Volume 64, Number 1 Spring 2022

NEWS OF THE LEPIDOPTERISTS' SOCIETY

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Inside:

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Volume 64, Number 1
Spring 2022

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

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

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

Contents

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Issue Date: February 14, 2021 ISSN 0091-1348
Editor: James K. Adams

Front Cover:

On August 7, 2021, in Harwinton, Connecticut I placed a reared female Monarch butterfly on our butterfly bush. When I came back to check on her I was shocked to see a male Tiger Swallowtail was coupled with her. I have raised monarch butterflies for over 30 years and have never seen such a sight! I immediately grabbed my phone to take several photos and videos. I placed the two coupled butterflies into a screened in tent in our backyard. I then went to a nearby nursery where I purchased milkweed and some flowering plants with hopes that the female would lay eggs and they would have nectar in the meantime. I released the male after a couple days. The female was released after 7 days (after laying eggs), but unfortunately her eggs were not viable. But it was such an awesome experience for my husband and myself and we wanted to share with everyone! Pam Rahn, **fergie55555@hotmail.com.**

Some notes on *Heraclides andraemon* and its subspecies

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ABSTRACT: *Heraclides andraemon* and its subspecies are discussed and illustrated. Ways to differentiate the sexes of *H. andraemon* and two other closely related *Heraclides* species from the Caribbean are also presented.

Three closely related species of *Heraclides* occur in the Caribbean region. *Heraclides andraemon*, which has three described subspecies, *H. aristodemus* which has five or possibly six subspecies (depending on actual status of *H. a. driophilus*) and *H. machaonides* which is monotypic.

They all have larvae which feed on rutaceous host plants, and are all birdlime mimics in the early instars. The male and female of *H. andraemon* are easily differentiated by the submarginal lunules on the hindwing. In the male they are yellow, but in the female they are always dusted with or heavily marked with red or orange. Occasionally a female has no trace of orange or only a small amount, but that is very rare. There is also an occasional male with a trace of orange. *H. machaonides* females also have the submarginal lunules orange or at least heavily dusted with orange. The males of *H. machaonides* usually have yellow submarginal lunules, but the senior author has collected and examined some where the lunules are also orange, but not as heavily dusted as in the females. This dusting does not seem to occur in *H. aristodemus* as both male and female have ochreous or yellowish submarginal lunules.

One other interesting aspect which is not often noted in the literature is that all three species, *H. andraemon, H. aristodemus* and *H. machaonides*, can be easily differentiated in the male and female by the color of their antenna. The males have antennae which are dark brown with a yellow club and a dark brown tip, while the females have completely black antennae (Fig. 1). Upon microscopic examination, some females have a few lighter colored scales at the club of the antenna, but these are really not visible to the naked eye, and not useful for identification purposes.

In all the literature cited for the above three species, it is mostly stated that sexes are similar, but females are generally larger than males. Only in Brock and Kaufman (2003), and Minno and Emmel (1993) are these differences in antenna color properly noted. In no other *Heraclides* species is this aspect of antenna color known.

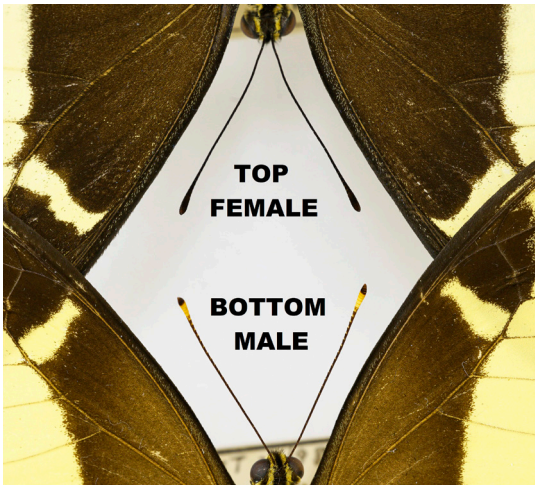

Figure 1. Close up of male and female antennae of *Heraclides andraemon*.

Heraclides andraemon andraemon (Fig. 2) is found on Cuba and Jamaica. The population from the lesser Cayman Islands is also regarded as the nominate subspecies. This subspecies is characterized by its broad yellow discal band on both wings. Very rarely does it have any indication of submarginal lunules on the upper side of the forewing, and when it does, it is more often in the female. Most specimens have a pronounced bar in the forewing cell on the upper side. The females have the hindwing submarginal lunules dusted with orange, sometimes quite heavily. The name 'Hernandezi' de la Torre, which was originally described as a subspecies is merely a form which occurs in most females. *Heraclides andraemon bonhotei* (Fig. 3) is found throughout the Bahamas and the Turks and Caicos Islands. It is also occasionally found on the Florida Keys. This subspecies has the yellow discal band on both wings much narrower and the cell bar on the upper side of the forewings pronounced. Most specimens have at least vestigal and sometimes very pronounced submarginal lunules on the forewing upper side. Females also have the submarginal lunules on hindwing dusted with variable amounts of orange. Throughout its range in the Bahamas, *andraemon bonhotei* forms a cline from north to south. In the north from Grand Bahama, the Abacos and islands on the Great Bahama Bank, specimens tend to be large with almost spatulate tails and a large central yellow spot. Specimens from around Nassau, New Providence are sometimes extremely large. As one proceeds further south on Rum Cay, Crooked Island, and Mayaguana, the specimens tend to be smaller with the tails a bit less spatulate and the yellow spots on tail not so pronounced.

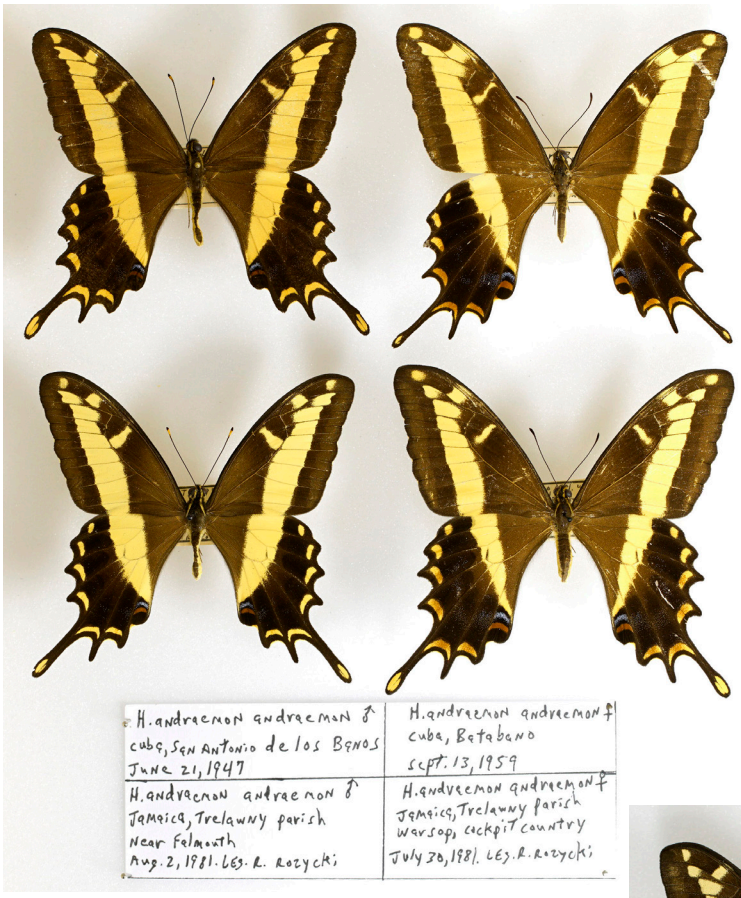

Figure 2. *H. andraemon andraemon* from Cuba and Jamaica.

Going further south, on Great Inagua and the Turks and Caicos Islands, specimens are similar but some are very small and have spiked tails totally devoid of yellow spots. Future studies would need to be carried out to determine whether this phenomenon is a genetic or environmental factor.

Heraclides andraemon tailori (Fig. 4) is found only on Grand Cayman Island. The width of the yellow discal band is somewhere intermediate between the other two subspecies. The yellow cell bar can be very small, vestigial or almost completely absent. The type specimen plated in Rothschild and Jordan, 1967, demonstrates this nicely. Females have at least some orange dusting in the submarginal hindwing lunules.

When long series of all three *H. andraemon* ssp. were examined, it was found that the width of the yellow discal band and cell bar is quite variable. Carpenter and Lewis (1943) noted that *andraemon* specimens from Grand Cayman were variable in appearance, some approaching to a degree the Bahamian subspecies, *bonhotei*. Specimens were said to be abundant in the Georgetown area and noticeably very large, while in other, drier areas they were much smaller. They saw no *andraemon* at the eastern end of the island. They also remarked that their series of specimens from the Lesser Caymans were small, some exceptionally so, and they believe that they differ subspecifically from the Cuban form.

While performing a moth survey for University of Florida McGuire Center on the Cayman Islands in June 2017, three of the authors were able to secure a small series of *H. andraemon* on Little Cayman (Fig. 5). They also collected some specimens at the east end of Grand Cayman. They did no collecting on Cayman Brac at that time. On Grand Cayman one male which was very small was collected near Compass Point condos on the east end of the island. It matches *a. tailori* fairly well, except the cell bar is very pronounced. The two females that were taken there are also small and both have very narrow yellow discal bands along with small cell bars. The tails are also longer and thinner than average. In the specimens taken on Little Cayman, the males (only three) have the yellow discal band variably wide, cell bar pronounced and one has a fairly distinct row of submarginal spots on the forewings. The females (nine) have a narrow yellow discal band, about as restricted as in *a. bonhotei*,

Figure 3. *H. andraemon bonhotei* from the Bahamas and Turks & Caicos.

Figure 4. *H. andraemon tailori* from Grand Cayman Island, and *H. andraemon bonhotei* from the Bahamas.

a variable cell bar and a few have a limited amount of submarginal lunules on forewing. On average, the Little Cayman specimens are very small.

Specimens of all three subspecies of *H. andraemon* found throughout their range are illustrated to show variation. Also shown is a close-up shot of male and female antennae.

ACKNOWLEDGEMENTS

We would like to thank the Department of Agriculture, and local government of the Bahamas for providing collecting permits. We thank Jane Haakonsson from the Department of Environment, Grand Cayman Island, for collecting permits issued in June 2017. We thank Dr. Jacqueline Miller for reviewing this manuscript and providing valuable suggestions. We would also like to thank Larry Burk for photographing the specimens.

LITERATURE

Askew, R.R. and P.A. van B. Stafford. 2008. Butterflies of the Cayman Islands. Apollo Books, Denmark.

Brock, J.P. and Kaufman, K. 2003. Field Guide to Butterflies of North America. Houghton Mifflin Company, New York.

Brown, F.M. and Heineman, B. 1972. Jamaica and it's Butterflies. E.W. Classey Limited, London.

Carpenter, G.G.H. and Lewis, C.B. 1943. A collection of Lepidoptera (Rhopalocera) from the Cayman Islands. Annals Carnegie Museum 29: 371-396.

D'Abrera,B. 1981. Butterflies of the Neotropical Region. Part 1. Papilionidae and Pieridae. East Melbourne, Landsowne Editions.

Hernandez, L.R. 2004. Field Guide of Cuban-West Indies Butterflies. Editorial de la Universidad del Zulia.

Klots, A.B. 1951. A Field Guide to the Butterflies of North America East of the Great Plains. Houghton Mifflin Company, Boston.

Minno, M.C. and Emmel, T.C. 1993. Butterflies of the Florida Keys. Scientific Publishers, Inc., Gainesville.

Riley, N.D. 1975. A Field Guide to the Butterflies of the West Indies. Collins, London.

Rothschild, L.W., Hartert, E.,and Jordan, K. Facsimilie – Edition 1967. A Revision of American Papilios. Novitates Zoologicae, Tring, 13: 411-752, pls. 4-9.

Smith, D.S., L.D. Miller and J.Y. Miller. 1994. The Butterflies of the West Indies and South Florida. Oxford University Press Inc., New York.

Tyler, H.A. 1975. The Swallowtail Butterflies of North America. Naturegraph Publishers, Inc., California.

Tyler, H.A. Brown, K.S. and Wilson, K. 1994. Swallowtail Butterflies of the Americas. Scientific Publishers Inc., Gainesville.

Figure 5. *H. andraemon* from Little Cayman Island.

Wolves in sheep's clothing: predation by *Chalcoela* (Crambidae) of *Polistes* wasp immatures and additional wasp nest infestations by *Niditinea orleansella* (Tineidae)

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Introduction

There are two similar, small but beautiful crambid moth species in the United States whose caterpillars are predators of wasp immatures. *Chalcoela pegasalis* (Walker, 1859) (Fig. 1) occurs in the southeastern United States and in the Caribbean; *C. iphitalis* (Walker, 1859) populates the rest of the United States and Canada. These two closely related species have remarkable and similar life histories.

There are several studies of this predator/prey associations, mostly conducted by wasp researchers. In northern Georgia, for example, 5% of *Polistes metricus* nests were found to have been attacked by *Chalcoela pegasalis* (Hodges et al., 2003). These authors found that the more advanced the stage of development of the immatures inside a nest, the more likely it is to be infested. According to the sources cited in that study, *C. pegasalis* lays eggs on the larvae or pupae of *Polistes*, and these occurrences are frequent, with around 10% of *Polistes annularis* and *Polistes fuscatus* colonies infested by *C. pegasalis* in Missouri, for example.

More is known about the widespread *Chalcoela iphitalis*, which commonly attacks *Polistes metricus* in southern Illinois and in Texas. Madden *et al.* (2010) report that these moths also attack the invasive European *P. dominulus*. Predation on immatures of *Mischocyttarus flavitarsis* paper wasps by *C. iphitalis* larvae has been documented by Little (1979) and Nacko & Henderson (2017). According to the latter study, the nest infestation rates vary considerably between the wasp species, ranging from 50% in the case of *P. bellicosus* to no infestations in some of *Mischocyttarus* species.

The frequencies of predation by *Chalcoela pegasalis* on *Polistes* nests (*P. crinitus*, *P. dorsalis*, and *P. major*) were studied in Jamaica by Starr & Nelson (2015). On the campus of the University of the West Indies, numerous nests of all three species could be collected from the buildings, all presumably equally exposed to the moths. Despite that, *P. crinitus* colonies experienced predation rates as high as 27%, while *P. dorsalis* nests were infested in 5.6% of cases, and *P. major* - only 0.5%, demonstrating that either wasps have different levels of defense against these moth predators, or that moth preferentially prey on some wasp species over others.

McCormac (2014) depicted the white grub-like caterpillar of the *Chalcoela iphitalis* that he found in a nest, near which a female moth had previously been observed. Buck (2016) illustrated a nest of *Polistes apachus* infested by *C. iphitalis*, demonstrating that a cell with a single wasp pupa may result in several moth cocoons. However, Nacko & Henderson suggest that one moth caterpillar destroys, on average, one wasp immature, and sometimes moves sideways into a neighboring cell if it runs out of food.

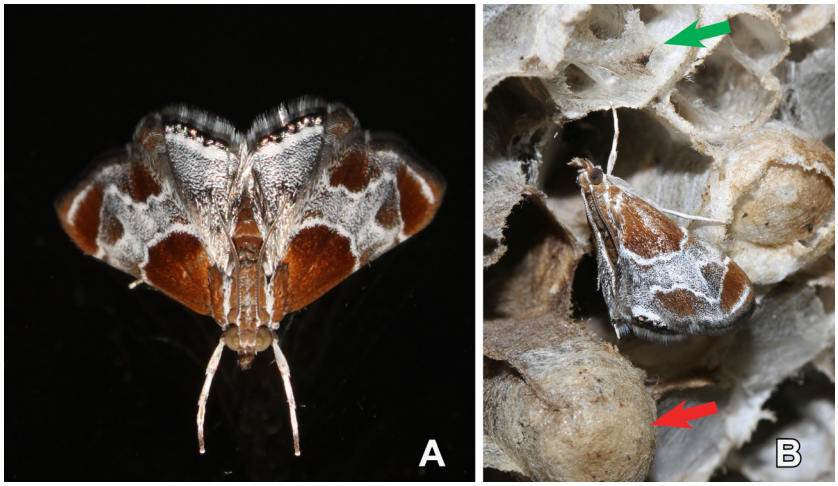

Fig. 1. Predatory Pegasus Moth, *Chalcoela pegasalis*: (A) Adult moth. Its dorsal hindwing pattern supposedly helps the moth mimic a jumping spider; (B) Moth eclosed from the *Polistes* wasp nest: Arrows: green – cells where immature wasps were destroyed; red – seemingly normal wasp cells.

Observations of *Chalcoela pegasalis* and *Niditinea orleansella* developing in *Polistes* wasps' nests

I had two personal encounters with *Chalcoela pegasalis* in north-central Florida. During the first, a local naturalist, Eric Anderson, discovered moths emerging from a *Polistes* nest containing about 100 active cells (Fig. 2), which he collected near Williston, Florida

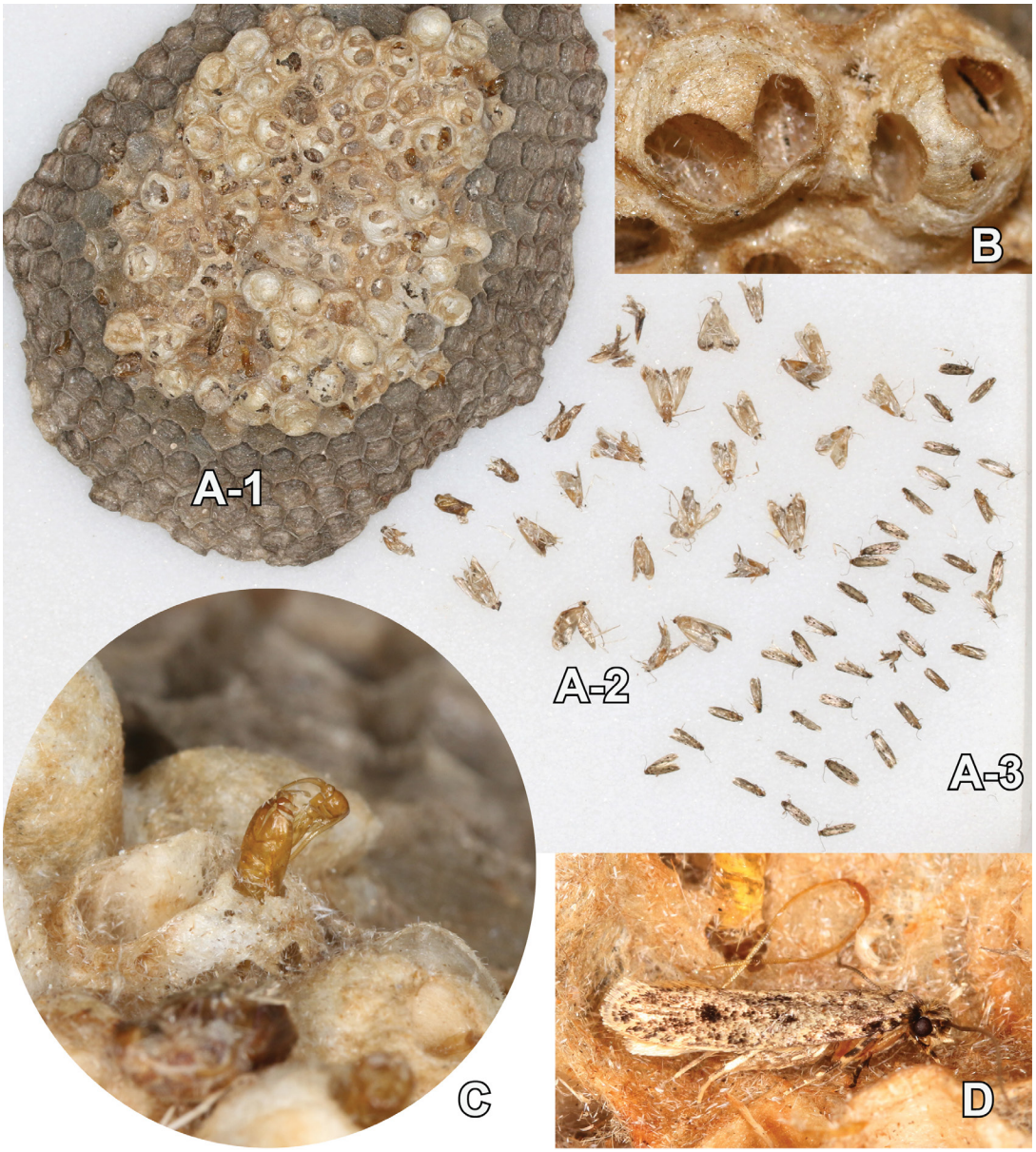

Fig. 2. *Chalcoela pegasalis* crambids (A-2) and *Niditinea orleansella* tineids (A-3) reared from a *Polistes* wasp nest (A-1) collected in August 2018 near Williston, Florida; (B) *Polistes* nest cells, from which *C. pegasalis* adults emerged; (C) One of the many pupal cases of *N. orleansella*; (D) A close-up of *N. orleansella.*

in 2018. *C. pegasalis* continued to emerge until early September. Recently, after examining the container where I had stored the nest since, I discovered that an additional 40 tineid moths, *Niditinea orleansella* (Chambers, 1873) also emerged from the nest.

The second encounter happened in February 2019, when I removed a small *Polistes* nest from a birdhouse in my backyard in Gainesville. From approximately 70 cells of this nest, about 30 *Chalcoela pegasalis* emerged in March. Dissection of the nest yielded, not only signs of caterpillar infestation, but also intact cocoons and a dead pink caterpillar (Fig. 3).

Chalcoela pegasalis individuals that emerged from the first nest appeared to be smaller and more frequently malformed than those that emerged from the second nest. The appearance of the 2018 nest is also different from the 2019 nest: while, in the former, the moths' cocoons open at the top and appear to be woven into the wasp silk enclosing each cell (Fig. 2B), in the latter, a loose silk, presumably spun by the caterpillars, encloses the cells at the top (Fig. 3C). The difference is likely a result of the developmental stage of the wasps' immatures when they were attacked by *C. pegasalis*.

By comparing the photographs of the 2018 nest before and after the *Niditinea orleansella* moths emerged, one can conclude that the pupal cases protruding from this nest belong to these tineid moths (Fig. 2C), as they appeared only after they eclosed.

Discussion

An obvious question is: How do the moths and their caterpillars escape the wasps' vigilance? Busk in his 2016 BugGuide.com post suggests that the webbing that caterpillars spin may be tough enough to protect them from the wasps. The laboratory behavior of *Chalcoela iphitalis* described by Nacko & Henderson (2017) reveals that adult wasps frequently display an alarm behavior when sensing moths and chase them away. The moths get around it to some extent by being nocturnal and ovipositing near the nest, so neonate caterpillars must locate the food by crawling into the nest.

It takes, according to Nacko & Henderson (2017), four weeks for the moths to develop at 22°C, so probably around three weeks are spent in the caterpillar stage. While the caterpillars' means of evading wasp attack are unclear,

Fig. 3. *Chalcoela pegasalis*: (A) *Polistes* wasps' nest collected in Gainesville, Florida, in February 2019, from which 30 *C. pegasalis* emerged; (B) A cross-section of a seemingly intact cell with a dead wasp and a caterpillar of *C. pegasalis* (blue arrow) that may have entered from a neighboring cell; (C) Cells enclosed with caterpillar silk; (D) *C. pegasalis* cocoon; (E) A cross-section of a cell impacted by *C. pegasalis* showing caterpillar silk tunnels and frass.

McCormac in his blogpost suggests that *Chalcoela iphitalis* mature caterpillars are similar in appearance to the wasp larvae, thereby eluding notice as intruders. However, it remains to be determined whether there is an additional chemical crypsis at work, as in the case of predatory Lycaenidae larvae living in ants' nests.

Nacko & Henderson (2017) only described feeding damage to a large mature wasp larva by a small caterpillar of *Chalcoela iphitalis*, and this observation does not suggest parasitoid mode of development (trying to keep the host alive while feeding on it) but rather a simple act of predation. *Chalcoela* moths turned the table on the predatory wasps and became predators of wasp immatures, even though these moths are frequently portrayed in literature as "parasites."

Finally, while this note is meant to bring attention to an interesting, albeit previously described by others, trophic interaction between *Polistes* wasps and *Chalcoela* moths, it also describes two additional pairs of interactions: between wasps and *Niditinea orleansella* and between these tineids and *Chalcoela* moths.

Did tineid development inside the wasps' nest relate directly to the presence of *C. pegasalis*, or would it occur inside any vacant nests of *Polistes*? Metz et al. (2018) had recently clarified taxonomy and host associations within the genus *Niditinea* and, while stating that the biology of *Niditinea orleansella* "*is unknown*" (p. 154), also say, in the caption of Fig. 23, that "*maximum of five independent records of N. orleansella reared from uninhabited Polistes nests*" exist (p. 164). These authors caution however that, because of the difficulties of identifying *Nitidinea*, and because there may be more species of *Niditinea* out there than have been described, there may be additional host associations discovered in the future.

Niditinea orleansella and *Chalcoela pegasalis* infestations of the same *Polistes* nest has not, to my knowledge been previously reported. Was the larval feeding of the former responsible for the reduced fitness of the latter? Much remains to be explored in a scenario where these

three species co-mingle in a predator-prey-scavenger relationship. Additional studies of life histories with a focus on caterpillars, rather than the wasps, would help to clarify these questions.

Acknowledgements

I thank Eric Anderson for bringing the moth-infested wasps' nest to my attention and donating it to our museum, Jim Hayden for identifying *Niditinea orleansella*, and Alexandra Sourakov for proofreading this note.

References

Busk, M. 2016. **https://bugguide.net/node/view/1301957** [last accessed November 2021]

Hodges, A.C., Hodges, G.S. and Espelie, K.E. 2003. Parasitoids and parasites of *Polistes metricus* Say (Hymenoptera: Vespidae) in northeast Georgia. *Annals of the Entomological Society of America*, 96(1): 61-64.

Litte, M., 1979. *Mischocyttarus flavitarsis* in Arizona: social and nesting biology of a polistine wasp. *Zeitschrift für Tierpsychologie*, 50(3): 282-312.

Madden, A.A., Davis, M.M. and Starks, P.T. 2010. First detailed report of brood parasitoidism in the invasive population of the paper wasp *Polistes dominulus* (Hymenoptera, Vespidae) in North America. *Insectes sociaux*, 57(3): 257-260.

McCormac, J. 2017. Wasp-eating moth fills rare niche. **http://jimmccormac.blogspot.com/2017/02/wasp-eating-moth-fills-rare-niche.html** [last accessed November 2021]

Metz, M.A., Davis, D.R. and Davis, M.M., 2018. A new species of *Niditinea* (Tineidae: Tineinae) with a preference for bird nests, and the known larval habitats of the species in the United States. *Proceedings of the Entomological Society of Washington*,120(1): 153-166.

Nacko, S. and Henderson, G. 2017. A preliminary investigation of the interactions between the brood parasite *Chalcoela iphitalis* and its Polistine wasp hosts. *Insects*, 8(3): 89.

Starr, C.K. and Nelson, J.M. 2015. Differential nest parasitism in three sympatric social wasps (Hymenoptera: Vespidae: *Polistes* spp.) in the West Indies. *Sociobiology*, 62: 604–606.

Strassmann, J.E. 1981. Parasitoids, predators, and group size in the paper wasp, *Polistes exclamans. Ecology* 62: 1225-1233.

Membership Updates

Chris Grinter

Includes ALL CHANGES received by February 11, 2021. Direct corrections and additions to Chris Grinter, **cgrinter@gmail.com.**

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

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Diversity of *Calydna* and symachiine relatives in 2017 at a lowland site along the Las Piedras River in southeast Peru

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Figure 1. Map of Peru and location of the Amazon Research and Conservation Center (ARCC) in southeastern Peru.

All photos by the author

I had traveled with Mariposa Butterfly Tours (MBT) to South America on several occasions, but always to the Andes. When I asked David Geale, the owner/administrator of MBT, to guide four photographers to a lowland site with primary rainforest he suggested the Amazon Research and Conservation Center (ARCC, also sometimes referred to as Lago Soledad). He had visited the site previously on birding tours and reported that it had terra firme forest (not flooded), varzea forest (seasonally flooded), bamboo-infested forest, light gaps (especially around the lodge and oxbow lake), and river beaches. We all signed up and agreed on late September-early October.

ARCC is located at 230 m elevation in the Upper Amazon River Basin along the Las Piedras River in Southeast Peru (Fig. 1, Fig. 2). The headwaters of the Las Piedras begin in the Alto Purus National Park (the "Upper Piedras"), 650 km from its confluence with the Madre de Dios River at Puerto Maldonado. The Upper Piedras is home to isolated native indigenous tribes. ARCC is along the "Middle Piedras", the more accessible but still biologically rich lower section of the river.

Unlike the Upper Piedras, the Middle Piedras is presently divided into numerous individual land concessions, each managed based on long-term rights agreements with the Peruvian government. Most of these concessions were designated for the harvest of timber or non-timber forest products (mostly Brazil nuts). Just a few are currently managed for reforestation, ecotourism, or conservation. There apparently is little enforcement of concession agreements, however, so illegal activities like over-harvesting of timber, road building, clearing for agriculture and pasture,

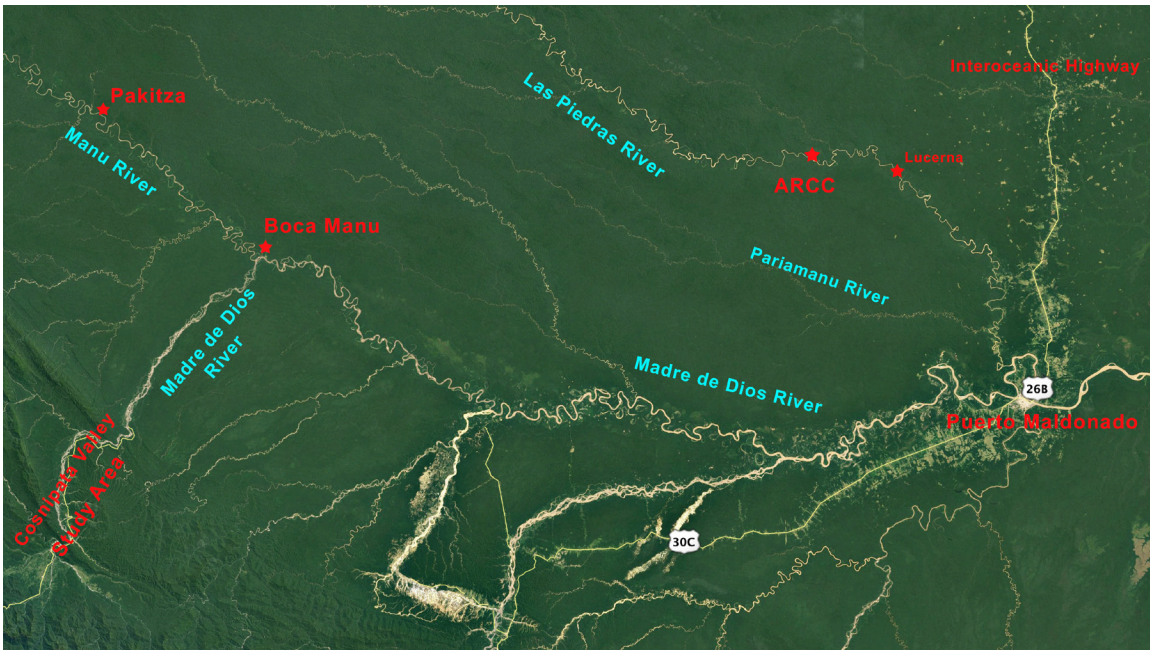


Figure 2. Location of the ARCC and the surroundings in southeastern Peru.

Figure 3. The bungalows at the ARCC. Figure 4. Preparing bait for attracting butterflies. Figure 5. View of primary forest from the canopy tower at ARCC.

and gold mining are occurring with greater frequency. Also, recent loopholes in the law (resulting apparently from a lack of coordination among agencies defining the original concessions) have resulted in thousands of Brazil nut concessions (hundreds of thousands of ha) now being logged, farmed, and/or mined for gold. These activities are apparently exacerbated by the generally low income from Brazil nut harvesting.

In the absence of government oversight, efforts to protect the Middle Piedras (for its biological diversity, and as a buffer for native tribes in the Upper Piedras) are being coordinated by a Peruvian non-profit, the Alliance for Research and Conservation in the Amazon (ARCAmazon). Together with several neighboring land partners (one of which is ARCC), ARCAmazon has reportedly managed to protect almost 30,000 ha along the Las Piedras with a goal of 100,000 ha by 2030. Google ARCAmazon for more information.

To reach ARCC, we first traveled overland from Puerto Maldonado to Lucerna (a very small mestizo community) and from there up the Las Piedras River approximately 50 km by outboard canoe. We arrived the evening of September 27 with reservations for 16 nights. Clearly there had been recent rains judging by the flush of new growth in the areas cleared of rainforest adjacent to the lodge and bungalows (Fig. 3).

Except for a one-day boat ride to a nearby parrot clay lick and surroundings, our entire stay was spent walking no more than 2-3 km from the lodge. Each morning, and several times throughout the day, David applied a bait mixture to vegetation along selected trails. The bait was prepared by combining water and fish parts in a plastic bottle, curing this in the sun, and then straining off the water into a handheld pump sprayer and topping it off with urine (Fig. 4). When conditions are right, this bait works extremely well at attracting butterflies down from the forest canopy, which at ARCC is around 30 m above the forest floor (Fig. 5). The area near the lodge is otherwise flat with no hilltops or ridgetops and baiting the top of the canopy tower proved labor intensive (for David) and was abandoned.

With timely rains and the above bait concoction, we managed to photograph well over 500 species in 15 days. Most impressive to me was the incredible diversity of metalmarks, especially *Calydna*. I personally photographed 10 species, including both male and female of six (Table 1). One additional species, *C. micra*, was photographed by a member of our group but I do not have access to the image. This genus was recently placed in the small new tribe Calydnini (along with *Echenais*, *Echydna*, and *Imelda*) by Seraphim et al. (2018).

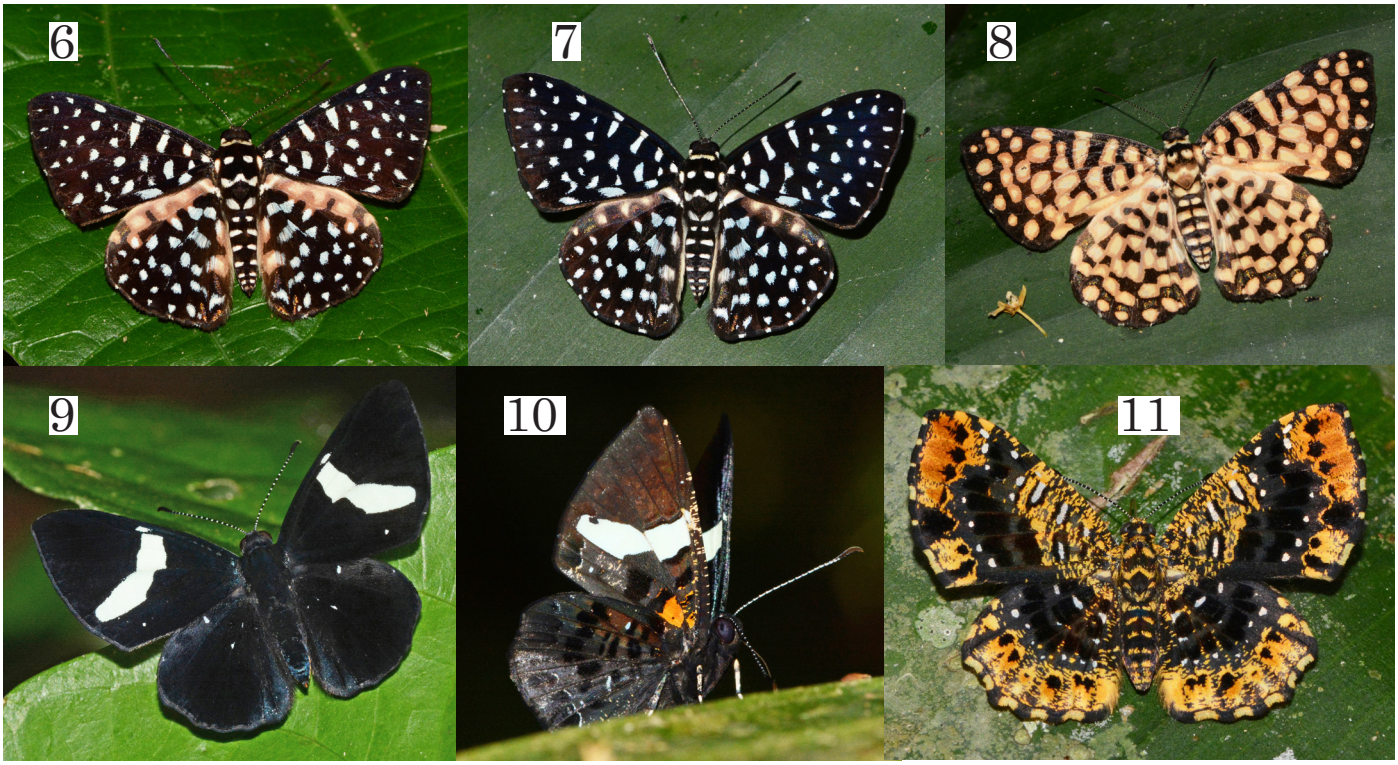
There are only 21 *Calydna* (Warren et al. 2017) among the estimated over 1300 riodinid species in the Neotropics. In his revision of the genus, Hall (2002) listed 14 species for Peru, 13 confirmed and one expected (*C. venusta*), and since confirmed. An additional Peruvian species, *C. pichita*, was later described (Hall and Lamas 2004) bringing the total to 15 (Table 1). This number is exceeded apparently only by Brazil with 18 and possibly by Colombia (Hall 2002). For many of these there are (or were) few or no available photographs of live individuals or specimens.

What makes ARCC attractive to *Calydna*? Hall (2002) discovered during his revision of the genus that although *Calydna* are relatively common in collections, specimens occur as "highly localized populations". Most species are found exclusively in primary wet lowland forest. According to Hall, "Unusually, the majority of species appear to be confined to below 600 m instead of the typical 1000 m

Table 1. Comparative *Calydna* Diversity in Peru		
ARCC, Peru (2017)	**Pakitza, Peru (Robbins et al. 1996)**	**Hall (2002) and Hall and Lamas (2004) – all of Peru**
Calydna caieta (Figs. 6 & 7 male, Fig. 8 female)	*Calydna caieta*	*Calydna caieta*
C. carneia (Figs. 9 & 10 male, Figs. 11 & 27 female)	*C. carneia*	*C. carneia*
C. catana (Figs. 12 & 13 male, Fig. 14 female)	*C. catana*	*C. catana*
C. cea (Fig. 15 male)	*C. cea*	*C. cea*
C. charila (Fig. 16 male, Fig. 17 female)		*C. charila*
C. hiria (Fig. 18 male, Figs. 19 & 20 female)	*C. hiria*	*C. hiria*
C. jeannea (Fig. 24 female)		*C. jeannea*
C. micra (not photographed by me)		*C. micra*
C. nicolayi (Figs. 21 & 22 male, Fig. 23 female)		*C. nicolayi*
C. sturnula (Fig. 25 male)		*C. sturnula*
C. venusta (Fig. 26 female)		*C. venusta*
	C. thersander	*C. thersander*
		C. cabira
		C. candace
		C. pichita
11 sp.	6 sp.	15 sp.

for lowland species, and the low *Calydna* species diversity at the very base of the eastern Andes increases sharply only 20 to 50 kilometers further east." More specifically, he suggested that this pattern may be due to the absence of larval foodplants in the wet forests near the Andes. I can find no published information on *Calydna* foodplants in wet lowland forests east of the Andes, although previously reported larval foodplants for two dry-habitat species were in the Olacaceae.

Two additional surveys support the above characterization of *Calydna* distribution: 1) the Cosñipata Valley survey in the eastern Andes and 2) a survey at Pakitza east of the Andes (Fig. 2). In the Cosñipata Valley, despite more than a decade of butterfly sampling by experienced lepidopterists along a 126 km transect at elevations ranging from 400 to 4,000 m (Lamas et al. 2021) there have been no records of *Calydna* (M. McInnis, pers. comm. 2021). However, six *Calydna* species (Table 1) were recorded at Pakitza, a lowland site along the Manu River approximately 75 km N of the Cosñipata Valley study area (Robbins et al. 1996). ARCC is approximately 194 km NE of the Cosñipata Valley study area and 180 km E of Pakitza (Fig. 2).



Figures 6-8: *Calydna caieta*, 2 males, female. Figures 9-11: *Calydna carneia*, 2 males, female.

Figures 12-14: *Calydna catana*, 2 males, female. Figure 15: *Calydna cea,* male. Figures 16-17: *Calydna charila*, male, female. Figures 18-20: *Calydna hiria*, male, 2 females. Figures 21-23: *Calydna nicolayi*, 2 males, female.

The one remarkable exception to the above is *Calydna pichita*. *C. pichita* is confined to cloud forest in Peru, where it is currently known from about 2000 to 2100 m (Hall and Lamas 2004). This is near the upper elevational limit of the Riodinidae, and 600 m above the highest elevation of any other *Calydna* species.

The intricately marbled wing patterns of *Calydna* are truly mesmerizing but staring too long at images of these beauties can result in eye strain and in rare instances hallucination. Therefore, to hopefully mitigate the potential visual impact I have included images of some *Symmachia*, *Argyrogrammana*, and *Mesene* also photographed at

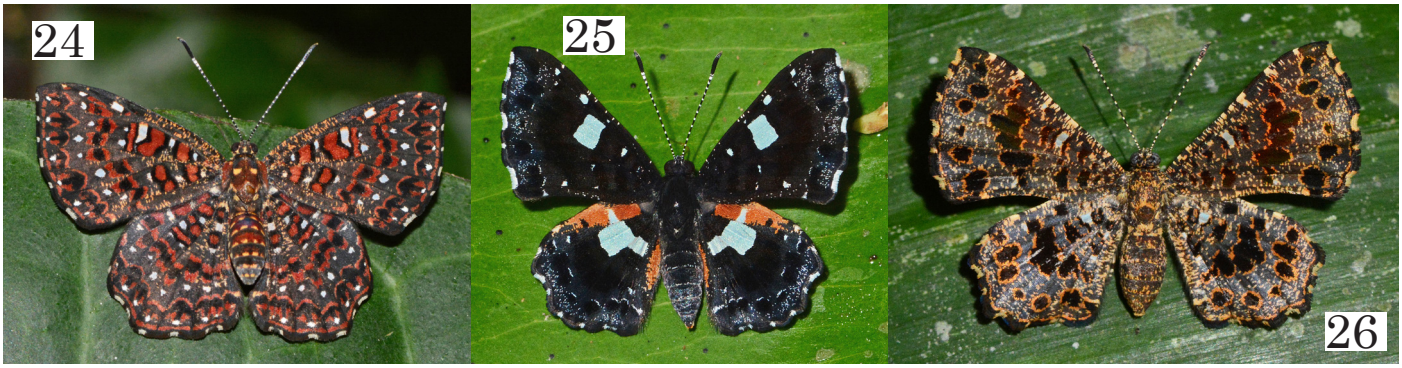


Figure 24: *Calydna jeannea*, female. Figure 25: *Calydna sturnula*, male. Figure 26: *Calydna venusta*, female.

ARCC during our 2-week stay (Table 2). *Argyrogrammana* was recently removed from the Helicopini and placed in the Symmachiini with these two other genera (Seraphim et al. 2018).

ACKNOWLEDGEMENTS

I wish to thank Nick Grishin, Mike McInnis, and Jon D. Turner for their time and expertise. David Geale's bait concoction and eagerness to discuss photos during evening sessions at ARCC was much appreciated. A special thank you to the wonderful staff at ARCC who provided us with comfortable lodging, excellent meals, and timely first aid.

LITERATURE CITED

Hall, J.P.W. 2002. A phylogenetic revision of Calydna and relatives (Lepidoptera: Riodinidae), Insect Systematics & Evolution 33(2):185-237.

Hall, J.P.W. and G. Lamas. 2004. A new cloud forest species of *Calydna* (Lepidoptera: Riodinidae) from Peru, with a revised phylogeny of the hiria group. Proc. Entomol. Soc. Wash. 106(4):733-738.

Hall, J.P.W. and G. Lamas. 2007. Four new symmachiine taxa from the eastern Andes of Peru and Ecuador (Lepidoptera: Riodinidae). Zootaxa 1533:41-52.

Hall, J.P.W. and K.R. Willmott. 2007. Four new species of symmachiini from Ecuador (Lepidoptera: Riodinidae). Tropical Lepidoptera 16(1-2):1-5.

Lamas G., M.L. McInnis, R.C. Busby, and R.K. Robbins. 2021. The lycaenid butterfly fauna (Lepidoptera) of Cosñipata, Peru: annotated checklist, elevational patterns, and rarity. Insecta Mundi 0861:1–34.

Robbins, R.K., G. Lamas, O.H.H. Mielke, D.J. Harvey, M.M. Casagrande. 1996. "Taxonomic composition and ecological structure of the species-rich butterfly community at Pakitza, Parque Nacional del Manu, Peru." in *Manu: the biodiversity of southeastern Peru*, edited by Wilson, D. E. and A. Sandoval, pages 217–252. Washington D. C.: Smithsonian Institution Press.

Seraphim, N., L.A. Kaminski, P.J. Devries, C. Penz, C. Callaghan, N. Wahlberg, K.L. Silva- Brandão, and A.V.L. Freitas. 2018. Molecular phylogeny and higher systematics of the metalmark butterflies (Lepidoptera: Riodinidae). Systematic Entomology 43(2):407-425.

Warren, A.D., K.J. Davis, E.M. Stangeland, J.P. Pelham, K.R. Willmott & N.V. Grishin. 2017. Illustrated lists of American Butterflies, **https://butterfliesofamerica.com/L/Neotropical.htm**

Table 2. Diversity of Symmachiini at ARCC	
Symmachia accusatrix	Fig. 28 female
S. falcistriga	Fig. 29
S. hypochloris[a]	Fig. 30
S. pardalis	Fig. 31
S. rubina separata	Fig. 32 male, Fig. 33 female
Argyrogrammana glaucopis	Fig. 34
A. physis phyton	Fig. 35
A. praestigiosa	Fig. 36
Mesene epaphus pyrrha	Fig. 37
M. leucophrys	Fig. 38
M. margaretta anartia[b]	Fig. 39
Mesene sp. 1	Fig. 40

[a]*Symmachia hypochloris* was formerly in the genus *Exoplisia* in the tribe Riodinini until it was transferred to the tribe Symmachiini by Hall and Willmott (2007) who were "preferring at least to classify the species in the correct tribe until a natural generic classification can be completed for it."

[b]see image in Hall and Lamas (2007)

Figure 27: *Calydna carneia*, female.

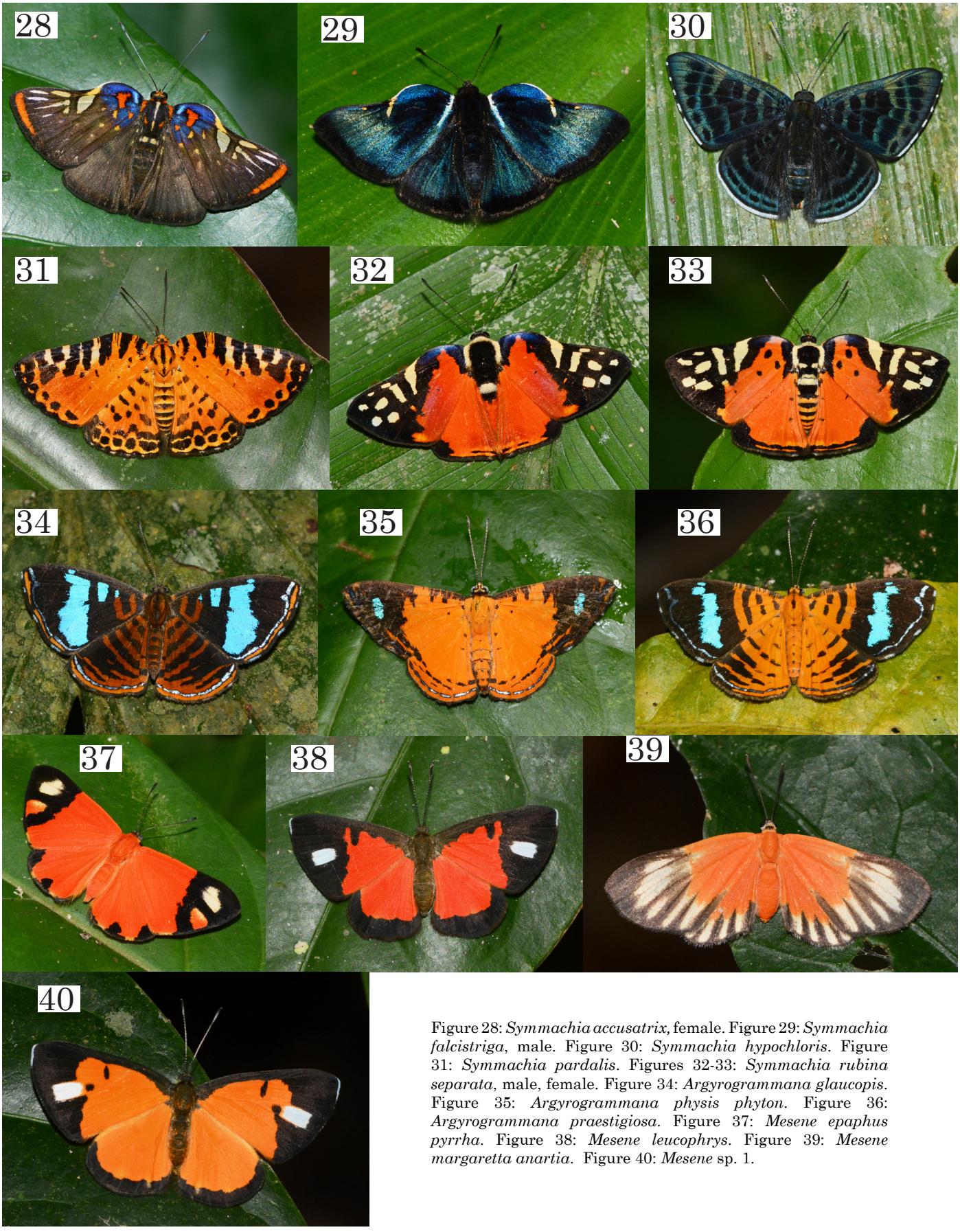


Figure 28: *Symmachia accusatrix*, female. Figure 29: *Symmachia falcistriga*, male. Figure 30: *Symmachia hypochloris*. Figure 31: *Symmachia pardalis*. Figures 32-33: *Symmachia rubina separata*, male, female. Figure 34: *Argyrogrammana glaucopis*. Figure 35: *Argyrogrammana physis phyton*. Figure 36: *Argyrogrammana praestigiosa*. Figure 37: *Mesene epaphus pyrrha*. Figure 38: *Mesene leucophrys*. Figure 39: *Mesene margaretta anartia*. Figure 40: *Mesene* sp. 1.

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Because of the vast scope of this research, names and numbers might change with time. Therefore, we have published it online to maintain an ever-evolving resource that, with your help and a dedicated curation and periodic updates of the list, will be consolidated as the main reference to inventory the butterfly fauna of Colombia.

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

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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.**

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Equipment

FOR SALE: LEPTRAPS LLC

After 32 years of designing, fabricating and marketing globally, I would like sell Leptraps LLC and retire. I would like to collect Lepidoptera and travel.

The business includes all the drawings, inventory, and some equipment. I operated the company from my home.

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

The price is $150,000 USD. Or, make me a reasonable offer.

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

Research

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

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

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

Canadian Wildlife Service, Prairie Region, is seeking information about observations of four species: *Melaporphyria immortua* (any obs); and *Notamblyscirtes simius*, *Hesperia pahaska*, and *Amblyscirtes oslari* (any obs from Canada, MT, ND or MN). Data will be used to help identify potential habitats and locations for future Canadian surveys and to assist with determination of Canadian at-risk status. Detailed locations do not have to be shared. Please contact Medea Curteanu, CWS Edmonton, AB; **medea.curteanu@ec.gc.ca** 641

WANTED, spring to summer 2022: 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. 641

Miscellany

Tony Roberts, a continuous Lep. Soc. member since 1956 with a concentration from 1987-2010 on the moth, and in particular the post-glacial microlepidopteran, fauna of immediate coastal Down East Maine, seeks suggestions, inquiries, requests regarding residual lab equipment, reagents, 20th century micro-photographic and drawing paraphernalia, fiberoptics, slides, pins, pith for double-mounts, drawing aids, etc. and, most important, an extensive library of North American books, offprints and copies of North American papers on same, PLUS many scarce Holarctic titles. Kindly contact: Michael A. "Tony" Roberts at maroberts@maineline.net, if interested in any of the above. 641

SPECIAL REQUEST from Ranger Steve Mueller:

Editor's Note: I, and many of you, are friends with Ranger Steve. I have been for quite some time. Do not hestitate to call Steve during this difficult time; he has provided his phone number and I'm sure whatever support you can offer will be appreciated.

Due to multiple myeloma cancer my impending demise weighs heavy on my heart. I am downsizing materials. I am working on surviving year 24 since diagnosis. I am Ranger Steve (Mueller).

I have 75 Cornell drawers ($25 each) and two cabinets ($600 each) with additional display boxes for sale. Most Lepidoptera have been donated to Smithsonian, Carnegie, Michigan State, Milwaukee Public, Bemidji State, Gillette at Colorado State, Brigham Young U, Colorado Plateau Arthropod Biodiversity at Northern Arizona U, and Ottawa Canada National museums. My remaining collection will go to MSU upon my passing.

Journals and newsletters are available for the cost of shipping, or can be picked up. My library is available for examination. Some materials will be held until my passing.

Newsletters, journals, and magazines:

- American Butterflies and Butterfly Gardener from origin.
- The Ohio Lepidopterists Newsletters
- Lep Soc Newsletters
- Great Lakes Entomologists Journals
- Michigan Botanical Club – White Pine Chapter Newsletters
- Michigan Botanical Club Journals (Now Great Lakes Botanist)
- Young Entomologists Society Journals
- Wings - Xerces Society Journal
- Utah Lepidopterists Society Newsletters
- Michigan Audubon Journals (formerly Jack Pine Warbler and most recently became Michigan Birds and
- Natural History).
- Michigan Audubon Jack Pine Newsletter (name changed from journal to newsletter when the new MAS journal was created).
- MONA Fascicles; $999.00 for complete set (not including the three most recently published fascicles); individual fascicles may also be purchased
- Many Entomology books.
- Natural History Library book series (early 1900's) for many taxa.
- How to Know Taxonomic Keys series (mostly entomology – Botany has been distributed)
- Handbook of Nature Study by Anna Comstock.
- Johnson's Natural History Vol 1 & 2.
- The Riverside Natural History – 1884.
- Henry Thoreau Journals – two volume set
- Rickett Wildflowers of US – (Northeastern, Southeastern, and Southwest – 7 Volumes).
- Aldo Leopold's 1933 Game Management Text 1947.
- Vegetation of Wisconsin - John Curtis 1959.
- Plant Ecology Weaver and Clements -1929

As regional editor for NABA Butterfly Counts for Michigan, I write the introduction report that precedes count reports. There are about 17 Michigan Counts annually. Separate count summaries for each count are maintained on Excel files allowing species and numbers of individuals to be easily compared for each of the counts. It allows easy tracking of the high count for each species with years of abundance or scarcity. Summaries are available by email as noted in the NABA reports. The NABA count reports are not easily compared without time consuming review of each annual report.

I regularly summarize Lep Soc Meeting field trips in the Lep Soc Newsletter.

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

Butterfly bait -– a little humor

Diogenes Otimista de Souza

In the 90´s I joined a Lepidoptera survey project at Fazenda Rancho Grande, Rondônia, invited by Tom Emmel, lepidopterist and professor in Gainesville, FL. One of the usual guides was George Austin, another American lepidopterist, who normally joined every expedition. One of his specialties was to collect butterflies using one of those butterfly traps. (To attract the butterflies, all kinds of rotten stuff was used: rotten bananas mixed with sugarcane juice and beer, rotten fish, etc. … any stinking stuff).

He was quite successful with the method. He always he captured 2-4 times more specimens than the other guys, who were supposedly using the same kind of bait. They could not understand the reason for his success. Every time he was asked for the reason, he patiently gave the same explanation: rotten bananas, beer and sugarcane juice in some traps, rotten fish in others, etc.

One day I was collecting along one of the trails and met one of Tom´s students. The student asked me if I knew what made George so successful.

"*Socks",* I said.

"*Socks! So that is what he uses".*

Back to the lodge, at the end of the day -when all the participants brought in their catch to compare or to be identified- my friend George's catch was always, by far, the most productive.

I was sharing a table, drinking a beer, with George, and told the story to him. "*That is a good one!",* he said laughing.

Soon the student came and joined us.

"*Any luck?",* I asked.

"*No. Nothing!"*

"Washed your socks…" remarked George, with a straight face.

So, the student following George´s advice, decided to wear the same pair of socks for a few days…

One night I heard (my room was next to the one the student and another friend were sharing): "*Joe, please, take your boots outside. I want to sleep… Damn…"*

So "*Joe*" took his boots outside... to find out next morning that one of the boots was missing. It was found, later on, a few yards away… with no socks inside…

Serra Bonita, 5 January 2022

Collins, Remembering John Rawlins

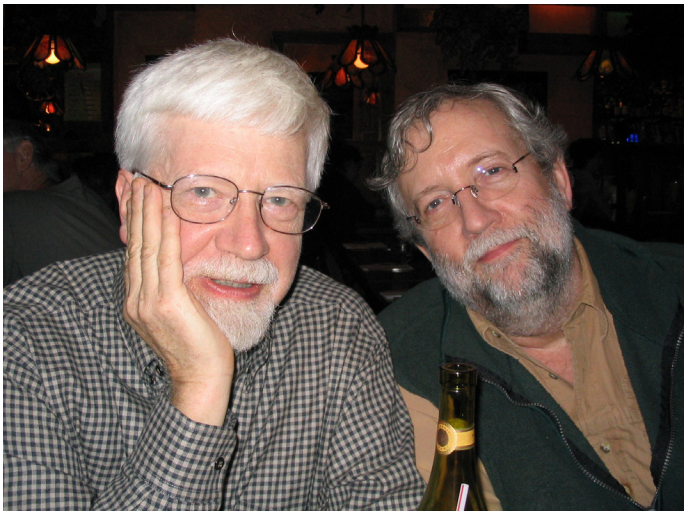
Continued from page 51

never happen in California. John was unusually quiet, yet we kept up a casual natural history narrative. "Look at those dragonflies flying around over my car. Why do you suppose they are doing that, John?" "*I think they mistake the reflection from the windshield and hood for a pool of water.*" We then walked in silence before I asked John if he noticed something that was missing – neither to be seen nor heard. A puzzled look from John, but uncharacteristically no reply. "No Steller's jays. Look at the trees – all juniper but no pinyon pine. No pinyon pine – no pine nuts – no jays." Steller's jays are one of the most widespread and common western birds, and frequent campgrounds for the food scraps. But not here.

The next morning the aroma of my pre-dawn espresso didn't waken John, but he eventually emerged from his tent just as the sun rose over the high-country ridge. We had a relaxing day. The most stressful chore was setting up the black light. (A noisy generator and brilliant mercury vapor light were not a part of this low-key expedition.) A stickler for proper method and protocol, John made sure I knew to orient the light vertically, to conform to moth's vision physiology, yet throughout the day he was more relaxed than I had ever seen him in his museum habitat.

John loved hi-tech gadgets that might be useful in his work. Once my Garman GPS coordinates were taken, he would use his watch GPS to take a comparative reading. He was especially proud of the museum's electron microscope, and kept current with the latest color scanner/printer should Carnegie's budget allow a purchase.

Our final trapping site was the Ochoco Mountains in central Oregon, midway between the Cascade Range to the west and the Blue Mountains in northeast Oregon. As we approached Bend John gleefully introduced me to his friends visible to the west, the "Three Sisters" peaks, all above 10,000 feet elevation. We stayed in a motel in Prineville and set out a series of traps along the grade to Ochoco Summit at about 4400 feet. Here we saw scattered western larch, making this range a bridge between the Cascades and the Bitterroots of Idaho and Montana, where larch forms large stands. In the Ochocos I expected to collect *Hyalophora euryalus;* the *Hyalophora* from the Blue Mountains are typical *euryalus* in color and markings, but with occasional hybrid-like intermediates. Further to the north near Boise and again in the Bitterroots the moths are all hybrids with very few parental phenotypes. Over the years John and I had discussed these hybrid populations in all aspects: their origin in changing Ice Age distributions, the relatively weak reproductive isolation among the seeming distinctive *Hyalophora* species, the nature of a species in the genus, and the nomenclature we should use to discuss these topics in the paper we were preparing. John got a big kick out of seeing firsthand in nature the geographic pattern of variation in this genus. We were lucky in that we trapped moths every day and in every trap we set out. John was impressed by our success and by the ability of the *Hyalophora* to thrive in different plant communities over a wide range of altitudes.



Collins and Rawlins unwinding after hours, Pittsburgh, September 2006. Photo courtesy of Pat Hamilton.

Driving downslope from the summit back to Prineville we both summed up our experiences of the last few days. All of our campsites were in country new to me, but not to John. The trip for him was a homecoming of sorts. As we descended the canyon through changing vegetation and land forms, John wistfully told me he hoped one day to retire near here, close to his boyhood ranch home.

The next day we drove to Corvallis where he would stay with his sister, leaving the day after for a long day's travel to Pittsburgh. We never collected together after this trip, and he never again returned to his beloved eastern Oregon. I will miss this multi-talented, colorful, and generous friend, and will long remember our time in sagebrush country.

Michael M. Collins, PhD. Associate, Section of Invertebrate Zoology, Carnegie Museum of Natural History, Pittsburgh, PA.

The friends and family of John Rawlins have established **The Dr. John E. Rawlins Scholarship and Conservation Fund.** Donations in honor of John's memory can be made as follows: 1. Write a check to The Dr. John E. Rawlins Scholarship and Conservation Fund, mail to Charles Rawlins, 2764 East Lowell Ave., Gilbert AZ 85296. 2. Give to the Dr. John Rawlins Scholarship & Conservation Fund at: **https://gofund.me/3d328194** . All proceeds will be used to impact the research and studies of young scientists, and to aid in conservation efforts in the U.S. and beyond.

Conservation Matters: Contributions from the Conservation Committee

Still counting after all these years

Larry Gall

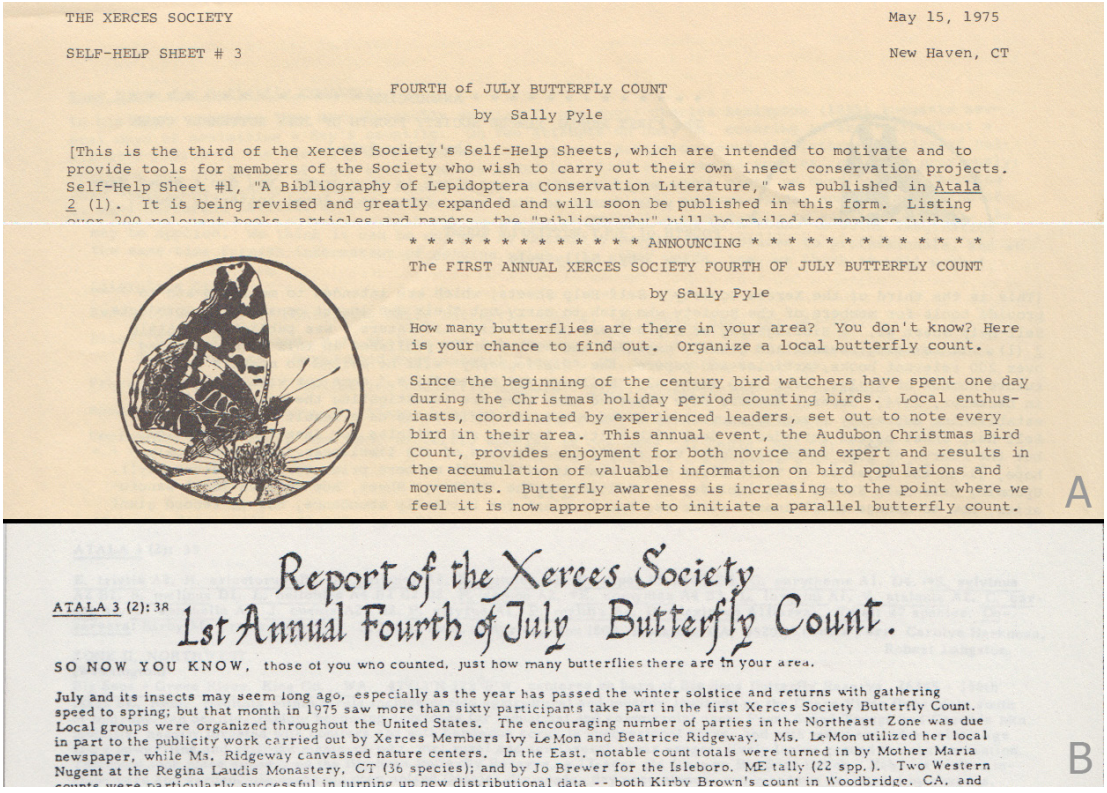
Entomology Division, Yale Peabody Museum of Natural History, New Haven, CT 06511 **lawrence.gall@yale.edu**

Many moons ago as a young lad I got roped into what is now an annual summer ritual for various North American lepidopterists… no, not something occult, but rather the Fourth of July Butterfly Count (4JBC), which is closing in on its 50th anniversary in 2024. Modeled after the Audubon Society's century-old annual Christmas Bird Count, the 4JBC is a one-day citizen science count of butterflies in a defined local area. This popular program has been run for three decades now by the North American Butterfly Association (NABA), and regularly involves thousands of participants taking part in hundreds of counts across the continent (and occasionally elsewhere). But it began otherwise.

The 4JBC arose during the early years of the Xerces Society. Its architect was Sally Pyle (nee Sarah Anne Hughes, then wife of Robert Michael Pyle, co-founder of Xerces), and a graduate student of Charles Remington (co-founder of The Lepidopterists' Society). In December 1974, Sally and Bob took part in the Christmas Bird Count in Old Lyme, Connecticut (the "home" count of Roger Tory Peterson). Upon returning to New Haven, Sally pronounced there should be such an event for butterflies -- Remington concurred, and encouraged her to pull it off. In May 1975, Sally published the rationale and procedure for the 4JBC in the Xerces Society's *Self-Help Sheet #3*, a four-page fold-over handout, and then spearheaded publicity for the nascent program that was launching just a few short weeks later (remember, the internet was unavailable to beckon a crowd). There was an endearing edginess and personal appeal to *Self-Help Sheet #3* (Pyle, 1975; Figure 1):

"I will be in the field all summer so no correspondence will be possible before the 1975 count. So if you wish to take part, get it together with your butterfly colleagues and friends and just DO it… so won't you get out and celebrate the Fourth with butterflies? They're just as colorful as fireworks, and a lot less dangerous."

Gonna be gone, she says, just do it… indeed. The count was a success. A total of 29 counts happened in summer 1975 with the tallies and observer notes appearing the next year in the fledgling journal *Atala*. The count grew moderately over the next decade but picked up momentum starting in the late 1980s -- Xerces transitioned operation of the 4JBC to NABA in 1992/1993, and the program then tapped more fully into the ever-increasing interest in butterfly watching (Figure 2). The fundamentals of the count remain largely unchanged from its inception, although the "official" date of 4 July was relaxed early on to accommodate regional variation in butterfly flight times. NABA recognizes the 1st of July Butterfly Counts (Canada), 16th of September Butterfly Counts (Mexico), and 4th of July Butterfly Counts (USA).



THE XERCES SOCIETY May 15, 1975

SELF-HELP SHEET # 3 New Haven, CT

FOURTH of JULY BUTTERFLY COUNT

by Sally Pyle

[This is the third of the Xerces Society's Self-Help Sheets, which are intended to motivate and to provide tools for members of the Society who wish to carry out their own insect conservation projects. Self-Help Sheet #1, "A Bibliography of Lepidoptera Conservation Literature," was published in Atala 2 (1). It is being revised and greatly expanded and will soon be published in this form. Listing

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The FIRST ANNUAL XERCES SOCIETY FOURTH OF JULY BUTTERFLY COUNT

by Sally Pyle

How many butterflies are there in your area? You don't know? Here is your chance to find out. Organize a local butterfly count.

Since the beginning of the century bird watchers have spent one day during the Christmas holiday period counting birds. Local enthusiasts, coordinated by experienced leaders, set out to note every bird in their area. This annual event, the Audubon Christmas Bird Count, provides enjoyment for both novice and expert and results in the accumulation of valuable information on bird populations and movements. Butterfly awareness is increasing to the point where we feel it is now appropriate to initiate a parallel butterfly count.

A

ATALA 3 (2): 38

Report of the Xerces Society
1st Annual Fourth of July Butterfly Count.

SO NOW YOU KNOW, those of you who counted, just how many butterflies there are in your area.

July and its insects may seem long ago, especially as the year has passed the winter solstice and returns with gathering speed to spring; but that month in 1975 saw more than sixty participants take part in the first Xerces Society Butterfly Count. Local groups were organized throughout the United States. The encouraging number of parties in the Northeast Zone was due in part to the publicity work carried out by Xerces Members Ivy LeMon and Beatrice Ridgeway. Ms. LeMon utilized her local newspaper, while Ms. Ridgeway canvassed nature centers. In the East, notable count totals were turned in by Mother Maria Nugent at the Regina Laudis Monastery, CT (36 species); and by Jo Brewer for the Isleboro, ME tally (22 spp.). Two Western

B

Figure 1. Early snapshots from the inception of the Fourth of July Butterfly Count. A. From the 1975 Xerces Society *Self-Help Sheet #3* announcing the program. B. From the journal *Atala* Volume 3 for 1976 in which results of the first (1975) count appeared.

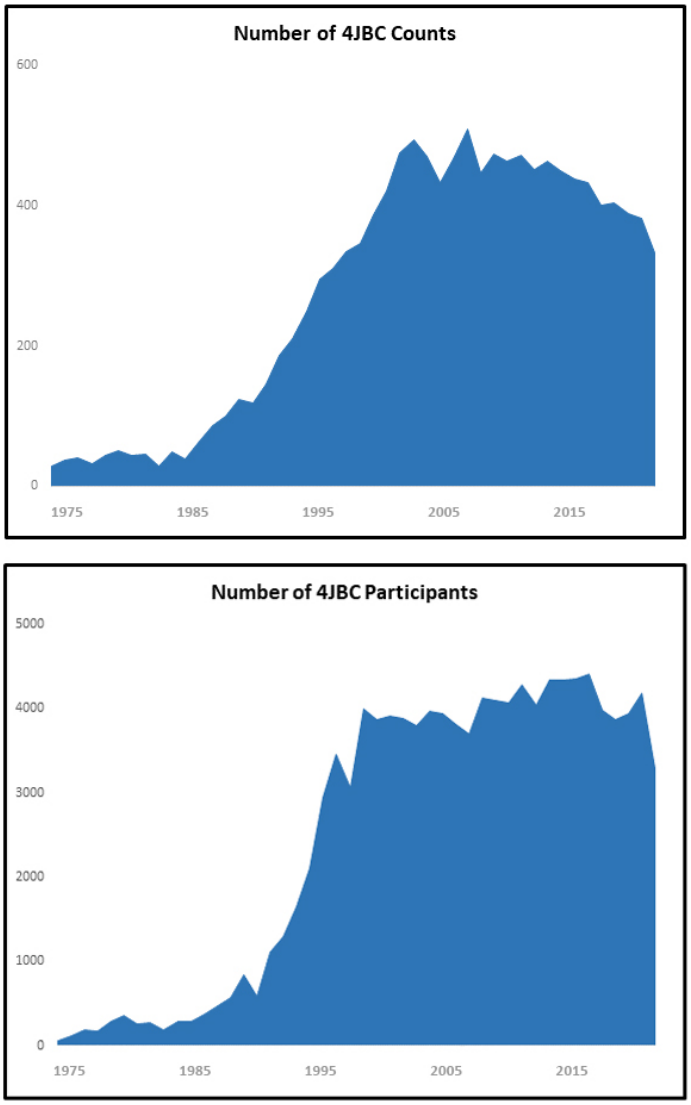

Figure 2. Summary trends for the entire Fourth of July Butterfly Count program over time: number of counts per year and number of participants per year.

The 4JBC came about as part of a global pursuit in the 1970s – to develop simple and robust methods for measuring population trends in butterflies that were of comparable scientific veracity to mark-release-recapture studies, but without handling the butterflies. The "Pollard Walk" would soon coalesce as the gold standard for transect counts for observational censuses of Lepidoptera as well as for many other organisms (see Pollard, 1977). However, it can easily be argued that the intellectual progenitor of the 4JBC had already appeared two decades earlier – in the article "How many butterflies in one day?" in the *Lepidopterists' News* by Remington (1955).

Charles had noticed that many regional lists of Lepidoptera were available in the literature then, both in North America and elsewhere, but there was "very little to be found on the maximum number of species flying in a small area at the same time." Charles and his father, Pardon Sheldon Remington, set out to make such a count of butterflies in and around New Haven, Connecticut on 14 July 1952 -- and then repeated the effort on 14 July 1954 at the same localities with his son Eric, Roger Pease and Sidney Hessel. The totals were 38 and 45 species, respectively. Remington's article intrigued other lepidopterists who right away followed suit (e.g., Austin & Austin, 1956).

The 4JBC protocols established in 1975 mimicked those of the 1950s counts, and the hope was that one-day censuses would allow for comparative scientific analysis down the road. However, out of the starting gate this was a somewhat sketchy premise, as acknowledged in the *Self-Help Sheet*:

"Editor's Note: DO BUTTERFLY COUNTS WORK? Some of our readers who are sophisticated in the ways of insect population biology may question the value of rather informal counts of this nature… Of course, we recognize that the open structure of the count as we propose it will not provide results comparable to those of a refined transect count such as the ones at Monks Wood [Pollard et al.]. In future years we may impose or suggest a specified mode of operation for the count which will give numbers of similar reliability in all count localities. But for now, and perhaps for the life of the count, we offer a simple and open kind of a count to which imagination may be applied. We think it can be enjoyed by butterfly people from novices to professionals, and at the same time furnish information of genuine value. In other words, yes, we think it will work."

The 4JBC caught on despite any formal misgivings because it was immensely popular -- an excellent opportunity to conduct an annual check-up on your local butterfly fauna, to enjoy a field outing with friends and colleagues, and to promote public awareness of insect biodiversity and conservation. Although NABA greatly expanded the reach of the existing 4JBC program, Xerces never completely left the counting business, and reoriented its focus on *Danaus plexippus* and an annual wintertime Western Monarch Count (https://www.westernmonarchcount.org/).

Such is the enduring legacy of Sally Pyle's brainchild, and definitely a job most well done. But what about that scientific rigor? Among other issues the 4JBC is but a one-day snapshot; the procedures are left to some degree up to the counters; and observational skills differ markedly among participants. A number of the longer-running 4JBC counts have worked specifically to address these issues. For example, in my backyard on the Southern New Haven County count, the number of participants has been kept rather constant from year to year (typically two knowledgeable lepidopterists), and we have worked a standardized count route over a course of 5 to 6 hours total. Dale Schweitzer (Figure 3) launched the Southern New Haven County count and tapped me to help (a thrilling honor for a teenager) and the two of us repeated on 7 years during the 4JBC's first decade. After Dale moved to Massachusetts,

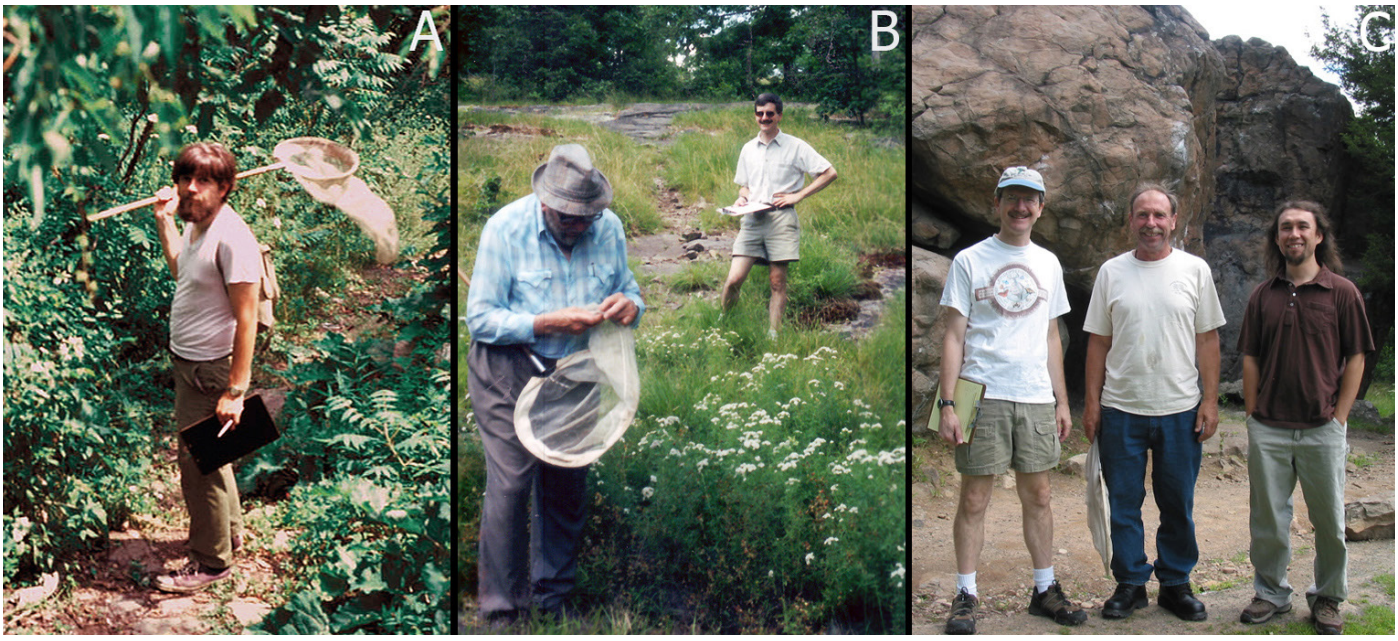

Figure 3. Rogues' gallery from the Southern New Haven County butterfly count. A. Dale Schweitzer on the 1981 count. B. Charles Remington and the author on the 2001 count. C. The author, Eric Remington (Charles' son) and Ejyo Remington (Charles' grandson) on the 2007 count. Photos A/C by Teruo Utsumi, B by the author.

I counted with a variety of others: Charles Remington on 8 years (Figure 3; showing his last 4JBC in 2001); Teruo Utsumi on 11 years; Ray Simpson and/or Nicole Palffy-Muhoray on 12 years; occasionally a ringer like John Peacock, Jeff Fast, David Furth, Lynn Jones. Once in a while, I pinch-hit solo. Once the count featured Charles' son Eric and grandson Ejyo (Figure 3; 2007). With an explicit nod to history, our count reprised the same localities visited by Charles in 1952 and 1954: "home in North Haven… a wooded hilltop known as West Rock, a pondside marsh and an old alfalfa field in Woodbridge, roadside and field near the Ansonia flying field, [and] the vicinity of Osborn Laboratory at Yale" (Remington, 1955). Dale swapped vacant lots/fields around New Haven for the Ansonia airport and Charles' neighborhood.

However, if we are talking about scientific rigor, then that medal for the 4JBC certainly goes to Arthur Shapiro. With tongue partly in cheek, he described the Willow Slough, California count thusly in the preface to the 1999 count report, on the occasion of the 25th anniversary of the 4JBC (Shapiro, 2000):

"My count is the only one of its kind. It has been done on the same date every time (July 4!) by the same person (me! except for the year I broke my ankle on July 3 – more on that anon), in exactly the same place and in the same way. It isn't that I'm anti-social (though I am, a bit). Rather, it's that I'm trained as a quantitative scientist and from the start I wanted this activity, if I were to do it at all, to be set up in such a way that I could ask rigorous questions of the resulting data set… I will not discuss the rigorous questions or their answers here, because I intend to do so in a formal publication…"

And as promised, Shapiro followed through on the scientific analysis a decade later (O'Brien et al, 2011). By that time the 4JBC data had been explored to a degree in other publications (see Swengel, 1990; Kocher and Williams, 2000). The utility of the count data was emerging, but Shapiro rightly hammered away in his signature quasi-iconoclastic style at the issues of comparability and repeatability inherent in the 4JBC. Fortunately, he and his colleagues had at their disposal a trove of other butterfly monitoring data from California, that had been amassed over a comparable time period and with which they could slice, dice, and compare to the Willow Slough count data. This was their encouraging summary:

"We conclude that once-a-year sampling, if properly and rigorously done, is in fact useful as a monitoring tool for butterfly faunas, and that Fisher's alpha is well suited to early detection of trends in repeated diversity sampling."

Shapiro's group focused on number of species (S), total number of individuals (N), several climatic variables and butterfly life history characteristics, and a metric called Fisher's alpha (Fisher et al., 1943) which can be thought of as an index of biodiversity (it is one of many dozens of related indices deployed in ecological research). In addition to overall faunal trends, Shapiro's group also explored in detail the patterns shown by 24 different butterfly species over the 32 years of that count. While thinking about this *News* column, the Willow Slough effort inspired me to make a similar albeit perfunctory stab at the 45 years of Southern New Haven County count data.

Figure 4 presents the trends in S, N, and alpha for the Southern New Haven County count (linear regression fits

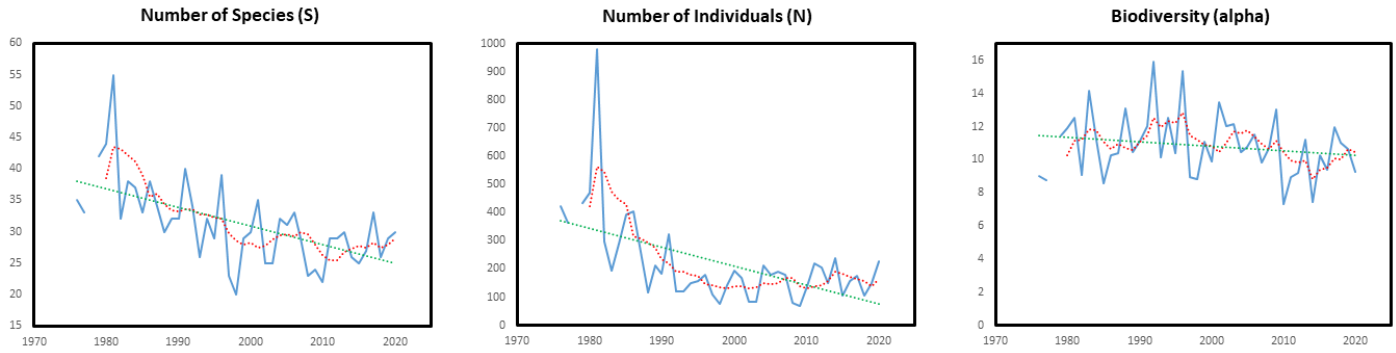

Figure 4. Butterfly patterns on the Southern New Haven County count. Green dots represent linear trend fits, red dots represent five-year moving averages. Total number of species (S) decreases significantly over time ($F_{1,42} = 23.44$, $p < 0.001$). Total number of individuals (N) decreases significantly over time ($F_{1,42} = 18.33$, $p < 0.001$). Biodiversity (alpha) does not decrease significantly over time ($F_{1,42} = 1.41$, $p > 0.20$).

are shown by green dots, and trend lines based on five-year moving averages are shown by red dots). Both S and N decrease significantly over time whereas alpha does not. Our observations contrast with Willow Slough, at which decreases in both S and alpha but not N were witnessed. This may seem intriguing but it is basically uninformative, as these are merely two disparate geographic localities for which there is no a priori expectation of comparability.

One statistic tallied for the Willow Slough butterflies was their individual life history "weediness" (which translates approximately to greater dispersal/colonization ability and fluctuating population size). Weediness proved not to correlate well with any of the other variables in California. What about the Southern New Haven County count? Three plausibly weedy candidates have been observed every year on our count -- *Pieris rapae*, *Colias eurytheme*, and *Epargyreus clarus*. The next most reliably seen species, *Speyeria cybele* and *Satyrodes appalachia*, were each missed in two count years but I would classify neither as weedy. The next few most reliably seen species clock in at five or more misses, and the next weedy candidate at seven misses (*Phyciodes tharos*). Culling the three most prominent weeds makes no difference in the patterns shown in Figure 4, but there does seem to be another element at work here, as seen in Figure 5 – an upward trajectory in the *proportion* of butterfly abundance for which these species account. This "weedy factor" has increased significantly over time on our count. My guess is that the weedy factor is linked to incremental and creeping loss of habitat diversity at all of our count localities. I further suspect the ongoing and persistent "neatening up" of roadside margins, vacant lots (those that even remain), and both private and commercial acreage is responsible, coupled with corollary pressures from invasive and introduced plants/parasitoids/predators and over-browsing by White-tailed Deer.

During the years we have been counting, and before, species losses among Connecticut butterflies were chronicled by the Connecticut Butterfly Atlas Project. The Atlas was a citizen science effort that explored faunal patterns by vouchering butterflies from 1995 through 1999 (specimens and photos) and analyzing historical specimen records from museums and private collections (O'Donnell et al., 2007). There are varied reasons for the species losses in Connecticut but the principal driver is loss of suitable habitat. For example, Charles' favored "pondside marsh and old alfalfa field" was included on our earliest counts, but it was already degraded by the time we began, and fell to changes in landscape practice well before the turn of the century. It was a reliable historical haunt for the Regal Fritillary, *Speyeria idalia*, which became extirpated in Connecticut before the 4JBC was conceived. The other pond with marsh that we included/substituted has

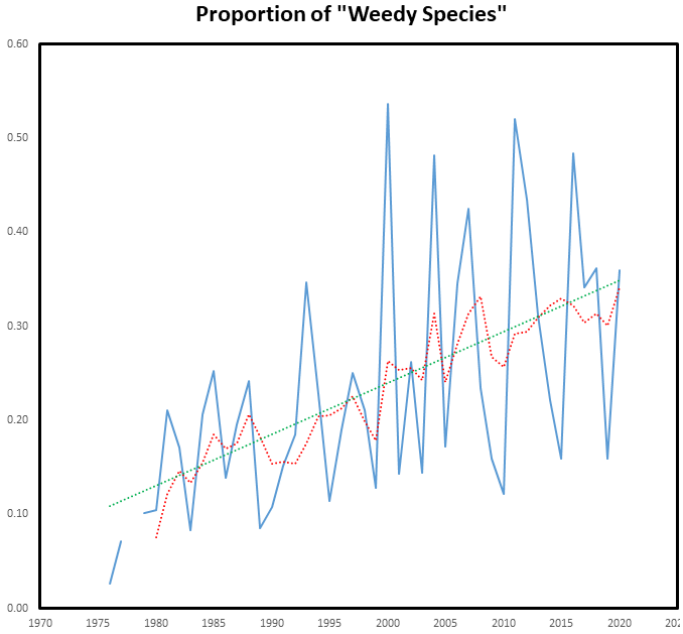

Figure 5. Proportion of total number of individuals represented by three "weedy species" (*Pieris rapae*, *Colias eurytheme*, *Epargyreus clarus*) on the Southern New Haven County butterfly count. Green dots represent linear trend fit, red dots represent five-year moving average. Weedy proportion increases significantly over time ($F_{1,42} = 17.36$, $p < 0.001$).

likewise been mostly overtaken by succession and development. West Rock State Park has escaped formal development since Remington's 1950s forays, although much of its ridgeline scrub oak barren habitat has not burned for decades, and is being encroached upon by the surrounding woodlands and invasive non-native plants. Deer over-browsing commenced in earnest on West Rock during the 1980s and 1990s, and has been steadily impacting the recruitment of native canopy tree species and understory plants there and elsewhere.

Figure 6. One loss and one gain among Connecticut butterflies, whose fates were witnessed during the course of the Southern New Haven County butterfly count. A. *Chlosyne nycteis* suddenly extirpated (photo by Rick Cech, 2013, Nashville, Tennessee). B. *Erynnis baptisiae* substantially expanded (photo by Rick Cech, 2020, Ossining, New York).

How well has our count detected known subtractions and additions to the Connecticut butterfly fauna? The Atlas documented the decline and/or loss in Connecticut in the latter part of the 20th century of at least five species that I consider could have been expected on our 4JBC count (*Chlosyne nycteis*, *Chlosyne harrisii*, *Boloria selene*, *Boloria bellona*, *Lycaena hyllus*). It also documented at least five species that could likewise have been predicted to either show up and/or increase on our 4JBC count (*Calycopis cecrops*, *Papilio cresphontes, Coenonympha tullia, Erynnis baptisiae, Poanes viator*).

Regarding the declines and losses, we never saw *Chlosyne harrisii*, *Boloria selene*, or *Lycaena hyllus* on our count, and *Boloria bellona* was seen only once in 1981. That could partly be due to our count not coinciding with flight periods (but note that Remington's earlier counts found all but *Lycaena hyllus*). In contrast, *Chlosyne nycteis* (Figure 6) was a regular resident in Connecticut and nearby states in the 20th century, and was seen on 6 of our first 7 counts before dropping quickly in numbers, as it did contemporaneously and without much warning throughout the region. Its last gasp at the reliable West Rock colony was on the 1988 and 1990 counts (sight records that are not part of the voucher-oriented Atlas). Only later in hindsight did we realize it had left for good. We also witnessed one clear localized species loss due to habitat alteration in the count area -- *Satyrium acadicum*. This hairstreak was common at the Woodbridge pond and adjacent marsh, and was recorded on the first 13 consecutive counts, but after 1989 only one or two individuals were seen in each of 1992, 1996, and 1999 (its last year at the site). During that timeframe, its formerly extensive local habitat was overtaken by succession and development, with only snippets still persisting in a nearby natural gas-line right of way. *Satyrium acadicum* did make a brief 2005 reprisal within the count area at an entirely unrelated site (two individuals), but did not persist there.

As for the additions, *Coenonympha tullia* was seen on our count in 2000 and 2007, and *Calycopis cecrops* in 2011. We have not yet seen *Papilio cresphontes* on our count, although in the last ten years this swallowtail is now reliably spotted every year in and around New Haven. The relative absence of these three species on recent counts is likely because our count typically takes place during the second week of July and we are between broods. For example, the 2000 and 2007 counts were the earliest (1 July) and latest (5 August) count dates respectively, which meant better timing opportunities to see the multivoltine *Coenonympha tullia*. *Poanes viator* first appeared in 1987, next in 1991, and in 18 of the 30 counts since 1990. Likewise, *Erynnis baptisiae* (Figure 6) first appeared in 1992, and in 12 of the 30 counts since 1990. Both skippers are now well-established and increased in frequency and numbers over the duration of the count.

In sum, the Southern New Haven County count clearly detected the fall of one species in Connecticut and the rise of two others, among the ten species that I flagged from the Atlas. But the count had mixed success detecting predicted trends for the other seven flagged species. About detection, Remington (1955) asserted that "if everything went perfectly, we could expect a maximum of 65 species on one day" for this count. Perhaps so in the southern Connecticut of the 1950s, but such a feat would be essentially impossible today. We met or exceeded Remington's *lowest* total (38 species in 1952) on only 7 of our 45 counts. Likewise, we met or exceeded his *highest* total (45 species in 1954) only once -- and that high-water mark of 55 species in 1981 was an anomaly, exceeding by 11 our next most species-rich count. Moreover, among our seven counts that bested Remington's lowest total, five occurred during the first decade of the 4JBC, and the other two (1990 and 1996) are now more than 15 years in the rear view mirror. In my opinion the stars did align in 1981, a year of huge Lepidoptera numbers and diversity in the region, yet Dale and I still came up "10 Remingtons short," if you will.

Getting back to sampling protocol, Remington (1955) also said "we challenge collectors in any part of the world to beat our records, confident, of course that many will succeed and in making the attempt will produce useful information on the relative richness of different regions." Friendly rivalries to be at the top of a pile with bragging rights are natural, and the competitive urge has unquestionably energized and propelled the popularity of the

4JBC program. But the flip side of the coin is problems in methodological standardization within and between counts, which present conundrums for downstream study (the concepts of party hours and party miles were written into the DNA of the 4JBC to offer some help). Two recent papers have employed 4JBC data to investigate continent-wide patterns in butterfly numbers and diversity over time in North America. These comprehensive analyses found that trends in butterfly abundance have not been uniform, with numbers declining over time in the western United States but neutral or even increasing elsewhere (Forister et al., 2021; Crossley et al., 2022; see also the previous "Conservation Matters" column in the *News* by David Wagner and Richard Bailowitz). The Northeast was one of the regions displaying neutral to increasing abundance, and this contrasts somewhat with the pattern of the Southern New Haven County count (Figure 4). However, the downward trend in numbers on our count does concord with the sense of resident Connecticut lepidopterists that butterfly abundance has been in decline in the state. Interestingly, Crossley et al. (2022) found that increases in butterfly abundance were slightly positive around urban areas, and our count takes place primarily in an urban setting. Clearly there is room for *vastly* more data mining of the accumulated 4JBC data, and the methodological issues in particular need to be fully unpacked. Digging deeper *can't not help* further inform ongoing butterfly conservation initiatives. As Shapiro said back in 2000 when speaking of Willow Slough, the scientific analysis will come along in due course...looking at you, current young mavericks, undergraduates, graduate students, whipper-snappers...how about this low-hanging data fruit?

References

Austin, E. J. & G. T. Austin. 1956. What's in your backyard? *The Lepidopterists' News* 10: 55.

Crossley, M. S., O. M. Smith, L. L. Berry, R. Phillips-Cosio, J. Glassberg, J., K. M. Holman, J. G. Holmquest, A. R. Meier, S. A. Varriano, M. R. McClung, M. D. Moran & W. E. Snyder. 2022. Recent climate change is creating hotspots of butterfly increase and decline across North America. *Global Change Biology* 27: 2702-2714.

Fisher, R. A., A. S. Corbet & C. B. Williams. 1943. The relation between the number of species and the number of individuals in a random sample of an animal population. *Journal of Animal Ecology* 12: 42-58.

Forister, M. L., C. A. Halsch, C. C. Nice, J. A. Fordyce, T. E. Dilts, J. C. Oliver, K. L. Prudic, A. M. Shapiro, J. K. Wilson & J. Glassberg. 2021. Fewer butterflies seen by community scientists across the warming and drying landscapes of the American West. *Science* 371: 1042-1045.

Kocher, S. D. & E. H. Williams. 2000. The diversity and abundance of North American butterflies vary with habitat disturbance and geography. *Journal of Biogeography* 27: 785-794.

O'Brien, J. M., J. H. Thorne, M. L. Rosenzweig & A. M. Shapiro. 2011. Once-yearly sampling for the detection of trends in biodiversity: the case of Willow Slough, California. *Biological Conservation* 144: 2012-2019.

(*Continued on page 33*)

The luckiest moth catch ever?!

Dale Schweitzer, Port Norris, NJ **dfstnc@aol.com**

For your amusement, a pondering of the very improbable perhaps even the non-universality of Murphy's Law or a reminder that p<0.001 is not quite the same as p=zero.

In the 1990s I was contracted by the US Forest Service as part of a major effort to evaluate non-target impacts of *Btk* as used then and now to suppress gypsy moth outbreaks. Initially, my job was basically to select appropriate species, obtain eggs of some of them, rear the caterpillars, and transport them to the experimental spray tower in Hamden, Connecticut in early May as instars that would be present at spray time down here in Cumberland-northern Cape May Counties, New Jersey (about 39°2-4' N). I was second author to the published laboratory study (Peacock, et al., 1998, Environmental Entomology). Sensitivity to Btk varied widely, even within some genera.

I particularly wanted decent representation of xylenine genera and *Catocala*, the two most diverse potentially affected "macro" taxa. Getting eggs of Xylenini often involves collecting unmated adults of both genders at bait and keeping them alive and healthy for anywhere from a few days to about five months until mating season (late February-early April, depending on species). That's not as difficult as it might seem. With proper care and feeding, even over the winter survival is seldom as low as 80%.

In early March 1991 I collected an obviously unmated female of *Xystopeplus rufago* (Noctuidae, Xylenini) at the nearby Manumuskin preserve just as the winter-early spring bait season ended. Despite bait season being over, and therefore against any reasonable expectation of getting a male, I kept her well-fed outdoors and saw her "calling" a few times. Over a month later my wife sent me to the supermarket in Millville with a shopping list that included tomato soup. On top of a soup can was a *Xystopeplus rufago*. In April there were only two possibilities, a male or a mated female--I could hardly have cared less which! I rushed out to the car to get a pocket-sized plastic pill bottle. A minute or two later the moth was in the bottle in my pocket. I finished shopping and within an hour the moth was in a larger jar on my porch sipping a maple syrup-honey-rotten apple solution and getting quite bloated. By morning the excess liquid had been expelled and absorbed in a strip of paper towel, and I determined that I had a male. I put him and the female in an outdoor screen-topped cage. Skipping ahead…their progeny were included in the above publication. *X. rufago* is moderately sensitive to *Btk*.

Most of us are familiar with Murphy's law, but could there be an anti-Murphy who prevails on rare occasions? How many supermarket isles in the world have ever had a *Xystopelus* perched atop a soup can? And exactly when I needed him.

A local irruption of *Chlosyne nycteis* (Nymphalidae) in Maine, with an important new foodplant record

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The silvery checkerspot, *Chlosyne nycteis* (Doubleday) (Fig. 1), is a widespread North American butterfly. It is highly colonial, establishing small, localized populations, which are often part of larger metapopulations that inhabit extensive areas of patchy, suitable habitat. Over most of its range, this butterfly is an uncommon to common resident with a secure conservation status (NatureServe 2021). However, it has experienced an alarming decline in the northeastern United States. It is presumably extirpated in New Jersey and has apparently disappeared from four of the six New England states. A local irruption of this species in Maine in 2021 offered a unique opportunity to learn more about this butterfly in a region where it is seldom encountered.

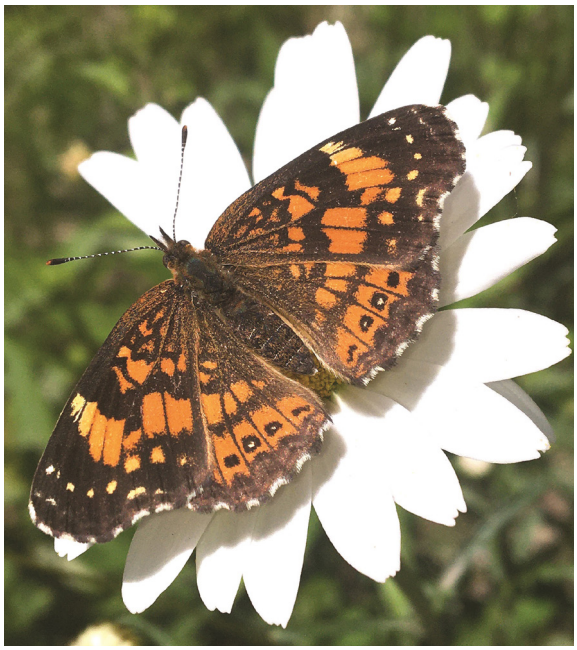


Fig. 1. Female *C. nycteis* nectaring on *L. vulgare*, 18 June 2021, Franklin Co., Maine.

Occurrence in New England. The first reference to *C. nycteis* in New England was by Scudder (1863), who described the species as *Melitaea oenone* based on specimens from Maine and Massachusetts. He noted that the butterfly was "quite rare." Five years later, Scudder (1868) realized that his *M. oenone* was synonymous with the species previously described by Doubleday ([1847], 1848) as *Melitaea nycteis*. (The type locality of this species was originally "United States (Middle States)," but it was suggested by Calhoun (2011) to be "Vicinity of Cincinnati, Hamilton County, Ohio.") In subsequent publications, Packard (1869) and Scudder (1872, 1874, 1888-1899, 1899) reiterated the rarity of this species in New England and listed several records from Connecticut, Maine, Massachusetts, and New Hampshire. Maynard (1886) claimed that *C. nycteis* was an "inhabitant of northern New England and northward, seldom, if ever, appearing in Massachusetts." The few records in Massachusetts were of single individuals (Leahy 2006), and only four localities were listed by Fiske (1901) in New Hampshire. In his review of the Lepidoptera of New England, Farquhar (1934) noted that *C. nycteis* was "not a common species." He listed one record from Connecticut, seven from Maine, five from Massachusetts, and three from New Hampshire, Most of the records were the same as those given by Scudder (1888-1889). Brower (1974) listed eight localities for *C. nycteis* in Maine, but only four more than Scudder (1888-1889) nearly a century earlier. In Vermont, the species remained unrecorded until 1989 (Grehan et al. 1995, K. McFarland pers. comm.).

Over the past four decades, *C. nycteis* has vanished from much of New England. For mysterious reasons, it declined rapidly in Connecticut, where it is believed to be extirpated following a lack of records after 1986 (O'Donnell et al. 2007, Schweitzer et al. 2011, Wagner 2012). In Massachusetts, Stichter (2015) noted that the last confirmed records were from the nineteenth century, though Glassberg (1993) claimed that it was last seen in the Boston area in 1985. It was not recorded during the Massachusetts Butterfly Atlas Project, which was conducted from 1986 to 1990 (Leahy 2006). Although there is an unconfirmed sight record from 2006 (Arey 2006a), the species is believed to be extirpated in Massachusetts (Cassie 1998, Stichter 2005, MBC 2021). In New Hampshire, Kiel (2003) suspected that populations of *C. nycteis* in the White Mountains had "long since disappeared," though there is one unconfirmed 2008 sight record at Twin Mountain, Coos County (Moore 2008). A lack of verifiable recent records from New Hampshire suggests that the species is extirpated (NHNHB 2013, NatureServe 2021). The butterfly is believed to still occur in Vermont, where it is very rare and imperiled (Pfeiffer 2016, VNHI 2017, McFarland and Pfeiffer 2021, K. McFarland pers. comm.). *Chlosyne nycteis* was listed from Rhode Island by Pavulaan and Gregg (2007) based on a single individual that was netted on 14 June 1992 in Bristol County, identified by several observers, then released (H. Pavulaan pers. comm.). If once present in Rhode Island, it may now be extirpated. There are no recent observations from any of

these states in the online databases of BAMONA (Lotts and Naberhaus 2021), BugGuide.net (2021), eButterfly (2021), iNaturalist (2021), GBIF (2021), NABA (2021), or SCAN (2021). The decline of this butterfly in New England is poorly understood, but it has probably resulted from a variety of factors, including habitat loss, parasitism, pesticide application, and deer grazing (Gochfeld and Burger 1997, Schweitzer et al. 2011, Wagner 2012).

Status in Maine. Museum specimens, literature references, and the database of the Maine Butterfly Survey indicate that records of *C. nycteis* are widely distributed across the state (Fig. 2), but most are based on one or few individuals. It was first documented in Maine around 1865, when Sidney I. Smith and his brother-in-law, Addison E. Verrill, collected single specimens in June at Norway (Oxford Co.) (Scudder 1868, 1888-1889), which were used for the original description of *Melitaea oenone* by Scudder (1863). Probably in 1867, a single individual was collected in July at Lewiston (Androscoggin Co.) by Philip S. Sprague (Scudder 1868, 1888-1889). Between 1868 and 1876, Henry H. Lyman found the species at Cape Elizabeth (Cumberland Co.), where he considered it to be rare (Lyman 1880). In the early 1880s, the species was collected in June at Orono (Penobscot Co.) by Frederick A. Eddy and perhaps Charles H. Fernald (Fernald 1884). During an expedition to Mount Katahdin in 1901, Harry H. Newcomb, the discoverer of the state endemic Katahdin arctic (*Oeneis polixenes katahdin*), captured *C. nycteis* on 24 and 25 June in two unorganized townships in central Penobscot County (Newcomb 1901). While conducting surveys of the insects on Mount Desert Island (Hancock Co.), Charles W. Johnson considered *C. nycteis* to be common (Johnson 1927), and he collected at least two specimens on 7 June 1921 and 25 June 1927. Continuing the survey on Mount Desert Island, William Procter collected additional specimens, possibly as late as the mid-1940s (Proctor 1946, Mittelhauser et al. 2014).

Chlosyne nycteis was not recorded again in Maine until the 1970s, when five specimens were collected at Portland (Cumberland Co.) on 22 June 1973 and 28 June 1975, and one worn individual was photographed at Bangor (Penobscot Co.) on 8 July 1978. There were six records in the 1980s and 1990s: Columbia (Washington Co.), Lewiston (Androscoggin Co.), Shapleigh (York Co.), and three unorganized townships in Washington and Aroostook counties. From 2000 to 2004, there were nine reports, mostly sight records, from Cherryfield and Deblois (Washington Co.), Sullivan (Hancock Co.), and three unorganized townships in Hancock and Piscataquis counties. It was also reported by Grkovich (2002) and Arey and Grkovich (2013) that Chris Livesay had found *C. nycteis* in Bowdoin (Sagadahoc Co.), but Livesay (pers. comm.) did not locate any such specimens in his collection.

After 2004, only four verifiable records of *C. nycteis* were documented in Maine. Although more than 24,000 records were recorded during the Maine Butterfly Survey from 2006 to 2015, just two were for *C. nycteis*, both from Somerset County in 2011: a single male collected by Ernest Deluca on 19 June in Indian Stream Township, and a single male collected by Gail Everett on 10 July in Flagstaff Township. Also in 2011, but not part of the survey, was the capture of two males by Glenn Morrell on 20 June in Carrabassett Valley Township (Franklin Co.). Nine years passed before the next record, when Ray Simpson captured a worn male on 11 July 2020 as it rested on a leaf in a small roadside wetland in Coplin Plantation (Franklin Co.). A purported sighting of six *C. nycteis* at Hollis (York Co.) in 2006 (Arey 2006b, 2006c) is questionable, as it was not mentioned in a later discussion by Arey and Grkovich (2013) about previous Maine records.

Maine records of *C. nycteis* over the last decade imply that the species is now confined to the mountainous portions of Franklin and Somerset counties (Fig. 2). Although there are no known records from this region prior to 2011, it was probably overlooked due to a low density of adults and lack of local survey efforts. Most disturbing is the absence of recent records from other areas of the state. This is especially surprising given that there are many more observers in

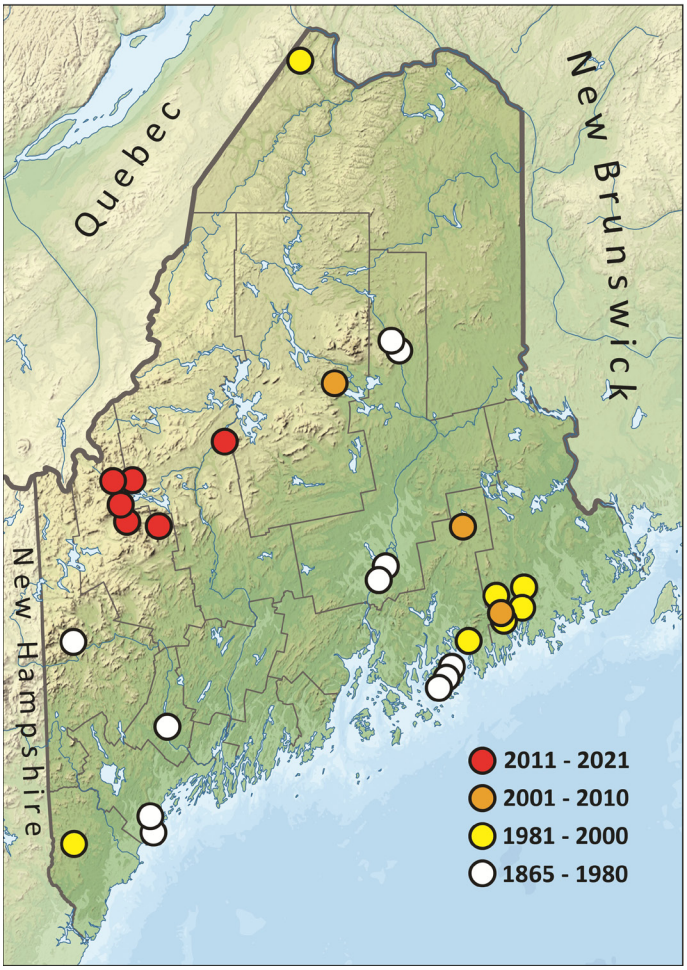


Fig. 2. Map of Maine showing documented records of *C. nycteis*, 1865-2021. Includes specimens, photographs, sightings, and literature records.

the field today than in years past. Numerous images of butterflies are submitted annually to various online databases, notably BAMONA, eButterfly, and iNaturalist. For example, 6,875 butterfly observations from Maine were posted on iNaturalist from 2011 to 2020, and 3,465 observations from the state were posted on eButterfly during the same period. Despite this large number of butterfly reports, only one was for *C. nycteis* (Ray Simpson's 2020 record). A total of seven Maine observations of *C. nycteis* are included on BAMONA, but all are legacy records prior to 2004. In addition, targeted visits to some historical *C. nycteis* collection sites, and searches of new areas in south-central Maine, have failed to locate the species (Arey 2014, Arey and Grkovich 2013, Grkovich 2013). These are troubling signs that *C. nycteis* may be facing the same fate in Maine as elsewhere in New England. As of 2021, this butterfly is listed as a species of special concern in Maine (P. deMaynadier pers. comm.).

An unexpected discovery. On 13 June 2021, I decided to visit the locality in Franklin County, Maine, where R. Simpson had found a single *C. nycteis* on 11 July 2020. His capture was at the very end of the expected flight period, and I hoped that visiting earlier in the season would reveal a colony and its local larval food plant. After visiting the capture site without success, I hiked along a nearby forested trail. To my astonishment, the species was quite common there, prompting me to search elsewhere in the area. By the end of the day, I found the species at six additional sites. Most yielded one to three adults, but as many as 20 individuals were observed at two sites. Returning to the area on 17, 18, and 24 June, I documented *C. nycteis* at six more sites in Coplin Plantation and Eustis Township. It was a conspicuous species in the area, and I estimate that I observed more than 100 adults during the two-week study period. These pockets of individuals were clearly part of an irrupting metapopulation, though it was often difficult to distinguish the boundaries of discrete colonies. I encountered several adults seemingly moving between core areas along road corridors. By expanding the search area, I determined that the population covered an area of at least three square miles (eight square kilometers), making it the largest on record in New England.

Exploring another area about eight miles farther north with Phillip deMaynadier on 21 June 2021, I recorded three individuals of *C. nycteis* in Eustis Township (Franklin Co.) and Flagstaff Township (Somerset Co.). These sites may not be part of the same metapopulation as those to the south, and the small number of adults encountered is more typical of historical populations in Maine.

The density of individuals within populations of *C. nycteis* typically fluctuates from year to year (Harris 1972, Iftner et al. 1992, Handfield 2011, Acorn and Seldon 2016). Sightings at known localities can be separated by many years, but impressive irruptions sometimes also occur, when unusually large numbers of adults emerge over a given area. Such temporary outbreaks were recently reported in Maryland and Virginia (Borchelt 2018, Pavulaan 2021). The unusual abundance of *C. nycteis* in Franklin County, Maine, in 2021 is indicative of a local irruption, and the first to be documented in New England. The cause of these sporadic surges is unknown, but they are probably triggered by a combination of factors, such as favorable weather conditions, increased food supply, and decreased parasitic activity.

Habitat and adult behavior. All recent Maine records of *C. nycteis* are from the Quebec/New England Boundary Mountains ecoregion as defined by Griffith et al. (2009) (Fig. 2). Extending from northeastern Vermont, across northern New Hampshire into northwestern and north-central Maine, this region is characterized by densely forested low mountains. Lower elevation forests include northern hardwoods, with spruce-fir forests on cooler slopes. The climate of this ecoregion is one of the coldest in New England (Griffith et al. 2009).

In 2021, *C. nycteis* was found in hilly terrain at elevations ranging from 1200 ft. to 1400 ft. (366 m–427 m) in association with forests of spruce-fir and mixed hardwoods, including birch, maple, and beech (Figs. 3-5). This forest type corresponds to the spruce-northern hardwoods forest community as described by Gawler and Cutko (2010). Permanent or intermittent streams flow near many of the colony sites. The butterfly was most often encountered at flowers or damp soil along semi-shaded roads and trails (Figs. 1, 6-8). Flowers visited included bush-honeysuckle (*Diervilla lonicera*), buttercups (*Ranunculus* spp.), common yarrow (*Achillea millefolium* L.), dogbane (*Apocynum* spp.), hawkweeds (*Hieracium* spp.), ox-eye daisy (*Leucanthemum vulgare* Lam.), and withe-rod (*Viburnum nudum* L.). The butterflies usually flew near the ground or close to understory vegetation, with shallow wingbeats interrupted by brief glides. Males spent a great deal of time patrolling for females, and both sexes frequently perched on leaves (Fig. 9). A few individuals were seen fluttering up into the trees to rest, especially in late afternoon.

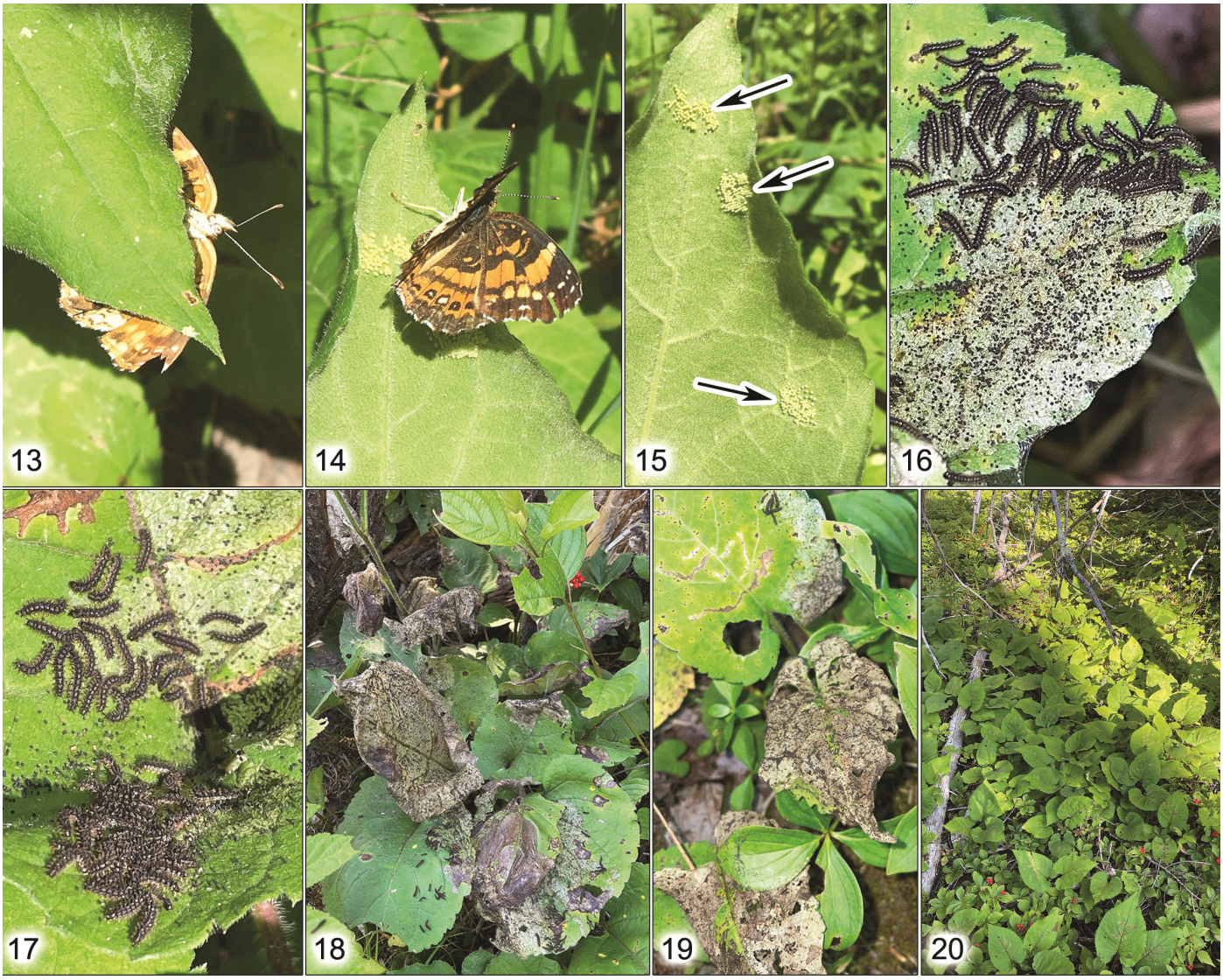
I always found *C. nycteis* in the company of Harris' checkerspot, *Chlosyne harrisii* (Scudder), which also was common in the area. In fact, I never found *C. nycteis* where *C. harrisii* was absent. On multiple occasions, I observed females of *C. nycteis* being courted by males of *C. harrisii* (Fig. 10), sometimes repeatedly by one or more individuals. Males of *C. harrisii* occasionally became so aggressive that the *C. nycteis* females were forced to fly away to escape the onslaught. Interestingly, I do not recall seeing any males of *C. nycteis* courting females of *C. harrisii*. Pairs of courting *C. nycteis* were also encountered (Fig. 11), and at 1200 hrs on 18 June I observed a male court and join with a female, which acted as the carrier in flight (Fig. 12).

Food plant. *Chlosyne nycteis* is univoltine in Maine, flying from early to mid-June until mid-July. Although the

Figs. 3-12. *Chlosyne nycteis* in Franklin Co., Maine, 13-18 June 2021. **3,** sunlit trail through forest where *C. nycteis* was common. **4,** overgrown trail through forest where *C. nycteis* was common. **5,** dirt road with brushy edges where *C. nycteis* was common. **6,** male nectaring on *L. vulgare*. **7,** female with expanded orange coloration nectaring on *V. nudum*. **8,** male at damp soil. **9,** perching female. **10,** male *C. harrisii* (bottom) courting female *C. nycteis*. **11,** male *C. nycteis* (left) courting female *C. nycteis*. **12,** mated pair of *C. nycteis*.

food plant was unknown in Maine, the species is generally reported to feed on various members of the Asteraceae, especially taller species, such as sunflowers (*Helianthus* spp.), crownbeards (*Verbesina* spp.), and coneflowers (*Rudbeckia* spp.) (Robinson et al. 2002). Eastern populations of *C. nycteis* seem to form food plant races or biotypes, which favor different groups of plants (Schweitzer et al. 2011). For example, it is believed that extirpated populations in Connecticut and New Jersey were part of a univoltine *Helianthus*-feeding biotype, while more secure, multivoltine *Verbesina*-feeding populations range from southeastern Pennsylvania to Georgia (NatureServe 2021). Nonetheless, such populations at least occasionally exploit other plants (e.g., Minno 2015). While undetermined, the food plant race in Maine was believed to differ from the *Helianthus*-feeding and *Verbesina*-feeding biotypes (NatureServe 2021). Three native species of *Helianthus* have limited distributions in Maine, and no *Verbesina* occur in the state (Go Botany 2021).

On 24 June 2021, the local food plant of *C. nycteis* in Franklin County, Maine, was confirmed when I observed a female fluttering slowly around a patch of low-growing plants with large, heart-shaped leaves. After several aborted attempts, the female finally came to rest on one of the larger leaves. Facing away from the edge, she carefully



Figs. 13-20. Food plant of *C. nycteis*, Franklin Co., Maine, 24 June and 28 July 2021. **13,** female ovipositing on underside of *E. macrophylla* leaf, 24 June. **14,** leaf lifted to show ovipositing female. **15,** three egg clusters on underside of *E. macrophylla* leaf (arrows). **16,** second instar larvae skeletonizing *E. macrophylla* leaf, 28 July. **17,** groups of second instar larvae on *E. macrophylla*. **18,** leaf damage caused by feeding larvae. **19,** leaf damage caused by feeding larvae. **20,** large patch of *E. macrophylla* in forest clearing.

backed over the leaf edge, inverting herself onto the bottom of the leaf, until only her head and wingtips were visible (Fig. 13). She remained under the leaf for about 20 minutes, methodically depositing a cluster of eggs. At one point, a gust of wind overturned the leaf, offering an unobstructed view of her activity. Realizing that this did not interrupt her task, I carefully flipped over the leaf to take photographs (Fig. 14) and was surprised to see two other egg clusters on the same leaf (Fig. 15). I searched nearby plants and found several additional egg clusters. The leaves with egg clusters were larger and slightly higher off the ground. I later identified this distinctive plant as large-leaved wood-aster, or bigleaf aster, *Eurybia macrophylla* (L.) Cass., formerly known as *Aster macrophyllus*.

Eurybia macrophylla is a native perennial with a broad range across north-central and northeastern North America, from Manitoba to Nova Scotia, south to Missouri and Georgia (Reeves 2006). In New England, this aster inhabits semi-shaded openings in hardwood forests and mixed forests (Elliman and Native Plant Trust 2016). It is recorded from all 16 counties in Maine (Campbell et al. 1995, Magee and Ahles 1999), and occurs abundantly throughout the area where I found *C. nycteis* in 2021, growing in dense colonies along the edges of wooded roads and trails (Fig. 20). Unlike other reported food plants of *C. nycteis*, which tend to be taller species, *E. macrophylla* has wide basal leaves that are produced in dense, low colonies, often separately from flowering stems.

On 28 July 2021, I returned to the area to search for larvae of *C. nycteis* on *E. macrophylla*. As expected, I found second instar larvae at all the localities visited (Figs. 16, 17). The gregarious young larvae skeletonize the leaves,

creating distinctive damage coated in frass (Figs. 18, 19). This type of damage was accurately described by Rummel (1919), who found larvae in New Jersey on *Helianthus*: "Colonies of fifty or more [larvae] may be found on one leaf, eating only the soft tissue on the upper and underside and leaving the skeleton which shrivels and appears as having been exposed to great heat." As noted by Wagner (2005), once you develop a search image for larval damage, one merely needs to scan a given patch of food plant to confirm the presence of the butterfly. On *E. macrophylla*, the larvae favor the large basal leaves; very few were seen feeding on leaves on flowering stems. I did not find larvae of *C. nycteis* on any other plant species in the area.

I visited Franklin County once again on 6 August 2021. By that time, all the larvae had dispersed from the food plants to diapause in the leaf litter until the following spring. I found one additional colony site based on the distinctive damage present on a few *E. macrophylla* plants. Located about seven air miles (11.3 km) farther north, in Jim Pond Township, this site supports patches of the food plant along a road through similar forested habitat.

Hall et al. (2014) listed *Eurybia*, and another aster genus, *Oclemena*, as food plants of *C. nycteis*. It was determined, however, that the inclusion of these genera was the result of nomenclatural confusion and they do not represent valid records for Ontario (P. Hall pers. comm.). Acorn and Sheldon (2016) repeated the same food plants given by Hall et al. (2014), including *Eurybia* and *Oclemena*.

McFarland and Pfeiffer (2021) mention that one *C. nycteis* was reared in 1993 in Vermont on white wood aster, *Eurybia divaricata* (L.) Nesom. This record is based on an adult specimen of *C. nycteis* from Milton, Chittenden County, which is labeled "reared ex Wood aster" (K. McFarland pers. comm.). However, it is unknown if this was a forced laboratory rearing, or even if *E. divaricata* was involved, as three species of wood asters are known to occur in Chittenden County, Vermont (Magee and Ahles 1999, Go Botany 2021).

Food plants of *C. nycteis* are unknown in Quebec (Handfield 2011, L. Handfield pers. comm.) and Nova Scotia (J. Klymko pers. comm.). In New Brunswick, it was once found in association with a non-native *Helianthus*, but the natural food plant may be a species of aster (R. Webster pers. comm.). *Eurybia macrophylla* is common in Nova Scotia where *C. nycteis* has been found (J. Klymko pers. comm.). The use of *E. macrophylla* in Maine may be indicative of a *Eurybia*-feeding biotype across the region. Areas with healthy populations of this plant should be searched for evidence of *C. nycteis*.

Historical reports of aster food plants. Despite numerous literature references for over a century, the use of asters as natural food plants by *C. nycteis* is, at best, poorly documented. Authors have mostly reiterated a few of the same reports, which need further confirmation. In addition, many horticultural and botanical websites arbitrarily claim that *C. nycteis* feeds on a variety of aster species, presumably because asters are so often associated with this butterfly. Further complicating matters is the use of "aster" as a general term for plants in the aster family (Asteraceae), not just those genera that are commonly identified as asters.

Edwards (1879) reported that larvae of *C. nycteis* accepted an unidentified species of aster, possibly a non-native garden variety, during his rearing studies in West Virginia. He stated that "*Actinomeris squarrosa*" (=*Verbesina alternifolia* (L.) Britt. Ex Kearney) served as the wild food plant in that area, while sunflowers (*Helianthus* spp.) were fed upon in New York. Although Edwards' personal journals (West Virginia State Archives) contain numerous references to rearing *C. nycteis*, he never mentioned that he found early stages on asters in nature.

Tall white aster, *Doellingeria umbellata* (P. Mill.) Nees, is frequently given as a food plant of *C. nycteis*. I traced this report to the booklet on Maine butterflies by Fernald (1884), who listed "*Diplopappus umbellatus*" as a food plant, without explicitly stating that he found the butterfly on this plant. *Doellingeria umbellata* is the only known larval food plant of *C. harrisii*; a discovery made during the 1860s by Sidney I. Smith at Norway, Maine (Scudder 1868). I have been unable to find any verifiable records of *C. nycteis* feeding on this plant and suspect that Fernald's report is due to confusion between this butterfly and *C. harrisii*, which is locally common in Maine.

Shapiro (1966) remarked that *C. nycteis* feeds on asters, especially *Aster puniceus,* which is now recognized as *Symphyotrichum puniceum* (L.) A. & D. Löve (purple-stemmed American aster). This report is probably based on a wild observation in Montgomery County, Pennsylvania (A. Shapiro pers. comm.), within the purported range of the *Verbesina*-feeding biotype (NatureServe 2021). Although *S. puniceum* continues to be listed as a food plant of *C. nycteis* (e.g., Monroe and Wright 2017), I have found no other verifiable reports. This was possibly a rare event, much like records of hairy leafcup (*Smallanthus uvedalia* (L.) Mack. ex Small) and cocklebur (*Xanthium strumarium* L.) being fed upon by *C. nycteis* in the southeastern United States (Minno 2015, Ogard 2021).

Acknowledgements

For providing helpful information, I thank Peter Hall, Louis Handfield, Colin Jones, John Klymko, Ross Layberry, Kent McFarland, Chris and Susan Livesay, Glenn Morrell, Paul Opler, Harry Pavulaan, Chris Schmidt, Arthur Shapiro, Ray Simpson, Sharon Stichter, Reggie Webster, and David Wright. Phillip deMaynadier kindly read a draft of the manuscript and provided helpful comments.

Literature Cited

Acorn, J., and I. Sheldon. 2016. Butterflies of Ontario & eastern Canada. Lone Pine Publ., Tukwila, Washington. 320 pp.

Arey, M. 2006a. Boxford, Danvers, Ipswich. 29 May. MassLep discussion group, https://groups.google.com/g/masslep.

_____. 2006b. Day trip to Maine. 21 June. MassLep discussion group, https://groups.google.com/g/masslep.

_____. 2006c. Harris' checkerspot / Maine. 24 June. MassLep discussion group, https://groups.google.com/g/masslep.

_____. 2014. Central Main (Bowdoin and Litchfield, Sagadahoc Co.) 6/21/14 – continued search for the silvery checkerspot (*C. nycteis*). 21 June. MassLep discussion group, https://groups.google.com/g/masslep.

Arey, M., and A. Grkovich. 2013. Search for the silvery checkerspot in central Maine (6/16/13). 16 June. MassLep discussion group, https://groups.google.com/g/masslep.

Borchelt, R. 2018. Mid-Atlantic butterfly field forecast for the week of 2018 July 28. LepLog. Online blog: https://leplog.wordpress.com/.

Brower, A. E. 1974. A list of the Lepidoptera of Maine – Part 1: the macrolepidoptera. Life Sci. Agr. Exp. Sta., Univ. of Maine, Orono. 136 pp.

BugGuide.net. 2021. Online database. Iowa St. Univ., Dept. of Entomol. Webpage: https://bugguide.net/node/view/15740.

Calhoun, J. V. 2011. The conceptual history of *Melitaea nycteis* Doubleday, [1847] (Nymphalidae), with the designation of a lectotype and a portrait of its collector, David Dyson (1823–1856). J. Lepid. Soc. 65:182-186.

Campbell, C. S., H. P. Adams, H. P. Adams, A. C. Dibble, L. M. Eastman, S. C. Gawler, L. L. Gregory, B. A. Grunden, A. D. Haines, K. Jonson, S. C. Rooney, T. F. Vining, J. E. Weber, and W. A. Wright. 1995. Checklist of the vascular plants of Maine. Third revision. Josselyn Bot. Soc. Maine Bull. 13. xviii+100 pp.

Cassie, B. 1998. Personal observations on two decades of progress on the Massachusetts butterfly frontier. Massachusetts Butterflies no. 11:13-15.

Doubleday, E. [1847]. Plate XXIII. Nymphalidae. *In* Doubleday, E. and J. O.Westwood, 1846–1850, The genera of diurnal Lepidoptera: comprising their generic characters, a notice of their habits and transformations and a catalogue of the species of each genus. Vol. 1. Longman, Brown, Green and Longmans, London.

_____. 1848. Pp. 133–200. *In* Doubleday, E. and J. O. Westwood, The genera of diurnal Lepidoptera: comprising their generic characters, a notice of their habits and transformations and a catalogue of the species of each genus. Vol. 1. Longman, Brown, Green and Longmans, London.

eButterfly. 2021. Online database. Webpage: https://www.e-butterfly.org.

Edwards, W. E. 1879. Description of preparatory stages of *Phyciodes nycteis*. 11:101-105.

Elliman, T., and Native Plant Trust. 2016. Wildflowers of New England. Timber Pr., Portland, Oregon. 448 pp.

Farquhar, D. W. 1934. The Lepidoptera of New England. a list of the species, their distribution, period of imaginal activity, and larval food plants; the New England faunal zones; origin of the New England lepidopterous fauna. PhD thesis. Harvard Univ., Cambridge, Massachusetts. ii+329 pp., 13 pls.

Fernald, C. H. 1884. The butterflies of Maine. designed for the use of the students in the Maine State College, and the farmers of the state. Sprague and Son, Augusta, Maine. 104 pp.

Fiske, W. F. 1901. An annotated catalogue of the butterflies of New Hampshire. New Hampshire Coll. Agric. Exp. Sta. Tech. Bull. No. 1. 80 pp.

Gawler, S., and A. Cutko. 2010. Natural landscapes of Maine: a guide to natural communities and ecosystems. Maine Natural Areas Program, Maine Dept. of Cons., Augusta, Maine. 347 pp.

GBIF [Global Biodiversity Information Facility]. 2021. Online database. Webpage: https://www.gbif.org/.

Glassberg, J. 1993. Butterflies through binoculars: a field guide to butterflies in the Boston – New York – Washington region. Oxford Univ. Pr., New York, New York. 160 pp., 40 pls.

Go Botany. 2021. Online database of New England plants. Native Plant Trust, Framingham, Massachusetts. Webpage: https://gobotany.nativeplanttrust.org/.

Gochfeld, M., and J. Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutgers Univ. Pr., New Brunswick, New Jersey. xxii+327 pp., 8 pls.

Grehan, J. R., B. L. Parker, G. R. Nielsen, D. H. Miller, J. D. Hedbor, M. Sabourin, and M. S. Griggs (eds.). 1995. Moths and butterflies of Vermont (Lepidoptera): a faunal checklist. Agric. Exp. Sta., Univ. Vermont Misc. Publ. 116, Vermont Mon. Coop. Bull. No. 1. xi+94 pp., 4 pls.

Griffith, G. E., J. M. Omernik, S. A. Bryce, J. Royte, W. D. Hoar, J. W. Homer, D. Keirstead, K. J. Metzler, and G. Hellyer. 2009. Ecoregions of New England (color poster with map, descriptive text, summary tables, and photographs). U.S. Geol. Surv., Reston, Virginia.

Grkovich, A. 2002. Silvery checkerspot. 18 June. VTLeps discussion group, https://list.uvm.edu/cgi-bin/wa?A0=VTLEPS.

_____. 2013. Rambling around Maine. 8 July. VTLeps discussion group, https://list.uvm.edu/cgi-bin/wa?A0=VTLEPS.

Hall, P. W., C. D. Jones, A. Guidotti, and B. Hubley. 2014. Butterflies of Ontario. Royal Ontario Museum, Toronto, Ontario. 488 pp.

Handfield, L. 2011. Le guide des papillons du Québec. Version scientifique. Édition revue et corrigée. Vol. 1. Part 1. Broquet, Saint-Constant, Québec. 1200 pp.

Harris, L. H., Jr. 1972. Butterflies of Georgia. Univ. Oklahoma Pr., Norman, Oklahoma. xxii+326 pp., 23 pls.

Iftner, D. C., J. A. Shuey, and J. V. Calhoun. 1992. Butterflies and skippers of Ohio. Ohio Biol. Surv. Bull. (n.s.) 9(1):xii+212 pp., 40 pls.

iNaturalist. 2021. Online database. Webpage: https://www.inaturalist.org.

Johnson, C.W. 1927. Biological survey of the Mount Desert region. Part I. The insect fauna with reference to the flora and other biological features. Wistar Inst. An. Biol. Philadelphia, Pennsylvania. 247 pp.

Keil, W. J. 2003. The butterflies of the White Mountains of New Hampshire. Falcon, Guilford, Connecticut. xxvii+195 pp.

Leahy, C. W. 2006. Silvery checkerspot, *Chlosyne nycteis*. *In,* Leahy, C. W., B. Cassie, and R. K. Walton (eds.), Massachusetts butterfly atlas 1986—1990. Massachusetts Audubon. Webpage: https://www.massaudubon.org/learn/nature-wildlife/insects-arachnids/butterflies/find-a-butterfly/(id)/39.

Lotts, K., and T. Naberhaus (coords.). 2021. Butterflies and Moths of North America. Webpage: https://www.butterfliesandmoths.org.

Lyman, H.H. 1880. List of diurnal Lepidoptera taken in the vicinity of Portland, Maine. Can. Entomol. 12:7-9.

Magee, D. W., and H. E. Ahles. 1999. Flora of the Northeast: a manual of the vascular flora of New England and adjacent New York. Second edition. Univ. Massachusetts Pr., Amhurst, Massachusetts. xxxvii+1214 pp.

Maynard, C. J. 1886. The butterflies of New England; with original descriptions of one hundred and six species, accompanied by eight lithographic plates, in which are given at least two hand-colored figures of each species. Bradlee Whidden, Boston, Massachusetts. iv+65 pp., 8 pls.

MBC [Massachusetts Butterfly Club]. 2021. Butterfly photos and information. Webpage: https://www.naba.org/chapters/nabambc/butterfly-info.asp.

McFarland, K., and B. Pfeiffer. 2021. Vermont Butterfly Survey. Vermont Center for Ecostudies – Vermont Atlas of Life. Webpage: http://val.vtecostudies.org.

Minno, M. C. 2015. New host plant records for the silvery checkerspot (*Chlosyne n. nycteis*) (Nymphalidae: Nymphalinae) in the southeastern United States. So. Lepid. News 37:193-194.

Mittelhauser, G, M. Barr, and A. Swann. 2014. Catalog of the butterflies and moths (Lepidoptera) of Mount Desert Island, Maine from early- to mid-1900s: based on the catalog of William Procter's insect collections. Maine Nat. Hist Obs., Gouldsboro, Maine. 466 pp.

Monroe, J. L., and D. M. Wright. 2017. Butterflies of Pennsylvania: a field guide. Univ. Pittsburgh Pr., Pittsburgh, Pennsylvania. xiii+304 pp.

Moore, S. 2008. Errol, NH area 6/14/2008. 15 June. MassLep discussion group, https://groups.google.com/g/masslep.

NABA [North American Butterfly Association]. 2021. Recent sightings. Webpage: https://sightings.naba.org/.

NatureServe. 2021. NatureServe Explorer. Webpage: https://explorer.natureserve.org/.

Newcomb, H. H. 1901. *Chionobas katahdin* and an account of its discovery. Entomol. News 12:225-231.

NHNHB [New Hampshire Natural Heritage Bureau]. 2013. Rare plants, rare animals, and exemplary natural communities in New Hampshire Towns. Div. For. & Lands. Concord, New Hampshire. 220 pp.

O'Donnell, J. E., L. F. Gall, and D. L. Wagner (eds.). 2007. The Connecticut butterfly atlas. State Geol. Nat. Hist. Surv. Bull. No. 118. Hartford, Connecticut. 376 pp.

Ogard, P. H. 2021. Silvery checkerspot, *Chlosyne nycteis*. Alabama butterfly atlas. Webpage: https://alabama.butterflyatlas.usf.edu/species/details/40.

Packard, A. S. 1869. Guide to the study of insects, and a treatise on those injurious and beneficial to crops: for the use of colleges, farm-schools, and agriculturists. Naturalists' Book Agency, Salem, Massachusetts. viii+702 pp.

Pavulaan, H. 2021. Butterflies of the Potomac River woodlands in Leesburg, Loudoun Co., Virginia: a depauperate fauna? Taxon. Rpt. 9(5):5-13.

Pavulaan, H., and D. W. Gregg. 2007. Checklist of Rhode Island Butterflies. Rhode Island Nat. Hist. Surv. Available: https://rinhs.org/partners-resources/download-pubs/checklist-of-rhode-island-butterflies/.

Pfieffer, B. 2016. The sunflower and the butterfly: together they fall. 24 August. Online blog, https://bryanpfeiffer.com/blog/.

Procter, W. 1946. Biological survey of the Mount Desert Region incorporated. Part VII. The insect fauna with references to methods of capture, food plants, the flora and other biological features. Wistar Inst. Nat. Biol., Philadelphia, Pennsylvania. 566 pp.

Reeves, S. L. 2006. *Eurybia macrophylla*. *In* Fire Effects Information System, U.S. Dept. Agr., For. Serv. Webpage: www.fs.fed.us/database/feis/plants/forb/eurmac/all.html.

Robinson, G. S., P. R. Ackery, I. J. Kitching, G. W. Beccaloni, and L. M. Hernández. 2002. Hostplants of the moth and butterfly caterpillars of America north of Mexico. Mem. Amer. Entomol. Inst. 69:1-824.

Rummel, C. 1919. Observations on *Physiodes* [sic] *nycteis*. Bull. Brook. Entomol. Soc. 14 :47.

SCAN [Symbiota Collections of Arthropods Network]. 2021. Online data portal. Webpage: https://scan-bugs.org/portal/

Scudder, S. H. 1863. A list of the butterflies of New England. Proc. Essex Inst. 3:161-179.

_____. 1868. Supplement to a list of the butterflies of New England. Proc. Boston Soc. Nat. Hist. 11:375-384.

_____. 1872. A systematic revision of some of the American butterflies; with brief notes on those known to occur in Essex County, Mass. Ann. Rpt. Trustees Peabody Acad. Sci. 4:24-83.

_____. 1874. The distribution of insects in New Hampshire. Final report upon the geology of New Hampshire 1:331-384, 1 pl.

_____. 1888–1889. The butterflies of the eastern United States and Canada with special reference to New England. 3 vols. Author, Cambridge, Massachusetts. xxiv+1956 pp., 89 pls.

_____. 1899. Every-day butterflies: a group of biographies. Houghton, Mifflin and Co., Boston and New York. vii+391 pp.

Schweitzer, D. F., M. C. Minno, and D. L. Wagner. 2011. Rare, declining, and poorly known butterflies and moths (Lepidoptera) of forests and woodlands in the eastern United States. Second edition. USDA Forest Serv., Morgantown, West Virginia. iv+517 pp.

Shapiro, A. M. 1966. Butterflies of the Delaware Valley. Amer. Entomol. Soc. Sp. Publ., Philadelphia, Pennsylvania. vi+79 pp.

Stichter, S. (ed.). 2005. Guide to good butterfly sites. Massachusetts Butterfly Club, Northampton, Massachusetts. ix+132 pp.

_____. 2015. The butterflies of Massachusetts: their history and future. Author, Middletown, Delaware. 488 pp.

VNHI [Vermont Natural Heritage Inventory]. 2017. Butterflies and moths of Vermont. Vermont Fish and Wildlife Dept. Avai lable: https://vtfishandwildlife.com/conserve/conservation-planning/animal-inventory/invertebrates.

Wagner, D. L. 2005. Caterpillars of eastern North America: a guide to identification and natural history. Princeton Univ. Pr., Princeton, New Jersey. 512 pp.

_____. 2012. Moth decline in the northeastern United States. News Lepid. Soc. 54:52-56.

Gall, Butterfly Counts

Literature Cited continued from p. 25

O'Donnell, J. E., L. F. Gall & D. L. Wagner. 2007. *The Connecticut Butterfly Atlas*. State Geological and Natural History Survey of Connecticut (Hartford, CT). 376 pp.

Pollard, E. 1977. A method for assessing changes in the abundance of butterflies. *Biological Conservation* 12: 115-134.

Pyle, S. A. 1975. *The Xerces Society Self Help Sheet #3.* The Xerces Society (New Haven, CT). 4 pp.

Remington, C. L. 1955. How many butterfly species in one day? *The Lepidopterist' News* 9: 77-78.

Shapiro, A. M. 2000. Willow Slough. Page iii, *In: Fourth of July Butterfly Count Report for 1999*, North American Butterfly Association (Delaware, NJ).

Swengel, A. B. 1990. Monitoring butterfly populations using the 4th of July Butterfly Count. *American Midland Naturalist* 124: 395-406.

Wagner, D. L. & R. Bailowitz. 2021. The 2020-2021 megadrought and southeastern Arizona's butterflies. *News of The Lepidopterists' Society* 63: 202-205.

Xerces Society & North American Butterfly Association. 1976-2020. *Fourth of July Butterfly Count Reports*. [published initially in *Wings* and *Atala* (1976-1981), subsequently as separate reports of the Xerces Society (1982-1991) and the North American Butterfly Association (1992-2020)].

***Announcements*:**

70th Annual Lepidopterists' Society Meeting, June 2022

Welcome back to an in-person annual meeting! Please join us for the 70th Annual Meeting of the Lepidopterists' Society, held from Tuesday, June 14 – Friday June 17, 2022 in Cullowhee, North Carolina. We will be meeting in conjunction with the **Southern Lepidopterists' Society** and the **Association for Tropical Lepidoptera**. The meeting will be hosted by Western Carolina University and Dr. James Costa. WCU is the westernmost university in the UNC system, located in a valley between the Blue Ridge and Great Smoky Mountains. Started in 1889, it is a comprehensive university for 11,000 undergraduates and graduates. Dr. Costa has been in the Department of Biology at WCU since 1996 and the director the Highlands Biological Station since 2005. He has studied and published extensively on social behavior in caterpillars and is a Darwin scholar, recently recognized as a finalist for the AAAS/Subaru Prize for his book "Darwin's Backyard: How Small Experiments Led to a Big Theory."

Field Trips (both collecting and observing) will be organized for Tuesday (14 June). If you plan on attending one of the Tuesday field trips or the organized Thursday moth night (after the BBQ), please fill out the field trip form (available on the website), and send it to Brian Scholtens (**scholtensb@cofc.edu**). If you register for a package that includes Tuesday, you will receive a box lunch for the field trip day.

The welcome reception will be on campus Tuesday evening. The Executive Council meeting of the Lepidopterists' Society is scheduled for Tuesday (14 June); the Southern Lepidopterists' Society business meeting will convene sometime Wednesday through Friday (to be announced). Talks are scheduled for Wednesday through Friday (15-17 June). The barbecue will be held Thursday evening (followed by blacklighting for anybody interested), and the banquet Friday evening. Main sessions, the Thursday BBQ, and the Friday banquet will be on campus, with housing conveniently located in Blue Ridge Hall on campus.

If you would rather not stay on campus, several hotels and motels are within easy driving distance. The closest is a Comfort Inn between Cullowhee and Sylva, just a few miles from campus, and there are several other hotel options within a 10-15 minute drive. If you Google "Sylva NC Hotels" you'll come up with that Comfort Inn, a Best Western, Holiday Inn, and smaller locally owned hotels like the Blue Ridge Inn. Please register as a commuter if you plan on staying in one of these locations.

Online registration is now available through WCU. LINK: https://wcupg.wcu.edu/C20252_ustores/web/product_detail.jsp?PRODUCTID=458&SINGLESTORE=true

The conference has 4 different package options for registration. **Registration Deadline is June 1.**

Option #1 includes the full conference with a 5-night residence hall stay checking in on Monday (6/13) and departing Saturday (6/18) with breakfasts, lunches, the BBQ and banquet. Single or double occupancy rooms available. **$482 pp Single Occupancy/ $432 pp Dbl Occupancy.**

Option #2 includes the full conference with a 4-night stay, checking in on Tuesday (6/14) and departing Saturday (6/18) with breakfast, lunches, the BBQ and banquet. **$409 pp Single Occupancy/ $369 pp Dbl Occupancy.**

Option #3 includes the full conference with a 3-night stay, checking in on Tuesday (6/14) and departing FRIDAY (6/17: No Friday night stay). Includes breakfasts, lunches, the BBQ and banquet. **$331 pp Single Occupancy/ $301 pp Dbl Occupancy.**

Option #4 is for commuters staying off-campus. It includes the full conference with lunches, the BBQ and banquet, but no accommodations. **$199 per person**

ABOUT ON-CAMPUS STAYS

University residence halls are wonderfully economical compared to traditional hotel prices. They are comfortable but very simple in terms of amenities. Your air-conditioned room will have 1 or 2 XL twin-sized beds with a basic linen package including a blanket, 2 sheets, a pillow w/ case and some towels and wash clothes. No more than 2 people will share a bath. Single occupancy rooms share a bath with the adjoining room (matched by gender) and double occupancy rooms have a private bath. Doubles are suited for couples. Free Wi-Fi is available to all conference guests.

WCU recommends bringing the following items with you for your stay:

- Your favorite extra pillow
- clothes hangers
- soap, shampoo and other toiletries
- an UMBRELLA
- an alarm clock
- a small bedside lamp (optional)
- an XL twin sized mattress pad (optional)

Meals at the Courtyard dining hall offer an all-you-can eat dining experience with many different options to suit a variety of tastes and dietary restrictions. Guests will have a conference card they can swipe for their meals. This same card will serve as your access card for your residence hall. Individual rooms will have a separate key.

Check-In Times:
IMPORTANT: Check in times for Monday (6/13) and Tuesday (6/14) will be from 4pm until 8pm EST.

Please note that unlike traditional hotels, university residence halls are not staffed 24 hours a day. We ask participants to make every effort to check-in during the designated check-in times. It may not be possible to accommodate very late arrivals. If you know that you will have to arrive after these times, please let us know well ahead. Directions and a map will be sent to all participants closer to the conference date.

If you have question about your stay or your registration please call WCU's Educational Outreach office at 828-227-7397 or email Bobby Hensley (**hensley@wcu.edu**).

We encourage contributed papers and posters by anyone who is interested in presenting! Please use the abstract submission form (available on the website) to give either a paper or a poster. Please submit abstracts electronically to Brian Scholtens (**scholtensb@cofc.edu**). Abstract submission will be open until June 1.

Western Carolina University is part of the University of North Carolina system. The picturesque campus is situated in the western North Carolina mountains at an elevation of about 2,100 feet (640 m) but elevations up to about 6,000 feet (1,829 m) are adjacently accessible by road. Great Smoky Mountains National Park, Pisgah National Forest, and Nantahala National Forest are all within fairly close driving distance. Since WNC is located in the Appalachian Mountains, there is no direct way of travelling to Cullowhee. The closest airport is Asheville Regional Airport, in Asheville, NC; from here WCU is about 45 miles.

Links:
Western North Carolina University: **https://www.wcu.edu/**
Highlands Biological Station: **https://highlandsbiological.org/**
North Carolina National Forests: **https://www.fs.usda.gov/main/nfsnc/home**
Asheville, North Carolina: **https://www.exploreasheville.com/**

Contact:
The LepSoc 2020 meeting organizing committee consists of James Costa and Brian Scholtens. Please email **scholtensb@cofc.edu** with any questions regarding the meeting. **Hope to see you in North Carolina this June!**

Lep Course returns! 23 July - 1 August 2022

Please join us at the beautiful Southwestern Research Station for a return to in-person instruction. Details and application available on **www.lepcourse.com**.

Lep Soc Statement on Diversity

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

Reduction of Lep Soc page charges continued

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

Wedge Entomological Research Foundation Student Award

The Wedge Entomological Research Foundation (WERF) was founded to promote the study of insects, their evolution and diversity, and in particular to research and publish information on the moths of North America. WERF's flagship publication is the *Moths of America North of Mexico* (MONA) series, now in its 50th year, of which many fascicles are available for free in PDF form at **http://wedgefoundation.org/publications_paypal.asp**. The Foundation has recently initiated an award program for students. This Student award is up to $1,000 per year, and can be used for expenses related to the study and conservation of moths, butterflies, and related insects (e.g., travel to meetings, field station room/board, biosystematics research costs, etc.). High school, undergraduate, and graduate students are eligible. WERF is especially committed to supporting underserved groups. A one page (500 word) project description with an indication of how the funds will be used must be submitted by **15 April 2022**. The application should be accompanied by a resume or curriculum vitae, and a letter of recommendation from the student's major professor or academic advisor. Please email all application materials to the committee chair, David Wagner, at **david.wagner@uconn.edu**. Preference will be given to proposals that focus on Lepidoptera. Completion of a 350-word summary of project findings, with one to two appropriate images, is required by 31 December of the award year. Support from WERF should be acknowledged in relevant presentations, publications, web products and similar deliverables.

Mix Family Award for Contributions in Lepidoptera

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

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

Searching The Lepidopterists' Society Season Summary on SCAN

Brian Scholtens and Jeff Pippen

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

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

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

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**

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 69th Lane, Gainesville, FL 32653.

Society of Kentucky Lepidopterists

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

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

The Association for Tropical Lepidoptera

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

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!

Metamorphosis

Charles "Chuck" Hageman of Yuba City, passed away Monday September 20, 2021, at the age of 76. He was born February 6, 1945 to Ruth and Leo Hageman. Chuck grew up and lived his entire life in Yuba City. Chuck was one of those individuals who spoke very little but his presence spoke volumes. Whether it was just an utterance of a few words or his grunts about an unfavorable situation, you always knew where he stood. His love for his family, butterflies, his 1939 Chevy two door coupe and the tree filled orchards showed his passion for the things that mattered most. However, he lived a quiet life with a large footprint that people will be able to see for years to come.

Very few people knew that Chuck had a large private butterfly collection, one of the largest in North America for Northern California butterflies. One of Chuck›s many journeys with friends was along Sierra Nevada Mountains both north and south of Yuba City, where he helped in the study of a new sub-species of butterfly. In fact, this butterfly was named *Speyeria callippe hagemani* in his honor for his knowledge, and many years of field research of California butterflies. Specimens of the new butterfly are deposited and can be seen at the Los Angeles County Museum of Natural History in Los Angeles, California. Chuck left a collection of Butterflies to several different museums across the United States to include UC Davis Bohart Museum and McGuire Center for Lepidoptera and Biodiversity at the University of Florida.

Chuck is survived by his loving and supporting wife Cathy who often joined him on his «hunt» for butterflies with numerous other friends and family members. He is also survived by his children Tina Biles and Charles "Chuck" Hageman III (Leah), Brother David Hageman (Judi), four grandchildren -- Ashley and Brooke Biles, Kaitlyn and Dillan Hageman. He was preceded in Death by parent's Ruth and Leo Hageman and brother Richard Burk.

As all who knew him, and no one knew him better than Cathy, will agree that Chuck may have been stubborn as a mule at times but he had a heart of gold.

Private Memorial at a later date. Obituary provided by Cathy Hageman (wife of Chuck)

Digital Collecting:

Butterflying Alaska --
Fairbanks, East Central and Dalton Highway

Kenneth Kertell[1] and Bill Berthet[2]

[1]4344 E. Monte Vista Drive, Tucson, AZ 85712 **teleost07@yahoo.com**
[2]12885 Julington Road, Jacksonville, FL 32258 **bergems@comcast.net**

A Travelogue

We first discussed a trip to Alaska in February 2020 at the end of a butterfly tour to Argentina, inspired in part, we think, by the mountains of northern Patagonia. There was little action on our part, however, until October 2020, when Andy Warren shared with us the detailed itinerary of a collecting trip he had taken a few years earlier. It was the spark we needed. Aware of potential covid-related travel restrictions, but confident in the availability of a vaccine by spring, we started planning for 2021, making sizeable financial commitments in December 2020 in the form of non-refundable rental payments for truck campers, which we would need for the final two weeks. We then reserved lodging and a rental car for the first week. The trip was on, hopefully.

We had a few goals in mind: to enjoy a 3-week break from the summer heat; to experience some of Alaska's most spectacular scenery; and, of course, to photograph butterflies. We would focus on interior Alaska and the Dalton Highway (Fig. 1) in hopes of seeing as many "specialty" nymphalids, i.e., *Erebia*, *Oeneis*, and *Boloria*, as possible.

Traditionally, it was thought that all northern landscapes, including Alaska, were covered by ice to a similar extent during glacial periods. However, in 1937 Eric Hultén, a Swedish botanist, proposed in his book "Outline of the History of Arctic and Boreal Biota during the Quarternary Period" that most of Northeast Russia and Northwest North America (east to the Yukon Territory in Canada) remained ice-free during the Pleistocene. He applied the name "Beringia" to this unglaciated region and suggested that it served as a refuge, as well as a movement corridor, for arctic plants and animals until the Bering Strait formed. A recent study of the evolution of the genus *Erebia* concludes that it, and several other genera (e.g., Oeneis), colonized North America through Beringia, perhaps as "recently" as 3.5 million years ago (Peña et al. 2015).

Our travelogue is presented chronologically in three parts: 1) Fairbanks and the Steese Highway; 2) Tok and Delta Junction; and 3) the Dalton Highway through the Brooks Range. The first two parts were completed based out of comfortable accommodations with access to a variety of services, including dining options. The effective accomplishment of part 3 would require the aforementioned truck campers, and a food supply for approximately two weeks.

Fig. 1. Alaska with locations visited indicated with red and black arrows.

The Dalton Highway through the Brooks Range was the most anticipated portion of the trip. The true richness of the butterfly fauna of Alaska was unclear until construction of the Dalton Highway (and the Dempster Highway in the Yukon) in the 1970s. Both roads provided access to remote locations with a variety of previously under-explored habitats. Lepidopterists took advantage, soon recording several new species and better defining the ranges of several others.

The butterfly season in interior Alaska is brief. Our visit would be from June 9-July 3, which seemed about right for a "normal" year. We prepared using Butterflies of Alaska: A Field Guide by Philip and Ferris (2016), studied the images at the Butterflies of America (BOA) website (Warren et. al. 2017) and pored over pertinent sections of The Milepost: Alaska Travel Planner.

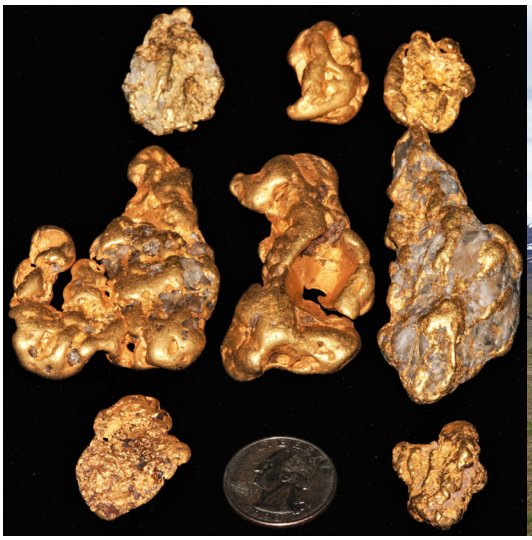


Fig. 2. Gold Nuggets.

Fig. 7. The White Mountains.

Segment 1 - Fairbanks and the Steese Highway

We are both seasoned travelers but air travel in summer 2021 was frenetic and disorganized. Although our flights were on time, Bill was delivered to Fairbanks without his checked luggage containing, among other items, his lightweight Tingley rubber boots and permethrin-treated clothing. His luggage would arrive 24 hours later!

For Bill, a retired gemologist and former jewelry store owner, the evening visit to the airport to look for his missing luggage was an opportunity to explore nearby downtown Fairbanks, which is small and accessible. There he befriended and swapped gemologist stories with a local jewelry store owner, who, apparently confident that Bill was not scheming to steal his gems, retrieved from a safe eight large gold nuggets (totaling 8.8 ounces) for Bill to photograph (Fig. 2). The gold was reportedly from the area around Coldfoot on the Dalton Highway, an area we would visit.

Since our camera equipment is always carried on, we were able to visit local sites as planned on our first day. At Goldstream Creek, the weather on June 10 was cool and overcast, however, and despite our best efforts we did not find Philip's Arctic (*Oeneis philipi*). We did find a nice Arctic Skipper (*Carterocephalus palaemon skada*), our first hesperid (Fig. 3). In retrospect, we should have returned to Goldstream later in the day.

By early afternoon the sun was shining on Murphy Dome, an alpine tundra site, also just a few minutes from Fairbanks. Here we photographed two highly anticipated species, Polaris Fritillary (*Boloria polaris*) (Figs. 4 and 5) and Banded Alpine (*Erebia fasciata*) (Fig. 6). These two beauties were seen again on several occasions in suitable habitat throughout the trip. Dinner, and a beer, at the Pump House restaurant (which featured bison burger, scallops wrapped in birch syrup-glazed bacon, and reindeer with gorgonzola meatballs) became our evening routine whenever we based in Fairbanks.

The following morning, June 11, we drove the Steese Highway northeast through the White Mountains (Fig. 7). Our destinations, Twelvemile and Eagle summits, were both

Figs. 3-6. Fig. 3: *Carterocephalus palaemon skada*. Fig. 4 & 5: *Boloria polaris*. Fig. 6: *Erebia fasciata*.

Figures 8-13. Fig. 8: *Erebia mancinus*. Fig. 9: *Erebia discoidalis*. Fig. 10: *Oeneis jutta alaskensis*. Figs. 11-12: *Pieris marginalis*. Fig. 13: *Oeneis tanana*.

well south of Circle, once the largest mining town on the Yukon River. Between the two summits, along the recently graded roadside, we encountered Taiga Alpine (*Erebia mancinus*) (Fig. 8), adjacent to streamside forest, several Red-disked Alpine (*Erebia discoidalis*) (Fig. 9), higher up but below treeline, and our first of many Jutta Arctic (*Oeneis jutta alaskensis*) (Fig. 10) and Margined White (*Pieris marginalis*) (Fig. 11). Philip and Ferris (2016) treat Margined White as a complex to account for apparent taxonomic uncertainties. Here are two *marginalis* photographed later in the trip at Galbraith Lake on the north side of the Brooks Range (Fig. 12)

The fact that we were visiting Alaska in 2021, an odd-numbered year, was not lost on us. Although most of the butterflies of interior Alaska are reportedly present as adults annually, most *Erebia*, and at least a few *Boloria* and *Oeneis* develop from egg to adult in two years. In Alaska and the Yukon, they fly in odd-numbered years, while in eastern Canada they fly in even-numbered years. Apparently, they also have synchronized life cycles so that adults are rare, or absent, every second year, which in Alaska would be every even-numbered year. Clear as mud?

Segment 2 - Tok and Delta Junction

On June 12 we left Fairbanks and drove 200 miles southeast to Tok, located in the Tanana River Valley at the junction of the Alaska and Glenn highways. Driving through Canada to Fairbanks or Anchorage means passing through Tok; consequently, the town's economy is fueled by a brief summer tourism season.

Because Canada's border was closed in June, Tok was comparatively quiet during our visit. In support of the economy, we booked accommodations at Caribou Cabins for 3 nights (apparently an unusually long stay according to the lodge manager) and enjoyed 2 meals a day at Fast Eddy's Restaurant, another excellent pre-trip dining suggestion. Reindeer was again on the menu, in the form of sausage at breakfast.

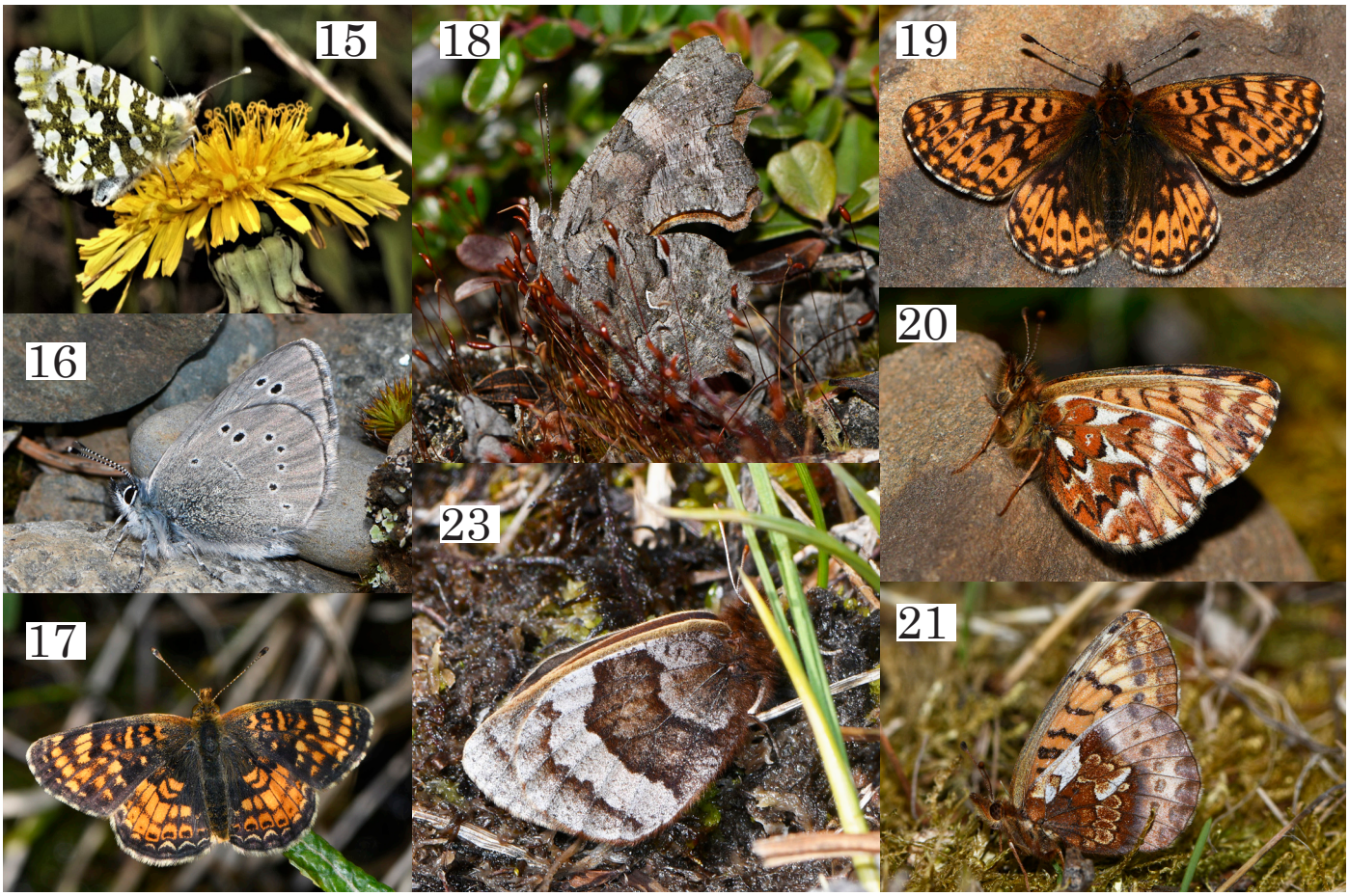
Our principal reason for the visit? Tok is very near the type locality of one of our target species, the recently described Tanana Arctic (*Oeneis tanana*) (Fig. 13). The story behind the "discovery" of Tanana Arctic, its resemblance to Chryxus Arctic (*Oeneis chryxus*), and its hypothesized hybrid origin is fascinating reading in its original form (see Warren et. al. 2016). In the morning we followed directions to the location and, during bouts of sunshine, watched several fresh individuals patrolling a utility corridor and nearby dirt road bordering spruce forest (Fig. 14). Also photographed here were Clouded Sulphur (*Colias philodice vitabunda*) and Large Marble (*Euchloe ausonides*) (Fig. 15).

Fig. 14. *Oeneis tanana* habitat.

Fig. 22. Taylor Mountain.

The following day, June 14, we visited several additional lowland taiga sites along the Alaska Highway. We enjoyed views of Arctic Duskywing (*Erynnis persius*), Silvery Blue (*Glaucopsyche lygdamus*) (Fig. 16), Field Crescent (*Phyciodes pulchella*) (Fig. 17), Canadian Tiger Swallowtail (*Pterourus canadensis*), Arctic Anglewing (*Polygonia faunus*) (Fig. 18), Freija Fritillary (*Boloria freija*) (Figs. 19 and 20), and Frigga Fritillary (*Boloria frigga saga*), the ssp. found south of the Brooks Range in taiga (Fig. 21). A Northern Hawk Owl, a taiga specialty for birders, was perched on a white spruce near the Northway Airport.

On June 15, craving more time in alpine tundra, we drove the Taylor Highway to Taylor Mountain (Fig. 22), located near Chicken. We followed an 8-mile-long dirt road, reasonably well maintained after a stream crossing at mile 2, to the summit. Just below the summit, in wet alpine tundra with sedges and dwarf willows, we encountered a flight of perhaps a dozen Banded Alpine. The highlight was two females, one of which hunkered down in the vegetation (Fig. 23). In the afternoon we searched the rock-strewn summit unsuccessfully for Ross's Alpine (*Erebia rossii*), before departing for our motel in Delta Junction.

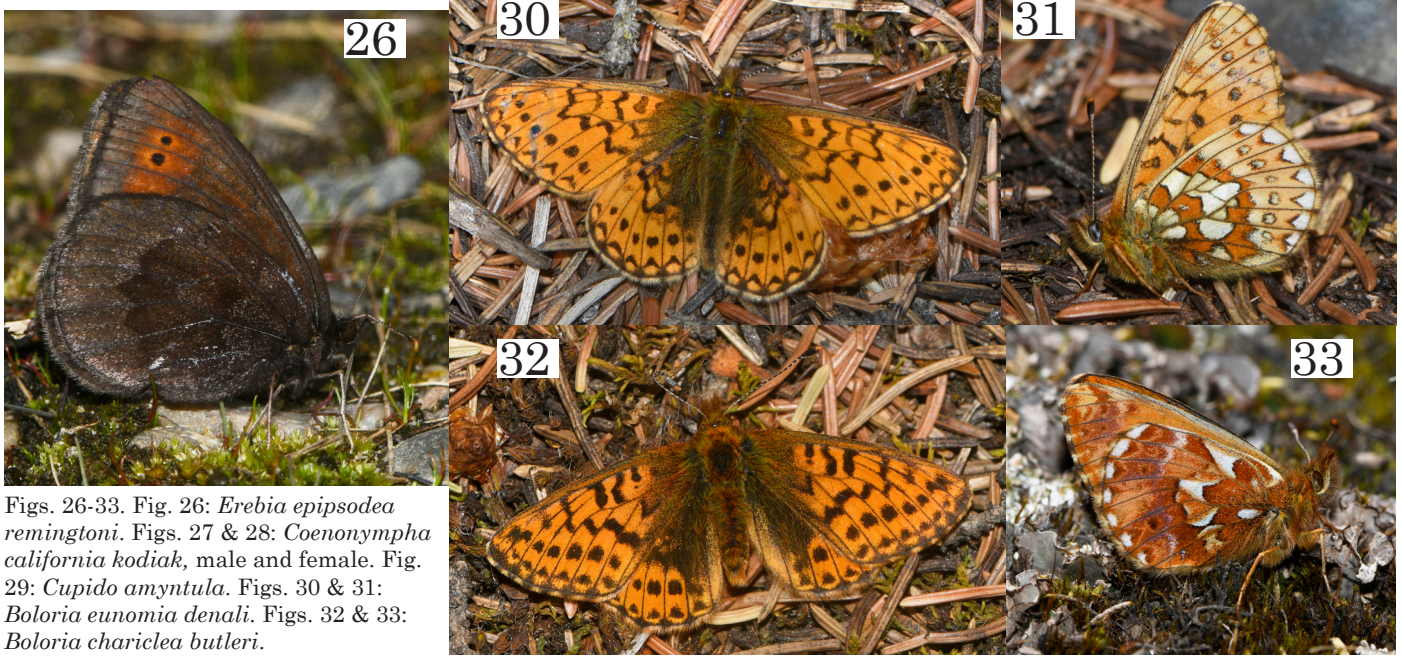


Figures 15-21, 23. Fig. 15: *Euchloe ausonides*. Fig. 16: *Glaucopsyche lygdamus couperi*. Fig. 17: *Phyciodes pulchella*. Fig 18: *Polygonia faunus*. Figs. 19 & 20: *Boloria freija*. Fig. 21: *Boloria frigga saga*. Fig. 23: *Erebia fasciata*.

Fig. 24. The Alaskan Range.

Fig. 25. Talus slopes.

The Richardson Highway, which connects Fairbanks to Valdez via Delta Junction, has been described as the most scenic drive in Alaska. Despite numerous stops to admire the nearly continuous spectacular views of the eastern Alaska Range (Fig. 24), we arrived at a site reputed to provide tundra access. Although the topography was a bit daunting (including talus slopes that promised future avalanche, Fig. 25), we managed to find Common Alpine (*Erebia epipsodea remingtoni*) (Fig. 26), Kodiak Ringlet (*Coenonympha california kodiak*) (Figs. 27 and 28), Western Tailed Blue (*Cupido amyntula*) (Fig. 29), Bog Fritillary (*Boloria eunomia denali*) (Figs. 30 and 31), and Butler's Fritillary (*Boloria chariclea butleri*) (Figs. 32 and 33). We passed several moose out foraging during our drive to Fairbanks that evening.



Figs. 26-33. Fig. 26: *Erebia epipsodea remingtoni*. Figs. 27 & 28: *Coenonympha california kodiak,* male and female. Fig. 29: *Cupido amyntula*. Figs. 30 & 31: *Boloria eunomia denali*. Figs. 32 & 33: *Boloria chariclea butleri*.

Segment 3 - Dalton Highway

On June 18, after our usual debriefing over breakfast at Denny's, we dropped off our rental vehicle and picked up our Ford 350 4x4 trucks with mounted campers. Each camper was equipped with a small bathroom (including shower), fridge and freezer, and stove. Thankfully, we both opted for an extra spare tire, which was loaded in the cab

Fig. 34. Trans-Alaska pipeline.

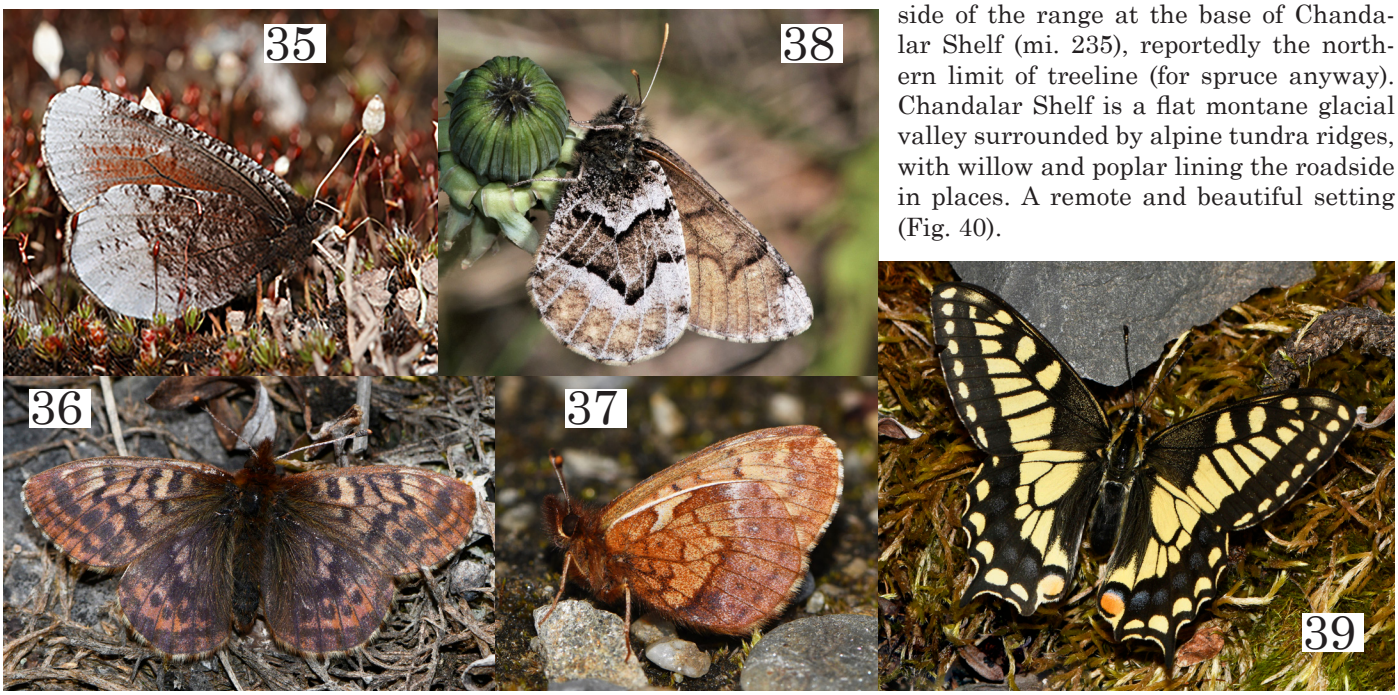
Fig. 40. Chandalar Shelf.

behind the passenger seat. After transferring our gear, we drove to the nearest Fred Meyer Supermarket and wandered, aisle by aisle, picking up groceries for 2 weeks-worth of meals. In hindsight, we overestimated. After stowing the groceries, we headed north to the Dalton Highway.

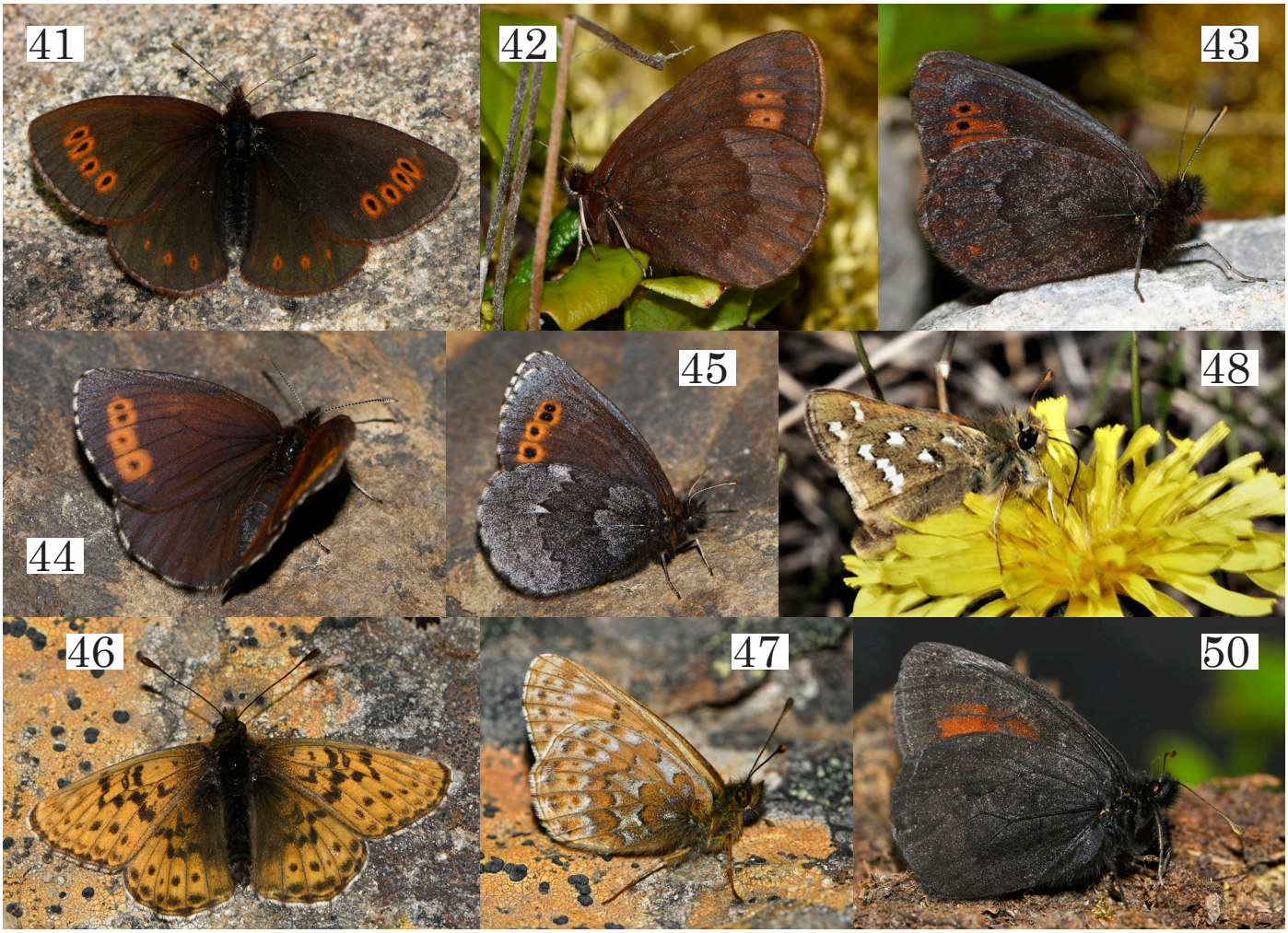
Beginning 85 miles north of Fairbanks at Livengood, the Dalton Highway is a 414-mile-long, primitive (mostly gravel) road connecting the interior with the Arctic oilfields at Deadhorse/Prudhoe Bay along the Beaufort Sea. It was constructed as a support road for the trans-Alaska pipeline, which it parallels (Fig. 34). There are only three towns along the road: Coldfoot (pop. 10), Wiseman (pop. 22), and Deadhorse (3500+ seasonal residents depending on oil production). Fuel is available only at Coldfoot (mi. 175) and Deadhorse (mi. 414); the nearest medical facilities are in Fairbanks and Deadhorse. All of this was a reminder to "pay attention" while driving (and hiking), and to do these trips while relatively "healthy".

We had in mind several stops and 3-4 nights on our way to base camp at Galbraith Lake Campground (mi. 275) on the north side of the Brooks Range. At our first planned stop, well south of the Brooks Range (mi. 94), we worked a "tussock" tundra ridge after a vigorous 1.5-mile walk along a rough track overgrown by dense alder. Here we photographed another Red-disked Alpine (Fig 35), one of our favorite alpines, Dingy Arctic Fritillary (*Boloria improba*) (Figs. 36 and 37), Azure (*Celastrina lucia*), and White-veined Arctic (*Oeneis bore*) (Fig. 38). Several Old World Swallowtails (*Papilio machaon aliaska*) (Fig. 39) were chasing and basking at a nearby hilltop. Alerted by thunder to an approaching storm, we reluctantly returned to our campers after just a couple hours. Encouraged by the abundance of butterflies, we were determined to revisit this site.

Continuing north the following day we ascended gradually into the Brooks Range. Our first night was on the south side of the range at the base of Chandalar Shelf (mi. 235), reportedly the northern limit of treeline (for spruce anyway). Chandalar Shelf is a flat montane glacial valley surrounded by alpine tundra ridges, with willow and poplar lining the roadside in places. A remote and beautiful setting (Fig. 40).



Figures 35-39. Fig. 35: *Erebia discoidalis*. Figs. 36 & 37: *Boloria improba*. Fig. 38: *Oeneis bore*. Fig. 39: *Papilio machaon aliaska*.



Figures 41-48, 50. Figs. 41 & 42: *Erebia lafontainei*. Fig. 43: *Erebia youngi*. Figs. 44 & 45: *Erebia disa streckeri*. Figs. 46 & 47: *Boloria astarte distincta*. Fig. 48: *Hesperia colorado borealis*. Fig. 50: *Erebia mackinleyensis*.

Hiking the steep ridges here tested our conditioning, although we considered it more enjoyable than negotiating the "ankle-breaking" tussocks that characterized wet tundra at lower elevations. Here we were afforded splendid views of the south slope of the Brooks Range, including the upper Dietrich River valley. The butterflies were exceptional. We eventually photographed several new species, including Reddish Alpine (*Erebia lafontainei*) (Figs. 41 and 42), Young's Alpine (*Erebia youngi*) (Fig. 43), Disa Alpine (*Erebia disa steckeri*) (Figs. 44 and 45), Astarte Fritillary (*Boloria astarte distincta*) (Figs. 46 and 47), and Common Branded Skipper (*Hesperia colorado borealis*) (Fig. 48).

Fig. 49. Truck descending off of Atigun Pass.

Located at a modest 4,739 feet (but well above treeline at this latitude), Atigun Pass (mi. 244) forms the northernmost drainage divide in North America; streams on the north side flow into the Arctic Ocean and streams on the south flow into the North Pacific. Immediately south of the pass the Dalton Highway is especially steep (12% grade), with switchbacks and drop-offs. This stretch of road is apparently "notorious" among truckers, especially during winter due to the threat of avalanche.

Although large trucks (semi-trucks with trailers serving the oilfields) were infrequent on the Dalton Highway, their appearance was unpredictable. Consequently, stopping along the highway, here or anywhere else other than at obvious rest areas, is not recommended (Fig. 49). We stopped, however (after pulling to the far right close to the guard rail), in response to the presence of a McKinley Alpine (*Erebia mackinleyensis*), observed through the windshield flying

Fig. 51. Galbraith Lake.

Fig. 52. *Erebia rossii*.

just above eye level along the talus rubble adjacent to highest switchback. No large trucks arrived during the next few minutes, and we considered ourselves very fortunate to have captured images of this elusive alpine (Fig. 50).

That afternoon, June 22, we arrived at Galbraith Lake Campground (Fig. 51), relieved to be able to park and "spread out" our supplies. The campground, managed by the Bureau of Land Management, consists of 15 dispersed sites, fire rings, picnic tables, and a restroom, all interspersed among tall willows. Very few of the campsites were occupied on any given day, and mosquitoes generally limited casual outdoor activity in the evenings, so it was always quiet. Best of all, we could walk to a variety of habitats without first securing our supplies and driving.

The alpine tundra ridges west of the campground were the most accessible. Here we photographed several *Boloria*, more Disa and Banded alpines, and a Ross's Alpine (*Erebia rossii*) (Fig. 52), our ninth *Erebia*! Tantalizingly out of reach was another McKinley Alpine, patrolling a steep rubble slope, and our first Eversmann's Parnassian (*Parnassius eversmanni thor*). We never got close to the parnassian as it sped along just above the tundra.

Fig. 53. Prudhoe Bay General Store

The weather on the north side of the Brooks Range was especially fickle. On the afternoon of June 24, after two days of intermittent sunshine, we experienced our first bout of wind, rain, and cool temperatures, conditions that persisted into the following morning. Not enthusiastic about the prospect of sitting in our campers all day, we decided to drive to Deadhorse. Our rationalization for this 280-mile roundtrip diversion was twofold: 1) an opportunity to view the waterfowl-rich wetlands of the Arctic Coastal Plain; and 2) hopes that the weather would improve enough for us to visit the Sagwon Hills (mi. 353) and Oil Spill Hill (mi. 320), both butterflying opportunities, on our return to Galbraith Lake the following day.

We arrived safely in Deadhorse in the early afternoon. After filling up at the gas pumps and purchasing a few items at the Prudhoe Bay General Store (Fig. 53), we enjoyed the excellent evening buffet (the highlight being the clam chowder) at a cafeteria serving oilfield workers. Revived by the meal, but uninspired by the idea of a night in Deadhorse, we drove south 50 miles to "Last Chance Wayside" in the Sagwon Hills, passing several caribou and two women peddling bicycles. Emerging from our campers late in the morning (mid 50s F) the following day, we found our second subspecies of Frigga Fritillary (*Bolora frigga gibsoni*) (Figs. 54 and 55), which replaces *B. f. saga* across the North Slope on tundra.

Figs. 54 & 55. *Boloria frigga gibsoni*.

Fig. 56. Tundra ridges west of the campground at Galbraith Lake.

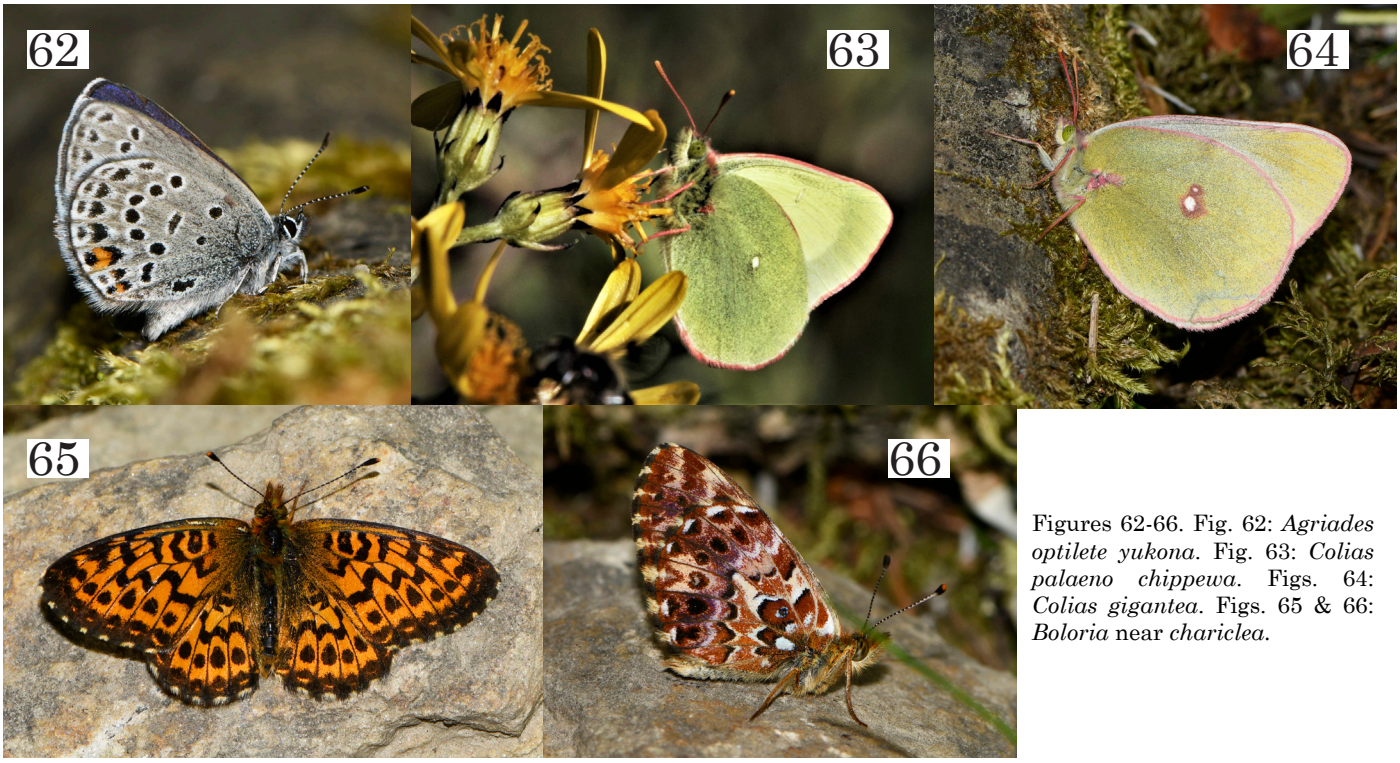
In the late afternoon, after a lengthy stop to replace a flat tire at mi. 334 and admire a nearby herd of muskoxen with calves (re-introduced in the Arctic but sensational to see nonetheless), we arrived at Oil Spill Hill. A single Sentinal Arctic (*Oeneis alpina*), our target bug here, flew off the road and disappeared into a dense willow thicket before our cameras were ready. Jilted again by an arctic. We did manage to photograph our second Ross's Alpine, however. That evening we dined on left-over clam chowder at Galbraith Lake.

The weather in the morning was overcast but calm at Galbraith Lake. Hopeful, we again set out on foot for the tundra ridges west of the campground (Fig. 56). Late In the morning, during a particularly long bout of glorious sunshine, we watched three different male parnassians, as well as several alpines and whites, flying up and down a narrow willow-lined gully at the base of a steep rocky slope. One male parnassian perched briefly (Figs. 57 and 58)! We suspected, but were never able to confirm, that they were responding to the presence of a nearby female. Over the course of the afternoon, we photographed another Reddish Alpine, our first Thula Sulphur (*Colias tyche thula*) (Fig. 59) and a Northern Marble (*Euchloe creusa*), the common small white we had neglected. A Grizzled Skipper (*Pyrgus centaureae dzekh*) was a good find near the campground (Fig. 60).

This would be our final day butterflying on the North Slope as it turned out. That afternoon, while enjoying adult refreshments and hors d'oeuvre (i.e., mixed nuts and potato chips) at our picnic table, the ever-changing weather again became the topic of conversation as dark clouds moved in. By morning a brisk cold wind from the northwest was raising whitecaps on Galbraith Lake, so, with little discussion, we packed, secured our gear, and started driving south. Unfortunately, the Brooks Range did not adequately buffer the sites we had planned to revisit, like Chandalar Shelf, where it was similarly cold and bleak. We wound up driving all the way to Coldfoot (mi. 175), stopping only for landscape pictures along the way.

The following day (June 29) we arrived back to Fairbanks where the weather was rapidly improving. Arriving a couple days earlier than planned provided each of us with the opportunity to pursue personal side trips. Keen to see Mount Denali, Bill drove south on the Parks Highway to Denali National Park and Preserve, where he explored the first few miles of the park road and spent the night. Ken, who worked as a park ranger there in the distant past, opted for a motel room and hot shower in Fairbanks, a second visit to Goldstream Creek, and an afternoon at

Figures 57-61. Figs. 57 & 58: *Parnassius eversmanni thor*. Fig. 59: *Colias tyche thula*. Figs. 60: *Pyrgus centaureae dzekh*. Fig. 61: *Erebia pawloskii*.



Figures 62-66. Fig. 62: *Agriades optilete yukona*. Fig. 63: *Colias palaeno chippewa*. Figs. 64: *Colias gigantea*. Figs. 65 & 66: *Boloria* near *chariclea*.

the University of Alaska Museum which has a splendid Pleistocene mammal exhibit.

We savored our final two days in Alaska and combined managed to add several new species to our trip list. These included Theano Alpine (*Erebia pawloskii*) (Fig. 61), our tenth *Erebia* (out of 11 legitimate possibilities; we missed *occulta*), Cranberry Blue (*Agriades optilete yukona*) (Fig. 62), Palaeno Sulphur (*Colias palaeno chippewa*) (Fig. 63), Giant Sulphur (*Colias gigantea*) (Fig. 64), and an attractive new *Boloria* currently considered "near" *chariclea* (Figs. 65 and 66) by Philip and Ferris (2016).

July 3, our final day, was devoted to washing and cleaning out our mud-coated campers (no small task), donating (or discarding) unused food, packing personal belongings, and dropping off our campers at the rental company. All transport went as planned, although airplanes and terminals were again packed with fellow travelers. We both arrived home safely, Ken in Arizona and Bill in Florida, tired but extremely satisfied.

ACKNOWLEDGEMENTS

We thank those collectors who preceded us to these locations. Our interest in the butterflies of Alaska was sparked by Kenelm Philip, who initiated the Alaska Lepidoptera Survey in 1970, and by Clifford Ferris, who was primarily responsible for publishing the results after Philip's death. As always, the images at the BOA website were inspirational, particularly the live images by David Shaw. A special thank you to Andy Warren for his generosity, and for reviewing an early version of the manuscript. We appreciate the difficulties associated with identifying alpines (in particular) based on photographs alone. Any errors are our own.

LITERATURE CITED AND READING LIST

Abbott, R.J. and C. Brochmann. 2003. History and evolution of the arctic flora: in the footsteps of Eric Hultén. Molecular Ecology (2003) 12:299-313.

Hultén, E. 1937. Outline of the History of Arctic and Boreal Biota During the Quaternary Period: Their Evolution During and After the Glacial Period as Indicated by the Equiformal Progressive areas of present plant species. Bokförlags aktiebolaget Thule, Stockholm.

Lafontaine, J.D. and D.M. Wood. 1997. Butterflies and moths (Lepidoptera) of the Yukon. Pages 723–785 in H.V. Danks and J.A. Downes (Eds.), Insects of the Yukon. Biological Survey of Canada (Terrestrial Arthropods), Ottawa.

Peña, C., H. Witthauer, I. Kleckova, Z. Fric, and N. Wahlberg. 2015. Adaptive radiations in butterflies: evolutionary history of the genus *Erebia* (Nymphalidae: Satyrinae). Biological Journal of the Linnean Society 116(2): 449-467.

Philip, K.W. and C.D. Ferris. 2016. Butterflies of Alaska: A Field Guide. Second Edition. Alaska Entomological Survey, Fairbanks, Alaska.

Walker, D.A., T.D. Hamilton, C.L. Ping, R.P. Daanen, and W.W. Streever. 2009. Dalton Highway Field Trip Guide for the Ninth International Conference on Permafrost. State of Alaska, Dept. of Natural Resources, Division of Geological and Geophysical Surveys.

Warren, A.D., K.J. Davis, E.M. Stangeland, J.P. Pelham, K.R. Willmott & N.V. Grishin. 2017. Illustrated lists of American Butterflies, **https://butterfliesofamerica.com/L/Neotropical.htm**

Warren, A.D., S. Nakahara, V.A. Lukhtanov, K.M. Daly, C.D. Ferris, N.V. Grishin, M. Cesanek, and J.P. Pelham. 2016. A new species of *Oeneis* from Alaska, United States, with notes on the *Oeneis chryxus* complex (Lepidoptera: Nymphalidae: Satyrinae). The Journal of Research on the Lepidoptera, The Lepidoptera Research Foundation, Inc. 49: 1–20.

Remembering John Rawlins

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John Rawlins died on December 26, 2021, at age 71. His legacy includes a long and distinguished career in the Invertebrate Zoology section of the Carnegie Museum of Natural History as a curator of Lepidoptera. Through his intelligence, gregariousness and sheer energy his loss is deeply felt within the museum, among a broad sector of the Lepidopterist community, and beyond. While no single obituary or remembrance could aspire to characterize the full breadth of his personality or achievement, Julie Hannon published an excellent tribute to John at his retirement ("Living in a Bug's World", 2018, Carnegie Magazine, Summer: 24-29). In this article we present select personal memories and impressions of John from graduate school at Cornell University, to a brief professorship at University of Texas, Austin, and during his 30-odd years at CMNH. A more formal obituary will be forthcoming from the Invertebrate Zoology section at Carnegie Museum.

John Rawlins and I both entered Cornell University in 1974 as graduate students, but I didn't meet him until four years later. John's initial research was with roosting behavior and thermoregulation by the black swallowtail, *Papilio polyxenes*, in the Department of Ecology and Systematic Department. By 1978 his interests changed to systematics of Lepidoptera, and he became a student of John G. Franclemont in the Department of Entomology, conducting research on systematics of *Bertholdia* (Arctiinae). It was during this time that he began rearing larvae, adopting some of methods of Franclemont (who John referred to as "Doc"). John was one of several graduate students being advised by Dr. Franclemont along with other students in systematics that were advised by William Brown and George Eickwort. At the time it was customary for the students to congregate in Franclemont's lab every evening to talk about a wide range of topics. One night John posed the question about what our generation of students should do in our future careers. He then gave his opinion that we should concentrate on doing field work and collecting specimens as so many species were threatened with extinction by the increasing loss of natural habitats. While several students agreed with John, one student differed in stating that we should first do phylogenies of taxa to determine presence of questionable relationships that could be resolved by collecting in areas of the world where these taxa occurred. John countered that field work and collections could not wait for completion of phylogenies, and this became the theme of his career.

Richard L. Brown, PhD, W.L. Giles Distinguished Professor Emeritus, Director Emeritus, Mississippi Entomological Museum, Mississippi State University

I was saddened to learn of the death of lepidopterist John Rawlins, Curator Emeritus at Carnegie Museum of Natural History on December 28th at the young age of 71. It is little known that John had a profound effect on what would become the Department of Integrative Biology and the Biodiversity Center at The University of Texas. My old entomology professor at UT, Osmond Breland, had retired in the early 80's and I was chair of the search committee reviewing candidates. The former UT Zoology Department voted to hire John fresh out of his Ph.D. at Cornell. The one thing I recall about John's job seminar was that he came with a handout for the audience providing glossary of terms from phylogenetic systematics, like synapomorphy, apomorphy; homoplasy, etc. In 1982, no one in Austin Zoology was familiar with such terminology and the handout idea was brilliant. John stayed with me and we discussed the position. He warned me that he was not likely to stay because he wanted to associate with a major museum collection. I said "John I would rather have you here for a while than not at all. "

As director of Brackenridge Field Laboratory, I was able to offer John a room to house entomological cabinets and his own collections. True to his word he was gone by 1985 to Carnegie Museum where he would live out his career. John's brief presence reverberates today for two reasons. First when it came to replacing John Rawlins, the department had been convinced by his lecture that phylogenetic systematics was a priority over entomology and the subsequent search led to hiring a University of Miami assistant professor named David Hillis. Second, the small collection room at BFL I started for Rawlins became a lever for hiring a string of great entomologists hired as temporary lecturers. These included the late Al Hook (ground-nesting wasps), Riley Nelson (flies), and John Abbott (dragon and damsel flies). Each added to local collections and John Abbott spear-headed merging the BFL collections with that of the Texas Memorial Museum, a collection that had little space and was under staffed. This collection became today's UT insect collection at the Lake Austin Center curated by Alex Wild and under the UT Biodiversity Center directed by David Hillis!

Prof. Larry Gilbert, Department of Integrative Biology, University of Texas at Austin.

John touched the lives of many during his career. I was privileged to be his student at UT Austin, along with Nancy Jacobsen. John recruited me away from Larry Gilbert's lab (sorry Larry!) with his enthusiasm for rearing caterpillars.

Retiring UT professor Osmund Breland handing net over to newly hired John Rawlins, Zoology Department, 1983. Photo courtesy of Larry Gilbert.

Rawlins with his first graduate student, Susan Weller, at her thesis defense, 1989. Photo courtesy of Larry Gilbert.

When I first met him, his lab was filled with plastic rearing boxes and solo cups of female moths laying eggs on index cards. He opened my eyes to Noctuoidea as a fascinating, diverse group of Lepidoptera in need of research on the evolution of life histories and modernized taxonomy. Whether we were in the Lost Pines at Bastrop, TX or scrambling through secondary forest in Ecuador, John was always the teacher. No matter where or time of day, he enthusiastically talked all things lepidopteran, transmitting his encyclopedic knowledge. I learned about Hampson, the hairy eyes of hadenines, and how to keep my lep killing jars and non-lep killing jars separate in the dark. Wide ranging discussions about the tangles of noctuoid evolutionary classification and possible caterpillar host plants stand out as highlights. But perhaps my most important take-home was witnessing how he generously spent time with students and his respect for us as developing scholars. Had John stayed at UT, he likely would have graduated many more students. However, he went on to impact the careers of many who visited him at the Carnegie. John left us too soon – it will be bittersweet this spring to set the blacklight and raise a beer in salute to him and his legacy.

Susan Weller, PhD, Director, University of Nebraska State Museum

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John Rawlins visited the [Harvard] Museum of Comparative Zoology in the late 1970s or possibly very early 1980, and together we examined the Lepidoptera specimens and their *exuviae* I had reared in Panama so far. That was early in my transition from botany to entomology, a critical point for me. John was enthusiastic and supportive and gave me the encouragement I needed to continue my tropical insect adventures. After that, our communications were few and far between, and I never saw him again, but those few hours with him made a lasting positive impression on me, and for that I am deeply grateful and am saddened that he has passed on so prematurely.

Annette Aiello, PhD, Smithsonian Tropical Research Institute, Panama. 14 January 2022

In 1982 I took my first sabbatical leave from the University of Dayton and returned to Austin to spend a year at UT. Across the hall was a new faculty member who was raising caterpillars and early on we talked. It was his first semester at UT and I invited him to join us for dinner at our house west of campus. My wife and I had 3 boys and the oldest was 7. John not only entertained us but he played with the kids and the piano.

John and I did a small project on radioactive tagging of caterpillars to find pupation sites at the Smithville property of UT. He introduced me to phylogenetic systematics and cladistics and a lot of bugs. Both my wife and I are from Texas and we would see John on trips home. He called me to talk about leaving Texas for the Carnegie. When he arrived in Pittsburgh our friendship and contacts got stronger. Carol and I have been to Pittsburgh to see him many times and he has been to see us in Dayton. John, Bob Davidson and Chen worked with Giovanni Onore, PhD, SM in Quito. In the 1990s John and Giovanni did an expedition to the Congo, where Giovanni had formerly worked. During that expedition John saved Giovanni's life when he developed a high fever. After taking a blood sample, John identified the malaria parasite under the microscope, and injected Giovanni with a French-developed drug. This was during a violent time when local revolutionaries were a constant threat.

In the spring of 2019 I brought Giovanni to the University of Dayton to be recognized for his service to the Society of Mary, as Giovanni is a Marianist Brother, and for his conservation work in the cloud forest called Otonga. Giovanni

did not know that I had invited John to come to Dayton. John was in a wheel chair with debilitating disease but his mind was untouched. John was put in the front row of the auditorium and Giovanni had no idea he was here. It was a lifetime memorable moment watching them meet.

Kelly Williams, Professor of Biology Emeritus, University of Dayton, Dayton, OH

During their morning arrival, the employees of the Carnegie Natural History Museum seem all together a happy lot, and are as varied as the creatures on display and tucked away in specimen drawers. Standing out among them was my friend and colleague John Rawlins, sporting his signature hat and his regulation collecting vest and exchanging a warm, personal 'hello' and 'good morning' to a cross section of staff, from security to section head. John was part of the museum and the museum was part of John.

Upon entering the Invertebrate Section John tossed his hat on the awaiting peg, walked past the large map with remembrances of past expeditions, and made his way through the maze of specimen cases, file cabinets, and unopened shipments of returned specimens toward what one could only loosely refer to as his office 'space'. Like many high-energy, multi-talented scientists I have known, it was obvious he was over-committed. His desk was a mess. In the center of all was an imposingly large monitor and desk top computer, from which, in spite of the clutter, he composed crisp and concise descriptions and theoretical arguments. John took his writing seriously, and was in turn an effective editor and reviewer.

John's day typically involved him carving out time to do what he loved best, working in the collection, and tending and photographing his broods of larvae in plastic boxes and petri dishes. He has left us a massive collection of preserved immatures with host plant and life history data, and tragically also took with him a wealth of such knowledge in his near-photographic memory banks.

A phone call would remind him of a forgotten administrative meeting, where he would be a forceful and effective advocate for his section and for the museum as a whole. John's philosophy was that it was better to fund collecting expeditions to exotic realms while the biota still survived, rather than spend an inordinate time in the museum identifying and describing the material already on hand.

He was successful in securing grant money and contracts, especially from federal agencies seeking his help in identifying potentially harmful introduced pest insects. Yet with all these commitments, John was a gracious host to visiting specialists, calling forth genuine enthusiasm for their projects, and offering a sample of his personal knowledge for the bugs under study and suggestions for future work. As others attest to herein, this enthusiasm was infectious and inspiring.

Carnegie Museum, Invertebrate Section "bug room", 1996. Rawlins photographing geometrid life cycle.

One of my most enjoyable projects with John was researching the life and career of Walter Sweadner, Holland's successor (under the supervision of Andrey Avinoff) as curator of Lepidoptera at Carnegie (1941 – 1951). With John's help I collected extensive published material, interviewed Sweadner's widow and published an article in Carnegie Magazine (January/February 1997). Sweadner's classic analysis of natural hybridization within *Hyalophora* was the first quantitative study of a hybrid zone in which he proposed defining species on the basis of reproductive isolation, predating the modern Biological Species Concept. And yet, a part of Sweadner's story was missing. His thesis research was centered on a near-heroic solo expedition in 1933 from Pittsburgh to the canyon lands of Utah, and north to the Bitterroot region of Idaho and Montana, often over primitive roads. John and I searched for any diary or log of this trip but had given up on finding what would be fascinating reading until by chance he found it hiding in its rightful place in a cabinet of field trip logbooks, overlooked because the spine with title had been torn from the binding. I remember how excited we both were to discover this important bit of Carnegie history, lost over the decades. Sweadner had faithfully made detailed daily entries on butterflies collected, other natural history observations, and his adventures in this rough-and-tumble mining and logging country. John scanned the document and I transcribed the text. The entire log, with Sweadner's notes on a 1931 Conoco road map and an index of butterfly species, is available as a computer file from CMNH, Invertebrate Section. (For a more complete discussion see *Moth Catcher*, Collins, 2007, Univ. Nevada Press.)

For DNA analysis I had been systematically collecting samples of *Hyalophora* throughout the western United States since 2004, but had never been able to entice John to join me in the field. We had a series from the Blue Mountains of northeast Oregon and from several locales in the Cascades, but needed to fill in some gaps in central Oregon. This was among John's favorite regions, near where he was born and raised. The temptation of this upcoming

The austere beauty of the Santa Rosa range, northern Nevada. At this elevation, only drought-resistant shrubs occur, such as bitterbrush (*Purshia*), a *Hyalophora* hostplant.

Steens Mountain overlook. Gorge formed by glacial erosion. This is true wilderness, ideal for escaping from daily worries.

trip was too much; he cleared his schedule and we made plans. "Fly into Reno, John. Don't bother to bring camping gear; I'll supply all that." We joined up on the fifth of June, 2013 for what would be our only collecting trip together, and headed for the isolated Santa Rosa Range in north-central Nevada. This range receives little summer rain, and the lower and mid elevations are nearly devoid of trees. *Hyalophora* host plants were abundant with bitterbrush covering the hillsides and western choke cherry and willow growing along the creek. There was no campsite but John assured me that he was used to sleeping on the ground, so we set up the tent and folding camp table. The air mattresses absorbed the rocky ground, no complaints from John, and in the morning the funnel trap was full of male *H. gloveri*, the Great Basin and Rocky Mountain species. The next two days would involve a shorter trip, to the isolated Steens Mountain to the north just inside Oregon.

Steens Mountain is a thirty mile long fault block formation, surrounded on three sides by arid alkali basins and sage brush country. A relatively high range with a 9700 foot peak, the resulting rain shadow to the east creates the Alvord Desert, a truly desolate place. The range is known for its spectacular gorges, cut by Ice Age glaciers, and making for breathtaking vistas. Whatever specimens we might collect would be a product of this isolation, dating to post-Ice Age times.

We camped in a developed campground with tables, outhouses, and water from a tap. After setting out a trap line of several funnel traps, baited with virgin *Hyalophora* females, we relaxed at the campsite. John and I filled our water jugs and afterward walked slowly around the campground. We were the only campers, something that would

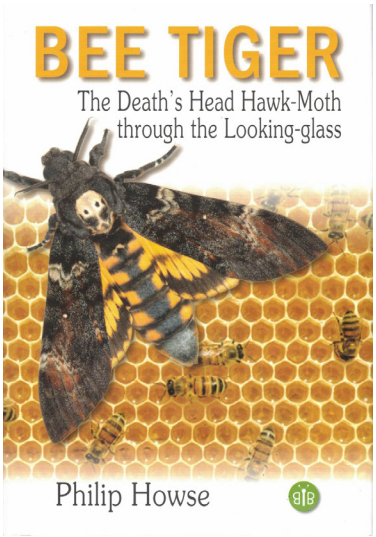
Left: John inspecting a trap full of *H. gloveri*, along a stream in the Santa Rosa range, northern Nevada. We released most of these 43 males, keeping only a portion. Above: Steens Mountain campground. John removing specimens for papering and labelling.

(*Continued on page 19*)

Book Reviews

Book Review: "*Bee Tiger: The Death's Head Hawk-Moth through the Looking-glass*" by Philip Howse

Brambleby Books, 28 June 2021, Format and Pages: Hardback, 160pp, ISBN: 9781908241627



Ordering info at http://bramblebybooks.co.uk/ (£12.60 UK as of 17 Dec. 2021)

The book is written by a professor emeritus of biological sciences at the University of Southhampton, who is also an accomplished writer. Under Philip Howse's belt are several beautifully illustrated and intriguing books, such as "*Butterflies: Decoding Their Signs and Symbols*" 2010, "*Butterflies - Messages from Psyche*" 2010, "*The Giant Silkmoths: Colour, Mimicry & Camouflage*" 2012 (co-authored with Kirby Wolfe), "*Seeing Butterflies: New Perspectives on Colour, Patterns & Mimicry*" 2014, and "*Butterfly Wings: Pictures in their patterns*" 2021.

The new book that I have in front of me today, "*Bee Tiger: The Death's Head Hawk-Moth through the Looking-glass*," is also beautifully crafted, with 16 color plates and a cover that prominently features a live specimen of one of the most fascinating of all moths, *Acherontia atropos* (Sphingidae).

The book is a delightful read. Judging by the tender and personal way in which the author describes his encounters with the moth, Philip Howse, like so many of us, must have arrived to studying Lepidoptera via an attraction and fascination with their intricate patterns. So often this fascination leads to a more profound interest; it is easy to become entangled in the complexity of biological processes that lie beneath. From DNA to ecology, and the physiology of metamorphosis to the sheer diversity of over 160,000 described species, there is enough to get meticulous about. But what I like so much about Howse's book is that he makes the moths interesting to a much broader audiences than just scientists.

Full of poetic excerpts, the opening chapters explore the fascination of humans with the symbol of the skull – a notable feature of the thoracic decoration of *A. atropos*. Many poets, writers, and artists, among them surrealists such as Salvador Dali, were fascinated by the moth for that reason and included it in their writings and paintings. Six pages of bibliography tell of the monumental exploration that the author conducted to collect material for "*Bee Tiger.*"

In general, Howse is particularly fascinated by the ideas of "satyric mimicry," a term referring to the features of one animal resembling something entirely different, but nevertheless working to the animal's advantage. Miriam Rothschild (1908 – 2005) referred to this phenomenon as "*Aide memoire mimicry*" describing it as a feature "*… reminding would-be aggressors of failure, or an unpleasant experience following an attempt at capture and ingestion.*" According to her (Rothschild, 1984), an animal "*need not be mistaken for noxious or dangerous prey; defence is adequate if the aggressor is forced to recall the attributes of such species, or the disagreeable sequela to a previous assault upon them.*" Numerous behavioral observations, mostly unpublished, exist to support hypotheses about functioning of Lepidoptera color patterns (see, for example, the twitter posts by Lapwing, 2021 & Satomi, 2021).

And while such cases of potential mimicry are notoriously hard to test (how would one test, for example, the "skull" on the Death's Head Moth's thorax possibly mimicking giant hornet's head?), the critics of such speculations have little to stand on, in my opinion. If we were not permitted to hypothesize based on circumstantial evidence combined with our understanding of senses and processes, or if any speculation based on observations were rejected as lacking empirical evidence, then whole fields of science, such as paleontology or anthropology, would have turned into boring descriptions of bone or DNA fragments.

In addition to discussing many interesting biological phenomena associated with the Death's Head Moth, "*Bee Tiger*" reminds us to step back and, instead of obsessing with hypothesis-driven research, look at the bigger picture. It also reminds us that the fascination with Lepidoptera is not particular to the people of science. When Bram Stoker has Dracula send the Death's Head Moth into the night in his 1897 novel, when peasants in Eastern Europe a century ago feared the "death's head phantom," or when the producers and the publishers of "*The Silence of the Lambs*" chose to put *A. atropos* on the cover of the book and film poster, they were not concerned with facts, but instead sought to appeal to our imagination – a feature of *Homo sapiens* that allowed us to prosper and become the most dominant (and, eventually, the only) hominid surviving on Earth.

The moth, which is one of the largest Lepidoptera species in Europe, feeds on Solanaceae as a caterpillar and adopted potatoes as its host. As adults, they make audible defensive sounds. To add to this array of fascinating features is the moth's warning color pattern and its ability to enter beehives to steal honey. Adaptations that allow moths to evade the bees' ire are thoroughly discussed in the chapter entitled "Honeybees' Tale," together with various educational digressions into the bee and moth biology. "The Bat's Tale: Seeing Sounds" and "The Bird's Tale" chapters follow a similar path.

Recently, I wrote a script for a children's education program entitled: "*Why are butterflies beautiful?*" In the program we talked about colors, pigments, sexual and natural selection, and so forth. But, in conclusion, the narrator said: "*Why we, people, think butterflies are beautiful we may never know, but perhaps some questions have no answers*." When I got to "Mirrors to Reality," the ninth chapter of "*Bee Tiger*," which opens with a poem "*Why is a butterfly bluer than blue*?...,"one of several of the author's lovely poems scattered throughout the book, I had a sense of *déjà vu*. The poem eloquently and concisely summarized our TV program, ending with four questions with no answers.

I highly recommend "*Bee Tiger*" to anyone interested in natural history, art, poetry, science history, or any combination of the above.

References cited

Lapwing, L. 2021. Peacock butterfly display video. (https://twitter.com/Lucy_Lapwing/status/1470090324542464006 last accessed 12-2--2021)

Rothschild, M., 1984. Aide mémoire mimicry. *Ecological entomology*, 9(3): 311-319.

Satomi, R. 2021. Eastern Death's Head Hawk Moth display video. (https://twitter.com/Ryo_Satomi1357/status/1443081077266927623 last accessed 12-2--2021)

Andrei Sourakov, The McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, Gainesville, FL, USA

Book Review: ICONOTYPES. A Compendium of Butterflies & Moths or: Jones Icones Complete. An Enhanced Facsimile. Introduced by Richard I. Vane-Wright, entomologist & taxonomist at the Natural History Museum (BMNH), in partnership with Oxford University Museum of Natural History. Three other listed contributors are: Alberto Zilli, curator of lepidoptera, the Natural History Museum (BMNH); Arlene Leis, art historian; Stefanie Jovanovic-Kruspel, art historian, the Natural History Museum (BMNH); and Francisco Sáches-Bayo, environmental scientist and ecologist.

Published by University of California Press. Oakland, California US. 2021. 687 pp. ISBN 978-0-520-38850-1 $85.00 hard cover. (The hard cover is the only authorized edition, and my review pertains only to the hard cover. See my note at the end of this review.). Available from the University of California Press and many other retail outlets. Published in the United Kingdom by Thomas & Hudson, *Iconotypes* © 2021 Thomas & Hudson, Ltd., London. Quarto; each page measures nine seven-eighths" by seven five-sixteenths" (25 cm by 18.5 cm).

I said WOW! when I first opened the box and extracted the book. Patricia, my spouse, verbally noted my enthusiasm. This book, at first glance, indicates high quality and attention to detail. Further examination shows my initial impression to be accurate. The book is a three-quarter binding of brown over white with gold stamping and an embossed picture of a butterfly, illustrated as in the manner of Cramer and Stoll (1775-1791). You see tasteful marble end papers when you open the front and back boards. From there, it gets better. The leaf opposite the title page is a reproduced drawing (Schäffer 1766) of an antique insect cabinet with a cherub holding forceps to inspect a butterfly from the one drawer removed from the cabinet. The color illustration shows two spreading boards laying on the worktable. The ornate wooden legs of the worktable render this illustration a treat for the eye.

The hefty book (4.5 lbs. = 2.04 kg), 687 pages, is Smythe sewn making each page easy to see. The paper is an off-white and easy on the eyes while giving excellent contrast with the color figures. A note on the last page says: "Paper from responsible sources." As was often done in European books, there is extra attention to detail, such as a cloth book marker attached to the top spine. My initial positive impression is strengthened; I am impressed, and I used the cloth book marker extensively as I wrote this review.

Simply leafing through the hundreds of pages reveals exquisite full color reproductions of hand painted butterflies, skippers, and a few moths, Castniidae, painted as in the style of Cramer and Stoll (1775-1791). The figures on the plates in the *Icones* are not as arranged like Cramer and Stoll (Fig. 1), rather, the figures are arranged in two rows (Fig. 2) with two or, at most, four specimens in a row; upper sides are shown to the left of undersides. For larger species, such as *Morpho* spp., the upper side is the sole image on the top row, and the underside is the sole image for the second row. Smaller species, such as Lycaenidae, Riodinidae, and Hesperiidae, are arranged with four specimens, upper and undersides, on each row. The legends for the specimens are in neat flowing cursive and spelled out in an eye-pleasing typeface (approximating 'Adobe Hebrew') at the bottom of each page. Unidentified paintings of lepidoptera in Jones' *Icones* are not given identifications in this book; they are presented exactly as Jones left them in the *Icones* manuscript.

Figure 1. Plate CCIX from (Cramer 1779) Figures E & F are the upper and undersides of the iconotype for the original description of *Papilio Nymphalis hegasia* Cramer, 1779.

Some pages in this new book show entire reproductions with a new legend inserted at the bottom of the page; some pages are magnified details of the illustrations showing the care used by Jones to include shadows. Other pages are composites of illustrations with as many as 54 individual reproductions on the page, and yet more pages are full color facsimiles from other well-known books, e.g., Harris (1776) and Wilkes (1747-1760). Some color illustrations of butterflies are from medieval illustrated manuscripts; page 112 shows a fresco from Nebamun's tomb. Other color illustrations, too numerous to list here, are exciting by offering a peek into the use of Lepidoptera in nonentomological illustrations, such as Adriaen Coorte's *Three Peaches on a Stone Ledge with Red Admiral Butterfly* [painted lady *Vanessa cardui*] C. 1693-95 Dutch still life painting oil on paper. The color illustrations go on and on for nearly the full 687 pages. Page 664 of this volume reproduces the frontispieces to volumes I, II III, and IV of the *Icones*

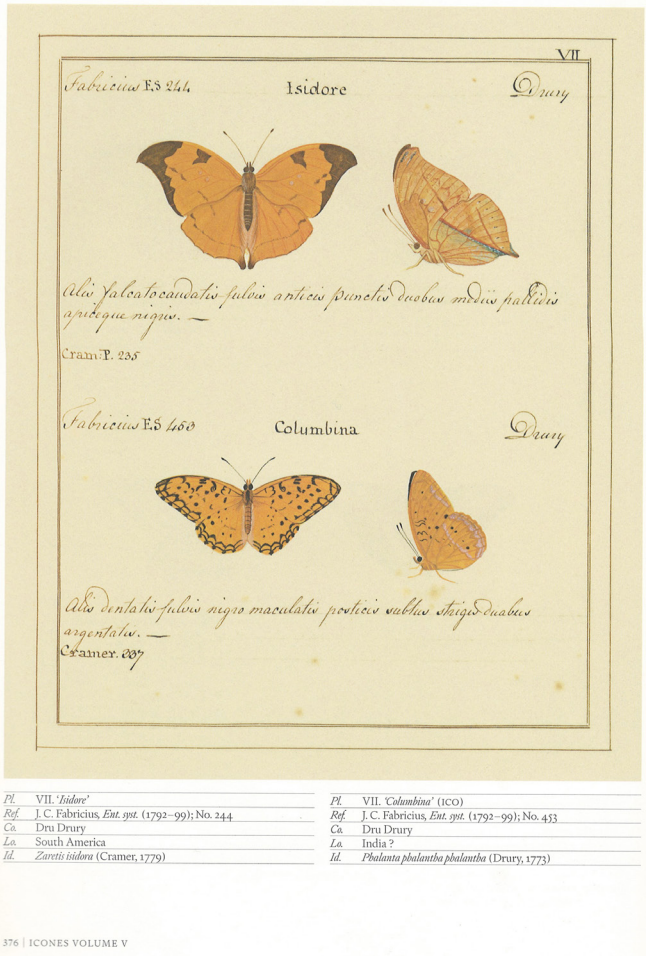


Figure 2. Painting from Jones' *Icones*, (Volume V, picture VII), as reproduced on page 376 in *ICONOTYPES. A Compendium of Butterflies & Moths or: Jones Icones Complete. An Enhanced Facsimile*. The paintings on the second row are the iconotypes for *Papilio Nymphalis columbina* Fabricius, 1793 (Fabricius 1793 p. 148).

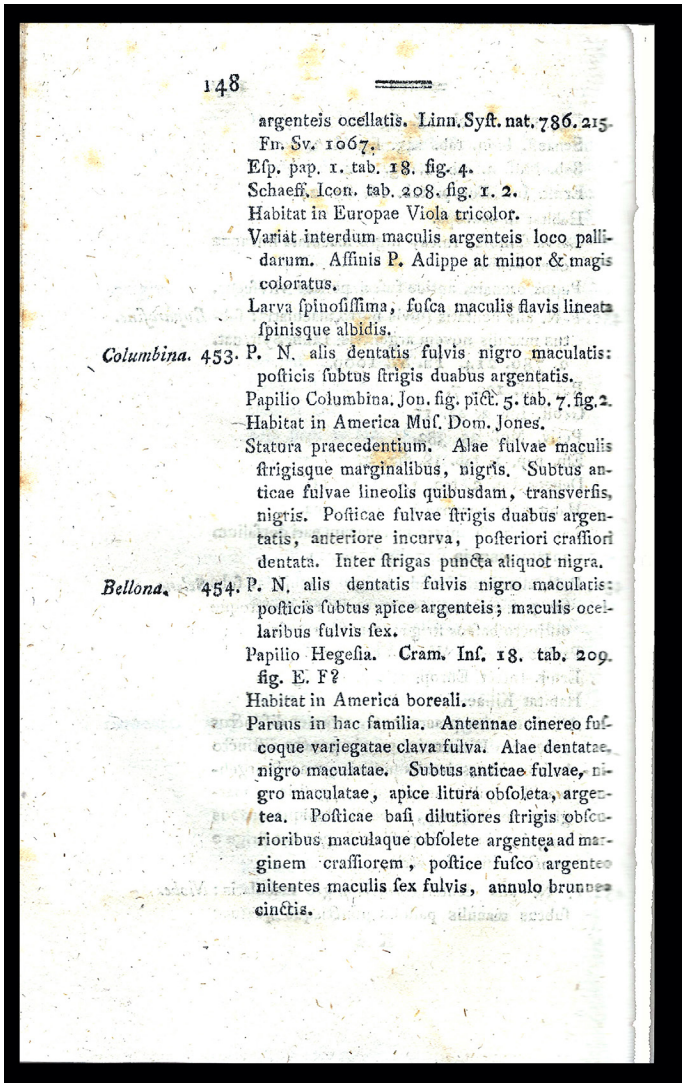
manuscript; volumes V, VI, and VII of the manuscript have no frontispieces. The illustrations are not reproductions on glossy paper for identification purposes; they are reproductions of a magnificent collection of paintings on antique colored paper, just as they would be greeted by the eye of a person looking at the original paintings. They are exquisite and a beauty to behold.

The manuscript, reproduced in the book, contains 1,292 individual paintings of 856 species in approximate life size. Jones was acquainted with Joseph Banks, who was the author of many worldwide floras, Dru Drury, who was the author of *Illustrations of natural history wherein is exhibited upwards of two hundred and forty figures of exotic insects, according to their different genera; very few of which have hitherto been figured by any author* (1770-1782), John Latham, author of many books on worldwide ornithology, and Johann Christian Fabricius, who was the author of *Entomologia systematica emendata et aucta. Secundum classes, ordines, genera, species adjectis synonimis, locis, observationibus, descriptionibus*, (1792-1794) and many other important entomological works.

Jones painted pictures of specimens from the collections of the first three persons, and he provided paintings for use by Fabricius as the iconotypes in Fabricius (1793), such as *Papilio Nymphalis columbina* Fabricius, 1793 (Fabricius 1793 p. 148) (Fig. 3). An iconotype is the picture upon which a name is based, rather than a holotype specimen. Such practices were common in the 18th century. For example, many of Linnaeus' names were based on paintings from others, and he noted these in his original descriptions (Linnæi 1758). Fabricius carefully states the painting he used for the description of *P. N. columbina*, and for the first time the entire world can see the iconotype of *P. N. columbina*. Publication of the *Icones* is a major accomplishment and advancement for taxonomy and nomenclature.

Pohl et al. (2016) listed *P. N. columbina* as a synonym of *Euptoieta hegasia* (Cramer, 1779) People who know me know I love a mystery regarding species names; I did some searching. Cramer (1779) illustrated the iconotype of *Papilio Nymphalis hegasia* on plate 209 E & F (Fig. 1). I examined images of *E. hegasia* on the internet. I can reconcile the images of specimens identified as *E. hegasia* with Cramer's painting of *P. N. hegasi*a. Fabricius (1793) distinguishes *P. N. columbina* from *E. hegasi*a by stating the description of *P. N. bellona* (species number 454 on page 148) is possibly the same as *Papilio hegesia* [sic.] "Cram. Ins. 18. tab. 209. Fig. E. F?" In other words, Fabricius knew that *P. N. columbina* was different from *P. N. hegasi*a. I wanted to know more about the synonymy of *P. N. columbina* with *E. hegasia* because the *Icones* were shut away for so many years.

The word Drury is neatly written on picture VII of Volume V of the *Icones*. I searched my copy of Drury (1770-1782) and the Westwood revision (1887) finding neither



148

argenteis ocellatis. Linn. Syſt. nat. 786. 215
Fn. Sv. 1067.
Eſp. pap. 1. tab. 18. fig. 4.
Schaeff. Icon. tab. 208. fig. 1. 2.
Habitat in Europae Viola tricolor.
Variat interdum maculis argenteis loco pallidarum. Affinis P. Adippe at minor & magis coloratus.
Larva ſpinoſiſſima, fuſca maculis flavis lineata ſpinisque albidis.

Columbina. 453. P. N. alis dentatis fulvis nigro maculatis: poſticis ſubtus ſtrigis duabus argentatis.
Papilio Columbina. Jon. fig. pict. 5. tab. 7. fig. 2.
Habitat in America Muſ. Dom. Jones.
Statura praecedentium. Alae fulvae maculis ſtrigisque marginalibus, nigris. Subtus anticae fulvae lineolis quibusdam, transverſis, nigris. Poſticae fulvae ſtrigis duabus argentatis, anteriore incurva, poſteriori craſſiori dentata. Inter ſtrigas puncta aliquot nigra.

Bellona. 454. P. N. alis dentatis fulvis nigro maculatis: poſticis ſubtus apice argenteis; maculis ocellaribus fulvis ſex.
Papilio Hegeſia. Cram. Inſ. 18. tab. 209. fig. E. F?
Habitat in America boreali.
Parvus in hac familia. Antennae cinereo fuſcoque variegatae clava fulva. Alae dentatae, nigro maculatae. Subtus anticae fulvae, nigro maculatae, apice litura obſoleta, argentea. Poſticae baſi dilutiores ſtrigis obſcurioribus maculaque obſolete argentea ad marginem craſſiorem, poſtice fuſco argenteo nitentes maculis ſex fulvis, annulo brunneo cinctis.

Figure 3. Page 148 from Fabricius, J. C. 1793. Species number 453 is the original description of *Papilio Nymphalis columbina* Fabricius, 1793. Fabricius is careful to state the image he used for this original description is from "Jon. Fig. Pict. 5, tab 7, fig. 2.

illustration resembling this species nor reference to Fabricius with *P. N. columbina*. I examined more pictures of *Euptoieta hegasia*. I cannot reconcile Cramer's painting of the underside of *P. N. hegasi*a (Plate 207 F) with Jones' painting of the underside of *P. N. columbina* (Volume V Plate VII) Fabricius, 1793. In other words, it seems to me that Fabricius was correct when he said *P. N. columbina* and *E. hegasia* are not the same species. A taxonomist of the Nymphalidae, who is better than me, is required to sort this out, however I can see reason to reevaluate published synonymies of this and other described species using iconotypes from Jones' paintings.

The Introduction by Vane-Wright explains the history of William Jones and the creation of the text and paintings that became the unpublished seven large volumes that took about 30 years to complete. Jones not only painted adult butterflies and moths, he painted plants, caterpillars,

and he made detailed drawings of lepidopteran wing venation. The introduction is full of details about Jones' life, his contributions to classifications of lepidoptera, and the history of how the *Icones* were preserved in private ownership, and eventually presented to Oxford University by Frederick Dawtrey Drewitt in the years 1925-1938.

The book is divided into 'chapters' based on the seven volumes of the *Icones*. Each volume of Jones' paintings is reproduced in full color, and individual painted specimens are highlighted in groupings. Colored maps illustrate the origins of the specimen depicted on the plates in each of the seven volumes. Additional articles by specialists add commentary about the study of lepidoptera thereby further emphasizing the importance of this book.

Volume I. *Papiliones and Equites: Troes & Archivi* are facsimilies of Jones' illustrations of *Papilio* and related groups.

Immediately following Volume I. is Alberto Zilli, Ph.D.'s, article "The Early Study of Lepidoptera." One sentence by Zilli caught my eye. "Lepidoptera have long provided an uninterrupted source of inspiration in decorative arts, poetry and literature, but all available evidence points to the first steps in lepidopterology being driven by utilitarian motives." This is a new concept for me, yet it suddenly makes sense from the standpoint of silk production. I learned something, and because I love to learn, I read with more enthusiasm about the Greeks, Egyptians, and Pliny the Elder. I learned Lucius Columella (AD 4-70) was possibly the first person to use light trapping for moths. Who knew my principal research tool was invented about 2,000 years ago? Zilli traces museology through the need to organize collections as new parts of the world were explored. Zilli's treatment is Eurocentric.

Volume II. *Papiliones Heliconii*, of the *Icones* is next with stunning artwork reproduced from the Jones' manuscript paintings. Volume III. *Papiliones Danai: Candidi & Festiva*, immediately follows Volume II, with color plates of Pieridae, Nymphalidae: Danainae, Castniidae, and a few unnamed Satyridae.

The next article, Zilli's "A Flourishing of Lepidopterological Activities," provides a detailed Eurocentric study of the interest in lepidoptera from about 1720 forward into the time of Linnaeus. Zilli gives the reader a brief look into chicanery involved with buying, selling, and trading specimens. Zilli then turns the subject to a detailed discussion of Linnaeus and Fabricius; the latter was a student of Linnaeus and an instrumental influence on binomial nomenclature with Latin descriptions. During this time classifications evolved with the addition of character analysis. The latter subject is described in greater detail in several treatises not germane to my review. Lastly, Zilli describes the relationship between Jones and Drury. Zilli's article is full of lepidopterological European history up to introducing the significance of Jones' paintings.

Volume IV. *Papiliones Nymphales: Gemmati & Phalerata* contains 82 pages of full color reproductions of Jones' paintings.

The article "Collecting Lepidoptera in the 18th & 19th Centuries" is by Arlene Leis in which she discusses a more scientific approach of collecting and classifying along with artistic and scholarly collaboration. She mentions Jones' collaboration with book conservator Elizabeth Denyer on her manuscript book 'Insects of the Lepidoptera Class Collected in the Environs of London Painted from Nature.' Denyer's book, unpublished, sounds breathtakingly beautiful. Leis then discusses global networks and the market for lepidoptera, followed by a section regarding collecting as it intersected with the slave trade, and by discussions of women's access to entomology before summarizing her Eurocentric chapter with a paragraph explaining the importance of collecting.

Volume V. *Papiliones Nymphales* includes 114 more full color pages of Jones's paintings including the painting of *P. N. columbina* (Fabricius, 1793) (Fig. 2). The reproductions of the blue color in the specimens of *Morpho* spp. is exceptional.

The article "The Art of Painting Butterflies" by Stefanie Jovanovic-Kruspel is as compelling as the previous articles. I am not an artist, yet I enjoyed her discussion on scientific illustration because people who master this skill amaze me, so much so that I honored Elaine R. Snyder Hodges, a skilled scientific illustrator, and her husband, Ronald W. Hodges, with the name of a moth (Metzler 2014). Jovanovic-Kruspel's Eurocentric contributions to this book offer insights into science and illustration not easily garnered from other literature. She homes in on the taxonomic eye of William Jones thus explaining the relevance of his paintings to modern scientific exploration. She further illustrates her chapter with several plates of books we would never see, and she carefully explains the differences between decorative and instructive illustrations.

Volume VI. *Papiliones Plebeji.* As the name implies, these paintings are mostly Lycaenidae, however they include Hesperiidae.

The article "The Decline of Lepidoptera Around the Globe" by Francicso Sänchez-Bayo provides a sobering look at the loss of butterflies as highlighted in recent studies including one I helped organize in Ohio (Wepprich et al. 2019). I give many public lectures in addition to my research and teaching. People often tell me they do not see as many butterflies as they did years ago. I reply that I agree with them, and the situation makes me feel bad.

Volume VII. *Papiliones.* Is the last volume of Jones' Icones. It is no less attractive nor less well produced.

Chapter Legends for the plates with scientific name and distribution are summarized on pages 671-675 after which Vane-Wright provides a tabulation of pages 671-675. A bibliography is provided for each chapter of this book. Two indices, one for animal names and another for articles mentioned in the book, are followed by a list of the sources of the illustrations used in the book. The diligence to detail is, as in the words of my students, amazing!

Vane-Wright introduces and concludes the book with explanations of Jones' scholarship and color reproductions of Jones' manuscript text and color studies. The scholarship and totality of this new book are as complete as I can want and could easily be a template for anyone writing a scholarly as well as beautiful book. This is the best book I ever reviewed.

The editor of the *NEWS*, James Adams, does an excellent job of introducing the readers of the *NEWS* to a variety of books about our favorite subject. This is no exception and is perhaps one of the most anticipated books on my personal library's desiderata. I first heard about the *Icones* when Jacqueline Y. Miller (1978) gave an oral paper at the Annual Meeting of The Lepidopterists' Society. I collect books on lepidoptera, mostly moths, and when I heard her paper, I knew I wanted to own a copy of the *Icones*. I was disappointed to learn the *Icones* was an unpublished manuscript. As soon as I saw an advertisement for this book, I knew I would acquire a copy. I expected a very expensive book. The price of $85.00 is a relative steal compared to what I usually spend for high quality books; it is the most cost-effective price per unit of weight. I highly recommend this volume for its images, so long locked away from most of the public, and for the text of historical information, for a fine example of scholarship, and coverage of the subject material. I learn something new each time I read through this book. I suggest you will not be disappointed in this book. It proudly sits on my bookshelf alongside several other handsome and much costlier books.

Please note: Some retailers are selling softcover copies of the book in this review. The publishers in the UK and the US did not publish a softcover edition, therefore the softcover copies are probably pirated, and they constitute a violation of the publishers' intellectual rights. I suggest any pirated versions will be inferior and the purchase of a pirated copy benefits criminals. I strongly suggest that a savings of a couple dollars on an inferior and pirated book is unethical and contributes to criminal activity.

References Cited:

Cramer, P. & C. Stoll. 1775-1791. *De Uitlandshe Kapellen voorkomende in de drie Waereld-deelen Asia, Africa en America, by een verzameld en Beschreeven. & Aanhangsel van het Werk, ... door den heere Pieter Cramer*. S.J. Baalde and Nic. Th. Gravius. 947 pp, 442 hand-colored plates in five volumes.

Cramer, P. 1779. *De Uitlandshe Kapellen Voorkomende in De Drie Waereld-deelen Asia, Africa En America, by Een Verzameld En Beschreeven. II. Deel*. S.J. Baalde, Amsterdam. 151 pp, 96 hand-colored plates.

Drury, D. 1770-1782. *Illustrations of Natural History Wherein are exhibited Upwards of Two Hundred and Forty Figures of Exotic Insects, According to their different Genera; Very few of which have hitherto been figured by any Author*. Published by the Author, London. 296 pp, 150 hand color plates in three volumes.

Fabricius, J. C. 1792-1794. *Entomologia Systematica Emendata et Aucta. Secundum Classes, Ordines, Genera, Species Adjectis Synonimis, Locis, Observationibus, Descriptionibus*. Impensis C. C. Proft, Fil. Et Soc. Hafniae. [Denmark]. 2,352 pp in four volumes.

Fabricius. J. C. 1793. *Entomologia Systematica Emendata et Aucta. Secundum Classes, Ordines, Genera, Species Adjectis Synonimis, Locis, Observationibus, Descriptionibus tom III. pars. I.* Impensis Christ. Gottl. Proft., Hafniae, [Denmark]. 478 pp.

Linnæi, C. 1758, *Systema Naturæ. Per Regna Tria Naturæ, Secundum Classes, Ordines, Genera, Species, cum Characteribus, differentiis, Synonymis, Locis. Tomus I.* Intensis Direct. Laurentii Salvii, Holmiæ [Sweden]. 824 pp.

Harris, M. 1766. *The Aurelian or Natural History of English Insects; Namely Moths and Butterflies Together with the Plants on Which They Feed*. Published by the Author. London. 145 pp, 44 hand color plates.

Metzler, E. H. 2014. The Lepidoptera of White Sands National Monument 6: A new species of *Chionodes* Hübner, [1825] (Lepidoptera, Gelechiidae, Gelechiinae) dedicated to Ronald W. Hodges and Elaine R. Snyder Hodges in the year of Ron's 80th birthday. Journal of The Lepidopterist's Society, 68 (4): 80–84. http://dx.doi.org/10.18473/lepi.v68i2.a2

Miller, J. Y. 1978. The Jones *Icones*. 29th Annual Meeting of The Lepidopterists' Society, University of Louisville Kentucky, July 6 - 9, 1978 Program. 4 pp.

Pohl, G. R,. B. Patterson, and J. P. Pelham. 2016. *Annotated Taxonomic Checklist of the Lepidoptera of North America, North of Mexico***.** Working paper published online by the authors at ResearchGate.net. DOI: 10.13140/RG.2.1.2186.3287. 766 pp.

Schäffer, J. C. 1776. *Elementa entomologica*. Ausgemahlte Kupfertalfen, Regensberg, Weiss. 135 pp, 135 hand color plates.

Wepprich, T., J. R. Adrion, L. Reis, J. Wiedmann, and N. M. Haddad. 2019. Butterfly abundance declines over 20 years of systematic monitoring in Ohio, USA**.** PLoS ONE 14(7): 1-21 e0216270. https://doi.org/10.1371/journal.pone.0216270

Westwood, J. O. 1837. *Illustrations of Exotic Entomology, Containing Upwards of Six Hundred and Fifty Figures and Descrip tions of Foreign Insects Interferred with Remarks on their Nature and Properties By Dru Drury, a New Edition Brought down to the Present State of the Science, with the Systematic Characters of Each Species, Synonyms, Indexes, and Other Additional Matter*, Henry G. Bohn, London. 316 pp, 150 hand color plates in three volumes.

Wilkes, B. 1747-1760. *The English Moths and Butterflies*. Published by the author, London. 63 pp, 120 hand color plates in four parts.

The figures are scans from books in the reviewer's personal library.

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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.

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

Issue	Date Due
64 2 Summer	May 12, 2022
3 Fall	August 15, 2022
4 Winter	November 15, 2022
65 1 Spring	February 15, 2023

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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A selection of Lepidoptera illustrated in Jones's *Icones*, showing the undersides of their wings. See related Book Review by Eric Metzler on pg. 53. ©University of Oxford, Museum of Natural History.