever Tamarack trees provide those thin but ample needles (modified leaves). Thanks to updates in Wikipedia *H. columbia* is recorded now in only four states thus far (Maine, Michigan, New York, & Wisconsin), although Tamarack trees grow in other northern states, from Labrador to West Virginia, from British Columbia to Alaska. Tamarack, synonymous with larch, is characteristic of northern swamps and bogs. Eastern Larch is the first to grow in such wetlands, and tolerant of long cold leafless winters. Its name comes from the Abenaki word “abemantak”, that alludes to its wood being preferred for snowshoes! Larch is classified as a deciduous conifer in the family Pinaceae. The farther west one goes *H. cecropia* is eventually succeeded by other *Hyalophora* species and subspecies. *H. cecropia* does not feed on Larch. Columbia larvae have all yellow dorsal tubercles and less blue in the lateral mini-tubercules. All the more fascinating is speculation that the genes that are specific to *H. cecropia*, and again different in *H. columbia*, suggest that the evolutionary separation of species may have had its biogenesis due to changes brought about by the choice and dependency on the one columbia larval food tree - the Tamarack or Eastern Larch (*Larix laricina*).

My own entomological journey has yet to include a visit to the northern realms where *H. columbia* thrives in the boreal forests. When I was a youngster about eleven years of age, my neighbors in Englewood New Jersey, knowing my growing interest in birds, alerted me to a tamarack grove, wherein a flock of Evening Grosbeaks were hold up, feeding perhaps on tamarack seeds found in their small cones. What an exciting encounter, especially so because we learn that these magnificent grosbeaks are facing serious decline today, likely due to multiple factors, some reliable sources (Cornell Ornithology Lab) relating up to 90% of total former population nearly gone. Follow the

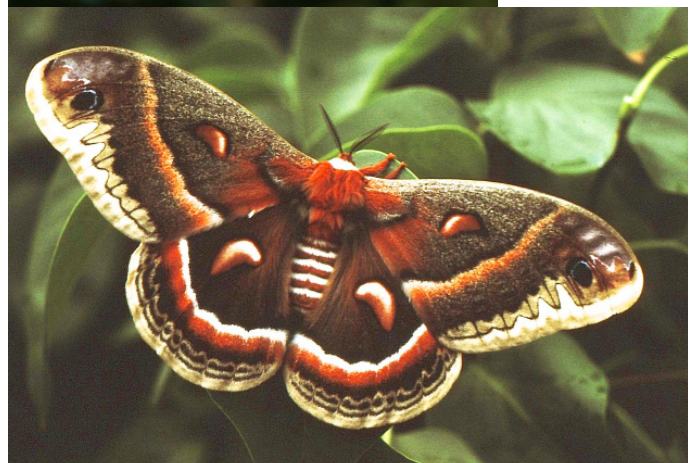
ecology of tamaracks, and we might learn more regarding range and ecology of *H. columbia*!

To borrow a line from the poetry of Walt Whitman, “Out of the Cradle Endlessly Rocking” ...appears fitting for a descriptive phrase...a tribute to the long time running of Columbia, a resilient and ingenious silk moth able to endure countless generations of growth and reproduction despite harsh seasonal weather and surviving the austere crucible of evolutionary natural selection and adaptation.

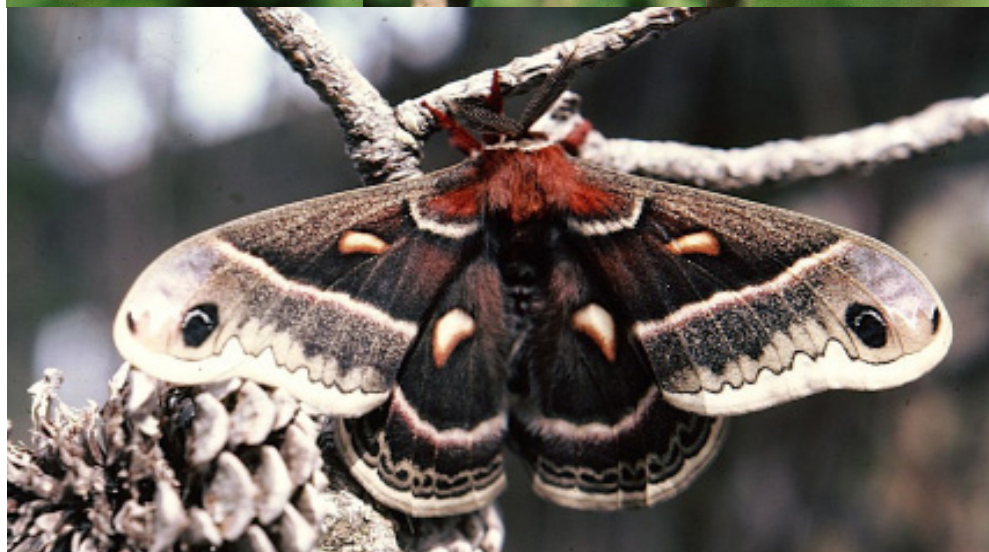
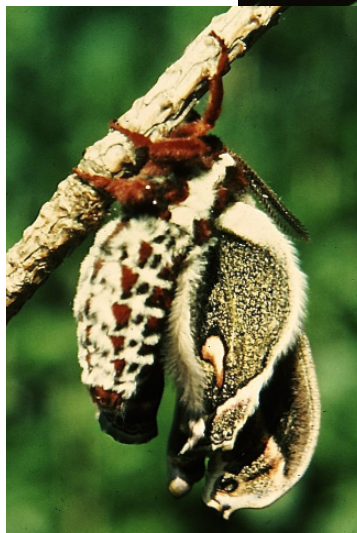
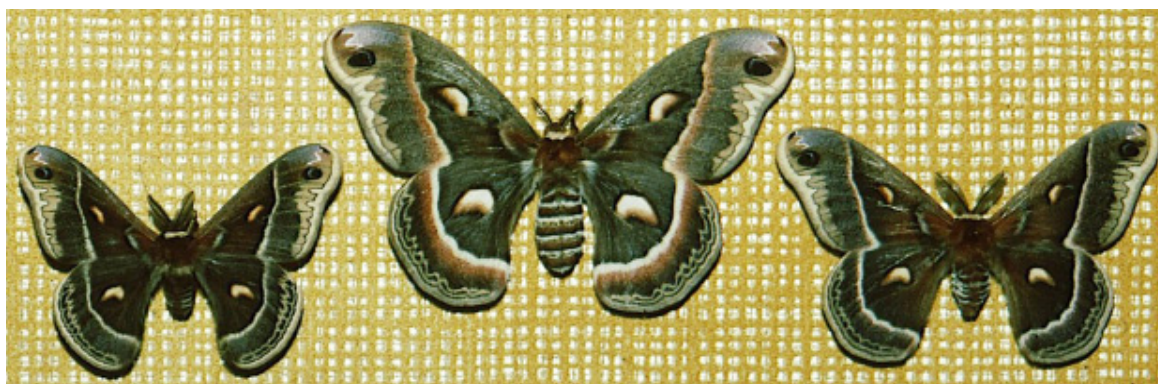
Please read the data in Wikipedia to gain knowledge as to what diseases also effect tamarack trees, so much an integral part of our boreal forests. With special thanks to the late Gardiner Gregory for enabling my illumination of hybrids from *H. columbia* X *H. cecropia*. I apologize for a late declaration of a most intriguing file of photos of an enduring moth surviving the rigors of natural selection and adaptation. How glad I was to be ready with Minolta film camera at hand when the Columbia hybrid emerged. Photos of larva and cocoon and cross bred *Hyalophora* species are courtesy of our much beloved Gardiner Gregory.



Caterpillar and adult female of *Hyalophora cecropia*



Top: Columbia father, Cecropia mother and hybrid bred from their cross. Second row left: hybrid larva spinning cocoon; right: hybrid cocoon. Middle: several shots of the hybrid individual unfurling its' wings after emerging from the cocoon. Bottom left: hybrid individual, upper-side. Bottom right: hybrid individual, underside. All photos by Gardiner Gregory.



The Ailanthus Silkmoth (*Samia cynthia*) in the New Jersey Meadowlands

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The current status of the Ailanthus Silkmoth (*Samia cynthia*) (Fig. 1) in the New York-New Jersey-Pennsylvania region is not well-known. However, it is evident from my recent observations that a population persists in the New Jersey Meadowlands (hereafter called Meadowlands) and this may be the last wild bastion in North America for this beautiful silkmoth. The Meadowlands is a 30.4 square mile region in northern New Jersey bisected by the New Jersey Turnpike and comprised of vast wetlands, landfills, railroads, commercial and industrial development and abandoned and now overgrown previously developed areas (Fig. 2). Pyle (1975) described the habitat of *S. cynthia* as “Confined to the sterile backyards of eastern United States cities...” an apt assessment of the Meadowlands in the 1970’s sitting just a few miles west of New York City and after centuries of abuse and neglect. But these conditions may have been the savior of the beautiful Ailanthus Silkmoth, allowing the host plant, Tree of Heaven (*Ailanthus altissima*) to thrive and keeping predators at bay (Peigler and Naumann 2003).



Figure 1. Female *Samia cynthia* that emerged from a collected cocoon prior to release.

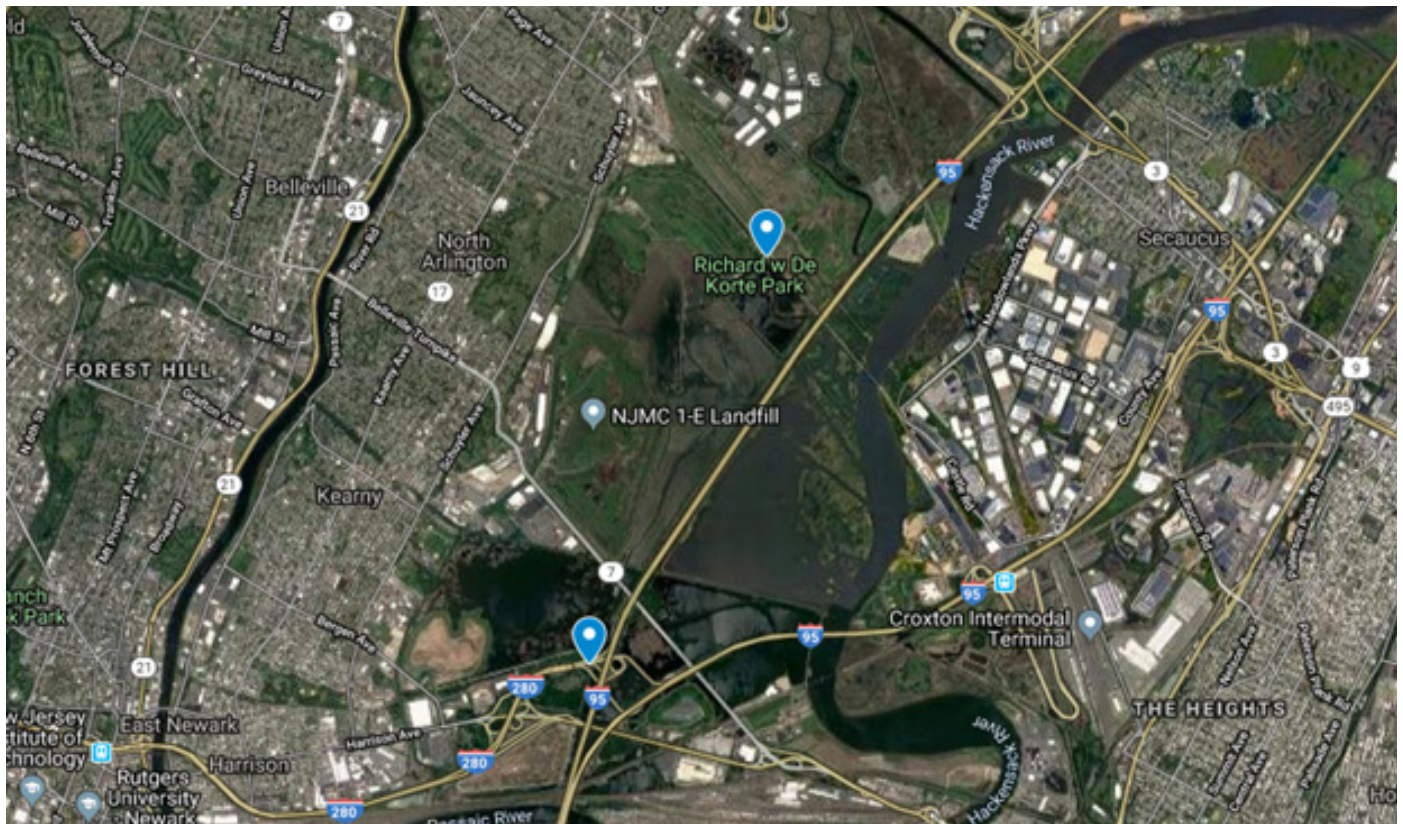


Figure 2. Location of two caged *Samia cynthia* females that attracted males denoted by large blue tear drops. Map created from Google Maps.



Figure 3. *Samia cynthia* cocoon on Tree of Heaven along New Jersey Turnpike entrance.

On 15 March, 2019, three Ailanthus Silkmoth (*Samia cynthia*) cocoons were discovered hanging from a small Tree of Heaven in a small vegetated island between three heavily travelled roads in Kearny, Hudson County, New Jersey (Figure 3). I observed four additional cocoons in nearby Tree of Heaven over the next few weeks but they were not accessible.

On 18 March, 2019, the three cocoons found three days earlier were collected (Figure 4) and placed in an empty fish tank with a mesh cover. The cocoons were kept at room temperature and were occasionally misted with water. Sometime between 1 July and 11 July, 2019, a male eclosed from one of the cocoons but perished prior to being found on 11 July. On 12 July, a female eclosed and on 14 July a second female eclosed from the remaining two cocoons.

On 15 July, the two females were caged in a mesh basket and placed in the late afternoon near the location where their cocoons were found (Figure 5). The following morning the cage was checked and three males were found: two males on the cage and one near it. On 16 July, 2019 in the late afternoon, one of the females was placed in a metal minnow trap at a second location in Lyndhurst, Bergen County, New Jersey. The following morning the trap was checked and a male was found beneath it. On 18 July, 2019 both females were released where their cocoons were collected.

There are only two recent reports of *S. cynthia* from New Jersey: an apparent male based on the antennae from Lyndhurst, Bergen County, New Jersey photographed on

a building wall on 16 July, 2015 and a moth of unknown sex (antennae obscured) lacking supporting details photographed on 4 October, 2018 in Morristown, Morris County, New Jersey (Lotts and Naberhaus 2017). Other older New Jersey reports include David Grossmueller (p. comm) recalling finding cocoons near the intersection of Route 21 and Broad Street in Newark, New Jersey in the late 1970's, Bryan Yenish (p. comm) found a couple near Medieval Times in Lyndhurst in 1992-1993, Daniel Sblendorio reports checking "the NJ Turnpike in the Meadowlands Area for 2 consecutive years between 1990 and 1994 and found at least 25 cocoons each time" and Don Simonds (p. comm.) "took 2 male *Cynthia* moths in a paint factory I was working in in 1958 or 59. The paint plant address was Delancy and Rutherford Streets in Newark, N.J. The plant was on the east side of the New Jersey Turnpike and it was in the meadows." There were also established populations in the 1970's in "New York City extending well into adjacent urban New Jersey" and persistence in the New York City area

through 1999 (NatureServe 2019). The author also found a single *S. cynthia* cocoon in 1994 in Lyndhurst, New Jersey.

Regionally, the species was common in the late 19th through at least the middle 20th century in urban centers in the northeastern United States but has apparently declined or been extirpated in many of these areas since that time



Figure 4. Three *Samia cynthia* cocoons with their distinctive and easily recognizable form collected on 18 March, 2019 in Kearny, New Jersey.



Figure 5. Caged female *Samia cynthia* and one of three attracted males in Kearny, New Jersey (top) and a male attracted to the female in Lyndhurst, New Jersey (bottom).

(Frank 1986, NatureServe 2019, Wagner 2012). There are no records for the United States in BugGuide or iNaturalist and no New Jersey records in GBIF after 1961 (GBIF 2019). Records in Moth Photographers Group include New York, Connecticut, Pennsylvania, Ohio and Maryland but year data are unfortunately not available (MPG 2019 and p. comm. Steve Nanz). The most recent specimen in the Yale Collection from New Jersey is from 1961 in Monmouth County, from Connecticut in 1979 from New Haven, and in New York from Nassau County, Long Island in 2005 (there is also a specimen from 2007 but it lacks specific

location information beyond the state). Wagner (2012) notes its extirpation in Connecticut (formerly occurring in New Haven), apparently last reported around 1985 (NatureServe 2019). Frank (2015) notes it was last found in Philadelphia, Pennsylvania in 1992, the city where it was first introduced in 1861 in a failed effort to establish a silk industry. There is also a 1994 record in GBIF from the city (UMNH 2019) and a 2017 larval record from Mt. Airy in northwestern Philadelphia (iDigbio 2019). It was apparently quite common in New York in the 1950's and Stan Malcolm (p. comm.) recalled "*I would have been*

rearing *Ailanthus* silk moths in Elmhurst, Queens, by age 8 at least – say 1955 or so. My father made me a rearing cage and spreading boards that I still use. The neighborhood had plenty of *Ailanthus* trees, including one that hung over our backyard from the lot next door that provided plenty of caterpillars...neighborhood kids also brought some to me. I remember some came in a paint can that still had wet green paint in the bottom, but I was able to save those that were above that level.” Paul Cavalconte (p. comm.) reports that in the Bronx, New York in the 1970’s “...the fenced areas between Woodlawn Cemetery and the Harlem line Metro North tracks were especially productive for cocoons.” A single *S. cynthia* was photographed at Jamaica Bay National Wildlife Refuge in Queens, New York on 18 July, 2001 (p. comm. Steve Walter and SWN 2019). Calling with caged females near Fresh Kills Landfill on Staten Island, New York “for years” has also failed to produce any males despite extensive *Ailanthus* (p. comm Bryan Yenish). In what appear to be the last reports from New York City, Daniel Sblendorio (p. comm.) notes their precipitous decline, including efforts to repopulate areas near the Canarsie Pier with breeding stock:

Through approximately 1995, I was still getting massive amounts of *Cynthia* cocoons (200 to 2,000 annually) from South Brooklyn (Battery Tunnel, Brooklyn Bridge, DUMBO (Down Under Manhattan Bridge Overpass)). Continual upgrading of neighborhoods and clearing of lots and *Ailanthus* fragmented and decimated populations from 1995 – to approximately 2005, when I was unable to locate any cocoons. South Brooklyn - last found in 2005 (approximately 50 cocoons, 20 taken) adjacent to the Brooklyn Queens Expressway service road. None found for several consecutive years following 2005. Belt Parkway still productive at least through 2010...very consistent populations (20 to 120 annually) on the Belt Parkway from Knapp Street to Starrett City (Plum Beach to Canarsie Pier). They remodeled the Canarsie Pier and almost eliminated the population there to where I could only find 1-4 cocoons annually. I extensively repopulated (with well mixed gene pools) but had no success. Plum Beach was better, as I was always able to find 6-12 cocoons to mix with my bred stock. I tried to increase the population of the Plum Beach stock but my success continued to hover around the 6-12 mark. I still was able to find 7 viable cocoons in 2010. They recently completed huge road and bridge improvements on the Belt Parkway in exactly the prime area, so I suspect they are extirpated.

In 1909, Smith (1910) reported the distribution of the moth as:

Common near Jersey City and for some distance in its vicinity. Also taken at Paterson, Trenton and near Philadelphia, but has not reached New

Brunswick nor any cities or towns remote from the larger centres of population. Mr. Davis records it from Staten Island, and it is quite possible that it has a foothold at other points near the coast. It is an importation from China, and has never really established itself in the country at large.

The inability of *S. cynthia* to colonize areas outside of urban centers despite the host plant being widespread is one of the more interesting ecological questions regarding the species (Peigler and Naumann 2003). As Ferguson noted (1972):

A curious feature of *cynthia* is its occurrence only in the vicinity of cities, wherever *Ailanthus* has become established around railroad yards or in any such weedy, vegetated sites in heavily industrialized districts. Although seemingly suitable stands of *Ailanthus* may be here and there around the countryside well removed from the city, *cynthia* is rarely if ever present. The reason for this anomalous habitat has not been investigated, although one is tempted to guess that it has something to do with the absence of natural predators or parasites that do not persist effectively in the disturbed city environment.

As reported in Peigler and Naumann (2003), Klausnitzer et al. (1988) suggest *S. cynthia* “...has a free ecological license (*freie ökologische Lizenz*). They opined that no indigenous species were displaced by *S. cynthia*, because it occupies an empty ecological niche, adapts to a newly created ecosystem, and does not disturb an already existing one.”

Although the reasons for the decline of *S. cynthia* and other large Saturniidae (as well as other moths) is not thoroughly understood (Opler 2000) a variety of factors have been suggested including: a tachinid fly (*Compsilura concinnata*) that was introduced from Europe to control the gypsy moth (*Lymantria dispar*) and the brown-tail moth (*Euproctis chrysorrhoea*) (Elkinton and Boettner 2012); bird predation on cocoons (Wagner 2012); light pollution (MacGregor et al. 2015, 2017); climate change (Kocsis and Hufnagel 2011); and loss of habitat (Schweitzer et al. 2011). It is evident that our large Silkmoths and many other lepidoptera are under siege, most likely from a suite of factors (Peigler and Naumann 2003). In 1983, Daniel Sblendorio (unpublished letter to Robert Weast dated December 12, 1983) noted “*Cynthias* can be taken in all 5 boroughs of N.Y. City. All of my efforts to populate them in the surrounding countryside have failed. Direct observation indicates that predatory wasps destroy virtually all larva within the first 10 days of their development. Birds, parasitic flies and and wasps, and disease do not come into play.”

Despite losses elsewhere in the region, at least for now, it is certainly possible that there is a healthy but overlooked population of *S. cynthia* in the New Jersey Meadowlands. Peigler and Naumann (2003) described it as “almost extinct”

and “nearing extinction”, but for all practical purposes, we actually believe that *Samia cynthia* is extinct in the United States”. Similarly, in 2007, the status of *S. cynthia* was described: “It is likely no viable occurrences exist any more in the USA due in part to introduced and native (at least in Philadelphia) parasitoids.” (NatureServe 2019).

However, given the seven cocoons found in March and the ease of attracting males to calling females at two locations separated by approximately three miles in July, perhaps they have been hiding out in plain sight in the New Jersey Meadowlands, possibly the last stronghold for wild *S. cynthia* in North America. There are extensive areas with the host plant and it is possible that a combination of factors might be shielding their presence. Access to many areas in the Meadowlands is limited or complicated by private property and secure guarded facilities, landlocked lands from roads and railways, vegetated landfills with restricted access and vast wetlands and wide ditches. The Meadowlands is also not likely a priority area for Lepidoptera exploration. As a result, it does not seem unreasonable for the moths to simply be missed in places where they occur or at least not reported by lay people who see them. *Samia cynthia* also may not be attracted to lights as readily as other Saturniidae. Covell (1984) noted “Adults...will not come to lights.” Experiments with *S. cynthia* in a room with a 60-watt incandescent light bulb and an uncovered window lit by outside urban lighting seem to suggest that neither was an attractant at night (Rau and Rau 1929). The second location in Lyndhurst, New Jersey where a male was attracted to the caged female (and where there was a photograph of another male in 2015), is in close proximity to the New Jersey Meadowlands Commission Environmental Center. This facility is heavily visited by naturalists and staffed by ecologists and it is unlikely that a large moth like *S. cynthia* attracted to the building lights would have been overlooked. In addition, this facility has held National Moth Week events with mercury vapor lights the last full week of July each year from 2012 to 2018 without attracting *S. cynthia*. The lights have been setup less than 900 feet from where the male was attracted on 17 July and adjacent to the same scrub habitat with abundant Tree of Heaven. Harry Zirlin (p. comm) also noted *S. cynthia* did not come to blacklights or mercury vapor lights at Jamaica Bay National Wildlife Refuge in the late 1980’s and early 1990’s, although flying moths were observed at dusk. R. Peigler (p. comm.) also believes *S. cynthia* is “not very phototactic” but may be at times based upon Ruffo (1998) reporting it flying at streetlights in Italy.

The New Jersey Meadowlands is undergoing change with old abandoned landfills being remediated, new residential and commercial developments being built, and the redevelopment of old industrial sites fueled largely by the growth of e-commerce warehousing removing *Ailanthus* trees that had colonized those places. How this might impact the remaining *Cynthia* populations there is unknown, but in what may be a prescient observation more

than twenty-five years ago, Peigler (1992) noted “*The moth may become extinct in North America because of urban renewal that destroys the unique and primary habitat of ailanthus trees in railroad yards and industrial parks.*”

Samia cynthia has a wonderful natural and unnatural history spanning more than 150 years in the eastern United States and although it has disappeared from many areas, it is comforting to know it still persists at least in some of these places. How long it can hang on may be another chapter in the story of this lovely moth. As Frank (1986) noted “...*S. cynthia* survives only in cities in North America; it does not have a population reservoir in rural or suburban areas...[and] may be considered a fugitive species with nowhere to go, a faunal remnant of nineteenth century industrial urban America.”

Acknowledgements

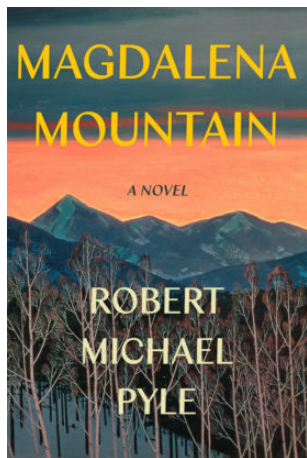
I am deeply indebted to Dr. Ric Peigler for sharing his wealth of knowledge and providing critical references about *S. cynthia*. I also appreciate the assistance of Tony McBride and the Newark Entomological Society, David Grossmueller, Harry Zirlin, Don Simonds, Paul Cavalcante, Lawrence Gall and Stan Malcolm for information about *S. cynthia* in New Jersey and the region, and George Hamilton for access to the Rutgers Entomological Collection. Special thanks are due EcolSciences for the time to conduct the study and prepare the article.

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Book Review



Magdalena Mountain: A Novel. By Robert Michael Pyle. 2018. Berkeley, CA: Counterpoint Press. 388 pages. Paperback, US \$16.95

The book jacket for Bob Pyle's *Magdalena Mountain* proclaims it to be a novel, but in truth this beguiling critter is a chimera of several interconnected novellas, or novelettes, or whatever comparable term you prefer. Each of these novellas rely on and play deftly off one another. Each also portrays a journey of significance for their respective protagonists, whose stories unfold in alter-nating chapters across two sections, Part I (chapters 1-20) and Part II (chapters 21-42). The entire book is framed by a brief Before and brief After. The main protagonists in order of appearance: Erebia, an immature Magdalena Alpine (*Erebia magdalena* Strecker) vying to make it to adult eclosion; Mary of varying surnames, skirting death and exploring identity and spirituality; James Mead, traveling down the graduate student's path of revelation; and October Carson, or more aptly his freewheeling field notes/journals, that set the lepidopterological and historical tables. Springing forth to engulf this foursome is a rich and vibrant array of supporting characters.

The principal narrative belongs to Mead. Hailing from New Mexico as a relative neophyte lepidopterist, Mead sojourns east to matriculate at Yale University and begin his pursuit of a doctoral degree, with no particular topic in mind a priori. His colorful advisor George Winchester grants Mead free intellectual exploratory reign, and settles him in as a student curatorial assistant in the bowels of the Peabody Museum of Natural History in the "Alexander Petrunkevitch Arachnology Alcove" (indeed, that's what it was called). There, Mead promptly stumbles across the mis-shelved volume twelve of October Carson's *Field Book and Journal*, and then tracks down the entire series. Carson is an amalgam of vagabond travel guide, collector lore and earthy lessons, who proves to be smitten by *E. magdalena*. Winchester is relieved that Carson's tomes are no longer AWOL, and this literature find triggers much of the remainder of the storyline. Mead becomes inescapably more and more obsessed with hunting down both Carson and the ethereal black butterfly. As the chapters whirl by, we follow along as Mead's many life experiences accumulate and parallel those penned in Carson's notes.

As for the two other protagonists, Mary starts out flying wildly in chapter 1, and *Erebia* manages to get into the air by chapter 12. You will be hard pressed to find

a more harrowing yet poignant entrance than Mary's, encapsulated in a parsimonious two page Pyle-ian takeoff on humankind's insignificance, and, only partly by inference, our general arrogance toward nature. The latter theme gets developed robustly throughout the book and particularly in the chapters that recount Mary's route from nursing center to high altitude hideout. Who is she? It is never fully resolved but the consensus is: many things to many simultaneously, as well as a namesake. *Erebia* as a character is great fun for lepidopterists, and I suppose if anyone can conjecture what clicks in an immature satyrine brain it is Pyle. Chapters 3 and 7 offer the larval perspective, and chapters 12, 19, 24, and 28 that of the adult male. *Erebia*'s flying and non-flying activities bring him into contact with numerous animates and inanimates sharing the tallus redoubt. Pyle definitely knows Colorado's alpine zone, and its depiction throughout is both magisterial and intimate. A Swift's beak-mark becomes *Erebia*'s badge, defining and propelling his destiny with several lepidopterist archetypes he subsequently encounters. *Erebia* also owns the Before and After.

Spoiler alert! *Magdalena Mountain* is a novel but is also essentially autobiographical, set in identifiable times and places bookended roughly by the mid-1960s through the mid-1980s. As it happened, a number of us other lepidopterists walked alongside the author, often in a literal sense yet always figuratively... which makes this book a deliciously entertaining Where's Waldo guessing game as to which real person is mirrored by which character (but being "in the room where it happened" is quite unnecessary to appreciate Pyle's characters). Consider the supporting cast. Some enter literally. For example, appearing onstage as themselves are the lepidopterists Charlie Covell, F. Martin Brown, Ken Philip, and Gerald Hilchie among others, as well as the noted Yale ecologist



Figure 1. At Rocky Mountain Biological Laboratory (Gothic, CO) smack in the middle of the Magdalena Mountain timeline, 14 July 1977, prepping for the Xerces Society Fourth of July Butterfly Count to Kebler Pass. Left to right: Marc Epstein, Candyce Clark, Russ Miller, Charles Remington, Robert Michael Pyle, David Shaw, Larry Gall. Photographer unknown but plausibly Robert Melton.

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Membership

The Lepidopterists' Society is open to membership from 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
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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 volume 62 must reach the Editor by the following dates:

Issue	Date Due
62 1 Spring	February 15, 2020
2 Summer	May 12, 2020
3 Fall	August 15, 2020
4 Winter	November 15, 2020

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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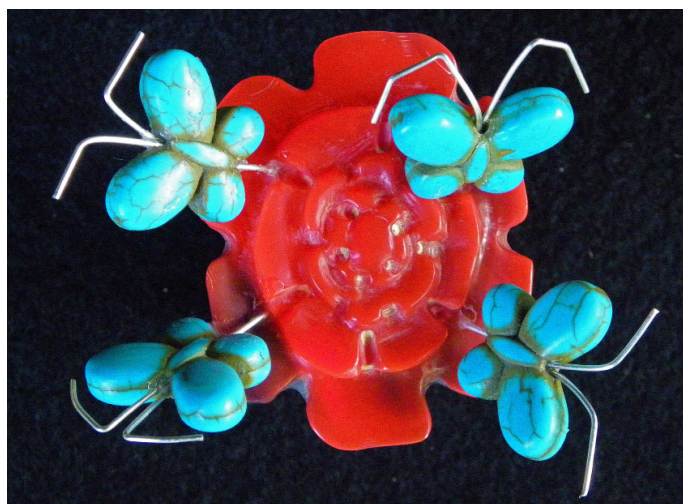
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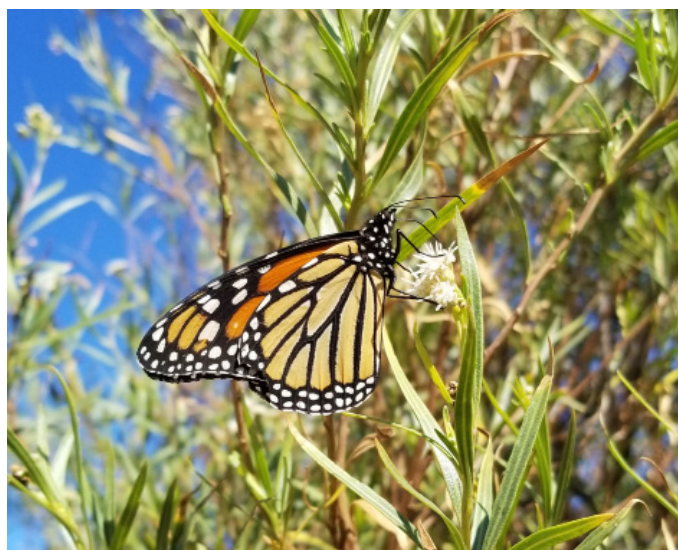
Ornithoptera tithonus females: left -- “normal”; right -- white. (photos by Bill Berthet; see related article pg. 159)



High Country Lepidopterists group photo, October 12, 2019 (photo by Evi Buckner-Opler, see pg. 177)



“Flower with Four Butterflies.” Multi-figure, multi-media Zuni carving. Red bowlerite, blue turquoise, and silver wire. Artists: Farlan and Paulette Quam (Pueblo of Zuni, NM). Date carved and acquired: September 2019. (see related article by Ross, pg. 191).



Monarch nectaring on mule fat at a California overwintering site (photo by Stephanie McKnight, The Xerces Society, see pg. 192).