Volume 52, Number 1 Spring 2010

NEWS OF THE LEPIDOPTERISTS' SOCIETY

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Correction:

The moth reported as *Eustrotia fausta* Druce in the News of the Lepidopterists' Society 51(3):93-94 is a female of a pyralid in the genus *Tosal*e. It is tentatively placed as *Tosale similaris* Barnes & Benjamin, which was described, but not illustrated, from Reddington, Arizona (Contributions to the Natural History of Lepidoptera in North America Vol. 5(3):191). The site at which the moth was collected is close to Reddington Pass. I was misled by an illustration in Godman & Salvin, Biologia Centrali-Americana, and my thanks to Ed Knudson for questioning the original identification and supplying follow-up information. — Cliff Ferris

Front Cover:

*Urbanus chalco,*Fazenda Rancho Grande, Rondonia, Brazil on Nov 17, 2006. Photo by Kim Garwood.

An Overlooked 18th Century List of North American Lepidoptera

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Published in 1860, the *Catalogue of the Described Lepidoptera of North America* by the American entomologist John G. Morris has long been recognized as the first compendium of North American Lepidoptera. While searching historical literature, I recently discovered a list of North American Lepidoptera that was issued nearly a century before Morris (1860). Published in 1771 by the German naturalist Johann Reinhold Forster, this early list was compiled when the systematic works of Carl Linnaeus represented the primary source of scientific names. Countless New World taxa had yet to be named by the European naturalists Dru Drury, Pieter Cramer, Johann C. Fabricius, James E. Smith, and Jacob Hübner. Forster's list is probably the first attempt to document the described Lepidoptera of North America.

Hoare (1976) published a very detailed biography of J. R. Forster's life and work. Of partial Scottish descent, Forster (Fig. 1) was born in 1729 in Polish Prussia. In 1766 he emigrated from Russia to England, where he briefly worked as a tutor of languages and natural history at the distinguished Dissenters' Academy in Warrington. While in England, he anglicized his given name to John. Forster was greatly influenced by the systematic works of Linnaeus, declaring in 1768, "Although I am not a pupil of Linnaeus, however I know the method, and reckon myself to be a kind of Linnaean being." Forster served as the expedition naturalist for Captain James Cook's second circumnavigation of the globe (1772-1775). After returning from Cook's voyage, Forster accepted a professorship at Halle, Germany, where he died in 1798. Although Forster was a dedicated scientist, he was generally regarded as surly and intemperate. While residing in England, he was particularly interested in entomology. His insect collection in 1769 contained more than 1000 specimens. Dru Drury of London received from Forster many species of Coleoptera that were collected during Cook's second voyage (Drury's collection notebooks, Hope Library of Entomology, Oxford University). After his death, Forster's natural history collections were sold by his widow, thus few of his insects have survived (Hoare 1976, Day & Fitton 1977). Drury's collection was dispersed at auction in 1805 and the fate of Forster's specimens is unknown.

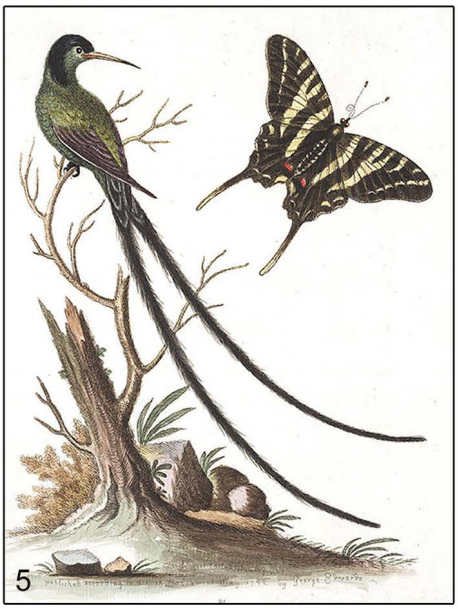
In 1770, Forster published the first English entomological work to apply the scientific names of Linnaeus. The following year, Forster produced a small book entitled, *A Catalogue of the Animals of North America* (Forster 1771a), which listed the region's mammals, birds, reptiles, fish, insects, arachnids, and crustaceans. Forster wrote, "I offer this small catalogue merely as an essay towards forming a more compleat Natural History of that extensive continent. To instruct Collectors, I have added to this list some short directions for the best method of preserving and transporting the various subjects of Natural History." Forster also published a companion volume on the plants of North America (Forster 1771b). He hoped that his catalogues would encourage the residents of the American colonies to collect and send specimens to England. In addition to his catalogues, Forster published an English translation of the journals of the Swedish-Finnish naturalist Pehr (Peter) Kalm (1716-1779). From 1748 to 1751 Kalm traveled through portions of Delaware (then part of Pennsylvania), New Jersey, New York, Pennsylvania, and Quebec to procure natural history specimens, especially plants (Kalm 1753-1761, Forster 1770). Forster considered his catalogues of the North American fauna and flora as "a kind of appendix" to his translation of Kalm's journals and suggested that these works be bound together (Forster 1771b). Because of these and other publications that he authored during the 1770s, Forster was considered to be an authority on North American natural history. Though scarce, Forster's original *Catalogue of Animals* is available for viewing on the Internet (e.g. Biodiversity Heritage Library, Google Books, Göttinger Digitalisierungszentrum [Göttengen Digitalization Center], and Internet Archive). This publication was reissued by the Willoughby Society (Sclater 1882), but it too is now rare.

Forster (1771a) included 50 species of "Papilionaceous Insects;" 29 butterflies and 21 moths. The brevity of his list reveals a rudimentary understanding of the New World fauna. For insects, Forster relied primarily on the authority of Linnaeus, who described taxa from "America septentrionali," "America boreali," and "America." Based on illustrations by Merian (1705), Linnaeus also noted that some of his new species fed on "Americes" [American] plants. Because Linnaeus erroneously attributed many Old World species to America, Forster naively reiterated those reports and applied them to his own definition of North America. Curiously, Forster omitted several additional species that Linnaeus had ascribed to America. Forster's list of Lepidoptera was arranged according

to Linnaeus (1767), which was very popular at that time and issued only four years earlier.

Although the term "America" has become synonymous with the United States, it originally denoted the entire New World (Fig. 2). The full name of the U.S. is indicative of this origin; the United States of *America* [a part of America]. This concept first appeared on maps during the 16th century and is still evident in the geopolitical designations of North America, Central America, and South America. The lands of the western hemisphere are often identified as the Americas. North America was generally defined in the 18th century as all lands located north of the South American continent, much of which remained uncharted (Fig. 3). Due to limited accessibility, Forster's "North America" was primarily restricted to the waters and settled territories of the eastern seaboard, westward to Hudson Bay in the north. Prior to 1770 most North American natural history specimens were collected between Hudson Bay and South Carolina (excluding the West Indian subregion).

For those species of Lepidoptera that Linnaeus did not associate with America, Forster presumably examined specimens that he believed were of North American origin. Whereas



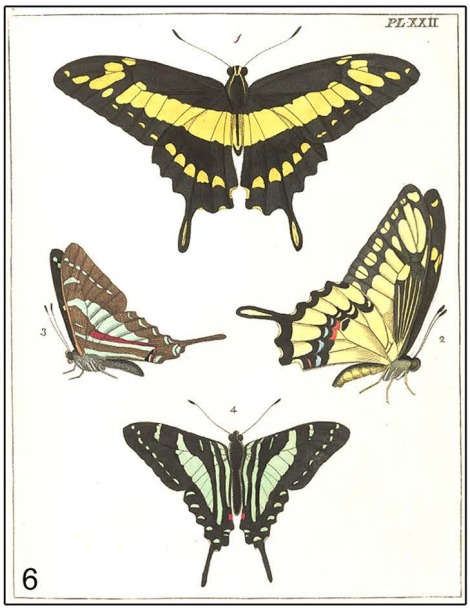


Fig. 1) Johann Reinhold Forster and his son, George (J. F. Rigaud, 1780) **Fig. 2)** 1762 map of America (A. Donaldson & J. Reid, Edinburgh). **Fig. 3)** 1774 map of North America (Samuel Dunn, London).**Fig 4** Drury (1770) Pl. 11: *B. philenor* & *P. polyxenes*. **Fig 5**) Edwards (1743) Pl. 34: *E. marcellus*. **Fig. 6)** Drury (1770) Pl. 22: *P. thoas* & *E. celadon*. **Fig. 7)** Catesby (1743) Pl. 83: *P. glaucus*. **Fig. 8)** Catesby (1743) Pl. 100: *E. marcellus*. **Fig. 9)** Catesby (1743) Pl. 91: *A. polyphemus*.

Forster properly identified a few taxa, he applied incorrect names to others, as most Nearctic species remained undescribed. He also probably attempted to identify some specimens using Linnaeus' brief written descriptions, but Forster was doubtless unfamiliar with the true identities of many Linnaean taxa (even Linnaeus was unsure about a few!). Forster compared four species with unidentified figures in Edwards (1743) and Drury (1770), two publications that he later took with him on Cook's second voyage (Hoare 1976). Although misidentifications were unavoidable, Forster's list suggests that at least two distinctive Palearctic species were established in North America during the 18th century. It is, however, difficult to assess the validity of these and other records.

Table 1 lists the Lepidoptera species as published by Forster (1771a). Also provided are the current names of each species, the likely reasons for their inclusion, and additional comments.

Literature Cited

Catesby, M. 1743. The natural history of Carolina, Florida and the Bahama Islands: containing the figures of birds, beasts, fishes, serpents, insects, and plants: particularly the forest-trees, shrubs, and other plants, not hitherto described, or very incorrectly figured by authors. Together with their descriptions in English and French. To which are added, observations on the air, soil, waters: with remarks upon agriculture, grain, pulse, roots, &c. To the whole is prefixed a new and correct map of the countries treated of. Vol. II. Publ. by the author, London, England. [6]+100 pp., 100 pl.

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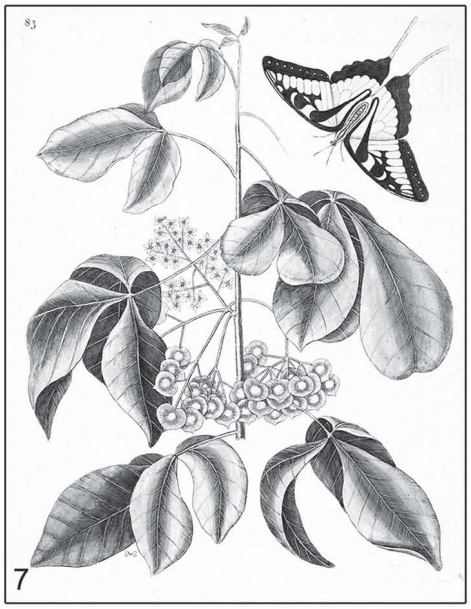

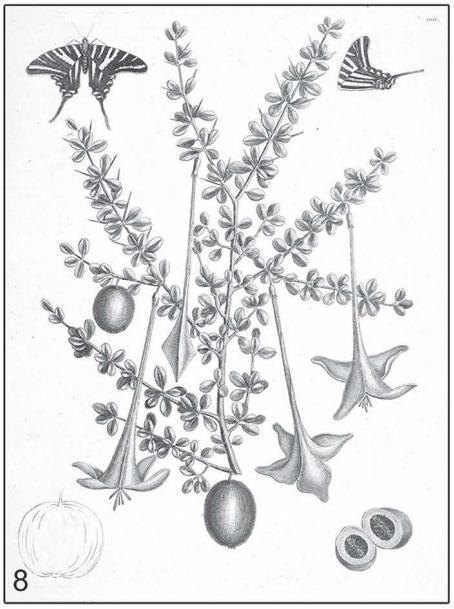

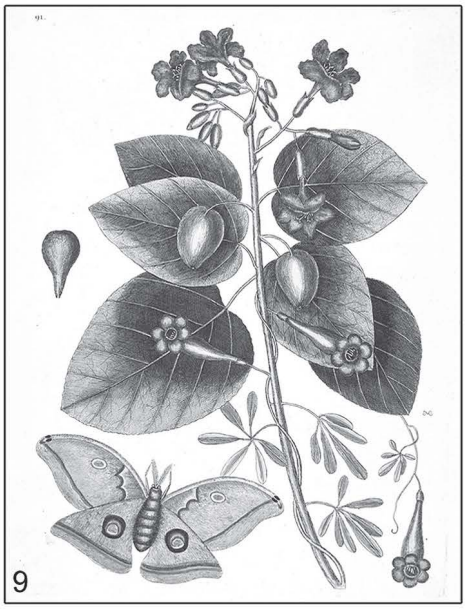

Natural and sexual selection in satyrine wing patterns: a complex story

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Key words: behavior, evolution, eye spots, wing pattern

A recent article by Oliver et al. (2009) suggests that evolution of different wing pattern elements in Satyrinae happens at different rates and under different selective pressures. Using a model group of *Bicyclus* satyrines, the authors test the hypothesis that dorsal and ventral sides are subjected to different selective pressures and hence evolve at different rates. This research group has also previously shown that male dorsal eyespots play a vital role in mate choice by females (Robertson and Monteiro, 2005). In the new study, using a phylogeny of *Bicyclus*, they showed that dorsal wing characters evolve faster than those on the ventral wing surface, and that forewing characters evolve faster than those on the hindwing. The ventral pattern, the authors suggest, serves mostly as cryptic coloration and therefore is more conserved compared to the dorsal one.

It might be tempting to extrapolate the above results to other groups of butterflies. In Junoniini, however, another group which is also very rich with eye-spot patterns that are frequently variable within a species, the eye-spots are apparently an antipredatory device. Their evolution has been shown to be non-linear, with the appearance and disappearance of individual spots having happened several times, and inheritance of individual spots may be linked (Kodandaramaiah, 2009). Even when it comes to other satyrine genera, different mechanisms might be employed by different species in nature for communication.

Here, I report behavioral observations on *Archeuptychia cluena* (Drury, 1782) and *Chloreuptychia arnaca* (Fabricius, 1776), which illustrate that the dorsal eyespots as well as shiny coloration in two of the neotropical satyrines function for signaling territoriality. I also would like to share observations on *Pseudochazara pelopea* (Klug, 1832) in Armenia and other satyrines of xeric habitats, such as *Auca barrosi* (Silva, 1917) and *Cosmosatyrus leptoneuroides* (Felder&Felder, 1867) in Patagonia, genus *Calisto* in the West Indies and many others, in which the signaling is restricted to the ventral rather than dorsal wing surface.

Observations

In June, 2009, in Bahia, Brazil, I observed *Archeuptychia cluena* and *Chloreuptychia arnaca* in the field. Males of both species normally perched in sunlight with their wings closed, orienting to the sun in such a manner that they would project a minimal shadow (Fig. A, C) – perhaps one of the defensive strategies they employ. They perched thus for many minutes. Abrupt opening of the wings occurred only when a conspecific male entered their territory at the distance of approximately 10 feet (Fig. B, D). Repeated observation confirmed that the opening/closing of the wings was caused by the potential rivals' entry or departure from the perching male's

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Misumenops bellulus (Araneae: Thomisidae) a predator of larval *Anaea troglodyta floridalis* (Nymphalidae)

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The Florida leafwing, *Anaea troglodyta floridalis* F. Johnson and Comstock (Nymphalidae), occurs locally within the pine rocklands of southern Florida and the lower Florida Keys (Minno and Emmel 1993, Smith et. al 1994). Hennessey and Habeck (1991) and Worth et al. (1996) described many aspects of *A. t. floridalis* natural history. Salvato and Hennessey (2003) and Salvato and Salvato (2008) also discussed *A. t. floridalis* ecology and provided a review of known predators for the species.

On 2 January 2010 we observed a recently captured early instar *A. t. floridalis* being consumed by a crab spider, *Misumenops bellulus* (Banks) (Figs. 1-3, p. 7) in the Long Pine Key region of the Everglades National Park

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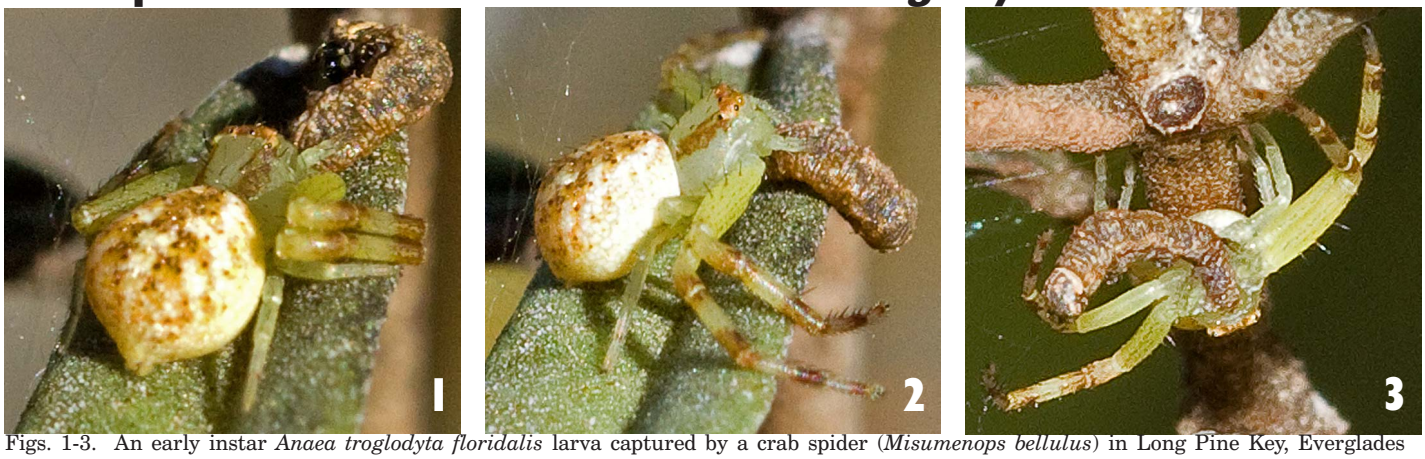
Competitor and mate signaling in satyrines (see text for details): (A-B) male *Chloreuptychia arnaca*; (C-D) male *Archeuptychia cluena*; (E) female *Cosmosatyrus leptoneuroides*; (F) *Auca barrosi*; (G) *Pseudochazara pelopea*

Crab Spider Predation on a larva of *Anaea troglodyta floridalis*



Figs. 1-3. An early instar *Anaea troglodyta floridalis* larva captured by a crab spider (*Misumenops bellulus*) in Long Pine Key, Everglades National Park (Photo Credits: H. L. Salvato).

A Striking Aberration of *Chioides albofasciatus* (Hewitson, 1867) (Hesperiidae: Eudaminae) From South Texas

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The illustrated female specimen was collected by the senior author in Hidalgo Co., TX, Mission, on 13 Nov. 2009. The appearance was so strange, that at first he did not recognize it. After closer examination, it became clear that this was an aberrant *Chioides albofasciatus*. The junior author, upon seeing the images of the specimen, recalled a recent article in this publication (Austin & Warren, 2008), in which a very similar aberration in a Brazilian specimen of *Urbanus teleus* (Hubner, 1821) was presented. Another similar aberration of *Thorybes pylades* (Scudder, 1870) was illustrated by Kendall & McGuire, 1984. We thought it interesting to have nearly identical aberrant forms in three different genera of the same subfamily.

In the aberrant specimens, the semi-translucent macules on the dorsal forewing are all greatly expanded in size and extent. Especially striking, is the outwardly convex row of enlarged macules along the outer margin of the discal cell extending along the costal cells to near the middle of the costa. On the ventral forewing the same pattern is repeated, and in addition, the contrasting dark subapical costal triangular patch found in typical individuals of *C. albofasciatus* is mostly replaced with white in the aberrant specimen. On the ventral hindwing, the dark bands over the central area of the disc are expanded and nearly fused, nearly obscuring the lighter central band. Traces of this central band can be seen in both aberrants of *C. albofasiatus* and *U. teleus*, but it is completely obscured in the aberrant *T. pylades*. Indeed, the remnant white streak on the ventral hindwing of the aberrant *C. albofasciatus* seems to eliminate the possibility of this being an aberration of *C. zilpa* (Butler, 1872).

Chioides albofasciatus is widely distributed from Central America through the southern half of Texas. Individuals have occasionally been found to the north and west of this range, and a rather large expansion has been noted eastward into eastern Texas and western Louisiana over the last ten years. In extreme south Texas it is usually a common breeding resident, although relatively few individuals were observed in the fall of 2009. The larval hosts include various vines in the Leguminaceae.

Literature cited

Austin, G.T. & A.D Warren, 2008. An Aberrant *Urbanus teleus* (Hubner, 1821) Hesperiidae, Eudaminae.
News of the Lepidopterists' Society 50 (2). pp. 40,41.

Kendall, R.O. & W.W. McGuire, 1984. Some New and Rare Records of Lepidoptera found in Texas.
Bulletin of the Allyn Museum 86. pp. 6,7.

A predator of larval *Anaea troglodyta*

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(Miami-Dade County, Florida). Crab spiders are commonly found on flowering plants where they lie in wait to ambush visiting insects. Fales and Jennings (1977) discuss crab spider predation on a number of butterflies and provide a summary of older accounts in the United States.

We have often witnessed crab spiders on *Croton linearis* Jacq., the sole hostplant of *A. t. floridalis*, and suspected they may serve as predators for larvae of this species. Early instar *A. t. floridalis* create a frass chain by attaching their fecal pellets to the mid-vein of a partially eaten *C. linearis* leaf with silk. The larvae then crawl to the terminus of this strand to avoid predation. However, larvae often move to the top of the frass chain to feed, thereby making them vulnerable to predators. The crab spider was initially observed on the *C. linearis* leaf directly atop of the frass chain suggesting it may have snatched the larvae as it was feeding. Over the course of an hour the spider continually re-positioned the larva with its legs in order to thoroughly feed on its prey. Once finished, the spider released the larva, letting the carcass fall to the ground.

Acknowledgement

We thank Dr. G.B. Edwards (Florida Department of Agriculture and Consumer Services, Gainesville, Florida) for examining photos and specimen identification.

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An aberrant *Chioides albofasciatus*

Fig. 1 *Chioides albofasciatus* (aberrant female) Hidalgo Co., TX, Mission, 13-XI-09 C. Bordelon; Fig. 2 same, ventral; Fig. 3 *Chioides albofasciatus* (typical male) Washington Co., TX, Brazos River at US 290, 24-II-08 C. Bordelon; Fig. 4. same, ventral

Conservation Matters:
Contributions from the Conservation Committee

Are Butterflies in Trouble? If So, Why?

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> I sometimes think of the story of Peter Bamm, who was on a lovely island where he met all kinds of people, good and bad. He dreamt in a nightmare that a bomb might come and destroy everything, and the first thing that occurred to him was what a pity it would be for the butterflies.
>
> Dietrich Bonhoeffer,
> *Letters and Papers from Prison*

I've been hearing the same mantra all my adult life: "There were more butterflies when I was a kid." And for most of those years, in my capacity as a butterfly guru to the public and the media, I've pooh-poohed the idea. I certainly didn't see it happening—and if anyone should see it I should, since I'm in the field at least 200 days a year looking at butterflies. The ubiquity of the perception, from New York to San Francisco to Buenos Aires, led me to hypothesize that its roots were psychological. Butterflies, I reasoned, are more prominent objects in a little kid's landscape than in an adult's. As we get bigger and older we notice them less, not because there are fewer of them but because they are smaller relative to us…and we get preoccupied with other sorts of things, like football and consumer electronics and sex. A neat explanation; perhaps even a correct one.

Of course, I knew butterflies can go downhill. My experience in this regard is anything but unique: I watched the butterfly fauna of my childhood neighborhood in Philadelphia, West Oak Lane, shrink as the city encroached farther and farther into what had been woodlots and old fields. Down the road from my house was the ancient Cedar Park Inn, with its hand-painted sign picturing eastern Red Cedar (*Juniperus virginiana*). The tree had once been common here; now it was extinct in Philadelphia County, and with it the Olive Hairstreak (*Mitoura gryneus*), which I had to go deep into the country to find. Even in the seemingly intact cool woodsiness of the Wissahickon Ravine, which seemed as if it could not have changed appreciably since Ben Franklin's day, the Falcate Orange-Tip (*Anthocharis midea*) and Bates' Crescent (*Phyciodes batesii*) vanished on my watch. (The latter seems to be extinct in most of its historic range.) As a senior at the University of Pennsylvania I used this history as my term paper in Jack McCormick's community ecology class. He gave me an "A" and said with a little tweaking it might be publishable. (One specific tweak: to drop the expression "to go extinct," which he regarded as slangy. It is normal in the scientific literature today.) But I never tweaked it. It's a pity; it was 40 years ahead of its time – not dissimilar, if more mature, papers are appearing all the time now. In 1965 Geographic Information Systems hadn't been invented yet and aerial photointerpretation was still largely a specialty of military intelligence. I relied on city planning documents to track the course of urbanization. Even that was ahead of its time. The first papers of this sort that I know about appeared decades later!

But those losses were local, their cause was transparent – habitat loss due to development – and I regarded such losses as regrettable but inevitable, and I wasn't thinking on larger scales. And at the same time, in southwest Philly, the Eastwick urban-renewal project had leveled many blocks of run-down housing, creating an exuberant swath of old-field succession that was absolute butterfly heaven. (There were outbreak populations of the Checkered White, *Pontia protodice*, there; it is reputed to be extinct in Pennsylvania now.) So losses might be reversible, at least in part: the bulldozer taketh away, but it also giveth. And yet…I had the 19th- and early 20th-Century records of Henry Skinner, Eugene Aaron, Frank Haimbach, Philip Laurent, J.U.D. Pleasants…; I knew that the Mulberry Wing (*Poanes massasoit*) and the Silver-Bordered Fritillary (*Boloria selene myrina*) had once occurred in Fairmount Park, and now they were gone. I saw one of the last Regal

Fritillaries (*Speyeria idalia*) recorded in southeastern Pennsylvania with my own eyes (near Devon, Chester County, in 1966; David Wright says the very last was in 1975— at least until 1990 and 1992, also in Chester County!). Despite all that, I remained an optimist. I also headed West.

Now I know better. I don't *think* butterflies are in trouble. I *know* it. But I didn't in 1971.

When I was hired at the University of California, Davis, I finally had the opportunity to do what I had been dreaming of doing: I wanted to monitor a butterfly fauna and use multivariate statistical methods to identify what environmental variables exerted the most influence on its seasonality (phenology). My undergrad adviser had been Robert MacArthur, the great ecologist, and he had encouraged me to think of life-history phenomena as "adaptive strategies" fashioned by Darwinian evolution. My project was conceived as running about five years. In a Mediterranean climate, with high interyear variance, that should be enough to give meaningful statistics. Besides, it was the time frame for learning whether or not I'd get tenure; I might have to move on after that.

I did get tenure, and the data were so exciting that the project just kept going. It's now in year 39. It expanded to ten sites (and ten faunas) from sea level to tree line, embracing both slopes of the Sierra Nevada and 159 species and subspecies of butterflies (so far). The only comparably large butterfly database is in the United Kingdom, and is of similar age but very differently organized. I collect all my own data (that's why I'm afield 200 days a year); the British use a network of many cooperative observers who monitor their local faunas. They have fewer than 60 species in the entire country, and substantially less topographic and climatic diversity than exists on my transect. The two projects are complementary, and both are designed for data mining. And they are being mined.

When I initiated my project in 1972, no one was talking about global warming. In fact, some were talking about global *cooling*, and the possibility that we were heading for a new Ice Age. My goals were short-term. To use some applied-math jargon, I was not looking for a signal; I was trying to identify biotic responses to noise—the short-term weather fluctuations that a 5-year study would focus on. The data were not collected to identify biotic consequences of any long-term trend. But when we had about 30 years' worth the mere amount of data was daunting, and my research group, led by then-doctoral student Matt Forister, convinced me that it was high time we started analyzing the data. (I had tried to get money from the National Science Foundation years before to do this. They were willing to fund data collection, but not the analysis unless I could explain in some detail the statistical methods to be used. I couldn't, because some of them hadn't been invented yet! When we did get funded, that was one of our highest priorities—to figure out how to do what we needed to do. They teach you in grad school that all research should be designed with the analytical procedures fully-defined in advance. They rarely teach you that the idiosyncrasies of real-world research routinely trump such notions. They do.)

So we took all those data and began taking them apart and asking questions whose answers were by and large inapparent on inspection but could be teased out with statistical analyses. You have probably read about our results in the press. The study came out in mid-January 2010 and is the first of several projected papers in various stages of completion. Now, by 2010 some things were glaringly apparent on the Philadelphia model—that is, visible to the naked eye—, but other things were not. Here is a summary of what we found.Keep in mind as you read this that we had no axe to grind; we were letting the data tell us their own story. Keep in mind also that the data and the inferences from them apply strictly only to our transect across north-central California. The degree to which they can be generalized elsewhere remains to be seen. They are, however, broadly consistent with data on other taxonomic groups and on butterflies in other places, as I'll discuss a bit later.

1. Butterfly faunas near sea level are deteriorating rapidly, especially in the last decade. But the deterioration is not adequately explained by climate change. The most important factor appears to be habitat loss (as documented by land-use statistics at the County level, a more-refined use of the same technique I applied in 1965!). We suspect that more sophisticated analysis using Geographic Information Systems will reveal that loss of habitat connectivity is more important than absolute habitat area.

2. Butterfly faunas at mid-elevation on both slopes of the Sierra Nevada are either holding their own or deteriorating slowly. Here there has been no significant habitat loss, and changes, such as they are, are inferred to be climate-driven.

3. At our highest (tree-line) site, overall butterfly richness is *increasing*, as more and more lower-elevation species follow warming uphill. However, most of them cannot establish as breeding residents because their essential resources, especially larval host plants, are not available; plants, which cannot fly, respond to climate change much more slowly than butterflies, which can. At the same time, 3 of the 4 most characteristic butterfly species of the alpine zone at Castle Peak (not necessarily globally) are becoming less common.

4. The most surprising finding—we were totally unprepared for this!—was that the common ruderal ("weedy"), multiple-brooded species, which some collectors take for granted and sometimes refer to derisively as "junk species," are actually declining *faster* than the ecological specialists. These species regularly colonize upslope in summer but cannot overwinter at high elevations. We expected to find them

becoming more common as the climate warmed, but in fact the reverse is happening! This is apparently due to loss of their preferred weedy habitats at low elevations (as they are replaced by sterile residential subdivisions, business parks and such), which reduces their populations and thus the number of individuals available to disperse and colonize upslope. (One "junk species" that is not declining is the European Cabbage Butterfly, *Pieris rapae*, which has benefitted from the spread of the invasive weed Perennial Peppergrass (*Lepidium latifolium*) at low elevations. This weed is now marching upslope, is established at 5000' and starting to show up at 7000'.)

In the Philadelphia of my youth, the Common Sooty Wing (*Pholisora catullus*) was a "junk species." When I came to California, it was one here too; I could find larvae within ten minutes' walk from my lab, and I had it in my garden every year. Now it is approaching regional extinction; I know one active population in my county (Yolo) and one in adjacent Sacramento County. It breeds on Amaranth pigweeds—not exactly endangered plants. The Large Marble (*Euchloe ausonides*) was common throughout this region in the 1970s, breeding on naturalized mustards (*Brassica*) and wild radish (*Raphanus*). Now it appears to be regionally extinct. Also on a regional basis, the entire macrolepidopteran fauna of willows (*Salix*) in riparian habitat is in dire straits on the floor of the Sacramento Valley for no obvious reason—Lorquin's Admiral (*Limenitis lorquini*), the Mourning Cloak (*Nymphalis antiopa*), the Sylvan Hairstreak (*Satyrium sylvinus*) and the once-abundant diurnal Sheep Moth (*Hemileuca eglanterina*), all extinct in many former localities and hanging on perilously only here and there. The habitats of these species appear unchanged; we infer that the cause of the declines is on a larger-than-local scale. Most of the changes are less striking and more subtle—but none the less real.

Let me qualify all of this: I know that folks who are concerned about pesticides, air pollution, genetically-modified organisms, introduced biological-control agents, and so forth are going to ask how we can be so sure their particular *bête noire* isn't involved in these declines. (They always do.) The answer in a nutshell is that we *can't*. For some of these factors no useful data is available. For others—pesticides—*too much* data is available, and we have no idea how to prioritize them for analysis. Agriculture in the Central Valley is a remarkably complex spatio-temporal mosaic. The crops planted and the pesticides used on them within the relevant geographic areas change constantly, particularly as a consequence of yearly variance in rainfall, economics, and the actions of regulatory agencies. The observed patterns of butterfly decline do not by and large suggest pesticides as an important factor, but as of now we just don't know. (And even in "eco-conscious" Davis a fair number of people have their lawns chemically treated for weeds and pests, but that hasn't dented the abundance of the ubiquitous Fiery Skipper (*Hylephila phyleus*) – at least not yet. Nor have garden pesticides prevented the spectacular recrudescence of the Gulf Fritillary, *Agraulis vanillae*, in this region in the past few years after a 40-year absence, an event that has drawn lots of media attention. Of course, both of these almost completely urban species are of subtropical origin… Last year the Western Tiger Swallowtail, *Papilio rutulus*, which unaccountably went extinct in Davis—but not elsewhere in the region—a decade before, reappeared all over the city in extraordinary numbers. There's a lot we don't understand.)

There is no doubt that climate is changing. Climate is always changing. At UC Davis I teach about paleoclimates and paleovegetation. I tell the students that our imaginations are hamstrung by the temporal scale of a human life. Let's harken back to my hypothesis about why people think there are fewer butterflies than there used to be. We tend to think of whatever we grew up with as "normal." Within our own threescore and ten, we see change as something alarming, something deviant. But Nature as we see it is a freeze-frame from a very long movie. Change is the *normal* state of affairs: it's stasis that is abnormal and requires explanation. There is controversy over whether human activity is driving the current episode of climate change; there is no controversy that the change is happening. There is also no controversy that land-use change, which is apparently driving our low-elevation butterfly decline in California, is human-caused!

So when some geezer my age says to me "There were a lot more butterflies when I was a kid," I'm a lot more willing than I used to be to take him seriously.

WANT TO LEARN MORE?

There's a lot of professional literature on butterfly declines, climate change and related subjects. By and large it is unknown to amateurs because it appears in scientific journals not focused on Lepidoptera per se. Here is some suggested reading. *This is NOT an attempt at an exhaustive bibliography!*

THE GRINNELL PROJECT is an attempt to resurvey the altitudinal distributions of mammals studied in detail by Berkeley zoologist Joseph Grinnell a century ago. Because his notes and voucher specimens and site photographs are lovingly preserved at the Museum of Vertebrate Zoology, UC Berkeley, it is possible to revisit nearly all of his collection sites and see how much the distributions have changed. You can read about the project at http://mvz.berkeley.edu/Grinnell/index.html and from it you can download the major publication to emerge thus far: C. Moritz et al., 2008. Impact of a century of climate change on small-mammal communities in Yosemite National Park, USA. *Science 322*: 261-264. The mammalian patterns the Berkeley crew is finding are quite similar to ours in butterflies.

BIOTIC RESPONSES TO CLIMATE CHANGE are documented in hundreds of papers, with more coming out weekly—as an on-line search will quickly show! Here are a few important ones.

Bale,J.S. et al. 2002. Herbivory in global climate change research: direct effects of rising temperature on insect herbivores. *Global Change Biology* 8:1-16.

Hickling,R. et al. 2006. The distributions of a wide range of taxonomic groups are expanding polewards. *Global Change Biology* 12:450-455.

Menendez, R. et al. 2006. Species richness changes lag behind climate change. *Proceedings of the Royal Society B (Biological Sciences)* 273:1465-1470.

Parmesan, C. 2006. Ecological and evolutionary responses to recent climate change. *Annual Review of Ecology, Evolution and Systematics* 37:637-669.

Parmesan, C. and G. Yohe. 2003. A globally coherent fingerprint of climate-change impacts across natural systems. *Nature 421*:37-42.

Root, T.R. 2003. Fingerprints of global warming on wild animals and plants. *Nature 398*:611-615.

Walther, G.R. et al. 2002. Ecological responses to recent climate change. *Nature 416*:389-395.

Wilson,R.J. et al. 2005. Changes to the elevational limits and extent of species range associated with climate change. *Ecology Letters* 8:1138-1146.

IMPACTS ON LEPIDOPTERA are documented in a few dozen papers so far, many of them from Europe and the British Isles, some from the Tropics! Examples:

Altermatt, F. 2009. Climatic warming increases voltinism in European butterflies and moths. *Proceedings of the Royal Society B (Biological Sciences)*: DOI: 10.1098/rspb.2009.1910

Chen, I.C. et al. 2009. Elevation increases in moth assemblages over 42 years on a tropical mountain. *Proceedings of the National Academy of Sciences of the USA 106*:1479-1483.

Conrad, K.F. et al. 2006. Rapid declines of common, widespread British moths provide evidence of an insect biodiversity crisis. *Biological Conservation 132*:279-291.

Dennis, R.L.H. and T.H. Sparks. 2007. Climate signals are reflected in an 89-year series of British Lepidoptera records. *European Journal of Entomology 104*:763-767.

Morecroft,M.D. et al.2009. The UK Environmental Change Network: Emerging trends in the composition of plant and animal communities and the physical environment. *Biological Conservation 142*:2814-2832.

Parmesan, C. et al. 1999. Poleward shifts in geographical ranges of butterfly species associated with regional warming. *Nature 399*:579-583.

Pollard,E. and B.C.Eversham. 1995. Butterfly monitoring 2—interpreting the changes. In A.Pullin, ed. *Ecology and Conservation of Butterflies*. Chapman & Hall. Pp.23-26.

Poyry,J. et al. 2009. Species traits explain recent range shifts in Finnish butterflies. *Global Change Biology 15*:732-743.

Roy, D.B. and T.H. Sparks. 2000. Phenology of British butterflies and climate change. *Global Change Biology* 6:407-416.

IMPACTS OF LAND USE AND INTERACTIONS WITH CLIMATE are increasingly well-documented, sometimes with Leps, e.g.:

Brook, B.W., N.S. Sodhi and C.J.A.Bradshaw. 2008. Synergies among extinction drivers under global change. *Trends in Ecology and Evolution 23*:453-460.

Clark, P.J., J.M. Reed and F.S. Chew. 2007. Effects of urbanization on butterfly species richness, guild structure, and rarity. *Urban Ecosystems 10*:321-337.

Jetz,W., D.S. Wilcove and A.P.Dobson.2007. Projected impacts of climate and land-use change on the global diversity of birds. *PLoS Biology 5*:1211-1219.

Opdam,P. and D. Wascher. 2004. Climate change meets habitat fragmentation: linking landscape and biogeographical scale levels in research and conservation. *Biological Conservation 117*:285-297.

vanDyck,H. et al. 2009. Declines in common, widespread butterflies in a landscape under intense human use. *Conservation Biology 23*:957-965.

vanSwaay,C., M. Warren and G. Lois.2006. Biotope use and trends of European butterflies. *Journal of Insect Conservation* 10:189-209.

Warren, M.S. et al. 2001. Rapid responses of British butterflies to opposing forces of climate and habitat change. *Nature 414*:65-69.

White, P. and J.T.Kerr.2006. Contrasting spatial and temporal global change impacts on butterfly species richness during the 20th Century. *Ecography 29*:908-918.

One of the first papers spotlighting urban butterfly ecology was by Bob (R.M.) Pyle, 1983: Urbanization and endangered insect populations, Ch.15 in G.Frankie and C.S.Koehler, eds., *Urban Entomology: Interdisciplinary Perspectives*, pp. 367-394. Praeger Scientific, New York. This paper was far enough ahead of its time that even I forgot about it for years, and it is hard to find. It should be reprinted accessibly for Lepidopterists.

…and finally, our own paper is

Forister, M.L. et al. 2010. Compounded effects of climate change and habitat alteration shift patterns of butterfly diversity.*Proceedings of the National Academy of Sciences of the USA*. DOI: 10.1073/pnas.0909686107.

And our Web site, with details on our project and summary data, is http://butterfly.ucdavis.edu. Come visit us!

Fig.1) Riparian habitat in the Sacramento Valley looks fine, though reduced by an estimated 99-95% since the 19th Century. It is losing species faster than any other habitat type on our transect. This is a scene in the North Sacramento study site. **Fig.2)** The Mourning Cloak, *Nymphalis antiopa*, shown here visiting Rabbitbrush, *Chrysothamnus nauseosus*, at Donner Pass in the Sierra Nevada, has undergone a catastrophic decline near sea level on our transect in the past ten years, but its troubles may be related to its rhythm of annual altitudinal migration. **Fig. 3)** The familiar Acmon Blue, *Plebejus acmon*, shown on a Smartweed (*Polygonum*) flower in a drainage ditch at our West Sacramento site, is one of the "weedy" species that seem to be suffering from loss of habitat at low elevations—leading to a decrease in occurrence in the mountains, where it is an immigrant. **Fig. 4)** Here at tree-line on Castle Peak in the Sierra Nevada, more and more lower-elevation species are turning up as strays. Meanwhile, the true high-altitude species, such as the Ivallda Arctic (*Oeneis chryxus ivallda)*, found in this rubble-strewn rock garden, appear to be in decline.

Lepidopterists' Society Election Results 2009

A total of 429 ballots were received in time to be counted. The results are (*indicates elected officials):

President-Elect

Andy Brower	185
John Shuey*	**211**
Bob Iverson (write in)	1

Vice President

(three, no more than one per country)

Adam Cotton	197
David Lohman*	**284**
Jeffrey Marcus*	**242**
Olaf H.H. Mielke*	**238**
Tomasso Racheli	155
Steve Spomer (write in)	1
Ray Stanford (write in)	1

Executive Council

Jason Dombroskie	166
Todd Gilligan*	198
Peter Jump*	247
James Kruse	197
Bruce Walsh*	307
Neil Dankert (write in)	1

Honorary Life	Yes	No	Abstain	Percent
Jackie Miller*	390	15	24	0.909
Jerry Powell*	404	4	21	0.942

Natural and sexual selection in satyrine wing patterns: a complex story

continued from p. 6

territory. The bright dorsal surface in this case was directed not at the attraction of females, but for repelling a competitor, which coincides with the traditional explanation for the bright wing pattern coloration (e. g., Silberglied, 1984). Unlike *Bicyclus*, it is the hindwings, not the forewings, that carry most of the signaling elements in the above two species.

In *Cosmosatyrus leptoneuroides* (Fig. E), *Auca barrosi* (Fig. F), *Pseudochazara pelopea* (Fig. G), and many other satyrines, while the ventral hindwing pattern serves as cryptic coloration, the exposure of the bright coloration of the ventral forewings by protruding the latter forward, rather than by the opening of the wings, is used for communication (Fig. G). This might be due to the need to conserve water and minimize exposure to direct sunlight, and hence overheating and dehydration, which are common problems in their habitats. It is therefore the ventral forewing pattern that is actively involved in mate signaling, while the dorsal surface in these species is rarely exposed and possesses no, or very limited, wing pattern elements.

To view a video clip of *Chloreuptychia arnaca*; *Archeuptychia cluena* rival signaling behavior, visit *http://www.lepidopterist.org/butterflies-fighting.htm*

Literature cited

Kodandaramaiah U., 2009. Eyespot evolution: phylogenetic insights from *Junonia* and related butterfly genera (Nymphalidae: Junoniini). Evolution and Development. 11(5): 489-497.

Oliver, J. C., Robertson, K. A., and Monteiro, A. 2009. Accommodating natural and sexual selection in butterfly wing pattern evolution. Proc. R. Soc. B: Biol. Sci. 2369-2375.

Silberglied R. E., 1984. Visual communication and sexual selection among butterflies. In: R. I. Vane-Wright and P. R. Ackery, Editors, The Biology of Butterflies (Symposium of the Royal Entomological Society of London, number 11), Academic Press, London.

An Overlooked 18th Century List of North American Lepidoptera

Continued from p. 5

Day, M. C. & M. G. Fitton. 1977. Discovery in the Linnaean collection of type-material of insects described by Johann Reinhold Forster, with notes on the Hymenoptera. Biol. J. Linn. Soc. 9:31-43.

Denny, M. 1948. Linnaeus and his disciple in Carolina: Alexander Garden. Isis 38:161-174.

Drury, D. 1770. 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, being engraved and coloured from nature, with the greatest accuracy, and under the author's own inspection, on fifty copper-plates. With a particular description of each insect: interspersed with remarks and reflections on the nature and properties of many of them. Vol. I. B. White, London. 158 pp., 50 pl.

_____. 1773. 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, being engraved and coloured from nature, with the greatest accuracy, and under the author's own inspection, on fifty copper-plates. With a particular description of each insect: interspersed with remarks and reflections on the nature and properties of many of them. Vol. II. B. White, London. 90 pp., 50 pl.

Edwards, G. 1743. A natural history of birds. Most of which have not been figur'd or describ'd, and others very little known from obscure or too brief descriptions without figures, or from figures very ill design'd. Containing the figures of sixty birds and two quadrupeds, engrav'd on fifty-two copper plates, after curious original drawings from life, and exactly colour'd. With full and accurate descriptions. College of Physicians, London, England. 52 pp., 52 pl.

Elkinton, J. S., Parry, D. & G. H. Boettner. 2006. Implicating an introduced generalist parasitoid in the invasive browntail moth's enigmatic demise. Ecology 87:2664-2672.

Fernald, C. H. & A. H. Kirkland. 1903. The brown-tail moth, *Euproctis chrysorrhoea* (L.). A report on the life history and habits of the imported brown-tail moth, together with a description of the remedies best suited for destroying it. Wright & Potter, Boston, Massachusetts. 73 pp.

Forster, J. R. 1770. Travels into North America; including its natural history, and a circumstantial account of its plantations and agriculture in general, with the civil, ecclesiastical and commercial state of the country, the manners of the inhabitants, and several curious and important remarks on various subjects. By Peter Kalm, Professor of Oeconomy at the University of Aobo in Swedish Finland, and member of the Swedish Royal Academy of Sciences. Translated into English by John Reinhold Forster F.A.S. Enriched with a map, several cuts for the illustration of natural history, and some additional notes. 3 vols. W. Eyers, Warrington, England.

_____. 1771a. A catalogue of the animals of North America. Containing, an enumeration of the known quadrupeds, birds, reptiles, fish, insects, crustaceous and testaceous animals; many of which are new, and never described before, to which is added, short directions for collecting, preserving, and transporting, all kinds of natural history curiosities. B. White, London, England. 43 pp.

_____. 1771b. Flora Americae septentrionalis; or a catalogue of the plants of North America. Containing an enumeration of the known herbs, shrubs, and trees, many of which are but lately discovered; together with their English names, the places where they grow, their different uses, and the authors who have described and figured them. B. White & T. Davies, London. viii+51pp.

_____. 1771c. Novae species insectorum. Centuria I. T. Davies & B. White. vii+100 pp.

Gardiner, B. O. C. 1974. *Pieris brassicae* L. established in Chile; another Palearctic pest crosses the Atlantic (Pieridae). J. Lepid. Soc. 28:269-277.

Hagen, H. H. 1881. *Papilio ecclipsis*, a doubtful or lost N. American butterfly. Papilio 1:42.

Hoare, M. E. 1976. The tactless philosopher, Johann Reinhold Forster (1729-98). Hawthorn Pr., Melbourne, Australia. x+419 pp.

Honey, M. R. & M. J. Scoble. 2001. Linnaeus's butterflies (Lepidoptera: Papilionoidea and Hesperioidea). Zool. J. Linn. Soc. 132:277-399.

ITZN [International Trust for Zoological Nomenclature]. 1954. Opinion 286. Suppression, under the plenary powers, of the specific name *ajax* Linnaeus, 1758, as published in the combination *Papilio ajax* (Class Insecta, Order Lepidoptera). Opinions and Declarations rendered by the International Commission on Zoological Nomenclature 8: 29-48.

Kalm, P. 1753-1761. En resa til Norra America, på kongl. Swenska Wetenskaps Academiens befallnung, och publici köstnad, förrättad. 3 vols. L. Salvii, Stockholm, Sweden.

Linnaeus, C. 1758. Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synomymis, locis, Editio Decima, reformata. L. Salvius, Holmiae 1:iv+823+[1] pp.

_____. 1764. Museum S:ae R:ae M:tis Ludovicae Ulricae Reginae Svecorum, Gothorum, Vandalorumque &c. &c. &c. In quo animalia rariora, exotica, imprimis Insecta & Conshilia describuntur & determinantur. Prodromi instar editum. L. Salvius, Holmiae. [viii]+720+[2] pp.

_____. 1767. Systema naturae. Editio duodecima reformata. L. Salvius, Holmiae. 1(2):[ii]+533-1328+[36] pp.

Merian, M. S. 1705. Metamorphosis insectorum surinamensium. In qua erucae ac vermes surinamenses, cum omnibus suis transfor-mationibus, ad vivum delineantur et describuntur, singulis eorum in plantas, flores et fructus collocatis, in quibus reperta sunt; tunc etiam generatio ranarum, bufonum rariorum, lacertarum, serpentum, araneorum et formicarum exhibetur; omnia in America ad vivum naturali magnitudine picta atque descripta. Gerard Valk, Amsterdam. [iv]+60 pp., 60 pls.

Morris, J. G. 1860. Catalogue of the described Lepidoptera of North America. Smiths. Misc. Coll., Smiths. Inst., Washington, D.C. viii+68 pp.

Sclater, P. L. (ed.) 1882. Forster's catalogue of the animals of North America, or faunula Americana. The Willoughby Soc., London. iv+43 pp.

Tuttle, J. P. 2007. The hawk moths of North America. A natural history study of the Sphingidae of the United States and Canada. Wedge Entomol. Res. Found., Washington, D.C. xviii+253 pp., 23 pl.

Wystrach, V. P. 1975. Ashton Blackburne's place in American ornithology. Auk 92:607-610.

_____. 1977. Anna Blackburne (1726-1793)—a neglected patroness of natural history. J. Soc. Bibl. Nat. Hist. 8:148-168.

Zirlin, H. 2002. Strangers in a strange land. Amer. Butterflies 10:4-11.

Table I. Lepidoptera listed by Forster (1771a).

SECT. III. Papilionaceous. Insects
XXXVI. Butterfly
Papilio

Troilus

Current name: *Papilio troilus* (L). (Papilionidae).
Reason for listing: Linnaeus (1764): "America septentrionali." Forster cited Plate 11, figs. 1-5 of Drury (1770), but questioned this identification.
Notes: Plate 11 of Drury (1770) (Fig. 4) portrayed unidentified figures of the species *Battus philenor* (L.) and *Papilio polyxenes* F. (Papilionidae), which Drury attributed to New York, Maryland, Virginia, and Carolina. Drury incorrectly suggested that *P. polyxenes* represented the *Papilio troilus* of Linnaeus and later identified his figures as such (Drury 1773). Both *P. polyxenes* and *P. troilus* are widespread in North America.

Linnaeus (1764) credited Pehr Kalm as the source of American specimens of *P. troilus*. Linnaeus' (1764) reference to North America contradicts the type locality of "Indiis" [Indies] as published in his original description of this species (Linnaeus 1758). He reiterated the type locality of "Indiis" in Linnaeus (1767)

Ajax

Current name: none; due to confusion over its identity, this name was suppressed by the International Commission on Zoological Nomenclature (ITZN 1954)
Reason for listing: Linnaeus (1758, 1767): "America boreali." Forster cited Plate 34 of Edwards (1743).
Notes: although the name *Papilio ajax* was associated with several different species, Plate 34 of Edwards (1743) (Fig. 5) portrayed the long-tailed summer form of the Nearctic butterfly *Eurytides marcellus* (Cramer, 1777) (Papilionidae). Edwards attributed his figured specimen to Maryland. Linnaeus (1758) cited Edwards' illustration, but also others that portrayed *Papilio glaucus* (L.) and *Papilio polyxenes* (F.).

Xuthus

Current name: *Papilio xuthus* (L.) (Papilionidae).
Reason for listing: Forster cited Plate 22, figs. 1, 2 of Drury (1770).
Notes: the butterfly portrayed on Plate 22 of Drury (1770) (Fig. 6) is not the Oriental species *P. xuthus*, but the Neotropical *Papilio thoas* L. (Papilionidae), which Drury attributed to "Surinam" (Suriname). Forster was possibly referring to specimens of *Papilio cresphontes* (Cramer, 1777), a widespread species in North America.

Antilochus

Current name: *Papilio glaucus* L. (Papilionidae).
Reason for listing: Linnaeus (1758, 1764, 1767): "America septentrionali."
Notes: This is a familiar Nearctic species. As an indication of this taxon, Linnaeus (1758) cited an exaggerated illustration of *P. glaucus* on Plate 83 of Catesby (1743) (Fig. 7). Linnaeus (1764) credited Pehr Kalm as the source of specimens of this species. Linnaeus described this butterfly three times, recognizing each as a different species: *Papilio glaucus* (dark form female), *P. turnus* (yellow form), and P. *antilochus* (yellow form with [fictitious] long tails).

Podalirius

Current name: *Iphiclides podalirius* (L.) (Papilionidae).
Reason for listing: misidentification.
Notes: this Palearctic species is very similar to the short-tailed spring form of *E. marcellus*.

Protesilaus

Current name: *Protesilaus protesilaus* (L.) (Papilionidae).
Reason for listing: Linnaeus (1758, 1767): "America septentrionali." Linnaeus (1764): "Carolina." Forster cited Drury (1770), Plate 22, fig. "34" [3, 4].
Notes: as an indication of *P. protesilaus*, Linnaeus (1767) hesitantly cited Plate 100 of Catesby (1743) (Fig. 8), which portrayed *E. marcellus*. Linneaus' reference to "Carolina" is probably applicable to specimens of *E. marcellus* that he received from Alexander Garden (1730-1791), who sent many natural history specimens to Linnaeus from South Carolina ca. 1760-1773. Garden's insects were possibly all collected in 1760 (Denny 1948).

Plate 22, figs. 3, 4 of Drury (1770) (Fig. 6) depicted the Jamaican butterfly *Eurytides marcellinus* (Doubleday, 1845). This species is also similar to *E. marcellus*. Drury (1770) cited Linnaeus' description of *P. protesilaus* and later misidentified his figures as this species (Drury 1773). There was much early confusion regarding the true identity of *P. protesilaus.*

Apollo

Current name: *Parnassius apollo* (L.) (Papilionidae).
Reason for listing: Forster cited "Mus. Bl." (museum of Anna Blackburne).
Notes: Anna Blackburne (1726-1793) was a woman of means who formed an impressive natural history collection at her residence near Warrington, England. Forster exchanged insect specimens with Blackburne and worked extensively with her collection (Wystrach 1977). Blackburne received numerous natural history specimens from her brother, Asthton Blackburne, who emigrated to New York prior to 1771 (Wystrach 1975, 1977). Forster (1771c) described several insects from "Noveboracensi" (New York) from Blackburne's collection.

Blackburne's *Parnassius* conceivably represented the Nearctic species *Parnassius smintheus* Doubleday, 1847. If so, such specimens would most likely have originated from Alberta, Canada. Fur traders, specifically agents of the Hudson's Bay Company, were beginning to explore portions of western Alberta during the mid-18th century, but it is unclear if they reached far enough to encounter this species. Blackburne may have incorrectly attributed specimens of *P. apollo* to North America. Unfortunately, Blackburne's collection is lost (Wystrach 1977).

Table I. Lepidoptera listed by Forster (1771a).

Brassicae
Current name: *Pieris brassicae* (L.) (Pieridae).
Reason for listing: misidentification?
Notes: although this listing predates the known naturalization in the New World of *Pieris rapae* L., it is possible that it was temporarily established during the 18th century and Forster confused specimens with the very similar Palearctic species *P. brassicae*. On the other hand, this may suggest that *P. brassicae* occurred in North America at that time. Forster was surely familiar with these common European species. There are several modern reports of *P. brassicae* in the United States, most recently in 2000 on Staten Island, New York (Zirlin 2000). New World records are from the vicinity of ports of entry, implying accidental introduction by humans. It became naturalized in Chile around 1970, possibly as a transport from eastern Europe (Gardiner 1974).

Hyale
Current name: *Colias hyale* (L.) (Pieridae).
Reason for listing: Linnaeus (1767): "…America septentrionali."
Notes: for many years this Palearctic insect was confused with *Colias philodice* Godart (Pieridae) and other similar Nearctic/Holarctic species of *Colias*. Even Linnaeus was confused about the true identity of his *Papilio hyale* (Honey & Scoble 2001).

Eubule
Current name: *Phoebis sennae eubule* (L.) (Pieridae).
Reason for listing: Linnaeus (1767): "Carolina."
Notes: a widespread New World butterfly. Linneaus' reference to "Carolina" is possibly applicable to specimens from Alexander Garden of South Carolina (see notes for *P. protesilaus*).

Ecclipsis
Current name: *Gonepteryx rhamni* (L.) (Pieridae).
Reason for listing: Linnaeus (1763, 1767): "America septentrionali."
Notes: Linnaeus based his description of *P. ecclipsis* on an illustration of a specimen that was later revealed to represent the Palearctic butterfly *Gonepteryx rhamni* (L.) (Pieridae) that was painted to look like a different species (see Salmon 2000). Linnaeus' reason for attributing this fictitious species to North America remains a mystery. Based on Linnaeus' reference to America, Hagen (1881) suggested that *P. ecclipsis* was perhaps "near to *Colias caesonia* [*Colias cesonia* (Stoll)], now not represented in cabinets, or a remarkable variety." This is an erroneous proposal.

Midamus
Current name: *Euploaea midamus* (L.) (Nymphalidae)
Reason for listing: misidentification.
Notes: a blue Indo-Australian danaiid, Linnaeus (1758, 1764, 1767) attributed this species to "Asia" and "China." It is possible that Forster applied this name to specimens of the Nearctic butterfly *Limenitis arthemis astyanax* (F., 1775). Linnaeus' brief written description of *P. midamus* could be interpreted to define *L. a. astyanax*.

Plexippus
Current name: *Danaus plexippus* (L.) (Nymphalidae).
Reason for listing: Linnaeus (1758, 1764, 1767): "America septentrionali."
Notes: Linnaeus (1764) credited Pehr Kalm as a source of specimens of this familiar New World species.

Misippus
Current name: *Hypolimnus misippus* (L.) (Nymphalidae).
Reason for listing: Linnaeus (1764, 1767): "America."
Notes: Linnaeus' reference to America probably alluded to the region in a general sense (i.e. New World), not strictly North America as interpreted by Forster. This species is Old World in origin, but Drury (1770) attributed it to "Surinam" (Suriname) and "St. Christopher's" (Leeward Islands), suggesting that Linnaeus' type locality (i.e. the Americas) was correct. Because Linnaeus (1764) based his original description of this species on the female, which he attributed to "America," later authors confused it with the similarly colored Nearctic butterfly *Limenitis archippus* (Cramer). Nonetheless, Forster probably based this listing solely on Linnaeus' reference to America, regardless of the species' identity.

Chrysippus
Current name: *Danaus chrysippus* (L.) (Nymphalidae).
Reason for listing: Linnaeus (1758, 1764, 1767): "…America."
Notes: Linnaeus' reference to America probably alluded to the region in a general sense (i.e. New World), not strictly North America as interpreted by Forster. This Old World butterfly was confused with several species, including the New World insect *Danaus gilippus* (L.). Although Forster possibly applied the name *chrysippus* to specimens of *D. gilippus,* he more likely listed *chrysippus* strictly on the basis of Linnaeus' reference to America.

Canthus
Current name: *Lethe eurydice* (Nymphalidae).
Reason for listing: Linnaeus (1767): "America septentrionali."
Notes: *Papilio canthus* L. is an unnecessary replacement name for *Papilio eurydice* L., now recognized as the widespread Nearctic species *Lethe eurydice*.

Almana
Current name: *Junonia almana* (L.) (Nymphalidae),
Reason for listing: misidentification.
Notes: An Oriental species, Linnaeus (1758, 1764, 1767) attributed it only to "Asia" and "China." Based on the brief original description (Linnaeus 1758), Forster possibly applied this name to specimens of a Neotropical species.

Table I. Lepidoptera listed by Forster (1771a).

Orithya
Current name: *Junonia orithya* (L.) (Nymphalidae).
Reason for listing: misidentification.
Notes: early authors confused this Paleotropical butterfly with several New World species, including the widespread *Junonia coenia* (Hübner, 1822).

Cardui
Current name: *Vanessa cardui* (L.) (Nymphalidae).
Reason for listing: occurs widely in North America.
Notes: it is also possible that Forster confused this species with specimens of the North American *Vanessa virginiensis* (Drury, 1773).

Antiopa
Current name: *Nymphalis antiopa* (L.) (Nymphalidae).
Reason for listing: Linnaeus (1758, 1767): "…etiam in Americae" [also in America]. Forster cited Pehr Kalm.
Notes: Kalm (1753-1761) reported this widespread Holarctic species from New Jersey.

urticae
Current name: *Aglais urticae* (L.) (Nymphalidae).
Reason for listing: misidentification?
Notes: Forster may have applied this name to specimens of the similar Nearctic species *Aglais milberti* (Godart, 1819). Alternatively, this may indicate that the Palearctic butterfly *A. urticae* was temporarily established in North America during the 18th century. Forster was doubtless acquainted with this common and widespread butterfly. There are a number of modern reports of this species in the United States and Canada, especially around New York City (Zirlin 2002). The source of these individuals is unknown.

C. album
Current name: *Polygonia c-album* (L.) (Nymphalidae).
Reason for listing: misidentification.
Notes: some early authors confused this Palearctic butterfly with the Nearctic species *Polygonia faunus* (Edwards, 1862). However, Forster possibly was referring to specimens of the more widespread Nearctic species *Polygonia progne* (Cramer, 1775) and/or *Polygonia comma* (Harris, 1841).

Atalanta
Current name: *Vanessa atalanta* (L.) (Nymphalidae).
Reason for listing: a widespread species in North America.

Euphrosyne
Current name: *Boloria euphrosyne* (L.) (Nymphalidae).
Reason for listing: Linnaeus (1758, 1767): "…America septentionali." Forster cited Pehr Kalm.
Notes: Kalm (1753-1761) reported this species from New Jersey, but he was undoubtedly referring to the Nearctic butterfly *Boloria selene myrina* (Cramer, 1777). Although Kalm was likely familiar with the Holarctic butterfly *B. selene*, that species was not described until 1775. Kalm was probably also the source of Linnaeus' reference.

Cupido
Current name: *Helicopis cupido* (L.) (Riodinidae).
Reason for listing: Linnaeus (1758, 1767): "Gossypio Americes" [American species of *Gyssipium* (hostplant reference)]. Linnaeus (1764): "America."
Notes: a Neotropical species, there is no similar North American butterfly. Linnaeus' reference to America probably alluded to the region in a general sense (i.e. New World), not strictly North America as interpreted by Forster. Linnaeus' hostplant reference was derived from Plate 10 of Merian (1705).

quercus
Current name: *Quercusia quercus* (L.) (Lycaenidae).
Reason for listing: misidentification.
Notes: Forster possibly applied the name of this Palearctic species to specimens of the superficially similar New World butterfly *Parrhassius m-album* (Boisduval & Le Conte, 1833). Worn females of *P. m-album* that lack hindwing tails are particularly reminiscent of *Q. quercus*. Also, there was early confusion regarding the true identity of *Papilio quercus*.

Echion
Current name: *Tmolus echion* (L.) (Lycaenidae).
Reason for listing: Linnaeus (1767): "America."
Notes: although this Neotropical species is now known to stray into Texas, Linnaeus' reference to America probably alluded to the region in a general sense (i.e. New World), not strictly North America as interpreted by Forster.

Virgaureae
Current name: *Lycaena virgaurae* (L.) (Lycaenidae).
Reason for listing: misidentification.
Notes: the original description of this Palearctic butterfly involved more than one species, including what is now recognized as *Lycaena phlaeas* (L., 1761) (Honey & Scoble 2001). Under his entry for *Papilio phlaeas*, Linnaeus (1767) wrote, "*similis P. virgaureae*" [similar to *P. virgaureae].* Forster may have applied this name to North American specimens of *L. phlaeas* or a Nearctic species of *Lycaena*, such as *L. hyllus* (Cramer, 1775).

Bixae
Current name: *Pyrrhopyge phidias bixae* (L.) (Hesperiidae).
Reason for listing: Linnaeus (1758, 1764, 1767): "America."
Notes: this is a Neotropical skipper. Linnaeus' reference to America probably alluded to the region in a general sense (i.e. New World), not strictly North America as interpreted by Forster.

Table I. Lepidoptera listed by Forster (I77Ia).

XXXVII. Hawkmoth

Sphinx

ocellata
Current name: *Smerinthus ocellata* (L.) (Sphingidae).
Reason for listing: misidentification.
Notes: Forster probably applied the name of this Palearctic species to specimens of a similar Nearctic moth, such as *Smerinthus cerisyi* Kirby, 1837.

Populi
Current name: *Laothoe populi* (L.) (Sphingidae).
Reason for listing: misidentification.
Notes: Foster possibly applied the name of this Palearctic moth to the Nearctic species *Amorpha juglandis* (J. E. Smith, 1797).

Carolina
Current name: *Manduca sexta* (L.) (Sphingidae).
Reason for listing: Linnaeus (1764, 1767): "Carolina…"
Notes: the specimens consulted by Linnaeus for his descriptions of *Sphinx sexta* and its junior synonym *Sphinx carolina* L. (also attributed to "Carolina") were possibly received from Alexander Garden of South Carolina (see notes for *P. protesilaus*).

Celerio
Current name: *Hippotion celerio* (L.) (Sphingidae).
Reason for listing: misidentification.
Notes: Forster possibly applied the name of this Palearctic species to North American specimens of *Hyles lineata* (F., 1775).

Pinastri
Current name: *Sphinx pinastri (*L.) (Sphingidae).
Reason for listing*:* misidentification.
Notes: Forster probably applied the name of this Palearctic species to specimens of the very similar Nearctic moth *Lapara coniferarum* (J. E. Smith, 1797). *Sphinx pinastri* was recently introduced into North America (Tuttle 2007)

fuciformis. B. Tityus
Current name: *Hemaris fuciformis* (L.) and *Hemaris tityus* (L.) (Sphingidae).
Reason for listing: misidentification.
Notes: Forster was apparently unsure which of these Old World species was applicable to North American specimens. *Hemaris fuciformis* was often confused in early literature with the Nearctic moth *Hemaris diffinis* (Boisduval, 1836).

XXXVII[I]. Moth

Phalaena

Atlas
Current name: *Attacus atlas* (L.) (Saturniidae).
Reason for listing: Linnaeus (1758): "…Americae." Linnaeus (1767): "Citro Americes" [American species of *Citrus* (hostplant reference)].
Notes: Linnaeus' references to America probably alluded to the region in a general sense (i.e. New World), not strictly North America as interpreted by Forster. Linnaeus' references to the presence of this Indo-Australian moth in America were undoubtedly derived from Plate 52 of Merian (1705), which portrayed the adult and early stages of the superficially similar Neotropical species *Rothschildia aurota* (Cramer, 1775) with a spring of *Citrus*.

Cecropia
Current name: *Hyalophora cecropia* (L.) (Saturniidae).
Reason for listing: Linnaeus (1758, 1764, 1767): "America septentrionali."
Notes: Linnaeus (1764) credited Pehr Kalm for specimens of this widespread Nearctic species.

Paphia
Current name: *Antheraea paphia* (L.) (Saturniidae).
Reason for listing: Linnaeus (1764): "America septentrionali."
Notes: Although Linnaeus (1758, 1767) attributed this Palearctic species to "Guinea" and "Asia," he also cited Plate 91 of Catesby (1743) (Fig. 9), which portrayed the similar Nearctic species *Antheraea polyphemus* (Cramer, 1775). This contributed to some confusion regarding the true identity of *Phalaena paphia*.

Luna
Current name: *Actias luna* (L.) (Saturniidae).
Reason for listing: Linnaeus (1758, 1764, 1767): "America septentrionali."
Notes: a widespread New World species. Linnaeus credited Pehr Kalm for specimens that he consulted.

Virgo
Current name: *Grammia virgo* (L.) (Arctiidae).
Reason for listing: Linnaeus (1758): "Philadelphia," Linnaeus (1764): America septentionali." Linnaeus (1767): "Pensylvania [sic]."
Notes: Linnaeus (1764) credited Pehr Kalm for specimens of this Nearctic species. As indicated by Linnaeus' references, Kalm spent time in Philadelphia, Pennsylvania.

Continued on p. 25

2010 Meeting of the Lepidopterists' Society

In conjunction with the Pacific Slope Section & Washington Butterfly Association

The Enzian Inn, Leavenworth, Washington

July 8-11, 2010

(http://www.lepsoc2010.com)

The Department of Entomology of Washington State University, the Washington Butterfly Association and the Pacific Slope Section invite you to the 59th Annual Meeting of the Lepidopterists' Society which will be held for the first time in Washington State, in the beautiful Bavarian-themed village of Leavenworth.

The meeting will convene at the Enzian Inn (http://www.enzianinn.com) in the center of Leavenworth which is at the base of the 8,000 foot high Cascade Mountains. A block of rooms has been reserved at the Enzian but bookings need to be made before June 8, 2010 to ensure availability. Early July in Leavenworth is invariably sunny with an average high of ~ 80 ºF and comfortable low of ~ 50 ºF. Lepidoptera are common and diverse with the adjacent mountains home to nearly 100 butterfly species.

The Young Ones! is the theme of our meeting, being a double entendre for immature Lepidoptera and youthful lepidopterists! Two symposia, "The Young Ones: Research on Immatures" and "The Young Ones:Youngling Research" will feature invited presentations on immature stages of butterflies and moths and the research of young lepidopterists. In addition, contributed papers and posters on any aspect of Lepidoptera will also be featured.

The tentative schedule includes formal presentations on Friday July 9, Saturday July 10 and Sunday July 11 with the symposia held in the mornings of July 9 and 10. Contributed papers will be presented in the afternoons and on Sunday morning and posters will be displayed during Friday-Saturday. Early check-in will occur on Thursday together with Executive Council and committee meetings. A reception will be held on Thursday evening at the Enzian Inn and a BBQ on Friday evening at Red-Tail Canyon Farm. The Banquet with guest speaker Bob Pyle reading from his forthcoming book "Mariposa Road", will be held on Saturday evening. The conference will conclude at mid-day on Sunday with contributed papers and business meetings during the morning.

A number of opportunities to experience the butterflies of Leavenworth and adjacent mountains will be available. A 'Collectors' field trip will take place on Thursday with a 'Watchers' trip on Saturday. 'Watchers' (am) and 'Collectors' (pm) trips will take place on Sunday. The Washington Butterfly Association will organize and lead the 'Watchers' trips and their 'no-collecting' policy will be strongly adhered to. Local naturalist, Don Rolfs will organize the 'Collector's' trips as well as a moth collecting trip on Friday evening.

Plan your trip to the refreshingly beautiful Pacific Northwest now and bring your family!

Local Arrangements

Travel:

The Enzian Inn, Leavenworth (http://www.enzianinn.com) is located 120 miles east of Seattle (SeaTac airport) and 180 miles west of Spokane airport. A small airport with limited service (3 flights/day) to and from Seattle is in Wenatchee (http://www.pangbornairport.com) about 20 miles east of Leavenworth. Rental car and taxi services are located at this airport.

Driving from SeaTac, take I-405 North until you reach Woodinville. Take SR 522 east until you reach Highway 2 which you follow eastward through the spectacular Cascade Mountains until you reach Leavenworth. The Enzian Inn is located at 590 Highway 2 and the journey takes about 2.5 hours. From Spokane follow Highway 2 westwards. Leavenworth may also be reached by train from Seattle and Spokane. Details may be found on the Enzian Inn website (http://www.enzianinn.com).

Housing and Food:

You are responsible for making your own arrangements for accommodation. Fifty rooms have been blocked at the conference hotel (Enzian Inn: 800.223.8511 toll-free) for LepSoc 2010 attendees during July 8-10, but need to be booked by June 8.

Registration

For the 2010 (59th) Meeting of the Lepidopterists' Society in conjunction with the Pacific Slope Section and Washington Butterfly Association at the Enzian Inn, Leavenworth, WA July 8-11 2010 (h*ttp://www.lepsoc2010.com*)

Members of the Lepidopterists' Society, Pacific Slope Section and Washington Butterfly Association (WBA) can register for the entire conference by completing this form. WBA will also offer its members a shorter Friday – Sunday registration option: contact WBA for details at http://www.naba.org/chapters/nabaws/.

1) Last Name_____First Name_____Initial_____

2) Last Name_____First Name_____Initial_____

3) Last Name_____First Name_____Initial_____

Mailing Address_____

City:_____State/Province_____Country_____PostCode_____

Email **(print clearly)**_____Phone ( )_____

Institution or Affiliation on Name Tag_____

**** Registration includes session attendance, break snacks, program, reception, field trips.***
**** Guest rate includes program outline, reception and field trips***
**** BBQ, Banquet and Box lunches must be paid for by June 20***

Number of persons x $100 (after May 21, $115).....$_____

Number of students x $75 (after May 21, $95).....$_____

Number of guests x $25 (after May 21, $35).....$_____

BBQ, Friday evening: Number of persons x $20 (Child 3-10 $10).....$_____

Annual Banquet (buffet) Number of persons x $38 (Child 6-12 $19).....$_____

Field trip box lunches (Sat & Sun, $14.50/day).....$_____

Circle choices. Give # of each. ***Turkey on Wheat, Ham on Rye, Veget. on Wheat, Chicken Cesar Salad***

TOTAL..... $_____

Make check payable to David James and mail to:

Dr David G James, LepSoc 2010, IAREC, Washington State University, 24106 N. Bunn Road, Prosser, WA 99350, USA.

IMPORTANT! BBQ, Banquet and Box lunches must be paid for by June 20.
Cancellations after June 15 will incur a $25 fee, otherwise refunds in full if possible.

Field Trips:

Number attending the '***Collectors'*** field trip on Thursday July 8 _____

Number attending the moth collecting trip Friday July 9 _____

Number attending the ***'Watchers'*** field trip on Saturday July 10 _____

Number attending a field trip on Sunday July 11 '***Watchers'***_____ ***'Collectors'***_____

Liability Release: I release the Lepidopterists' Society, Washington Butterfly Association, David James and field trip leaders from any liability that may result from my participation in field trips associated with the 2010 meeting of the above society at Leavenworth, Washington. I understand that I may be driven in a private vehicle and that there are potential hazards on any field trip. I assume all responsibility, personal and financial for any accidents or other personal injury or loss on any field trip in which I participate.

Name (Printed)_____Date_____

Signature_____

Call for Contributed Papers and Posters

2010 (59th) Meeting of the Lepidopterists' Society and Combined Pacific Slope and Washington Butterfly Association Meetings Enzian Inn, Leavenworth, WA July 8-11 2010

Name: _____

Address:_____

_____

Email:_____Phone:_____

Please check: Poster_____ Oral Presentation_____Student Paper_____

*All illustrated oral presentations must be in MS Powerpoint

Please provide title and abstract. Limit the abstract to 150 words or less.

Title:

Abstract:

Senior authors are limited to one oral presentation. Each contributed paper is limited to 15 minutes (12 minutes for presentation, three minutes for questions). The deadline for contributed papers is **May 14, 2010**. This completed form must be received for each contribution by the deadline for inclusion in the printed program. **Mail to:**

Dr David G James, IAREC, WSU, 24106 N. Bunn Road, Prosser, WA 99350.

Important: Please send an MS Word file of your title/abstract as an email attachment to *david_james@wsu.edu* (underline between david and james)

Contributed papers are scheduled for Friday and Saturday afternoons (July 9 & 10) and Sunday morning (July 11). Posters will be on display during Friday and Saturday.

There are numerous other hotels/motels, bed and breakfasts, lodges, cabins, RV parks and camping sites in Leavenworth (http://www.leavenworth.org). Early booking is advised because July is busy in Leavenworth.

Your registration fee covers attendance at the meeting, break refreshments, reception Hors d'oeuvres and field trips. The Friday BBQ ($20) and Saturday banquet (create your own buffet, choice of 2 entrees, 3 side dishes, 3 salads, 1 dessert, $38) are optional extras. Box lunches are available for field trips from the Enzian Inn at $14.50 each. BBQ, banquet and box lunches must be paid for by June 20. The Inn serves a full buffet breakfast and if you're there at the right time (8.15, 9.15 am) you'll be serenaded by Alphorn! Lunch will be on your own: Leavenworth has many fine dining options, many within walking distance of the Enzian Inn.

Featured Symposia

Two symposia, "The Young Ones: Research on Immatures" and "The Young Ones: Youngling Research" will feature invited presentations on immature stages of butterflies and moths and the research of young lepidopterists. "Research on Immatures" will take place on Friday morning and "Youngling Research" on Saturday morning. Speakers will be announced shortly on the web site (http://www.lepsoc2010.com).

Butterfly Guide

Local naturalist Don Rolfs (who will be leading the 'Collectors' field trips) has produced a local area pocket field guide "Butterflies of Chumstick Mountain" for identification of 87 species found in this local butterfly 'hotspot' and other local sites. A limited number of copies of this guide will be available at the meeting for $10 each.

T Shirts

A limited quantity of white T shirts featuring the 'LepSoc 2010 Young Ones' logo (see top of first page of this insert) will be available for a cost of $10 each at the registration desk. First come, first served!

Communication

Email is the preferred communication medium. Direct all enquiries to david_james@wsu.edu. (underline between david and james). Acknowledgment of registration and contributed paper/poster forms will be by email. Receipts will be available at the registration desk unless otherwise requested. Check the meeting web site for updates (http://www.lepsoc2010.com)

2010 Meeting of the Lepidopterists' Society

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Table I. Lepidoptera listed by Forster (1771a).

Continued from p. 20

Plantaginis — **Current name:** *Parasemia plantaginis* (L.) (Arctiidae).
Reason for listing: a widespread species across much of Canada and the western United States.

Chrysorrhoea — **Current name:** *Euproctis chrysorrhoea* (L.) (Lymantriidae).
Reason for listing: misidentification?
Notes: this widely distributed species was reportedly first found in North America (near Boston, Massachusetts) in 1897 (Fernald & Kirkland 1903). After an initial range expansion, it is now limited to two small areas in Maine and Massachusetts (Elkington et al. 2006). *Euproctis chrysorrhoea* may have been temporarily established in North America during the 18th century, or Forster confused it with a superficially similar Nearctic moth.

lubricipeda — **Current name:** *Spilosoma lubricipeda* (L.) (Arctiidae).
Reason for listing: misidentification.
Notes: this Palearctic species is very similar to the widespread Nearctic moth *Spilosoma dubia* (Walker, 1855).

paranympha — **Current name:** *Catocala fulminea* (Scopoli) (Noctuidae).
Reason for listing: misidentification.
Notes: this Palearctic species is similar to several Nearctic underwing moths, including *Catocala gracilis* Edwards, 1864 and *Catocala sordida* Grote, 1877.

Gamma — **Current name:** *Autographa gamma* (L.) (Noctuidae).
Reason for listing: misidentification.
Notes: this Palearctic species was often confused with Nearctic moths that were described during the 19th century.

Psi — **Current name:** *Acronicta psi* (L.) (Noctuidae).
Reason for listing: misidentification.
Notes: many Nearctic moths resemble this European species.

bilineata — **Current name:** *Camptogramma bilineata* (L.) (Geometridae).
Reason for listing: misidentification.
Notes: several Nearctic moths superficially resemble this Palearctic species.

viridana — **Current name:** *Tortrix viridana* (L.) (Tortricidae).
Reason for listing: misidentification.
Notes: Forster likely applied the name of this small Palearctic moth to a green Nearctic species, perhaps a geometrine.

bella — **Current name:** *Utetheisa bella* (L.) (Arctiidae).
Reason for listing: Linnaeus (1758, 1764, 1767): "America septentrionali."
Notes: this is a widespread Nearctic species.

pulchella — **Current name:** *Utetheisa pulchella* (L.) (Arctiidae).
Reason for listing: misidentification.
Notes: Forster possibly applied the name of this Paleotropical moth to specimens of the Neotropical species *Utetheisa ornatrix* (L.), which may be conspecific with *U. bella*.

A predator of larval *Anaea troglodyta*

Continued from p. 8

Literature Cited:

Fales, J. H. & D. T. Jennings. 1977. Butterflies as prey for crab spiders. J. Lepid. Soc. 31: 280-282.

Hennessey, M. K. & D. H. Habeck. 1991. Effects of mosquito adulticides on populations of non-target terrestrial arthropods in the Florida Keys. U. S. Fish and Wildlife Service and the Univ. of Florida Cooperative Wildlife Research Unit (Unpublished Final Report). Gainesville, Florida. 76 pp.

Minno, M. C. & T. C. Emmel. 1993. Butterflies of the Florida Keys. Scientific Publishers, Gainesville, Florida. 168 pp.

Salvato, M.H. & M. K. Hennessey. 2003. Notes on the Historic Range and Natural History of *Anaea troglodyta floridalis*. J. Lepid. Soc. 57: 243-249.

Salvato, M. H. & H. L. Salvato. 2008. Notes on the feeding ecology of *Strymon acis bartrami* and *Anaea troglodyta floridalis*. Fla. Scient. 71: 323-329.

Smith, D. S., L. D. Miller & J. Y. Miller. 1994. The Butterflies of the West Indies and South Florida. Oxford University Press, New York. 264 pp. 32 pl.

Worth, R. A., K. A. Schwartz & T. C. Emmel. 1996. Notes on the biology of *Strymon acis bartrami* and *Anaea troglodyta floridalis* in south Florida. Holarctic Lepid. 3:52-65.

Membership Update...

Julian Donahue

This update includes all changes received by 12 February 2010.

Additions/corrections to entries in 2008 Membership Directory:

Name Change: **Paulette Haywood** is now **Ms. Paulette Haywood Ogard**.

Name Change: **Ms. Kimberly N. Vann** is now **Mrs. Kimberly Vann Pegram**.

New and Reinstated Members:

members who have joined/renewed/ been found/or rescinded their request to be omitted since publication of the 2008 Membership Directory (not included in the 2008 Membership Directory; all in U.S.A. unless noted otherwise)

Backstrom, Parker: P.O. Box 31, Bear Creek, NC 27207-0031.

Chesney, John W. (M.D.): 4005 McClelland Boulevard, Joplin, MO 64804-3600.

Coldren, Daryl: 7333 Humboldt Hill Road, Eureka, CA 95503-7163.

Cooper, Holly (Ms.): 173 Briarwood Road, Apt. 1735, Fort Collins, CO 80521-2258.

Deidesheimer, Joseph A.: 13275 Harmony Road, Athens, OH 45701-9319.

Ellsbury, Susan H.: 70855 Highway 8, Fairbury, NE 68352-5565.

Finkbeiner, Susan (Ms.): 40521 Arroyo Drive, Irvine, CA 92617-4365.

Gaines, Russell: 3200 SW 72nd Street, Oklahoma City, OK 73159-3618.

Goyette, Serge: [address omitted by request]

Heath, Paul R.: 1208 West Dianne Lane, Mahomet, IL 61853-9153.

Hughes, Ian: 3674 Larchwood Drive, Riverside, CA 92506-1240.

Hurst, Jeremy: Box 960, Earlham College, 801 National Road West, Richmond, IN 47374-4021.

Kaleda, Richard: 2661 Niles-Cortland Road, Cortland, OH 44410-1727.

Kempema, Silka L.F. (Mrs.): South Dakota Game, Fish and Parks, 523 East Capitol Avenue, Pierre, SD 57501-3181.

Long, Elizabeth (Ms.): 812-1/2 11th Street, Davis, CA 95616-2019.

Madeiros, Matthew J. (Ph.D.): c/o D. Davis, MRC 105, Smithsonian Institution, Rm E-518, P.O. Box 37012, Washington, DC 20013-7012.

Miller, William K.: 6987 Olde Stage Road, Boulder, CO 80302-9440.

Nunnallee, Joanna: 2820 196th Avenue SE, Sammamish, WA 98075-9658.

Purdum, David A.: 8300 Old Kings Road South, Apt. 20, Jacksonville, FL 32217-4571.

Rillo, Imogene L.: P.O. Box 2226, Manila 1099, Philippines.

Scott, Clare (Ms.): 3320 SW 23rd Street, Apt. 8, Gainesville, FL 32608-2942.

Segebarth, Ian: McGuire Center for Lepidoptera Resch., Florida Museum of Natural History, Univ. of Florida, P.O. Box 112710, Gainesville, FL 32611-2710.

Shaw, David P. (M.D.): 27535 SE 154th Place, Issaquah, WA 98027-7340.

Van Zandt, Peter (Ph.D.): Department of Biology, Birmingham-Southern College, 900 Arkadelphia Road, Box 549022, Birmingham, AL 35254-9022.

Yack, Jayne E. (Ph.D.): Department of Biology, Nesbitt Biology Building, Carleton University, Ottawa, Ontario K1S 5B6, Canada.

Address Changes

(all U.S.A. unless noted otherwise)

Barron, Alan D.: 2644 Roy Avenue, Crescent City, CA 95531-9101.

Bennett, Tory (Ph.D.): Dept. of Forest Ecosystem and Society, Oregon State University, 321 Richardson Hall, Corvallis, OR 97331-5752.

Black, Benjamin A.: 32 Chatham Street, Apt. 4, Cambridge, MA 02139-1649.

Einem, Gerald E.: 8313 SW 77th Avenue, Gainesville, FL 32608-8464.

Hayden, James E. (Ph.D.): Section of Invertebrate Zoology, Carnegie Museum of Natural History, 4400 Forbes Avenue, Pittsburgh, PA 15213-4080.

Jantscher, Thomas: 6230 Rockwell Drive NE, Apt. 104, Cedar Rapids, IA 52402-7434.

Kuhn, Jeremy J.: 7718 Winecup Hill, San Antonio, TX 78256-2458.

LaBar, Caitlin (Ms): 5500 Tjossem Road, Ellensburg, WA 98926-8791.

Rusch-Fischer, Karen: 803 North Matterhorn Road, Payson, AZ 85541-3928.

Wahlberg, Niklas (Ph.D.): Ahventie 10 As 2, 20760 Piispanristi, Varsinais-Suomi, Finland.

Wauer, Roland H.: 2635 Trophy Drive, Bryan, TX 77802-2154.

Zwick, Andreas (Ph.D.): Entomology, State Museum of Natural History Stuttgart, Rosenstein 1, D-70191 Stuttgart, Germany.

Metamorphosis...

The Society has learned of the deaths of the following members. Our condolences to their families....

[Correction: in the "Metamorphosis" notice for John L. Tveten published in News 51(3) we misspelled his name as "Teveten." We apologize for the error.]

Adams, Carol, of Ulysses, Kansas, of a heart attack on 31 May 2009. Her husband Don reports that she enjoyed working with Society members in pictures and identifications, and apologizes for the delay in notifying her correspondents of her passing.

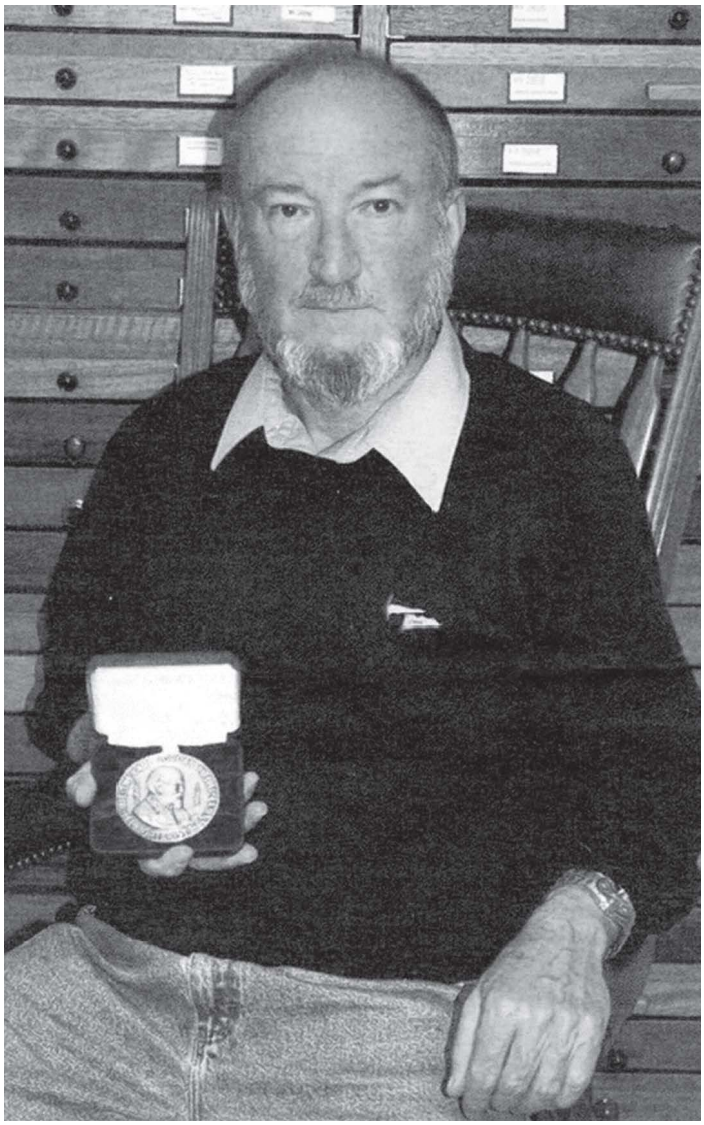
Beery, Eli W., of Traverse City, Michigan, on 7 September 2009. Mr. Beery had been a member of the Society since 1976.

Ekstrom, Nicolas H., of New York, New York, passed away in June 2009. Mr. Ekstrom had been a member of the Society since 1997; he was interested in butterfly gardening and photography, as well as Coleoptera.

Gomez Pignatero, Luis Diego, of San Vito de Coto Brus, Costa Rica, on 13 November 2009, after a long battle with leukemia. Dr. Gomez was a Life Member of the Society, having first joined in 1976. [Information from Dr. R.A. Zahawi, Director, Las Cruces Biological Station & Wilson Botanical Garden, Organization for Tropical Studies, Costa Rica.]

Knudsen, John P. of Raleigh, North Carolina, passed away on 18 January 2009. He was a Sustaining Member interested in all Lepidoptera of the Americas, and had been a member of the Society since 1962.

Robinson, Gaden S., legendary Microlepidoptera taxonomist of The Natural History Museum, London, on 7 September 2009, at the age of 60—only five months after retiring from a 35-year career at the Museum. Born in Winchester, England, he spent much of his childhood in the rainforests of Singapore and Malaysia, where he became captivated by the tropical diversity of insects. In 1974 he received a Ph.D. degree from Durham University on the taxonony and biogeography of the Lepidoptera of Fiji, and earned a D.Sc. degree from the same institution in 1995. Dr. Robinson was a prolific author, and compiled large online databases on the Tineidae and food plants of the world's Lepidoptera. Although he was never a member of the Society, in 2008 the Society awarded him the Karl Jordan Medal (photo) in recognition of these contributions, most notably his extraordinary work on the systematics of the Tineoidea [see article by J.Y. Miller in the News 50(2): 38, summer 2008].



Karl Jordan Medal winner Gaden S. Robinson

A Standalone Weatherproof Low Cost Camera System to Study Nocturnal Behavior Continiously for Extended Periods

Christian Salcedo

McGuire Center for Lepidoptera and Biodiversity, SW 34th Street and Hull Road, PO BOX 112710 Gainesville, FL 32611-2710, USA ***salcedo@ufl.edu***

Note: this article does not endorse any of the commercially available electronics mentioned.

Introduction

Field research on nocturnal behavior can be difficult due to the inherent conditions of the night. This has hindered and biased insect field research towards the study of diurnal behaviors with the obvious exception of moths. In many cases field recordings are essential because they are either the first step to document preliminary evidence or to register events that can only be seen in the wild (behavioral traits, predation events, physical changes of the subject or the environment, etc.). There are commercially available video systems that meet these needs but they are often out of the reach of researchers and naturalists due to high costs. Alternatively low cost systems can be developed but challenges meet in the process include weatherproofing, long time period recording capabilities, long lasting battery systems, video quality, and ease of installation in the field.

The camera system presented here, although developed for videotaping of nocturnal aggregations of *Heliconius* butterflies in tropical rainforests, can be used to study many other subjects even in daylight conditions. Despite the need to learn some basic concepts of electricity to assemble the system, it is relatively inexpensive, easy to operate, safe, and reliable. It is a weatherproof system and can record monochromatic video continuously during 8 hours in complete darkness (0 lux), or color video in daylight conditions. The system can be easily installed or attached to trees or any other supporting device. Footage recorded has a resolution of 720 x 480 lines and renders standard video in MPEG-2, a common and widely accepted video format compatible with many of the available behavioral and video editing software. Most importantly the parts and assemblage concepts presented here can be used to assemble similar systems if the specific components presented here are not available to the researcher.

System description (Figure I):

Sony® Hand held camera DCR-SR220: is the most important component of the system. The hand held camera has a 60 GB hard drive that can record up to 14 hours in high quality mode and provides fast video transfer to your computer. Autofocus feature enables the camera to focus the subject automatically. A provided remote control is essential to operate the camera and focus the subject. The camera can record in zero light conditions (0 lux) thanks to infrared capability (Super NightShot®). NightShot® mode is operated by a simple switch that needs to be turned on for night recording. Switching to Nightshot® mode physically displaces the camcorder's internal glass filter called "IR Cut Filter", which means that much more NIR light (Near Infrared Wavelength) reaches the CCD (Charge-Coupled Device or the sensor that captures the image). Sony's Nightshot® camcorders have excellent sensitivity level for the NIR. NIR is the same wavelength used in night vision goggles. If this model is not available, any handheld

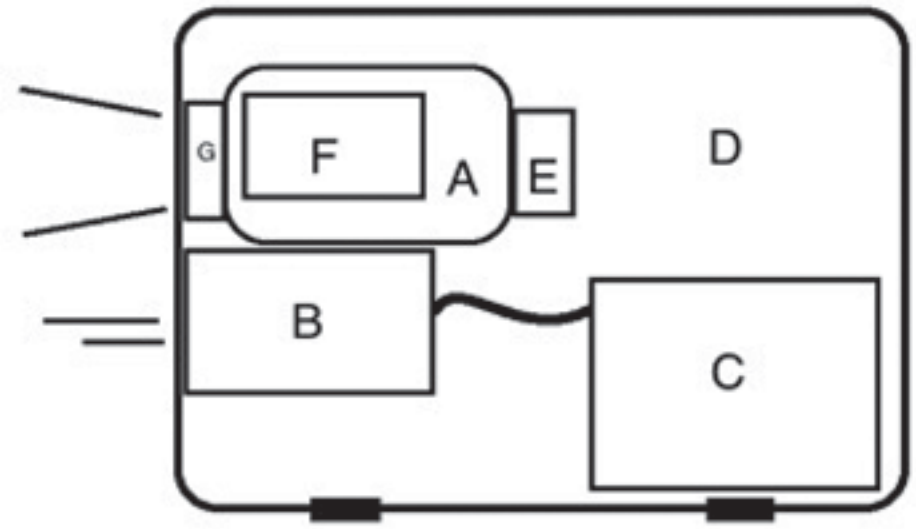


Figure 1. Camera system. ***A.*** *Sony® DCR SR220,* ***B.*** *IR 23 infrared illuminator,* ***C.*** *12V 4.5AH/ 20HR SLA battery,* ***D.*** *Weatherproof case,* ***E.*** *Camcorder battery,* ***F.*** *Camcorder LCD screen,* ***G.*** *Camera lens.*

camcorder from Sony® with Super NightShot® or NightShot® can be used. No other camcorder commercial manufacturer has 0 lux videotaping capabilities with NIR filters.

Sony® NP-FH100 Info-Lithium battery: is the highest capacity battery provided by the manufacturer. It is absolutely necessary to use the original Sony® battery if long continuous periods (up to 8 hours) of recording are necessary because third party manufacturers batteries do not provide the same performance.

IR illuminator (IR23 Supercircuits, Inc.): essential for night recording. This infrared illuminator provides a long-range infrared beam (up to 75 feet) that is necessary to properly illuminate the subject. A built-in photocell automatically senses darkness and switches the unit on and off as needed. If this model is not available a variety of online suppliers specialized on surveillance and security can provide similar illuminators at low cost. It is very important to take into account the power requirements of the IR illuminator to select the appropriate battery.

12V 4.5AH/20HR Sealed lead-acid battery and charger: powers the IR illuminator. These types of batteries (lead-acid) are reliable, durable, and inexpensive. A cable connection must be assembled to connect the two devices. A charger with 1 A capacity is necessary to charge the battery. Always charge the battery overnight.

Transparent weatherproof utility dry box #GSI0052 (GSI Outdoor, Inc): encloses all the components of the system and provides weatherproofing. No modifications are necessary because the camera can capture video through the transparent polycarbonate with no significant distortion. If a transparent box is not available, similar utility weatherproof boxes can be purchased from a variety of manufacturers but a modification will be necessary. Using a rotary tool cut two square sections of the box. One to make a window to capture video and to allow the IR beam to illuminate the subject and the second, to see the camera LCD screen to focus and adjust field of view. Cover the windows with 5 mm plexiglass and glue with marine grade silicone.

Electrical connections for LSA battery, IR illuminator, and charger

To make this connection purchase the right dimension DC power jacks and plugs to be able to charge the battery and to connect the battery to the IR illuminator. For the most common scenario, where the IR illuminator comes with a DC power jack, purchase a DC power plug of the same dimensions to the one of the charger. Replace the IR DC power jack with a DC power plug. A matching DC power jack would be needed to be attached to the battery. Use the appropriate electrical wire and properly solder and seal all the connections. Make sure all positive and negative connections are right using a voltmeter. All this assembly is very simple to do and only needs basic knowledge of electrical concepts, however, if you are not familiar or don't feel comfortable with soldering and measuring low voltage electrical currents please ask for help.

Preparation of the system before use:

Familiarize yourself with all the capabilities and operations of the camera by reading the owners manual and making trial videotaping. Charge the camera and the LSA battery. The LSA battery used in this system will be fully charged in 5 hours with the recommended charger. Place all the components of the system inside the case as shown in Figure 1. Make sure you flip the camera LCD screen. When placing the camera and the IR illuminator make sure they are in direct contact with the lateral wall of the box and avoid scratching of the internal and external part of the box where the image reaches the camera lens. To avoid movement of the components use high-density foam. The next step is to test the installation of the system. The system can be attached to any artificial holder or to a tree using bungees or straps with Velcro® attachments. Now the system is ready to be installed and used.

Operation:

Connect the IR illuminator to the battery. Turn on the camera and turn on the NighShot® mode. Close the box making sure there are no objects in the edges of the box and seal. Install the camera making sure your object is in the field of view. Adjust zoom and field of view using the remote control and press "rec". After the recording session is finished do not open the box in the field, because debris and water can get inside. Once you are in your workstation or laboratory, dry the outside of the box with a towel, if wet, and open it. Disconnect the IR illuminator from the camera. Remove the camera to download video and put the LSA battery and the camera battery to charge. If in a high humidity environment use a dry room to store and charge all the components, this will increase the reliability and life of all the electronics

Digital Collecting:

Stalking the Prey to Get the Prize

Kim Garwood

721 North Bentsen Palm Drive, Lot 40, Mission, Texas 78572-8269 ***kimgrwd@sbcglobal.net***

I shoot almost all macro photos with an inexpensive camera and therefore I have to get close, the closer the better. Often I'll shoot within six inches or less. This means I'm right next to the butterfly, with the camera almost touching it at times. How do you get this close? Stalking.

Butterflies are prey animals, and birds and dragonflies eat them, so they are highly sensitive to movement, especially quick movement. Running up to butterflies only flushes them away, so you must move deliberately and smoothly, not fast and jerky.

I first became aware of this when trying to photograph a *Marpesia* or Daggerwing on a muddy road in the Andes years ago. The butterfly would not let me get within about ten feet of it, which wasn't close enough, but it kept flying and landing at the feet of a large bull grazing right next to the road. The bull was considerably larger than me, but the *Marpesia* let the bull step almost on top of it before flitting out of harm's way. Why could the bull get so close, and not me? So I started to 'think like a cow' and move slowly, as if I was grazing, one step at a time. I eventually got right on top of that butterfly and got the shots. I have found that by thinking quiet, placid, calm thoughts, and not being overly excited and thinking "I'm going to get you" that often it seems to calm the butterfly down and I can get much closer. This is easier said than done.

I also spend a lot of time in the field watching butterflies' activity, finding the males perching along a trail and attacking others who fly through 'their' territory. You will notice an individual likes certain twigs or leaves to land on, and will often return to the same spot. Assuming it's in your reach, move up next to that leaf, prefocus your camera on the leaf and wait. If you don't get him today, come back tomorrow at the same time, and he will often be there. Sometimes I've spent three or four days going back to the same spot in the trail or a clearing at the same time, and eventually the butterfly seems to get tired of me and I get the shot.

A good way to get Hesperiidae to pose for photos is the Arhenholz technique of putting out spitwads, using toilet paper in your mouth and sticking it on a leaf at a good height for photography. This seems to be a lowland effect, but I have had it work up to about 1200 meters in Peru. It's associated with ant swarms, which are found in the tropics where antbirds follow swarms of army ants, and then the skippers follow the concentration of birds which means more bird droppings. The skippers are attracted to the white blobs as they resemble bird droppings, and they get minerals and salts from the droppings.

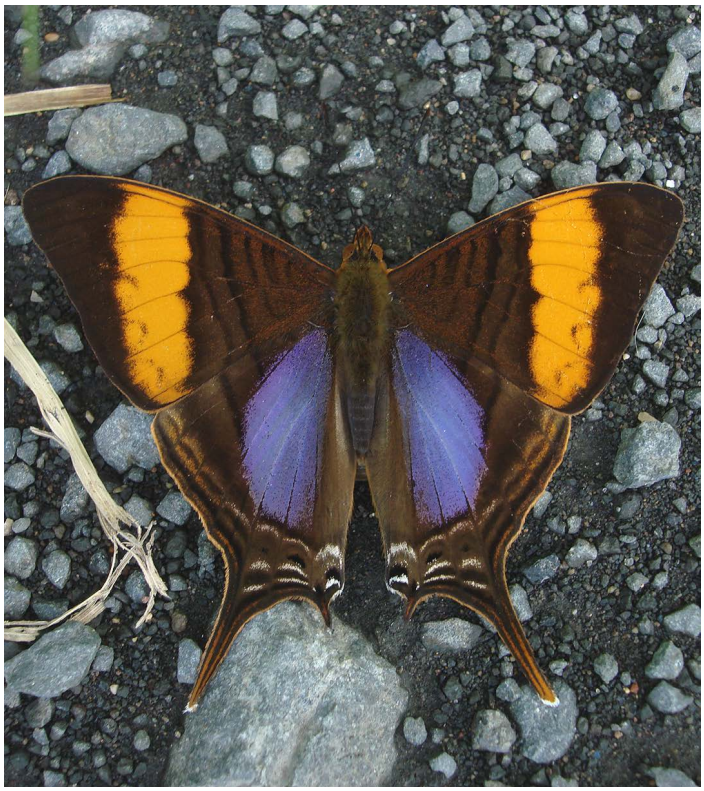
But you don't need an ant swarm to have this work. You have to use white paper, so if the lodge uses cheap brown toilet paper use napkins from the dining room, or Kleenex if you've brought some from home. We have found we can use salt water, carried in a small bottle, instead of having to use spit. Just add a few spoonfuls of salt to a water bottle and refill your small bottle brought from home, like a nasal squirt bottle. This is easier to carry in the field in a pocket. It is also easier when putting out lots of spitwads, and you can refresh a used spitwad by dripping some fresh salt water on it. It's similar to a bird feeder, they learn the spitwads are there and more and more butterflies will come over several days if you keep refreshing them.

Another advantage of salt water is you can dribble some on the nearby leaf, or even down below the spitwad, and often the skipper will move off the spitwad and onto the wet leaf. This makes for much nicer photos, so you don't have a big white blob in your shot. The skippers visually respond to the white, so just spritzing out salt water doesn't get them to stop. I've even found when creating pee spots near a stream that the skippers stop much quicker if I put one or two small white paper blobs on top of the wet sand, and then they'll move off onto the urine soaked dirt once they've stopped.

Some butterflies have very different dorsal and ventral wing patterns, so it's necessary to get both sides for an accurate identification. Particularly some of the Pyrrhopyge or Firetips in the Hesperiidae family look the same on the dorsal, but underneath they can show some differences between species. I have found by experimenting with individuals coming to wet sand, especially near streams, that they will allow me to lift their wing with a small twig and shoot the ventral. They don't like you using a finger and will slide away, keeping their wings flat and on the ground, but they will allow you to use a twig. I've even used reading glasses, but a twig works better and is smaller, so it is more out of the way of the camera and shows more of the wing.

Here are some shots showing the butterfly letting me lift his wing to shoot the underside. Sometimes they will then leave the wing lifted up, so you can get a shot without the twig if you're fast with the camera. In one of these shots I'm actually pushing him over to the ground to get him to hold up the wing when I take the twig away. Of

Continued on p. 36



Photographic Tricks of the Trade

Fig. 1) *Pyrrhopyge sadia* taken at Rio Zuñac, Ecuador 1300m, below Baños (1800m) on road to Puyo on October 17, 2009, taking moisture at sand...and refusing to offer a ventral shot. **Fig. 2)** A twigused to gently pull up the wings didn't disturb the still feeding subject. **Fig. 3)** With twig slowly removed, the tolerant specimen now holds its wings up so a shot can be taken of the underside as well. **Fig. 4)** *Marpesia corinna*, taken October 28, 2009 at Wild Sumaco Lodge, 1400 meters above the Loreto road in eastern Ecuador. This specimen and other Marpesia species often will land with wings closed and can be "tricked" into opening their wings by using the shadow of your body. The sudden "cloudy weather" causes the subject to open its wings in order to bask, thus offering the cautious photographer an opportunity to snap the shot of the dorsal surface. **Fig. 5)** *Marpesia berania*, taken July 19, 2008 just outside Medellin, Colombia at 1400 meters. All photos by Kim Garwood.

The Marketplace

***IMPORTANT NOTICE TO ADVERTISERS:* If the number following your advertisement is "514" then *you must renew your advertisement* before the next issue! Remember that all revisions are required in writing.**

Books/Videos

New book on American butterflies: R.R. Askew &P.A. v.B. Stafford: Butterflies of the Cayman Islands. Hardback, 24x17cm., 172 pages incld. 6 color plates and 119 color photos. Maps and other figures. US $69.50. Also available: Larsen: Butterflies of West Africa. Hardback 28x21cm.865 pages in two volumes. 125 color plates depicting 1,400+specimens. US $276.00. Monastyrskii: Butterflies of Vietnam, softcover, 21x15cm., Vol. 1: Satyrinae. 199 pages incl. 35 color plates, US $64.00. Many others available. Visit website: www.apollobooks.com or contact Peder Skou, Apollo Books, Kirkeby Sand 19, DK-5771 Stenstrup, Denmark, or ask for a copy of our 2009-10 catalogue. 514

For Sale: High quality critically aclaimed book, The Butterflies of Venezuela, Pt. 2 (Pt. 1 also in stock). 1451 photographic figs.(84 color plates) display all 196 species (355 subspecies) of Venezuelan Acraeinae, Ithomiinae, Libytheinae, Morphinae, and Nymphalinae. 8 new species, 91 new subspecies. Laminated hardback. Details/reviews, sample plates at: www.thebutterflies ofvenezuela.com Price GBP £110 (+ p&p). Please contact the author/publisher, Andrew Neild: 8 Old Park Ridings, London N21 2EU, United Kingdom; tel: +44(0)20 8882 8324; email: andrew.neild @blueyonder.co.uk 522

For Sale: Butterflies of Southern Amazonia, a photographic checklist. A spiral bound book with 350 color pages, 8 photos/page, of almost 1,350 species from southeast Peru and Rondonia and Mato Grosso, Brazil. Mostly live photos but includes some specimens too. $98 plus shipping $7.50 in the US or $16 international. You can order it with a credit card or by paypal at www.neotropicalbutterflies.com, or contact Kim Garwood at kimgrwd@sbcglobal.net, or mail a US check to Kim Garwood, 721 N Bentsen Palm Dr #40, Mission TX 78572. We also have Butterflies of Northeastern Mexico, for the states of Tamaulipas, Nuevo Leon and San Luis Potosi, Mexico. This includes over 600 species, one third of the Mexican species. The cost is $30 plus shipping. 522

Specimens

For Sale: Eggs: Saturnidae: Automeris amanda tucanmana, Copaxa flavolla, Syssphinx molina plus other Saturnids from Argentina. Papered specimens of butterflies (all families), Saturnidae or Sphingidae, alsom some beetles. For a list of all Argentina species, please write or email to Nigel South, Mis Montanas, Los Robles 1818, Villa Los Altos, Rio Ceballos 5111, Cordoba, Argentina. Also collecting trips in Argentina from September to May. Contact Nigel South for further details. Email: butterfly connections@hotmail.co.uk 514

For Sale or Trade: Very rare Propomacrus davidi (China) Yoshiaki Furumi, 97-71 Komizo, Iwatsuki-Shi, Saitama-Ken, 339-0003 Japan 514

Wanted: Want to purchase butterfly collections U.S./non-U.S., common/

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 worker 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.

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.**

Only members in good standing may place ads. **All advertisements are accepted, in writing, for two (2) issues unless a single issue is specifically requested.**

Note: All advertisements must be renewed before the deadline of the third issue following initial placement to remain in place.

All ads contain a code in the lower right corner (eg. 481, 483) which denote the volume and number of the **News** in which the ad. first appeared. ***Renew it Now!***

Advertisements must be under 100 words in length, or **they will be returned for editing**. Ads for Lepidoptera or plants must include full latin binomials for all taxa listed in your advertisement.

Send all advertisements to the Editor of the News!

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

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

rare. Contact: Brad Black, 2777 Carrington Street NW, North Canton, OH 44720-8163. email: doc3girls @aol.com 514

For Sale or Trade: Very rare Parnassius a. przewalskii, i. imperatrix, Propomacrus davidi (China). Yoshiaki Furumi, 97-71 komizo, Iwatsuki-Shi, Saitama-Ken, 339-0003 Japan 522

Research

Material needed for research project on geographic differences in Lophocampa maculata. Eggs, larvae (all instars) or adults useful. Will pay for shipping. Please contact Ken Strothkamp, Chemistry Dept., Lewis & Clark College at kgs.lclark.edu 514

Seeking egg masses of the Catalpa Sphinx, Ceratoma catalpa (Sphingidae) for research on the chemical ecology of this species. Please contact Deane Bowers at: deane.bowers@colorado.edu or (303) 492-5530. I am happy to reimburse for express shipping. Send to: Deane Bowers, Dept. of Ecology and Evolution, Ramaley N122, UCB 334, University of Colorado, Boulder, CO 80309. 514

The Ecoinformatics lab of Dr. Jeremy Kerr at the University of Ottawa is conducting an analysis of mobility for butterflies in Canada. In the absence of experimental mobility data for the vast majority of species, I will rely on the cumulative knowledge of Canada's lepidopterists to construct a mobility index. I am distributing a survey to people with field experience with butterflies and skippers of Canada. Surveys of lepidopterists in the UK and Finland have produced mobility estimates remarkably similar to those obtained from field experiments. If you have field experience with Canadian butterflies then I hope you will take the time to complete my survey. Visit: www.science.uottawa.ca/~jfitz049/survey.html for more information on this project and to download the survey. Email me: rburk091@uottawa.ca with any questions or comments you may have. 514

Equipment

A new Light Trap with Plastic or Aluminum Vanes: 12 VDC or 120 VAC with 15 Black Light or the new 36 Watt CF Twin Tube plasma UV. Rain Drain and Beetle Screens, Photoelectric Switch are optional. New Self Ballast Mercury Vapor Lights 250 Watt, 500 Watt and 750 Watt. New Tropics Bait Traps: 12 inch diameter 42 inches in height with a six inch cone top. Mosquito netting in Forest Green, Camouflage or White. A Plastic platform is suspended with plastic eye bolts and S hooks. Available in Tropical style for butterflies and flat bottom style for moths. Traps weigh less than 6 ounces. Excellent for travel to the tropics. For more information, visit our web site at: www.leptraps.com, or contact Leroy C. Koehn, Leptraps LLC, 3000 fairway Court, Georgetown, KY 40324-9454: Tel: 502-542-7091 522

Livestock

For Sale: Captive bred Philippine butterfly pupae, year round. Imogene Rillo, P. O. Box 2226 Manila 1099 Philippines email: clasinse@mindgate.net 522

Announcement

The 6th International Conference on the Biology of Butterflies will be held at the University of Alberta, Edmonton, Canada from June 29 through July 2, 2010. This meeting has been held at irregular intervals since 1981 and recognizes the role that the study of butterflies has played in our understanding of both evolutionary biology and ecology. The meeting will include Symposia, Contributed Papers, Posters, Banquet and Field Trips.

For those wishing attend this meeting, and anyone wishing to present a Contributed Paper or a Poster, please view the Conference webpage at:

http://www.biology.ualberta.ca/biobutterfly2010

Announcement

The Lep Course: A comprehensive Introduction to Lepidoptera Identification and Classification August 7 - 14, 2010.

Held at the SouthWest Research Station in the Chirichahua Mountains in SE Arizona (a 2 1/2 hour drive from Tucson), the focus of the lep course is to train graduate students, post-docs, faculty, and serious citizen-scientists in the classification and identification of adult lepidoptera and their larvae.

Topics to be covered include an extensive introduction into adult and larval morphology with a focus on taxonomically-important traints, extensive field work on both adults and larvae, collecting and curatoral techniques, dissection and preparation, larval classification, use (and abuse) of DNA bar coding, and general issues in lepidopteral systematics, ecology, and evolution. Course is limited to 16 students. Tuition is $900 for students and $1,000 for non-students. For further details go to: www.lepcourse.org

Announcement

Lepidoptera of the Northeast: Taxonomy, Ecology, and Biomonitoring of Butterflies and Moths with Brian Scholtens

Descriptions of seminars may be found at http://www.eaglehill.us/programs/nhs/nhs-calendar.shtml

Information on lodging options, meals, and costs may be found at http://www.eaglehill.us/programs/general/application-info.shtml

There is an online application form at

http://www.eaglehill.us/programs/general/application-web.shtml

Syllabi are available for these and many other fine natural history training seminars on diverse topics. For more information, please contact the Humboldt Institute, PO Box 9, Steuben, ME 04680-0009.

Online general information may be found at http://www.eaglehill.us

Caterpillars, Ants and Populuca Indians

An Adventure in Remote Mexico

Gary Noel Ross

6095 Stratford Ave., Baton Rouge, LA 70808 GNR-butterfly-evangelist@juno.com

My graduate research at Louisiana State University centered on the butterflies of La Sierra de Los Tuxtlas ("Los Tuxtlas") in southern Veracruz, Mexico. During 1962, 1963 and 1965 I spent 15 months in the field. Of all my experiences, the most nostalgic involve the periods when I was the guest of an anachronistic and indigenous culture known as the Popoluca and their American mentors, the John and Royce Lind family.

Happenstance introduced me to the Popoluca (technically, the "Sierra Popoluca" or "Highland Popoluca") and the Linds. On June 18, 1962, I had teamed up with Robert Andrle—a doctoral student in the geography department at LSU. Bob was conducting the seminal biogeographical study of Los Tuxtlas, with a concentration on the avifauna. We headquartered on the shores of the Lago Catemaco, a picturesque lake located in the heart of this volcanic landscape born of volcanoes. From there, weather permitting, we undertook forays into the surrounding forests—technically, the northern limit of the "Evergreen Tropical Rainforest" in Mexico and isolated from similar forest to the south by nearly 200 miles. We even managed several extended treks up Volcán San Martín, the highest peak (5577 ft). [See Ross, 2009a,b.]

But with no apparent access roads, Volcán Santa Marta (5413 ft), the second highest peak, eluded us. This was especially vexing. You see, Santa Marta was separated from the other peaks and cones. In addition, on a pilot jeep trek during the previous dry month of May, Bob was able to get to a vantage point from which he viewed what appeared to be red dirt ridges awash with pine and oak trees midway up the leeward slope of the volcano. Amazingly, no such ecosystem had been recorded for Los Tuxtlas.

Before returning to Lago Catemaco, Bob made some inquiries in Acayucan, a bustling Mexican town on the main highway connecting Veracruz with the distant Yucatan Peninsula. There he met a truck driver, Juan Carmona, who was familiar with a barely serviceable dirt road that accommodated trucks carrying supplies to the town of Soteapan—a Mexican outpost on the southern slope of the seductive volcano. Sr. Carmona, who owned a two-ton, ten-wheeled, open-back truck, offered transportation during a dry period. Patently, Volcán Santa Marta was now accessible.

But that had to wait. After my arrival in June, Bob and I spent our time sampling more accessible habitats. With the rainy season now in full swing, we kept postponing our attempt to reach Soteapan. But in mid October, the rains abated. So, on October 22, with the first light washing the eastern horizon, Bob and I hopped into a jeep stocked for an extended survey and then drove to Acayucan.

Sr. Carmona's truck, although aged, seemed capable of tackling any road. But let me not mince words. What actually spread before us were two parallel, water-filled ruts. It was gallingly evident that passage would be wrenching. Although we were deflated, Sr. Carmona was resolute and reassuring. Sr. Carmona affixed heavy chains to the tires before we set off. To my surprise, we did not mire. As we gained altitude we encountered another pariah: large rocks exposed by decades of erosion threatened the undercarriage of the vehicle. Yet, our driver continued to smile. After four-and-a half hours we had traveled 24 miles and were at an altitude of 1000 feet. But trumping all, was our location: the center of Soteapan.

While seemingly at the end of civilization, Soteapan consisted of about 200 houses, a few lackluster mom and pop stores, post office and military office (including a jail). The army officer in charge informed us that a village named Ocotal Chico ("Little Piney Ridge") lay several miles higher and could be reached on foot by a trail just north of town. The village was inhabited by Popoluca Indians, a friendly people who spoke little or no Spanish, but who ventured down to Soteapan each fall to market their coffee crop to Mexican traders who arrived in trucks. Now the kicker: "An American missionary family lives in the village," smiled the officer.

Super-stoked, we arranged with a local to rent his mule in order to pack as much of our equipment as possible. Then we soldiered into high adventure. Not far out of town we descended a good 300 feet to a roaring river that we had to cross on a rickety cable/rope footbridge. Ascending the opposite red-dirt ridge, we were duly rewarded: pine and oak trees (later identified as *Pinus oocarpa* and *Quercus conspersa* and *Q. ghiesbrechtii*, respectively). The pines were tall, their limbs swagged with light green bromeliads. As we continued to hike, Bob began identifying benchmark birds—Red-billed Azurecrown (*Amazilia cyanocephala*) and Acorn Woodpecker (*Melanerpes formicivorus*), for example. I observed the satyr *Cyllopsis gemma*, a species common in the pinelands of my home state of Louisiana.

After about another hour or so we faced a sizable hill. After pausing half way up for a second wind we could see that the trail segued into an expanse of stark mud. Several small huts lay to each side. Beyond, the ever-so-close jagged peak of Volcán Santa Marta dominated the skyline. The intense tropical sun combined with the lengthening shadows of late afternoon saturated colors and sharpened outlines. I was reminded of an image torn from the pages of *National Geographic*.

Well, not for long. Attuned to the moment, dogs began barking to herald the surprising approach of two strange *gringos* with a pack mule. The crescendo was followed by the appearance of several poorly clad, tan-faced children and adults. With stoic expressions, they all pointed to a tin-roofed, mud-waddle house to the right of the path, about 150 feet ahead. As we approached, a light-skinned couple with four children emerged: "Well, hello there," was the greeting—in English—from the smiling gentleman.

The Americans were John and Royce Lind and their children—Cindy, Michael, Laura and Juanita. Originally from Colorado, the Linds moved to Ocotal Chico (altitude, 1800 feet on the leeward slope of Volcán Santa Marta) in 1961 as missionary linguists/anthropologists as affiliates of the Summer Institute of Linguistics (SIL) (Oklahoma) and the Wycliffe Bible Translators (WBT) (California). They had come to the heartland of the 3,000 plus Popoluca with laudible goals: master the verbal Popoluca language, transcribe the language into a written form, record much of the culture's folk lore, translate the Holy Bible into Popoluca and prepare literacy materials so that they could teach the villagers to read and write in their own dialect. In addition, another important aspect was to serve the basic and emergency medical needs of the villagers. Such tasks require a lifetime commitment. But in the end, these accomplishments guarantee that an indigenous culture does not slip into oblivion.

The Linds graciously shared their limited supplies and space with Bob and I for the next ten days. The home was a modified version of a typical primal hut: single room of stick sides and grass roof, mud floors, no electricity, no running water, no bathing area. However, the Linds' domicile was relatively upscale: mud-waddle sides, a tin roof (to collect rain water in a cistern), and as a sort of totem from home, a kitchen equipped with a sink and small stove powered by propane tanks (the tanks were transported every month or two on mule back from Soteapan); there was even an outdoor privy. Drinking water was carted from a nearby spring in two five-gallon plastic containers strapped to Mike's donkey, *Eeyore*. At night, Bob and I slept in hammocks swung in the "living room." To bathe, each afternoon we made our way through a coffee grove down a steep quarter-mile path to a boulder-strewn stream of clear, cold water. Often in the evenings, men would stop by to get a look at the "pale visitors." This proved of great value to us since the villagers could provide detailed information about the region's larger native animals (jaguars, tapirs, monkeys, curassows, guans and reptiles, for instance). Also, the Popolucas were delighted to learn that their mundane was of interest to outsiders, and the Linds learned some new Popoluca vocabulary.

For me only 22 years old and still in my formative years, the exotic experiences were profound. When the rains held out, Bob and I took to the field. Whereas the ridges were dominated by pines and oaks and inhabited by relatively few insects, the valleys sported more "tropical" vegetation and glitzy butterflies such as blue morphos, owl-eyes (caligos), longwings (heliconians) and clearwings (ithomiines). But not to overstay our welcome, we backtracked to Soteapan with a mule and guide, secured passage in a supply truck for the trip back to Acayucan, and then retrieved our jeep for the final leg of the journey to our headquarters on Lago Catemaco. In November, upon my return to LSU, I began the arduous task of preparing the 2679 specimens I had collected during my nearly six-month stay in Los Tuxtlas. The hairstreaks (family Lycaenidae) and metalmarks (family Riodinidae) were shipped to the late Harry Clench of the Carnegie Museum in Pittsburgh for identification. Within the lot was a single specimen of an unrecognized riodinid. He concluded that the specimen might represent a new and perhaps endemic species. But with only a single specimen, the question was open ended. And the locale? My field notes indicated:

" *Specimen no. 3267. October 23, 1962. "1 mi. SSE Ocotal Chico, 1800 ft." Found resting with wings horizontal on the undersurface of a leaf near the crest of a ridge in the pine forest. Plant was small and growing in grass. Only one specimen seen. Seventh specimen of 98 collected on first day in field after heavy rain the night before.*"

Go figure!

I fired off a letter to John and Royce Lind to seek their opinion regarding my return to Ocotal Chico as a boarder for the upcoming summer. The Linds responded by stating that they were delighted with the prospect of having a de facto naturalist in residence. But first, they would have to secure permission from tribal elders. Accordingly, within a few days I received a second letter: "Come!" On June 2, 1963, I flew out of New Orleans. After rather complicated logistics—two buses, a truck, a mule—on June 4 I was back in "Little Piney Ridge" and co-opting into the Lind family.

The rains had not yet begun. Therefore there was no hindrance to outdoor activities. I spent the first two days orienting myself to the village and village life. Mike Lind offered to be my field companion whenever he was free. I was thrilled with the offer particularly since Mike was fluent in Popoluca. Then on June 7, I decided to try to relocate the venue where I had captured the mystery metalmark the previous fall. With memories still fresh, I headed

south along the main trail leading into the village. After less than a half hour, I recognized a sloping contour. The ground, however, was now charred from a recent fire. (Each April and May, Popolucas routinely burn the upper slopes of the pine ridges circumscribing their villages. The fires are low-impact since there is not much ground litter. Still, these burnings enrich soil and encourage growth of fresh grass to graze horses and mules.) My spirit sank. To my surprise, however, a medium-size, light-colored butterfly suddenly darted past me, settling on a sunny boulder. Against all rationality, my brain registered METALMARK! Thinking no one could have such luck, I anxiously approached the boulder for a closer look. When I got within a few feet, I could see that the individual was in impeccable condition, and without a doubt, my Holy Grail. A chill wafted upward from my core. As I readied my net and prepared to bolt, the butterfly took flight, hugging the ground. Within seconds, the insect paused on a small single-stem plant that had recently resprouted from the blackened earth. The plant bore roundish leaves and small, white flowers (later determined to be *Croton repens*, family Euphorbiaceae). With wings outstretched, the butterfly proceeded to nectar, but after a few minutes, resumed flight. The insect alighted a few feet away on a similar plant, moved to the edge of a terminal leaf, curled its abdomen under, and deposited a single egg—milky pale green in color. This behavior was repeated on several nearby, identical plants. And so, on Day One in the field, I had relocated the metalmark and identified its hostplant. A heady day, indeed!

I learned over the next week that the metalmarks were common just outside the village but only on recently burned ridge slopes dotted with their newly emergent hostplant. Males—similar in color to females but slightly smaller—were particularly easy to observe in late afternoon when males often pirouetted in pairs or basked on illuminated boulders. At this point, I was tempted to end my research with the metalmark, to concentrate on my broader study of the butterflies of the volcano. But I realized that I now had a rare opportunity to work out the entire life history of the metalmark. So, on days that were not conducive to long distance hiking, I devoted my time to metalmark research.

Turns out, *Croton repens* is typically a foot-high shrub that thrives in colonies on disturbed lands, particularly those that experience the passage of fire. The root system is fire resistant; fresh stems and leaves sprout shortly after the passage of fire. A pair of round nectaries (glands that secrete sugary liquids) is situated on the basal portion of each leaf. I noticed that the secretions of these glands often attract a variety of small ants. Female metalmarks seek out immature leaves, which have minimal pubescence. I had no problem locating eggs and young larvae. They habitually rested on the undersurfaces of leaves near the petioles and nectaries. But large caterpillars? Ah, that was a conundrum. Sure, I observed many plants with ravaged leaves—a telltale sign of feeding by advanced larvae. But, nary a caterpillar.

Then an epiphany. On a cloudy day in late June, I was seated on a log that had been burned just weeks before. Dozens of new *Croton* stems had already sprouted on the blackened slope. While eating my typical lunch—two jelly and peanut butter sandwiches—my eyes focused on a single-stalked *Croton* near my feet that was practically denuded but being overrun with a flurry of six large, reddish-black ants. But on the single extant leaf, an inch-long, mottled green caterpillar was feeding rapaciously. My instinct, of course, was to squash the ants and rescue what could be my first mature metalmark caterpillar. But as I dropped to my knees, my trepidation was put on hold. The caterpillar did not seem to be under attack. Rather, it continued with the business of feeding. Even stranger, every few seconds the caterpillar everted two small fleshy and tubular organs from one of its posterior abdominal segments and two hydra-like tentacles from an anterior thoracic segment. In addition, a pair of tiny brown and blade-like structures protruded from the caterpillar's thorax and extended over the hard (chitinous) head; these organs vibrated rapidly up and down, presumably tapping the head. All three pairs of organs—none of which I had ever observed before—were being probed by the ants' antennae. In fact, the ants' tactile stimulation caused the caterpillar's tubular organs to release a clear liquid that was imbibed by the ants. After a few minutes, the astonishing tableau changed: The caterpillar ceased feeding and proceeded to crawl down the stem—all the while coddled by its entourage of ants. When the caterpillar had descended to the ground, it crawled into a hole at the base of the plant. The ants then began frantically moving pellets of dirt to seal the penny-sized entrance. Within minutes, the relandscaping was complete and both caterpillar and ants were invisible to me and to the rest of the world. Realizing I had unraveled the case of the vanishing caterpillars, I returned to my base, my face now relaxed into a smile.

At the time, I was vaguely familiar with the concept of "myrmecophily," that is, a symbiotic relationship between ants and other insects. (Indeed, myrmecology—the science of ants—was the specialty of my graduate advisor, Murray S. Blum.) The ants feed on a sugary solution called honeydew that is secreted by various species of aphids and some lycaenid and riodinid butterfly larvae. In return, the ants protect their food source from predators. However, I had only witnessed a single ant-aphid interaction. Nevertheless, by innuendo, I questioned: Could this metalmark caterpillar be embedded in that quirky symbiotic paradigm? As the enigmatic saga unfolded during the remainder of the season (and during subsequent visits), I documented through both empirical and experimental data, the following:

_Every heavily defoliated *Croton* was subtended with a two to three inch deep

cavity constructed by a handful of *Camponotus abdominalis* ants (a variety of formicine "carpenter ant") that concealed usually a solitary caterpillar after its second-instar molt;

_From the third instar on, the caterpillar is detained during daylight hours within this hollow, which is a temporary holding chamber and not the carpenter ants' permanent nest. Marking ants with spots of colored paint indicated that the attending ants are not always the same individuals. The feisty ants are attracted by volatile pheromones from "tentacle organs" on the thorax, sounds from the "vibratory papillae" above the head (confirmed by Philip DeVries in another riodinid—*Thisbe irenea*—in Panama), and placating honeydew produced by the abdominal "nectary organs";

_At dusk, between 7:00-7:10 PM, the ants remove the surface pellets to create a small opening in the underground chamber;

_The ants then crawl onto the *Croton*, running over every leaf and stem, policing for potential predators, which if found, are quickly attacked and carried down the plant and deposited a few inches distant;

_After 10-15 minutes, the caterpillar emerges, crawls up the stem, and begins feeding on nascent leaves;

_The caterpillar remains above ground during the entire night, feeding and resting with the ants in constant attendance;

_Just prior to dawn, approximately 4:30-4:45 AM, the ants increasingly agitate the caterpillar, which then descends the stem to eventually enter the underground chamber;

_The ants follow and quickly reseal the entrance;

_The metaphoric "shepherds" and "cows" remain secluded in their "pens" until the following dawn, except on rainy days when the pens can fill with water. Then, the insects emerge and spend much of their time on the *Croton*. [NOTE: Except for my initial observance, never did I observe another caterpillar feeding during the day. What prompted the maverick caterpillar to emerge and feed is anyone's guess. Whatever, I was one lucky *meme pixiñ*—local parlance for "butterfly man"]. When ants were removed and the hosplant shielded with a net, caterpillars remained on the leaves of their host during both day and night indicating that the daily up-and-down ritual is a behavior forced upon the larvae by the attending ants;

_The daily ritual (again, metaphoric "husbandry" or "pact") continues until the caterpillar reaches maturity and virtually all *Croton* leaves are skeletonized;

_Pupation of the caterpillar occurs within the clandestine chamber. The caterpillar attaches its terminal abdominal segment to the subterranean part of the stem or a root;

_The chrysalis does not produce honeydew but does continue to secrete an ant-attracting pheromone from a pair of thoracic organs located in the same position as the larval "tentacle organs." The pupa also has two pairs of abdominal intersegmental organs, which have a stridulatory (sound-producing) function, that keep the ants in attendance;

_Usually two days prior to the emergence of the butterfly, the ants vacate the chamber, leaving the entrance unsealed;

_The adult emerges, ascends the *Croton* stem, dries its wings, and then takes to the air;

_There are usually five generations of butterflies during the year;

_During the cooler months of November-April, last instar caterpillars remain quiescent and more or less secluded in their chambers (on warm, non-rainy nights they do occasionally emerge for a brief time in order to feed on whatever leaves remain);

_The subterranean "pens" are crucial. They (1) conceal the ants along with the tender caterpillars during the daylight hours from parasitoids and most importantly, predators, particularly the ponerine ant *Ectatoma tuberculatum*—a common daytime forager that challenges with its fierce mandibles and stinger virtually any other arthropod it encounters on the pine ridges. (Since butterfly colonies occur in close proximity to Popoluca villages, free-ranging chickens and turkeys constitute common diurnal carnivores, too.); and (2) they protect their insect occupants from the heat and flames of the fast-moving grass fires set each spring by the Popolucas;

_Spring burns are vital, too. They (1) encourage the pervasive growth of *Croton* from their fire-resistant roots and underground stems. Without periodic burns, *Croton* plants become shrubby, their leaves thick and densely pubescent. This altered morphology deters female butterflies from ovipositing. Moreover, ridges soon become so congested with non-pioneer plants (including oak and pine saplings) that *Croton* is eventually smothered out; and (2) they stimulate the last-instar caterpillars to complete their growth with adults emerging between late April and early May;

_The spring generation is small: 4-10 individuals in an area of 30-40 square feet of a pine ridge. But as the warm season progresses and *Croton* plants flourish, successive generations of metalmark butterflies increase in size so that by August and September a single colony may consist of 25-35 individual butterflies and occupy 60-100 square feet;

_As the Popoluca population expands and modernizes, more land is being devoted to cattle ranching and corn milpas. As a corollary, more horses and mules have to be employed to assist with the work. Since the grassy pine ridges are the primary source of fodder for work animals, more ridges are burned annually—increasing *Croton* habitat. Consequently, the metalmark should fare well. Revisits to Ocotal Chico in 1970 and 1978 confirmed that colonies of the metalmark were larger and more widespread than in the '60s.

Fig. 1) Red-dirt trail entering the indigenous Popoluca Indian village of Ocotal Chico at 1800 feet on Volcán Santa Marta. **Fig. 2)** Smoke from spring fires set to encourage forage grass. Smoke often obscures sun in late afternoon. **Fig. 3)** Gary collecting in metalmark colony in pine forest during a revisit in 1978. **Fig. 4)** Colony of metalmark immediately after a spring fire. White stakes mark underground "pens" of caterpillars and ants. **Fig. 5)** Gary researching natural activity of metalmark caterpillars when shielded with nets from carpenter ants that normally attend the caterpillars. 1965. **Fig. 6)** First and second instar larvae of metalmark caterpillars do not possess myrmecophilous organs and so rest on the underside of a *Croton* leaf near a nectary of the plant.

My activities in and around Ocotal Chico did not go unnoticed by curious villagers. For starters, Popolucas call themselves *Nuntajýyipýc* ("straight-speaking-ones") At the time, they basically were existentialists in that their lives were rooted in the here-and-now. (A small number of villagers, however, had been converted to Christians by missionaries.) For example, butterflies are sometimes eaten by children to supplement their meager diets. Also, butterflies represent the visual manifestations of the spirits of the dead. Furthermore, Popolucas have remained for the most part isolated from mainstream Mexican society. Ergo, scientific research explains nothing. From Popolucan point of view, I must be collecting butterflies to feed my hungry relatives living across the "big water." Upping the ante, the local shaman spread the word that I was a witch, securing butterflies for diabolical incantations.

Then John hit on an idea. He conveyed to the villagers that I was collecting, preserving and photographing in order to show my family and friends back home the beauty of the Popoluca homeland. This explanation helped demystify my activities. After, Popoluca karma increased, that is, except with the shaman who continued to avoid all contact with me. Children often tagged along with me on my short excursions. Each time I netted a butterfly, they reacted with the unbridled exuberance that only the young can muster. (I suppose I was the equivalent of a *Sesame Street* muppet.) Soon, some of the more impetuous boys began bringing me dead butterflies that they had switched from the air using crafty, handmade nets—a forked twig laced with spider webs. By the time the specimens reached me, however, they were simply bodies with scaleless stubs for wings. But not wishing to be impolite, I graciously accepted the specimens. Thinking fast, John explained that I needed to collect with my own net in order to keep the all-important wings of the butterflies intact.

Popolucas are very much in tune to their natural surroundings. However, the Ocotal Chico residents were unaware of the caterpillar-ant hideaways beneath the Croton plants—odd, considering that the idiom includes a specific name for the *Croton*: *paji iay* (translating as "diarrhea leaf"), which when boiled is used in folk medicine. Once I made my discovery known, elders developed a deep respect for my acuity. Some individuals, though, remained unconvinced of my motives. For example, in order to tackle the details of my newly discovered insect "pact," I often engaged in nighttime forays. I masked my flashlight with red cellophane in order to minimize disturbance to the insects. But because local folklore has it that the early Spanish conquistadors left behind buried gold in the region, the Popolucas concluded that my strange nocturnal activities involved sorcery to locate the fabled treasure. Often I would detect murmurings and giggles from nearby shadows. When I returned to the site the following morning, I usually discovered that my research plants had been dug up—I suppose in an attempt to find any treasure that I might have overlooked. Again, I called upon my hosts to explain that digging around the plants destroyed the oddball caterpillars I was observing. No plants were pillaged thereafter, although I sometimes attracted a bevy of children who seemed to monitor my activities—I suppose, just to make sure I was telling the truth. (It is ironic that the insect coffer I discovered was to me more precious than gold.)

My several visits with the Popoluca in Ocotal Chico proved mutually beneficial. I, for example, managed to write both a master's thesis and doctoral dissertation from my ecological studies of the butterfly fauna. As a side project, I was able to produce a 16 mm, 55-minute, color and sound motion picture of the culture—which I dedicated to the Linds and which was later shown in Soteapan. For their part, the Popolucas learned a little bit more about themselves and the small creatures that inhabit their unique realm. But just as valuable, we all learned to appreciate the similarities and differences between our cultures—the dignity of human kind. And today, some forty-plus-years later, that elemental meeting of the minds remains my most cherished memory. (I even remember a few Popoluca words!)

[NOTE: The riodinid that I had researched, was deemed a new species by Harry Clench of the Carnegie Museum (Pittsburgh). In 1964, he named the species *Anatole rossi* or in the vernacular, "Ross' Metalmark" in my honor. That same year I published on the immature stages of the species. Oh, if only the truth were that simple. In 1981, Curtis Callaghan of the Museo Nacional (Brazil), published that *Anatole rossi* is actually a synonym for *Anatole caliginea* named by Butler in 1867 from a single male specimen labeled "Mexico" and housed in the British Museum of Natural History. Later, the species was relocated to the genus *Lemonias* producing *Lemonias caliginea* (Butler) 1867. Indeed, in 1940, Carlos Hoffman of the Instituto de Biología (México) had recorded *Apodemia caliginea* from the "hot country in the southern part of Veracruz." In 1987, Roberto de la Maza Ramíerez in *Mariposas Mexicanas*, (México) listed the distribution of *Lemonias caliginea* as "Veracruz (Santa Martha (sic)), Oaxaca (Palomares), and Tabasco (Chontalpa)"—all in southern Mexico. Considering the insect's complicated life history on Volcán Santa Marta and that no ecological data is available on the populations in Oaxaca and Tabasco, my opinion is that the taxonomy of the metalmark is far from settled. For example, are the isolated populations in Oaxaca and Tabasco the same subspecies or even the same species? Even less clear is the relationship between these Mexican populations and the other seven members within the genus *Lemonias*—all of which are found nowhere else but in South America. And finally, what of the common name "Ross' Metalmark?]

REFERENCES

Andrle, R.F. 1967. Birds of the Sierra de Tuxtla in Veracruz, Mexico. The Wilson Bulletin 79(2): 163-187.

Butler, A.G. 1868. Mr. A.G. Butler on the species of *Lemonias*. Journal of the Linnean Society 9:13-229.

Callaghan, C.J. 1981. Notas sobre un caso de sinonimia entre las riodinidae Mexicanas. Rev. Soc. Mex. Lep. VI(2): 41-42.

Clench, H.K. 1964. A new species of riodinidae from Mexico. Journal of Research on the Lepidoptera 3(2): 73-80.

De la Maza Ramírez, J. 1987. Mariposas Mexicanas. Fondo de Cultura Económica, S.A. de C.V. México, D.F. 302 pp.

DeVries, P.J. 1988. The larval ant-organs of *Thisbe irenea* (Lepidoptera: Riodinidae) and their effects upon attending ants. Zoological Journal of the Linnean Society 94: 379-393.

DeVries, P.J. 1989. Butterfly exploitation of an ant-plant mutualism: adding insult to herbivory. Jour. New York Entomological Society 97(3): 332-340.

DeVries, P.J. 1990. Acoustic enhancement of symbioses between butterfly caterpillars and ants. Science 248: 1104-1106.

DeVries, P.J. 1991. Call production by myrmecophilous riodinid and lycaenid butterfly caterpillars (Lepidoptera): Morphological, acoustical, functional, and evolutionary patterns. American Museum Novitates No. 3025: 1-23.

DeVries, P.J. 1991. Mutualism between *Thisbe irenea* butterflies and ants, and the role of ant ecology in the evolution of larval-ant associations. Biological Journal of the Linnean Society 43: 179-195.

DeVries, P.J. 1992. Singing caterpillars, ants and symbiosis. Scientific American 267(4): 76-82.

Dirzo, R. and M.C. Garcia. 1992. Rates of deforestation in Los Tuxtlas, a neotropical area in southeast Mexico. Conservation Biology 6(1): 84-90.

Dirzo, R., González Soriano, E. and R. C. Vogt. 1997. Introducción General (pages 3-6). IN: Historia natural de Los Tuxtlas. González Soriano, E., R. Dirzo, and R.C. Vogt (Editors). Universidad Nacional Autónoma de México. México, D.F. 647 pp.

Editors. 1963. Animal husbandry in the animal kingdom. IN: Entomology. Time Dec. 6: 98.

Editors. 1986. Sjælden Sommerfugl overlever på grund af myrers lækkersult. IN: Ny Viden. Illustreret Videnskab April(4):24. Denmark.

Editors. 1986. Sjelden sommerfugl overlever takket være maurens lyst på snop. IN: Ny Viten. Illustrert Vitenskap April(4):24. Norway.

Editors. 1986.Sällsynt fjäril överlever tack vara myrors godisbegär. IN: Naturvetenskap & Teknik. Illustrerad Vetenskap April(4):24. Sweden.

Hoffman, C.C. 1940. Catálogo sistemático y zoogeográfico de los lepidópteros Mexicanos. Primera Parte; Papilionoidea. Anales del Instituto de Biología. XI(1): 640-739.

Lamas, G. (editor). 2004. Atlas of neotropical lepidoptera. Vol. 5A. Checklist: Part 4A: Hesperioidea-Papilionoidea. Association for Tropical Lepidoptera: Scientific Publishers. Gainesville, FL. 439 pages.

Patent, D.H. 1979. Butterflies and moths: How they function. Holiday House Publishing. New York, N.Y. 160 pages.

Raguso, R.A. and J. Llorente-Bousquets. 1990(1991). The butterflies (Lepidoptera) of the Tuxtlas Mts., Veracruz, Mexico, Revisited: Species-richness and habitat disturbance. Journal of Research on the Lepidoptera 29(1-2): 105-133.

Ross, G.N. 1964. Life history studies on Mexican butterflies. I. Notes on the early stages of four papilionids from Catemaco, Veracruz. Journal of Research on the Lepidoptera 3(1): 9-18.

Ross, G.N. 1964. Life history studies on Mexican butterflies. II. Early stages of *Anatole rossi*, a newmyrmecophilous metalmark. Journal of Research on the Lepidoptera 3(2): 81-94.

Ross, G.N. 1964. Life history studies on Mexican butterflies. III. Nine rhopalocera (papilionidae, nympalidae, lycaenidae) from Ocotal Chico, Veracruz. Journal of Research on the Lepidoptera 3(4): 207-229.

Ross, G.N. 1964. Life-history studies on Mexican butterflies. IV. The ecology and ethology of *Anatole rossi*, a myrmecophilous metalmark (Lepidoptera: Riodinidae). Annals of the Entomological Society of America 59(5): 985-1004.

Ross, G.N. 1975-77. An ecological study of the butterflies of the Sierra de Tuxtla in Veracruz, Mexico. Journal of Research on the Lepidoptera 14(2): 103-124, (3): 169-188, (4): 233-252; 15(1): 41-60, (2): 109-128, (3): 185-200, (4): 225-240; 16(1): 87-130.

Ross, G.N. 1985. The case of the vanishing caterpillar. Natural History 94(11): 48-55.

Ross, G.N. 1994. Winged Victory. Wildlife Conservation 97(4): 60-67.

Ross, G.N. 1997. *Lemonias rossi*. IN: Historia natural de Los Tuxtlas. Parte IV. Invertebrados: Insecta (pages 323-328). González Soriano, E., R. Dirzo, and R.C. Vogt (Editors). Universidad Nacional Autónoma de México. México, D.F. 647 pp.

Ross, G.N. 2009a. My scariest moment in the field. Southern Lepidopterists' News 31(1):16-19.

Ross, G.N. 2009b. White morphos, shotguns, and "evil women." News of the Lepidopterists' Society 51(2):67,70-71.

Stalking the Prey

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course, he (it's usually a male coming to wet dirt for minerals) has to want to keep drinking and returning to the same spot. If he's too jumpy he won't let you get up to him, but most of the time, even if you flush him initially, if you kneel down and wait he will buzz around and return in a few minutes. Maybe he'll land nearby and watch, but if you don't move and be patient, in a few minutes he'll land a few feet away and gradually sneak back in to the same spot. Wait until he's right where he wants to be and has his proboscis out probing away, then you can move him around with the twig. Start touching him gently, so he gets used to it and you can gradually get more aggressive. This takes time, I have spent more than twenty minutes working with the same individual to get the shots I wanted, and you can easily spend several hours working a good mud spot with different species coming throughout the morning. You also have to be alone to do this. Having more than one photographer distracts the bug too much and he usually leaves.

On other species, like Marpesia for example, when you do get close to one he often has his wings closed, especially if it's hot and sunny. They do this for temperature regulation. Of course you want to get his wings open, so one way to attempt this is to shade the butterfly with your body, or you can use your hand. It's usually easier to get the butterfly in the shade of your body, then let your camera adjust for shooting in the shade, maybe try to flash him and see how it looks. Be sure to shoot the ventral first before shading, as sometimes they fly away when shaded. Move the shade over him as if you were a tree branch swaying in the wind.

To summarize, move slowly, watch what they do and where they go, try and get both dorsal and ventral shots of the same individual to aid in id's, and be patient. The more you work with them, the more responsive they can be, and the better photos you'll get. Have fun!

Metalmark Caterpillars, Ants and the Populuca Indians

Fig. 7) *Camponotus* ants and metalmark caterpillars emerging from underground "pen" to climb stalk of *Croton* hostplant after dark. **Fig. 8)** *Camponotus* ants and metalmark caterpillar in underground pen that has been opened during the day by the author. Blue paint on one ant proved that ants periodically return to their home nest.**Fig. 9)** A pair of "vibratory papillae" under prothoracic shield. Sound attracts ants. **Fig 10)** Predatory *Ectatoma* ants attacking a metalmark caterpillar that was exposed during daytime.**Fig. 11)** A *Camponotus* ant drinking honeydew from a metalmark caterpillar. **Fig. 12)** Marking ants with paint for tracking. All photos: Gary Noel Ross

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

Kelly Richers,
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The Lepidopterists' Society
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Submission Guidelines for the News

Submissions are always welcome! Preference is given to articles written for a non-technical but knowledgable audience, illustrated and succinct (under 1,000 words). 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.

2. Article (and graphics) on diskette, CD or Zip disk in any of the popular formats/platforms. Indicate what format(s) your disk/article/graphics are in, and call or email if in doubt. Include printed hardcopies of both articles and graphics, a copy of the article file in ASCII or RTF (just in case), and alternate graphics formats. Media will be returned on request.

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

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

Submission Deadlines

Material for Volume **52** must reach the Editor by the following dates:

Issue	Date Due
2 Summer	May 15, 2010
3 Autumn	Aug. 15, 2010
4 Winter	Nov. 15 2010

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 for Zone Coordinator information.

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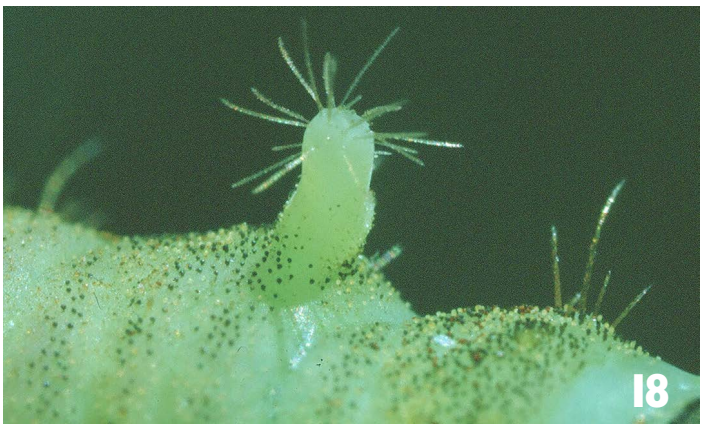

Metalmark Caterpillars, Ants and the Populuca Indians

Fig. 13) Predatory *Ectatoma* ants attacking a metalmark caterpillar that was exposed during daytime. **Fig 14)** Trail into indigenous Popoluca Indian village of Ocotal Chico on Volcán Santa Marta. **Fig. 15)** Female metalmark. **Fig. 16)** Mating metalmarks, named in 1964 as *Anatole rossi*. **Fig. 17)** Mature metalmark caterpillar showing three pairs of myrmecophilous organs. **Fig. 18)** Anterior pair of "tentacle" organs of a metalmark larva. The tentacles are presumed to release a pheromone to attract *Camponotus* ants. All photos: Gary Noel Ross. See article on p. 34.