Volume 62, Number 2 Summer 2020

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:

Top: *Apatura metis,* Anisimovka, 235m, July 9, 2017; bottom: *Papilio m. maackii* on road to Vityaz Bay, July 18, 2017. Both photos from the Ussuri region, Primorsky Krai, Far Eastern Russia, images by Bill Berthet (see related article, next page).

Digital Collecting:

Butterflies of Primorsky Krai Far Eastern Russia

Bill Berthet

12885 Julington Road, Jacksonville, FL 32258 **bergems@comcast.net**

This article is based on the following butterfly holidays in 2017: July 8-12 at Anisimovka Village; July 13-16 at Dalnegorsk City; July 18-22 at Vityaz Village; July 23-28 back at Anisimovka Village, with a visit on July 24 to the Vladivostok Botanical Garden-Institute.

This tour was organized by Yuri Berezhnoi Entomological Tours (**Butterflies@mail.ru**). Our trip leader was Adrian Hoskins; our butterfly guides were Vadim Golovizin **(g.vadim-krsk@yandex.ru)** and Yuri. Ground transportation was provided by Olga Golovizin.

January 2016 Adrian Hoskins asked if I wanted to travel to Russia, along with several others to photograph butterflies. Many years ago I had the chance to visit Russia with a group from my Alma mater, the Gemological Institute of America to view some of their many gemological treasures. Owning a jewelry store and being a Certified Gemologist Appraiser of the American Gem Society, I was very interested to attend, but could not adjust my schedule, a decision I regretted. When I had a second chance to visit the decision was a "no brainer".

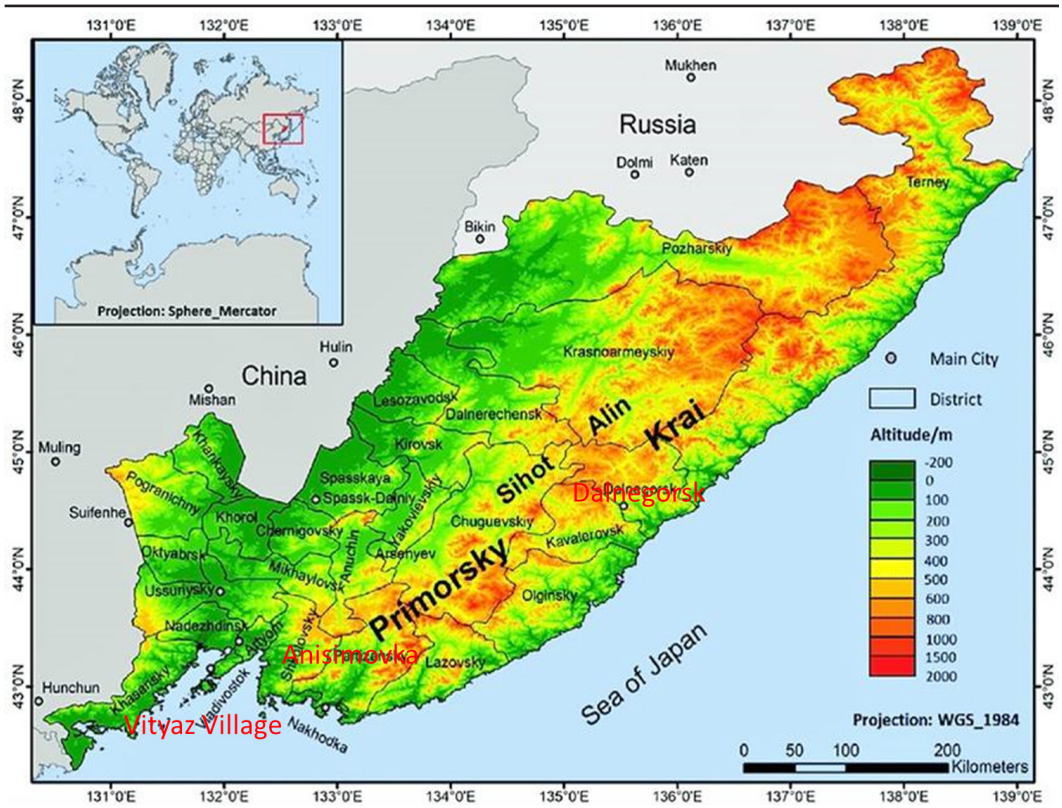
Obtaining a visa from the Consulate General of Russia in Houston cost $378.00. This included an Invitation letter from Universal Tour in Moscow, and completing the on-line visa application form. Some of the questions asked:

- Your father and mother's full name.
- Ever been arrested, had a communicable disease, drug abuser.
- List all countries you have visited in the last ten years.
- List all educational institutions, you attended.
- Do you have specialized skills relating to fire-arms, explosives, nuclear matters, biological or chemical substances.
- Performed any military service.
- Ever been involved in armed conflicts.

We departed JFK on Korean Air for the 14 ½ hour flight to Seoul, South Korea. The next leg was an Aeroflot flight for the 2 hour trip to Vladivostok, the home of the famous movie actor Yul Brenner. The distance is less than 500 miles, but to avoid North Korean air space you have to fly East over the Sea of Japan over the Island of Japan then head back west landing in Vladivostok. The driving distance from Moscow to Vladivostok is over 5,600 miles!

Immigration and customs entering Russia was a breeze. Four of us crashed for the night at the Avia Hotel, near the airport.

Primorsky Krai is around a 64,000 square mile area located in Far Eastern Russia, bordered by China, North



The Primorsky Krai region of far eastern Russia. Visited sites indicated in red.

The "chalet" in Anisimovka.

Korea, Peter the Great Gulf, the Sea of Japan, and is home to the Russian Navy's Pacific Fleet. Most of the area is 80% mountainous tundra, conifer-deciduous forest, and forest steppe. Average annual temperature in the North is around 34 degrees F and 42 degrees F in the Southern Coast.

Various butterfly habitats included sparse mountain steppe; oak, broadleaf, deciduous, montane, and mixed forests; river and stream valleys, open landscapes, humid to dry meadows, and high bogs. Around 235 species of butterflies are residents of this region. Butterfly activity is highest during the months of June, July, and August.

Early the next morning, driving on the right side of the road, one American, and three Brits took about a four hour, narrow, two lane, poor condition road trip N.E. to Anisimovka Village, arriving at a tiny chalet in the Alpine Ski "Resort" Gribanovka ("Mountain House") with an outside shower above a bathtub. This was home for the next 4 days. The chalet had a set of dangerous stairs leading to a very tiny area just big enough for a bed. At night, we used a "pee bucket", as the stairs were too dangerous to go down to the bathroom at night.

There were no dining areas. Yuri arranged for our meals to be prepared by a local couple and eaten in their outdoor dining area. When we arrived, there were five Japanese butterfly collectors eating. We had to wait until they were finished to eat. We were then told that our butterfly guide is also a collector and will be leading two trips simultaneously. We were shocked. We had no idea this was part of our trip. A group of butterfly photographers and Japanese butterfly collectors, both going after the same targeted butterflies -- this was going to be interesting!

Vadim and the Japanese men left first to the primary collecting spot for the day while we went with Olga to a puddle filled small area bordered on one side by a river and the other side by railroad tracks. We were pretty pissed that throughout this trip, the Japanese got the prime spot first, followed by us photographing the same area the next day. We tried to reason with Vadim, to let us go to the prime spots first. After all we were just photographing, not collecting. He apparently didn't care, as he continued to allow the collectors to go in first, collecting all they wanted, then had us come the next day to photograph what was left. He received no tip from me. I had to remind myself if it were not for collectors these spots would not be known, so I would not even have been there if it were not for collecting.

Left: *Sericinus m. montela.* Right, top: *Pieris canidia*; bottom: *Argynnis ruslana.*

One of the targets of the day was *Sericinus m. montela*, a striking "dragon" tailed swallowtail. Crossing the road, walking through a large ditch, then up a 10' high berm with railroad tracks on top, we observed several of these butterflies nectaring in a field on the other side of the tracks. A train would come by every 10 minutes or so, and, as such, there was no way to get close enough for a decent click. I went back across the road, followed a trail and got good clicks of a *S. montela* female. Other species of the day included three *Pieris canidia* imbibing moisture from a rotting log, *Apatura metis substituta* (see front cover), *Argynnis ruslana*, *Polygonia c-aureum* and *Mimathyma* (*Amuriana*) *s. schrenckii*.

Top row: P*olygonia c-aureum, Mimathyma s. schrenckii, Argynnis paphia*. Middle row: *Parnassius nomion, Papilio m. machaon, Papilio xuthus*. Bottom row: *Coenonympha oedippus*, pair of *Ochlodes venata amurensis, Bibasis a. aquilina*, a pair of *Plebejus subsolanus ida*. Right: *Melanargia halimede*.

The next several days Olga drove about 45 minutes, then turned off the main road, following a narrow path, then parking under a small railroad bridge bordering a small stream. We crossed the stream to our 235m elevation habitat for the day -- a large meadow with foliage from two to over six feet tall. The target butterfly is the fast flying, hardly ever landing, *Parnassius nomion korshunovi*. Finally after spending several days and many hours wading through the dense ground cover I got several good clicks, followed by a fist pump with happy emotions to follow. During this time I was only able to photograph two different *Parnassius nomion*. The collectors had netted many before we got there.

There were several muddy areas that were attracting *Papilio m. machaon*, and the very fast flying *P. xuthus*. Trying to photograph *P. xuthus* in China was frustrating, as they hardly ever landed and would zip by you at what seemed like lightning speed. Every 20 minutes or so trains carrying oil containers would rumble by, sometimes scaring the butterflies with the ground vibrations.

Following a narrow trail for about ¾ mile, I came across an ecotone, from open meadow to a closed canopy forest towering above a small stream and got a good click of *Coenonympha oedippus*. Skippers that day included a pair of *Ochlodes venata amurensis* and *Bibasis a. aquilina*. I also photographed a pair of *Plebjus subsolanus ida*, an *Argynnis paphia*, and the Satyr *Melanargia halimede*.

One night there was a heavy rainstorm. Having no room to store my luggage inside the chalet, I left it open on a table in the roof covered entry way. There was a leak in the roof just above my open suitcase drenching the contents with water including my trusty Canon G-15 Power shot camera. When I checked the camera, it worked but the viewing screen was damaged. The owner felt bad about what happened and immediately fixed the leaky roof but offered no compensation for the camera.

The next day we stayed at the chalet, and trudged up and down the flower filled ski slope, various trails, and the dirt road leading to the chalet. The Japanese collectors were at a different location that day, but we still had a collector from Moscow to share the slope with. The target bug this day was the large blue, *Maculinea arionides*, but none were observed. Were we too early or too late for their flight time? The clicks of the day included A*patura metis substituta, Limenitis populi ussuriensis, Aglais urticae eximia*, and the hairstreak *Satyrium w-album fentoni*.

One of the participants, Nigel Peace, used portions of the Guide to the Butterflies of the Palearctic Region by G.C. Bozano, Butterflies of the Asian part of Russia by Korshunov & Gorbunov, The Butterflies of Russia and adjacent Territories by Tuzou, P.V. Bogdano and others to cobble together an invaluable 79 page guide for butterflies of Primorsky Krai. A heart felt personal thanks to Nigel for the time and effort to compile this great resource and making a copy available to me.

The next day after breakfast, the four of us depart in one van and the five Japanese collectors in another for a road trip further North East arriving in the late afternoon to the 220m high, famous mining town Dalnegorsk (meaning River of Wild Boars), less than 25 miles from the Sea of Japan. The area has a warm summer, humid climate, with Korean Pine and Mixed Broadleaf Forests. The population of around 34,000 is declining because residents suffer from serious lead poisoning. Overcoming several issues with the hotel, we finally have a late dinner.

In the morning Vadim left with his group hunting for the target bug of the day, *Parnassius eversmanni maui*, that has a flight time from late July to August. Vadim assures us that we would also be observing this butterfly at the spot Olga is taking us to. About an hour's drive later Olga took us to a huge 500m high meadow bordered on all four sides by forest. Many of the locals were out picking berries. By the end of the day we were exhausted from walking large distances in high vegetation, and rocky, uneven surfaces. We saw very few butterflies, with no observations of the target butterfly, but we still managed to see *Aporia crataegi banghaasi, Apatura iris, Mimathyma* (*Amuriana*) *s. schrenckii, Limenitis d. doerriesi, Boloria angarensis hakutozana*, the satyrs *Aphantopus h. hyperantus, Lopinga achine*, and my favorite for the day *Coenonympha hero*. Five out of the eight butterflies mentioned above were photographed in a 25' by 25' muddy area.

Back at the hotel we mentioned to Vadim no observations of the target butterfly today. Later that evening he showed us 17 pinned, assorted males and females of *P. eversmanni maui* that he caught and planned on selling on Ebay. He assured us that the next day we would see this species.

Clockwise from top left: *Apatura metis, Limenitis populi ussuriensis, Aglais urticae eximia, Satyrium w-album fentoni.*

The next morning after a Russian style breakfast, Vadim took off first. About 15 minutes later we left with Olga, who finally parked the van not very far from the spot yesterday. We spent several hours with few butterflies in the area. I decided to hike up a trail and finally met up with Vadim, asking where the spot is for our target butterfly. He reluctantly hiked further up the trail, to a meadow filled with *Corydalis gigantea*, host plant for *P. eversmanni*. I stay there for about ½ hour and finally see one male zipping by, followed by another. Very few were observed, as many had been captured by Vadim and the Japanese today and yesterday. The males were patrolling for females and not interested in landing for a photographic opportunity. I asked Vadim to

Top row: *Aporia crataegi banghaasi, Apatura iris, Mimathyma* (*Amuriana*) *s. schrenckii.* Second row: *Limenitis d. doerriesi, Aphantopus h. hyperantus.* Third row: *Boloria angarensis hakutozana*, *Lopinga achine*, *Coenonympha hero.* Fourth row: *Corydalis gigantea* foodplant for *Parnassius eversmanni*; *Parnassius eversmanni maui,* male; *P. eversmanni maui* female, with sphragis.

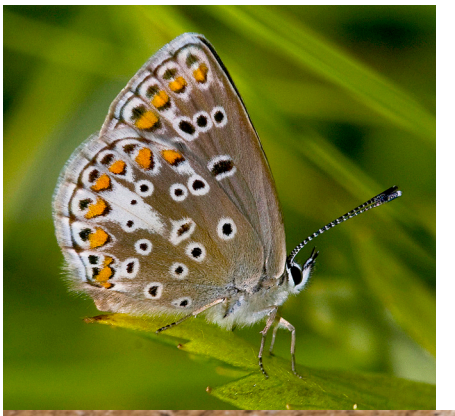
net one for me to photograph then let it go, and he did. I went back to alert the others of the new site, but none were able to get a good click of male or female. Later on at 880m elevation, I get a shot of a nectaring female with sphragis. The other butterfly of the day is *Apatura iris amurensis*.

After dinner we heard a number of speakers blaring out music from a band. The very large parking lot across the street from the hotel was celebrating some sort of festival. I decided to watch and listen to the music. Kind of weird listening to big hit rock songs of the 70's and current cover songs spoken in Russian. One act featuring a petite, gorgeous, long blonde haired Russian female lead singer was outstanding.

The sphinx moth *Mimas cristophi*, on a hypodermic needle. Identified by Jean Haxaire.

Later that evening Vadim and Olga were going to put up a moth light to collect moths to sell on Ebay. I decided to tag along. Vadim drove to the same spot we were at earlier in the day. Soon the light was up and the moths started pouring in by the hundreds. I watched Vadim pick out what he wanted, stab it with the hypodermic needle, hand it to Olga who prepared them. They worked like a well oiled machine, obviously having done this many times before. We left around 1:30 am.

Groggy eyed, we drove back to the same site as the previous day. Hundreds of dead moths were lying on the ground below where the light and sheet was the night before. *P. eversmanni* was seldom seen today; most had been captured the previous several days. Clicks included the beautifully marked *Polyommatus icarus tumangensis* and *Limenitis helmanni duplicata* imbibing minerals on a dead snake that Vadim ran over the day before.



Left: *Polyommatus icarus tumangensis*; below: *Limenitis helmanni duplicata* on (squashed) snake.

Both vans left on July 17, the one with the five Japanese collectors heading back to the airport near Vladivostok, and our van is traveling to Vityaz Village, southwest of Vladivostok, near Peter the Great Gulf. Along the way the other van quit working and cannot be fixed. Vadim connected a rope using our van to pull the other van along. Various ropes and other webbed materials break five times during the approximately 120 mile trip. We finally arrived at the Avia hotel parking lot near the airport. We were joined by the tour organizer Yuri and say good bye to Vadim and the five Japanese men. We spent the night at this hotel and enjoyed several good meals.

In the morning Olga drove to Vityaz Village. During one of the pee breaks, we all got good clicks of a fresh open winged *Paplio m. maackii* (see front cover). Stopping at an above ground gasoline tank station, I headed towards the back of the station for another pee break and noticed this sign. Do not pee, if caught we will cut it off! Do not poop, if caught you will get a kick in the ass! Do not litter, if caught you will get your arm cut off with an ax! I decided to use their bathroom.

The warning sign

After getting lost, Yuri finally figured out how to find the house owned by a college Professor and his wife, where we would be staying for the next five nights. There were separate single bedrooms, attached to a large room with a dining table and several other tables that we could place our computers on to work on images and talk about our experiences. The home cooked food was excellent.

In 2009 the Professor had authored a book on butterflies and moths, and he gave each of us a copy. He spent several hours talking in broken English about his book and butterflies in this area. On several occasions he invited me to fish with him at his backyard pond sharing stories and Vodka.

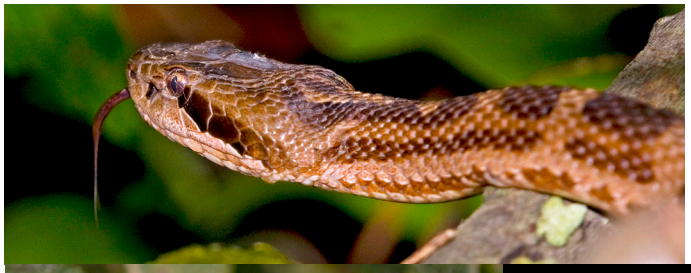
For the next few days we drove up near the top of a series of 1,000' to 1,500' hills overlooking the bay. The scenery was spectacular, but it took a lot of effort to wade through the 4'-7' high thickets making butterfly photography extremely challenging. You would see a good bug, it would fly 50' away and it took

Vityaz Village accommodations, with Nigel Peace, Adrian Hoskins, and the author; view of Vityaz Bay.

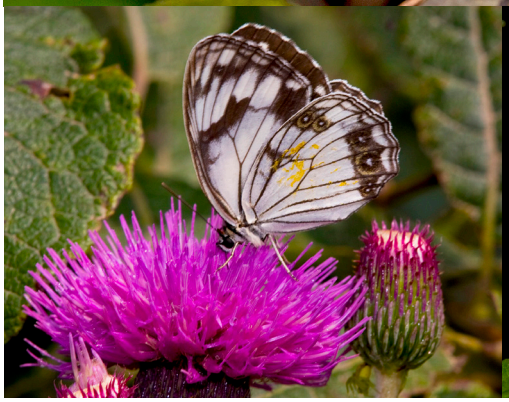
The college professor's book.

forever just to travel that distance. Another factor was the wind. Several days we tried to work the area but it was just too windy, so we discovered other trails below the hilltop. Clicks here included the hairstreaks *Niphandra fusca, Ussuriana michaelis,* and *Favonius orientalis schischkini*, the skipper *Thymelicus sylvatica*, the Ussurian viper Shitomordnik, a pair of *Argynnis laodice japonica* (next page), and the satyrs *marginalis*, and *Ypthima*

Melanargia epimede, Lethe motschulskyi amphithea.



Top row: *Niphandra fusca.* Second row: *Ussuriana michaelis, Favonius orientalis schischkini.* Left: Ussurian viper Shitomordnik. Right: *Thymelicus sylvatica.* Bottom row: *Melanargia epimede, Lethe marginalis*, and *Ypthima motschulskyi amphithea.*



Mating pair of *Argynnis laodice japonica*

Our next stop was Gusevka village, but for various reasons we chose not to go there, so we headed back to Anisimovka, staying at the comfortable Ski Resort facilities. Yuri buys supplies to cook there, a wise choice, as the food was excellent. We wandered around in the late afternoon with clicks of *Maculinea k. kurentzovi* and a *Papilio m. maackii* puddle party.

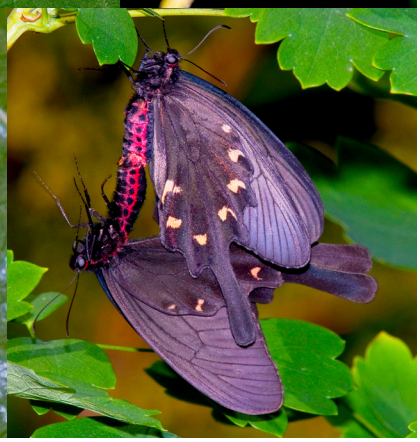
After pigging out at breakfast the next day, our destination was Vladivostok Botanical Garden-Institute established in 1949. Highlights of the day was the life cycle of *Atrophaneura a. alcinous*, because the gardens include *Aristolochia* host plant vines for this butterfly.

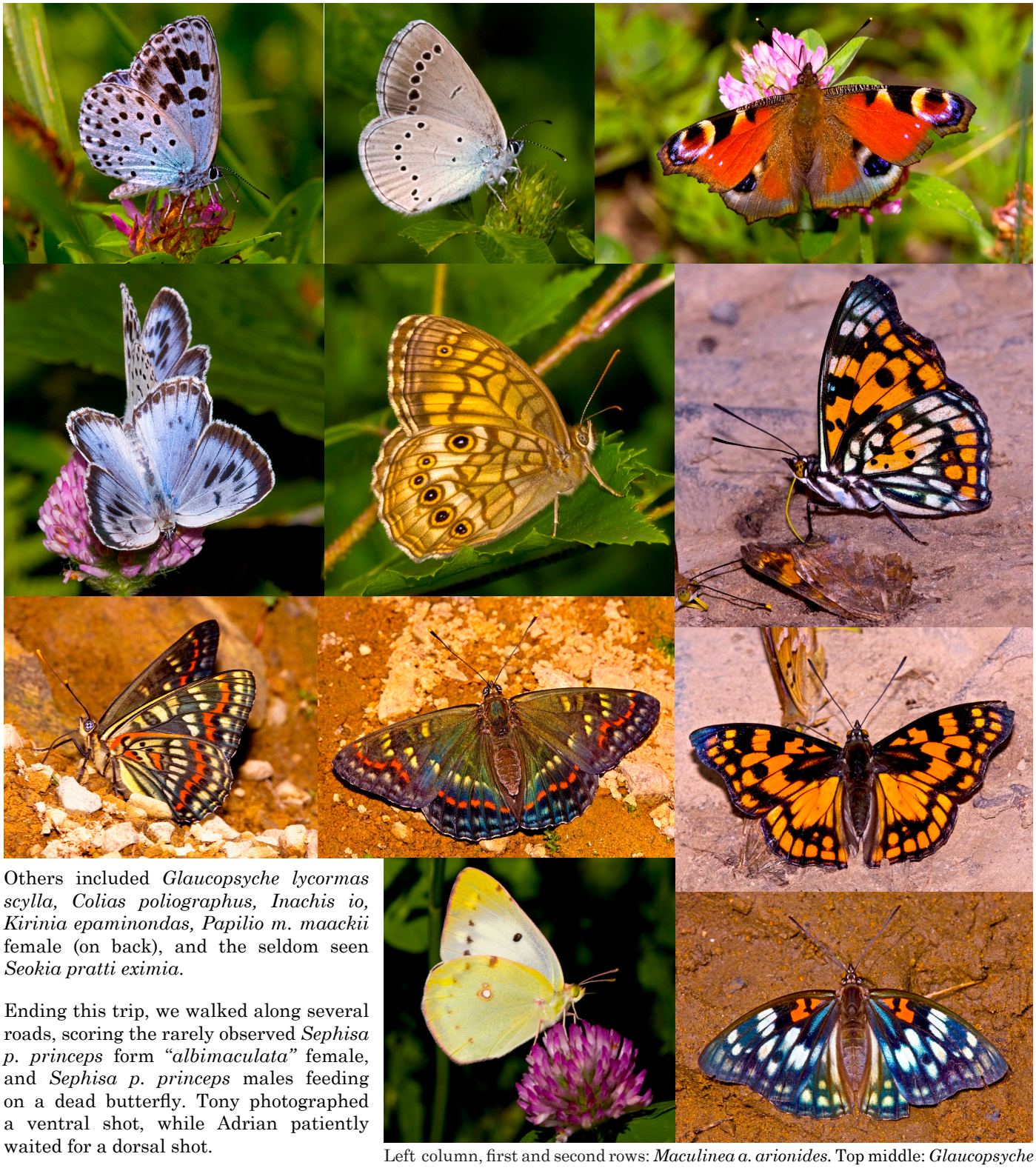
We also checked out the opulent 17th Century architectural style Vladivostok train station that is the eastern terminus for the Trans-Siberian Railroad.

I chuckled at this painting of Putin and Obama playing chess and wanted to get a closer look but the shop it was in was mobbed with Chinese tourists.

The next morning we are excited to see if our target butterfly *Maculinea a. arionides* is in flight. The next couple of days we shared the hill with collectors from Russia, and Germany all looking for this bug. This is a fast flying, quick to nectar butterfly that is a challenge to get close enough for a good click. I found a nectaring spot of clover away from the collectors where I hid in a large patch of vegetation then darted out, getting several clicks.

Left: *Maculinea kurentzovi kurentzovi*. Below: *Papilo maackii* puddle party. Right: eggs, larva, pupa and mating adults of *Atrophaneura alcinous alcinous*, immature stages on *Aristolochia* host plant.





Others included *Glaucopsyche lycormas scylla, Colias poliographus, Inachis io, Kirinia epaminondas, Papilio m. maackii* female (on back), and the seldom seen *Seokia pratti eximia.*

Ending this trip, we walked along several roads, scoring the rarely observed *Sephisa p. princeps* form *"albimaculata"* female, and *Sephisa p. princeps* males feeding on a dead butterfly. Tony photographed a ventral shot, while Adrian patiently waited for a dorsal shot.

On July 28th we all celebrated a great trip and head off to the airport at Vladivostok. I had one last chance to purchase King or Snow Crab before the long trip back to Florida.

Left column, first and second rows: *Maculinea a. arionides.* Top middle: *Glaucopsyche lycormas scylla.* Top right: *Inachis io.* Second row center: *Kirinia epaminondas.* Third row, left and center: *Seokia pratti eximia.* Right column, second third and fourth rows: *Sephisa p. princeps*, male venter and dorsal, female form albimaculata. Above: *Colias poliographus.*

A mushroom diet for Djernaes' sandune ghost moth, *Aenetus djernaesae* Simonsen, 2018 (Lepidoptera: Hepialidae)

John Grehan[1] (corresponding author), Paul Kay[2], and Paul Hutchinson[3]

[1]Research Associate. McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, 3215 Hull Rd, Gainesville, FL 32611, USA **calabar.John@gmail.com**
[1, 2]630 Armadale Road, Forrestdale, Western Australia, Australia **mothcatcher4@gmail.com**
[3]Department of Primary Industries and Regional Development, Locked Bag 69, Welshpool DC, Western Australia 6986, Australia **paul.hutchinson@dpird.wa.gov.au**

In Western Australia the callus feeding stem-borer *Aenetus djernaesae* Simonsen, 2018 lives entirely or principally within coastal sand dunes where it feeds on the sand dune shrub *Myoporum insularae* R.Br. (Scrophulareaceae). Only recently made known to taxonomic science (Simonsen 2018), this species attracted the attention of PK and PM who initiated a rearing program in 2017 and 2018. The goal was to rear all stages of the insect from egg to adult. This was a particularly challenging ambition since the larvae of stem-boring Hepialidae do not start out plant feeders. Instead, early instar larvae feed on fungi or dead fungal-infested woody plant tissues before transferring to live plant hosts where they excavate a tunnel into the wood and feed on callus growth around the tunnel entrance under a silk/debris web. This pattern of larval development has been documented in detail for only one species – *Aenetus virescens* (Doubleday, 1843) – but the general absence of evidence for first instar entry into plant hosts supports this two stage development being applicable to all species (Grehan 1988).

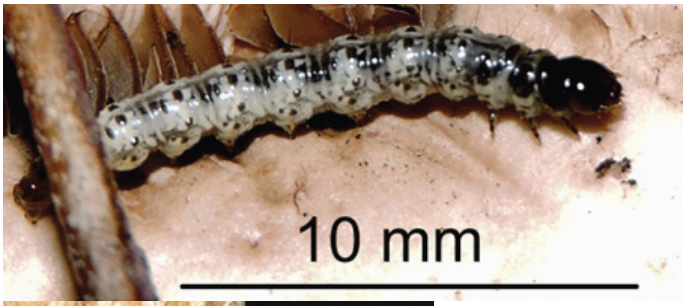
Early instar larvae of *A. virescens* feed on the encrusting fruiting bodies of polypore fungi growing on the exposed under surfaces of moist, dead wood, or they graze hyphae and surface wood tissues. Maintaining this habitat under laboratory conditions was found to be impractical, mostly due to problems with sustaining a sufficiently aerated humid environment while also avoiding mortality, often from the pathogenic fungus *Beauveria bassiana* (Balsamo) Vuillemin (Grehan 1982). These problems prevented extensive study of larval feeding and development for these early stages. Some attempts were made to rear larvae on artificial diets that were being developed for pasture pest hepialids (*Wiseana* spp.) but these diets were not viable for *A. virescens*. The option of substituting the natural diet with an artificial source in the form of commercial mushrooms was never considered, but this alternative was successfully tried in 2018 for *A. djernaesae* by PK and PMH as published by Kay *et al.* (2020). Some of the principal findings from this study are summarized here to highlight a promising approach for rearing of early instars to investigate the ecology and evolution of fungal feeding in the Hepialidae.

Eggs were obtained from a moth at a light trap sheet in April 2018. She produced numerous eggs which were placed into moist containers as well as soil around some potted host plants. The eggs hatched after 20 days and the first instar larvae were transferred to the potted plants (Fig. 1) along with sliced mushroom (Swiss brown) and decaying *Eucalyptus* bark fragments. Fresh mushroom pieces were added every three days. Larvae remained secluded during the day but were active at night and mushroom feeding was apparent from the patches of grazed surface tissues, droppings, and ingested food within the gut visible through the semi translucent body (Fig. 2). Larvae were also observed to tunnel into the bark, the surface of which was covered in frass, chewed bark, and silk.

After about five weeks some larvae were 10-15 mm long and perhaps in their third instar (Fig. 3), although some other larvae were still no more than 5 mm long. By the end

Fig. 1 (above). First instar larvae of *Aenetus djernaesae* placed in plant pots with mushroom and dead bark fragments. Fig. 2 (left). First instar larva of *Aenetus djernaesae* with ingested food within the gut visible through the body, and surrounded by elongate fecal pellets that are typical of hepialid larvae.

of June larvae began to actively crawl around the pot rims or suspend from the sides by silk thread. These larvae were placed on host branches where they crawled about before constructing a web cover of bark, frass, and silk. Within 2-3 hours the initial web completely enclosed the larva under the web (Fig. 4). Beneath this web a vestibule was constructed comprising the web and a feeding area around the entrance of a tunnel into the stem. Active construction lasted 5-13 nights, with larger diameter branches or stems taking longer to complete.



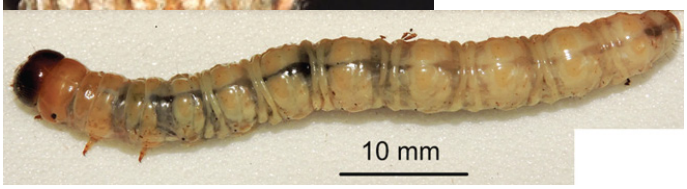


Fig. 3 (above). Possibly third instar *Aenetus djernaesae* larva of the fungus feeding stage. Fig. 4 (left). Newly constructed web of *Aenetus djernaesae* on *Myoporum insularae*. Fig. 5 (below). Mature larva of *Aenetus djernaesae*.

The newly established larvae continued to feed and grow in a manner similar to that observed in the wild. The vestibule was enlarged over time to surround the circumference of the stem and for some distance below the tunnel entrance. The early fungal feeding larvae were observed to have dark, almost black sclerotized patches (pinacula) as shown in Fig. 3, but the pinacula of older larvae within the host plants are very pale and indistinct, with only the head capsule remaining dark (Fig. 5). Larvae in the potted host plants matured the following year in April when moths began to emerge during the first two weeks the month (Fig. 6).

The success of the mushroom diet for *A. djernaesae* represents the first successful rearing of a stem-boring hepialid through its entire life cycle. For *Aenetus djernaesae* the life cycle comprised adult emergence over a period of about 22 days in late March to late April, egg development of 20 days which would suggest late April to late May for egg development in the wild, fungal feeding for about 36 days corresponding to late May to mid June, and then host plant development to adult for 300-315 days between

Fig. 6. Newly emerged male (left) and female (right) of *Aenetus djernaesae*.

late May and mid April. This approach demonstrates the feasibility of maintaining all the immature stages of stem boring Hepialidae under artificial conditions where it is possible to maintain potted host plants. Where live host plants are not available it may be feasible to maintain larvae on apple as accomplished for various *Aenetus species* (Beaver & Grehan 2019).

The mushroom technique also has potential for rearing the early stages of many other Hepialidae in addition to stem borers since most, if not all, species appear to have an initial fungal or detritus feeding stage before feeding mostly or exclusively on live plant hosts (some species continue to feed on dead plant detritus throughout development). The present study did not focus on the number of instars, but it should be possible to rear individual larvae on mushroom to track instars through head capsule measurements.

The combination of fungal and plant feeding at different stages of development is an evolutionarily intriguing characteristic of Hepialidae as it is inclusive of very primitive growth forms (fungi) and the most derived plants (angiosperms). Various studies of Lepidoptera-host plant relationships have emphasized the strong association of most Lepidoptera with angiosperm host plants and suggest a shared evolutionary origin and relationship. Hepialidae are part of this pattern, but the fungal feeding transcends the angiosperm relationship as the sole specialization for this family. This dual specialization may represent a new evolutionary development for the Hepialidae or it may represent an ancestral condition, perhaps originally shared by all ancestral Lepidoptera where larvae fed within a matrix of detritus and plant tissues on the soil surface. The exclusive feeding on either live plants or on fungi by most Lepidoptera may represent a specialization on one or the other from an ancestor feeding on both, whereas in Hepialidae the separation has occurred within different stages of larval development rather than different lineages (Grehan 1989).

(References continued on page 63)

Announcements:

The Southern Lepidopterists' Society invites you to join

The Southern Lepidopterists' Society (SLS) was established in 1978 to promote the enjoyment and understanding of butterflies and moths in the southeastern United States. As always, we are seeking to broaden our membership. Regular membership is $30.00. Student and other membership categories are also available. With membership you will receive four issues of the SLS NEWS. Our editor J. Barry Lombardini packs each issue with beautiful color photos and must-read articles. The SLS web page (http://southernlepsoc.org/) has more information about our group, how to become a member, archives of SLS NEWS issues, meetings and more.

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

Society of Kentucky Lepidopterists

The Society of Kentucky Lepidopterists is open to anyone with an interest in the Lepidoptera of the great state of Kentucky. Annual dues are $15.00 for the hard copy of the News; $12.00 for electronic copies. The annual meeting is held each year in November, at the University of Kentucky, Lexington. Jason Dombroskie will be this year's featured speaker. In addition, there will be a fall field meeting held in Georgia over the Labor Day weekend. 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 troplep.org website for further information and a sample journal. Send dues to ATL Secretary-Treasurer, PO Box 141210, Gainesville, FL 32614-1210 USA. We hope you will join us in sharing studies on the fascinating world of tropical butterflies and moths.

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.

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!

Lep Soc Statement on Collecting

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

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.

Searching The Lepidopterists' Society Season Summary on SCAN

Brian Scholtens and Jeff Pippen

The Season Summary coordinators, Brian Scholtens and Jeff Pippen, want to thank everyone who made our first effort at producing the Season Summary a success. We particularly thank all the Zone Coordinators, who put up with lots of instructions about how to format and submit records, and who all successfully sent records so that we could produce the summary.

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

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

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

2020 Annual Meeting at Western Carolina University Rescheduled for 2021

The annual meeting of the Lepidopterists' Society (meeting jointly with the Southern Lepidopterist's Society and Association of Tropical Lepidopterists) that was scheduled for 16-19 June 2020 has been cancelled for this year due to the Covid-19 outbreak. All public institutions in North Carolina are required to cancel all on campus events through the end of June this year and rescheduling for later in the year wasn't feasible.

As a result, we will plan on hosting the meeting at Western Carolina University next year, 2021, at the same time of year, during mid-June. If you were planning on joining us, please plan for next year. If you could not attend this year, maybe next year will work out better. And for both groups, we hope that you all stay safe and healthy.

We look forward to hosting you next year.

Brian Scholtens and Jim Costa

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**

References for Mushroom diet for *Aenetus djernaesae*

Continued from p. 61

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www.lepsoc.org and https://www.facebook.com/lepsoc

Phyciodes orseis herlani identification (versus *P. pulchella montana*) (Nymphalidae)

James A. Scott

Lakewood, Colorado **Jam3allsco@gmail.com**

Every photo of *P. orseis herlani* females that has appeared in books and internet (including butterfliesofamerica.com) (except one near Yosemite), is actually *P. pulchella montana*. This note provides an easy way to identify them, with photos. On the dorsal hindwing of females, the median band varies in color from pale to darker orangish-tawny in individuals of both species, but in *herlani* the median band is the same shade on front as it is on the rear where it becomes a lunule, whereas in *montana* the median band is whiter on the rear. This always works to separate females; however male *montana* often have little or no paler coloration on the rear. Two other traits serve well to identify them: the forewing margin tends to be straighter toward the rear in *herlani* (sometimes a bit concave in females, and often concave in males), convex in *montana*. The ventral hindwing is variegated with numerous markings in *herlani*, while those markings are less noticeable in *montana* especially on the submargin/margin; and the dorsal hindwing is more suffused with orange toward the apex in *montana*.

These butterflies look somewhat similar because adults are in a mimicry complex in California. At low altitude in the Sierra Nevada and northern Calif. adults are blacker: *Euphydryas chalcedona chalcedona*/*E. c. sinecat* and *Chlosyne leanira leanira*/*daviesi* are evidently models (containing poisonous iridoid glycosides from their hostplants), and *Chlosyne palla palla*/*C. palla eremita* females, *P. pulchella pulchella*, and *P. orseis orseis* are evidently Batesian mimics, but at high altitude in the Sierra Nevada they become orangish as *E. c. sierra*, *C. l. alma* models, *C. p. altasierra*, *P. pulchella montana*, and *P.orseis herlani* mimics.

Another little-known trait is useful for identifying other *Phyciodes*. All *P. pulchella* ssp. have the ventral forewing costal (anterior) subapical conical patch tawny in color, with little or no black, whereas the *P. tharos* group (*tharos*, *diminutor*, *cocyta*, *batesii*) usually have this spot partly or greatly black. Another newly-touted character is poor: on the *P. tharos*-group the orangish submarginal spot in

Phyciodes female uppersides. Left: *P. orseis herlani*; right: *P. pulchella montana*.

Phyciodes female undersides. Left: *P. orseis herlani*; right: *P. pulchella montana*.

Phyciodes males. Left: *P. orseis herlani*; right: *P. pulchella montana*.

Left: *P. orseis orseis*, three males, three females; right: *P. pulchella pulchella*, three males, three females.

dorsal forewing cell CuA_2 often has a curious little black dot within it (the dot most often visible in *tharos*, less often visible in *diminutor* & *cocyta*, usually engulfed by tornus black thus seldom visible in *batesii* ssp.); this dot is lacking in most other *Phyciodes* (rarely tiny in *P. pulchella*, sometimes visible in *P. phaon*).

References to my papers revising *Phyciodes* that also help identification: Papilio (New Series) #7:1-120; #10:1-42; #13:1-38; #23:1-26. (free pdfs at https://archive.org)

Phyciodes batesii apsaalooke, left: uppersides, right: undersides, Middle Popo Agie R., 6750-7100' (N of Bruce P. G.), Fremont Co. WY June 29,1997 J.S.Nordin

Danaus gilippus cleothera in the Bahamas -- a new record

Rick Rozycki[1] and Denis Knowles[2]

[1]Research Associate, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL 32611 **rickroz1@msn.com**
[2]Nassau, New Providence, Bahamas

ABSTRACT: *Danaus gilippus cleothera* Godart 1819 is recorded from Great Inagua Island in the Bahamas for the first time. It is discussed and illustrated along with *D. gilippus berenice* Cramer 1779, the other subspecies already recorded on various islands in the Bahamas, including Great Inagua.

Danaus gilippus cleothera occurs on Hispaniola where it is common, and rarely observed in western Puerto Rico. The authors have now recorded it from Great Inagua in the southern Bahamas. Great Inagua is situated about 90km northeast of the eastern end of Cuba, and slightly more than that north of the western part of Hispaniola. The occurrence of *D. g. cleothera* there should not be much of a surprise, given the fact that Inagua lies midway between Cuba and Hispaniola.

The subspecies of *D. gilippus* that is recorded from Great Inagua and throughout the northern Bahamas is *D. g. berenice*. It is possible to have two different subspecies

present at the same time, but very unusual, and over time one will likely out compete the other.

In his 1980 paper – Butterflies of Great and Little Inagua, Clench lists 5 specimens of D. gilippus he personally took in April 1977. He recorded them as berenice, but with differences approaching *D. g. cleothera* from Hispaniola, "variable loss of white pm spots upfw below Cu_1; and paler, brighter ground color uphw and unhw."

We have examined photos of these specimens. In addition, we examined photos of several other specimens housed at the Carnegie Museum. These specimens are from Great Inagua and New Providence in the Bahamas, and there is a small series mentioned by Clench (1980) from the Caicos Islands. One specimen from North Caicos has a fairly bright h.w. both upper and under surface. All fall within the range of variation that we have seen in *berenice*. It appears that within any given *gilippus berenice* population there is considerable variation among individual specimens.

Carpenter and Lewis (1943) A Collection of Lepidoptera (Rhopalocera) from the Cayman Islands, reported that among their series of *berenice* from the Cayman Islands, there is the occasional specimen that resembles *strigosa* H. W. Bates or *jamaicensis* H. W. Bates.

The senior author has collected a few times on Grand Cayman since 1977. While there, he has taken several *D. g. berenice* and these specimens are quite variable. Most specimens look like typical *berenice*, but several are similar to *thersippus* (*strigosa*) and one looks like *D. g. jamaicensis.* Three different appearing specimens were all collected at the same locality on Grand Cayman within four days of each other in June 2017. Along with the McGuire Center, University of Florida, we have been conducting field studies on the Lepidoptera of the Bahamas for several years.

In general, other than on Great Inagua, *D. gilippus* is fairly uncommon or of erratic appearance in the Bahamas. On several trips to various islands where it is known to occur, we have only seen or taken it on a few occasions.

The junior author, who resides in Nassau, collected on Great Inagua between November 1991 and March 1992, and again in late November 2006. He collected only *D. g. berenice* on the first few trips. He then did an extensive survey going there on at least 18 trips over a period of 18 months, from October 2007 through March 2009. He collected and recorded many specimens of *D. gilippus* from those trips, primarily in the months of November through March. A few were also seen or collected in other months as well, especially after sufficient rains had fallen, but the heaviest flights appear to be in the fall and winter.

Knowles found them at three different locations: at the airport, near Matthewtown; near the Morton Salt processing facility pump station; and at the Flamingo Nest area (an old, abandoned and now torn down restaurant) just south of Matthewtown near the Salinas. The host plant *Cynachum angustifolium* was evident at all three locations, and there were large stands of it available. Oviposition was observed on several occasions, but no early stages were collected or reared.

When Knowles collected on November 7-14 of 2007, at both Matthewtown locations, he collected some typical, dark *berenice*, but also several very light orange specimens which were actually *D. g. cleothera*. In January 2008, *D. gilippus* was widespread and numerous, many of the specimens flying were *berenice*, but a majority were now *cleothera*. By mid-February through March 2008 several mated pairs of *gilippus* were observed with dark *berenice* mating with light colored *cleothera*.

Between mid-January through mid-February 2008 the junior author collected several intermediate specimens of *D. gilippus*. These are likely hybrids, resulting from the earlier pairings of the two subspecies. By April and into May 2008 very few, if any, *gilippus* were seen.

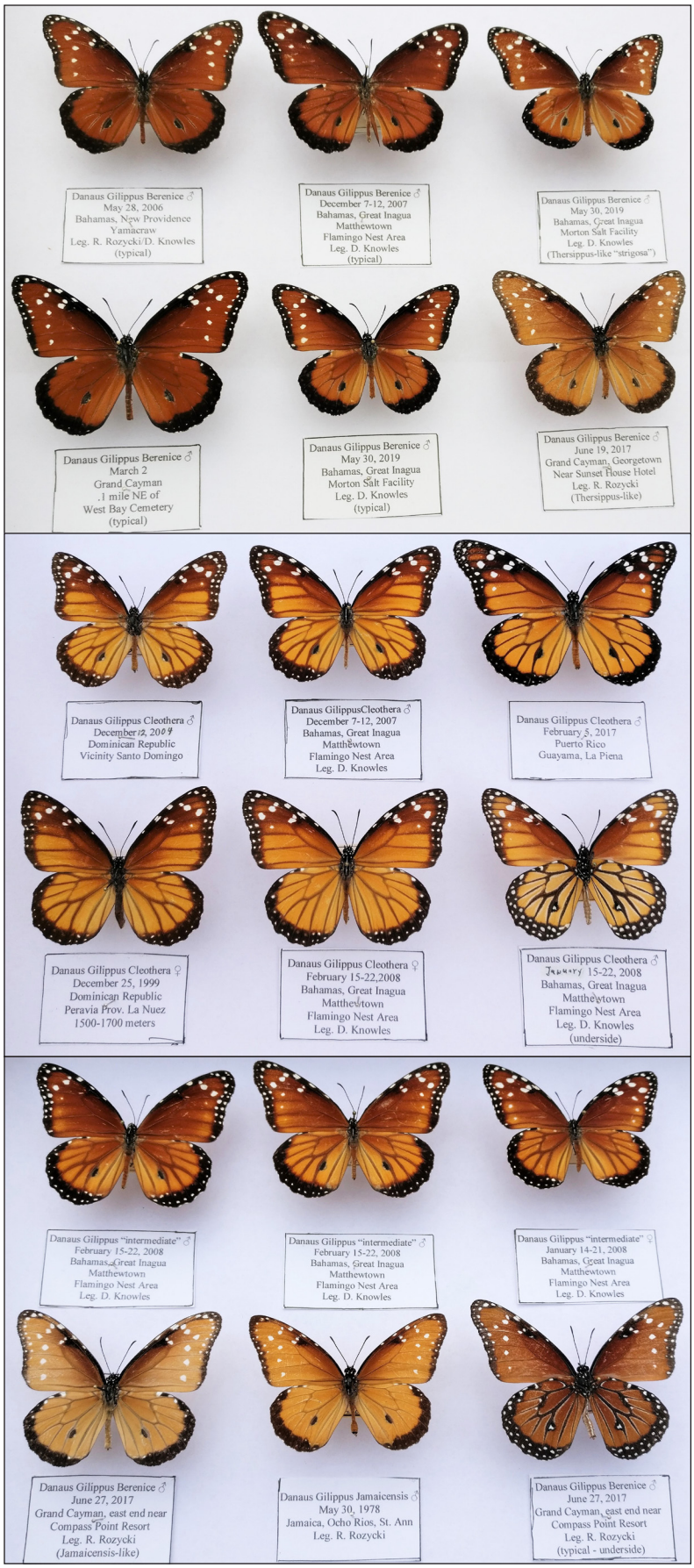
On a few occasions *gilippus* were extremely common. In February 2009 at the Flamingo Nest site, *D. g. cleothera* was there by the hundreds, flying along with *D. plexippus*. Again in March 2009 *cleothera* were literally swarming near the airport at Matthewtown.

The latest trip to Great Inagua, over 10 years later was in May/June 2019. *D. g. berenice* was seen at the Flamingo Nest site and also very commonly near the Morton Salt facility. No *D. g. cleothera* were seen at this time. Most of the specimens observed were slightly paler and variable, but referable to *berenice*. Some specimens were of the form "strigosa" where the hw veins on the upperside between the disc and the black border are narrowly edged with greyish white. This lends credence to the fact the *D. g. cleothera* may have been only a temporary occurrence.

Several specimens of *D. g. berenice* are illustrated to show range of variation. *D. g. cleothera* is also illustrated along with some intermediate specimens.

ACKNOWLEDGEMENTS

We thank the Department of Agriculture, and local government of the Bahamas for providing collecting permits. We thank Dr. John Rawlins and his collection assistant, Vanessa Verdecia from the Carnegie Museum in Pittsburgh, Pennsylvania. They kindly sent photos of specimens needed for this study and answered necessary questions. The senior author would like to thank Jane Haakonsson from the Department of Environment, Grand Cayman Island, for the issuance of collecting permits in June 2017. I would also like to thank the staff for hospitality shown to us while there. We thank Dr. Jacqueline Miller (McGuire Center, Gainesville) for reviewing the manuscript and providing valuable suggestions, and also her encouragement on the study of butterflies of the Caribbean region. Finally, I would like to thank my



Danaus gilippus from the Bahamas. Top: *D. g. berenice*; Middle: *D. g. cleothera* from Great Inagua Island; bottom: intermediates between *berenice* and *cleothera*.

wife, Patricia Rozycki. Without her help and constant encouragement, none of this would be possible.

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Metamorphosis

James M. Taylor, member from Savanna, GA, died from pancreatic cancer on June 18, 2019.

Editor's note: I knew Jim quite well, and enjoyed his enthusiasm for the butterfly and moth world. He participated frequently in meetings of both the Southern Lepidopterists' Society and the Society of Kentucky Lepidopterists. He and his lovely wife Pauline were fixtures at celebratory meals after the meetings, and the two of them even hosted my wife and me at their house not long after we were married. I will miss him.

Pterophoridae recorded on Block Island (Rhode Island, USA), 2018-2019

Aaron Hunt[1] and Deborah L. Matthews[2]

[1]100 Suffolk Road, Newton, MA 02467 **blockislander1@gmail.com**
[2]McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, P.O. Box 112710, Gainesville, FL 32611-2710 **dlott@flmnh.ufl.edu**

Introduction

Plume moths are small to medium-sized slender bodied moths with wings divided into fringed lobes resembling feathers or "plumes". These moths are easily recognized in the field by their characteristic T-shaped resting posture. There are about 166 species in the Nearctic Region. As part of an ongoing survey of the moths of Block Island, a systematic effort was made in 2019 to document this moth family on the island.

The current moth survey of Block Island aims to produce a species checklist as well as detailed data on the phenology, abundance, and local distribution of each species. Regular black lighting at sites throughout the island and nightly surveying at the Hunt property in the summers of 2018 and 2019, with records kept of all individual moths sighted (with sight identifications in some cases only to genus), has generated over 20,000 data points.

Block Island is a small (25 km^2) island about 15.1 km south of the coast of mainland Rhode Island and 22.5 km northeast of Montauk Point on Long Island, New York. Much of the island is agricultural fields, brushland and forest, with bayberry (*Myrica pensylvanica* Mirbel) and black cherry (*Prunus serotina* Ehrh.) the dominant floral components of the latter two habitats.

Methods

In 2019, 218 plume moths were collected on Block Island as part of an ongoing survey of the island's moth fauna. This family was not a significant target of collecting efforts in prior years, though 10 specimens collected in 2018 were also identified. 156 of the plume moths collected in 2019 were taken during nightly moth surveys at fixed MV lights at the home of Aaron Hunt (41.1950°, -71.5652°), 56 at a number of locations using a black light and sheet (some found flying or resting well away from sheets), and six by Nigel Grindley at his fixed MV lights (41.1615°, -71.6050°). No attempts were made to search for larvae or collect in the daytime.

Most superficially similar tan or white *Hellinsia* individuals encountered in the 2019 survey at the Hunt home lights and at black lights were collected; due to time constraints, a small portion were not collected as vouchers and therefore were not identified. Similarly, all unrecognized specimens and those requiring dissection for identification were collected, with the exception of a small number that escaped capture. All recognized specimens not collected were recorded as well. Surveys at the Hunt property were conducted on 80 nights in 2019, mostly from early June to mid-August; 27 nights of black lighting at locations around the island were conducted as well.

External examination of genitalia was helpful in confirming identifications in males. In cases where dissection was necessary for identification of males or females, abdomens were removed and macerated in heated 10% KOH. After cleaning and light staining with chlorozol black, abdomens were either placed in small glycerin vials on the same pin with the adult or slide mounted in Euparal as numbered dissections. Label data for all specimens includes: "Rhode Island, Washington Co., Block Island" along with GPS coordinates, collection date, collector(s), and UV vs. MV lights. GPS coordinates are indicated below in "specimens examined" sections and ordered by collecting site coordinates, date, specimen number, and repository. All specimens were collected by Aaron Hunt except where indicated. Wing expanse ranges in diagnoses are reported for Block Island material only. Specimens are deposited in the McGuire Center for Lepidoptera, Florida Museum of Natural History, Gainesville, Florida [**MGCL**], Cornell University Insect Collection, Ithaca, New York [**CUIC**], and the National Museum of Natural History, Washington, D.C. [**USNM**]. Image vouchers are available on BugGuide.net. Color terminology mentioned in diagnoses is adapted from Ridgway (1912).

Results

Along with image vouchers, 228 specimens were collected in 2018-19. Fourteen species of Pterophoridae were recorded and are listed below with comments on phenology and known hostplants present on the island. Previously known larval hostplants for each species reported below are derived from Matthews and Lott (2005). Occurrence of host plants on the island is based on the flora listed by Patton et al. (2002).

Systematic recording of specimens not collected each night in 2019 allowed for estimation of the local phenology of the commoner species (Fig. 1). By far the most abundant species at the Hunt property and likely across the entire island is *Hellinsia glenni* (Cashatt), a borer in goldenrod

(*Solidago* L.) with a peak flight time locally in late June and early July.

Platyptilia carduidactylus (Riley)

Diagnosis – Wing expanse 18–20 mm. Forewing light brown to drab with dark brown and white markings; a characteristic dark brown or fuscous triangle extends from costa to cleft base. Both forewing lobes with a narrow white subapical stripe. Hindwing drab with triangular fuscous scale tooth in fringes near middle of third lobe anal margin.

Specimens Examined – (1 ♂) 41.1950°, -71.5652°, 12.vii.2019, PTERO1759 [MGCL]; (1 ♂) same location, 18.vii.2018, PTERO1761 [MGCL]; (1 ♂) 19.vii.2019, PTERO1760 [MGCL].

Comments – Larvae infest artichokes (*Cynara scolymus* L.) in California and feed in the heads, shoots, and stems of various other thistle species, especially *Cirsium* L. Five species of *Cirsium* occur on Block Island including *C. arvense* (L.) Scop., *C. discolor* (Muhl.) Spreng., and *C. vulgare* (Savi) Tenore, all of which have been recorded as hosts in other parts of the range. Block Island specimens were collected in July. Multiple broods or flights are known in other parts of the species range.

Distribution – This species occurs across the USA and Canada and extends to a limited extent into Mexico. The distribution of natural populations is not entirely clear as specimens are often encountered in artichokes at grocery markets.

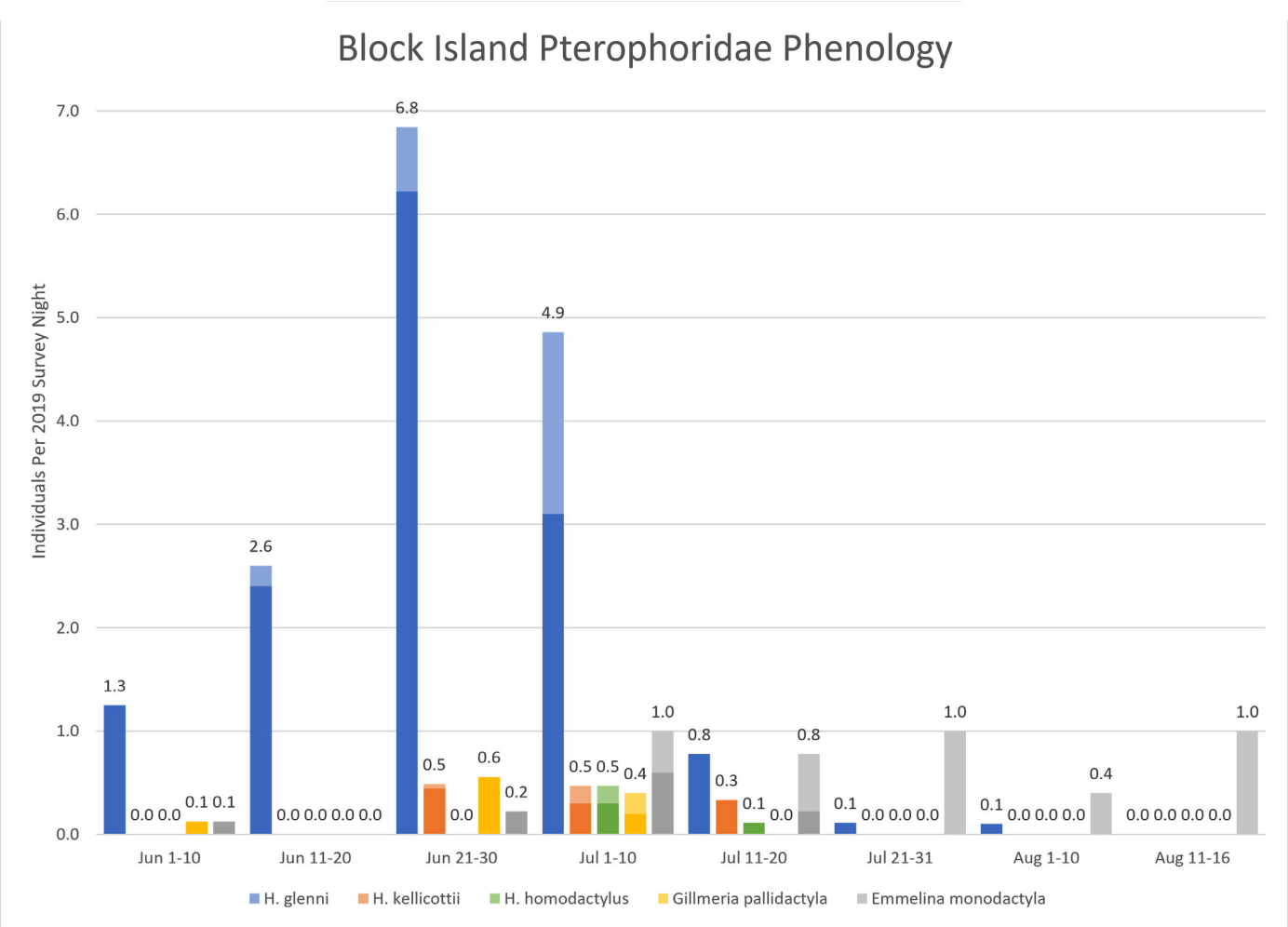


Figure 1. Comprehensive observation data, sorted by 1/3 month periods, for five species during nightly observations at the Hunt property 1 June to 16 August 2019. These species together accounted for 208 of 214 plume moths observed at the site over this period. The abundance of each species is expressed in individuals per night of surveying in each 1/3 month period. For each species, numbers of collected voucher specimens are represented in a darker shade, and individuals not collected in a lighter shade. The 28 *Hellinsia* not collected (all between 20 June and 7 July, inclusive) were left at random and not based on superficial appearance; therefore, they are assumed in the analysis to have been composed of the three similar collected species in the same proportions as the collected specimens were. The specimens not collected in each 1/3 month period were therefore apportioned in the graph to each of those three recorded species according to its representation among the specimens collected over that period. (Note that the earliest record on Block Island of *H. balanotes* is 15 July 2018.)

Gillmeria pallidactyla (Haworth)

Diagnosis – Wing expanse 18–25 mm. Head with distinctive conical frontal tuft. Forewing mottled, lobes light buff or cream buff, grading distally to drab or buffy brown, subapical narrow pale line sometimes distinguishable, especially on first lobe; discal area drab to buffy brown with elongate buff area near middle. Hindwing uniform drab to buffy brown, some dark brown scales sometimes present within hindwing third lobe anal fringe near middle but not forming a distinct scale tooth as in *P. carduidactylus*. Pale or worn specimens with forewing appearing mostly light buff except drab near cleft base.

Specimens Examined – (1 ♂) 41.1654°, -71.5884°, 1.vii.2019, PTERO1813 [CUIC]; (1 ♂) 41.1683°, -71.5852°, 22.vi.2019, PTERO1805, [MGCL]; (1 ♂) 41.1950°, -71.5652°, 6.vi.2019, PTERO1811 [MGCL]; (1 ♂) same location, 9.vi.2019, PTERO1803 [USNM]; (1 ♂) 21.vi.2019, PTERO1810 [MGCL]; (1 ♂) 23.vi.2019, PTERO1806 [MGCL], (1 ♂) 24.vi.2019, PTERO1808 [MGCL]; (1 ♂) 26.vi.2019, PTERO1812 [MGCL]; (1 ♂) 27.vi.2019, PTERO1804 [MGCL]; (1 ♀) 2.vii.2019, PTERO1809 [MGCL]; (1 ♂) 41.2062°, -71.5583°, 17.vi.2019, PTERO1807 [MGCL].

Comments – Larvae overwinter within rootstocks of *Achillea millefolium* L. and feed within shoots, leaf axils, or incipient inflorescence clusters in the spring. Adults on Block Island were collected early June through the first week of July.

Distribution – This Holarctic species occurs across Canada and most of the northern half of the USA and further south in higher elevations where the hostplant grows.

Stenoptilia pallistriga Barnes & McDunnough

Diagnosis – Wing expanse 18.5 mm. Forewing pale brown with scattered white and fuscous scales, fuscous minute discal spot, fuscous double spot at cleft base, and fuscous spatulate scales within fringes of first and second lobe termen. Distinguished from other *Stenoptilia* by a pale oblique dash on the first lobe. Hindwing pale brown with a small subapical tuft of fuscous scales on first lobe.

Specimens Examined – (1 ♂) 41.1681°, -71.5859°, 8.vi.2019, PTERO1780 [MGCL], abdomen missing.

Comments – Life history unknown. Based on hostplants used by congeners (Matthews and Lott 2005), plants of the families Gentianaceae, Plantaginaceae, and Lamiaceae should be checked on Block Island. This is the northernmost USA record. There is, however, a specimen from Ontario, Canada in the Canadian National Collection. The Block Island specimen was collected in June. The species occurs in all months of the year in the southern USA.

Distribution – USA: AL, AR, FL, LA, MS, TX, RI, VA. CANADA: Ontario. Recorded in the neotropics from Dominica, Ecuador, Jamaica, Paraguay, and Surinam (Gielis 2003, 2006).

Lioptilodes albistriolatus (Walsingham)

Diagnosis – Wing expanse 13 mm. Forewing drab-gray with fuscous discal spot and double spot at cleft base. A white dash along costa on first lobe adjacent to fuscous basal area. Discal cell pleated along middle. Hindwing uniform drab.

Specimens Examined – (1 ♂) 41.1950°, -71.5652°, 21.ix.2019, PTERO1818 [MGCL].

Comments – Larvae feed in the flower heads of various Asteraceae. Previously recorded hostplant genera which occur on Block Island are *Symphyotrichum* Nees, (formerly *Aster* L.), *Baccharis* L., *Conyza* Less., *Erigeron* L., and *Solidago* L.

Distribution – This species occurs throughout the Neotropical and Nearctic Regions. Adults are found in all months in the southern USA and are most frequently encountered in association with fall composite flowering times. The Block Island specimen is a northern record for this species.

Geina periscelidactylus (Fitch)

Diagnosis – Wing expanse 17–19 mm. Forewing clay color to ochraceous-tawny, banded on lobes, each with a narrow white subapical line, a broad cinnamon-brown band covering middle third, and a narrow white band basad; a short cinnamon brown to fuscous line at discal cell end near cleft base. Hindwing cinnamon-brown to russet except third lobe with middle third white, distal third russet with tuft of fuscous scales mixed in fringes. Legs banded cinnamon-brown and white. A similar species, *G. sheppardi*, though not yet recorded, may also occur on the island. The latter may be distinguished by its darker ground color and characters of the male and female genitalia.

Specimens Examined – (3 ♂) 41.2080°, -71.5607°, 5.vii.2019, PTERO1781, 1784 [MGCL], PTERO1782 [USNM]; (1 ♂) 41.1950°, -71.5652°, 6 .vii.2019, PTERO1783 [CUIC].

Comments – Larvae feed on grape leaves. Two species of *Vitis* L. occur on Block Island, one of these, *V. labrusca* L. is a previously recorded host for *G. periscelidactylus*. Adults on Block Island were collected in early July.

Distribution – This species occurs in the eastern part of the USA and Canada, extending west into Manitoba and eastern Texas and south into Georgia but not reaching Florida.

Geina buscki (McDunnough)

Diagnosis – Wing expanse 16 mm. Forewing garnet brown to russet with a slight metallic cast. Lobes with variably expressed white oblique lines at one and two thirds from

apex. Hindwing brown to russet except middle third of anal lobe white, distal third with distinct scale tooth comprised of fuscous spatulate scales mixed with fringes on both margins. Distinguished from *G. periscelidactylus* and *G. sheppardi* in having distinct lateral patches of white scales on metathorax. *Geina buscki* and *G. tenuidactylus* are distinguishable only by genitalia. Males can be identified without dissection by brushing away scales to examine the shape of the valvae tips. In *G. buscki* these are asymmetrical with one valve tip crossing over the other whereas the valvae tips are symmetrical and not crossed in *G. tenuidactylus*. Females have only slight differences in the shape of the antrum and are very difficult to identify.

Specimens Examined – (1 ♂) 41.1662°, -71.5880°, 1.vii.2019, PTERO1779 [MGCL].

Comments – Larvae of both *G. buscki* and *G. tenuidactylus* are reported to feed on *Rubus* L. (Rosaceae). The one specimen examined from Block Island is indeed *G. buscki*. There are however, several image vouchers which cannot be determined as one or the other since it is likely that *G. tenuidactylus* also occurs on the island. Six species of *Rubus* occur on Block Island, of these, *R. allegheniensis* T.C. Porter is a previously known host for *G. tenuidactylus*.

Distribution – The distribution of this species is poorly known since many published records may refer to either *G. buscki* or *G. tenuidactylus*. The two spcies do occur together in some areas.

Dejongia lobidactylus (Fitch)

Diagnosis – Distinguished from other species on Block Island by the narrow banded forewing lobes without a distinct termen and characteristic striping pattern on the abdomen. Forewing ground color ochraceous-tawny to chestnut-brown. Chestnut-brown to fuscous bands at middle third of first lobe bordered by white. Hindwing chestnut-brown, with fuscous scale tooth on distal third of third lobe anal margin, flanked by small patch of white fringe scales.

Specimens Examined – None.

Image vouchers – Block Island, 15.vii.2019, by Nigel Grindley, (https://bugguide.net/node/view/1697541).

Comments – Larvae feed externally on shoots and new leaves of *Solidago* L. Ten species occur on Block Island, including the previously recorded host species *S. rugosa* Mill. and *S. canadensis* L.

Distribution – This species ranges across the southern half of Canada as far west as Alberta and across the northeastern USA to Montana and south as far as New Jersey. The distribution in the west may overlap with *Dejongia californicus* (Walsingham), though the two species are widely separated in the eastern USA where *D. californicus* is restricted to the south.

Hellinsia inquinatus (Zeller)

Diagnosis – Wing expanse 17 mm. Forewing mottled gray with two dark gray dashes along the costa and diffuse gray spots at cleft base and middle of discal cell. Hindwings uniformly drab. Distinguished from *Adaina ambrosiae* (Murtfeldt) by the more diffuse markings, absence of cream-buff scales on the forewing, and paired, as opposed to single middorsal dark spots on the abdomen.

Specimens Examined – (1 ♂) 41.1950°, -71.5652°, 28.vi.2019, PTERO1757 [MGCL]; (1 ♀) same location, 17.viii.2018, PTERO1758 [MGCL].

Comments – Larvae feed externally on shoots of *Ambrosia artemisiifolia* L.

Distribution – This species is widespread across the USA and southern Canada.

Hellinsia homodactylus (Walker)

Diagnosis – Wing expanse 21–23 mm. Forewing pure white with a diffuse gray spot basad of cleft and scattered gray scales along costa and first lobe. Some, especially worn specimens, completely white. Hindwing uniform white to pale gray. The species is very similar to *Hellinsia elliottii* which although not yet found on Block Island, may occur there. The two species can only be separated by genitalia dissection. Males differ in the curvature of the saccular process of the left valve and females by the shape of the antrum.

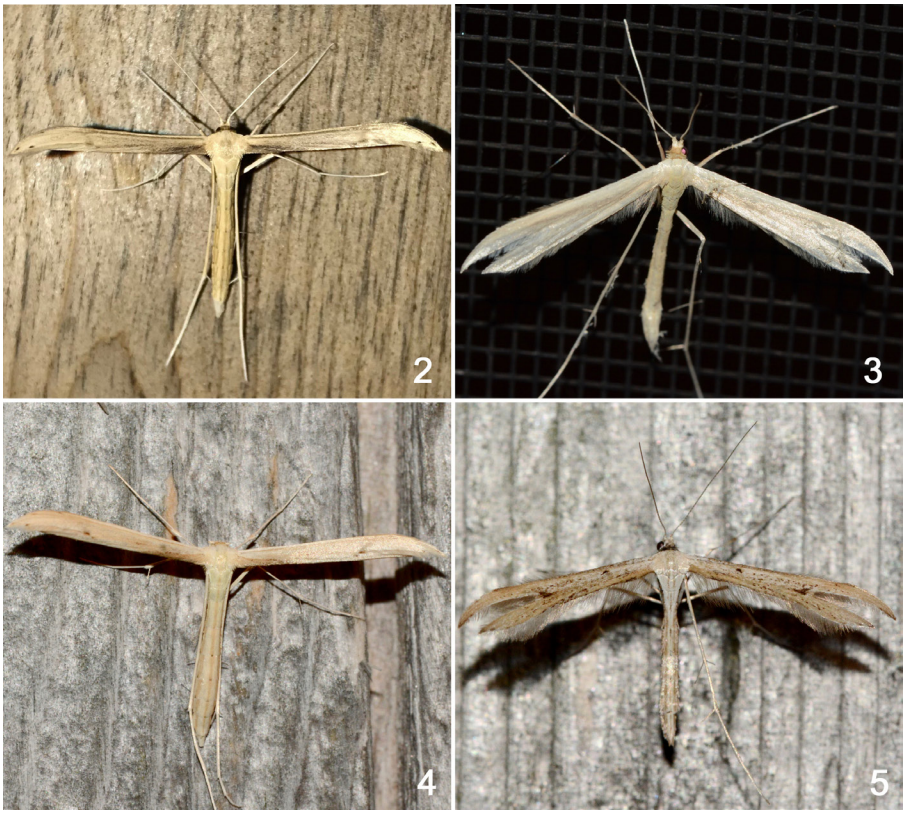
Specimens Examined – (1 adult, abdomen missing) 41.1950°, -71.5652°, 2.vii.2019, PTERO1815 [MGCL]; same location, (1 ♀) 8.vii.2019, PTERO1816 [CUIC]; (1 ♀) 9.vii.2019, PTERO1817 [MGCL]; (1 ♀) 17.vii.2019, PTERO1814 [MGCL].

Comments – Larvae feed externally on shoots and young leaves of *Solidago*, including *S. canadensis* and *S. rugosa*.

Distribution – This species occurs across Canada and in the northeastern USA it extends west to Minnesota and south as far as northern Georgia. Additional records in the western USA need verification.

Hellinsia balanotes (Meyrick) (Fig. 2)

Diagnosis – Wing expanse 27–38 mm. Ground color cream-buff to deep olive-buff with vein terminals and cleft base of forewing marked by one or more fuscous scales and a diffuse median line of fuscous scales along basal third of wing. Best distinguished from similar species, *H. kellicottii* (Fish) and *H. glenni* (Cashatt) by male and female genitalia characters described and illustrated by Cashatt (1972). These include the saccular process of the left valve in males and the shape of the anterior margin of the 8th tergite in females. In males, the saccular process of both *H. kellicottii* and *H. balanotes* is filamentous and terminates



Figures 2–5. Some examples of Pterophoridae collected on Block Island. **2)** *Hellinsia balanotes* male, 11.viii.2019, PTERO1753. **3)** *H. glenni* male, 15.viii.2019, PTERO1838. This worn specimen lacks forewing markings and exemplifies the necessity of genitalia characters for identifications. **4)** *H. glenni*, female, 15.vii.2019, PTERO1912. Note striking similarity to *H. balanotes* above, with only slightly paler markings. **5)** *Emmelina monodactyla*, female, 1.vii.2019, PTERO1793.

in a finely drawn point, usually extending beyond the tip of the valve in *H. balanotes*.

Specimens Examined – (1 ♂) 41.1950°, -71.5652°, 15.vii.2018, PTERO1747 [MGCL]; (1 ♂) same location, 4.viii.2019, PTERO1748 [CUIC]; (1 ♂, prep. DM 2333) 11.viii.2018, PTERO1753 [MGCL]; (2 ♀) 41.2018°, -71.5775°, 24.vii.2019, PTERO1752, 1754 [MGCL]; (1 ♂) 41.2020°, -71.5778°, 21.ix.2019, PTERO1755 [MGCL]; (2 ♂) 41.2020°, -71.5778°, 21.ix.2019, A.S. Hunt, N.D.F. Grindley PTERO1751, 1755 [MGCL]; (2 ♂) 41.2021°, -71.5786°, 21.ix.2019, A.S. Hunt, N.D.F. Grindley, PTERO1749, 1756, [MGCL], (2 ♀) same data, PTERO1746, 1750 [MGCL].

Comments – The wing expanse reported by Cashatt 31–42 mm. While most specimens fall within this range, one small female was determined on the basis of the rounded 8th tergite anterior margin. Wing expanses overlap for all three *Hellinsia* stem borers on Block Island. Larvae are stem borers in *Baccharis halimifolia* L. Adults were collected July through September.

Distribution – This species has an Atlantic and Gulf Coastal Plain distribution associated with *B. halimifolia* and *B. angustifolia* Michx. as well as a spotty distribution in the southwest corresponding to that of two other *Baccharis* species. The Block Island specimens appear to be the northernmost records for the species, though the hostplant does occur further north in Massachusetts (USDA, NRCS 2006).

Hellinsia kellicottii (Fish)

Diagnosis – Wing expanse 22–28 mm. Color and maculation similar to *H. balanotes* except somewhat paler, median line of fuscous scales at basal third of forewing lacking, and specimens generally less robust. Characters of the male and female genitalia, as noted above, are the most reliable means of identification.

Specimens Examined – (2 ♂) 41.1950°, -71.5652°, 22.vi.2019, PTERO1770, 1772 [MGCL]; (1 ♂) 41.1950°, -71.5652°, 26.vi.2019, PTERO1771 [MGCL]; (1 ♂, prep. DM 2334) same location, 28.vi.2019, PTERO1765 [MGCL]; (1 ♀) 2.vii.2019, PTERO1763 [MGCL]; (1 ♂) 6.vii.2019, PTERO1766 [MGCL]; (1 ♂) 8.vii.2019, PTERO1769 [MGCL]; (1 ♂) 12.vii.2019, PTERO1768 [MGCL]; (1 ♂, prep. DM 2332) 13.vii.2019, PTERO1762 [MGCL]; (1 ♂) 17.vii.2019, PTERO1764 [MGCL]; (1 ♂, prep. DM 2335) 41.2021°, -71.5786°, 21.ix.2019, PTERO1767 [MGCL].

Comments – Larvae are stem borers of *Solidago*, including *S. canadensis*. Adults were collected from June to September. Cashatt (1972) reported a broader wing expanse range of 20–28 mm.

Distribution – This species has been recorded across the southern part of Canada and throughout most of the eastern USA as far west as Colorado. The species likely has a much broader distribution corresponding to that of the host which occurs throughout most of the USA and Canada.

Hellinsia glenni (Cashatt) (Fig. 3, 4)

Diagnosis – Wing expanse 18–31 mm. Similar to *H. balanotes* and *H. kellicottii* with minute forewing markings at cleft base and vein terminals on both lobes. Males are identified by looking for the swollen or flattened tip of the left valve saccular process terminating in a minute hook (see Cashatt 1972). This character can usually be found without dissecting. Females require dissection and light staining and are recognized by the double layered cuticular band across the anterior margin of the 8th tergite (Cashatt 1972).

Specimens Examined – (3 ♂) 41.1496°, -71.5883°, 28.vi.2019, PTERO1893, 1931, 1962 [MGCL]; (1 ♀) same

data, PTERO1905 [MGCL]; (1 ♂) 41.150°, -71.588°, 28.vi.2019, PTERO1850 [MGCL]; (1 ♂) 41.1615°, -71.6050°, 15.vii.2019, N.D.F. Grindley, PTERO1838 [USNM]; (1 ♀) same data, PTERO1912 [MGCL]; (1 ♂) same location, 17.vi.2019, N.D.F. Grindley, PTERO1972 [MGCL]; (1 ♂) 41.166°, -71.588°, 1.vii.2019, PTERO1852 [CUIC]; (1 ♂) same data, PTERO1854 [MGCL]; (1 ♂) 41.1662°, -71.5880°, 1.vii.2019, PTERO1851 [MGCL]; (1 ♀) 41.1669°, -71.5728°, 27.vi.2019, PTERO1907 [MGCL]; (1 ♂) 41.1681°, -71.5859°, 9.vii.2019, PTERO1916 [MGCL]; (1 ♂) 41.1682°, -71.5859°, 22.vi.2019, PTERO1849 [MGCL]; (1 ♂) 41.1683°, -71.5852°, 8.vi.2019, PTERO1876 [MGCL]; (2 ♀) same data, PTERO1823, 1904 [MGCL]; (2 ♂) same location, 22.vi.2019, PTERO1939 [USNM], PTERO1947 [MGCL]; (1 ♀) 41.1950°, -71.5652°, 3.vii.2018, PTERO1911 [MGCL]; (2 ♂) same location 3.vi.2019, PTERO1965 [CUIC], PTERO1966 [MGCL]; (1 ♂) 7.vi.2019, PTERO1967 [USNM]; (6 ♂) 9.vi.2019, PTERO1970, 1971 [CUIC], PTERO1833, 1834, 1968 [MGCL], PTERO1836 [USNM]; (1 ♀) same data, PTERO1902 [MGCL]; (1 ♂) 12.vi.2019, PTERO1837 [USNM]; (11 ♂) 17.vi.2019, PTERO1889, 1954 [CUIC], PTERO1826, 1832, 1835, 1894, 1895, 1897, 1973 [MGCL], PTERO1890, 1969 [USNM]; (3 ♂) 21.vi.2019, PTERO1891, 1896, 1898 [MGCL]; (3 ♂) 22.vi.2019, PTERO1892, 1899, 1901 [MGCL]; (6 ♂) 23.vi.2019, PTERO1951, 1952, 1955, 1964 [MGCL], PTERO1843, 1845 [USNM]; (8 ♂) 24.vi.2019, PTERO1831, 1839–1842, 1880, 1920 [MGCL], PTERO1870 [USNM]; (1 ♀) same data, PTERO1829 [MGCL]; (9 ♂) 26.vi.2019, PTERO1867, 1938, 1940, 1942, 1944, 1945, 1948, 1950 [MGCL], PTERO1874 [USNM]; (5 ♂) 27.vi.2019, PTERO1941 [CUIC], PTERO1943, 1946, 1949 [MGCL], PTERO1930 [USNM]; (3 ♂) 28.vi.2019, PTERO1888, 1960 [MGCL], PTERO1929 [USNM]; (2 ♀) same data, PTERO1830, 1906 [MGCL]; (5 ♂) 29.vi.2019, PTERO1963 [CUIC], PTERO1819, 1958, 1959 [MGCL], PTERO1961 [USNM]; (9 ♂) 30.vi.2019, PTERO1853, 1855–1861, 1864 [MGCL]; (2 ♀) PTERO1828, 1910 [MGCL]; (2 ♂) 1.vii.2019, PTERO1956, 1868 [MGCL]; (1 ♀) same data, PTERO1822 [MGCL]; (4 ♂) 2.vii.2019, PTERO1866 [CUIC], PTERO1933, 1935, 1936 [MGCL]; (1 ♀) same data, PTERO1825 [MGCL]; (6 ♂) same location, 3.vii.2019, PTERO1869, 1932 [CUIC], PTERO1882, 1932, 1934, 1937, 1957 [MGCL]; (2 ♀) same data, PTERO1827, 1903 [MGCL]; (3 ♂) same location, 4.vii.2019, PTERO1883 [CUIC], PTERO1928, 1953 [MGCL]; (2 ♂) 6.vii.2019, PTERO1900, 1924 [MGCL]; (3 ♂) 7.vii.2019, PTERO1926 [CUIC], PTERO1923, 1925 [MGCL]; (4 ♂) 8.vii.2019, PTERO1878, 1881 [CUIC], PTERO1879, 1922 [USNM]; (1 ♂) 9.vii.2019, PTERO1913 [MGCL]; (2 ♂) 10.vii.2019, PTERO1915, 1918 [MGCL]; (2 ♂) 11.vii.2019, PTERO1846 [CUIC], PTERO1917 [USNM]; (♂) 12.vii.2019, PTERO1914 [MGCL]; (1 ♂) 13.vii.2019, PTERO1919 [MGCL]; (2 ♂) 14.vii.2019, PTERO1847 [MGCL], PTERO1844 [USNM]; (1 ♂) 16.vii.2019, PTERO1862 [MGCL]; (1 ♀) 27.vii.2019, PTERO1909 [MGCL]; (1 ♂) 1.viii.2019, PTERO1865 [MGCL]; (1 ♂) 41.2018°, -71.5775°, 24.vii.2019, PTERO1863 [CUIC]; (2 ♂) 41.2062°, -71.5583°, 17.vi.2019, PTERO1875 [CUIC], PTERO1871 [MGCL]; (1 ♀) same data, PTERO1821 [MGCL]; (2 ♂) 41.207°, -71.599°, 17.vi.2019, PTERO1877 [CUIC], PTERO1872 [MGCL]; (1 ♂) 41.207°, -71.560°, 17.vi.2019, PTERO1873 [MGCL], (1 ♂) 41.208°, -71.561°, 17.vi.2019, PTERO1927 [MGCL]; (1 ♂) 41.2080°, -71.5607°, 5.vii.2019, PTERO1921 [MGCL]; (1 ♀) 41.2085°, -71.5620°, 31.vii.2018, PTERO1824 [MGCL]; (2 ♀) 41.2156°, -71.5603°, 14.vii.2018, PTERO1820, 1908 [MGCL]; (4 ♂) 41.223°, -71.563°, 9.vi.2019, PTERO1885–1887 [MGCL], PTERO1884 [USNM]; (1 ♂) 41.226°, -71.572°, 7.vi.2019, PTERO1848 [CUIC].

Comments – The large sample size of this species gives us some insight into size variation. As noted above, wing expanse of Block Island specimens ranged from 18–31 mm, with several smaller specimens present. Cashatt (1972) reported 24–34 mm in his original description based on 51 specimens. While insular dwarfism has been noted in the case of segregate populations of *Dejongia californicus* (Walsingham) in the Bahamas (Matthews et al. 2019), this is likely not the case with *H. glenni*. *Hellinsia* stem borers can have a variable number of instars as found in *H. balanotes* by McFadyen (1972), allowing the compensatory response of fewer instars and hence different sized adults when suitable food quality and quantity are limited. Larvae are stem borers in *Solidago*, including *S. canadensis*, and *Symphyotrichum* (*Aster*).

Distribution – In Canada, the species has been recorded in Quebec and Ontario. In the USA, it is common throughout the eastern part of the country, rare as far south as Florida, and extends into eastern Texas. In the west, it has been recorded from California, Washington, and Montana.

Emmelina monodactyla (Linnaeus) (Fig. 5)

Diagnosis – Wing expanse 21–25 mm. Forewing ground color variable shades of drab and gray; buff and reddish forms also present, especially in the western USA. Generally recognized by the elongate wing shape with curved first lobe extending beyond second lobe, small oblique mark at cleft base, and a distinct minute discal spot.

Specimens Examined – (1 ♀) 41.1615°, -71.6050°, 15.vii.2019, N.D.F. Grindley, PTERO1793 [MGCL]; same location, (1 ♂) 12.viii.2019, N.D.F. Grindley, PTERO1791 [USNM]; (1 ♀) 3.ix.2019, N.D.F. Grindley, PTERO1788 [MGCL]; (1 ♂) 41.1670°, -71.5730°, 27.vi.2019, PTERO1794 [MGCL]; (1 ♀) 41.1950°, -71.5652°, 2.vi.2019, PTERO1789 [MGCL]; (1 ♂) same location, 7.vi.2019, PTERO1802 [MGCL]; (1 ♀) 24.vi.2019, PTERO1790 [CUIC]; (1 ♀) 1.vii.2019, PTERO1792 [MGCL]; (1 adult, no abdomen) 2.vii.2019, PTERO1795 [MGCL]; (1 ♀) 3.vii.2019, PTERO1796 [USNM]; (1 ♂) 8.vii.2019, PTERO1785 [MGCL]; (1 ♀) 8.vii.2019, PTERO1786 [MGCL]; (1 ♀) 9.vii.2019, PTERO1787 [MGCL]; (1 ♀) 16.vii.2018, PTERO1801 [CUIC]; (2 ♀) 17.vii.2019, PTERO1797, 1798 [MGCL]; (1 ♀) 4.viii.2018, PTERO1800 [MGCL]; (1 ♀) 41.2080°, -71.5607°, 26.vii.2019, A.S. Hunt, N.D.F. Grindley, PTERO1799 [CUIC].

Comments – Larvae feed on various species of Convolvulaceae and are most commonly associated with hedge-bindweed, *Calystegia sepium* (L.) R. Br. in the Nearctic Region.

Distribution – This widespread and common species has been recorded within the Nearctic, Palearctic, Neotropical, Ethiopian, and Oriental faunal regions.

Adaina ambrosiae (Murtfeldt)

Diagnosis – Wing expanse 16–18 mm. Forewing mottled gray consisting of scattered fuscous, drab, and white scales. Two fuscous to black costal dashes on first lobe usually darker than in *H. inquinatus* and more widely spaced. Best distinguished from *H. inquinatus* by markings on the abdomen: small middorsal fuscous spots along segments A2-A6 joined as single spots on midline as opposed to separate paired spots on *H. inquinatus*, and *A. ambrosiae* with fuscous lateral patches on abdominal segments A4 and A5. Hindwing uniform drab.

Specimens Examined–(1♂) 41.212°, -71.573°, 6.vi.2019, A.S. Hunt, N.D.F. Grindley, PTERO1774 [USNM]; same data (2 adults, abdomens missing) PTERO1775, 1778 [MGCL]; (1 ♂) PTERO1777 [MGCL]; (1 ♂) PTERO1776 [CUIC].

Comments – Larval hostplants which occur on the island are *Ambrosia artemisiifolia* L., and *Rudbeckia hirta* L.

Distribution – This species is widespread across the USA and the West Indies and has been recorded in Ontario, Canada.

Discussion

Plume moths compose a small but highly visible portion of Block Island's moth diversity. Currently, 1,056 species of moths are known from the island; the 14 species of plume moths documented in this survey comprise about 1.3% of this total. The commonest plume moth species found in this survey, *Hellinsia glenni*, was found at all survey sites visited in 2019 during its peak flight period from mid-June through early July and was among the ten most abundant moth species recorded at the main survey site (the Hunt property) during nightly observations (1 June to 16 August) in summer 2019 (Aaron Hunt, unpublished data).

Block Island's history of clear cutting for agriculture and wood has left it with a paucity of native tree species and a landscape dominated by brushland, cherry woods, and fields. The Hunt property is well removed from any substantial wooded areas and surrounded mostly by brushland dominated by bayberry (*Myrica pensylvanica* Mirbel) and beach rose (*Rosa rugosa* Thunb.), with small grassy areas and dunes comprising the remainder of the local habitat. A patch of goldenrod (*Solidago* L.) and a large *Baccharis halimifolia* L. on the property explain the local abundance of *Hellinsia* borers.

Based on the documented flora of Block Island (Paton et al. 2002), the detection of additional species is anticipated as a broader sampling regime is employed. Among these, as noted above, is *Geina tenuidactylus*, which feeds on *Rubus* and is difficult to distinguish from *G. buscki*. In addition to *Geina periscelidactylus*, two other grape feeders, *G. sheppardi*, and *Sphenarches ontario* (McDunnough) are also likely species to occur there. Likewise, *Oidaematophorus eupatorii* (Fernald) and *Hellinsia elliottii* are also possible, with both feeding on Joe-Pye weeds *Eutrochium* Raf. (= *Eupatorium* L. in part). Though more commonly known from the southeastern USA, *Buckleria parvulus*, the sundew plume moth, should also be searched for based on the occurrence of *Drosera intermedia* Hayne and *D. rotundifolia* L. on the island.

Acknowledgments

We thank Nigel Grindley for his help with black lighting nights and collection of specimens and especially for his photographing many pinned moths to help with later association of identifications with live images. We also thank Charles E. Vandemoer (Project Leader / Refuge Manager for the Rhode Island National Wildlife Refuge Complex, U.S. Fish and Wildlife Service) for permitting use of Block Island National Wildlife Refuge lands, Rob and Kit Rohn for providing access to their property, and Kim Gaffett (TNC-BI) and Scott Comings for their help coordinating land use permitting for the Block Island moth survey and for their encouragement and aid with the project over the last several years. Finally, we thank Terry A. Lott for reviewing the text.

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Preliminary notes on the life history of *Lasippa illigera* (Nymphalidae) from the Philippines

Jade Aster T. Badon[1] and Rhenniel D. Cardano[2]

[1]Biology Department, Silliman University, Dumaguete City, Philippines 6200 &
The Philippine Lepidoptera Butterflies and Moths, Inc. **jadetbadon@su.edu.ph**
[2]San Pascual, Bacon District, Sorsogon City, Philippines **lenniel.cardano@gmail.com**

Additional key words: Philippines, *Lasippa*, Life History

Lasippa illigera (Nymphalidae: Nymphalinae: Limenitidini) is an endemic butterfly of the Philippines. The species was described by Eschscholtz in 1821 as *Neptis illigera* from a type specimen collected from Luzon. There are currently six subspecies distributed in the country (Treadaway & Schroeder 2012), ssp. *illigera* Eschscholtz 1821 occurs in north Luzon and Polillo, ssp. *alabatana* Fruhstorfer 1908 occurs in Alabat, Catanduanes, south Luzon, Marinduque, and Pagbilao Grande, ssp. *calayana* Fruhstorfer 1908 occurs in Babuyanes and Batanes, ssp. *hegesias* Fruhstorfer 1912 occurs in Guimaras, Negros, and Panay, ssp. *pia* Fruhstorfer 1908 occurs in Basilan, and ssp. *sibuyana* Tsukada & Kaneko 1985 occurs in Masbate, Sibuyan, and Ticao. The paper describes some preliminary notes on the life history of *Lasippa illigera* documented from the province of Sorsogon located in south Luzon.

Lasippa illigera

The caterpillar that was documented in Sorsogon was probably on its wandering stage since it crawled on the leg of the junior author, and then it was taken home where it pupated on the *Thottea affinis* plant.

The color of the caterpillar is brown with dark markings on the mid-section and most of the posterior lateral region. It has three distinct pairs of dorsal protrusions; the anterior most pair is longer and with conspicuous spines compared to the other pairs (mid section and posterior end). The characteristics of the caterpillar and pupa are similar to those of the *Neptis* spp. illustrated in the publication of Igarashi and Fukuda (1997).

Habitat: The caterpillar was found in a secondary forest, on a grove of *Canarium ovatum* (Burseraceae). It was found around noon in hot sunny weather. Further studies on its ecology are still needed.

Hostplant: Currently unknown, but according to Robinson *et al.* (2001), this species feeds on *Quisqualis indica* (Combretaceae).

Acknowledgements

The authors would like to thank Linda Alisto of Philippine Lepidoptera Butterflies and Moths, Inc. and Keith Wolfe for their comments on this species.

Lasippa illigera. Top left and above: larva. Left: Lateral and laterodorsal view of pupa. Top right and right: upperside and underside of adult. Images by R.D. Cardano.

(References continued on page 79)

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

Publications

Supplement to Lepidoptera of North America. 14. Geometroidea: Larentiinae: Eupitheciini (Part) (2019) by Clifford D. Ferris.

This supplement was recently published online in Contributions of the C.P. Gillette Museum of Arthropod Diversity at Colorado State University, Fort Collins. Most of the Series is available online as open access downloadable pdfs. Dr. Ferris' contribution is a detailed species by species presentation of the North American fauna of *Eupithecia* together with the related genera *Nasusina* and *Prorella*. This group is the most species-rich of North American Geometridae and the most difficult to identify since the majority of species can only be reliably identified by genitalic dissection. The first publication includes 191 plates and the supplement includes 35 additional plates most of which amplify missing information from some of the original plates, e.g. adults and genitalia. The URL to access the supplement is **https://mountainscholar.org/handle/10217/186354.** 621

Paul Opler **paul.opler@colostatde.edu**, 970-667-8448

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. 621

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Paralobesia (Lepidoptera: Tortricidae), a systematic revision

Memoirs of the Lepidopterists' Society, No. 6

by Hanna Royals, Jean-François Landry, Todd Gilligan

Paralobesia is a genus of small moths in the family Tortricidae that is found primarily in North America. The genus has not been revised in close to 100 years, and many of the species have interesting host plant associations. This volume presents the results of a comprehensive systematic revision of *Paralobesia*. It combines information from morphology, DNA barcodes, and host plant data to provide diagnoses for all 43 species in the genus. The authors reexamine the morphological characters that define the genus, test monophyly of the genus using DNA data, and provide evidence that *Paralobesia* is indeed separate from *Lobesia*. Included are redescriptions of 17 previously described species, descriptions of 23 new species, 135 color photos of adults and 72 illustrations of male and female genitalia.

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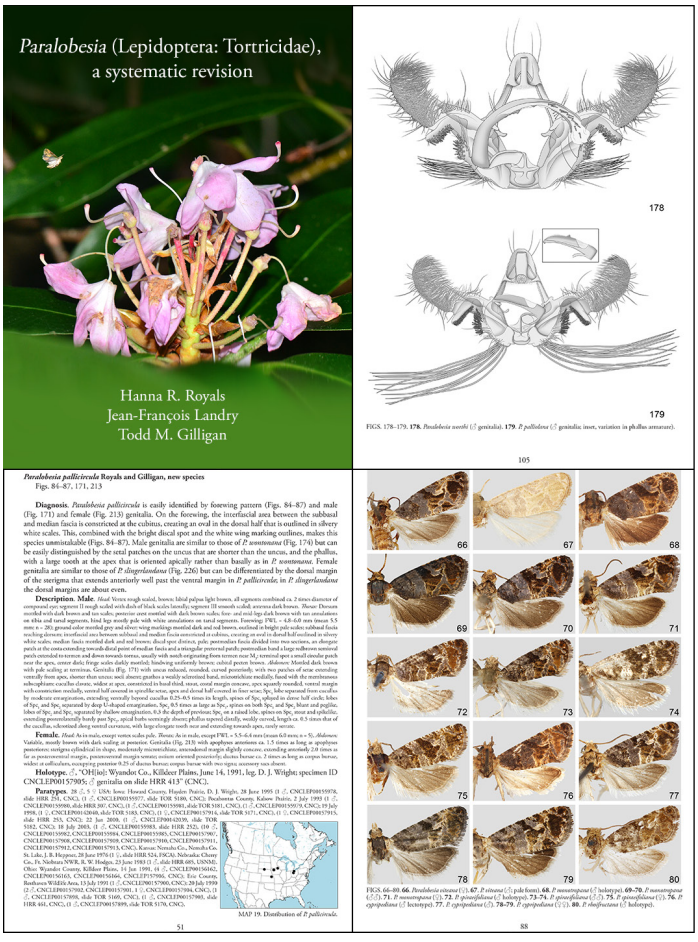
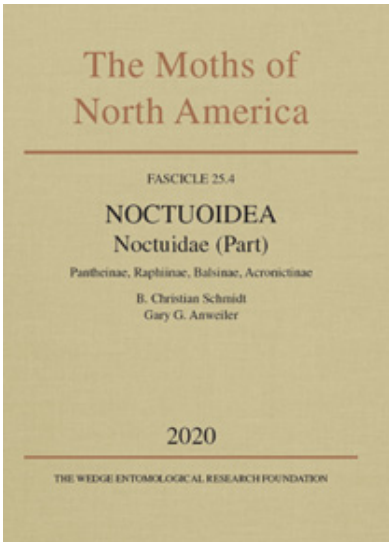
LepSoc Memoir No. 6 is priced at **$40 for members** and $50 for non-members (plus shipping: $5 for U.S., $19 Canada/Mexico, $25 all other locations). 621



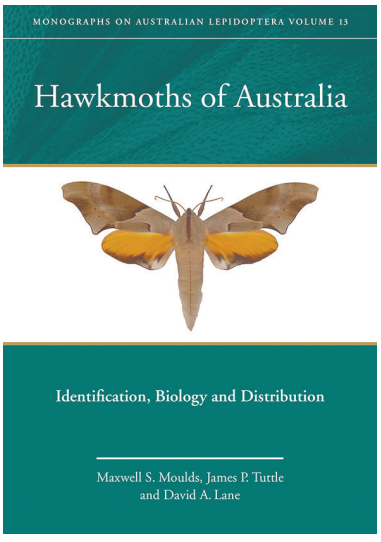
Publications (continued)

The Moths of North America Fascicle 25.4: NOCTUOIDEA Noctuidae (Part) Pantheinae, Raphiinae, Balsinae, Acronictinae, by B. Christian Schmidt and Gary G. Anweiler; 31 color plates and 44 monochrome photographs, plates, and maps by Jocelyn D. Gill. 479 pages, 130 species. Hardbound. ISBN: 978-0-9796633-4-5.



The Wedge Entomological Research Foundation is pleased to announce the publication of this new MONA fascicle. It will ready for shipping by the end of February. This volume is available for a short period of time (until March 31, 2020) at a reduced introductory price of $100.00 plus shipping; after that it will cost $115.00 (plus shipping). Orders may be emailed to Kelly Richers for direct shipment at email: **kerichers@wuesd.org** or mailed to Kelly Richers at 9417 Carvalho Court, Bakersfield, CA 93311. You may also go to the Wedge website and get the order form at **http://wedgefoundation.org/orderasp**. 621

Hawkmoths of Australia: Identification, Biology and Distribution. Monographs on Australian Lepidoptera, Series, Volume 13, by Maxwell Moulds, James Tuttle, and David Lane. CSIRO Publishing, Locked Bag 10, Clayton South VIC 3169 Australia. Full table of contents/order form at: **www.publish.csiro.au/book/7352**. 424pp, 800+ images, hardback, ISBN: 9781486302819, $220.00.



An essential reference to all hawkmoth species found in Australia and on its offshore islands.

Hawkmoths are large charismatic insects with highly variable and colourful larvae. Some species are specialised in their habitat preferences, but others are widespread and often encountered in gardens. However, little is known about most species, and associating the adults with their larvae has previously been difficult or impossible. Hawkmoths of Australia allows identification of all of the Australian hawkmoths for the first time and treats species found on mainland Australia, Tasmania and all offshore islands within Australian limits. It presents previously undescribed life histories of nearly all species and provides a comprehensive account of hawkmoth biology, including new parasitoids and their hawkmoth hosts. Detailed drawings and photographs show the external and internal morphology of adults and immatures, and eggs, larval instars and pupa. Keys are provided for last instar larvae and pupae of the 71 species that the authors have reared.

The book is concluded by a glossary, appendices to parasitoids and larval foodplants, an extensive reference list with bibliographical notes and a comprehensive index.

The wealth of new information in this book makes it an essential reference for anyone interested in these moths. 621

New book: **Butterflies of the Southern Rocky Mountains Area, and their Natural History and Behavior**, by James A. Scott 2020. Papilio (New Series) #27 is the text of the book, 390 pages. Four issues of Papilio (New Series) #28-31 totalling 57 pages have the same title, plus "Photos of Mostly Eggs Larvae Pupae", for Part I. Hesperiidae; Part II. Papilionidae, Pieridae, Nymphalidae (Libytheinae to Satyrinae); Part III. Nymphalidae (Acraeini to Melitaeini); Part IV. Lycaenidae.

The book is a scientific treatise including research gathered by the author from 1959-2019 mostly in the area, plus many hundred references. For each species the book provides identification, subspecies/forms and their genetic or environmental origin and justification for their species/subspecies/form status, then most space treats each species' habitat, hostplants in the area based on more than 5000 records, early stages with habits and description of eggs larvae pupae, diapause stages, number of generations and flight periods, adult foods condensed from more than 40,000 observations of adults on flowers etc., other behavior of adults including basking and roosting, flight habits, details of mate-locating behavior based on ~100,000 records, courtship and mating. The flight behavior of a thousand more mating pairs "carrying pair behavior" is given. The book contains a large professional treatment of mate-locating behavior and courtship, the largest treatment produced anywhere in the world, which has produced major results. A meta-analysis of courtship behavior proves that most butterfly species have both male and female pheromones. Mimicry and biochemistry research on host selection and pheromones etc. is included. The first portion of the book discusses butterfly natural history and behavior in general, updating that information, reporting recent scientific discoveries. Some interesting stories and natural foods lore are appended.

The five issues 27-31 are free pdfs (a simple search at Google.com for Papilio (New Series) +/- titles may work). Go to **https://dspace.library.colostate.edu** [which goes

to Mountainscholar.org] and select Colorado State University, Fort Collins, then search for Papilio (New Series) where all 31 issues are displayed (each has free pdf) and more butterfly papers from Colorado (including my paper on butterflies visiting flowers) are free there by me and other authors, some associated with the Gillette Museum at CSU. Or go to **https://archive.org** then search for Papilio (New Series) and download the issues after clicking the several columnal building icons storing their pdf files (a second click displays the pdf files stored in each building] [download issues 1-31 from the building icons, except #14 may be displayed by itself; #26 should be downloaded from the building, not the ~four displayed #26s which contain a spelling error]) 621

Butterflies of the Sierra Nevada was published in mid-March as Lepidoptera of North America 16 in the Contributions of the C.P. Gillette Museum of Arthropod Diversity at Colorado State University, Fort Collins.

The work by Ken Davenport is based on 50+ years of experience with the Sierra Nevadan butterfly fauna, particularly that of the southern Sierra Nevada in Kern and Tulare counties. It is available at the following link: **https://hdl.handle.net/10217/203548.**

This publication covers the butterfly fauna of the Sierra Nevada in eastern California and a small area of the Carson Spur in western Nevada. The Sierra Nevada occupies 28,000 square miles and runs 400 miles from the Feather River drainage in the north south to the Piute and Greenhorn mountains.

All 192 species, 104 subspecies and 15 segregates known to have occurred within the range at least twice are treated. An additional 5 butterfly species that have been recorded at least once in the Sierra Nevada are mentioned but not discussed in detail.

This publication covers distributions of these butterflies within the Sierra Nevada and three National Parks, their habitats, flight periods and taxonomic issues based on current knowledge. This is the first-ever comprehensive treatment of the Sierra Nevada butterfly fauna! Ken›s updated discussion of the taxonomy of the southern California butterfly fauna was published in 2018 in the same series and is also available as a downloadable pdf.

This publication and others in this series are open access and may be accessed and downloaded at no cost at **https://hdl.handle.net/10217/195576.**

Hard copies are not available from the author or the university, but may be printed from downloadable pdf›s from the web site.

Research

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

WANTED, spring to summer 2020: Live specimens, any stage, of *Leptotes marina*. Preferably from populations using *Plumbago* as the hostplant. Contact Raymond White (**rrweditha@yahoo.com**) to discuss numbers, timing, delivery, & payment. 621

WANTED: *Pereute, Catasticta, Dismorphia* and other Pieridae from Panama and Costa Rica. Also *Hamadryas ariome ariensis, Marpesia merops, M. marcella, M. alcibiades, Heliconius hecalasia formosus* and *Lycorea ilione albescens* from same area. Will purchase or exchange. All specimens must have data. Contact: Rick Rozycki, 5830 S. McVicker Ave., Chicago, IL 60638; **rickroz1@msn.com.** 621

References for Life history notes for *Lasippa illigera*

Continued from p. 75

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Observations of hostplant-induced larval polyphenism in *Hyalophora euryalus* (Saturniidae) from southwest Washington

Caitlin C. LaBar

Kelso, Washington 98626 **northwestbutterflies@gmail.com**

Larvae of *Hyalophora euryalus* exhibit hostplant-induced variable scoli length and color not seen within other *Hyalophora* species (Collins 1999). Scoli color of both *H. euryalus* and *H. columbia gloveri* larvae also varies geographically (Collins 2015). Investigations into the genes that trigger these variations and their potential adaptive significance are ongoing. As part of this research, Michael Collins requested I supply him with specimens from my region (southwest Washington) to fill a gap in his genetics work. On May 7, 2018, a friend in Vancouver, Washington found a female *euryalus* on the side of her garage, which she captured and from which I obtained 81 eggs. I sent 41 eggs to Michael and kept 40 to rear. This article summarizes my observations of the hostplant-induced polyphenism in *H. euryalus* larvae.

The Ceanothus Silk Moth, *Hyalophora euryalus*, occurs from central British Columbia south to Baja California, from the coast to the Great Basin in California, the coast to the Ochocos and Blue Mountains in Oregon, and in most of Washington. It forms a hybrid zone with *H. columbia gloveri* in Idaho and western Montana into British Columbia, producing individuals known as "*kasloensis*," adults of which have reduced white discal spots and are darker overall than *H. euryalus*. *H.* "*kasloensis*" larvae also resemble *H. c. gloveri* more than *H. euryalus* until fifth instar (L5), in which all the dorsal scoli are orange to red, a feature unique from all other *Hyalophora* species (Tuskes, et al. 1996). This larval phenotype extends west of the blend zone to Lewiston, Idaho (Tuskes, et al. 1996) and Wasco County, Oregon (M. Campbell, pers. comm.) but adults reared from these areas are more *euryalus*-like than typical "*kasloensis*." In contrast to *H. euryalus*, "*kasloensis*" larvae do not express a host-induced polyphenism (Collins 2015). Across their range, *H. euryalus* L5 display varying color of the first three pairs of dorsal scoli (two thoracic and first abdominal) in an apparent north-south gradation: individuals from California and southern Oregon appear to be always yellow, while larvae from northern Oregon, Washington and southwest British Columbia are pale pink to deep coral (Collins 2015, photographic reports on www.butterfliesandmoths.org, pers. obs. LaBar 2018).

Collins (1999, 2015) illustrates hostplant-induced larval polyphenism in *H. euryalus* reared on *Pseudotsuga menziesii* (Douglas-fir, Pinaceae), *Arbutus menziesii* (Pacific madrone, Ericaceae), *Arctostaphylos* spp. (manzanita, Ericaceae) and *Ceanothus* spp. (Rhamnaceae). When compared to larvae reared on *Ceanothus* or *Prunus*, larvae on *Pseudotsuga* exhibit longer scoli in L4 and especially L5, while larvae fed on *Arbutus* or *Arctostaphylos* exhibit reduced scoli in L4 and reduced or absent scoli in L5. Collins (1999) also discovered that three out of six L3 reared on *Pseudotsuga* displayed heavy black coloration on all scoli, similar to *H. columbia*, compared to the solid yellow dorsal scoli and pale blue lateral scoli typical of *H. euryalus*.

Rearing Observations

Of the 40 eggs I kept, 39 hatched between 9-12 days after oviposition. I placed 20 larvae on *Pseudotsuga menziesii* and 19 on *Arbutus menziesii*, all of which quickly began to feed on both species. The two groups were kept in 5x7 inch glass containers for three days with small cuttings on dry paper towels before being transferred to two 12-inch cube mesh rearing cages with larger cuttings in water. About two weeks later, the larvae were transferred to two 24x24x36-inch mesh rearing cages. All but two larvae from each group survived to maturity. The 35 cocoons were overwintered between two cotton towels in a 12-inch cube cage on a covered porch, then transferred back to the large cages in the spring. Adults emerged May 16-29, 2019. Three cocoons did not eclose but were overwintered again and are still alive judging by their weight.

The *Arbutus* group reached L2, L3 and L4 noticeably faster than the *Pseudotsuga* group, roughly by three to six days, which is consistent with observations by Collins (1999) and prior experience of Jonathan Pelham (pers. comm.). However, L4 on *Pseudotsuga* developed rapidly and two molted to L5 three days before the first larva on *Arbutus* reached L5, by which time an additional four larvae on *Pseudotsuga* had reached L5. The *Pseudotsuga* group started spinning cocoons around the same time as one larva in the *Arbutus* group, with all the *Pseudotsuga* group finishing cocoons five to seven days before any of the rest of the *Arbutus* group started spinning.

Table 1. Number of larvae exhibiting varying levels of the black scoli morph in L3.

L3 scoli color	*Arbutus (18)*	*Pseudotsuga (16)*
No black	18	3
Lateral black	0	8
All black	0	5

Larvae of both hostplant groups were identical in appearance through L2 as expected. L3 on *Pseudotsuga* exhibited increased black pigmentation on 81% of the group while L3 on *Arbutus* lacked any black on the scoli (Table 1). Larvae with the most black on the scoli also had increased amounts of black on their prolegs. The morphs are easily divided into three groups: no black indicates scoli are standard colors (yellow/orange dorsal and blue lateral) and prolegs may or may not have a small black patch, lateral black indicates the lowest lateral row and sometimes the upper lateral row of scoli are black-tipped and the prolegs have small black patches, and all black indicates all scoli are black-tipped, the lateral rows of scoli are often solid black and the prolegs have a large black patch (Table 1 and Figure 1).

Figure 1. Variation of black pigmentation in third instar *H. euryalus* larvae on *Arbutus menziesii* (top row) and *Pseudotsuga menziesii* (bottom row) from none (top left), some black on prolegs but no black-tipped scoli (top right), black-tipped lateral scoli and some black on prolegs (bottom right), and all scoli black-tipped and prolegs with large black patches (bottom left).

As expected, L4 began to display differences in scoli length between the two hostplant groups (Figure 2). The two pairs of dorsal thoracic scoli (DTS) and first pair of dorsal abdominal scoli (DAS) were about the same length between both groups in L4, while the mid-abdominal scoli measured 2 mm or less on all *Arbutus* larvae compared to 2.5 mm or greater on all *Pseudotsuga* larvae. These differences became more pronounced in L5 (Figures 3-5). The DTS and DAS lengths were very consistent within each group: 2 to 3 mm on *Arbutus* larvae and 2.5 to 3.5 mm on *Pseudotsuga* larvae (Figure 4). Mid-dorsal scoli on *Arbutus* were mostly absent ("nude", 0 mm) or small raised bumps ("button", < 0.5 mm), while one larva had variable-length scoli from 0 to 1 mm (Figures 3 and 4). Mid-dorsal scoli on *Pseudotsuga* all ranged from 2 to 3 mm (Figure 4). Two larvae from the *Arbutus* group were in the process of molting to L5 and were not included in the measurements, however they exhibited the same characteristics as the rest of their group.

Figure 2. Beginning of scoli length differences in early (top row) and late (bottom row) fourth instar *H. euryalus* larvae on *Arbutus menziesii* (left) and *Pseudotsuga menziesii* (right).

Once all the cocoons were formed and clipped from the branches, I noticed the *Arbutus* group cocoons appeared to be slightly smaller or more compact than the *Pseudotsuga* group (Figure 6). Using a flexible tape, I measured the length and girth around the widest points and found that both groups were very consistent (Figure 7). Out of the

Figure 3. Full expression of scoli length differences in early (top row) and mid-late (bottom two rows) fifth instar *H. euryalus* larvae on *Arbutus menziesii* (left) and *Pseudotsuga menziesii* (right). The mid-dorsal scoli of all larvae on *Arbutus* were absent or small bumps (top left and middle left) except one larva with variable-sized scoli (bottom left).

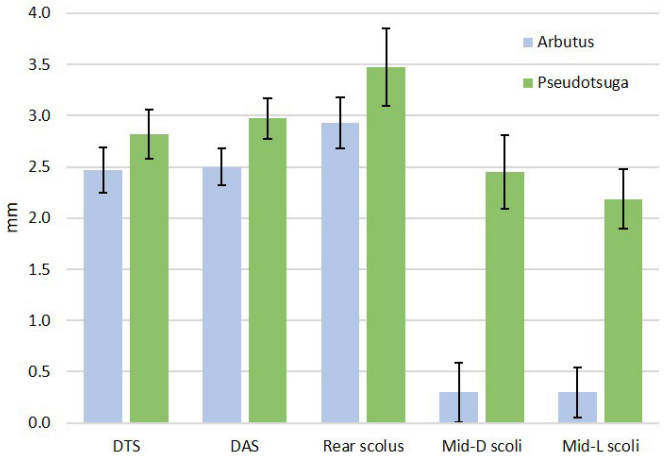

Figure 4. Average scoli length of mid-fifth instar *H. euryalus* larvae fed *Arbutus menziesii* (sample size = 15) and *Pseudotsuga menziesii* (sample size = 19). Error bars indicate the standard deviation.

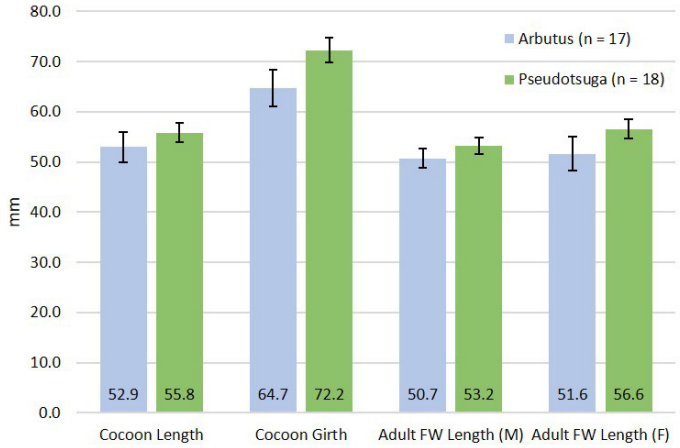

Figure 7. Comparison of cocoon and adult size between *H. euryalus* fed on *Arbutus menziesii* (sample size = 17) and *Pseudotsuga menziesii* (sample size = 18). Error bars indicate the standard deviation.

35 cocoons, 26 were exactly 55 mm in length, with the remainder falling between 45-50 mm in the *Arbutus* group and 60 mm in the *Pseudotsuga* group. Girths ranged from 60-70 mm in the *Arbutus* group and 70-75 mm in the *Pseudotsuga* group. Once the adults emerged, I measured the straight-line distance of each forewing from thorax to apex as an indicator of overall size and found they exhibited a similar trend of the *Pseudotsuga* group being marginally larger (Figure 7). The hindwing discal spot varied between barely touching the white postmedial line and crossing it, and some individuals exhibited a white or gray-brown patch surrounding the tip of the crescent (Figure 8), but these variations occurred in both hostplant groups with no apparent trend between the two.

Figure 5. Fifth instar *H. euryalus* larvae on *Arbutus menziesii* (left) and *Pseudotsuga menziesii* (right) on the day when all the scoli length measurements were recorded for Figure 4.

Figure 6. Cocoons of *H. euryalus* reared on *Arbutus menziesii* (left) and *Pseudotsuga menziesii* (right).

Summary

These observations of variation in scoli color and length associated with different foodplants corroborate previous observations and ongoing research (Collins 1997, 1999, 2015, and pers. comm.). Collins (1999) reported a similar ratio of black to non-black scoli out of 25 L3 on *Arbutus menziesii* from two broods, while 5 of 7 in one brood and 3 of 6 in another brood of L3 on *Pseudotsuga menziesii* exhibited some amount of black on lateral scoli; the remaining two lacked any black. The "all black" form of L3 scoli is typical of *H. columbia columbia* but is sometimes seen in *H. columbia gloveri* and *H. "kasloensis"* (Tuskes et al. 1996, Collins 1997, 1999).

Figure 8. Adult *H. euryalus* female (top right) and males (all others) showing variation in markings within a sibling clutch. Variations were identical between individuals reared on *Arbutus menziesii* and *Pseudotsuga menziesii*.

Figure 9. Demonstration of cryptic phenotypes of *H. euryalus* siblings reared on *Pseudotsuga menziesii* (left, 9 fifth instar larvae) and *Arbutus menziesii* (right, 7 fourth and fifth instar larvae).

I agree with the proposal made by Collins (1999) that the nude phenotype of L5 *H. euryalus* is more cryptic on the smooth leaves of *Arbutus* and *Arctostaphylos*, while the long scoli phenotype of L5 is more cryptic on *Pseudotsuga*, the long white scoli giving the appearance of light in between the needles (Figure 9). The slightly larger adults produced from the *Pseudotsuga* group may be a result of either higher leaf water content in the *Pseudotsuga* cuttings versus *Arbutus*, or because they come from a *Pseudotsuga*-feeding population with no *Arbutus* or other common hostplants within 20 miles. Further research is needed to determine how these scoli length and color phenotypes are triggered and if there is a correlation between adult size and larval hostplants across their range.

Acknowledgements

Thanks to Michael Collins for making a childhood dream of rearing *euryalus* even more intriguing by recommending this split-brood experiment, and to both him and Jonathan Pelham for providing rearing tips and feedback along the way. Thanks to my mom for "babysitting" my larvae for a few days while I was away, and to my sister for always being willing to review my publications for clarity and proper grammar.

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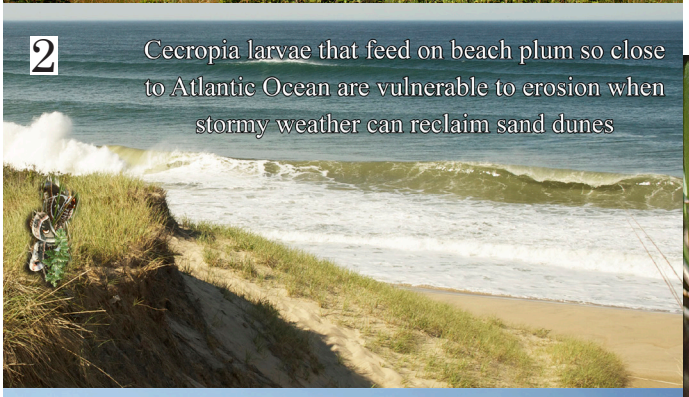
The Emperor Cecropia's new clothes

Tor Hansen

P.O. Box 775, North Truro, MA 02652 **torhansen46@gmail.com**

Living on a rolling glacial sand plain, heath & dune habitat, a stone's throw from Cape Cod Bay, I found Cecropia to be rather common, feeding primarily on black cherry and beach plum frequenting the shifting windswept sand dunes (Figs. 1-4). Indeed winters are long; spring is delayed since the Labrador Current continually pushes cold water southward. Even in discouraging circumstances in late May the moths find each other: males will fly through rain, fog, in stormy winds and cold in the low 50sF, and still find calling females and mate! Endeared at the height of rearing generations of viable moths, I had placed in brown bags around my house 4 calling Cecropia females, and the next morning observed inside each bag one mating pair, 4 coupled mating pairs in all. When I returned for a second time to bring them out of harms way, low and behold, only wings remained, and I turned to see a fat catbird following me!

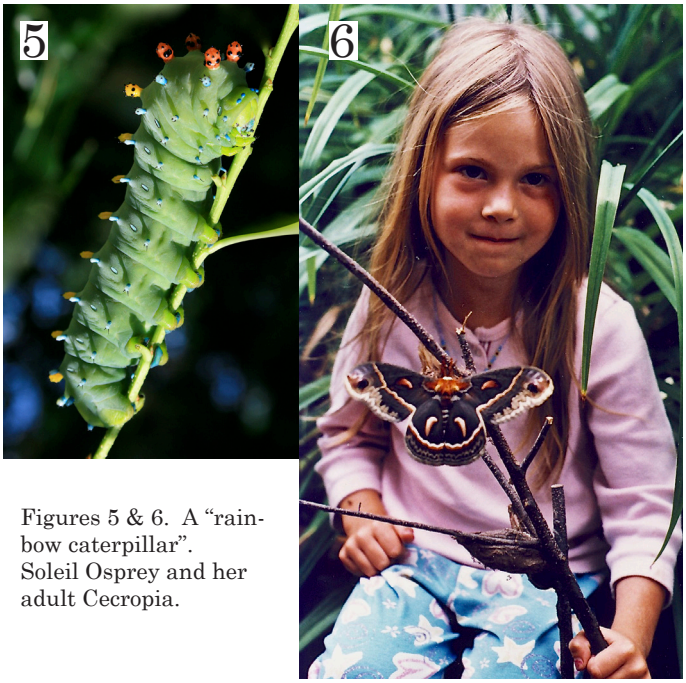


Figures 1-4. The seaside Beach Plum habitat for Cecropia moths, *Hyalophora cecropia*, in Massachusetts, and a mating pair in the habitat.

Changes like these inspire us to advocate that students and youngsters acquire a working curiosity as to learn vital values inherent in nature studies, starting with young Soleil Osprey, who found one "rainbow caterpillar" feeding on beach plum (Fig. 5). She followed its development into an astonishing Cecropia Moth (Fig. 6), recalling how these creatures accomplish their metamorphosis.Children like Coco and all ages love to let Cecropia cling to the cuff, and walk its way up the sleeve and jump into the air wings all a flutter! Encourage our youth to always continue their fascination with nature, and relate each organism to its place in the ecosystem, and understand its vital ecology. However if released in daylight they become prime targets for hungry blue jays. I have seen one male moth flying in subdued light of dusk to its female.

*****

The overhead lights flickered slightly as the subway rumbled onward throughout the tunnels in New York City, and soon arrived at our destination - 81st street and the underground entrance of my home away from home - The American Museum of Natural History. In those early 1950s I had to run to keep up with my dad Leonard, as he walked quickly across city streets to open my eyes and senses to learn how curators would portray the living diversity of animals that drew my keen interest. Taking a bus from our home in Englewood, New Jersey, this time my dear mother Eleanor Hansen would escort me to see the natural wonders within these astonishing



Figures 5 & 6. A "rainbow caterpillar". Soleil Osprey and her adult Cecropia.

halls, where dioramas presented an insect with which I would fall in love, a most remarkable moth the Cecropia, capable of amazing changes known as metamorphosis. The life cycle with all its intrigue is the subject of today's discourse, following curiosity to discover, focusing with close up camera the fascinating process of molting, known to science as ecdysis.

Once within the revolving doors the huge model of an Alaskan Brown Bear standing tall would greet us with an imposing uplifted claw and primeval stare. Then turning right we walked past an enticing gift shop and into the hall of North American Forests and suddenly, there mounted on the maple tree's bark was a Cecropia Moth, distilled in time as if fanning its velvety and captivating wings. Nearby spun on an outstretched limb was its cocoon (Fig. 7), as I recognized it, since I had perused Cecropia among the many other moths in my first youngster's book, "Insects, A Golden Nature Guide", Golden Press, a beginner's guide to insects.

Once I had seen this provocative diorama, I new what to look for in my own back yard. Recharged and inspired to find cocoons, I and my brothers Bjorn and Erik searched a vacant lot in Englewood for the silken baggy cocoons camouflaged in the overgrown weeds and briars. "Yes, I found a Cecropia cocoon!!" I cried out. From there months later I was called from my bathtub by Erik's exclamation, "Tor, the Cecropia Moth has emerged!" Quickly I raced into his room to behold the fanning wings on a window shade that to some may suggest a face of an owl or fangs of a bobcat, or an animal surviving a brush fire gone from flame to charcoal. This witness of sylvan grandeur began my odyssey with inquiry into the biology of our sylvan king Cecropia, as I still say! (Figs. 8 - 15, next page).

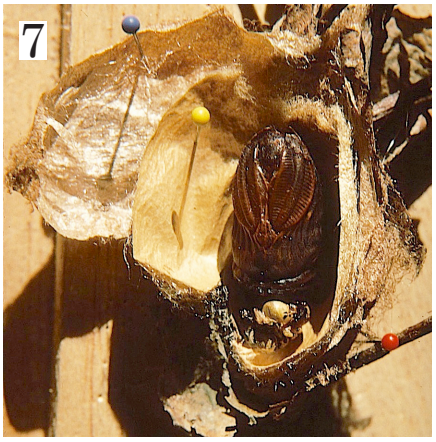
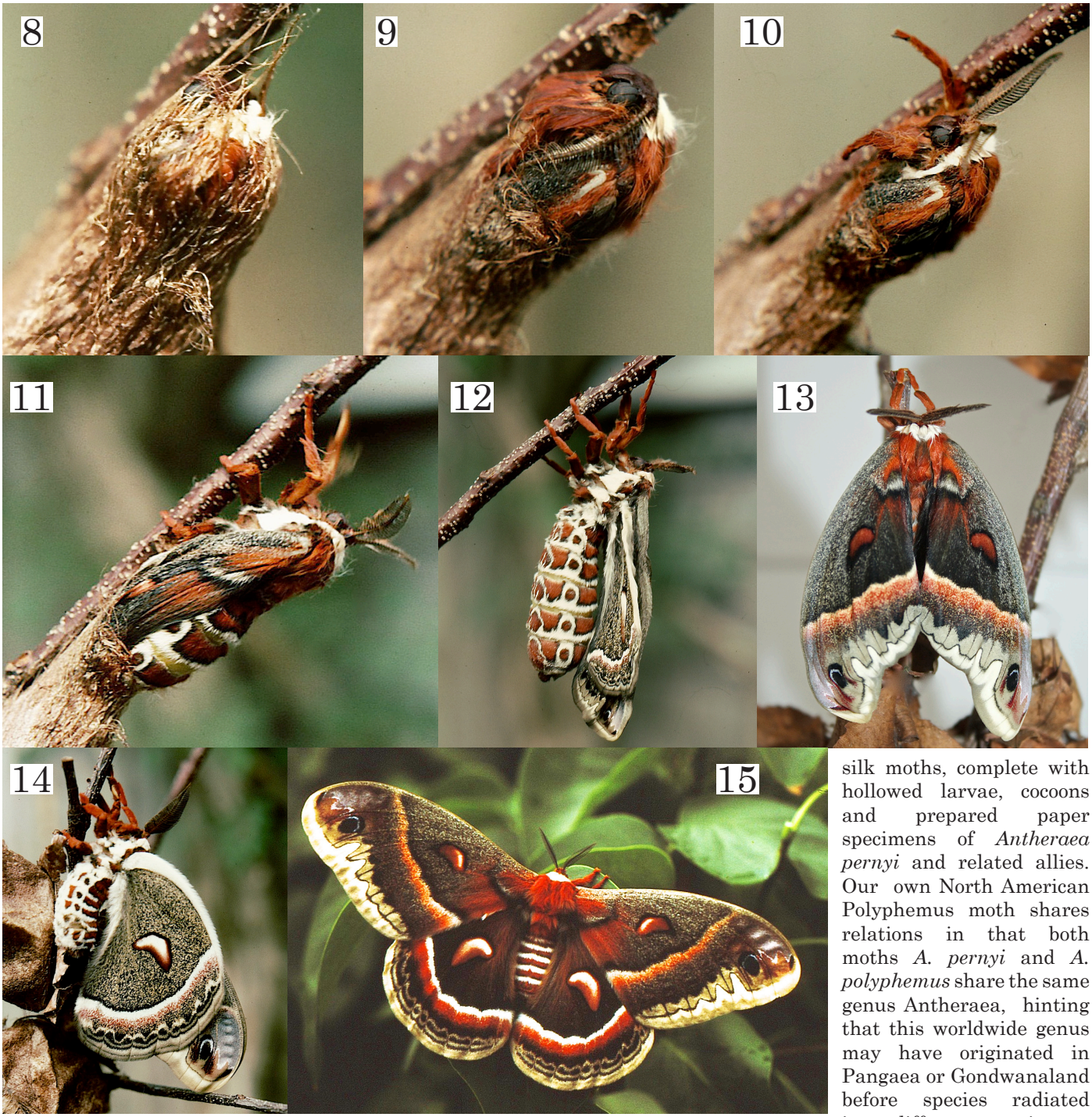


Figure 7. A Cecropia cocoon.

I spent hours collecting a sample of cocoons spun by the common silk moths abiding in Northern New Jersey. How I looked forward to weekends away from school walking miles along our Erie Railroads to find also cocoons of Polyphemus, Promethea, & Cynthia quite common alongside the railroad tracks in the overgrown brushy margins left to grow wild. What a contrast to afternoons at football practice. On the way to Roosevelt School in grade 4, I found on Audubon Road many Polyphemus silvery egg-like cocoons in the gutter, some squashed flat between parked cars. By sixth grade my collection of diverse insects grouped in orders overflowed my cigar boxes and display cases, and riker mounts provided by the same museum. My first green mesh butterfly net was purchased from the same as a kit. My gift as an illustrator stemmed from these forays and repeated visits to same museum. From that gift shop came several very inspirational books; a huge boost came from Frank Lutz's book "Field Book of Insects". One day only two blocks from home along the railroad I found over 40 Cecropia cocoons in a large apple tree, many of which were zapped dead with a telltale small pierced hole. Recently retracing those footsteps, the wild shrubs are all cut back, and no cocoons are found, including Cynthias that were common to ailanthus trees now missing, obviously removed by industrial expansion. If the moth could speak, surely it would say "Cecropia Has Spoken!"

Years later during college I returned to the same hall, where I was deeply impressed with a carved marble bust of distinguished author of "Wake Robin" and more, John Burroughs, set in a recessed alcove, a wonderful likeness of one of my favorite nature writers. His works in prose were so influential to the thinking that saved so much natural habitat through conservation measures, in the times of John Muir, Walt Whitman, and Teddy Roosevelt. Their witty authority was so well guided as to set in motion preservation of significant wild lands and our National Park Service. In honor of the key and excellent works of pioneer John Burroughs, we can trust that this hall will not become subject to removal or dismantling. At the entrance to the Museum President Teddy Roosevelt is memorialized in a great bronze sculpture … a seated equestrian in huge scale facing Central Park. Burroughs did recount encounters with Cecropia, when in grade school, a student brought in a cocoon that later eclosed for all to see and marvel at the unique bio-gem. Its cocoon in "Leaf & Tendril", vol. 13… "is incredible!" Also he recalled research into Promethea



Figures 8 - 15. This sequence shows the emergence of a female Cecropia Moth from the cocoon.

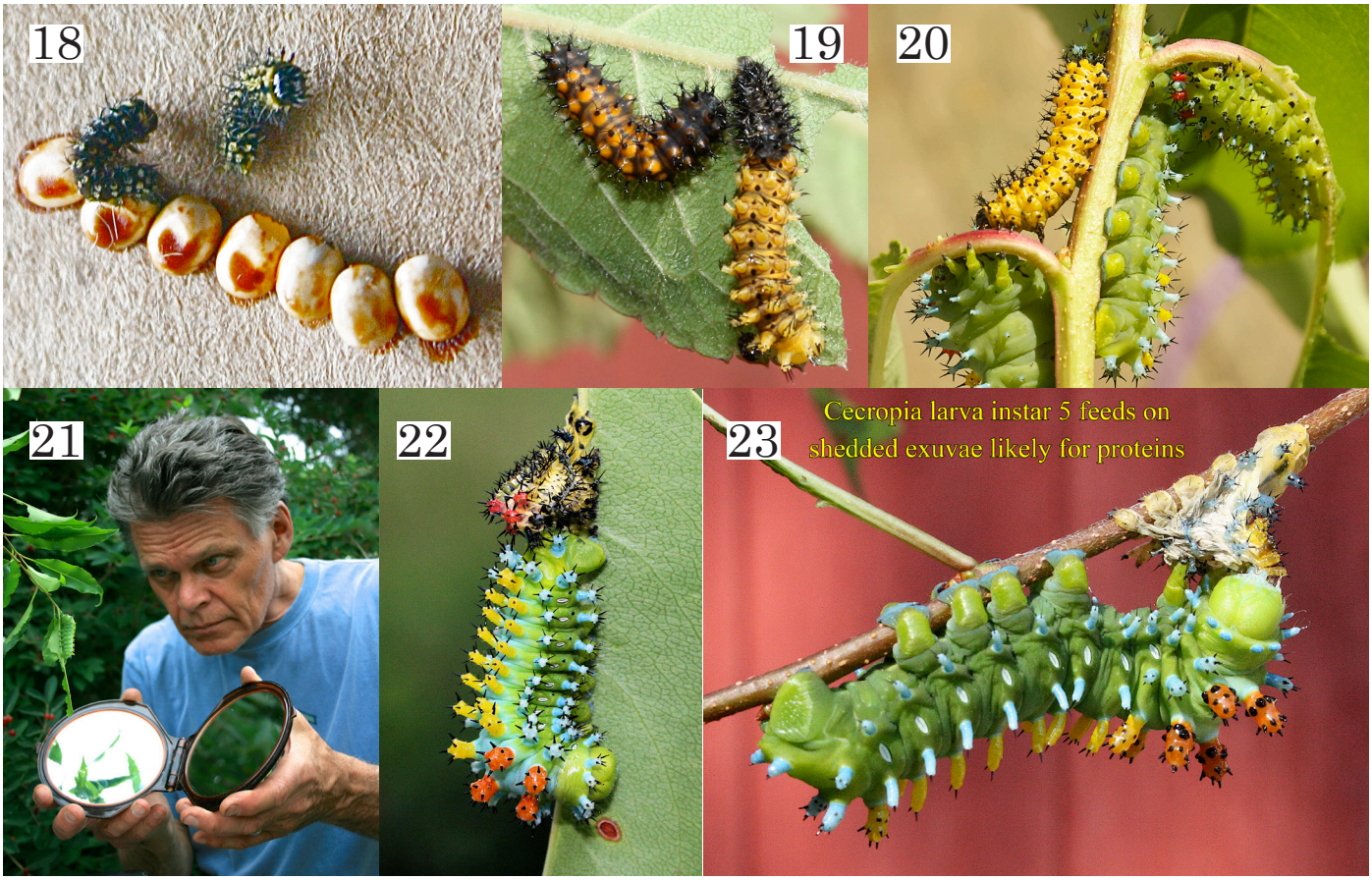
moths revealing in vol. 15 that A.G. Meyers showed the moths had no color sense by gluing opposite sex wings to living moths that mated regardless of color swap.

And then after much exclamation we walked up those wide marble stairs to the third floor and the marvelous Hall of Insects, that time and again I would return to study the wide diversity of insects from social ants to walking sticks. Honey bees and flies were depicted in greatly magnified models. On the wall lodged a display case of silk moths, complete with hollowed larvae, cocoons and prepared paper specimens of *Antheraea pernyi* and related allies. Our own North American Polyphemus moth shares relations in that both moths *A. pernyi* and *A. polyphemus* share the same genus Antheraea, hinting that this worldwide genus may have originated in Pangaea or Gondwanaland before species radiated into different species as continents diverged. This moth in the late 1980s would become my primary moth under study on Cape Cod, where I did rear live caterpillars feeding on assorted oaks to record on film the life cycle of a most adaptable moth native to China. Studies in phenotypic variation in *A. pernyi* crossed with *A. harti* did show interesting heterozygous forms relating to Gregory Mendel's "Classic Laws of Heredity", that will be featured in a forthcoming issue. Today this hall is revised into a living butterfly house, all the more interactive. Yet because

Figures 16 & 17. Female Cecropias (left) have slender antennae; males (right) have very plumose antennae for detecting pheromones released from the females.

of space limitations, the original insect hall had to yield to replacement. If only their exterior grounds had included space for a nonesuch greenhouse for Lepidoptera!

And throughout recent years, my dear brother Erik Hansen, as a mentor of dramatic lighting, enhanced my photos then on film, and did assist my efforts with back lighting to illuminate metamorphic changes and entire life cycles of various insects (Figs. 18 - 23). He retouches my bird photos with finesse techniques inherent in photoshop since I converted to digital. And today my dear younger brother Nils Hansen is indispensable for his computer knowledge that enabled us to transfer my slide-talks from desk top I-Mac to dell laptop. Two people who have peaked my interest and sparked my progress in biology are Casper Hill, PhD. teacher of tenth grade biology at Dwight Morrow High School, Englewood. A highlight of his teaching skills was an immaculate penmanship in chalk on the blackboard for the day's lesson, and encouraging me to complete an illustration of the 5 instars of black swallowtail larvae, a summer's special project. And of great inspiration for me to follow and photograph the life cycle of Cecropia Moths is Campell Norsgaard, a pioneer of nature motion pictures, who with early Kodak and RCA 16mm cameras, an Englewood resident in the same years, captured life cycles of insects ranging from bumble bee to praying mantis to monarch butterfly metamorphosis. And later Cecropia (at my behest). He instigated preservation of 150 acres of old growth woodland in the palisades ecosystem, Englewood, and the birth of nature center Flat Rock Brook is so named in his honor.



Figures 18 - 23. Developmental sequence of the eggs and larvae of Cecropia moths. Lower left photo shows Erik Hansen using a mirror to help with back lighting of a caterpillar during photography.

Year after year, into the new millennium, I have reared Cecropia larvae into cocoons, and concentrated on moth enclosure as well as photographing larval ecdysis. Watching these flamboyant cats regulate molting via the aroused hormone secretions of ecdysone, and synergistic hormones prothoracic gland hormone (PGH) and juvenile hormone (JH), is still astonishing as ever. Since the larva can discard the barbed exoskeleton in one easy shedding, and under the old discarded skin arises a new inflatable skin, the larva made mew heralds a profound transformation. That this inherent metamorphosis has by orderly progression, evolved up through the immense tower of time, through so many successive uncountable generations, the species remains intact with approximately identical features.

However a dire flaw in the genome has hindered the moths' lifeline. In that feeding with larval-like jaws or imbibing nectar with a butterfly's proboscis, both features are lost in the adult metamorphosis. We speculate that cellular changes are governed by synergistic hormones that sacrifice a digestive system in exchange for highly developed organs that facilitate pheromone production and detection. Nonetheless they pass on their genes by the female's pheromone emissions, perfumed macro-molecules that drift out in a steady stream, that attract males whose plumose antennae have incredible surface area to detect (Figs. 16-17). This enables fast mating and species continuity. Via intrinsic organization of their DNA and hormone secretions, photoperiod, and gene pooling, Cecropia has accomplished the impossible!

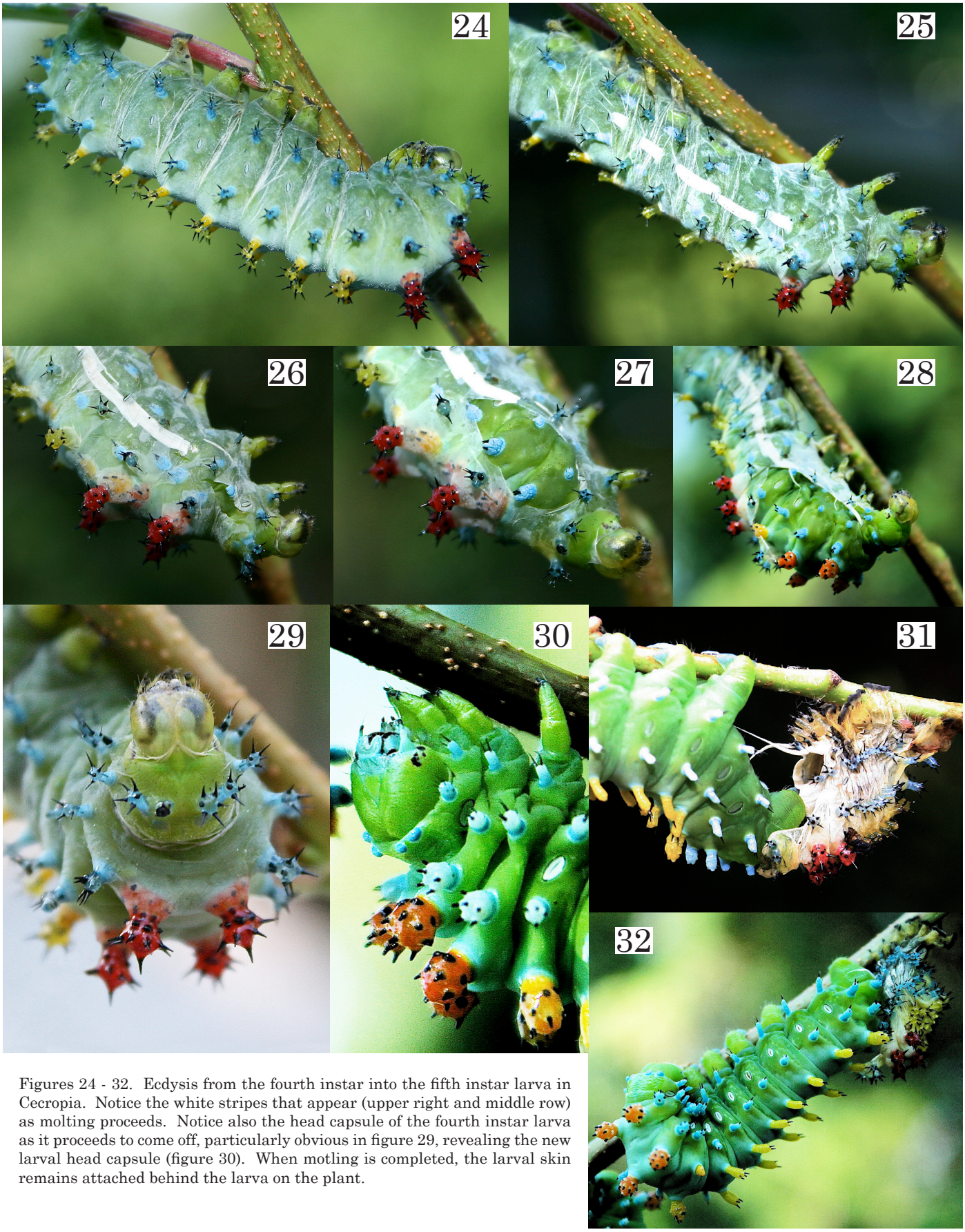
Reading the literature filed in a science library does yield clues as to the central organizing body or organ that commands and advances the DNA recipe for survival. Up to date research likely shows more in depth info now available for further clarification, Just what forces govern the metamorphic transformations? At Harvard, PhD. Bob Pyle of Cape Cod investigated the role of imaginal discs in Promethea Moths. In his thesis he states that such could be a central control. He isolated these disc bodies by staining sagittal sections of larvae & pupal specimens. but yet they appear not definitive in governing molting in absolute sense. Hard to prove. Since then there must be more viable research in the zoological record, but not known to me. What cellular programing works over and again? Consider many new organs arise in changed form. Minute larval antennae give rise to new plumose antennae. The larva's 10 prolegs vanish and 6 larval true legs reappear greatly modified. Simple eyes become compound eyes, which are much more complex.

When molting is initially underway (figs. 24 - 32), during the last larval molt (instar 4 to 5), notice white stripes (figs. 25- 28) that burst from the spiracles. Prior to ecdysis there is no previous or obvious role for these stripes. What tissues are they and from what tissues do they arise? They arise from the trachea and emerge through the segmented spiracles, 2 per segment. Again I recall the thoughts of a biologist in Darwin's day, George J. Mivart, who postulated that butterfly wings are evaginated trachea. Today research indicates cuticle of the exoskeleton is the tissue called chitin. Chitin is a polysaccharide of the amino sugar glucosamine, and can be hard as in beetles or soft as in butterflies. Apparently the stripe tissues may be different from chitin since they originate inside spiracles (window membrane) and may not be the same as the exoskeleton.

These stripes appear just before the drying outer integument is about to be expelled. They appear to be beneficial to facilitate the fast orderly splitting open of the shedding skin, assisting the skin to bypass the barbs and spiny tubercles, so sharp that they could derail the complete shedding. They quickly adhere to the stretching exuvae, and extend forward on the outside to contain the systematic passing of equidistant segments, thus preventing a building up of puffy impeding segments. From the first of 8 spiracles stem the stripes arising from segment 4 through 8. Only later does tape exude from first thoracic segment. As body contractions proceed, white tape is stretched out like making candy taffy. I suggest an analogy that stripes are like a fireman's ladder that is needed to rescue someone high in a window on fire. Gourmet chefs have to consider lots of ingredients to prepare an exciting tasty dish. Yet Cecropia has fashioned a special combo of tissue through remote past millennia that interact in concert to accomplish this complex transformation. Is it DNA alone?

Do watch this ecdysis and be amazed just how fast these remarkable activities happen. When we humans are asked to make a sleeping bag from threads, and then crawl in for a long winter's nap, we can then admit that we humans cannot compare in this regard to the innate ingenuity intrinsic in Cecropia. According to The Living Webster's Encyclopedic Dictionary, their definition of emperor places the title above domain of the title King. I call Cecropia "Our Sylvan King" and well deserving, too. The arrangement of wing and body scales modified to downey hairs suggest the moth is in regal dress and ready for a coronation! I am quite content to designate the Cecropia Moth to be our emperor moth as well, also because I could not resist the story written by Hans Christian Andersen that appeared to fit the title of this discussion! For a good read on the prehistory of Cecrops first king of Attica, Greece, read Greek Mythology by Robert Graves! Indeed a known reformer, so named by Carolus Linnaeus that translates as "He with a feather in his cap", I refer you to my nature column "Berkshire Wild" by Tor Hansen, at the website "www.iberkshires.com" (note small letter "i" before berkshires).

www.lepsoc.org and https://www.facebook.com/lepsoc



Figures 24 - 32. Ecdysis from the fourth instar into the fifth instar larva in Cecropia. Notice the white stripes that appear (upper right and middle row) as molting proceeds. Notice also the head capsule of the fourth instar larva as it proceeds to come off, particularly obvious in figure 29, revealing the new larval head capsule (figure 30). When motling is completed, the larval skin remains attached behind the larva on the plant.

Red-lined Scrub Hairstreak, *Strymon bebrycia* (Hewitson, 1868) -- a photo essay

Bill Beck

15660 N. Roadrunner Ridge Lane, Tucson, Arizona 85739 **billbeck001@gmail.com**

Introduction:

Thru a team effort, a few of us have worked to photo document the life stages of the Red-lined Scrub Hairstreak; our subjects having been in far-south Texas. This is one of the hairstreaks that is not uncommon (in Mexico), but little has been written about their behavior or developmental stages in literature.

This last fall, November 2019, Bill Dempwolf sent a note that he'd seen Red-lined Scrub Hairstreaks in far south Texas; this was MOST noteworthy because he saw SEVERAL adults in a small locale; I was hopeful this represented a reproducing colony! This area had experienced a very favorable rainfall season, and the vines, brush, and trees had turned to acres of "jungle". Some of this jungle was abundant balloon vine (*Cardiospermum* sp.); and as you may know balloon vine is the reported host plant for *S. bebrycia*.

Though I'd seen a single *S. bebrycia* in late 2015 near Tucson, and only one other in 2018 in Sonora, Mexico, I'd certainly never had an opportunity to observe an active "colony"! Knowing the quick expiration of sightings, we packed the bags and my wife Jane and I were shortly off to Texas to find these hairstreaks. What a good chance to observe in the field, and maybe raise thru a life cycle!?

Whether in a "boom" cycle or whatever, when we arrived the area did have red-lined scrub hairstreaks! They were locally fairly common, though not abundant. We observed *S. bebrycia* males in a typical *Strymon* fashion, holding strategic mate locating positions about chest height or so, on brush or trees close to host plant. Females appeared to randomly move, traveling through brush, crawling around host plant, or nectaring on flowers. Both sexes nectared on most plants having active blooms at the location, including the balloon vines, flowering trees, and white lantanas. (PS. Timing is everything!)

Methods:

So in late November I caged females with balloon vine. (The "cage" is a one-foot rectangular terrarium, with sliding screening on one side.) The cage was kept indoors at 72F, with artificial light timed for 12-hour daylight periods. Host plant and some nectar flowers were set up in a water "vase" to keep as fresh as possible. In addition to plants, diluted 1:10 honey water was refreshed on a cotton pad for butterfly use.

The caged females oviposited on balloon vine in several locations, typically near flower buds or developing "balloons", the plant reproductive parts. Eggs were very pale lime green.

A story line in itself, and I believe a somewhat more difficult task, Berry Nall searched and found eggs in the field (I cant imagine!), which he successfully reared to adult! He has documented these as well.

Rearing Results:

A few notes are warranted: Not all my eggs hatched. I'm not sure of the reason, perhaps some were not fertilized. I was able to raise six thru from egg to adult. Four of these were on balloon vine solely and the larvae stayed quite green, but with some pattern in third instar. By happenchance I placed *Dalea bicolor (*Fabaceae) flowers for supplemental adult nectar in the cage. Some eggs were volunteered on these flower buds. Two hatched on *Dalea* and continued to feed on this that plant to second instar. As this plant material dried up I replaced it with flower buds from fairy duster plant *Calliandra sp*. (Fabaceae), a known *S. melinus* host locally. These caterpillars readily switched to this food and appeared to develop normally completely thru to adult. You will see the larval color was much different however.

Stage times were fairly consistent for the six hatched, especially for the instars:

- Egg to hatch: 5-7 days
- First, Second, Third instar: 3 days each instar
- Fourth instar: 4 days
- Prepupa: 4 days
- Pupa: 11-15 days

1) Female *Strymon bebrycia* ovipositing on Balloon Vine, *Cardiospermum* sp.

Strymon bebrycia devlopment. 2) New egg on Balloon Vine. 3) Mature egg detail. 4) 1st instar having eaten flower bud. 5) Late 1st instar.

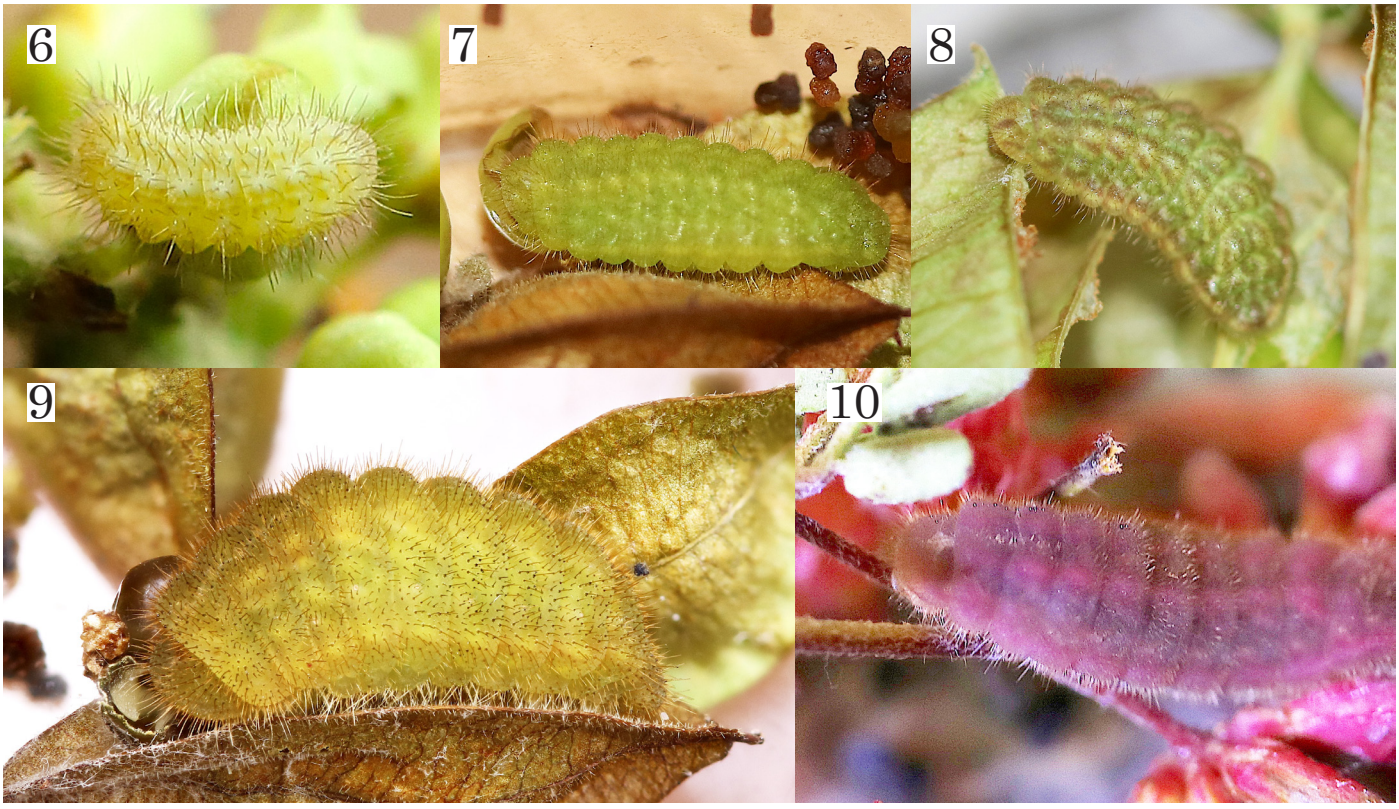
In just a few days the eggs hatched. The hatchlings were so small, it was tough to see them, let alone take good photos. Here are about the best I have showing a fresh hatchling and also showing a larva burrowing into a flower bud.

By day four after the first hatching, one could see a larva molted into second instar. Though still quite small, they changed into a uniform green, and they gained many more setae. See for yourself! This instar often switched to a balloon pod seed diet.

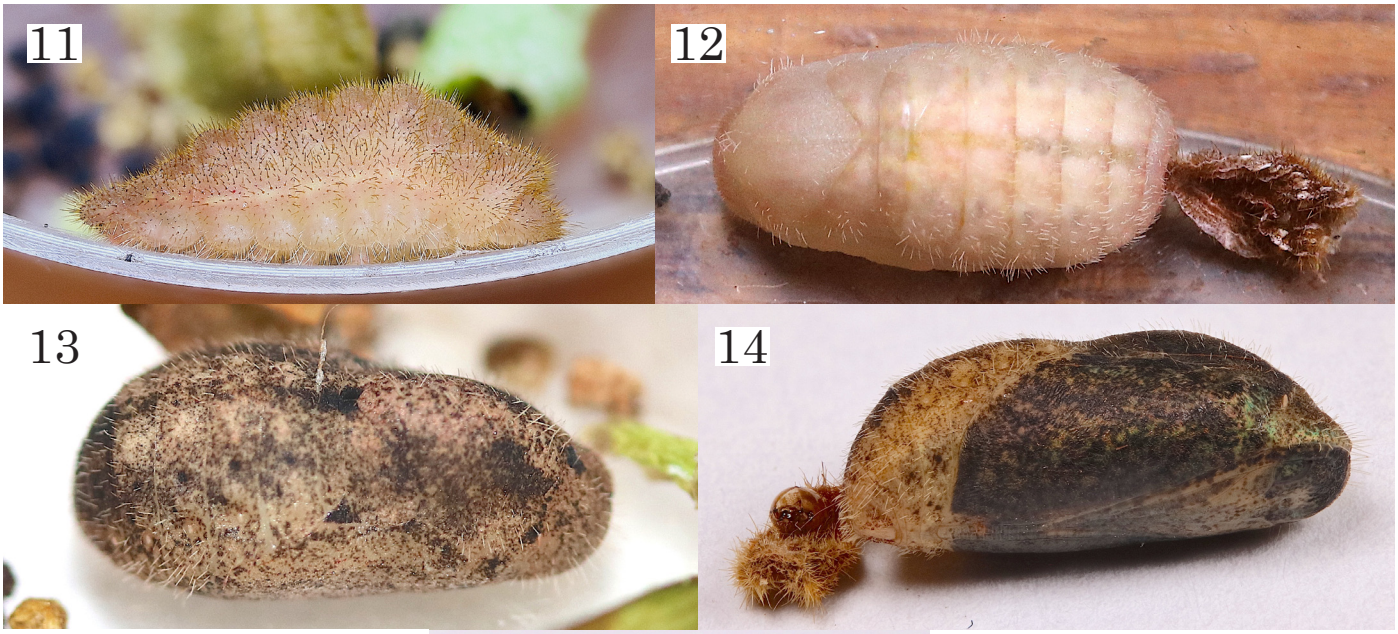
With day seven, the third instar again showed a change in color and setae. They also grew quickly both in size and appetite. They continued to eat reproductive plant parts.

After ten days there were last instars, which, though similar in appearance, continued to get larger. As last instars, after a couple days of feeding, they became active crawling around not eating, before pre-pupation. Eventually choosing a pupation location, they become lethargic. In the prepupal state, they shrunk in length, lost most of their external shape, and became a slightly flattened oval.

On the first pupa preparing to eclose, the light cream-colored area over the wing got noticeably very dark almost overnight, as the wing membrane became pigmented. You can see the difference. Once out of the pupal skin (almost an instant move), the adult would find a place to rest vertically, and there spread its wings for drying and hardening. This also happened fairly quickly, 10 or 12 minutes at most, to full wing extension. Once fully open, the butterfly would rest for a couple hours before more movement and flight.



Strymon bebrycia development. 6) 2nd instar larva. 7 & 8) 3rd instar larvae. 9) 4th instar "normal". 10) 4th instar feeding on fairy-duster plant.



Strymon bebrycia development. 11) Prepupa. 12) Pupal just skin cast. 13) Seasoned pupa. 14) Pupa with pigmentation. 15) Adult just eclosed. 16) Adult with wings expanded.

Discussion:

Some Literature:

The Red-lined Hairsteak was described and illustrated as early as 1868 by Hewitson (1). Synonyms include *Thecla chonida* and *Strymon buchholzi*. It is listed as *T. chonida* in Godman and Salvin's 1887 "Biologia Centrali-Americana" (2).

In 1967 Clench lists localities where this butterfly has been taken by Gervase Mathew and described by W.C. Hewitson (1874) as from Mexico, either Mazatlan or Acapulco (3). Clench mentions *Strymon buchholzi* as being known in Texas in 1966 (4).

Robbins and Nicolay include *S. bebrycia* in their subspecific *Strymon albata* Group. "An Overview of *Strymon* Hubner (Lycaenidae: Theclinae: Eumaeini)" (JLS 55(3), 2001, 85-100). This group includes *Strymon albata*, *Strymon alea*, and our *Strymon bebrycia* as close relatives (5).

"Butterflies of Southeastern Arizona" (Bailowitz and Brock) states the species is common from northern Sonora south, but is a rare stray in Arizona. Reported Arizona records include June 1952, May 1962, May 1965 (6).

Opler reports "early stages not reported"; flights Feb, June and Sept thru Dec. South to nw Costa Rica (7).

Scott's book states "Habitat subtropical thorn forest, also desert scrub in Big Bend, Tex. Host: *Cardiospermum halicacabum*; though *Prunus havardii* in Big Bend. Many flights. All year in S Tex (rare) Mar-Sep in W Tex. Males perch on hilltop bushes to await females" (8).

I checked BOLD systems online, and there is one specimen sequenced, but the data is not public.

Ending Thoughts:

Since balloon vine is quite common in LRGV, it would seem that occasional colonies would continue.

From my observations, the four instar stages of the egg/larvae cycle appear very similar to *S. melinus* as well as other *Strymon* species. I could not separately identify them if I found one in the field!

Many species of *Strymon* use several or many plant hosts. Though the commonly reported *S. bebrycia* host plant is balloon vine, because of the readily volunteered eggs on *Dalea* and successful development on this and the other Fabaceae, it seems likely that *S. bebrycia* may use other

hosts in the wild, as do their kin. (Also see above Scott's reference to *Prunus havardii* as well.)

Robert Robbins found the following two rearing records for *S. bebrycia* in museum collections, which supports this idea.

Leguminosae: *Cajanus cajan* Druce

> Honduras, Francisco Morazan, El Zamorano. (1♀). *Leg*. R. Caballero. *Ex*. larva 14 Jan 1986, boring into pods. In Steve Passoa Collection (on long-term loan to USNM) with pupal case.

Sapindaceae: *Cardiospermum halicacabum* L.

> Mexico, Sonora, near Alamos. (2♂,1♀). *Leg*. G. Ballmer. *Ex*. larvae 6 Sep 1989 feeding on seeds. From correspondence with RKR. Photograph of adult in USNM. In the collection at the University of California at Riverside.

Its always fun to rear out some butterflies!

Acknowledgements:

Gratitude and thanks for direction, reviews, and guidance goes to Bill Dempwolf, Berry Nall, Robert Robbins and Jim Brock. And thanks for permission to use the rearing records to Steve Passoa and Greg Ballmer!

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gbif.org/species/4300378
mothphotographersgroup.nsstate.edu/species.php?hodges=4339

Monarch Anomalies

Ranger Steve (Mueller)

Ody Brook Nature Sanctuary, 13010 Northland Dr.,
Cedar Springs, MI 49319-8433
Odybrook@chartermi.net

Two winter trips to the southwest between 2011 and 2020 resulted in adult Monarch sightings. The experience struck me a highly unusual and even unlikely. In January 2011 I hiked to Phantom Ranch at the bottom of the Grand Canyon and found an adult Monarch flying. On 21 February 2020 at 11:30 a.m. in San Antonio Texas I saw an adult Monarch flying in a residential neighborhood and two more flying when I visited the botanical gardens in the afternoon.

If Monarchs are on the wing between the winter solstice and spring equinox, I would expect I would have heard about it but did not. I checked ebutterfly and found a few winter sightings across the south. I-naturalist provided several adult winter sightings. Journey North provided sightings from across the south.

Even though these might be anomalies, they are something that should be investigated more thoroughly. Are wintering adults scattered across the south that survive winter and reproduce in spring? Are they migratory or residential? How do they contribute to the species survival? Are scattered numbers in thousands, hundreds of thousands, or more than a million? No wintering colonies have been reported so if Monarchs are present in moderate to large numbers they are most likely scattered individuals. It will be interesting to learn the significance of US and Mexico scattered Monarchs to the overall survival of the migratory phenomenon.

Being from Michigan, I was caught unaware when I discovered adults flying in winter on both visits to the south. I encourage regional residents to note winter Monarch sightings to help determine presence/absence as well as possible importance for Monarch species survival.

Thanks to Jeff Pippen and Jeff Pavlik for article comments.

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New locality records of endemic butterflies (Lepidoptera: Lycaenidae) in the Philippines

Stefani M. Harrison[1] and Jade Aster T. Badon[2]

[1]The Philippine Lepidoptera Butterflies and Moths, Inc. Fish & Wildlife Foundation of Florida, USA
stef.m.harrison@gmail.com
[2]Biology Department, Silliman University, Dumaguete City, Philippines 6200 &
The Philippine Lepidoptera Butterflies and Moths, Inc. **jadetbadon@su.edu.ph**

Additional key words: Philippines, *Deramas*, *Hypothecla*, New Record

There are 10 endemic species of *Deramas* Distant 1886 in the Philippines (Treadaway & Schroeder 2012). The rarest of them is *Deramas sumikat* Schroeder & Treadaway 1986, which can only be found in the southern part of Negros Island. The current distribution of *Deramas toshikoae* H. Hayashi 1981 is Leyte, Mindoro, Mindanao, Panay, and Samar, and this species is now recorded on Negros Island. The single Negros Island specimen of *Deramas toshikoae* (Figure 1) was collected in the forested area (Figure 2) of *Mount Talinis* (also known as *Cuernos de Negros*) on October 2016. It was collected midday between 10-11 am as we walked down the trail and followed the creek in a primary-secondary forest. An unknown female of *Deramas* (Figure 3) was photographed in August 2019, and the specimen may be a female of *D. toshikoae* (Takanami pers. comm.) since it was photographed to almost exact location to where the male was collected.

Figure 1. *Deramas toshikoae* (♂) H. Hayashi 1981 from southern Negros Island. Photo by Jade Badon.

Figure 2. The site where the newly recorded *D. toshikoae* was collected. The place is a primary forest but with surrounding farms and on-going developments. Photo by Jade Badon.

Figure 3. An unknown *Deramas*, possibly the female of *D. toshikoae*. Photo by Jade Badon.

The life histories and hostplant of all *Deramas* species are still unknown but their foodplants must be in the vicinity where the *Deramas toshikoae* was collected it. The discovery of this species gives hope on finding the rarest and threatened species, *Deramas sumikat*, which is also known as the Negros Bluejohn. Treadaway (pers.comm.) presumed that the species is probably extinct since it has not been recorded since its discovery in 1986, and in 2019, it was classified as Vulnerable (Gonzalez *et al.* 2019). Since their hostplant and life history are still unknown, further exploration and studies are needed to enhance the protection and conservation of the Negros Bluejohn.

The genus *Hypothecla* Semper 1980, currently has two species, and one, *Hypothecla astyla* Felder & Felder 1862 is endemic to the Philippines. There are currently four subspecies in the country, ssp. *astyla* Felder & Felder 1862 occurs in Biliran, Bohol, Cebu, Leyte, Luzon, Marinduque, Mindoro, Panaon, and Samar, ssp. *mindanaensis* Fruhstorfer 1912 occurs in Mindanao, ssp. *palawensis* Hayashi 1976 occurs in Palawan, and ssp. *tegea* Fruhstorfer 1912 occrus in Basilan (Treadaway & Schroeder 2012). The new locality record of a female *Hypothecla astyla astyla* (Figs. 4, 5) was photographed along the bushes of the roadside which passes through the *Bulalakaw* Forest Reservation in San Juan, Siquijor Island, Philippines (Fig. 6). The butterfly was photographed on October 6, 2019 around 10-11 am on a sunny day, but the interior of the

Figure 4. A female *Hypothecla astyla astyla* from the *Bulalakaw* Forest Reservation, San Juan, Siquijor island, Philippines. Photo by Jade Badon.

Figure 5. The underside of the female *Hypothecla astyla astyla* from Siquijor island, Philippines. Photo by Jade Badon.

forest was cooler and moist. The life history and ecology of this butterfly still needs to be studied.

Acknowledgements

We would like to thank the late Thomas C. Emmel, Ph.D. for providing research funds for Philippine Lepidoptera exploration. To Mr. Colin G. Treadaway, F.R.E.S. for verifying the new locality record of *Deramas toshikoae* and his valuable inputs on Philippine Lepidoptera. To Mr. Yusuke Takanami for his comments on the recently photographed Deramas from Negros island. To Esteven Theodore Nacar and Jean Henri Oracion from Silliman University for fieldwork assistance. To the Department of Environment and Natural Resources (DENR) for providing the Gratuitous Permit Number: R18-2016-004.

Figure 6. The place where the *Hypothecla astyla astyla* was photographed. The *Bulalakaw* Forest Reservation, Siquijor island, Philippines. Photo by Jade Badon.

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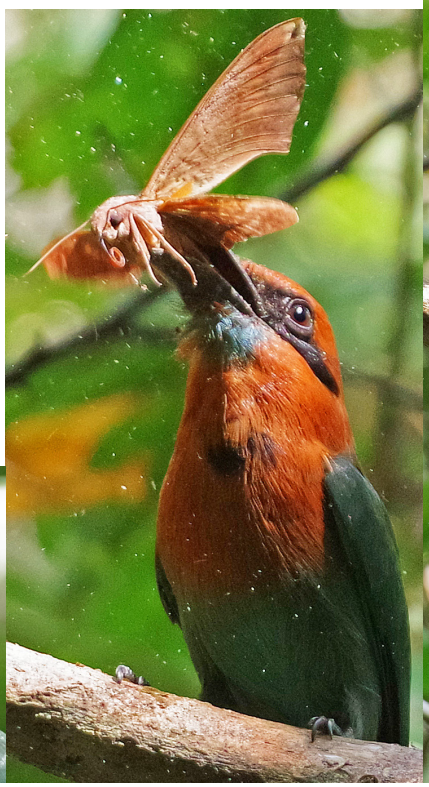
Motmot versus Sphinx Moth

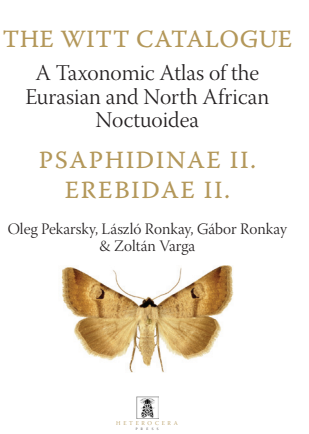
Bill Yake

Green Cove Ravine, near Olympia, Washington
yake@comcast.net

These photos were taken on 15 Feb. 2020 at the Panama Rainforest Discovery Center off Pipeline Road near Gamboa -- about 8 mi. NW of Panama City, Panama. The bird appears to be a Broadbilled Motmot (*Electron platyrhynchum*) tussling with sphingid moth (*Eumorpha* sp., maybe *triangulum*, per Jean Haxaire). The tussle went on for 10-15 minutes and a 'rain' of scales shaken loose from the moth appears in several of the images (see back cover). Here is the Flickr site: **https://www.flickr.com/photos/myake/albums/72157713375756038**



Book Reviews



Book Review: *The Witt Catalogue Volume 10. A Taxonomic Atlas of the Eurasian and North African Noctuoidea: Psaphidinae II. - Erebidae II. The tribes Feraliini and Psaphidini and the Lygephila generic Complex*. By Oleg Pekarsky, László Ronkay, Gábor Ronlay, and Zoltán Varga. Published by Heterocera Press, Budapest. 2019. 300 pp. ISBN 978-615-5279-08-9. €170,00. Available from the publisher and other retail outlets including Pemberley Books, UK, and Goecke Evers, Germany.

This book is unquestionably substantial for several reasons. The first examination reveals a book of quality construction. The pages are Smythe sewn allowing the book to lie flat when open. The grain of the glossy paper runs from top to bottom allowing the paper to bend easily rather than fighting the user. The book is case bound with cloth covered boards. The book has a colorful dust jacket, and the gold stamping on the cloth spine clearly identifies the book. A nice touch, that I like from European publishers, is the cloth bookmark attached to the top of the binding that can be used to mark my place.

The taxonomic actions include designation of one neotype and seven designations of lectotypes. Descriptions include two new subtribes, two new genera, four new subgenera, and four new species. Additional taxonomic actions include two taxa that are revised to species, and two species that are revised to subspecies. There are 17 new combinations, and designations of nine new synonyms.

The text is written in impeccable, and easy to understand, English. The first 101 pages of the book are text followed by 28 plates of colored illustrations of 120 species and subspecies of moths enlarged, eight moths per page (see back cover). Many of the illustrated specimens are holotypes, paratypes, lectotypes, paralectotypes, and one neotype. The enlarged size allows easy examination of details of many species that are remarkably similar in appearance. The plates are printed on both sides of the page; each specimen is identified on the plate. The next 20 color plates are show the moths life-size with 20 to 54 specimens per page. The moths are printed in color on the right-hand side (odd numbered pages), and the legends for the plates are printed on the opposing left side (even numbered pages). The legend includes the name of the species, the sex of the specimen, the type status, if any, the collecting locality, the collecting date, the name of the collector, the slide number if the specimen was dissected, and the name of the collection housing the specimen. The background color is white; the color of the moths is brilliant. The detail is clear, and the registry (alignment of colors) is excellent. Following the color plates are 106 pages of outstanding black-and-white photographs of genitalia (see back cover). The next 12 pages include the references, followed by the index including generic, species, and subspecies names. The index does not include names of plants.

The entry in the text for each taxon includes the complete name of the taxon, the author, and year of description. The reader is directed to the plate showing the adults and the genitalia. If the taxon was described prior to this publication, the citation for the original description is given. The history of synonymy of a taxon is given, whereas the historical use of the name in literature is not given. The designation of synonyms, revisions in status, and other taxonomic actions, if any, are included for each taxon. Each species is diagnosed, and the distribution is circumscribed. Details about the distribution, such as elevations, habitat types, and flight times of adults are given. Further notes, such as remarks about the type series of a previously described species containing multiple species are given. Life history information, if known, is not given.

The descriptions of new species are truncated from what I am used to finding in serial literature. The descriptions consist of the diagnosis and comparisons to similar species. The details of the descriptions include color traits and structures of the genitalia evident from examination of the plates. Telescopic writing is not used in the descriptions of the new taxa.

The usual sections of the book I expect to find including details about the authors, the table of contents, commonly used abbreviations, acknowledgments and introductory materials (Preface) are present. The implied abstract is the section titled "Taxonomic and nomenclatural summary."

I was eager to review this book because I own the previous nine volumes in the series, and I want to share them with the readers of the NEWS and members of The Lepidopterists' Society. According to the website for the Witt Catalogues, nine more volumes are in preparation. In my opinion, this is an outstanding series of revisionary works covering part of the world most of us, in North America, seldom get to see; Northern Africa, Eastern Europe and Asia including China, the Koreas, and Japan. The exquisite color illustrations and extremely well executed genitalia illustrations (see back cover) are a pleasure for the eyes. I only wish I could prepare such fine photographs of genital organs.

Many of the species are illustrated in color, larger-than-life, the photographs of genitalia are of the highest quality, and each page of genital illustrations includes one species, both male and female, enlarged and in exquisite detail. The details of the photographs are hard to describe unless you get to see one, and I highly recommend that you take

a look. The cost of producing the work of this quality must be enormous, and fortunately the work is supported by a series of grants, cited in the acknowledgments, grants that are not unavailable in the western hemisphere.

The authors of this book are highly acclaimed experts in the field, therefore I have no comments on the taxonomy nor the nomenclature. The authors are responsible for the work, and because of their expertise, I accept what they say. Others may refine, with new descriptions and detailed revisions, our interpretation of the contents of this book. If you ever wondered about some of the nomenclatural changes to the names of moths, you could discover that some may come from books like this series. The extensive list of references examined and the inclusion of photographs of so many type specimens attest to the extensive research and scholarship of the authors.

The editor of the NEWS, James Adams, does an excellent job introducing us to many species occurring worldwide. With species constantly being transported from continent to continent I feel it is important to be familiar with worldwide faunas. The contemporary article in the Journal of The lepidopterist's Society by Crabo and Holden (2020) illustrates the importance of knowing species that are extra-limital to any continent.

My research just north of the border between US and Mexico leaves me wondering if any of the supposedly "new" ones are already described from Mexico or farther south. If books like the Witt Catalogues were available for Mexico and Central America, my research would be less arduous.

I give a quick editorial about the cost of this book. It is not inexpensive, however at €170,00 it is a real bargain for the quality, the scholarship, and the geographical coverage. Not only is the quality very high, I can think of nowhere else a person can obtain a single volume covering such a huge geographical region of the globe with color photographs of all the species and high quality illustrations of genital organs.

This book is the tenth in the series, and they can be ordered by subscription. If somebody orders the full series, they are offered a special, one time, 30% discount by the publisher. Only a few copies of the first three volumes remain in stock and are not expected to stay in print beyond the end of 2020. Volume 11 (Hadeninae: Poliina) was published 7 May 2020.

This book, and the others in the series, with high scholarship and production values are especially important. It is a worthy reference and addition to your library.

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Crabo, Lars G. and David G. Holden. 2020. A review of established accidentally-introduced Noctuoidea in the Pacific Northwest region of North America, with first report of the Eurasian cutworm *Mesapamea secalis* (L.) (Noctuidae, Noctuinae, Apameini) for North America. Journal of The Lepidopterists' Society. 74 (2): 95–105.

Membership Updates

Chris Grinter

Includes ALL CHANGES received by May 11, 2020. 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)*

Robert Blakney: 7219 North Starcrest Dr., Warrenton, VA 20187 (bb1950@comcast.net)
Lois A. Bolin: 5009 Berkeley Dr., Naples, FL 34112 (Lois@LoisBolin.com)
Trevor Edmonson: [address red. by req.] (trevoredmonson@gmail.com)
Chad Michel Hawthorne: 916 South View Dr., Molalla, OR 97038 (chawthor@uoregon.edu)
Suzanne Herel: [address red. by req.] (suzanne.herel@gmail.com)
Trip Lamb: Department of Biology, East Carolina University, Greenville, NC 27858 (lamba@ecu.edu)
Anna McDonald: 1 Grand Army Plaza Apt 4A, Brooklyn, NY 11238 (mcdonald.anna@gmail.com)
Karri McGovern: [address red. by req.] (karri.mcgovern@sbcglobal.net)
Valeria Palma Onetto: Orompello 1470, depto 1507, Concepción, Bio Bio, CHILE 473000 (valeria.palmaonetto@gmail.com)
Lucio Antonio Sanchez: [address red. by req.] (sanchezlucio622@gmail.com)

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

Thomas W. Carr: 6626 Weckerly Drive, Whitehouse, OH 43571 (tom_robyn_carr@yahoo.com)
Laurence Crabtree: P.O. Box 213, Bieber, CA 96009 (ldcrabtree@frontiernet.net)
Juan Grados: Av. Arenales 1256 Jesús María, Universidad Nacional Mayor de San Marcos, Lima, PERU 15072 (gradosjuan@yahoo.com)
Brian P. Harris: 6714 Cockerille Ave, Takoma Park, MD 20912 (brhar@comcast.net)
Genevieve M. Kozak: 285 Old Westport Rd, SENG 328A, Dartmouth, MA 02747 (gkozak@umassd.edu)
Wallace Mattson: 2718 W 15th Street, Duluth, MN 55806 (mattsonw@gmail.com)
Hector Alejandro Merchan: 188 Box Lane, Sacramento, CA 95818 (hector.merchan@gmail.com)
Joe E. Riddlebarger: 31 N. St. Augustine Blvd., St. Augustine, FL 32080 (jriddlebarger@earthlink.net)

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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
The Lepidopterists' Society
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Bakersfield, CA 93311

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(outside U.S., for above add 5$ for Mexico/Canada, and 10$ elsewhere)	
Life	1800.00
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Air Mail Postage, **News**	15.00
($30.00 outside North America)	

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

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Please send permanent changes of address, telephone numbers, areas of interest, or e-mail addresses to:

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Journal of The Lepidopterists' Society

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60 West 13th Street
New York, NY 10011
cabutler1@outlook.com

WebMaster

Todd Gilligan, Colorado State University, Bioagricultural Sciences and Pest Management, 1177 Campus Delivery, Fort Collins, CO 80523-1177, (970)490-4478
tgilliga@gmail.com

Submission Guidelines for the News

Submissions are always welcome! Preference is given to articles written for a non-technical but knowledgable 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/inch^2 for interior use, 1800 x 2100 for covers.

2. Article (and graphics) on disk or thumb drive in any of the popular formats/platforms. Indicate what format(s) your disk/article/graphics are in, and call or email if in doubt. The InDesign software can handle most common word processing software and numerous photo/graphics software. Media will be returned on request.

3. Color and B+W graphics; should be high quality images suitable for scanning. Original artwork/maps should be line drawings in pen and ink or good, clean photocopies. Color originals are preferred.

4. Typed copy, double-spaced suitable for scanning and optical character recognition.

Submission Deadlines

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

Issue		Date Due
62	3 Fall	August 15, 2020
	4 Winter	November 15, 2020
63	1 Spring	February 12, 2021
	2 Summer	May 12, 2021

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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President

Alma Solis
Research Entomologist
Systematic Entomology Lab
USDA, Smithsonian Inst.
P.O. Box 37012, National Museum of Natural History
E-517, MRC 168
Washington, D.C. 20013
(202)633-4573
alma.solis@usda.gov

Past President

Brian Scholtens
Biology Dept., College of Charleston, 66 College St.
Charleston, SC 29424-0011
(843)953-8081
scholtensb@cofc.edu

Vice Presidents

Andrew V. Brower (1st VP)
Assistant Director, National Identification Services (NIS)
USDA APHIS PPQ Plant Health Programs
4700 River Rd., Unit 52
Riverdale, MD 20737
(301)851-2243 ***Andrew.V.Brower@APHIS.USDA.gov***

André Victor Lucci Freitas
Departamento de Biologia Animal, Universidade Estadual de Campinas, CP 6109, Campinas, Sao Paulo, 13083-970, Brazil
55-19-35216310
baku@unicamp.br

Jeffrey Marcus
Dept. of Biological Sciences
208 Biological Sci. Building
University of Manitoba
Winnipeg, Man. R3T 2N2
Canada (204)474-9741
Jeffery.Marcus@umanitoba.ca

Treasurer

Kelly M. Richers
9417 Carvalho Court
Bakersfield, CA 93311
(661) 665-1993 (home)
kerichers@wuesd.org

Secretary

Todd Gilligan
(see Webmaster, opposite)
tgilliga@gmail.com

Assistant Secretary & Assistant Treasurer

Chris Grinter
The California Academy of Sciences, 55 Music Concourse Drive, San Francisco, CA 94118; 847-767-9688
cgrinter@gmail.com

Publications Manager

Kenneth R. Bliss
1321 Huntington Trail
Round Rock, TX 78664
(512)850-1700
krbliss@gmail.com

Editor, Journal of The Lepidopterists' Society

Keith Summerville
Dept. of Environmental Science and Policy, 131 Olin Hall, Drake University
Des Moines, IA 50311-4505
(515)271-2498
ksummerville@drake.edu

Editor, News of The Lepidopterists' Society

James K. Adams
School of Sciences and Math
Dalton State College
650 College Drive, Dalton, GA 30720 (706)272-4427
jadams@daltonstate.edu

Editor, Memoirs of The Lepidopterists' Society

Kelly Richers
(see Treasurer, left)

WebMaster

Todd Gilligan
(see WebMaster opposite)

Members-At-Large

Chuck Harp, Elizabeth Long, Debbie Matthews, Jason Dombroskie, Todd Stout, Geoff Martin, Jeffrey Pippen, Reginald Webster, David Wright

Season Summary Zone Coordinators

Refer to Season Summary for Zone coverage details.

Chief Season Summary Coordinators/Editors

Brian G. Scholtens
Biology Department
College of Charleston
66 College Street
Charleston SC 29424-0001
(843) 637-6224
scholtensb@cofc.edu

AND

Jeff Pippen
101 Forest Oaks Dr.
Durham, NC 27705
jeffpippen9@gmail.com

Zone 1, The Far North:

Crispin Guppy
5 Boss Road, Whitehorse, Yukon Y1A 5S9, Canada
(778) 256-1251
csguppy@gmail.com

Zone 2, The Pacific Northwest:

Jon H. Shepard
4925 SW Dakota Ave.
Corvallis, OR 97333
(541) 207-3450
shep.lep@netidea.com

Zone 3, The Southwest:

Ken Davenport
8417 Rosewood Avenue
Bakersfield, CA 93306
(661) 366-3074
kdavenport93306@yahoo.com
with help on moths from Kelly Richers (see Treasurer, this page)

Zone 4, The Rocky Mountains:

Chuck Harp
8834 W. Quarto Ave.
Littleton, CO 80128-4269
(720) 981-5946
cehmoth@aol.com

Zone 5, The Plains:

Michael M. Ellsbury
70855 Highway 8
Fairbury, NE 68352-5565
(402) 805-5456
bugsnrails@gmail.com

Zone 6, Texas:

Mike A. Rickard
411 Virgo Street
Mission, TX 78572
(956) 519-0132
Cell: (281) 734-1110
folksinger4@yahoo.com

Zone 7, Ontario and Quebec:

Jessica E. Linton
245 Rodney Street
Waterloo, ON, Canada
N2J 1G7, (519) 489-2568
Cell: (519) 502-3773
jessicalinton86@gmail.com

Zone 8, The Midwest:

Thomas Jantscher
2800 Rustic Pl. Apt. 206
Little Canada, MN 55117-1389, (612) 875-1710
tjantscher@gmail.com

Zone 9, The Southeast:

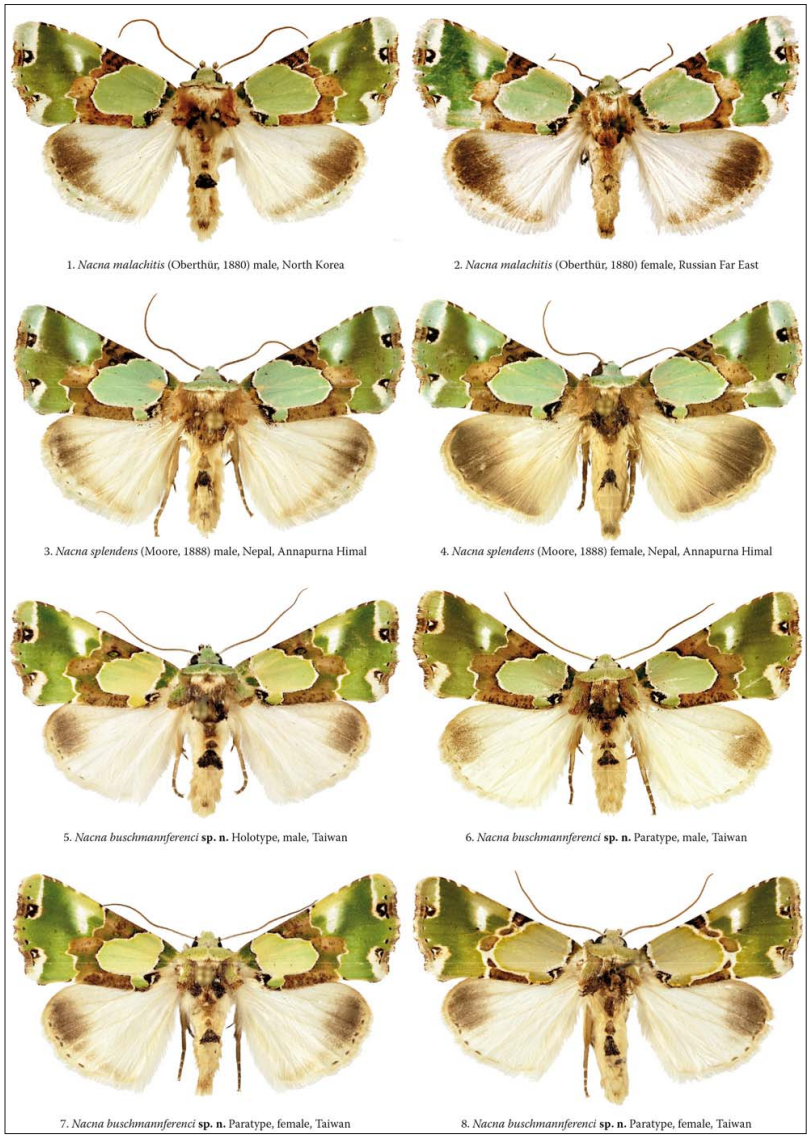
Brian G. Scholtens
Biology Department
College of Charleston
66 College Street
Charleston SC 29424-0001
(843) 637-6224
scholtensb@cofc.edu

Zone 10, The Northeast:

Mark J. Mello
c/o Lloyd Center,
430 Potomska Rd
Dartsmouth, MA 02748
markmello@lloydcenter.org

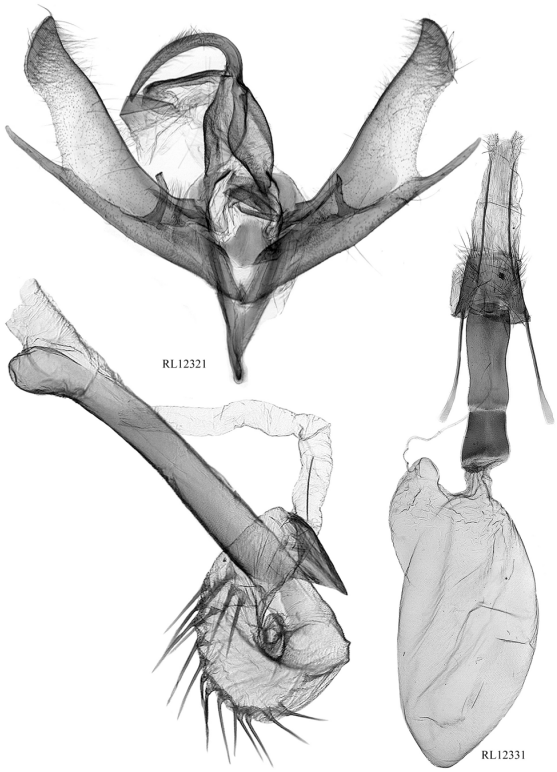
Zone 11, Mexico & the Caribbean:

Isabel Vargas Fernandez
Museo de Zoologia,
Facultad de Ciencias,
Univ. Nacional Autonoma Mexico, Apartado Postal 70-399, D.F., Mexico 04510
ivf@ciencias.unam.mx



A plate of *Nacna* species from The Witt Catalogue Volume 10. A Taxonomic Atlas of the Eurasian and North African Noctuoidea: Psaphidinae II. - Erebidae II. See the review of this book, page 96, by Eric Metzler.

Broadbilled Motmot (*Electron platyrhynchum*) tussling with sphingid moth (*Eumorpha* sp., maybe *triangulum*). See more images page 95.



Genitalia of *Phidrimana amurensis* (Staudinger, 1918), illustration from The Witt Catalogue Volume 10. A Taxonomic Atlas of the Eurasian and North African Noctuoidea: Psaphidinae II. - Erebidae II. See the review of this book, page 96, by Eric Metzler.

Final instar larva of *Hyalophora euryalus* from Clark Co., Washington, reared on Douglas Fir (*Pseudotsuga menziesii*). See related article on page 80.