

# NEWS

OF THE

# LEPIDOPTERISTS' SOCIETY



## ***Inside:***

### ***Butterflies of Ghana***

***A guide to finding, and an intimate perspective on, Frosted Elfins***

***Recent information on Carmenta ogalala***

***New Weidemeyer's Admiral records in extreme southern Alberta***

***A new state record for Colorado: Erynnis tristis***

***James Sinclair: con artist or shrewd businessman?***

***Book Reviews, Election Results, Metamorphosis, Announcements, Membership Updates, Marketplace***

***... and more!***



# NEWS OF THE LEPIDOPTERISTS' SOCIETY

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# Contents

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

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<b>Shrewd businessman or con artist? James Sinclair and his elaborate Lepidoptera sales scheme</b> <i>John V. Calhoun.</i> .....	3
<b>New records for Weidemeyer's Admiral, <i>Limenitis weidemeyrii</i> (Nymphalidae: Limenitidinae), from Canada: the extreme north of its range</b> <i>Lynne E Burns, Victoria Snable, and Medea Curteanu.</i> .....	10
<b>Recent capture information on the scarcely collected moth <i>Carmenta ogalala</i> (Sesiidae)</b> <i>William H. Taft, Jr.</i> .....	13
<b>Announcements:</b> .....	14
Southern Lep Soc; Soc of Kentucky Leps; Assoc for Tropical Leps; Categories of Financial support for the Wedge Foundation; Pay Pal; the Lep Soc Collecting Statement; Increase in late subscription fees; New MONA fascicles coming; The combined 2020 Lep Soc annual meeting, with the Southern Lep Soc and Association of Tropical Leps; Election results; the Lep Soc Pacific Slope 2020 annual meeting; Correction to the Winter News; the Lep Soc statement on diversity, inclusion, harrassment, and safety	
<b>Digital Collecting – Butterflies of Ghana, Africa</b> <i>Bill Berthet.</i> .....	16
<b>The Marketplace.</b> .....	26
<b>Conservation Matters --</b>	
<b>Science and storytelling: an intimate perspective on Frosted Elfins</b> <i>Jennifer Selfridge.</i> .....	30
<b>A guide to finding Frosted Elfins</b> <i>David McElveen and Virginia Dell Craig.</i> .....	34
<b>Book Reviews.</b> .....	40
<b>Membership Updates.</b> <i>Chris Grinter.</i> .....	43
<b>A new confirmed state record for <i>Erynnis tristis tatus</i> (W. H. Edwards, 1883) in Colorado, USA</b> <i>S. Mark Nelson.</i> .....	44
Membership, Dues Rates, Change of Address, Mailing List, Missed or Defective Issues, Submission Guidelines and Deadlines. ....	46
<b>Executive Council/Season Summary Zone Coordinators.</b> .....	47

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## Front Cover:

*Leucodonta bicoloria*, May, 14, 2016, Želtišķiai, Lithuania, 55.398642°N, 25.260881°E, image by Arūnas Eismantas.

# Shrewd businessman or con artist? James Sinclair and his elaborate Lepidoptera sales scheme

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As a devoted bibliophile, I often visit used book stores and spend a great deal of time scanning the internet for old entomological volumes. Over the past three decades, I have repeatedly come across one particular publication. Most copies are worn, with torn paper wrappers and discolored pages. The word "INSTRUCTIONS" figures prominently across their covers, followed by the descriptive subtitle "for Collecting and Preserving Valuable Lepidoptera." Closer inspection reveals differences among the copies. Those with gray covers read "Copyrighted 1916," while others with gold or black covers read "Copyright 1917." All include descriptions of North American butterflies and moths, with crude, uncolored illustrations, or "cuts," of adult specimens inserted into the text.

These stapled, paperback manuals were not prepared to educate budding lepidopterists about the fun and scientific value of collecting specimens. Instead, they are glorified catalogs, designed to advise readers about the most desirable species and how to collect and preserve them for the sole purpose of selling them to the author. They were privately published by James Sinclair, a self-described entomologist who was not bashful about the purpose of his endeavor: "to secure collectors who will work spare time collecting for me."

As a boy growing up in California, the naturalist James W. "Bill" Tilden (1904-1988) purchased Sinclair's manual, hoping to make money. The money never came, but Tilden learned the fundamentals of collecting, which sparked his life-long interest in Lepidoptera (Smith 1989). The entomologist Ralph W. Macy (1905-1999) similarly recalled that as a 12-year-old boy in the spring of 1917 he ordered Sinclair's manual and collected butterflies with an expectation of becoming rich. None of the specimens he collected were valuable, but Macy credited Sinclair with stimulating his interest in entomology (Macy 1991). Macy also mentioned that Sinclair was later convicted of mail fraud. Although I had heard the same story, it seemed more myth than reality.

Unable to locate any published biographies of Sinclair, I decided to conduct my own research. I consulted multiple copies of his publications, as well as newspapers and magazines, census records, city directories, and various other public documents. I share my findings in the hope that they are of interest to others who are curious about this eccentric character and his quirky instruction manuals.

**From Scotland to California.** James Sinclair (no middle name) was born on 22 December 1886 at Stromness, Orkney (Orkney Islands), Scotland, to John Sinclair (1854-?), a shipmaster, and Catherine Sinclair (née Munro) (1854-1924). He was the third child of six, the others being Williamina (b. 1881), John (b. 1885), George (b. 1890), Arthur (b. 1892), and Wilfred (b. 1894). Sinclair immigrated to the United States aboard the SS Laurentian, arriving at Boston, Massachusetts, on 27 April 1907. By 1909, he had settled in San Francisco, California, where he worked as an insurance agent and elevator operator. He soon began collecting local butterflies and spent some months at Truckee, California, learning collecting fundamentals from Charles F. McGlashan (1847-1931) and his daughter, Ximena (1893-1986), who were renowned collectors of Lepidoptera. Ximena wrote a full-page article about breeding and selling butterflies (McGlashan 1912), which undoubtedly influenced Sinclair.

While working as an elevator operator, Sinclair became acquainted with Reginald G. "Rex" Ashby (1872-1942), an English immigrant who came to the United States in 1899. Also interested in natural history, Ashby spent the summers in the field with Sinclair and started working as his assistant. Sinclair began running advertisements in entomological journals that offered "fresh and perfect duplicates of specimens obtained." Describing himself as an "Experienced propagator, and collector of California Lepidoptera," he offered bulk quantities of specimens for a flat rate of five cents each from "the best localities in California," though he sold certain rare mountain species for fifty cents a pair (about \$13 in today's economy). He sometimes gave his name as "Prof. James Sinclair," presumably to lend credibility to his operation, which he conducted from his residence 333 Kearny Street, San Francisco.

Sinclair's business was a success and he reportedly once had \$2000 on deposit in the Hibernian Savings Bank; a considerable sum at that time. His orders soon exceeded his ability to collect all the specimens himself, so he devised a way to obtain more material. In a March 1913 advertisement, he explained, "My orders for such are so numerous that I am forced to get collectors to work for me. But a few know the art of collecting and preserving insects. I am going to make my own collectors by sending out instructions . . . so let me know if you will learn to collect." Sinclair planned to create an army of collectors, who would

send specimens in exchange for cash. He would then offer those same specimens to paying customers at a higher price. This was just the beginning of Sinclair's enterprise.

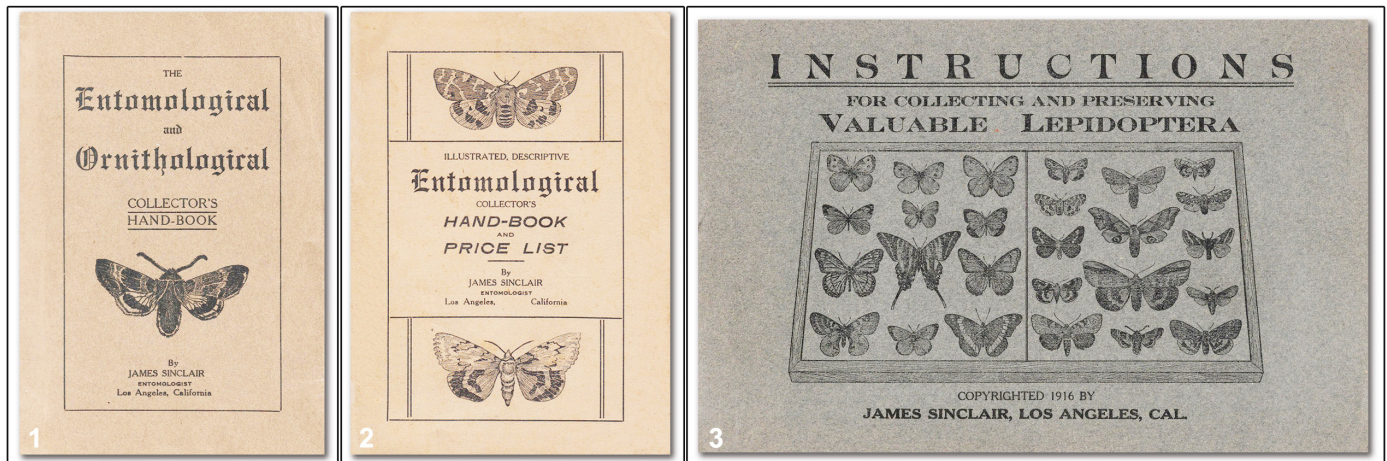
**A burgeoning business.** In 1913, Sinclair moved to Los Angeles, where he took up residence at the Lincoln Hotel, 207 S. Hill Street. He also rented a room in the Copp Building, 218 S. Broadway, to use as a business office. Ashby also moved to Los Angeles and temporarily lived with Sinclair, working as his assistant until at least 1916. Claiming to supply specimens to colleges and scientists, Sinclair advertised for would-be collectors to send a two-cent stamp for more information. Probably to promote his assertion of being a serious entomologist, he succeeded in being elected a member of the Entomological Society of America in 1914.

It is unclear what Sinclair mailed to potential collectors who responded to his ads prior to 1915, but beginning that year he sent an introductory letter with an 8-page folder of prices, directing them to purchase his book of instructions for one dollar. Those who sent the requested amount received a small (about 6" x 4"), 80-page booklet titled *The Entomological and Ornithological Collector's Hand-book* (Sinclair 1915a) (Fig. 1). According to copyright records, it was printed by F. G. Corwin and was first published on 24 January 1915. In this booklet, Sinclair encouraged collectors to send another dollar to purchase a second booklet of similar size, his 46-page *Illustrated, Descriptive Entomological Collector's Hand-book and Price List* (Sinclair 1915b) (Fig. 2), which included descriptions and illustrations of the species of butterflies and moths he wanted. Also printed by F. G. Corwin, it was first published on 1 February 1915. In addition, Sinclair suggested that his collectors purchase from him two popular books by W. J. Holland: *The Butterfly Book* (for \$3.30) and *The Moth Book* (for \$4.40). Before they even got started, some of his collectors were into Sinclair for as much as \$9.70, which is equivalent to \$250 in today's economy. This does not include other supplies, such as pins and forceps, which Sinclair also sold.

The sale of his publications and books soon became the real source of Sinclair's income. A teacher from New York recalled that she received Sinclair's first booklet, which she described as "a small paper-covered book, of the cheapest paper and poor, small print." Realizing that the species worth any money did not occur in her area, she refused to continue with the program. Such dissatisfaction became a recurring theme among Sinclair's correspondents.

Sinclair was visited by Post Office Inspector Clark E. Webster, who requested "a change in his books." Sinclair complied by combining his two small booklets into one larger manual and price list titled *Instructions for Collecting and Preserving Valuable Lepidoptera for Scientific Purposes* (Sinclair 1916). Measuring about 8.75" x 5.75" in size, it was printed in a horizontal format in black ink, had gray card-stock wrappers, and 80 double-sided newsprint pages (Fig. 3). Copyright records indicate that it was published on 2 February 1916. Sinclair printed 10,000 copies at a cost of \$1000. Selling for two dollars, this manual included a separate introductory letter in which Sinclair thanked his "friends" for taking his course and agreeing to collect during their spare moments "every season from now on." He insisted that they needed these instructions to "make a success of this business." Sinclair repeatedly emphasized that he only wanted the listed "750 kinds" of butterflies and moths and would not pay for anything else. He claimed that his instructions were "as simple as can be" and required only "a few hours to master the rudiments of the work." His manual included descriptions and illustrations of nearly 100 species for which he would pay cash. Nonetheless, many who sent specimens never received payment. This soon led to accusations of fraud.

**Arrest and trial.** On 19 April 1916, Sinclair was arrested and charged with conducting a scheme of using the mails to defraud, by inviting persons in the United States and elsewhere to send Lepidoptera specimens in return for liberal payment. He was accused of keeping the specimens and refusing payment, and also selling booklets that were erroneously professed to contain valuable information on



Figs. 1-3. Covers of Sinclair's publications (sizes relative). 1, Sinclair (1915a). 2, Sinclair (1915b). 3, Sinclair (1916).

the science of entomology. Sinclair was investigated for six months by Post Office Inspector C. E. Webster, who claimed that Sinclair posed as a professional entomologist, and, "through extensive advertising and correspondence, got in touch with amateur naturalists, school teachers and pupils, promising to pay them from 5 cents to \$10 for specimens of butterflies." Webster argued that Sinclair "furnished these butterflies to rich and fashionable clients . . . who did not care for expense so long as they got what they wanted." Supposedly among such clients was the English zoologist Lionel Walter Rothschild (1868-1937), who amassed an immense Lepidoptera collection during his lifetime. Webster noted that during 1915 Sinclair advertised in 72 leading magazines and his bills amounted to as much as \$5,000, yet his receipts totaled more than \$8500. At the time of his arrest, Sinclair possessed 25,000 letters from all over the country – many enclosing money orders – and more than 2000 boxes of butterflies and moths. He also was preparing for another marketing campaign. The government accused Sinclair of running a business that ensnared collaborators, and in return he received no less than one million specimens.

Sinclair's alleged scheme also involved the sale of his own booklets, as well as Holland's books. Collectors often purchased his booklets only to find that they contained little information of value. When they sent specimens, Sinclair would tell them that he was considering paying for them, but in the meantime they should purchase Holland's butterfly and moth books to help them find better specimens. If a collector protested, Sinclair allegedly informed them that their specimens were worthless or the wrong species. Sinclair supposedly refused to pay many of his collectors, yet he later sold their specimens to other customers. The prosecution sought to prove that Sinclair reaped a great profit from selling his booklets and Holland's books to collectors, all the while baiting them with the impression that he would purchase their specimens. Sinclair maintained that he was conducting a "perfectly legitimate business."

The case was heard in the United States District Court before Judge William C. Van Fleet (1852-1923), who had been appointed to his seat by President Theodore Roosevelt. Sinclair's lawyer, Dudley W. Robinson (1881-1958), a former assistant U.S. district attorney, begged the court to try his client within a week following his arrest, arguing that Sinclair had used every dime to pay his \$2000 bond, which already had been reduced from \$2500 due to hardship. On the surface, this seemed like a noble request, but it was revealed that this action was meant to release Sinclair's money for payment of his attorney fees.

The trial began on 23 May 1916 and Sinclair's numerous boxes of specimens were entered as exhibits in the case (Fig. 4). The prosecution, headed by Assistant United States Attorney Mansel G. Gallaher (1873-1944), assembled a group collectors to testify.

With great fanfare, they arrived from California, Georgia, Massachusetts, Pennsylvania, and Vermont. One of those who testified against Sinclair was his own assistant, R. G. Ashby, who detailed the alleged "accumulation of wealth at the expense of thousands of butterfly chasers." Ashby claimed that he had no interest in the business except the two dollars per day that Sinclair paid him. He estimated that receipts from the sale of Holland's butterfly and moth books reached \$8400 (about \$198,000 in today's economy), and that his total commission on these sales was only \$393.90 (about \$9,300 today).

Among other witnesses for the prosecution were several children, including 14-year-old James E. Walker, a schoolboy from San Mateo, California, whose collection had won first prize at the San Francisco World's Fair in 1915. After sending specimens to Sinclair, Walker reportedly received a printed postcard regretting that they were unacceptable. When asked why he didn't send any more specimens, Walker quipped, "Well, Judge, I figured that if a man had enough regrets to express to those who were catching butterflies that he had to have the cards printed, it was time for me to get out." Another duped collector was a 65-year-old woman who chased butterflies under the promise of making money, which never materialized.

The defense brought in two witness to defend against the accusation that Sinclair's booklets did not contain valuable information: Albert B. Ulrey and Samuel Rittenhouse, both from the University of California. Ulrey, a marine biologist and questionable expert in this case, testified that the booklets were scientifically correct and "filled with valuable information for the benefit of those interested in the capture and mounting of butterflies." Rittenhouse, a zoologist, was more cautious, stating that they were "all right as far as they went," but he did not recommend them as textbooks.



Fig. 4. Post Office Inspector C. E. Webster and assistants sorting Sinclair's butterflies during his trial (Anonymous 1916a).



Fig. 5. Cartoon of Sinclair's trial (Anonymous 1916b). Signature at lower right is from a 1917 document.

Sinclair testified on his own behalf, providing a chronological review of his life, from birth in Scotland up to his arrest. He claimed honest intentions in all his dealings, and vigorously denied swindling anyone for money. He argued that he purchased all the specimens that were sent per his instructions. Although he claimed to have only \$300 in his possession when arrested, he later admitted that he had put up \$2000 for bond. He became the talk of the town and the story of the trial was covered in nationwide newspapers. Sinclair was labeled in the press as a "spider" and a "canny Scotchman," who preyed upon unwitting children and old ladies. The *Los Angeles Times* published a whimsical cartoon of the proceedings, including the only known image of Sinclair (Fig. 5). A short man of slight build with

exaggerated features, he looked the part of the reclusive oddity that readers probably imagined.

At 10:30 pm on 26 May 1916, the jury found Sinclair guilty of using the mails to defraud in connection with offers to buy butterflies from collectors. He was found not guilty of devising schemes to defraud and the use of mails in furtherance thereof. The jury recommended leniency. Judge Van Fleet did not believe Sinclair's guilt had been proven beyond a reasonable doubt, and he criticized the grand jury for bringing the indictment. He was, however, bound to abide by the jury's decision. To show his displeasure, Van Fleet imposed a fine of only \$500, when such a charge could have carried a \$10,000 fine and two years in prison. He also granted Sinclair all the time he needed to pay the fine. Afterwards, Sinclair declared, "The finding of the jury was one of those freak verdicts for which our juries are famous, and which was not justified, either by the law or the evidence." As a result of his conviction, the Entomological Society of America dropped Sinclair from their membership list (Aldrich 1917).

Because Sinclair was found guilty of using the mails to defraud, Post Office Inspector Webster applied for a fraud order on 30 May 1916 to prevent Sinclair from using the mails for further fraudulent activities. A hearing was conducted on 2 June, during which Sinclair demonstrated why such an application was unwarranted. After a three-month investigation, the Post Office ruled on 2 October 1916 that Sinclair could continue to conduct his operation through the mail.

**Resuming business.** Following his trial, Sinclair wished to avoid more legal entanglements. He inserted a large, folded page into his 1916 manual with the heading "Important Notice to Collectors," commanding recipients to "read every word of this note, and please do so very carefully so as to be sure that you will never make these mistakes." He imposed a complex set of rules for sending correspondence and specimens, remarking that "some people are very hard to satisfy," adding that "they will always complain and call me all kinds of names." In his defense, he boasted that his business had been "very carefully investigated by the Postal authorities and also the United States Government," though he failed to mention that he had been convicted of mail fraud. Complaining that "certain people ignore all my RULES entirely," he promised that those who followed his guidelines could "make good money." In addition to

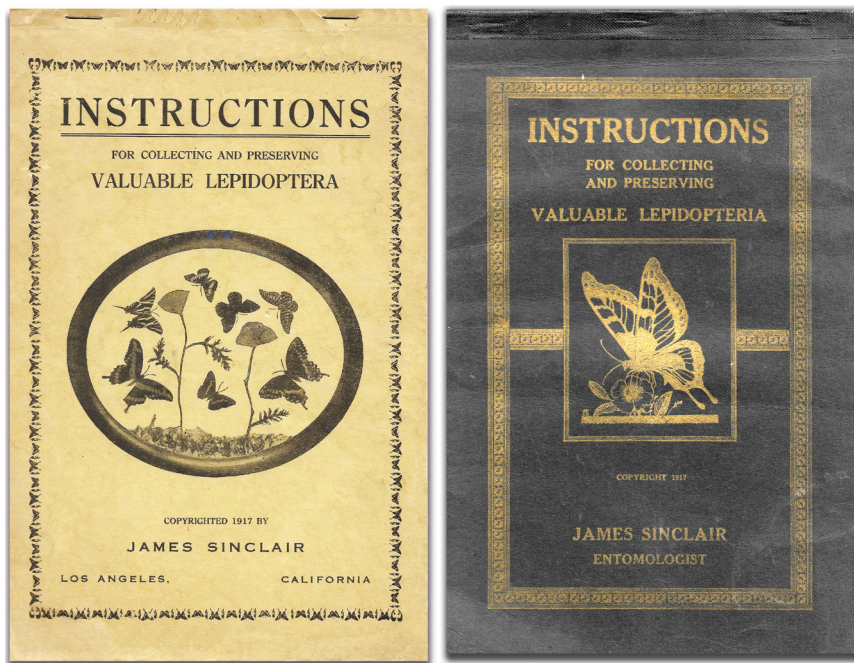


Fig. 6 (left). Cover of Sinclair (1917). Fig. 7 (right). Cover of Sinclair ("1917" a).

the folded notice, Sinclair inserted a small advertisement for collecting supplies that he sold. It seems that Sinclair intentionally made his instructions so complex that he could easily justify his refusal to pay collectors who failed to follow his rules. He kept their specimens and also made money from the sale of his manual and supplies. This is exactly what he was accused of doing all along, but he was now doing it legally in the eyes of the post office.

Sinclair used his 1916 manual for less than two years. He created a new version in 1917 in a vertical (table) format, stapled at the top, with gold, card-stock paper wrappers that featured a large circular design (Sinclair 1917) (Fig. 6). About 6" x 9" in size, it was printed in black ink on both sides of newsprint pages, which flipped on their short edge. The title omitted the phrase "for Scientific Purposes" of the previous version. This manual, printed in Los Angeles, was 80 pages in length and illustrated more of the species he wished to purchase, though many of the figure numbers were out of sequence. It was officially published on 19 September 1917 and the cover stated that it was "Copyrighted 1917." Like Sinclair's earlier manual, this one was rife with Latin name misspellings, and he listed forms and aberrations as full species. Sinclair surely lacked credibility to any knowledgeable lepidopterist.

Sinclair offered this new "course" for two dollars, but some collectors still questioned the legitimacy of his business. They complained about the poor quality of his publications and his refusal to send payment for their specimens. Nonetheless, Sinclair continued to place advertisements in a wide range of publications, including *Boy's Life*, *Electronics World*, *Farm Journal*, *Farm Life*, *Field and Stream*, *Forest and Stream*, *Fur-Fish-Game*, *Hunter-Trader-Trapper*,

*Kansas Farmer*, *National Republic*, *National Sportsman*, *Nature Magazine*, *Popular Mechanics*, *Popular Science*, *Science and Invention in Pictures*, *Scientific American*, *Successful Farming*, and *The Instructor*. He was even mentioned in the book *100 Ways of Making Money for Women at Home* (Marshall 1918). An editor of the *Rural New Yorker* warned readers that the "circulars from James Sinclair seem too good to be true . . . we have the same old game of requesting a small sum of money before any business can be done" (Anonymous 1917).

Sinclair also traded in birds and still advertised his earlier booklet, *The Entomological and Ornithological Collector's Hand-book* (Sinclair 1915a). In a 1918 issue of the journal *Oölogist*, Sinclair offered a mounted passenger pigeon in exchange for an "extra good automatic shot gun." Because the last known passenger pigeon died in captivity in 1914, demand was high for such specimens.

**Later manuals.** In early 1919, Sinclair relocated to Santa Monica, California, where he roomed at 3017 Washington Boulevard. Apparently to protect his privacy, he used the nearby Ocean Park post office for his correspondence. Around this time, he met George H. Rock (1873-1943), an Englishman who came to this country in 1888. Like Ashby years before, Rock moved in with Sinclair and worked as his assistant, listing his occupation in 1920 as insect salesman, while Sinclair called himself an insect dealer.

Sinclair once again updated his manual. Although it was still produced in the same vertical (table) format, it was somewhat larger (about 10.25" x 6.75") and its wrappers were stiff, black card-stock with a gilt title and butterfly illustration (Sinclair "1917" a) (Fig. 7). Printed in blue ink (resembling a mimeograph) on newsprint, the manual returned to a one-sided sheet layout, resulting in an increase to 112 pages. Sinclair's introductory letter was bound in at the front and its letterhead incorporated a small version of the circular design that he used on the cover of the previous manual (Fig. 6). Sinclair continued to cite the original 1917 copyright, which was granted for the previous, 80-page version.

Early copies of this manual were slightly shorter in length and had a less elaborate design on the cover, displaying a different border with no frame around the butterfly. Mailed with some of these copies was a small, folding advertisement reading "Latest 1920 Price List of Supplies." The wrapper of early copies was a single piece glued onto the stapled portion of the text. This weak attachment must have proven faulty, as later copies had a reinforcing black cloth strip pasted over the stapled binding. Later copies were also printed on thinner newsprint and included an

**\$10,000,000**  
 Why not collect insects this summer! The work is simple, profitable, healthful, interesting. **NO CAPITAL REQUIRED.** I buy large quantities, if scientifically prepared. All have cash value—some worth \$5,000—also birds, skins, eggs, nests, etc. I supply rich collectors, scientists and museums. \$10,000,000 is the value of Rothschild collection. Complete book instructions. Send stamp for particulars **James Sinclair, Entomologist, 333 Kearny St., San Francisco, Cal.**

**Butterflies Wanted** Why not spend your spare time, vacation, gathering butterflies, insects for me. I buy hundreds of kinds. They are wanted for rich collectors, museums, colleges. Easy outdoor work. Even two boys 11 and 13 earned good money with their mother's help and my instructions, price list, pictures, descriptions. Send 3 cents at once for prospectus before sending any specimens.  
**SINCLAIR, Dept. 2, Los Angeles, Calif.**

**BUTTERFLIES AND MOTHS WANTED** every summer for colleges. No experience needed. Easy, profitable work for trappers and nature lovers during summer. All have cash value if properly prepared. Get complete instructions, market prices, and valuable information. Send 2c. stamp.  
**JAMES SINCLAIR, Entomologist, Dept. 2, LOS ANGELES, CALIFORNIA**

**MONEY IN INSECTS,** eggs, nests, etc. Five cents and up paid for insects. I supply Scientists and Colleges for study purposes. Scents and Moth-Traps attract insects from miles around. I have taken 2000 in a single day with these. Each State contains different insects. Please prepare for the coming season now. Send 2c stamp for more information, and beginners get instructions.  
**JAMES SINCLAIR, Entomologist, Los Angeles, Calif.**

**FREE** Send at once for free prospectus. Get posted now for the coming Spring, Summer, Fall. I pay good prices for hundreds of kinds of butterflies, insects, for collections. Simple work with my pictures, price list, instructions. **SINCLAIR, Dealer in Insects, Dept. 6, Ocean Park, Calif.**

**WHY NOT** spend Spring, Summer and Fall, gathering butterflies, insects? I buy hundreds of kinds for collections. Some worth \$1 to \$7 each. Simple outdoor work with my instructions, pictures, price-list. Send 10 cents (not stamps) for my illustrated Prospectus before sending butterflies.  
**MR. SINCLAIR, DEALER IN INSECTS, Dept. 6, Box 1210, Victoria, B. C., Canada**

**WHY NOT** spend Spring, Summer and Fall, gathering butterflies, insects? I buy hundreds of kinds for collections. Some worth \$1 to \$7 each. Simple outdoor work with my instructions, pictures, price-list. Send 10 cents (not stamps) for my illustrated Prospectus before sending butterflies.  
**MR. SINCLAIR, DEALER IN INSECTS, Dept. 6, Box 1424, San Diego, Calif.**

**WHY NOT** spend spring, summer, fall, gathering butterflies, insects for profit-pleasure. I buy for collections. Good cash prices paid. Some worth \$1 to \$7 each. The work is intensely interesting with my instructions, pictures, price list. Don't delay; Send 10c (not stamps) for Illustrated Prospectus, before sending butterflies.  
**Mr. Sinclair, Dealer in Insects, Dept. 6, Box 1830, San Diego, Calif.**

Fig. 8. Examples of Sinclair's ads: a, April 1913; b, January 1914; c, March 1919; d, December 1913; e, April 1916; f, February 1920; g, February 1926; h, April 1926; i, August 1941.

inverted illustration (no. 6, pg. 42), as well as some other minor differences. Sinclair used the same fanciful butterfly design on the cover for some advertisements around this time (Fig. 8c).

These manuals also included an intimidating caution statement, in which Sinclair advised his collectors to “not become discouraged or offer any excuses whatsoever. I will not listen to them. No reason for excuses. The main thing is, get the specimens that are LISTED. That is all I ask. They are to be found, so no EXCUSE will be accepted by me . . . But whatever you do never threaten me or write me letters about you being discouraged, because there is no reason under the sun for excuses.” He concluded this discussion with a dubious promise: “By following my rules and only sending in the specimens of which I give CUTS AND DESCRIPTIONS AND PRICE in these instructions, you will be sure to make a success, and can depend on prompt payment from me.”

Sinclair continued to place small advertisements (Fig. 8), which typically appeared alongside others that peddled sock garters, penguin oil, and lessons on ventriloquism. In a 1923 issue of *Popular Mechanics*, Gerald E. Hyde of Wisconsin wrote a glowing review of Sinclair's ads: “I

am like most of Uncle Sam's Americans – the regular salary doesn't stretch far enough to cover all I want. Mr. Sinclair seems to offer a reasonable way out of the difficulty; he gets an inquiry from me!” Census records reveal that Hyde was a 24-year-old married clerk, who placed his own ads in *Popular Mechanics* for phonograph needles. Seeking ways to augment his limited income, Hyde was a perfect example of Sinclair's target audience.

In 1924, Sinclair moved yet again, taking up residence at 1211 5th Street in Coronado, across San Diego Bay from the city of San Diego. His assistant, G. H. Rock, went along and they continued to room together. Over the years, Sinclair received mail from two different post office boxes in San Diego, and his manuals reflected those addresses. He advertised his program as “simple outdoor work” that was “intensely interesting” (Fig. 8).

Although copies of Sinclair's manuals from Ocean Park and San Diego read “Copyright 1917,” they were issued up to 24 years after that date. This is revealed by the addresses that he used for his various advertisements (Fig. 8). Manuals with an address of Ocean Park (Sinclair “1917”a) were printed from about 1920 to 1924. Those with an address of P.O. Box 1424 in San Diego (Sinclair “1917”b) were



issued between 1925 and April 1938. Printed in blue ink on slightly thicker paper, manuals printed during this period were otherwise identical to those from Ocean Park. Sinclair evidently traveled to Victoria, British Columbia, in January and February 1926, as he temporarily changed the address in his ads to "Box 1210, Victoria, B.C., Canada" (Fig. 8g). By March of that year, he was back to using P.O. Box 1424 in San Diego.

Sinclair's manuals with an address of P.O. Box 1830 in San Diego (Sinclair "1917" c) were issued from May 1938 until at least August 1941. They were printed in blue ink on higher quality coated paper and included a table of contents. Sinclair replaced his introductory letter with an "Important Notice" about the cost of doing business. He also inserted a half-page flyer that quoted portions of McGlashan (1912) and another article that promoted collecting butterflies. Considering the large volume of manuals that Sinclair sold over a 25-year period, it is no wonder that so many have survived. They even turn up in antique stores and flea markets.

I found no evidence that Sinclair continued doing business after 1941. He conceivably lost his corps of collectors when the United States entered the Second World War in December that year. Many probably enlisted in the military and others directed their activities toward the war effort. Sinclair may also have lost his assistant, G. H. Rock, to illness, as he died two years later. Sinclair never married and lived the rest of his life in Coronado. He petitioned for U.S. naturalization in 1957, when he lived at 1401 Ynez Place and gave his occupation as "retired entomologist." The date of his death is uncertain, but records suggest it was 28 August 1962, at the age of 75. Although his motives were unmistakably self-serving, we owe a debt of gratitude to this "canny Scotchman" for introducing many to the study of Lepidoptera.

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The Orange Freak Nymphalidae, Calinaginae: *Calinaga sudasana*, Doi Pha Hom Pok, Chiang Mai, Thailand, Feb. 24, 2018. During a **Thaibutterflies.com** trip; images by Antonio Giudici.

# New records for Weidemeyer's Admiral, *Limenitis weidemeyeri* (Nymphalidae: Limetidinae), from Canada: the extreme north of its range

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**Additional key words:** Alberta, conservation, geographic distribution, prairie, species at risk

Members of the genus *Limenitis* Fabricius (Nymphalidae: Limenitidinae) are found throughout northern temperate areas with four species reported for North America (Scott 1986). These four species have broad ranges spanning large areas of the continent, to varying degrees, with overlap occurring for two to three species in many areas. The Weidemeyer's Admiral (*L. weidemeyeri*; Edwards) is a species of the western half of the continent ranging as far south as Mexico and extending in the north a mere approximate 20 km into the Canadian province of Alberta (Layberry et al., 1998, Pohl et al. 2010). In southern Alberta, it co-occurs with the Viceroy (*L. archippus*; Cramer) and White Admiral (*L. arthemis*, Drury) where hybrids with the later are known (Pinel and Kondla 1985, Bird et al., 1995). Previous occurrence records for the species in Alberta, known since the mid 1970's, fall into two general localities within the Milk River Basin; in and around Writing-on-Stone Provincial Park (WoS PP), and the Pinhorn/Milk River Natural Area (PMRNA; Smith and Bird 1977, Pinel and Kondla 1985). These localities are separated by a distance of approximately 45 km. This restricted Canadian distribution and small number of records of the Weidemeyer's Admiral led to the listing of the species under the Canadian Species at Risk Act as a species of Special Concern (Environment and Climate Change Canada 2019).

Throughout its range, Weidemeyer's Admiral generally appears to use woody riparian and canyon/gully habitats (Scott 1986, Layberry et al., 1988). With few records available from Alberta, little is known of the ecology of the *oberfoelli*, Brown, subspecies that occurs in this northern extreme of its range. Specimens of *L. w. oberfoelli* collected in the badlands of North Dakota are listed from lush coulees and breaks within the prairie landscape (Royer 1988). In Montana, the subspecies is known from coulee/badlands habitat in the east (Kohler 1980) to riparian areas with trees at high elevation and shrubs in low elevations in the Sweetgrass Hills of Montana (Kondla 2005; N. Kondla and S. Kohler pers. com.). This later location is directly south of the Alberta population. Previous work in Alberta lists occupied habitat as containing Plains cottonwoods (*Populus deltoides* ssp. *monilifera* (Aiton) Eckenwalder) in larger

riparian valleys, to several shrubs in the smaller coulees and breaks such as Thorny buffaloberry (*Shepherdia argentea* (Pursh) Nuttall), Choke cherry (*Prunus virginiana* Linneus) and Saskatoon (*Amelanchier alnifolia* Nuttall). Saskatoon is the only known oviposition plant for the species in Alberta (Pike 1987; Kondla 2005).

Here we report the results of surveys targeting the species in the summers of 2015 and 2016 aimed at gathering information to better delineate the species distribution and to improve understanding of habitat resource use in Canada.

**Methods.** We conducted surveys during the known flight period at riparian or coulee sites from July 10-19, 2015 and from June 24 to July 3, 2016 in the Milk River and Lost River basins. Sites were chosen based on 1) a ranking of medium to high for habitat suitability from previous habitat models (Taylor 2004), 2) satellite imagery to locate probable shrub cover within suitable topography, and 3) land access and permission. We surveyed sites on foot to locate shrub/tree patches and then looked for individuals. When possible, we captured individuals with nets for identification, or verified dorsal and ventral wing patterns via photographs. We recorded all location coordinates using a standard GPS. N. Kondla verified species identification. Sites were surveyed by two observers and sampling effort ranged from 1 to 12 person-hours at each site; we surveyed some sites on more than one occasion. To synthesize current knowledge of the species, we reviewed species records in the Alberta Conservation Information Management System (ACIMS) against museums records, published accounts or unpublished reports. We report general habitat characteristics at sites with occurrences but did not formally quantify this.

**Results and Discussion.** We surveyed a total of 19 sites (11 in 2015, 8 sites in 2016) and observed 12 Weidemeyer's Admirals at 7 of the sites (Fig. 1; Table 1). Six of these sites represent new locational records and one site, (Davis Coulee of WoS PP), is a previously known location with records dating back to 1976 (Smith and Bird 1977, Pinel and Kondla 1985, ACIMS unpublished data). In our surveys, we observed individuals in three new creek/coulee systems (Breed and Bear Creeks, Philp Coulee) between the two previously known location centers. Pike (1987) surveyed these same creek/coulee systems, in addition to others

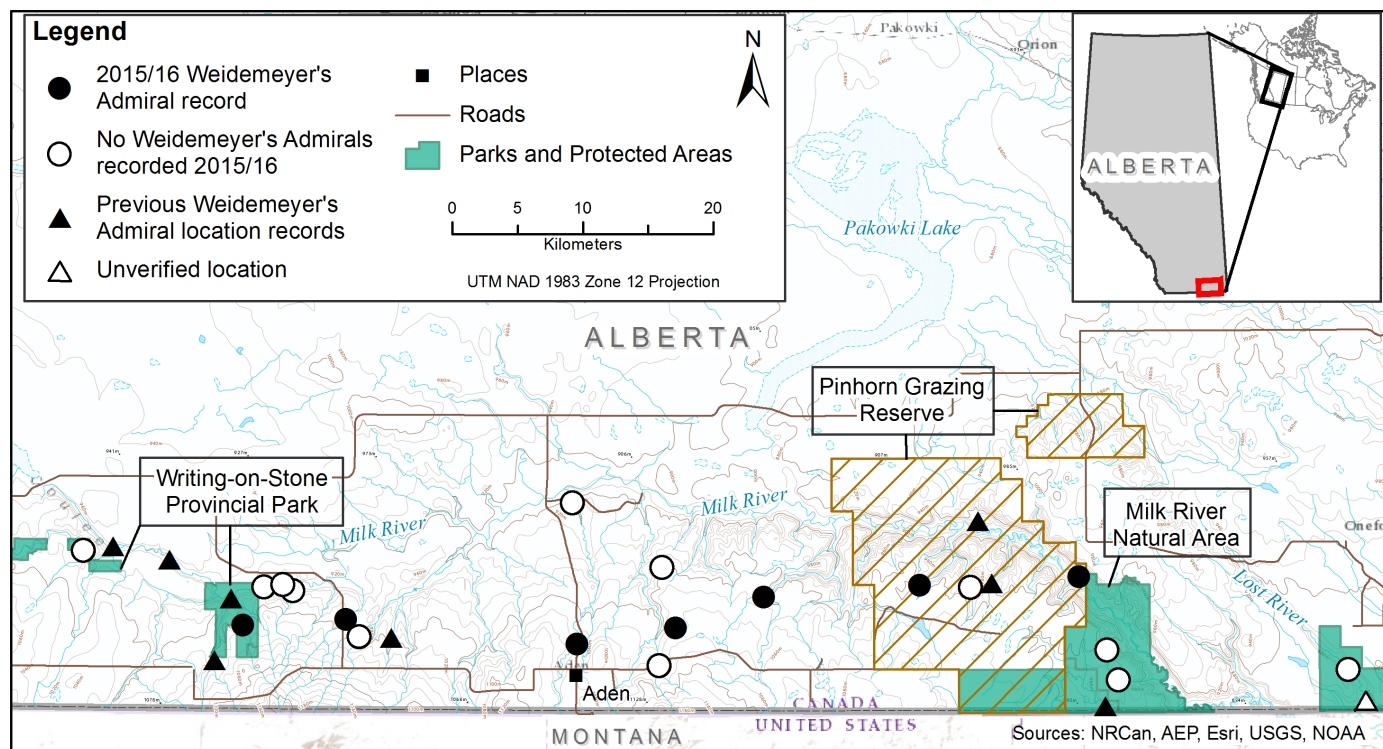


Figure 1. Distribution of Weidemeyer’s Admiral (*Limenitis weidemeyerei*), in Canada as determined by previous records and survey efforts during 2015 and 2016. Records are generalized points taken as representative of the site survey or polygon element occurrences in the Alberta Conservation Information Management System.

in between the two centers. He did not locate any individuals, but noted probable habitat on many of the creek/coulee tributaries. The three other occurrence locations

in our survey are close to other previous records (< 6 km away) but contribute to an overall expansion of records. We deposited a voucher specimen collected from

**Table 1.** New records of Weidemeyer’s Admiral (*Limenitis weidemeyerei*) in Alberta, Canada from surveys (2015, 2016), with general habitat characteristics of occurrence site topography and woody vegetation present.

Location	Survey date(s)	Survey effort (person-hours)	# of <i>L. weidemeyerei</i> observed	General habitat characteristics
Pinhorn <sup>A</sup> – Milk River Valley	11 July 2015	7.0	1	Wide riparian flats in canyon; shrubs <sup>1,2,3,4,5,6,7</sup>
Pinhorn <sup>A</sup> Coulee	15 July 2015	12.0	2	Narrow rugged coulee, badlands; shrubs <sup>1,2,6,7</sup>
Deer Creek	18 July 2015	6.0	1	Narrow riparian area (dry at survey); shrubs <sup>1,2,7</sup> , trees <sup>10</sup>
Bear Creek	26 June 2016	7.4	3	Narrow and steep coulee, shrubs <sup>1,5,6,7</sup>
Breed Creek	30 June 2016	8.0	1	Moderately wide, gently sloped riparian area; shrubs <sup>1,4,7,8</sup>
Philp Coulee	29 June 2016	11.3	2	Moderately rugged coulee, badlands; shrubs <sup>1,2,5,6</sup>
Davis Coulee (WoS PP)	01 July 2016	9.0	1	Rugged coulee, badlands; shrubs <sup>1,2,6,7,9</sup> , trees <sup>10</sup>
	02 July 2016	11.3	1	

<sup>A</sup>Pinhorn Grazing Reserve; shrubs noted at observation site: <sup>1</sup>Saskatoon (*Amelanchier alnifolia*), <sup>2</sup>Chokecherry (*Prunus virginiana*), <sup>3</sup>Thorny buffaloberry (*Shepherdia argentea*), <sup>4</sup>unidentified Willow (*Salix* spp.), <sup>5</sup>Silver sagebrush (*Artemisia cana* Pursh), <sup>6</sup>Shrubby cinquefoil (*Dasiphora fruticosa* (Linneus) Rydberg), <sup>7</sup>Western snowberry (*Symphoricarpos occidentalis*), <sup>8</sup>Wolf willow (*Elaeagnus commutata* Bernhardt ex Rydberg), <sup>9</sup>Juniper (*Juniperus communis* Linneus); and trees <sup>10</sup>Plains cottonwood (*Populus deltoides monilifera*).

at the University of Alberta, Edmonton, Alberta (Specimen number UASM391762).

Records in ACIMS corresponded to published and unpublished accounts of surveys for the species known from the locations around WoS PP and the PMRNA (e.g., Smith and Bird 1977, Pinel and Kondla 1985, Pike 1987, Kondla 2004, ACIMS unpublished data). In our review of the first Canadian record of the species mapped to Lost River (1974), we found the photograph and habitat information (e.g., tree cover and rugged topography) provided in the Smith and Bird account (1977) did

not match known habitat (e.g., sparse shrub habitat) in the gentler topography of the Lost River where it is currently mapped. We surveyed in the Lost River Basin in 2016 and also did not find any individuals or much suitable shrub habitat for the species. Examination of the information on the specimen record for the occurrence at the University of Calgary (Alberta, Canada) was unable to provide precise location coordinates of the record (J. Swann, pers. com.). Further, Kondla (2004) lists this historical location in the Milk River Canyon of the Pinhorn Grazing Reserve where he revisited the original site based on his personal communication of the location with the collector, W.W. Smith. We therefore suggest that this Lost River record be considered as unverified and recommend more survey effort in the area to assess the species presence.

At sites where we observed Weidemeyer's Admiral in Alberta, we found they occurred in landscape features consistent with previous work in the province and nearby States (Smith and Bird 1977, Kohler 1980, Pinel and Kondla 1985, Royer 1988). These features were breaks within the dominant prairie landscape provided by riparian areas and dry coulees, often in badlands formations, where shrub or tree patches were available. These habitats are not uniformly distributed throughout the coulees/riparian areas but are quite patchy depending on the slope, aspect and availability of moisture (Bain et al., 2014). Lastly, we document a few other noteworthy observations. At the site we surveyed in the Pinhorn Grazing Reserve on 15 July 2015, we observed two individuals mating. Copulation occurred for several minutes and then both individuals flew away – the female up to the top of the coulee out of our viewing range, and the male returned to perching on a nearby shrub. At WoS PP and Bear Creek, we found hybrid individuals, later identified by N. Kondla as hybrid Weidemeyer's x White Admirals. Hybrids have been noted before by Pinel and Kondla at WoS PP (1985) and future work may locate others within the distribution in Canada. A voucher hybrid specimen was placed in the Strickland Entomological Museum (Specimen number UASM391763). Lastly, at several sites we observed individuals perching and nectaring on Western Snowberry (*Symphoricarpos occidentalis*; Hooker), an additional nectar source observed for the species in Canada.

Collectively, this work suggests that the northern range of the species is likely continuous within the Milk River Basin in Canada along many of the creek tributaries and coulees that flow into the river; it is not restricted to two distinct location centers. However, the distribution is likely patchy within this range reflecting the discontinuous nature of shrub and tree habitat patches found in this semi-arid and prairie dominated landscape. Future surveys are recommended to the west and east of the current distribution of records, and to determine the biophysical attributes of habitat resources that are important for the species to aid in the understanding and management of this species in the northern extreme of its range.

**Acknowledgements.** We thank Alberta Environment and Parks for permits to survey (15-131, 16-086). Norbert Kondla kindly provided species expertise, identifications and specimen preparation, and we are indebted to him for his helpful advice throughout the project. John Swann provided data for Admirals from southern Alberta housed in the University of Calgary collection. Accommodations for surveys were graciously provided by staff at Writing-on-Stone Provincial Park, coordinated by Dennis Spackman. Marje Meijer and Dragomir Vujnovic from the Alberta Conservation Information Management System kindly provided information and records from their database. Dr. Cory Sheffield from the Royal Saskatchewan Museum, kindly reviewed *Limenitis* records for Saskatchewan from the museum and L. Guignet collections. We are grateful to the private landowners who granted us access to their properties to carry out surveys.

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# Recent capture information on the scarcely collected moth *Carmenta ogalala* (Sesiidae)

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For many years, I have been researching the literature regarding where and when other collectors have encountered the rare moth species *Carmenta ogalala* Engelhardt (Sesiidae). Unfortunately, there is a paucity of natural history and capture information about this small moth. This great plains and Rocky Mountain species (Figure 1) has been collected infrequently using aerial nets mostly one or two times every decade since the 1930's. The male holotype was collected near Durango, Colorado but most of the recent records occur along the eastern edge of the Rocky Mountain's front range, Kansas, and Nebraska.

According to Engelhardt (1946) this species was observed on hilly pasture lands flying among the herbaceous plants. Duckworth & Eichlin (1988) speculated that the food plant is likely in the Borage family (*Boraginaceae*) such as Fringed Puccoon (*Lithospermum incisum*) similar to another closely related prairie sesiid species, *Carmenta mariona* (Beutenmuller).

In 2009, I reviewed the annual 2008 Lepidopterists' Society summary and noticed that Chuck Harp reported collecting this species in Littleton, Colorado (Deer Creek Canyon Park) on July 10, 2008. He was using the "general clearwing lure" numbered L103, a primarily ZZ 3,13 A blend similar to the Peachtree borer lure. This was interesting as the lure has been used across this species range for years without ever attracting any male *Carmenta ogalala* specimens. I have noticed this enigma while collecting other sesiid species in Taos, New Mexico during a mass emergence of *Carmenta wildishorum* adults (Taft & Cognato, 2017). On the first day of emergence, they were attracted to both EZ 3,13 A lure blend (similar to the Lesser Peachtree borer lure) along with the ZZA lures. However, after that day the adults were never again captured using that EZ 3,13 A lure blend during that trip and all subsequent collecting trips in New Mexico.

On August 12, 2019, one of my collaborating collectors, (Nathan Taylor from Lamesa, Texas), reported that he had captured a specimen of *Carmenta ogalala* in a multi-pher #1 pheromone trap. The location was a sandy pasture dominated with Havard oak (*Quercus harvardii*) and sand sagebrush (*Artemisia filifolia*) located in Gaines County, Texas approximately half-way between Seminole and Lamesa. The lure used was a custom blend produced by Alpha Scents that I named Alpha EZA (EZ 3,13 A, EZ 2,13 A, ZE 3,13 A - 88:6:6). Four days later, 2 more males were captured at the same location using the same lure. This

collecting area has quite a few patches of fringed puccoon and is the most southerly location ever reported for this species.

My review of the Texas Lepidoptera Atlas Volume VII indicates that the *Carmenta ogalala* specimens are likely a new Texas state moth record. Hopefully, this new information will assist the author and other collectors in providing additional specimens for research and insect museums.

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Figure 1. Male *Carmenta ogalala* captured by Chuck Harp near Littleton, Colorado.

[www.lepsoc.org](http://www.lepsoc.org) and  
<https://www.facebook.com/lepsoc>

## ***Announcements:***

### **The Southern Lepidopterists' Society invites you to join**

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

Please write to me, Marc C. Minno, Membership Coordinator, at [marc.minno@gmail.com](mailto:marc.minno@gmail.com) if you have any questions. Dues may be sent to Jeffrey R. Slotten, Treasurer, 5421 NW 68<sup>th</sup> Lane, Gainesville, FL 32653.

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### **Society of Kentucky Lepidopterists**

The Society of Kentucky Lepidopterists is open to anyone with an interest in the Lepidoptera of the great state of Kentucky. Annual dues are \$15.00 for the hard copy of the News; \$12.00 for electronic copies. The annual meeting is held each year in November, at the University of Kentucky, Lexington. Jason Dombroskie will be this year's featured speaker. In addition, there will be a fall field meeting held in Georgia over the Labor Day weekend. Be looking for a report in the next SKL Newsletter. Follow the Society's facebook page (<https://www.facebook.com/societykentuckylep/>) for announcements of this and other field trips.

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

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### **The Association for Tropical Lepidoptera**

Please consider joining the ATL, which was founded in 1989 to promote the study and conservation of Lepidoptera worldwide, with focus on tropical fauna. Anyone may join. We publish a color-illustrated scientific journal, Tropical Lepidoptera Research, twice yearly (along with a newsletter), and convene for an annual meeting usually in September, though that may change with the recent move to Spring for the SLS meeting in 2019, with whom we typically share a meeting. Dues are \$95 per year for regular members in the USA (\$80 for new members), and \$50 for students. Regular memberships outside the USA are \$125 yearly. See the [trolep.org](http://trolep.org) website for further information and a sample journal. Send dues to ATL Secretary-Treasurer, PO Box 141210, Gainesville, FL 32614-1210 USA. We hope you will join us in sharing studies on the fascinating world of tropical butterflies and moths.

### **The Wedge Entomological Research Foundation Revises Categories of Financial Support**

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

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

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

Please contact Kelly Richers, [krichers@wuesd.org](mailto:krichers@wuesd.org), for further information. Thank you for your continued support.

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### **PayPal -- the easy way to send \$ to the Society**

For those wishing to send/donate money to the Society; purchase Society publications, t-shirts, and back issues; or to pay late fees, PayPal is a convenient way to do so. Sign on to [www.PayPal.com](http://www.PayPal.com), and navigate to "Send Money", and use this recipient e-mail address: [kerichers@wuesd.org](mailto:kerichers@wuesd.org); follow the instructions to complete the transaction, and be sure to enter information in the box provided to explain why the money is being sent to the Society. Thanks!

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### **Lep Soc Statement on Collecting**

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

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### **Increase in Late subscription fees**

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

**The joint Lepidopterists' Society/  
Southern Lepidopterists/Association  
for Tropical Lepidopterists meeting –  
Western Carolina University, Cullowhee,  
North Carolina – June 16-19, 2020**

For the full announcement of this joint meeting, please see the Winter 2019 issue (Volume 61,4: 174-175). This joint meeting, will be held from Tuesday, June 16 – Friday, June 19, 2020 in Cullowhee, North Carolina. The meeting will be hosted by Western Carolina University and Dr. James Costa. WCU is the westernmost university in the UNC system, located in a valley between the Blue Ridge and Great Smoky Mountains. Dr. Costa has been in the Department of Biology at WCU since 1996 and the director the Highlands Biological Station since 2005.

We encourage contributed papers and posters and will have a special trip for the BBQ and collecting to Highlands Biological Station on Thursday. A welcome reception will occur on campus Tuesday evening. Field Trips will be organized for Tuesday, and The Executive Council meeting of the Lepidopterists' Society is also scheduled for Tuesday. Main sessions (Wednesday through Friday) and the Friday banquet will also be on campus, with housing conveniently located in Blue Ridge Hall on campus.

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

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

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### Election Results

Here are the election results for the 2020-2021, starting as of the end of the Lep Soc meeting this summer. New electees are encouraged to attend the Executive Council meeting at this summer's Annual Meeting (see announcement above).

<u>Vice President:</u>	<u>Votes:</u>
Deane Bowers (1st VP)	252
Ivonne Garzon	235
Greg Pohl	243

#### Member at Large:

Elizabeth Barnes	205 ✓
Jeffrey Belth	188 ✓
Sangmi Lee	186 ✓
Carol Butler	174

**The Lepidopterists' Society, Pacific  
Slope Section, 2020 Annual Meeting, May  
8-10, White Mountain Research Center,  
Owens Valley Station Bishop, CA**

Kelly Richers, organizer. 9417 Carvalho Court, Bakersfield CA 93311 (661) 201-7357 kerichers@wuesd.org

The 2020 meeting of the Pacific Slope Section of the Lepidopterists' Society will be held at the Owens Valley Station of the White Mountain Research Center, University of California, Los Angeles located at 3000 East Line Street, Bishop, CA 93514 Tel: (760) 873-4344. The meeting will be for amateur and professionals, with presentations desired for Friday evening and Saturday.

This is a rare opportunity to hold a meeting in a desirable location within reach of numerous lepidopterists, whether one is interested in photography, collecting or just getting to some of the best scenery California has to offer.

The meeting will be from noon, May 8<sup>th</sup> to noon May 10<sup>th</sup>, Friday-Sunday, with meals included in the price per person. Friday evening will be devoted to informal presentations while Saturday will be more formal presentations as time and the number of presentations permit.

It is anticipated that there will be room and board space for 30 persons at the actual facility, and nearby Bishop has much more in the way of formal (but more expensive) motel and hotel overnight accommodations. There will be a room for presentations and lab space available for detail work.

**Costs:** Room and board, per person per night are \$55, plus five dollars for me for postage for stuff being mailed and printed to make a per person price of **\$115.00 per person** for the meeting.

If you are NOT staying on site you still have to pay because they do not separate out meals from the boarding part. If you are staying in a camper on site you still have to pay because they do not separate out meals from the boarding part. Therefore, **the cost, no matter what you do, is \$115 per person if you are eating there.** If you are not eating there or staying there, you still have to pay because I need to make up the costs for the lab and the meeting room, and this is the only way you can help me do that. If you are staying and **not** eating there, you still have to pay but only \$60 for the two nights.

Got all that? A release will need to be completed also, which is attached and can be mailed in or brought.

Please reply to me before April 15 so I can get numbers together for them. Thanks, Kelly

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*Announcements continued on pg. 29*

Digital Collecting:**Butterflies of Ghana, Africa**

Bill Berthet

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This article covers two trips: April 14 to May 06, 2018, Bunso Arboritum - Kwabena Sam Forest - Ankasa National Park and Bobiri Forest & Butterfly Sanctuary - Atewa Hills - Wili Falls; and April 24 to May 11, 2019, Bobiri Forest & Butterfly Sanctuary - Kwabena Sam Forest Bia - Ankasa - Kakum National Parks - Aburi Botanical Gardens.

The 2018 Butterfly photographic holiday was organized by Adrian Hoskins using Ashanti African Tours as the ground agent. The 2019 holiday was organized by Bill Berthet using Ashanti African Tours as the ground agent.

Ghana, about the size of Oregon, is located on the western edge of central Africa, between Cote D' Ivore (Ivory Coast) and Togo bisected by the equator (0° latitude). The southern edge borders the Gulf of Guinea, part of the Atlantic Ocean. Predominantly Christian, but largely Muslim in the North, Ghana is often referred to as Africa for beginners. Not only does this amiable and largely hassle free country form an obvious entry-level destination for nervous, newly independent travelers, but it also boasts a remarkably varied set of attractions within an unusually compact travel circuit. Post millennial Ghana has embraced the democratic process, and the regular changovers of elected government, along with the freedom of speech and free press that go along with it.

The weather Gods were smiling on both trips. While hot and humid, not a single day was lost to rain. Mosquitoes, snakes, and other biting insects were not bothersome, however, I would recommend malaria pills, drinking lots of bottled water, wearing a hat and open fingered gloves, using lightweight rubber boots, and watching out for thorny vines and ants. Most trail/roads are flat with elevations ranging from 88 to 247m. At 560 m, only the trail to the top of Atewa Hills near Kibi was higher, with Wili Falls being the highest waterfall in Ghana. I will begin with descriptions and locations of the various habitats in western Ghana

near the Cote D' Ivore (Ivory Coast) border then move east across the country to the Togo border.

The mid to large size butterflies in the genus *Euphaedra* are among the most gorgeous of all Lepidoptera in the world, combining great contrast of coloring with the most exquisite and harmonious blending of the colors. This genus constitutes one of the largest and most complex genera in Africa with around 192 species, with Ghana featuring around 32.

Most of the species are forest dwelling, fruit feeding butterflies, sharing a common wingshape. Most have a similar pattern on the upperside, typically with the basal areas of the wings (particularly the hindwings) have large suffused patches of metallic blue, green, yellow, orange or red. Most species have a cream or orange colored sub-apical bar of varying widths and lengths. The undersides are usually some shade of yellow or green, marked with black spots and streaks that vary in intensity and configuration according to taxon and locality. Several species have beautiful red to pink patches or streaks on the underside hindwings.

On the second trip, my butterfly companion P.Y. "Skipper" Thong from Singapore and myself hopped into a very comfortable Toyota four wheel drive Land Cruiser type vehicle, with Prince as our driver. Our butterfly guide Philip, handed us the Ashanti African Tours Butterflies of Ghana checklist with 192 Genera, and 936 species of butterflies. After many hours of driving through farm scrub habitat with very poor to fair road conditions and constantly being approached by various road vendors, we stopped at a local market to pick up ripe mango's for bait. We planned to drop these on various trails and squish them with our feet.

We finally arrived at Jodies Guest House with working A/C, hot showers, and electrical plugs, near Bia National Park. Food at the



Wili Falls





Top: Bia Reserve Area sign; Bottom: one of the roads in Bia reaching a point where it is virtually impassable.

local restaurant was not edible. I always have a large box of corn flakes and Lances Peanut Butter Crackers with me for moments like this.

Early the next morning we picked up the required Ranger with shotgun to guide us to where the butterflies are in Bia National Park. At around 247 m this rarely visited area is a 563 square kilometer biosphere reserve with some of Ghana's last remains of untouched forest. Here there are a just under 400 species of butterflies. The problem was that the road going into the park was not maintained, and was blocked by several fallen trees and other debris. We had to hire a local to clear the debris so we could drive

further into the park. After several kilometers the reeds, shrubs, and grasses were over seven feet tall preventing us from driving any further, so we were restricted to walking a small portion of the trail/road. We spent several days there with Philip using rotting crab and smashed mangos for bait. There were not many butterflies, though the several that were photographed we did not see on the rest of our holiday. This area has the potential to be quite productive if you spent more time and the road was cleared.

Butterflies in this location included an extremely fresh, very brightly colored *Charaxes lucretius* male feeding on rotting crab; *Euphaedra perseis*, rather scarce, exceptionally shy, but strongly attracted to fruit; and one of the red *Euphaedra* species that mimic the day-flying moth *Aletis helcita* in the Family Geometridae. After many days, I finally was able to get a decent open wing shot of *E. perseis*. Often when approaching *perseis*, they sense you are there, and fly off, only to land a short distance away, almost always facing you and usually perched too high to allow a good dorsal shot opportunity.

Leaving Bia we passed many groves of Cacao. The beans are a pure form of chocolate. Ghana is among the largest exporters of Cacao in the world, second only to the Ivory Coast. Cacao is not native to this country, but with government assistance this plant has become a dominant crop in Ghana.



Cacao tree.



Left: *Charaxes lucretius*; center and right: *Euphaedra perseis*.



Ankasa National Park

forest on each side, was quite difficult to navigate, with high water areas and extremely deep muddy conditions.

Baiting the road with fermented smashed mangos lured in the pink, black, and yellow colored *Charaxes zingha*. *C. brutus* & *C. castor* both came to rotting crab. We also photographed *Eresiomera bicolor*, *Liptena simplicia*, and *Telipna semirufa* in this area, all 3 in the family Lycaenidae.

*Euphaedra xypete* is one of the most beautiful butterflies in the world. It is found in a variety of forested habitats, including those that are somewhat degraded. It is always a treat observing this uniquely colored butterfly. *Euphaedra zampa* is a rather scarce, deep forest butterfly that usually flies by itself, is extremely shy, and a real challenge to photograph, especially opened wing. Binoculars to guide you, stealth like approach, understanding habits, direction and strength of light, background, angle of shot, and having patience are some of the requirements for good butterfly photography.

Located in Southwestern Ghana near the Cote D'Ivoire border at around 88 to 100 meters lies Ankasa, the wettest National Park in Ghana. During our first trip we stayed on site in a very basic uncomfortable room, with no A/C, hot water, or electrical plugs. At least the beds had mosquito nets. The second trip we crashed at much better accommodations about 45 minutes away. Ankasa has one main road, and we had to use their driver and guide. The vehicle we were in was a high clearance very old Land Rover with 398,456 kilometers showing on the dashboard. The road, with closed canopy



Top row: left -- *Eresiomera bicolor*; center -- *Liptena simplicia*; right -- *Telipna semirufa*. Center row: left -- *Charaxes zingha*; center -- *C. brutus*; right -- *C. castor*. Bottom row: left -- *Euphaedra xypete*; center and right -- *E. zampa*.



Cape Coast Castle

From Ankasa, we headed almost straight east to Kakum National Park, driving through Cape Coast, home to the most famous castle in Ghana with a dark history of slavery. Up to 1500 slaves were shackled here, their last memory of their homeland before being shipped off across the Atlantic never to return again. Originally a trade lodge constructed by the Portuguese in 1555, the Swedish African Company in 1653 constructed a larger wooden fortress for trade in timber and gold. A decade later the fort was reconstructed in stone by the Danes who seized power from Sweden.

At around 160m, Kakum is the most visited National Park in Ghana and is famous for its canopy walkways some 30m above the ground. The area we explored was a narrow trail about 1.5 kilometers in length, with partially degraded forest on both sides that was rich with skippers. Highlights included the female of *Euriphene atossa*, a huge, very fresh,

shy *Protogoniomorpha parhassus* and a basking female of *Cymothoe fumana*.

Driving north towards Kumasi, just past the coffins for sale on the side of the road, we stopped at the junction in New Edubiase, turned right on Assiamah Guahyia Road for about 8 miles to one of the two best habitats for butterflies in Ghana, the Tropical moist semi-deciduous Kwabena Sam Forest. This area was once an old road but now more of a wide forest trail with excellent closed canopy forest on both sides. As you go along the trail it bisects a large powerline that provides open habitat with different species of butterflies than the forest. We baited heavily with squashed mangos along the trail and are soon rewarded with scads of butterflies in the genera *Euphaedra*, *Hypolycaena*, *Anthene*, *Bicyclus*, *Charaxes*, *Palla*, *Cyrestis*, *Cymothoe*, *Euriphene*, *Bebearia*, and others, coming out of the forest canopy to feed on the mango. Using rotting crabs lured in several species of *Charaxes* and *Palla*.

I love this place. I usually took off with four bottles of water and various snacks so I could stay out all day without returning to the vehicle. This kind of habitat is magical, with colorful butterflies of various shapes and sizes, flying low along the ground, looking for dappled sunlight to bask in. You get tested on your photographic skills, with various light conditions. You need a stealth like approach on some of the really skittish species. This is a great place to observe different butterfly species behavior -- flat terrain without a lot of rocks, letting you save the knees and get into "commando" position when necessary.



Top: left -- *Euriphene atossa*; right -- *Protogoniomorpha parhassus*. Bottom: left -- *Cymothoe fumana*; right -- *Bicyclus xeneas* (female).

I spot an eye spot, a *Bicyclus xeneas* female. Eye spots are a prominent feature on some butterfly wing patterns. Up close they help scare predators, and from a distance they help butterflies blend into their surroundings. In many species, eye spots are quite variable in size and number. In some Satyrine butterflies the presence and prominence of these eye spots changes with seasons or the years. Recent research from the University of Singapore suggests that the male and female of certain species of butterflies in the genus *Bicyclus* have different levels of the hormone ecdysone which regulates their different-sized eye spots.

During the past two trips to this habitat I have photographed 15 different species of *Euphaedra* (Forester Butterflies, including the following species. *Euphaedra hebes* occurs in high quality wetter forests. On the second trip, I only observed one specimen in 3 1/2 days of photographing butterflies at this forest, which was attracted to mango,

always at the same location. It was very skittish, and usually took off back into the forest when flushed. It took several days to finally get just this one open wing shot.

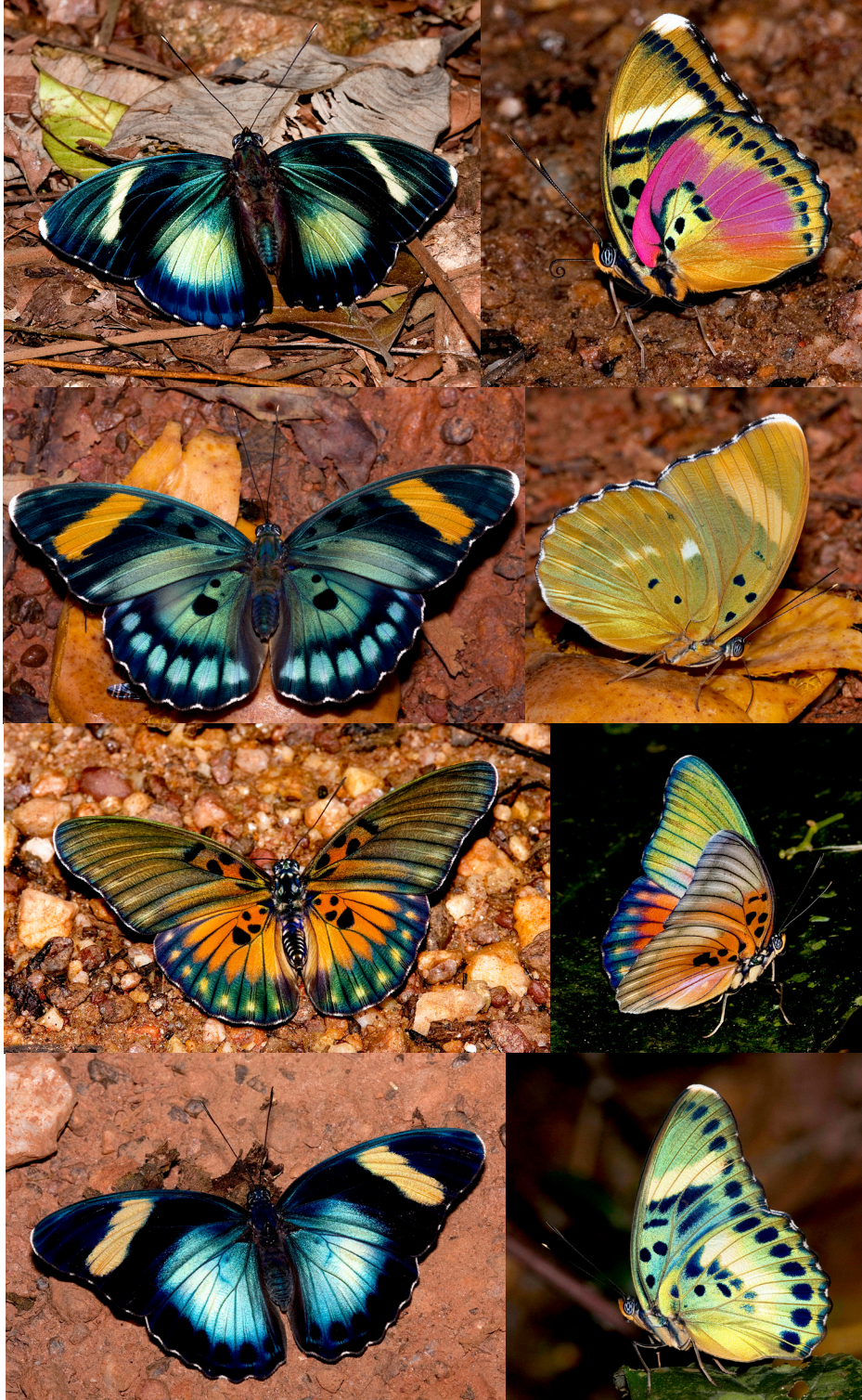
*Euphaedra francina*. The only time I was able to get a decent dorsal shot of this butterfly is when it landed near mango, walked slowly towards the bait moving its wings up and down. Once positioned on the bait it closed its wings. When startled, it flew several feet away, landing about 3 feet off the ground. If scared again, it would fly high up into the canopy. Occasionally you could find one basking, but always off the ground and not in a good position for a photograph.

*Euphaedra edwardsii*. On the 34th day of several butterfly photography holidays in Ghana I finally got decent shots of *edwardsii*. I observed this butterfly only twice in the past, never getting close enough for a decent click. When you see this timid butterfly it seems to sense you immediately, flying away deep into the forest.

*Euphaedra ceres*. Both sexes fly close to the ground, elegantly weaving their way through the forest undergrowth. They do so with great adeptness, and are very graceful in flight, often seen basking with wings outspread, either in sunspots on the forest floor, or on the foliage of bushes in light gaps. Females sometimes fan their wings slowly open and closed when feeding. It is strongly attracted to fruit.

*Euphaedra elius* is one of several red species which mimic day flying geometrid moths in the genus *Aletis*. These moths are noxious, so a bird that tasted one is deterred from attacking any similarly colored species. Both sexes tend to fly in the dark interior of the forest but can occasionally be found on the ground on forest roads, feeding on fallen fruit. Larval food plants include *Deinbollia*, *Paullinia*, and *Phialodiscus*.

*Euphaedra medon* shows more sexual dimorphism than any other *Euphaedra*. Probably the most common and adaptable, it may be found in all types of forest as well as heavily disturbed areas. One of the host plants is *Paullinia*



Upperside and underside, all species. Top: *Euphaedra hebes*; second row: *E. francina*; third row: *E. edwardsii*; bottom: *E. ceres*.



Top row: left and center -- *Euphaedra elius*; right -- *E. harpalyce*. Middle row: left and center -- *E. medon*; right-- *Pseudacraea warburgi*. Bottom row: left and center -- *Euphaedra crockeri*; right -- *Bebearia sophus*.

*pinnata*. The stems are sometimes used to poison fish in shallow pools in the Neotropics.

*Euphaedra harpalyce* is a common butterfly and one of the most robust, occurring in most types of secondary growth as well as forest, sometimes even in gardens. Their flight is low, fast, and often more sustained than most other species, and they are avid fruit visitors. Host plants are in the Sapindaceae family.

*Euphaedra crockeri* is a fairly common butterfly found in wetter forests in good condition. Males like to perch in dappled sunlight along forest paths.

*Pseudacraea warburgi*, when on the wing, rarely pause or stop. I followed this one for several minutes, when it finally landed long enough for me to get one click. They do not come to flowers or fruit.

And finally, one of the most beautiful butterflies in Africa, the open wing female of *Bebearia sophus*.

After a long, hot, humid, sweaty day of fabulous butterfly photography, I arrived back at Joe's Hotel, then took a long hot shower with a picture of Kate Hudson on a tile staring at me!

After several great days we moved further North bypassing Kumasi, then heading East to the other best place for butterflies in Ghana, the 21.40 square mile Bobiri Forest and Butterfly Sanctuary. At around 230 m above sea level, this reserve was created by the Forestry Research Institute of Ghana in 1939, falling in the Tropical moist Semi-Deciduous Forest Zone. In 1995 the FRIOG created the Bobiri Butterfly Sanctuary. This forest hosts around 400 species of butterflies, 120 bird species, about 100 indigenous tree species, and 80-100 plant species per acre.



The Bobiri Sanctuary sign.

We lodged on site, with good food, family like hospitality, and a generator for power at night, but no fans or A/C. It was a sweat box coming back in the late afternoon. Next time I will stay in a more comfortable hotel near Kumasi about 45 minutes away.

Early in the morning the lumberjacks would come in to cut down Wawa (*Triplochiton scleroxylon*), Mahogany (*Khaya ivorensis*) and Onyina (*Ceiba pentandra*) trees on the sometimes muddy forest road, continually turning over the dirt and exposing additional moist areas that many butterflies liked to mineralize on. Logging continued in this area everyday.

You can travel up and down this road for many miles. Several times we would hop into our 4 wheel Toyota and drive for miles, looking for different habitats. One spot had a large 100 foot long puddle in the middle of the road, that you had to get off the road to bypass. This left a narrow trail that was bordered on one side with 10-15 ft. tall flowering shrubs and closed canopy forest on the other side. This small area was fantastic. The shade loving species would come out of the forest to bask in the light gaps along the trail, while the flowering shrubs provided nectar for other species, including *Oxylides faunus* and *Gamia buchholzi*.

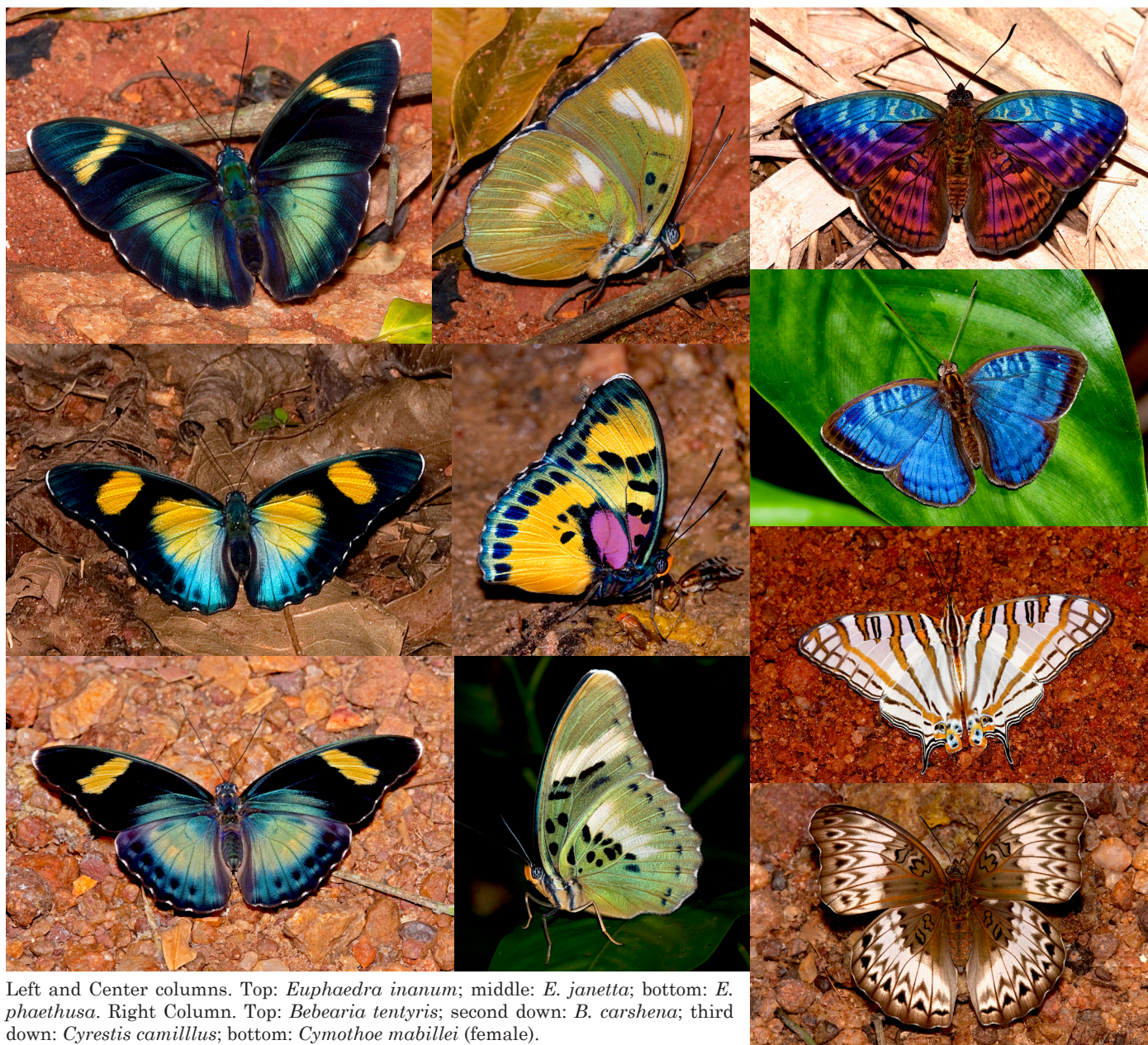
Using rotting crabs for bait attracted several species of early morning ruby eyed skippers including *Gretna cylinda*, that kept us busy before breakfast. Lots of discarded fruit was placed in the parking area and across the road about 30 feet away. The fruit was a magnet for butterflies, and you could spend several hours just in this one place, clicking away like mad. The 2018 trip had hundreds of *Libythea labdoca*, flying in one small area along the road, an incredible sight.

Philip spotted about an 8 ½ inch Tarantula around 50 feet away from my room.

Some of the *Euphaedra* found here included the following. *Euphaedra inanum* is widespread in all types of forest, but not a common butterfly, and in Ghana it is scarce. I have only observed it a few times. This butterfly is extremely wary, even when feeding on fruit. *Euphaedra janetta* is a common forest species butterfly of great beauty, that can survive a significant amount of habitat degradation.



Left Column: top -- *Oxylides faunus*; middle -- *Gamia buchholzi*; bottom -- *Gretna cylinda*. Right: Hundreds of *Libythea labdoca*.



Left and Center columns. Top: *Euphaedra inanum*; middle: *E. janetta*; bottom: *E. phaethusa*. Right Column. Top: *Bebearia tentyris*; second down: *B. carshena*; third down: *Cyrestis camillus*; bottom: *Cymothoe mabiliei* (female).

*E. janetta* stays near the forest floor, never flying high, and frequently comes to fallen fruit on forest roads. *Euphaedra phaethusa* is one of the most common members of the genus, being found in all types of forest and tolerating habitat disturbance relatively well.

Additional goodies included *Bebearia tentyris*, *B. carshena*, *Cyrestis camillus*, and a *Cymothoe mabiliei* female.

Leaving Bobiri behind we headed Southeast to the Atewa Hills near Kibi to look for the 650 species of butterflies found in the Atewa range. A large area of the range has been declared a forest reserve, including about 17,400 hectares of upland evergreen forest, rare for Ghana. The Atewa Range is one of the few places in Ghana that have documented sightings of *Papilio antimachus*, one of the

largest butterflies in the world.

The reserve is managed by the Forestry Commission of Ghana in collaboration with other stakeholders, key among them being the Okyeman Environment Foundation, which has restricted people from farming in the area and instead is trying to encourage eco-tourism. However, the reserve is under pressure from logging and hunting for bushmeat. It may also be vulnerable to mining exploration activities, since the reserve contains gold deposits as well as low-grade bauxite, the world's main source for making aluminum.

There is a narrow, sometimes steep, muddy trail with very good closed canopy forest on both sides that heads up to the 560 m summit. While there I came across several men with nets to collect butterflies. Observed were *Euphaedra*



Top: *Euphaedra themis*. Bottom: left -- *Cymothoe sangaris* (female and male); right -- *Kallimoides rumia*.

*themis* that seems more common in drier forests than in forests of good quality, the highly dimorphic *Cymothoe sangaris*, and *Kallimoides rumia*.

About a 45 minute drive from Kibi we arrived at the single road/trail Bunso Arboretum, famous for its canopy walkway. After spending about a half day here we started south down the main road passing through Accra, then east for an additional hour's drive to Aburi Botanical Gardens. P.Y. and I observed termite mounds and spent several hours here. To our surprise we found a lek of *Pyrrhochalcia iphis*. This shy, timid, very large skipper is a challenge to get close enough for a decent photograph and does not like flash. Having a fluttering flight, when sighted it usually takes off high into the canopy.

Heading northeast, just across the Volta River Bridge we stopped at a dry meadow that was hopping with yellow and white butterflies. Sweating profusely in the hot sun I manage to get a few shots of butterflies that I would not see during the rest of either trip. Dry meadow species included *Axiocerses harpax*, *Colotis euipe* (female), *C. evagore*, *Belenois hedyle*, and *B. subeida*.

Nearing the end of this adventure was the multi-hour drive Northeast to Wili Falls, with thousands of fruit bats

clinging to the rocky surfaces, bordering Togo. Unfortunately we visited this area on May 1st, a national holiday in Ghana. It was an interesting trail/falls that were packed with people, so hardly any butterflies. The event of the day was a beautifully colored, highly venomous boomslang snake.

This trip is possible to arrange on your own using Ashanti African Tours as your ground agent and requesting Andrew or Philip as your guide. They are quite helpful, are very knowledgeable on birds, and know many of the butterfly ID's. I took the very heavy 2 volume Butterflies of West Africa books by Torben Larsen with me for additional help with ID's. I would recommend the last 2 weeks in April to the first 2 weeks in May.

By far the two best habitats are Kwabena Sam Forest and Bobiri Forest and Butterfly Sanctuary. You could spend



Termite mound.





Top row. Left: *Pyrrhocalcia iphis*; middle: *Colotis euipe*; right: *Belenois hedyle*. Bottom Row. Left: *Axiocerses harpax*; middle: *Colotis evagore antigone*; right: *Belenois subeida frobeniusi*. To left: boomslang snake.

several days at each site. I would fit in Aburi Botanical Gardens, a 1 hour drive East of Accra for one day. After that you would have Kakum and Ankasa. If you are in good shape and have a small group the trail up to the summit at Etewa Hills near Kibi might be a good choice. Delta has a direct flight from New York to Accra.

I would like to thank Adrian Hoskins for sharing his photographic and ID skills, and allowing me to use some of his text found in his excellent [learnaboutbutterflies.com](http://learnaboutbutterflies.com) worldwide butterfly website.



Both of these images of aberrant Baltimore Checkerspots were taken on my three acre property where I have managed colonies (two) of *E. phaeon* for about 25 years. West Bridgewater is located in the northwest corner of Plymouth county, in southeastern Massachusetts. Additionally, I photographed another aberrant *E. phaeon* form which was taken at this same location (19 June 2004) and published in the Autumn 2004 edition of the NEWS on pg 77. Don Adams, [bankercheryl@comcast.net](mailto:bankercheryl@comcast.net).

# The Marketplace

**IMPORTANT NOTICE to ADVERTISERS:** If the number following your ad is "614" then you must renew your ad before the next issue if you wish to keep it in the Marketplace!

## Equipment

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

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

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

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

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

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

(Speaking of Leptraps) **FOR SALE:** LEPTRAPS LLC

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

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

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

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

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

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

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

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

### third issue following initial placement to remain in place.

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

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

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

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

Publications

Supplement To Lepidoptera of North America

14. Geometroidea

Geometridae: Larentiinae: Eupitheciini (Part)



Contributions of the C.P. Gillette Museum of Arthropod Diversity Colorado State University

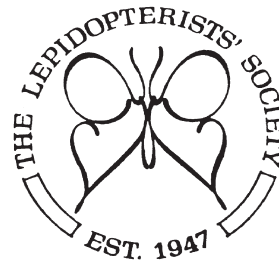
Supplement to Lepidoptera of North America. 14. Geometroidea: Larentiinae: Eupitheciini (Part) (2019) by Clifford D. Ferris.

This supplement was recently published online in Contributions of the C.P. Gillette Museum of Arthropod Diversity at Colorado State University, Fort Collins. Most of the Series is available online as open access downloadable pdfs. Dr. Ferris' contribution is a detailed species by species presentation of the North American fauna of Eupithecia together with the related genera Nasusina and Prorella. This group is the most species-

rich of North American Geometridae and the most difficult to identify since the majority of species can only be reliably identified by genitalic dissection. The first publication includes 191 plates and the supplement includes 35 additional plates most of which amplify missing information from some of the original plates, e.g. adults and genitalia. The URL to access the supplement is https://mountainscholar.org/handle/10217/186354. 621

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

WANTED: Part 1 (Satyriinae), Part 2 (Heliconiinae and Danainae), and Part 3 (Nymphalinae) of The Butterflies of Colorado by Michael S. Fisher (C. P. Gillette Museum Series). Will purchase entire Series (Parts 1-6) if necessary. Contact David C. Iftner at (217)730-7500 or iftner@casscomm.com. 621



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fauna of Eupithecia together with the related genera Nasusina and Prorella. This group is the most species-

Paralobesia (Lepidoptera: Tortricidae), a systematic revision

Memoirs of the Lepidopterists' Society, No. 6

by Hanna Royals, Jean-François Landry, Todd Gilligan

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

This is the first Memoir produced by the Society in nearly 20 years! Printed by Allen Press in full color on the same quality paper as the Journal, the new Memoir is 149 pages and is available now!

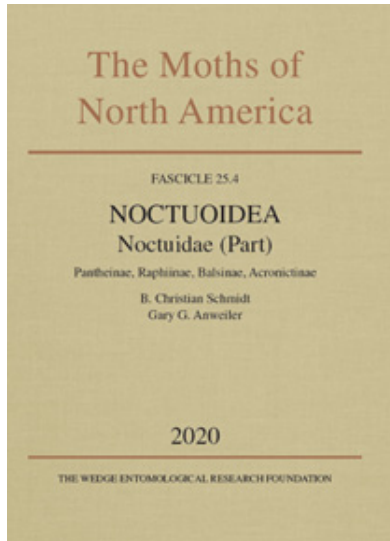
To order, visit https://www.lepsoc.org/catalog/memoirs or contact Ken Bliss, LepSoc Publication Manager at krlbliss@gmail.com.

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

Paralobesia (Lepidoptera: Tortricidae), a systematic revision. Includes text, illustrations of genitalia (Figs. 178-179), and a grid of 135 color photos of adult moths (Figs. 66-80).

Publications (continued)

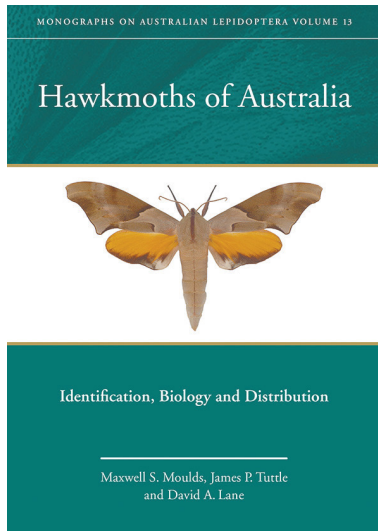
**The Moths of North America Fascicle 25.4: NOCTUOIDEA Noctuidae (Part) Pantheinae, Raphiinae, Balsinae, Acronictinae**, by B. Christian Schmidt and Gary G. Anweiler; 31 color plates and 44 monochrome photographs, plates, and maps by Jocelyn D. Gill. 479 pages, 130 species. Hardbound. ISBN: 978-0-9796633-4-5.



The Wedge Entomological Research Foundation is pleased to announce the publication of this new MONA fascicle. It will be ready for shipping by the end of February. This volume is available for a short period of time (until March 31, 2020) at a reduced introductory price of \$100.00 plus shipping; after that it will cost \$115.00 (plus shipping). Orders may be emailed to Kelly Richers for direct ship-

ment at email: [kerichers@wuesd.org](mailto:kerichers@wuesd.org) or mailed to Kelly Richers at 9417 Carvalho Court, Bakersfield, CA 93311. You may also go to the Wedge website and get the order form at <http://wedgefoundation.org/order.asp>. 621

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



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

Hawkmoths are large charismatic insects with highly variable and colourful larvae. Some species are specialised in their habitat preferences, but others are widespread and often encountered in gardens. However, little is known about most species, and associating the adults

with their larvae has previously been difficult or impossible.

Hawkmoths of Australia allows identification of all of the Australian hawkmoths for the first time and treats species found on mainland Australia, Tasmania and all offshore islands within Australian limits. It presents previously undescribed life histories of nearly all species and provides a comprehensive account of hawkmoth biology, including new parasitoids and their hawkmoth hosts. Detailed drawings and photographs show the external and internal morphology of adults and immatures, and eggs, larval instars and pupa. Keys are provided for last instar larvae and pupae of the 71 species that the authors have reared.

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

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

(see the Review of this book in this issue, page 42)

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

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

The five issues 27-31 are free pdfs (a simple search at

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

## Research

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

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

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

## To all it may concern: Search Notice.

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

America were coming from Labrador through the Moravian Missionaries. Was it the case with this specimen? Nobody knows. The abdomen of the specimen seems to have been cut off. Was it for genitalic dissection purpose? In any case, no dissection was found in the Muséum in Paris (Patrice Leraut, pers. comm.).

According to Dr Alma Solis (pers. comm.), it could be a mislabeled specimen seemingly related to an Indo-Australian group of moths. But who knows? If North American, it could feed on dried materials, insects, etc., and it could be a late Autumn or an early Spring species.

So, if anybody has one or more specimens in collection that could be this species, from America or other countries, please contact urgently: **Louis Handfield, 845 de Fontainebleau, Mont-Saint-Hilaire, Québec, Canada J3H 4j2; e-mail: [lscal@netover.com](mailto:lscal@netover.com); and phone: 450-467-8925** indefinite



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

## Announcements, continued

Continued from p. 15

### Correction to 61(4), Winter 2019

It has been brought to my attention that the issue date (bottom of the Table of Contents) was not changed from the Fall to the Winter issues. As such, the Winter issue date should read "November 22, 2019," NOT "August 27, 2019."

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

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



[www.lepsoc.org](http://www.lepsoc.org) and  
<https://www.facebook.com/lepsoc>

*Conservation Matters: Contributions from the Conservation Committee***Science and storytelling: an intimate perspective on Frosted Elfins**

Jennifer A. Selfridge, Invertebrate Ecologist

Maryland Department of Natural Resources, Wildlife and Heritage Service, 909 Wye Mills Road, Wye Mills, MD 21679 [jennifer.selfridge@maryland.gov](mailto:jennifer.selfridge@maryland.gov)

It is a chilly and windy morning in late April in Pocomoke State Forest on Maryland's lower eastern shore. I stand atop a sandy dune, hands in pockets, talking and laughing with a couple of other DNR staff and volunteers. All of us are zipped up trying to stay warm, competing for rays of sunlight that trickle through the budding branches of oaks, hickories, and dogwoods. We are waiting for a small, 3-person television crew who are coming to the site to film the frosted elfin butterfly, and to tell the story of the relationship between the elfin and one of its caterpillar host plants, wild lupine.



**Frosted Elfin on Lupine Leaflets:** A female frosted elfin inspects a twisted cluster of lupine leaflets while searching for a suitable oviposition site. (see also back cover)

The story is almost a romance of sorts. The frosted elfin is a small butterfly, with a wingspan of about an inch, and I think it is safe to assume that most people have never seen it. From a distance it is not particularly noteworthy, just a small brown butterfly that can easily escape notice if you aren't looking for it. But close up it is extraordinary. Shades of tan and auburn and chestnut come together like puzzle pieces on the wings. The edges of the wings are frosted, as if they have been dusted with snow. The antennae are striped like the stockings of the wicked witch of the West. The lupine is stunning in a more traditional way, and one more obvious to those fortunate enough to walk by a patch of it when it is in flower. Stalks of purple flowers stand in tall clusters (see back cover) sometimes over

a foot tall, towering over a bed of dark green leaflets that are distinctive even when the flowers are absent. At this site there is also a third character, wild indigo, another host plant used by the frosted elfin, a taller, bushier plant with small, yellow, pea-shaped flowers. Some of the frosted elfins here use lupine, others indigo, although we don't really know what determines female oviposition choice, or whether there is an advantage to using one over the other.

Today is unseasonably cold and the wind is fierce; it will not be easy to find nor photograph a frosted elfin in these conditions. I told the crew leader that I thought this might be a problem two days earlier when we spoke on the phone, but she explained that the date couldn't be changed. Schedules wouldn't permit it, crew availability would be a problem...other places to go, other people to see.

The frosted elfin is listed as endangered in the state of Maryland. It is also listed as threatened or endangered in several other states including Delaware and New York. In fact, frosted elfins are considered rare in every state where they occur, from New Hampshire to Florida and west to Wisconsin in the north and Texas in the south. They are globally rare butterflies, and as such, the US Fish and Wildlife Service is currently taking steps to determine whether or not the species warrants federal protection by carrying out intensive range-wide surveys, and evaluating whether known populations can be maintained through management efforts. The decision to federally list the frosted elfin will be determined in time. For now, our crew waits amidst the hardwoods with fence posts, mallets and polywire at our feet, set to re-enact the construction of an electric deer fence that we install around a 2-acre stand of lupine every year in order to protect the flowers and seed pods from browsing deer. Like the elfin, lupine is also rare, and is listed as threatened in the state of Maryland.

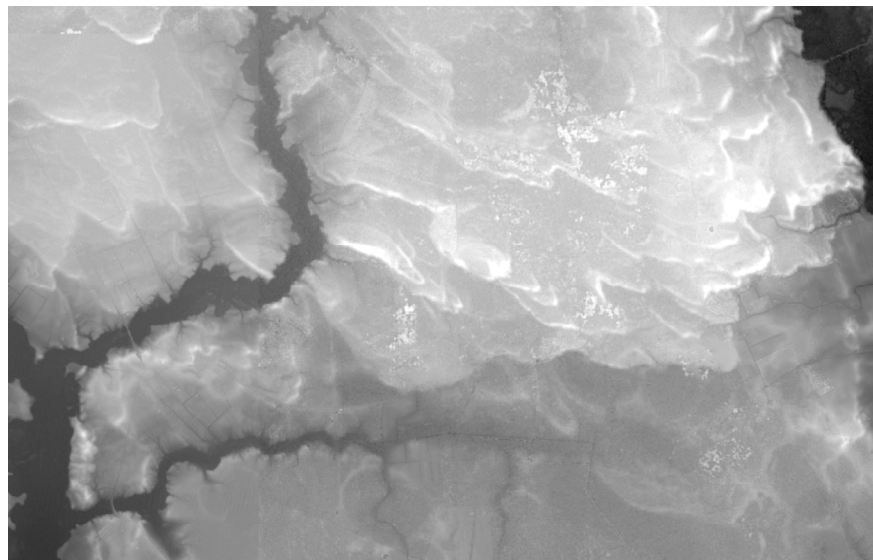
The dune on which we stand is part of a rare and ancient natural community known as an inland dune and ridge forest. These low-relief dunes were shaped by northwest winds during the Pleistocene epoch, and occur only in Maryland and Delaware. The soils are sandy, and the plant communities are dominated by various species of oaks and shortleaf pine, as well as loblolly pine, a preferred species for commercial timber production; some of it was planted over a century ago. Like the frosted elfin, the dunes can



Left: **Electric Deer Fence:** A baited, electric deer fence made from polywire and fiberglass posts protects lupine flowers and seed pods from browsing white-tailed deer. Right: **Volunteers and Solar Charger:** Maryland DNR Volunteers Gordon Burton and Dave Hindle hook up a solar charger to power an electric deer fence around a two-acre stand of lupine.

be easy to miss. This one stands tall for the lower eastern shore of Maryland, at an elevation of about 50 feet. Over the years, Maryland DNR has cut trees to keep the site relatively open and promote the growth of wild lupine and other flowers and shrubs including blueberry, prickly pear, northern wild pink, purple hoary pea, and even wild indigo. In the absence of management, the dunes quickly become forested, shading out many of these early successional species, which then persist only around the edges, if at all. As the canopy closes, the dunes lose some of their “character” and the subtle elevation shifts may go completely unnoticed; you may not even realize that you are walking across an ancient dune formed thousands of years ago.

The biggest threats to frosted elfin habitat in this area include a lack of vegetation management, and forestry practices that favor thick loblolly pine stands over early successional species. Excessive shading from trees prevents lupine and indigo from thriving in these habitats, as do thick beds of pine needles that blanket the sandy soils. Mats of pine litter enrich the sterile soils with organic matter that favors weedier species over sandy habitat specialists like lupine. Management, however, brings its own set of challenges, as the habitats are disturbance-dependent, maintained through intensive and often harsh activities including mechanical clearing of trees and prescribed fire to maintain their openness, activities that can result in direct mortality of frosted elfins. When the habitats are expansive, with lots of butterflies and dense areas of host plants, burning, clearing or thinning even large sections of potential habitat may still leave plenty of refugia for frosted elfins. Small patches (with small elfin colonies), however, require significantly more planning and flexibility.



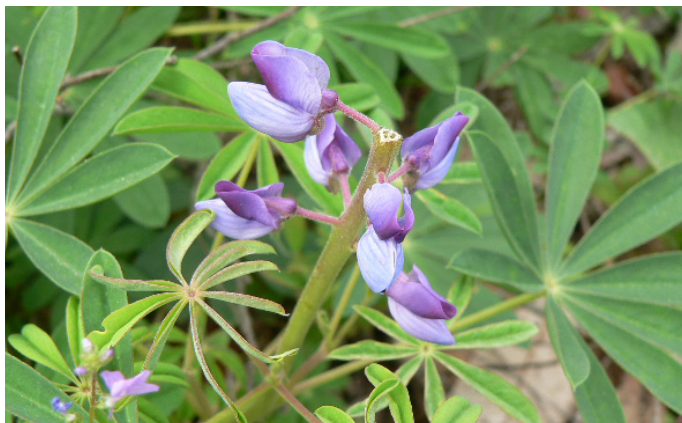
**LIDAR Map Base:** LIDAR (Light Detection and Ranging) aerial imagery over Inland Dune and Ridge Forest habitat in Worcester County, Maryland. LIDAR is a remote sensing method that uses light in the form of a pulsed laser to generate 3-dimensional information about the earth's surface. Although inland dunes represent subtle changes in elevation, they are detected by LIDAR and represented as bright white, ellipses on the landscape.

The dune on which we stand encompasses about 5 acres of lupine plants, scattered in clusters, abundant but not uniformly distributed. After an initial clear cut in 2004 that resulted in an explosion of lupine, management became more of a challenge, ironically because the frosted elfins quickly colonized this newly cleared area. All of us standing on the dune today have helped manage this site for 15 years by thinning trees, either with chainsaws or selective herbicide applications like stump or hack-and-squirt treatments, so as not to impact the caterpillar host plants. Over the years

though, ground vegetation, especially blackberry, has also thrived, and in many places it has started to choke out the lupine.

Many of the dunes in this system don't support lupine or indigo even with intensive management. Neither fire nor mechanical clearing guarantee the presence of either host. And even when one or both host species are present, it is not a guarantee that frosted elfins will be. We assume that even though it is a small butterfly, it can move reasonable distances – several kilometers perhaps – to colonize new sites, particularly when there are sandy roads, power line corridors, and forest gaps through which they can move. But maybe they don't move as far as we think. Deer herbivory poses another threat to frosted elfin populations, particularly as it impacts lupine, which appears to be a preferred food plant for white-tailed deer. This is the reason we install an electric fence around a portion of the lupine stand each spring: to protect lupine flower stalks and seed pods from excessive deer herbivory. Years earlier, we devised a small-scale field experiment that involved pairing patches of lupine, half of which were protected with wire cages and half which were left exposed. We periodically inspected the plants for evidence of browse, looked for flowers, measured and compared seed pod production. The study revealed what we had suspected, that the caged plants produced more seed pods than the uncaged plants. But statistics aside, the results were most dramatic to a person standing up on the dune during the peak of the lupine flowering period and gazing out at the lupine stand. It was a sea of dark green foliage with a few dots of purple – about 40, one for each caged patch of lupine. On one occasion I climbed into an old deer stand to get an aerial view and the results were stunning. It was like gazing at the night sky in the middle of New York City, seeing only a handful of stars but knowing there are billions out there. The plants were there, but they'd been robbed of their flowers.

We've just about decided that the television crew has gotten lost when we finally see two men and one woman walking up the sandy road of the state forest. We do everything they ask us to, answer questions, do interviews, pretend to install an electric deer fence, even drive the truck all the



*A partially-browsed lupine inflorescence.*

way back down to the gate so that they can film us driving back up the road again toward the site. And through all of this, although we are looking, we don't see any frosted elfins. We switch tactics and decide to focus on the lupine, finding some that are further along in the flowering process than others and look like showy movie stars, but we also highlight the less dramatic flower buds, where female elfins typically deposit their eggs. I am kneeling on the ground next to a lupine plant talking about female oviposition when suddenly a lone frosted elfin emerges from somewhere deep within the vegetation and half flies and is half blown to an adjacent patch of lupine. I am so excited for the television crew to finally see a frosted elfin. But they are not so impressed.

"That's it?" the woman doing the interviews exclaimed. "That's what we came all the way over here to film? That little brown butterfly?" She laughed. "It's the size of a quarter." The camera man tried for a short while to film it, but the wind was too strong, and the butterfly eventually flew off and out of sight. It was the only frosted elfin that we saw that day.

Her laughter echoed in my ears for days afterwards.

With all the threats that frosted elfins and small insects all over the globe face, perhaps the greatest one is indifference. It is hard for people to get excited about the conservation of an insect that they have never seen, harder still when they do finally see one and it's not a monarch or a birdwing, but a small, ordinary creature. If it disappeared from the globe few would notice. Why should people care?

E.O. Wilson was interviewed on the Diane Rehm show on public radio many years ago. Some people called in to say how much they loved his books, others called in to ask him how to rid their kitchens of ants. Towards the end of the interview, the question was asked. Why should people care?

The long and short of what he said was this: the earth is our home, a home to all of us, and that it takes all of us to make it work. I believe this to be true. Our staff and volunteers who were out on the dune with me that day believe it to be true. And not only to make it work - to make it function - but also to make it beautiful. While the loss of some species would certainly be noticed more than others, all species have something to contribute. When species are lost because of our indifference, even small, little known creatures, it is a loss to be mourned. Relationships are altered, romances are destroyed. I could not imagine coming up to this dune in April without the frosted elfin. It would be like walking into the Metropolitan Museum of Art and not seeing any paintings decorating the walls or sculptures lining the grand halls. When the television crew had departed and we were left to take down our mock fence and head back to the truck, we were all disheartened. Yet we continue our work every year for this species and other denizens of the inland dune and ridge forest ecosystem.



Two years ago, I got a phone call from Ian Shelley, the Collections Manager at that time for the Salisbury Zoo. The zoo wanted to get involved with the conservation of a local species. Was there something they could do to help butterflies in Maryland? We had a long conversation about frosted elfins, since all but one of the known populations in the state are in the Salisbury area. I tried to temper expectations. I explained that they were small, that the caterpillars looked like green slugs, that the public might think they were cool but they might also view them as unremarkable. But Ian just said something to the effect of 'Let's try it. Let's tell the story about this rare species that people have right in their own backyard (so to speak).'

So we posed a question – where do frosted elfins pupate at our site, in the leaf litter or beneath the sandy soils? And would their pupation site change based on whether they fed on lupine or indigo? This would help us determine how careful we should be when managing the site with prescribed fire, something we had never done before, fearing significant pupal mortality. Pupae in the leaf litter would be more vulnerable to mortality than those under the soil, so knowing where they were likely to be would help us in drafting a burn plan. The zoo gave us a space to do our research, in an outdoor enclosure near the south entrance. Salisbury University got involved early in the process, funding an undergraduate student who would monitor the caterpillars on a near daily basis. We had additional help from the Smithsonian National Museum of Natural History and from Tall Timbers Research Station in Tallahassee, Florida.

We mimicked natural conditions in large screen tents where we kept the caterpillars and the host plants. The overwhelming majority of our caterpillars pupated in the leaf litter, regardless of host plant. We would still experiment with burning, we decided, but only in a third of the lupine stand, less than two acres on the south slope of the dune, at least initially. And in October of 2018, we did just that. The results of our first burn will be evaluated with



**Post Burn:** A portion of the inland dune that was burned in the fall of 2018. Prescribed fire does not always spread uniformly across burn units, especially in areas with large sandy areas and sparse vegetation.

the use of a drone, which we initiated for the first time in the spring of 2018. Photos will allow us to track the lupine density at the site year after year, and evaluate the impacts of prescribed fire. But again, as informative as mathematics can be, a lot can be learned simply from visiting these sites year after year and observing how they change in big and small ways. In late October of 2018, a few days after the first burn, I saw patches of leaf litter that were nothing but black ash, sitting aside patches that the fire had totally missed, probably because the soil was too sandy and the vegetation too sparse to carry it uniformly throughout the burn unit. Even in some of the blackened areas you could pick up handfuls of ashy leaf litter and find the bottom layers untouched by flames, still dry, brown leaves atop the sand. Perhaps pupae deep beneath the leaf litter would have survived the flames. Months after the burn, the lupine that had been covered up with blackberry and grapevine and broomsedge thrived in open patches and didn't have to fight their way to the sun. Elfins still flew on the south side of the dune that spring, and the north side that was protected by the electric fence was still a flurry of activity, animated with the short flights of territorial males and the slower, more deliberate flights of females as they visited various lupine plants depositing their eggs between the flower buds.

Our small outdoor lab at the zoo didn't have the appeal of live butterflies, which is what most visitors expected when they were told the zoo was helping to facilitate butterfly research. There were always people who walked away when we told them there were no butterflies in the enclosure. But so many people stayed and talked to us. They wanted to understand the questions we were asking, and why we were asking them. Some came back for updates. People were interested in how our small collaboration could inform management of the species.

In all fairness to the television reporter who visited the sand dune that day, she was out there to tell a story. She was mindful of the expectations of viewers. It probably didn't really matter what she thought, it mattered more what they would think, and that's what came across that day in the field. Sometimes though, I think maybe we don't give people enough credit. All species have great stories and live fascinating lives, and are in some way remarkable. These are stories that should be shared, even for the lesser known beings, and as our small experiment at the zoo showed, there are people who want to listen.

For me, frosted elfin butterflies are like old friends, ones that you always make time for when they are in town. I will hike out to the dunes every April for as long as life keeps me in Maryland, and for as long as the population there persists. I realize not everyone will have the same relationship with frosted elfins that I do, but I hope that those of us who have gotten to know this species, and other small and overlooked species throughout the globe, can share a little piece of those relationships by telling their stories.

# A guide to finding Frosted Elfins

Dave McElveen<sup>1</sup> (corresponding author) and Virginia Dell Craig<sup>2</sup>

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<sup>2</sup>1833 Halstead Blvd., #702, Tallahassee, FL 32309      [vdellcraig@centurylink.net](mailto:vdellcraig@centurylink.net)



Figure 1. Adult Frosted Elfin in north Florida.

Frosted elfins (*Callophrys irus*) are a rare lycaenid with a single, early spring generation (Figure 1). There are three recognized subspecies: *C. irus irus*, *C. irus arsace* and *C. irus hadros*. All are closely associated with their larval food plants, with different populations using various species of lupine (*Lupinus* spp.) and wild indigo (*Baptisia* spp.) (Schweitzer et al. 2011, Frye and Tangren 2013). The species is currently ranked as vulnerable globally and nationally (NatureServe 2017). A species status assessment was begun by the United States Fish and Wildlife Service (USFWS) in 2018 to support development of a conservation strategy and consideration of potential listing under the Endangered Species Act (USFWS 2018).

The USFWS is currently coordinating range-wide frosted elfin surveys, primarily using volunteer citizen scientists. This Guide is designed to assist surveyors by presenting step by step methods for use in searching for and finding frosted elfins and their host plants.

These methods were primarily developed in north Florida for a frosted elfin population feeding on sundial lupine (*Lupinus perennis*), but we have also drawn on some limited experience with populations feeding on wild indigo (*Baptisia tinctoria*) in Maryland. These methods have worked well for us and we hope they will work for others working with other frosted elfin populations. At minimum, they are offered as a starting place for others' efforts.

This Guide does not cover the details of survey methods, e.g., how many times to visit a site, how to traverse a given site or for what length of time. These should be designed and tailored to your specific circumstances by consulting the following USFWS website: <https://www.fws.gov/northeast/frosted-elfin/index.html>

**A note on use of this Guide:** The sequence in which steps are presented does not necessarily imply the order in which they should be completed. Also, some steps may need to be subsequently repeated based on particular needs and circumstances.

## Find the Host Plants

### Identify possible sites:

The following steps can be done at any time of year:

- Refer to Schweitzer *et al.* 2011 and NatureServe if you are unsure which host plant the frosted elfin population may be using in your search area.
- Search historical records for locations of host plant occurrence. Determine if historical sites are still suitable habitat by looking at satellite imagery or checking with others who are familiar with the area. Also, check *iNaturalist* for citizen scientist reports of host plant locations.
- Poll Natural Heritage Program and university staff about their knowledge of the whereabouts of the host plant (and frosted elfins, as well, of course).
- Use GIS data/satellite imagery to identify possible areas. In Florida, we used the Florida Natural Areas Inventory database to make maps of relic and historic sandhill sites. These maps were instrumental in narrowing our search area and finding previously unknown (aka “new”) host plant sites. We concentrated on public lands, but private lands can be valuable habitat as well.
- Poll plant and butterfly enthusiasts for host plant sites. We found native plant society groups particularly helpful.
- Poll public lands staff and staff of other agencies that work on the area, like state fish and wildlife biologists and wildlife officers, of potential sites. We found that sitting down with these staff generated a degree of *gravitas* and buy-in to the effort that was helpful. Try to get help from those who are on the ground staff like burn-teams and equipment operators.
- Poll citizens that live in the area and others who frequent areas of potential interest in early spring. We put photos of lupine in the hands of local folks and asked “have you seen this plant?”, “please look for it as you use the area and call us”. Persons that own or live on inholdings can be helpful. We enlisted Florida Department of Corrections K-9 teams that train their dogs in a national forest to help find sites – and they did!

### Search sites for host plant presence:

For lupine, this step is best done when it is in full bloom, but before everything else greens-up.

- Conduct ground searches. This is the most time-consuming and difficult step. Most productive in Florida was using GIS maps. We used these to target search areas and drove/walked/biked them when lupine was in bloom. We found 50+ sites this way in our first four years of searching. (Wishing to find all the lupine within our study area, in year 5 we walked transects spaced 50m apart within 500m of any known lupine and found additional sites.) The more people you have doing this the better. We initially targeted relatively undisturbed sandhills, but later unexpectedly found many lupine patches in open-canopied planted pines on sandhill sites. When you find a lupine site, search other sandhill areas in close proximity for other sites. GPS all sites. We used an inexpensive smartphone app to record location and basic data about each site.

### Find the Elfin

**Identify and search for adults, eggs and larvae** where frosted elfins have been seen before, AND on “new” sites discovered during the initial host plant searches:

- Poll any persons or groups not contacted under the “Find the Host Plants” section above about the whereabouts of the elfin.
- Develop a survey methodology for what is appropriate to your circumstances. Consider using the methodology developed by the USFWS that is being used range-wide.
- Conduct ground searches for adults. In north Florida this is in March and April. In the first year, search sites you identified in previous steps. Record all your

search results.

- Conduct ground searches for larvae. (See larvae search tips below for detailed procedures for lupine-feeders and for indigo-feeders.) Larvae searches can be VERY productive since larvae are present at a particular site for weeks, while adults are short-lived and elusive! We documented elfin presence at 16% of our north Florida sites using larval presence alone. Begin larval searches about 3 – 4 weeks after adults are first seen. This gives larvae a chance to get large enough to find them. There’s a knack to this but it is very effective.
- Once you find a larva, make sure it’s a frosted elfin. Other butterfly species, particularly gray hairstreaks, can co-occur and can be difficult to distinguish from frosted elfins. When in doubt, take high-quality close-up photographs and send them to an expert.

### Frosted Elfin Larval Search Procedure on Lupine

**Early Season - ~weeks 3 and 4 after 1st adult seen:**

- Approach a given patch of lupine and find plants with immature inflorescences. Focus on these plants, searching the immature inflorescences for fresh or hatched eggs, which may be an indicator of a larvae on that plant (Figures 2 and 3). Look closely in-between the immature flower buds that constitute the inflorescence for eggs nestled therein. Fresh eggs are light green; hatched eggs are white and have a hole or tear in them. Also, examine the stalk just below the inflorescence. Handle carefully because early instars feed among these inflorescences (Figure 4).
- On plants with immature flowers, search the flower buds and sides of flowers for small round holes, which are evidence of likely elfin larval feeding (Figures 5 and 6). Check the edges of immature flowers and all

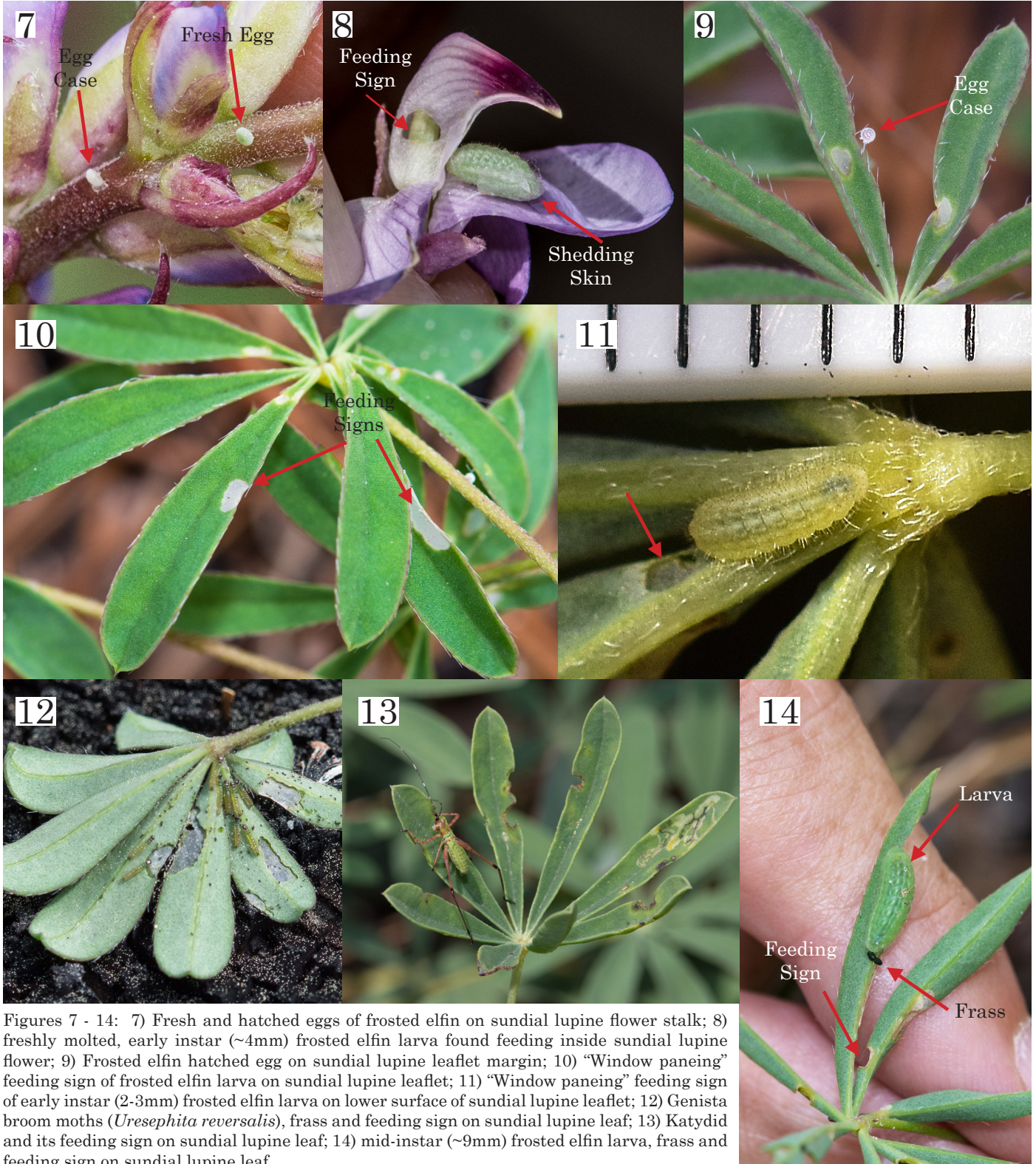


Figures 2-6: 2) Fresh frosted elfin eggs on immature sundial lupine inflorescence; 3) Frosted elfin hatched eggs on immature sundial lupine inflorescence; 4) Early instar (2-3mm) frosted elfin larva in immature sundial lupine inflorescence; 5) Early instar (~4mm) frosted elfin larva with feeding sign on immature sundial lupine inflorescence; 6) Mid-instar (~9mm) frosted elfin larva with feeding sign on immature sundial lupine inflorescence.

along the flower stalk for eggs (Figure 7). Not seeing a larva doesn't mean they're not around (Figure 8)!

- Check leaflet margins of all plants for eggs and egg cases (Figure 9). Check foliage for "window paneing" (Figures 10 and 11). Elfin larvae feed on leaves by scraping the epidermis from the undersides of leaflets

leaving an opaque window. It is often a feeding sign of early instar elfin larvae, though other insects also do it (Figures 12 and 13). If found, carefully hold the leaf petiole between two fingers and roll it to examine the underside (Figure 14). Check the underside of each leaf on the plant - larvae move around.



Figures 7 - 14: 7) Fresh and hatched eggs of frosted elfin on sundial lupine flower stalk; 8) freshly molted, early instar (~4mm) frosted elfin larva found feeding inside sundial lupine flower; 9) Frosted elfin hatched egg on sundial lupine leaflet margin; 10) "Window paneing" feeding sign of frosted elfin larva on sundial lupine leaflet; 11) "Window paneing" feeding sign of early instar (2-3mm) frosted elfin larva on lower surface of sundial lupine leaflet; 12) Genista broom moths (*Uresephita reversalis*), frass and feeding sign on sundial lupine leaf; 13) Katydid and its feeding sign on sundial lupine leaf; 14) mid-instar (~9mm) frosted elfin larva, frass and feeding sign on sundial lupine leaf.



- Finally, look at the terminal leaf buds and young leaves on all plants for signs of feeding. Look for missing leaflets or entire leaves (Figures 15-18).

**Mid-Season – ~weeks 5 and 6 after 1st adult seen:**

In addition to early season procedures, conduct the following:

- Look at each plant and assess its overall health and vigor. If there's significant *Genista broom moth* (*Uresiphita reversalis*) webbing present, move on to the next plant (Figure 19).
- On plants with mature flowers, look for young petals eaten off. If so, check flower stalk and petal edges for egg cases and leaves for larvae.
- Check plants for partially or fully consumed leaflets and entire leaves (Figure 20).



Figures 15 - 18: 15) mid-instar (5-6mm) frosted elfin larva feeding on sundial lupine; 16) mid-instar (~9mm) frosted elfin larva feeding on sundial lupine leaflet; 17) mid-instar frosted elfin larva feeding on sundial lupine terminal leaf bud; 18) late instar (~16mm) frosted elfin larva feeding on sundial lupine leaflet.

**Late Season - ~week 6 and later after 1st adult seen:**

In addition to early and mid-season procedures, conduct the following:

- Pay special attention to seed pods, if present. In Maryland, when seed pod production is good, this tends to be the easiest way to find frosted elfin larvae. They are easy to find because they make distinctive holes in the seed pods and can also burrow into the pod to get to the seed (Figure 21). Keep in mind that both frosted elfin and gray hairstreak larvae do this.



Figures 19 - 20: 19) *Genista broom moth* webbing and feeding sign on sundial lupine leaf; 20) mid-instar (~11mm) frosted elfin larva consuming entire sundial lupine leaflet.



Figure 21: Late instar frosted elfin larvae feeding sign on sundial lupine seed pods. Photo by Sara Tangren.



Figures 22 - 24: 22) mid-instar (~9mm) frosted elfin larva consuming sundial lupine flower stalk; 23) unidentified mite(?) on sundial lupine immature inflorescence; 24) mid-instar frosted elfin larva and associated feeding sign on small sundial lupine plants.

- Look at the top of flower stalks for late-instar larvae (figure 22).
- Look at the main stem below the flower for feeding sign, and at the base of main stems for late-instar larvae.
- There are other things out there that can fool you (Figure 23).
- A final note: don't ignore the little plants (Figure 24)!

**Frosted Elfin Larvae on Wild Indigo**

We do not have specific steps for searching for larvae on wild indigo. The following life history information is provided as an aid in searches, and is based on personal

communications with Jennifer Selfridge in Maryland, and the publication by Albanese *et al.* 2007 on studies done in Massachusetts. Both locales were *Callophrys irus irus* using *Baptisia tinctoria* as their host plant. The *hadros* subspecies or *C. i. irus* on different *Baptisia* species and in different locales may behave differently. However, this is the best information currently available to us. While all frosted elfin larvae we have observed were various shades of green, there are reports and photos of yellow larvae by Brian Reynolds in the Sulfur, Oklahoma area feeding on *Baptisia sphaerocarpa* (see <https://www.flickr.com/photos/bryanereynolds/sets/72157692841037834/with/13019569504/>).

- Females oviposit prior to host-plant flower bud development and most often lay eggs within the leaves of the apical shoots of the host plant, but also on leaf margins (Figure 25).
- Small larvae feed mostly on new apical growth, skeletonizing the surface of the leaves. As they grow they feed at the edges of leaves, then on entire leaves, frequently initiating feeding on the younger foliage near the tips of branches and sequentially consuming leaves while descending a branch (Figures 26 and 27). Larvae often defoliate an entire branch top before ascending a new apical shoot.
- In Massachusetts and Maryland, larger larvae produce distinctive “feeding rings” by consuming the epidermis near the base of the main stem of the host plant effectively “girdling” the main stem (Figure 28). In some cases two or more rings are present. Host plants develop scar tissue in the area of the feeding ring, causing it to persist throughout the growing season. Albanese *et al.* 2007 found that the presence of these girdled main stems is positive evidence of frosted elfins, even if larvae are not seen on the plant. Also, ants are frequently attending larger larvae.
- Larger larvae rest and feed at the base of the main stem, periodically ascending to the top of the plant to consume leaves (Figure 29).

**Acknowledgements**

This Guide derives from an on-going, multi-year study of a frosted elfin metapopulation in north Florida by Dean Jue, Sally Jue and the authors. The authors thank Dean and Sally for their invaluable contributions and tireless efforts in all aspects of the study's design and conduct. Also, the authors are grateful to and thank the following for their contributions: Jean McElveen for assistance in locating frosted elfin sites, data collection and overall support of and assistance with the project; Matt Trager, United States Forest Service (USFS), for sharing his larval search techniques; the USFS Apalachicola National Forest staff for providing access to their lands and managing fire regimes to support frosted elfin conservation and research; Jessica Valdez, USFS, for locating frosted elfin sites and assistance finding larvae; Dave Cook, Florida Fish and Wildlife Conservation Commission, and John Dunlap, USFS, for assistance finding larvae; the Florida Department of Corrections K-9 Teams of Jefferson, Wakulla and Liberty counties for locating frosted elfin sites; Jennifer



Figures 25 - 29: 25) Frosted elfin egg case on underside leaf margin of wild indigo leaflet; 26) Frosted elfin larva (~12mm) feeding on wild indigo; 27) Frosted elfin larvae (~12mm) feeding on entire leaflets of wild indigo; 28) Frosted elfin larvae (~17mm) feeding at girdled main stem of wild indigo; 29) Frosted elfin larvae congregating at base of wild indigo main stem with attending ant.

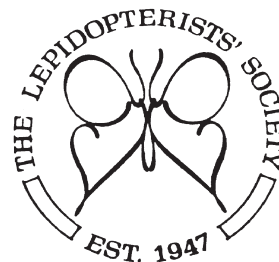
Selfridge, Maryland Department of Natural Resources, for her knowledge and experience with frosted elfins in Maryland, access to Maryland sites, and photographic and editorial contributions to the manuscript; Paulette Ogard and Robyn Niver for helpful additions to the manuscript; and Jim Cox, Tall Timbers Research Station, for his overall support of the project.

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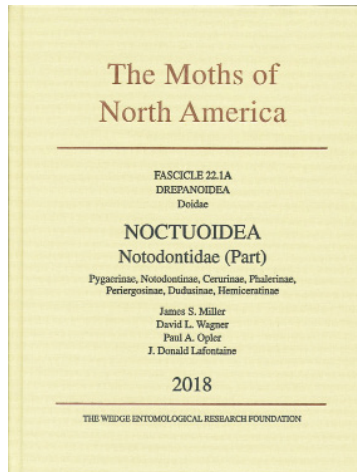
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# Book Reviews

**The Moths of North America, Fascicle 22.1A: Drepanoidea, Doidae and Noctuoidea, Notodontidae (part): Pygaerinae, Notodontinae, Cerurinae, Phalerinae, Periergosinae, Dudusinae, Hemiceratinae.** 2018. J. S. Miller, D. L. Wagner, P. A. Opler, and J. D. Lafontaine.



This is the first of two MONA fascicles that will cover the entire fauna (182 species) of the Notodontidae north of Mexico. This fascicle covers 74 notodontid species (as well as three species of Doidae, see below). Collectively in the two fascicles, 23 new species (8 in the current fascicle) are described. Fifteen more existing names are resurrected to species status, and two

new genera (*Paraeschra* for *georgica* and *tortuosa* and *Pheosidea* for *elegans*) are also described in this fascicle. The plates include all adults covered in the fascicle, examples of live adult resting postures, larvae of the majority of species, both male and female genitalia of virtually all species, male eighth sternites, sample larval chaetotaxy, sample wing venation, and sample head anatomy and antennae.

In the Materials and Methods section of the book, the authors indicate that they used barcodes as a significant part of the analysis of species boundaries. Thankfully, the authors further explain the shortcomings of barcoding and state that there are NO species in the fascicle recognized “solely on the basis of barcode distances.” They expound with what reads like a primer on evolutionary biology, indicating that nuclear markers may help delineate unclear species boundaries in some instances. They also indicate some entities may be difficult to segregate as speciation is a dynamic process, and so using the conventional 2% difference in barcodes as a species delimiter will not work in all cases. Indeed, under the discussion of the genus *Datana*, the authors state that “interspecific [barcode] differences of even 1% are rare.” So the authors ended up taking an appropriate multifaceted approach in determining species boundaries, utilizing morphology, biogeography, hostplant associations, and barcodes (they do not include barcode sequences in the species accounts). And they indicate that their use of larvae in understanding notodontid biodiversity cannot be overemphasized, including distinguishing between species and in the diagnosis of new species.

Inexplicably included in this fascicle are the three species in the drepanoid family Doidae that occur north of Mexico. The authors state that the Doidae have “two stalwart synapomorphies” with Noctuoidea, namely a metathoracic tympanum in the adult and two metathoracic MD proprioceptors in the larvae (although there are a LOT of larvae that have not been surveyed). However, these two characters are misrepresented as synapomorphies. All recent genetic and genetic/morphological studies on the family place Doidae firmly in the Drepanoidea, so the supposed “synapomorphies” with Noctuoidea are homoplastic. I assume it is because of the mistaken association with notodontids in the past that the authors include doids here, but the authors do not explicitly say this. Their inclusion here is particularly perplexing considering the Dioprinae (albeit just two species north of Mexico), with which doids are most likely to be confused within the Notodontidae, are not included in the current fascicle. I feel strongly that the Doidae should have been presented with other drepanoids in a later MONA fascicle.

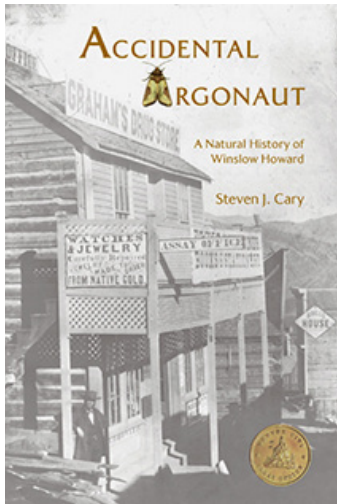
Under the discussion of the larva of *Doa dora*, the authors indicate that David Faulkner found larvae “**feeding** on *Tradescantia*” in late November in Oceanside, CA, unusual since all known life histories indicate euphorbs as foodplants. The authors then attempt to explain away this anomalous record, saying they “assume . . . the larvae may not have been on the actual foodplant” and later suggesting the late date may be indicative of larvae in diapause. But if they were FEEDING, were they truly in diapause? I was NOT convinced by their discussion that *Tradescantia* is not at least an occasional foodplant. In the text they also indicate *D. dora* occurs eastward to Tamaulipas in Mexico, but this is not shown on the distribution map.

Unlike the short section on Doidae in this fascicle, I have nothing but superlatives to say about most of the rest of the fascicle, which covers 74 species of Notodontidae. I am a little bothered by the use of the statement “the most primitive noctuoid lineage” when referring to the Oenosandridae in the discussion of Noctuoid relationships. Every extant family has its own derived characters that have allowed them to survive and diversify, and so I take issue with the use of “primitive.” I much prefer “basal” when referring to lineages that branch near the bottom of any phylogeny. Under the discussion of the family Notodontidae, there is a lot of detail on the synapomorphies for the family. Interestingly, none of the synapomorphies listed are actually shared by EVERY member of the family, a situation the authors appropriately agree is unsatisfying. The key provided for the subfamilies is not complete, with the authors indicating that the phalerine genera *Nadata* and *Peridea* are not identifiable as phalerines in the key; even the authors agree that assignment of these two genera to the Phalerinae is “tenuous at best”. Thankfully, these two genera are easily distinguishable by appearance. Each genus within each subfamily is diagnosed fully. The individual species accounts are typical of species accounts



in other recent MONA fascicles, with larval diagnoses provided when available, and distribution (dot) maps provided for each as well. As mentioned previously, several new species are described and several others raised from synonymy. New species described in the fascicle include *Gluphisia dickeli*, *Furcula nalli* and *vargoi*, *Nadata anastomosa*, *Peridea knudsoni* and *bordeloni*, *Crinodes mcfarlandi*, and *Hemiceras paltingi*. Species whose status was revised from synonymy include *Clostera ornata*, *multnoma*, *luculenta* and *jocosa*; *Pheosia pacifica*; *Gluphisia septentrionis*; *Notodonta manitou* and *ochreatea*; *Furcula cinereoides*, *wileyi*, *borealis*, and *meridionalis*; and *Datana californica*, *cochise* and *perfusa*. If you are like me, you may not have even been aware that some of the above had been “sunk” – I was still using *Gluphisia septentrionis* and *Furcula borealis* in my discussion of the Georgia fauna, and apparently can do so again! As for virtually all other MONA fascicles, the authors have done an excellent job of covering the included species, and anyone who is studying Noctuoidea, and Notodontidae specifically, will want to add this fascicle to his/her library.

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**Accidental Argonaut: A Natural History of Winslow Howard** by Steven J. Cary; Metalmarker Press, Santa Fe, NM, 237 pgs.

I admit I had to look up the definition of *Argonaut* to be sure I understood the title of this book. In Greek mythology the Argonauts were 50 heroic men who sailed with Jason on the ship *Argo* to retrieve of the Golden Fleece. Author Steven Cary is obviously

using the word to describe Winslow Howard more generally as an adventurous person who engaged in a dangerous but rewarding quest, and the description is quite apt.

*“I am not a scientific man, but amuse myself during my leisure hours by collecting everything in general... wish I could make it a specialty for some individual or institution.”*

Cary, author of *Butterfly Landscapes of New Mexico* (2009), tells the story of Winslow Howard, a pioneering naturalist who was part of the westward expansion of the American population. Howard was born in 1828 in southwestern New Hampshire. He initially worked at Tiffany and Company in New York where he became expert in fabricating and repairing jewelry and watches. Consumption (TB) was common at that time in the eastern

climate, and Howard followed the path of many American consumptives who found that their symptoms abated in the clean air, sunshine, and high altitudes of New Mexico and California. Cary graphically recounts Howard’s arduous cross-country trip in 1858 to Santa Fe where, at age 30, he opened a jewelry shop.

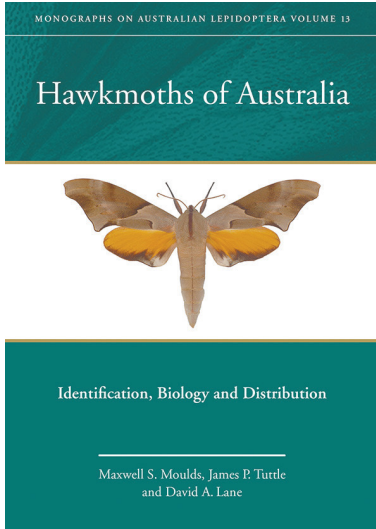
He had the genes of a collector, first collecting coins and stamps and later discovering, trading, and selling local specimens and collections of insects and plants wherever he lived. His cross-plains shipments of jewelry supplies brought him in contact with civilian scientists and entomologists who were collecting specimens and shipping them back to the Smithsonian, and he became increasingly involved in studying, collecting, and identifying butterflies, moths, and other local flora and fauna. He interacted with William Henry Edwards, a New York attorney in the coal business who authored the three volumes of *The Butterflies of North America*. He also knew Henry Edwards (no relation), an English stage actor and theatre manager who collected butterflies as a hobby and wrote and edited scholarly studies on butterflies and moths; his large collection of specimens was the foundation of the American Museum of Natural History’s butterfly and moth collection.

Howard followed the gold rush to Colorado in 1860 where he opened a jewelry stand in Denver and continued his local collecting expeditions, displaying his discoveries in his shop and attracting other naturalists, scientists, and private collectors who traded and shared their knowledge and resources. He used the expertise gained at Tiffany to supplement his living by assaying gold found by the novice miners. Howard’s health greatly improved out west, and he eventually went back east to try to rejoin his family. However his consumption returned and he again sought out the healthier western climate to try to prolong his life. He died of consumption in Arizona in 1898 at age 70.

This book is a detailed and extensively researched history of the American expansion westward and of the gold rush in the 1800s, told through the life history and experiences of one man and illuminating what it was like to live in that era; it is a fascinating read for any history buff. The aspect of the book that most interested me was Howard’s development as a collector, probably because I too have collector genes. I found it easy to identify with his passionate involvement in collecting and with the scholarly interest that it inspired in him. Like many Lepsoc members, whether they remained naturalists or became scientists, Howard loved collecting from an early age and he eventually evolved into a local natural history expert. Contemporary biologists recognized the importance of Howard’s contributions to natural history, botany, and zoology in the form of species he discovered or identified for colleagues.

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**Hawkmoths of Australia.** Maxwell Moulds, James Tuttle, David Lane 2020. Clayton, South Victoria, Australia: CSIRO Publishing. 414 pages. Hardcover. US \$174.95.



The Sphingidae of Australia are a magnificent, diverse, and colorful group of insects, deserving of close study and appreciation. In The Hawkmoths of Australia, they finally get the recognition they deserve in a wonderful monograph. The Hawkmoths of Australia is a fantastic resource, and first-of-its kind review of the Australian Sphingidae (Hawkmoths or Sphinx Moths).

This monograph outlines all species found in Australia, and provides great detail with plates, species accounts, full life histories, and much more. The three authors: Maxwell Moulds, James Tuttle, and David Lane spent years living in Australia, finding, rearing, and documenting every one of these amazing insects.

The book is packed full of resources that are beneficial to biologists, entomologists, and Sphingidae enthusiasts alike. Broadly speaking, it discusses specific aspects of Sphingidae taxonomy, biology, and ecology while peppering in technical instruction for collection and rearing of Hawkmoths. The vast majority of the book is utilized for detailed individual species accounts, each reviewing full life histories complete with egg, larval instar, and pupal descriptions. Following the life history information (often over a page, and exquisitely detailed) the accounts discuss the biology of the species, including larval foodplants, oviposition strategies, larval feeding and pupation habits, and known parasitoids. Scattered figures throughout this section demonstrate and illustrate differences between hard to identify species. To complete each account, range maps and flight period are also provided. Following these accounts are plates depicting full life histories and even parasitoids.

While exhaustive in its detail, this monograph is by no means inaccessible to the amateur entomologist. In fact, very early in the book, the authors detail internal and external anatomical features of these moths, elaborating on functional roles. Though not necessarily novel information, these clear figures and informative explanations are a fantastic reference to Lepidopteran anatomy, and a great orientation for the less technically-inclined. This section contains figures to easily and informatively explain every part of these insects, including the larval and pupal stages. No matter what your interests are, this section can provide a great reference of Lepidopteran anatomy, and

is presented in a way that is reader-friendly and easy to understand, making it a phenomenal learning resource.

Flowing naturally from structure to function, an overview of sphingid life stages details larval behavior, color morphs, and camouflage habits. A vast adult portion goes over a number of different behaviors exhibited by this group, including sections on the importance of hawkmoths as pests, human food and medicine, and their natural enemies. The natural enemies section is expansive, outlining the significant ecological/biological relationships sphingids have with pathogens and parasitoids. Viral, bacterial, and fungal pathogens are discussed in great detail - but the most impressive are the parasitoids. The discussion of host-parasitoid relationships is quite impressive, rivaled only perhaps by similar discussions in James Tuttle's other book, The Hawkmoths of North America (2007). Anyone with an interest in parasitoids should absolutely read this section, and examine the plates contained within the monograph.

For any reader interested in preparing, rearing, and storing specimens, the technical and ecological information found in this book will prove to be an invaluable resource. The insights provided on collection and preservation are broadly applicable to many groups of insects, and will likely prove invaluable to anyone interested in starting or maintaining an insect collection. The Rearing section is a must read for everyone interested in raising these magnificent insects, or other Lepidoptera. There are even specific notes for rearing the Australian fauna, which can likely be applied to other closely related species found elsewhere. This section also discusses the use of artificial diets for rearing Sphingidae - rarely discussed outside of laboratory rearings of *Manduca sexta*.

For ecologically-minded individuals, there are several aspects of this book that will pique your interests. Informative, descriptive, and detailed keys cover both larval and pupal identification. The key to final instar larvae is well-written and easy to follow; it is sure to aid many in their specimen identification. With their specimen and life history plates, the authors go above and beyond, including plates of the full life histories of species, adults, and parasitoids. Never before has Sphingidae life history been documented so thoroughly in one resource. You can easily follow the development of a single species photographically from egg to adult. The spectacular images are crisp, clear, and vibrant. The adult plates are standard specimen plates that highlight all the species found in the region quickly with an easily referenced format. If these plates weren't enough, there are also plates showing the parasitoids recorded by the authors during their rearings.

This fantastic monograph should absolutely not be missed by anyone interested in entomology, Sphingidae, or Lepidoptera. No matter what your group of interest is, this book has something for you. As someone who has never been to Australia, this book inspired wanderlust if only for

an exploration of the meticulously exhibited fauna. Tucked away in the end of the plates section is a plate showcasing some of the habitats the authors worked in. If you can look at that plate and not immediately want to visit Australia and collect Hawkmoths, you are much stronger than I. It cannot be understated how valuable this resource is. Not only is it the first of its kind for Australia, it sets the bar quite high for future monographs for other regions, earning its place as a must-have resource that is sure to please.

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## Membership Updates

Chris Grinter

Includes ALL CHANGES received by February 15, 2020. Direct corrections and additions to Chris Grinter, [cgrinter@gmail.com](mailto:cgrinter@gmail.com).

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

**Mathew L. Brust:** [address red. by req.] ([mbrust@csc.edu](mailto:mbrust@csc.edu))

**Roberta Chan:** PO Box 845, Gualala, CA 95445 ([rtha48@gmail.com](mailto:rtha48@gmail.com))

**Chares DeRoller:** 1134 Ridge Crest Dr., Victor, NY ([de-roller.julynn@gmail.com](mailto:de-roller.julynn@gmail.com))

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# A new confirmed state record for *Erynnis tristis tatus* (W. H. Edwards, 1883) in Colorado, USA

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## ABSTRACT

*Erynnis tristis tatus* is a duskywing butterfly native to Arizona, New Mexico, and western Texas in the United States and ranges south to Columbia, South America. The nominate subspecies *tristis* is found in California. The butterfly has not been definitively reported from Colorado previously. Immature stages are associated with oak (*Quercus*). I report on the collection of the first confirmed *E. t. tatus* for the first time from eastern Colorado at Roxborough State Park in Douglas County.

**Keywords:** Colorado, *Erynnis*, state record

On August 8, 2019 a butterfly survey at Roxborough State Park in Douglas County, Colorado took place during the hours of 10:03 to 13:26. Participants included the author and Douglas Andersen. Temperature ranged from 78.3 °F (25.7°C) at survey initiation to 83.6 °F (28.7°C) at conclusion. It was cloudy during the survey, with an estimated 75-100% cloud cover. Wind speed, initially non-detectable, increased during the survey to 4.7 mph (7.6 kph).

Butterfly surveys over the years at Roxborough SP (Nelson and Epstein, 1998) have documented several *Erynnis* species with the most common being *E. brizo*, *E. telemachus*, *E. horatius*, and *E. afranius*. None of these species possess the white fringe on the hind wings characteristic of *E. tristis*. The white-hindwing fringed species *E. funeralis* and *E. pacuvius* are found in Colorado and recorded as single observations at Roxborough SP. The subject individual was observed at a thistle flower (*Cirsium*) growing in a low-lying moist-soil swale near the upper parking lot. The white fringes were readily observable and, realizing the uncommonness, the specimen was captured. A nearby GPS point (N39° 26.487'W105°04.270') indicated an elevation of 6077 feet (1852 m). Two other white-fringed *Erynnis* were observed on this day but could not be captured. The only other *Erynnis* seen around this time of year was *E. horatius*. Three *E. horatius* were recorded in this vicinity on August 2 and a single specimen was documented on August 15, bookending the *E. tristis* record.

The male specimen was mounted and pinned on a spreading board, and claspers were prepared using KOH and then glued to a piece of paper retained with the specimen. See Figures 1 and 2 for dorsal and ventral views.

Several guides provide characters for the identity as *E. tristis*. The submarginal white patches next to the white wing fringe on the hindwings below are noted to be very distinctive of *tristis*. Perhaps *E. funeralis* or *pacuvius* could have such atypical white patches (not the case on any web sites I viewed) but the genitalia are totally different. In [www.butterfliesofamerica.com](http://www.butterfliesofamerica.com) the claspers are very similar to the one attributed to *tristis* by Godman (genitalia Image from: Godman, Frederick DuCane 1899. *Biologia Centrali-Americana. Insecta. Lepidoptera-Rhopalocera*. London, Dulau & Co., Bernard Quaritch. 2: 457-460, pl. 91 (June), f. 21).



Figures 1 & 2. Dorsal (top) and ventral (bottom) views of *Erynnis tristis tatus*.

Additional confirmation for this specimen's identity was sought from Mike Fisher, author of *The Butterflies of Colorado, Hesperiiidae-Part 6, The Skippers* (2017). Photos of the dorsal and ventral sides along with a clasper drawing were provided. Mike forwarded the information to James Scott and they both confirmed this Duskywing as *Erynnis tristis tatius* and noted it was the first confirmed Colorado state record.

Both Fisher and Scott suggested the specimen was probably an accidental record, perhaps artificially transported to Roxborough. Mike Fisher indicated it would likely occur more naturally in the southern part of Colorado and west of the Continental Divide where it is more in line with western New Mexico and Arizona from where *tatius* might stray from or be blown in by the wind from its known distribution and possibly establish temporary or permanent residency. Figure 3 shows the current range for the species *E. tristis*, eastern-most circles represent subspecies *tatius*.

While considered a state record, it is noted that in his account of *Colorado Butterflies* (1957, p. 260) Brown included *E. tristis tatius* based on a single specimen Evans listed (*l.c.* 3:211) in the British Museum collection. However, Fisher (2017, p. 16) believes this was probably a mislabeled specimen from elsewhere and thought this species had "long been dispelled" as a member of the Colorado fauna, even as a stray. Brown also illustrated simple line drawings of some *Erynnis* genitalia (p. 259) including *tristis* and those of the record specimen as noted earlier also compare favorably with Brown's rendering.

A search of the SCAN database by Frank T. Krell, Senior Curator of Entomology at the Denver Museum of Nature and Science, turned up two Colorado specimens identified as *E. tristis* collected in Boulder and Jefferson County during the 1940's. Both are held at the Peabody Museum of Natural History in New Haven, Connecticut (Catalog # YPM ENT 750167 and YPM ENT 749955). Dr. Lawrence Gall, collection curator, kindly provided photographs of these specimens on the request of Mike Fisher and he confirmed the specimens to be *E. pacuvius* and not *E. tristis*.

The record specimen has been placed in the collection at the Denver Museum of Nature and Science and was submitted to the BAMONA website database ([www.butterfliesandmoths.org](http://www.butterfliesandmoths.org)) in 2019 and assigned sighting number 1226698.



Figure 3. Range map (downloaded from BAMONA, [www.butterfliesandmoths.org](http://www.butterfliesandmoths.org)) of *Erynnis tristis*. The new record is shown for Colorado.

[www.butterfliesandmoths.org](http://www.butterfliesandmoths.org)) in 2019 and assigned sighting number 1226698.

## Acknowledgements

I thank Mike Fisher (Montrose, Colorado) and James Scott (Lakewood, Colorado) for confirming and identifying the record specimen. Mike Fisher was also instrumental in researching past records of *Erynnis tristis* and in editing an early draft of the m.s. I also thank DMNS staff Frank Krell for providing additional Colorado records, Eric Knutson for taking the *Erynnis* photos, and Jeff Stephenson for curating specimens.

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

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**Female Frosted Elfin on Lupine Stalk:** A female frosted elfin visits a wild lupine inflorescence where she will deposit an egg between the flower buds. (see related article, page 30; image by Jennifer Selfridge)



**Larva on Indigo by Sara Tangren:** A frosted elfin larva is tended by an ant on the leaflet of wild indigo (see related article, page 30; image by Sara Tangren).



**Fenced Lupine:** Wild lupine thrives under the protection of an electric deer fence. (see related article, page 30; image by Jennifer Selfridge)



**Wild lupine (*Lupinus perennis*) inflorescence:** in Worcester County, Maryland. (see related article, page 30; image by Jennifer Selfridge)