Volume 58, Number 3 Fall 2016

NEWS OF THE LEPIDOPTERISTS' SOCIETY

www.lepsoc.org

Inside:

NEWS OF THE LEPIDOPTERISTS' SOCIETY

Volume 58, Number 3
Fall 2016

The **News of The Lepidopterists' Society** (ISSN 0091-1348) is published quarterly by The Lepidopterists' Society, c/o Chris Grinter, Illinois Natural History Survey, 1816 South Oak St. Champaign, IL 61820-0904, and includes one or two supplements each year. The **Season Summary** is published every year as Supplement S1 and is mailed with issue 1 of the News. In even numbered years a complete **Membership Directory** is published as Supplement S2 and is mailed with issue 4 of that volume of the News. Please see the inside back cover for instructions regarding subscriptions, submissions to, and deadline dates for, the News.

Periodicals Postage paid at Champaign, IL, and at an additional mailing office (Lawrence, KS).

POSTMASTER: Please send address changes to **News of The Lepidopterists' Society,** c/o Chris Grinter, Illinois Natural History Survey, 1816 South Oak St., Champaign, IL 61820-0904.

www.lepsoc.org

Contents

Issue Date: August 25, 2016 ISSN 0091-1348
Editor: James K. Adams

Front Cover:

Anicia Checkerspot, *Euphydryas anicia capella,* Nature Place area, near Florissant, CO, July 8, 2016 (Photo by Jeff Pippen; see related information on page 148)

Additions to the knowledge of the butterflies of Pakistan

Khalid Mahmood[1], Muhammad Abbas[1], Mishkat Ullah[1], and Bertrand Gerschel[2]

[1]Pakistan Museum of Natural History, Garden Ave., Islamabad, Pakistan **dkmahmood@msn.com**
[2]French Embassy, Diplomatic Enclave, G-5, GPO 1068, Islamabad, Pakistan

ABSTRACT

Butterflies are considered as environmental indicator species. Among other items, they are sensitive to air and water pollution. Problems like climate disruption and habitat loss are becoming acute in Pakistan, so there is an urgent need to explore and document the butterfly species before they go extinct in the country. Eight new records of butterflies in three families (Papilionidae, Lycaenidae and Nymphalidae) are presented in this work. These eight species are the Common Bluebottle (*Graphium sarpedon*), Silverstreak Blue (*Iraota timoleon*), Mountain Tortoiseshell (*Aglais rizana*), the Common Jester (*Symbrenthia lilaea*), the Black Rajah, (*Charaxes solon*), the Anomalous Nawab (*Polyura agraria*), (*Polyura paulettae*) and East Himalayan Siren (*Hestina persimilis*). Their taxonomy, diagnostic characters, collection data and photographs of upper and underside are given.

Additional key words: new records, Papilionidae, Lycanidae, Nymphalidae, taxonomy, Pakistan

The taxonomic study of butterflies has attracted scientists for many reasons. Butterflies are good biological indicators of habitat quality and general environmental health (Larsen 1988) as they respond quickly to minor changes in environment due to their small size and number of generations in a year (Robert 2001). Butterflies are sensitive to habitat degradation as they prefer a particular habitat (host plant, humidity and temperature). The larvae of many species of butterflies feed on a single host plant or plants of same family. Therefore changes in the vegetation may lead to migration to other favorable habitat and hence local extinction (Blair 1999). Butterflies are also sensitive to water and air pollution.

Change in land use pattern may lead to change in landscape that can result in a change in butterfly diversity and distribution. As a result, butterflies can also be used as umbrella species (the species whose protection serves to protect many co-occurring species) for conservation planning and management (Fleishman et al. 2000). Butterflies are important as pollinators of crops and wild plants. They are an important part of food web as they feed on plants and are a source of food for insectivorous animals. Butterflies are considered to have an aesthetic value and their presence attracts butterfly watchers and eco-tourists. The faunal studies of butterflies are important for ecologists, environmentalists and scientists working on evolution and genetics (Robert 2001). Species are disappearing at an alarming pace while growing evidences indicates the dramatic impact of biodiversity loss on the ecosystem functioning (Cardinale et al. 2012). Man's ever increasing resource needs lead directly to most of our planet's problems like climate disruption and habitat loss, and these problems are becoming acute in Pakistan (Robert 2001). So there is an urgent need to explore and document the butterflies' species before they disappear from this country, and potentially the planet.

Taxonomic work on the butterflies of Pakistan, which started almost a century ago (Evans 1910, 1924, 1932, 1933; Talbot 1939, 1949) is far from complete. Robert (2001) gave detailed taxonomy, description, status, habitat and coloured drawings of 317 species of butterflies from Pakistan. Smith et al. (2004) gave distribution, status and coloured photographs of 114 species of butterflies from Hunza region, Gilgit Baltistan. Charmeux and Desse (2006) listed 216 species from Northern Pakistan of which 17 were new species. In the present work, eight new records of butterflies from Pakistan are given. Their taxonomy, diagnostic characters, collection data and photographs of upper and underside are given. There is still further need of a comprehensive work on the butterfly fauna of Pakistan using a systematic sampling method.

MATERIALS AND METHODS

Adult specimens were collected with a collecting net. The specimens were pinned and preserved. The terminology of Robert (2001) was followed. The coloured photographs were taken with a Sony, DSC-HX1 Camera. The specimens are deposited in Insect repository, Zoological Sciences Division, Pakistan Museum of Natural History, Islamabad, Pakistan.

RESULTS AND DISCUSSION

Papilionidae: Papilioninae

The Common Bluebottle, *Graphium sarpedon* (Linnaeus) (Figs. 1a & 1b)

Adult diagnosis: Upperside (fig. 1a): dark black, fore- and hindwings with a greenish almost medial longitudinal band running from the apex of forewing to the tornal area of the hindwing, the band broadest at the middle, hindwing with

whitish costal and dorsum areas, and also with greenish lunules at termen area. Underside (fig. 1b): dark brown, similar to upper side, hind wing with a short basal and sub-basal black band separated by a crimson band, a crimson spot in tornus area, dark black spot and small crimson bands on post discal area, greenish lunules at termen.

Distribution: This species has already been recorded from India, Sri Lanka, China, Japan, Indonesia, Vietnam, Australia, Malaysia and New Guinea (**http://www.learnaboutbutterflies.com/Malaysia%20-%20Graphium%20-sarpedon.htm** accessed on 22 January 2016).

Material Examined: Pakistan, Chitral; 1 female, 15.vii. 2011, Mishkat Ullah.

Lycaenidae: Theclinae

Silverstreak Blue, *Iraota timoleon* Stoll (Figs. 2a, 2b, 2c, 2d)

Adult diagnosis: Male Upperside (fig. 2a): fore- and hindwing blue outlined with black borders. Underside (fig. 2b): mostly light brown to dark brown, white costal band and a discal white spot on forewing, hindwing with long wavy white spot in discal area. In female the upperside (fig. 2c) of fore wing is purple outlined with black, hindwing entirely brown, underside (fig. 2d) mostly light brown to dark brown, white costal band and a discal white spot on forewing.

Distribution: This species has already been recorded from India, Myanmar, Thailand, Laos, Cambodia, Vietnam and South China. (**https://translate.google.com.pk/translate?hl=en&sl=fi&u=http://yutaka.itn.jp/lyc4/82770001.html&prev=search,** accessed on 22 November 2015).

Material Examined: Pakistan, Islamabad, Margalla Hills; 1 male, 15.x.2012; 1 female, 27.iv.2014, Gerschel.

Nymphalidae: Nymphalinae

Mountain Tortoiseshell, *Aglais rizana* (Moore) (Figs. 3a, 3b)

Adult diagnosis: Upperside (fig. 3a): forewing basal area orange with three alternating sets of black and whitish bands along costa, brown wavy band on apex, black and red subterminal bands, hindwing brownish basally followed by a thin whitish incomplete band, with apical brown wavy band, black and red subterminal bands. Underside (fig. 3b): mostly light brown to dark brown.

Distribution: This species has been recorded from Gilgit Baltistan (Pakistan) for the first time. It has already been recorded from Pamirs to Alay Range, Afghanistan, Northwest Himalayas (Tuzov et al. 2000).

Material Examined: Pakistan, Gilgit Baltistan, Rama, 3 males, 29.vi.2015; Khurram, Gilgit Baltistan, Sadpara, 1 male, 04.vii.2015; Abbas, Kyber Pakhunkhwa, Nathia Gali, 2 males, 30.x.2012, Gerschel.

The Common Jester, *Symbrenthia lilaea* (Hewitson) (Figs. 4a, 4b)

Adult diagnosis: Upperside (fig. 4a): forewing mostly black with yellow discoidal clavate band, yellow markings on subapical region, broad yellow marking on posterior subapical margin, hindwing black with broad subbasal yellow band and a narrow subapical yellow band. Underside (fig. 4b): mostly ochraceous orange with numerous brown spots and lines.

Distribution: It has already been recorded from China, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Papua New Guinea, Philippines, Thailand and Vietnam. (**http://www.learnaboutbutterflies.com/India%20-%20-Symbrenthia%20lilaea.htm**, accessed on 25th January 2016).

Material Examined: Pakistan, Islamabad, Margalla hills 1 male, 21.iv.2014, 1 male, 4.x.2015, 2 males, 06.x.2015, Gerschel.

Nymphalidae: Charaxinae

The Black Rajah, *Charaxes solon* (Fabricius) (Figs. 5a, 5b)

Adult diagnosis: Upperside (fig. 5a): dark brown with white discal band across both wings, the band is broken into spots towards the apex of forewing, hindwing has two similar-sized tails at veins 2 and 4, these are longer in the females and more pointed in the males. Underside (fig. 5b): fore- and hindwing with light brown basal and subbasal areas with black lines, white discal bands across both the wings, band is broken into spots towards the apex of forewing, dark yellow sub apical spot, hindwing with apical dark brown lunulae.

Distribution: This species has been already recorded from India, Indonesia, Malaysia, Myanmar, Philippines, Singapore and Sri Lanka (Van-Wright & De Jong, 2003)

Material Examined: Pakistan, Islamabad, 1 male, 12.viii.1996, Fida.

The Anomalous Nawab, *Polyura agraria* (Swinhoe) (Figs. 6a, 6b)

Adult diagnosis: Upperside (fig. 6a): fore- and hindwings with broad blackish brown border and wide pale greenish yellow discal band, forewing with a moderately broad and two small spots in anterior apex, hindwing with a submarginal row of small pale yellow spots. Underside (fig. 6b): fore- and hindwings with broad brownish border and wide

pale greenish yellow discal band, forewing with a moderately broad and two small spots in anterior apex, hindwing with submarginal row of small rusty spots. Both male and female share common morphological appearance.

Distribution: This species has already been recorded from India, Myanmar and Sri Lanka (Toussaint et al. 2015).

Material Examined: Pakistan, Islamabad, Margalla Hills, 1 male, 27.iv.2014, Gerschel.

***Polyura paulettae* Toussaint**
(Figs. 7a, 7b)

Adult diagnosis: Upperside (fig. 7a): fore- and hindwings with broad blackish brown border and wide pale greenish yellow discal band, forewing with a moderately broad and a single small spot in anterior apex, hindwing with a submarginal row of small pale yellow spots. Underside (fig. 7b): fore- and hindwings with broad brownish border and wide pale greenish yellow discal band, forewing with a moderately broad and a single small spot in anterior apex, hindwing with submarginal row of small rusty spots. Both, male and female share common morphological appearance.

Distribution: This is a recently described species (Toussaint et al. 2015). This is the first record from Islamabad, however it has already been recorded from Myanmar and Thailand

Material Examined: Pakistan, Islamabad, Margalla Hills, 1 male, 10.v.2014, Gerschel.

Nymphalidae: Apaturinae

East Himalayan Siren, *Hestina persimilis* (Westwood) (Figs 8a, 8b, 8c, 8d)

Adult diagnosis: Male Upperside (fig. 8a) and underside (fig. 8b): forewing marked with pale yellowish streaks and spots against a black background, hindwing with basal and discal areas pale yellowish with black veins and a black spot at costa, postdiscal and submarginal areas black with a marginal row of pale yellowish spots and a row of submarginal pale yellow lunulae. Female Upperside (fig. 8c) and underside (fig. 8d): forewing in female is like male but less dark, hindwing pale yellowish with black veins and a black postdiscal area on apex of V1-V4, with a black subapical line.

Distribution: This species has already been recorded from Bhutan, Cambodia, India, Laos, Myanmar, Nepal, Thailand and Vietnam (**http://yutaka.it-n.jp/apa/750270001.html** accessed on 26 January 2016)

Material Examined: Pakistan, Islamabad, Margalla Hills, 1 male, 21.v.2014, Gerschel, 1 female, 29.v.2014, Gerschel.

ACKNOWLEDGEMENTS

The authors are thankful to Mr. Ubaidullah Azeem, Senior System Analyst, for his help in preparing the photographs of the manuscript. The authors are also thankful to Dr. Muhammad Rafique, Director, Zoological Sciences Division, Pakistan Museum of Natural History, Islamabad for his support during this work.

Table 1. List of newly recorded species for Pakistan.

S.No	Species Name	Locality	Latitude	Longitude	Elevation (m)
1	*Graphium sarpedon*	Chitral	35° 53.996'N	71° 45.284'E	2816
2	*Iraota timoleon*	Islamabad	33° 44.311'N	73° 2.001'E	641
3	*Aglais rizana*	Rama (GB)	35° 21.506'N	74° 48.453'E	3171
		Sadpara (GB)	35° 14.332'N	75° 38.304'E	2678
		Nathia Gali (KP)	34° 4.353'N	73° 22.738'E	2348
4	*Symbrenthia lilaea*	Islamabad	33° 44.311'N	73° 2.001'E	641
5	*Charaxes solon*	Islamabad	33° 44.604'N	73° 1.898'E	668
6	*Polyura agraria*	Islamabad	33° 44.451'N	73° 2.124'E	699
7	*Polyura paulettae*	Islamabad	33° 44.451'N	73° 2.124'E	699
8	*Hestina persimilis*	Islamabad	33° 44.751'N	73° 1.333'E	961

LITERATURE CITED

Blair, R. B. 1999. Birds and Butterflies along an Urban Gradient: Surrogate Taxa for Assessing Biodiversity? Ecol. Appl. 9: 164-170.

Cardinale, B. J., J. E. Duffy, A. Gonzalez, D. U. Hooper, C. Perrings, P. Venail, A. Narwani, G. M. Mace, D. Tilman, D. A. Wardle, A. P. Kinzig, G. C. Daily, M. Loreau, J. B. Grace, A. Larigauderie, D. S. Srivastava & S. Naeem. 2012. Biodiversity loss and its impact on humanity. Nature. 486 (7401): 59–67.

Charmeux, J. F. & J. M. Desse. 2006. Bilan de huit sejours au Pakistan et description de *Cupido nagarensis* sp. nova et de *Paralasa gohlshali* sp. nova. Bull. des Lepidop. Parisiens. 15: 81-136.

Evans, W. H. 1910. Additions and corrections to certain local Butterfly list, with description of a new species. Jour. Bombay Nat. Hist. Soc. 20:423-427.

Evans, W. H. 1924. The Identification of Indian Butterflies, (Part 5) Nymphalidae). Jour. Bombay Nat. Hist. Soc. 30:72-96.

Evans, W. H. 1932. The Identification of Indian Butterflies, 2nd revised edition. Bombay Nat. Hist. Soc. Diocesan Press, Madras, India. 454 pp.

Evans, W. H. 1933. The Butterflies of Baluchistan. Jour. Bombay Nat. His. Soc. 36:196-209.

Fleishman, E., D. D. Murphy & P. F. Brussard. 2000. A new method for selection of umbrella species for conservation planning. Ecological Appl. 10: 569-579.

Hoskins, A. (2013) Learn about Butterflies: the complete guide to the world of butterflies and moths. Available from **http://www.learnaboutbutterflies.com/Malaysia%20%20Graphium%20sarpedon.htm** (accessed 22 January 2016).

Hoskins, A. (2013) Learn about Butterflies: the complete guide to the world of butterflies and moths. Available from **http://www.learnaboutbutterflies.com/India%20%20Symbrenthia%20lilaea.htm** (accessed 25 January 2016)

Larsen, T. B. 1988. The butterflies of the Nilgiri mountains of the Southern India (Lepidoptera: Rhopalocera). Jour. Bombay Nat. Hist. Soc. 85: 26-43.

Roberts, T. J. 2001. The Butterflies of Pakistan. Oxford University Press, Karachi, 200 pp.

Smith, D. S., G. Naseer, Z. Balint & S. A. Hassan. 2004. Butterflies of the Hunza Region. Holarctic Lepidop. 11: 1-59.

Talbot, G. 1939. The Fauna of British India including Ceylon and Burma. Vol. 1 (Papilionidae and Pieridae). Taylor and Francis Limited, London. 600 pp.

Talbot, G. 1949. The Fauna of British India including Ceylon and Burma. Vol. 2 (Danaidae, Satyridae, Amathusiidae and Acraeidae). Taylor and Francis Limited, London. 506 pp.

Toissaint, E. F. A., J. Moriniere, C. J. Muller, K. Kunte, B. Turlin, A. Hausmann & M. Balke. 2015. Comparative molecular species delimitation in the charismatic Nawab butterflies (Nymphalidae, Charaxinae, *Polyura*). Mol Phylogenet Evol. 91: 194-209.

Tuzov, V. K., P. V. Bogdanov, S. V. Churkin, A. V. Dantchenko, A. L. Devyatkin, D. J. Murzin, G. D. Samodurov & A. B. Zhdanko. 2000. Guide to the Butterflies of Russia and Adjacent territories (Lepidoptera, Rhopalocera); Volume 2: Libytheidae,Danaidae, Nymphalidae, Rionidae, Lycaenidae. Pensoft Pub lishers, Moscow. 581 pp.

Vane-Wright, R. I. & R. DeJong. 2003. The butterflies of Sulawesi: annotated checklist for a critical island fauna. Zoologische verhandellingen, Leiden. 343: 1-267.

Yutaka, I. 2014. A Checklist of Butterflies in Indo-China, Chiefly from Thailand, Vietnam & Loas. Available from **https://translate.google.com.pk/translate?hl=en&sl=fi&u=http://yutaka.it-n.jp/lyc4/82770001.html&prev=search**, (accessed 22 November 2015).

Yutaka, I. 2014 A Checklist of Butterflies in Indo-China, Chiefly from Thailand, Vietnam & Laos Available from **https://translate.google.com.pk/translate?hl=en&sl=fi&u=http://yutaka.it-n.jp/apa/750270001.html** (accessed 26 January 2016).

FIGURE 1. *Graphium sarpedon;* a, upperside; b, underside.

FIGURE 2. *Iraota timoleon;* male, a, upperside; b, underside; female, c, upperside; d, underside.

FIGURE 3. *Aglais rizana;* a, upperside; b, underside.

FIGURE 4.
Symbrenthia lilaea
a, upperside;
b, underside.

FIGURE 5.
Charaxes solon
a, upperside;
b, underside.

FIGURE 6.
Polyura agraria
a, upperside;
b, underside.

FIGURE 7. *Polyura paulettae;* a, upperside; b, underside.

FIGURE 8. *Hestina persimilis;* male, a, upperside; b, underside; female, c, upperside; d, underside.

Notes about early entomological type labels in the Museum of Comparative Zoology, Harvard University

John V. Calhoun[1] and Rachel L. Hawkins[2]

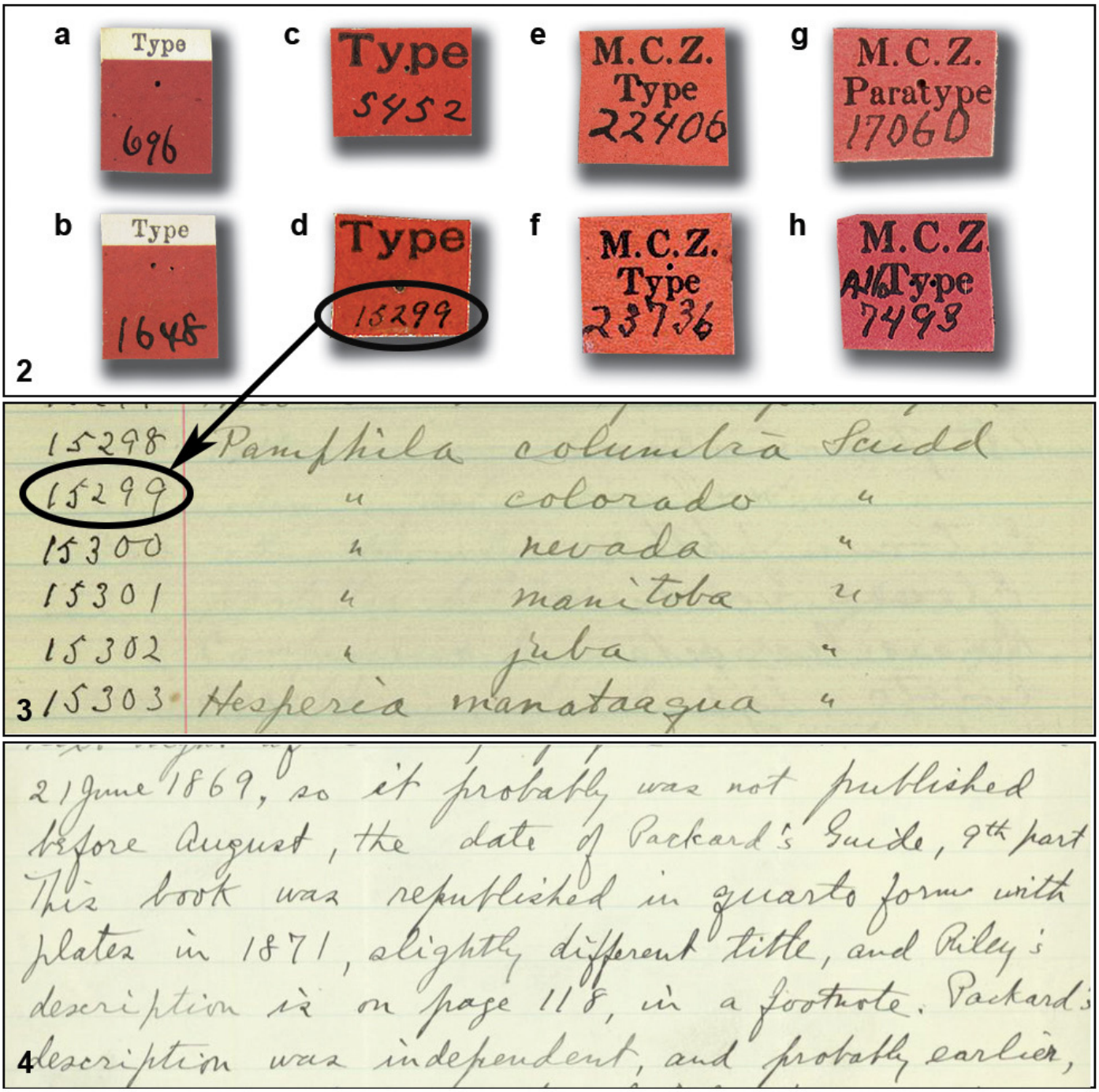
[1]Research Associate, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, Gainesville, FL; 977 Wicks Drive, Palm Harbor, FL 34684 **bretcal1@verizon.net**
[2]Entomology Dept., Museum of Comparative Zoology, Harvard Univ., 26 Oxford St., Cambridge MA 02138 **rhawkins@fas.harvard.edu**

While studying and photographing some of the primary types of taxa described by Scudder (1874), we became curious about the provenance of the small red type labels affixed to these specimens in the collection of the Museum of Comparative Zoology (Harvard University, Cambridge, Massachusetts; MCZ). The labels read "Type" and include handwritten numbers between 15298 and 15302, which correspond to entries in the museum's entomological type catalog, specifically the third volume. We assumed that these labels were prepared during the first half of the twentieth century, most likely when Nathan Banks (1868-1953) served as the curator of insects at MCZ. Banks (Fig. 1) came to MCZ in late 1916 and spent three decades at the museum (Carpenter & Darlington 1954). Prior to his arrival, museum staff had begun to locate and label some insect types in the collection (Henshaw 1914). Shortly after his arrival, Banks made this one of his top priorities. For many years beginning in 1919, he reported in the museum's annual reports the approximate number of entomological types that were "verified and numbered" during each academic year (September-June). From 1933 until his retirement in 1945, he also published a running tally of the total number of types that had been labeled and cataloged. The reported totals were 16,200 (Banks 1933), 19,666 (Banks 1934), 22,371 (Banks 1936), 22,990 (Banks 1937), 23,414 (Banks 1938), 23,724 (Banks 1939), 25,441 (Banks 1940), 25,707 (Banks 1941), 25,953 (Banks 1942), 26,514 (Barbour 1943), and 26,750 (Barbour 1944). By the end of the 1944-1945 academic year, an impressive 27,349 insect types were cataloged during Banks' tenure (Bigelow 1946). The actual quantity of individual type specimens that were labeled is much greater, as Banks applied a type label with the same number to each syntype of a given taxon. Unfortunately, Banks' successors did not continue the practice of reporting this information.

Fig. 1. Nathan Banks, 1933, and his signature from a 1907 letter (Archives of the Museum of Comparative Zoology, Ernst Mayr Library, Harvard University).

To confirm Bank's involvement in preparing the type labels for Scudder's specimens, we compared the handwritten numbers on the labels against the corresponding entries in the third volume of the museum's type catalog, known as Type Book 3. As we anticipated, they are written in the same distinctive hand (Figs. 2d, 3). We then compared these type book entries against several letters composed by Banks, dated 1904-1924, which are preserved in the Ernst Mayr Library at MCZ. Again, the numbers and name entries are consistent with Banks' script (Figs. 2-4). Weaver (1993) noted a similar connection regarding labels for types of Trichoptera at MCZ, but he did not provide an analysis of the handwriting to confirm this relationship.

Seven type books, which correspond to numbered specimens, are on file at the museum. The first five books were custom-made for this purpose, with gold titles on the cover (vols. 1-4) or spine (vol. 5). The seventh volume was recently begun due to the fragile condition of the sixth, which was originally purchased as a blank record book from the Harvard Cooperative Society, probably around 1971 (see below). Spine numbers were recently added to all the vol-



Figs. 2-4. MCZ type labels and writing examples. **2)** Type labels prepared by Nathan Banks*: **a, b,** first version; **c, d,** second version; **e, f,** third version; **g,** third version paratype label; **h,** third version label altered to read "*Allo*Type." **3)** Entries in Type Book 3 by N. Banks*. **4)** Handwriting of N. Banks, 1907**. The arrow indicates analogous handwriting. (*©President and Fellows of Harvard College.) (**Archives of the Museum of Comparative Zoology, Ernst Mayr Library, Harvard University.)

umes using a black marker. The titles of the first four volumes suggest that Banks initially intended to record insect types by Order, but he ultimately decided to number them consecutively from book to book. This is supported by missing pages from volumes 2-4, while the numbering remains continuous from volume to volume. The first 58 pages were removed from Book 2, and the first 60 pages are missing from Book 3. Likewise, Book 4 starts on page 13. By comparison, Book 1 begins on page 1. This implies that Banks changed his mind after recording a large number of entries by Order. He presumably removed the offending pages from volumes 2-4 after transferring those entries to the first volume. Book 6, begun long after Banks' tenure, is missing the first six pages, possibly because those pages contained standard front matter, such as a blank table of contents page, calendars, etc.

Type Book 5 has a different style of cover title and appears older than the previous four. It evidently dates back to Hermann A. Hagen (1817-1893), who served as the custodian of the MCZ entomological collection from 1867 until his death (Henshaw 1894). The first six pages of this volume are missing and a blank sheet opposite page 7 contains notations by Hagen. Banks evidently repurposed this volume after filling Book 4.

During the 1929-1930 academic year, Banks also began to document types in a card catalog, which allowed him to organize the records by Order as he had originally planned (Banks 1930). Other MCZ collections had utilized card catalogs for many years (Henshaw 1908). At the end of entomological Type Book 1, Banks referred to these cards when he wrote "All catalogued systematically May 1933 except blanks mentioned on front cover." The "blanks" were empty numbers in the volume, which he filled at a later date. Banks similarly noted "All catalogued on cards" in the back of Type Book 3.

Our analysis suggests that prior to 1932-1933 Banks significantly underreported the number of types that he documented during most years. Based on available evidence, including the years when recorded taxa were described, we have estimated when each type book was used. In turn, this indicates when each type specimen was most likely labeled. Banks dated the beginning of Book 5 as "1/20/38," which is consistent with our assessment. After Banks' departure, fewer types were documented, thus Books 5 and 6 were employed for a much longer period of time. Following are the entry numbers, titles, and the years associated with each volume:

Book 1 (1-6000): "NEUROPTERA, PSEUDONEUROPTERA, ORTHOPTERA" (c. 1918-1923).
Book 2 (6001-10000): "HEMIPTERA" (c. 1923-1929).
Book 3 (10001-17196): "COLEOPTERA" (c. 1929-1934).
Book 4 (17197-23313): "DIPTERA" (c. 1934-1938).
Book 5 (23314-31953): "RECORDS OF TYPES: ENTOMOLOGY DEPT." (c. 1938-1971).
Book 6 (31954-35852): "RECORDS" (c. 1971-2015).
Book 7 (35853-): No titles (2015-).

It is possible to more precisely determine when some type specimens were labeled during Banks' tenure. For example, Banks (1933) reported that 16,200 types had been labeled by the end of the 1932-1933 academic year. Although he did not report how many types were documented during that particular year, he stated that over 3,000 types were labeled during the previous academic year of 1931-1932 (Banks 1932). Therefore, the type labels numbered 15298-15302 for Scudder's butterflies were undoubtedly prepared between 1931 and 1933, rather than during the 1920s as previously noted by Calhoun (2016).

Banks' catalog entries are found in Type Books 1-5. In anticipation of future entries, he pre-numbered all the entries through the end of the fifth volume. He personally recorded the original entries in the first volume, and prepared the corresponding type labels, but his involvement gradually decreased over time. Beginning in the late 1920s, he received assistance with labeling and cataloging types. This probably involved Banks' students following his appointment in 1928 as an associate professor of zoology at Harvard. These students, including the trichopterist Lorus J. Milne (1910-1987), may be responsible for some of the unidentified handwriting associated with many type labels and type book entries during that period. Various associates in the entomology department also worked with type specimens. A large number of type labels and catalog entries, particularly relating to specimens received from William M. Wheeler, are consistent with the hand of Frank M. Carpenter (1902-1994), who studied under Wheeler at Harvard and later worked in several positions at MCZ (Furth 1994). Other type labels and catalog entries, principally for types of Coleoptera verified during the 1930s and 1940s, were written by Philip J. Darlington, Jr. (1904-1983). Darlington was appointed the Fall Curator of Coleoptera at MCZ in 1940 (Wilson 1991), when he labeled and recorded the types from the Henry C. Fall beetle collection (Darlington 1940). Above entry 27350 in Type Book 5 is the notation "J. B. 1946." This is where Banks' unsteady script is replaced by the more vibrant, slanting cursive of his successor, Joseph C. Bequaert (1886-1982), who was succeeded in 1951 as the curator of insects by P. J. Darlington. To date, all entries in the seventh volume have been recorded by Rachel L. Hawkins and Jignasha D. Rana, who work as curatorial assistants at the museum.

All the earlier type books include notations that were subsequently added to clarify, update, remove, or correct various entries. Among the entomologists who contributed comments were William L. Brown, Jr., Howard E. Evans, John F. Lawrence, Lionel A. Stange, Philip D. Perkins, and Margaret K. Thayer. In late 1974, a large number of Orthoptera specimens at MCZ, from the collections of Samuel H. Scudder and Albert P. Morse, were sent to the Academy of Natural Sciences (Philadelphia, Pennsylvania) in exchange for Coleoptera from the collections of George H. Horn and William G. Dietz (Lawrence 1973, Anonymous 1974, P. D. Perkins pers. comm.). Entries in the MCZ type books were marked to indicate which specimens were transferred "to ANSP." This was done by Janice White, who was employed as a curatorial associate at the museum (M. K. Thayer pers. comm.). It is sometimes incorrectly stated that this exchange took place during the mid-1960s (e.g. ANSP 2016).

Three formats of type labels were employed during Banks' tenure at MCZ. The first was composed of a rectangular piece of white or cream-colored paper with the word "Type" printed at the top, with a square piece of red paper glued below (Fig. 2a, b). During the early 1920s, Banks began to use square red labels reading "Type" (or "Type.") with the numbers written below (Fig. 2c, d). They were glued onto

white backing papers of the same size. Although Weaver (1993) claimed that the earlier style of label was used for all types up to number 10755, Banks alternated his use of these two labels for quite some time. Around 1934, Banks introduced a third style of red type label, reading "M.C.Z. Type," with the numbers written below or (rarely) above (Fig. 2e, f). From the mid-1930s onward, Banks used labels reading "M.C.Z. Paratype" to recognize secondary types (Fig. 2g), while reserving the standard "M.C.Z. Type" label for primary types. Labels that were customized to read "*Co*Type" "*Allo*Type," etc., with the prefix added in ink (Fig. 2h), were usually (if not always) prepared by someone other than Banks. Some type labels include an additional reference to the number of specimens affixed to a given pin (e.g. "1-4"). Such notations are particularly noticeable on ant types (Hymenoptera: Formicidae), which were labeled by F. M. Carpenter.

In some instances, original type labels were later replaced, resulting in the presence of newer labels on type specimens that were initially identified much earlier. On rare occasions, Banks overwrote earlier entries to record more recent types, and identified the corresponding specimens with newer type labels. For example, his type book entry for type 894 reads "*Lycaena dorcas* para. race *claytoni* Lycaenidae," and the associated specimen bears an "M.C.Z. Paratype" label inscribed with the number 894. Types numbered below 1000 were originally documented before 1920, yet the subspecies *Lycaena dorcas claytoni* A. E. Brower was not described until 1940.

Appearing at the front of Type Books 4 and 5 are fanciful poems by Banks, which reveal a great deal about his sense of humor and enduring commitment to documenting type specimens in one of the most important entomological collections in North America.

"Call that day lost
Whose taxonomic mist
Adds not one name
Unto the numbered types we list"

"With joy I add each number
Another type will be
Eternally in slumber
In the good old M.C.Z."

Acknowledgements

We thank Robert Young and Dana Fisher (Ernst Mayr Library, MCZ) for kindly providing the portrait of Nathan Banks and for scans of his letters, as well as permission to reproduce them. Melissa Aja (MCZ) granted permission to reproduce images of labels. Thanks also to Margaret K. Thayer and John F. Lawrence who identified handwriting and answered questions. Philip D. Perkins (MCZ) encouraged the publication of our observations and provided additional information.

Literature Cited

ANSP (Academy of Natural Sciences of Philadelphia). 2016. Webpage: http://www.ansp.org.

Anonymous. 1974. On the shelf! MCZ Newsl. 3:5.

Banks, N. 1930. Report on entomology. Pp. 16-17. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President and Fellows of Harvard College for 1929-1930. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1932. Report on entomology. Pp. 19-21. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1931-1932. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1933. Report on entomology. Pp. 15-16. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1932-1933. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1934. Report on entomology. Pp. 18-23. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1933-1934. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1936. Report on entomology. Pp. 17-20. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1935-1936. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1937. Report on entomology. Pp. 20-24. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1936-1937. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1938. Report on entomology. Pp. 18-22. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1937-1938. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1939. Report on entomology. Pp. 16-19. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1938-1939. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1940. Report on entomology. Pp. 18-21. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1939-1940. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1941. Report on entomology. Pp. 13-16. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1940-1941. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1942. Report on recent insects. Pp. 15-18. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1941-1942. Mus. Comp. Zool., Cambridge, Massachusetts.

Barbour, T. 1943. Report of the Director 1942-1943. Pp. 7-19. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1943-1944. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1944. Report of the Director 1943-1944. Pp. 7-11. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1943-1944. Mus. Comp. Zool., Cambridge, Massachusetts.

Bigelow, H. B. 1946. Report of the Acting Director 1945-1946. Pp. 7-28. *In*, Bigelow, H. B. (ed.), Annual report of the Acting Director of the Museum of Comparative Zoölogy at Harvard College to the Provost of Harvard University for 1945-1946. Mus. Comp. Zool. Cambridge, Massachusetts.

Calhoun, J. V. 2016. More about the neglected lectotype of *Pamphila colorado* Scudder (Hesperiidae). News Lepid. Soc. 58:45-46, 29.

Carpenter, F. M. & P. J. Darlington, Jr. 1954. Nathan Banks: a biographic sketch and list of publications. Psyche 61:81-110.

Darlington, P. J., Jr. 1940. Report on Coleoptera. Pp. 22-25. *In*, Barbour, T. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President of Harvard College for 1939-1940. Mus. Comp. Zool., Cambridge, Massachusetts.

Furth, D. G. 1994. Frank Morton Carpenter (1902-1994): academic biography and a list of publications. Psyche 101:127-144.

Henshaw, S. 1894. Hermann August Hagen. Proc. Amer. Acad. Arts. Sci. 21: 419-423.

_____. 1908. Report. Pp. 3-11. *In*, Henshaw, S. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President and Fellows of Harvard College for 1913-1914. Mus. Comp. Zool., Cambridge, Massachusetts.

_____. 1914. Report on the Entomological Department. Pg. 32. *In*, Henshaw, S. (ed.), Annual report of the Director of the Museum of Comparative Zoölogy at Harvard College to the President and Fellows of Harvard College for 1913-1914. Mus. Comp. Zool., Cambridge, Massachusetts.

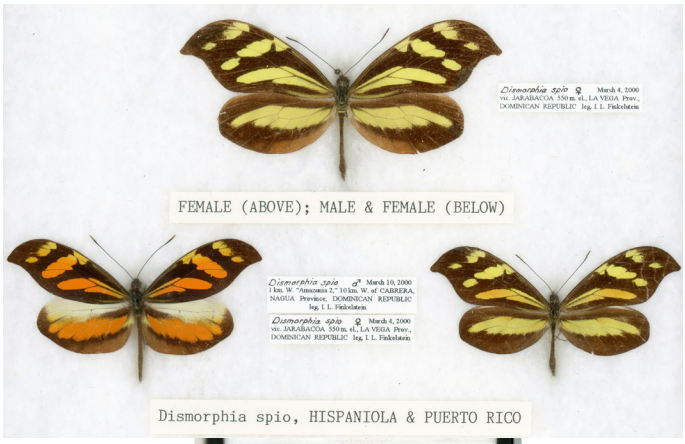
Lawrence, J. F. 1973. Horn and Dietz collections move to Harvard. Coleopt. Bull. 27:151.

Scudder, S. H. 1874. The species of the lepidopterous genus *Pamphila*. Mem. Boston Soc. Nat. Hist. 2: 341-353, pls. 10, 11.

Weaver, J. S. 1988. A tribute to Lorus Johnson Milne. Trichoptera News 15:7-8.

_____. 1993. The Trichoptera of the Museum of Comparative Zoology, Harvard University. Braueria 20:33-50.

Wilson, E. O. 1991. Philip Jackson Darlington, Jr. 1904-1983 Nat. Acad. Sci. Biog. Mem. 60:33-44.



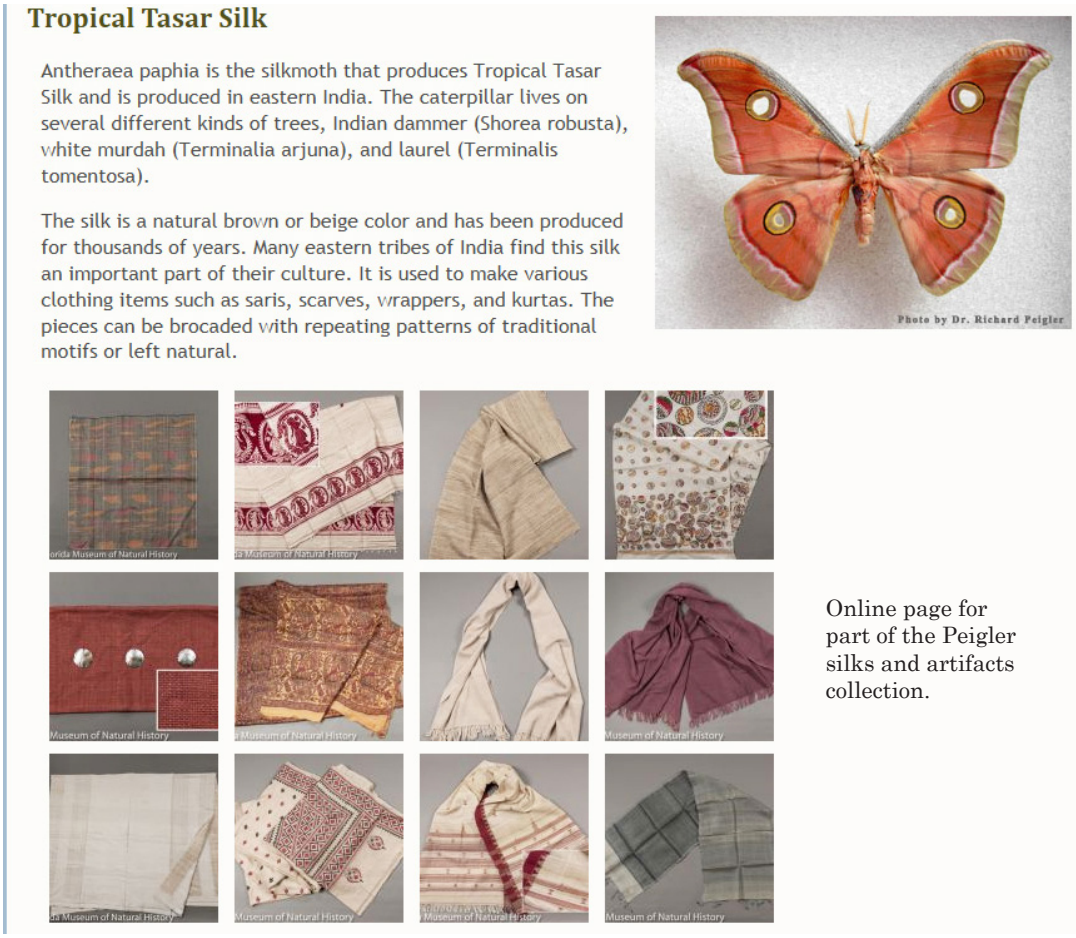
Parts of the Finkelstein collection.

Two special collections at the McGuire Center are digitized

Andrei Sourakov and Andrew D. Warren

McGuire Center for lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL 32611 **asourakov@flmnh.ufl.edu; andy@butterfliesofamerica.com**

The McGuire Center for Lepidoptera and Biodiversity at the Florida Museum of Natural History houses one of the world's largest collections of butterflies and moths, and is widely utilized by researchers from around the world. Recently, staff of the Center made high-quality images of two special collections available for the public to view online.



Online page for part of the Peigler silks and artifacts collection.

The first is a collection of silks and artifacts made from cocoons of various moth species. Few people are aware that in addition to the silkworm moth, *Bombyx mori*, there are several additional moth species whose silk is used by different indigenous cultures to make fabrics and other artifacts. Dr. Richard Peigler of Texas, a professor of biology and a specialist in silkmoths, assembled a large collection of these textiles and artifacts and has donated many of them to the McGuire Center. Samples range from a shawl of tropical tasar silk made from cocoons of *Antheraea paphia* by the Dhurvaa Tribe (Koraput District, India) to earrings made from pieces of cocoons of *Cricula trifenestrata* from Yogyakarta (Java, Indonesia).

The second collection, of butterfly and moth specimens, was donated by the late Dr. Irving Finkelstein of Atlanta, Georgia, a month before his death. It consists of over 4,100 Riker mounts that house over 20,000 specimens. A former professor of art history, Irving collected Lepidoptera as a pastime for 36 years. His collection contains a variety of interesting specimens, including a bilateral mosaic gynandromorph of *Speyeria diana*. The collection has many beautifully spread specimens from around the world, includes numerous Georgia state records, and is an invaluable resource for future scientific studies. The Riker mounts presented an ideal opportunity for digitizing specimens and the accompanying data using high resolution scanning. The collection was digitized with the help of Junior Volunteers, the local school students that intern at the Florida Museum of Natural History during the summer.

To view these collections, visit McGuire Center's website.

Cocoon artifacts: **http://www.flmnh.ufl.edu/mcguire/collection/cocoon-artifacts/**

Wild silk artifacts: **http://www.flmnh.ufl.edu/mcguire/collection/wild-silks/**

Finkelstein Collection: **http://www.flmnh.ufl.edu/mcguire/collection/irving-finkelstein/about/**

A new leguminous host for the Silver-Spotted Skipper: A consolation prize of an unsuccessful hunt for Golden-Banded Skipper in southern Indiana

Jeffrey E. Belth and Sandra H. Belth

4795 South Woodbine Drive, Bloomington, IN 47403 **jeffreybelth@gmail.com**

The current status of the Golden Banded-Skipper (*Autochton cellus*) in Indiana is unknown. A few were found in Brown County State Park in the 1970s (Shull 1987), and one individual was found in Perry County in southern Indiana on May 7, 2012 (L. Koehn, pers. comm.). In the Midwestern portion of its range, this species is typically rare and very local. While working on his book (Belth 2013), Jeff searched for it in many seemingly suitable habitats where the reported host, Hog Peanut (*Amphicarpea bracteata*) flourished. He did not find it at any of those locations. Hog Peanut is widely distributed across Indiana (Deam 1940, Yatskievych 2000), so it was a mystery why the skipper was not equally distributed.

In 2015 we read with interest the article "A case of mistaken identity: the true host of the Golden Banded-Skipper *Autochton cellus* (Hesperiidae: Eudaminae) in the eastern U.S.," published in the Summer 2015 issue of the *News of The Lepidopterists' Society* (Boscoe *et al.* 2015). We learned the reason we had not found the skipper was because we were looking for the wrong plant. As described by these authors, the plant used by *A. cellus* in the eastern United States is Wild Bean (*Phaseolus polystachios*) a legume similar in appearance to *A. bracteata* but with a much narrower distribution in Indiana. *P. polystachios* has only been recorded in eight southern Indiana counties (Deam 1940). Although a few additional localities have been discovered since 1940, it is still a far rarer plant in Indiana than *A. bracteata*. Armed with this knowledge, we thought perhaps this scarcity would make it easier to hone in on a location where *A. cellus* might still occur.

In June 2015, we visited Brown County State Park to deliver a presentation for a Pollinator Awareness Day event. Brown County State Park, 50 miles south of Indianapolis, at 15,776 acres, is Indiana's largest state park. Located in Indiana's Highland Rim natural region, the Park showcases the ridges divided by steep-sided valleys characteristic of the "Brown County Hills" section of the region. The uplands are primarily oak-hickory woodlands, the valleys beech-maple (Homoya and Huffman 1997). The Park is known to harbor numerous plants and animals uncommon in southern Indiana. In addition to *A. cellus,* Baltimore Checkerspot (*Euphydryas phaeton*) occurred in the Park at one time (Young 1956; Shull 1987), and West Virginia White (*Pieris virginiensis*) occurs there now (pers. obs.).

Jeff spoke to David Mow, a Park volunteer who established a herbarium collection of the Park's flora. David Mow said he had recently found *P. polystachios* in the Park, and would be happy to show us the location. Since *A. cellus* had occurred in the Park in the past, it was very exciting to learn that its "correct" larval host was still growing there. Jeff wanted to photograph the plant in bloom for a possible update to his book, so David agreed to contact him when the plant was blooming.

On July 19th David Mow notified Jeff via email that *P. polystachios* was in bloom. On July 22nd Jeff visited the Park and David showed him the plant. Jeff spent a short time photographing it. He also looked briefly for larvae, but found none. He returned on July 24th for a longer photo session and to look thoroughly for larvae. Again he did not find *A. cellus* larvae.

On August 12th Jeff received an email from David Mow indicating he had found the plant in another location at the Park. On August 13th both of us returned to the Park to investigate the new location. After considerable searching, Sandy found several leaf nests on *A. polystachios* plants which appeared similar to those illustrated by Boscoe *et al.* (2015) (fig. 1). We found six occupied nests. We opened a few

Fig. 1. Solitary larval nest of unidentified skipper on *Phaseolus polystachos*. Brown County, Indiana, August 13, 2015.

and photographed the larvae inside (fig. 2). We also found a few nests at the earlier site. All the larvae were small, about ½ inch in length, either second or third instars. In the field they looked very similar to the *A. cellus* larvae depicted in Boscoe *et al.* (2015), but were they? On closer examination of the photos on a home computer, they appeared to more closely match the photos of Silver-spotted Skipper (*Epargyreus clarus*) larvae shown in Boscoe *et al.* (2015) and in James and Nunnallee (2011). However, Boscoe *et al.* (2015) indicated *E. clarus* did not use *P. polystachios* in their West Virginia study area during the study period.

Fig. 2. Unidentified immature skipper larva on *Phaseolus polystachios*. Brown County, Indiana, August 13, 2015.

On August 14th Jeff contacted David Wright, co-author of the Boscoe *et al.* (2015) paper. His thoughts were that the larvae appeared similar to *E. clarus* which he had reared, but since there was enough overlap in appearance of the early instars of *E. clarus* and *A. cellus* that putting a definitive name on them at this stage was not possible. The only solution was to return to the site in a few weeks and examine later instars (D. Wright, pers. comm.).

On August 20th we revisited both sites at Brown County State Park. Most of the larval nests found on August 14th were empty. One nest at the second site contained a larva similar in age and appearance to what we had found on the 14th. At the first site we found two mature 5th instar larvae. Both were on the underside of leaves that had been stitched together, rather than within nests. These unquestionably appeared to be *E. clarus* larvae (Fig. 3). Jeff sent photos of these larvae to David Wright, who also thought they were *E. clarus*. David Wright also showed the photos to Richard Boscoe, senior author of Boscoe *et al.* (2015), who confirmed they were *E. clarus*.

Is this a new larval host record for *E. clarus*? The great majority of host references do not list *P. polystachios* as a larval host of *E. clarus*. However, it was listed by four authors. Howe (1975) mentioned "Fiske" as his source but did not provide a citation. Minno (1994) specifically cited Fiske (1896). Scott (1986) listed *P. polystachios,* but did

Fig. 3. Mature 5th instar larva of Silver-spotted Skipper (Epargyreus clarus) on Phaseolus polystachios. Brown County, Indiana, August 20, 2015.

not indicate a source. Jeff contacted James Scott, who indicated according to his file the record referred to Fiske following Howe (1975) (J. Scott, pers. comm.). Robinson *et al.* (2002) cited Scott (1986). Thus all four authors have based their record on a single source: Fiske. We are not aware of any other references to *E. clarus* using *A. polystachios* as a larval host. [Robinson *et al.* (2002) also listed the genus *Phaseolus* as a larval host, but this genus includes many other beans, such as the garden plant Common Bean (*P. vulgaris*). Any references to this genus alone do not necessarily refer to *P. polystachios*. For the *Phaseolus* genus record, Robinson *et al.* (2002) cited Smith *et al.* (1994), who in turn had cited Lenczewski (1980).]

In his account of New Hampshire skippers, Fiske indicates that all of the Hesperiidae treated in his paper were recorded in the town of Webster, about 10 miles northwest of Concord. He writes in his description of *Eudamus tityrus* [= *Epargyreus clarus*]: "I have frequently noticed the female hovering over patches of wild bean (*Phareolus* [sic] *perennis* [=*P. polystachios*)], but not until last season did I find larvae on this plant. Out of several such larvae one *tityrus* emerged this winter from a forced pupa. I have also seen larvae on garden beans, which were probably this species" (Fiske 1896). However, after consulting regional floras, we believe he misidentified the plant. *P. polystachios* does not occur in New Hampshire and has not been recorded north of Connecticut (Magee and Ahles 2007; Haines 2011; Kartesz 2015). Therefore, we believe our observation is the first documented record of *E. clarus* using *P. polystachios* as a larval host.

Although we did not find what we were looking for, we were treated to unlocking a secret of our ever fascinating Lepidoptera. In 2016 we will continue our search in Indiana for the elusive Golden Banded-Skipper.

We want to thank Richard Boscoe and David Wright for reviewing our manuscript and providing many helpful suggestions.

Literature Cited

Belth, J. E. 2013. *Butterflies of Indiana: A Field Guide*. Bloomington, Indiana: Indiana University Press, 328 pp.

Boscoe, R. W., M. C. Minno, and D. M. Wright. 2015. A case of mistaken identity: the true host of the Golden-banded Skipper *Autochton cellus* (Hesperiidae: Eudaminae) in the eastern U.S. News of The Lepidopterists' Society, 57(2): 56-59.

Deam, C. C. 1940. *The Flora of Indiana*. Indianapolis, Indiana: Department of Conservation, Division of Forestry, 1236 pp.

Fiske, W. F. 1896. New Hampshire Hesperiidae. Canadian Entomologist, 28(6): 162-164.

Haines, A. 2011. *New England Wildflower Society's Flora Novae Angliae: A Manual for the Identification of Native and Naturalized Higher Vascular Plants of New England*. New Haven, Connecticut: Yale University Press, 973pp.

Homoya, M. A., and H. Huffman. 1997. Sinks, slopes, and a stony disposition: The highland rim natural region. Pp. 167-171 in Jackson, M. T., ed., *Natural Heritage of Indiana*. Bloomington, Indiana: Indiana University Press, 482 pp.

Howe, W. H. 1975. *The Butterflies of North America*. Garden City, New York: Doubleday & Company, Inc., 633pp.

James, D. G., and D. Nunnallee. 2011. *Life Histories of Cascadia Butterflies*. Corvallis, Oregon: Oregon State University Press, 448pp.

Kartesz, J. T. 2015. The Biota of North America Program (BONAP). North American Plant Atlas. (http://www.bonap.org/napa.html). Chapel Hill, N.C. [maps generated from Kartesz, J. T. 2015. Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP). (in press)].

Lenczewski, B. 1980. *Butterflies of Everglades National Park*. Homestead, Florida: South Florida Research Center (Report T-588), 110pp.

Magee, D. W., and H. E. Ahles. 2007. *Flora of the Northeast: A Manual of the Vascular Flora of New England and Adjacent New York, Second Edition*. Amherst, Massachusetts: University of Massachusetts Press, 1214pp.

Minno, M. C. 1994. Immature stages of the skipper butterflies (Lepidoptera: Hesperiidae) of the United States: biology, morphology, and descriptions. PhD dissertation, University of Florida, 540 pp.

Robinson, G. S., P. R. Ackery, I. J. Kitching, G. W. Beccaloni, and L. M. Hernández. 2002. *Hostplants of the Moth and Butterfly Caterpillars North of Mexico*. Gainesville, Florida: The American Entomological Institute, 824 pp.

Scott, J. A. 1986. *The Butterflies of North America: A Natural History and Field Guide*. Stanford, California: Stanford University Press, 583pp.

Smith, D. S., L. D. Miller, and J. V. Miller. 1994. *The Butterflies of the West Indies and South Florida*. New York, New York: Oxford University Press, 264pp.

Yatskievych, K. 2000. *Field Guide to Indiana Wildflowers*. Bloomington, Indiana: Indiana University Press, 357 pp.

Young, F. N. 1956. *Euphydryas phaeton* in southern Indiana. Lepidopterists' News, 10(1-2): 46.

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

Literature Cited

Holland, W.J. *The Moth Book a Popular Guide to a Knowledge of the Moths of North America*. New York: Doubleday, Page & Company, 1903. Print.

Tietz, Harrison M. *The Lepidoptera of Pennsylvania*. State College: Pennsylvania State College of Agriculture, 1952. Print.

Tuttle, James P. *The Hawk Moths of North America: A Natural History Study of the Sphingidae of the United States and Canada*. Washington, DC: Wedge Entomological Research Foundation, 2007. Print.

Wagner, David L. *Caterpillars of Eastern North America: A Guide to Identification and Natural History*. Princeton, NJ: Princeton UP, 2005. Print.

Fig 1. *Amphion floridensis* final instar larva sitting on *Oenothera biennis*. Photo by Teá Kesting-Handly.

Fig 2. *Amphion floridensis* final instar larva actively feeding upon *Oenothera biennis*. Photo by Teá Kesting-Handly.

Unique host record for *Amphion floridensis* (Lepidoptera: Sphingidae)

Teá Kesting-Handly[1] and Paul Dennehy[2]

[1]804 Centre St. #330, Boston, MA **tea.kestinghandly@gmail.com**
[2]1101 Ridgeview, Danville, PA **Dennepj10@gmail.com**

Abstract

Amphion floridensis (Lepidoptera: Sphingidae) is a diurnal moth distributed throughout the eastern United States and parts of Canada. The larvae are known to feed on several genera of plants, including *Vitis*, *Parthenocissus*, and *Ampelopsis*. We confirm here that *A. floridensis* also uses *Oenothera biennis* as a host; a host association which is rarely mentioned in the literature. Continued searches for *A. floridensis* larvae on *O. biennis* should be conducted to determine how common this plant is utilized as a host, and whether populations of *A. floridensis* can be sustained completely on *O. biennis*.

Key Words: Sphingidae, Lepidoptera, *Amphion floridensis*, Hostplant

Amphion floridensis (B. P. Clark, 1920)

Amphion floridensis is a moth in the family Sphingidae found across Eastern North America. It is primarily active diurnally. Larvae have been recorded from several host plants including *Vitis*, *Parthenocissus*, and *Ampelopsis* (Holland, 1903; Wagner, 2005; Tuttle, 2007). Tuttle has recorded larvae on *Epilobium angustifolium* (Linnaeus, 1753) in New Brunswick (Tuttle, 2007). In the Northeast, we often find larvae of this species feeding on either *Vitis* or *Parthenocissus quinquefolia*, and adults often nectaring at flowers (*Syringa* has been frequently observed) or consuming sap from damaged trees. Adults are seen on the wing from late May to late June (occasionally straying into early July) in Massachusetts. Larvae are found from early June through the end of July. There is one generation in Massachusetts. Larvae are most reliably found at night by searching hostplants with a flashlight, however I have occasionally found large clusters of first instar larvae feeding on *Vitis* leaves in the daytime.

Records from Massachusetts include: Suffolk, Barnstable, Middlesex, Berkshire, Norfolk, Plymouth, and Worcester Counties. It is likely that this moth is widespread throughout the state, but has yet to be reported in the remaining counties.

The hostplant record of *Oenothera biennis (*Linnaeus) (Myrtales: Onagraceae) comes from Suffolk County, Massachusetts, on July 25, 2015. After dark, at approximately 23:35, a group of people (see end of paper) and I were taking a walk looking for nectaring moths. I found a final instar *A. floridensis* feeding on *Oenothera biennis*. The larva was found in a plant cluster of approximately 6 plants. The plant the larva was on, as well as a few surrounding plants, did have some larval damage, presumably from this larva in earlier instars as no others were found. It is possible additional larvae may have been present, but pupated; however, this is unlikely given the amount of damage to the plants. The closest *Vitis* species was approximately 200 ft away, and showed no indication of feeding damage. The larva was kept in captivity and reared to pupation on *O. biennis*. The time it lasted in the final instar while being fed this plant was 5 days. In searching the HOSTS database, *O. biennis* is listed as a hostplant for *A. floridensis*. This likely comes from a secondary citation from a paper published by Tietz in 1952. Tietz mentions in his paper of the Lepidoptera of Pennsylvania that *A. floridensis* has been recorded on *O. biennis* (Tietz, 1952). Beyond that citation, there is not a lot of additional information. The Tietz paper, while good does have a lot of errors. In particular, there are records of certain *Catocala* and others that wouldn't normally occur in the state of Pennsylvania and were obtained by written letters without examination of specimens. No citation of *A. floridensis* on *O. biennis* has been found other than that paper. In a personal communication with Dr. David Wagner, he mentioned that he had never heard of this plant being used by this species (D. Wagner, pers. comm., September 25, 2015). Generally, in the final instar, certain Sphingidae can become more generalist feeders. This species however, in my experience, is not one of them. It was also interesting that the damage found on surrounding plants was very characteristic for young-instar sphingid larvae.

Additional Viewers: Jennifer Forman Orth, see her record of this larva on BugGuide.net.

Acknowledgements

I would like to acknowledge Jeff C. Taylor for organizing the BioBlitz that led to the confirmation of *O. biennis* as a hostplant for *A. floridensis*. I would also like to thank the participants of the BioBlitz for taking ample photographs of the larvae and helping document the find. I would like to acknowledge Jean Haxaire, James Adams, and David Wagner for taking time to review this paper.

(Literature Cited and photos are on the previous page.)

Conservation Matters: Contributions from the Conservation Committee

North American butterflies: are once common species in trouble?

Scott Hoffman Black

Executive Director, Xerces Society for Invertebrate Conservation, Chair IUCN Butterfly Specialist Group
sblack@xerces.org

This month the Conservation Committee wanted to share Scott Black's recent article from *Wings* (Spring 2016: 5-9) on the decline of widespread and previously common species of butterflies. The message in his article is an important one, and, alarming, it echoes recent reports from other regions of the globe. There is a (bigger) worry that insect biomass across many terrestrials ecosystems is in decline. *David Wagner*

I grew up during the heyday of the American muscle car and have teenage memories of rocketing down Nebraska country roads in my 1971 Ford Mustang Mach 1. Back then even a short drive resulted in hundreds of dead bugs splattered across the grille, so I was always washing my car to keep it clean and shiny. When I returned to the Midwest last year with my wife and two kids—now driving a much more sensible and fuel-efficient rental car—I was struck by the paucity of bugs. These days you can drive the entire four hundred miles across the broad state of Nebraska and your car will be practically spotless when you get to the other side.

The situation was even more noticeable when I stepped out of the car. In many areas, there were shockingly few insects. Where I might once have seen thousands of monarchs in the fields, yards, and roadsides, I now saw perhaps a dozen. Butterflies are disappearing, along with countless other creatures.

With more than eighteen thousand species of butterflies and ten times as many species of moths gracing our planet, we know relatively little about the status of each one, but the information we do have is not encouraging. Recent reports from practically every continent document unprecedented declines in a broad array of butterflies.

Studies in Europe reveal that on average the continent's grassland butterfly species have had population losses of almost 50 percent since the early 1990s. Similarly, three-quarters of Britain's butterfly species are in decline. The situation is just as disturbing in the United States, where at least five butterflies have gone extinct since 1950, another twenty-five are presently listed as endangered nationwide, and four more are listed as threatened. NatureServe, one of the leading sources of information about rare and endangered species, assessed all of the roughly eight hundred butterfly species in the United States and found that 17 percent are at risk of extinction.

Many rare endemics, like this Uncompahgre fritillary (*Boloria acrocnema*) from the San Juan Mountains in Colorado, are imperiled. It is, however, becoming apparent that many common species are declining as well, though such declines are hard to track. Photograph by Scott H. Black.

Much of my career has been spent focusing on conservation of the rarest of the rare—those butterflies and other animals that are on the brink of extinction. Such butterflies are often called "rare endemics"—that is, species that are found only in particular places, either in a limited geographic area or occupying a very specific type of habitat. For a population living within such tight constraints, the advent of a housing development in or adjacent to its habitat, or the invasion of that habitat by weedy plants, can lead to decline and endangerment. Indeed, most of the butterflies listed by NatureServe as being at risk of extinction are rare endemics.

It is, however, becoming apparent that many of the common species are disappearing as well, though such declines were hard to notice at first. These common species were historically the most populous butterflies that you would find in your yard or notice along the side of the road. They are the ones we expect to see regularly—and, although we now see them less frequently or in scores rather than hundreds, the fact that we continue to see them at all further masks their decline. It is often hard to spot this type of slow, incremental erosion of butterfly populations, especially when our focus is on rare species or on those that are

already known to be threatened. Who was even counting the common or garden butterflies?

The realization that broadly distributed species are declining was brought home to me a few years ago when I was invited to give a keynote talk, at the Butterfly Conservation Symposium in England, on the status of butterflies in North America. It was a big topic and one where I felt I needed some feedback from colleagues to make sure that I covered it adequately. In preparing for the presentation, I asked a number of entomologists a series of questions, the last one being, "What is your take-home message about the status of butterflies in North America?" What amazed me was the similarity among the responses. The answer from Dr. Jaret Daniels of the University of Florida sums up the thinking of most of the scientists I queried: "There is no doubt that the rate of decline for at-risk butterfly populations continues to accelerate. . . . What should be most alarming to all of us is that this downward trend has now spilled over to include many previously more wide-ranging and common butterflies."

This precipitous decline is epitomized by the monarch butterfly (*Danaus plexippus*), whose population has fallen by over 70 percent across North America since monitoring efforts began in the mid-1990s. Another victim of this trend is the regal fritillary (*Speyeria idalia*), a striking butterfly that lives in the tallgrass and mixed-grass prairies of eastern and central North America. Historically it was found in thirty-two U. S. states and the Canadian province of Manitoba, but now Kansas is the only place where it is apparently secure. NatureServe lists the regal fritillary as extirpated from Manitoba and fourteen states, and as critically imperiled, imperiled, or vulnerable in fifteen; the other two states in its historic range have not tracked it. And the regal fritillary is not the only prairie species that is in decline; whole groups of butterflies that rely on open grasslands, such as grass skippers, appear to be in trouble throughout the Midwest and Pacific Northwest.

The regal fritillary (*Speyeria idalia*) was at one time found in thirty-two U. S. states, and now appears to be secure in only one. Photograph by Bryan E. Reynolds

One problem with determining the status of many species is that there are few long-term data sets that record butterfly numbers in the United States, but there are a couple that are worth noting. The first of these is an analysis by Greg Breed, Sharon Stichter, and Elizabeth Crone of two decades of observational data gathered by the Massachusetts Butterfly Club, compiled over the course of nearly twenty thousand one-day surveys covering a hundred butterfly species common in the state. The analysis revealed that the abundance of southerly distributed species increased while at the same time those species with a more northern distribution decreased. This finding corresponds with other climate studies demonstrating that butterfly populations may be moving northward and to higher elevations, but the study also showed something new: species that overwinter as eggs or as newly hatched larvae experienced greater declines than did those that overwinter at later stages.

The second investigation is ongoing and is now North America's longest-running butterfly study. Dr. Arthur Shapiro, a professor at the University of California at Davis, has been monitoring butterflies across northern California for nearly forty-five years. He began in 1972 with a single site near San Francisco, and over the next two decades added more sites; his regular transect now stretches from sea level on the San Francisco Bay to the crest of the Sierra Nevada near Lake Tahoe.

Dr. Shapiro and his colleagues, including Dr. Matthew Forister at the University of Nevada at Reno, monitor these sites every year, and though each of the locations is a natural or seminatural area that has not been directly impacted by urban or agricultural development, they have found that butterflies are declining at every one of the sites. Their study shows that these changes are occurring across all butterflies: every family has species that are in decline. The data also revealed that population losses are more severe at lower elevations; consistent with the results of other studies, some butterfly species seem to be moving to higher elevations. One of the most interesting findings is that endemic butterfly species appear to be in only slightly more severe decline than more-wide-ranging butterflies. At one site, for example, the western pygmy-blue (*Brephidium exilis*), a small, relatively localized species, is showing a similar decline to the cabbage white (*Pieris rapae*), one of the most common butterflies in North America.

Across the board, the information we have leads to the conclusion that a huge number of butterfly species, including many that we would consider common, are indeed in decline. What is happening in our landscapes to cause such alarming change? Loss of habitat and habitat degradation are important drivers. Urban landscapes increasingly displace natural ones, and those formerly green spaces that are not completely paved over are fragmented. For its part, agriculture favors fewer types of crops, leaves fewer edges

unplowed or untrampled, and tolerates ever fewer "pests." Insecticides and herbicides used on all of these landscapes directly kill both the butterflies and the plants that they rely on. The wild places that do remain suffer the effects of invasive species and climate uncertainty, as well as the destructive impacts of mining, logging, and other forms of resource extraction.

The fact is that we have created a fully human-dominated world, with devastating results for the other inhabitants of this planet, including butterflies and moths. But our lives would be greatly impoverished without these winged creatures. They are of vital importance to ecosystems, inspire poetry and art, provide livelihoods, offer a window into the natural world, and bring beauty into our cities and neighborhoods. We must do whatever we can to restore their populations to health.

The situation poses an enormous challenge, yet despite the biodiversity crisis unfolding all around us, we at the Xerces Society believe that butterflies and other animals can have a secure future. Continuing research is, of course, imperative, since the more we know the more effective we can be in our conservation efforts. There are a lot of data sets that can help answer these larger questions, but a coordinated effort must be made to compile and assess all of the data available.

Even so, we cannot wait until we have assembled "perfect" information to move forward, because by then it will be too late. We already know that the future health of the planet requires a thoughtful and sensitive reconciliation between the human environment and the more natural one. Policies that could accelerate that reconciliation are desperately needed; at the same time there is much that we can do, as individuals, while we as a society work for those policies to be enacted.

Moths make up the larger portion of Lepidoptera. We know even less about how well they are faring in North America than we do about the state of butterflies. Photograph by Bryan E. Reynolds; Sad Underwing (*Catocala maestosa*).

We must actively protect, enhance, and restore resilient habitats, in which both plants and butterflies can flourish. Many butterfly species require quality habitat connected by corridors to allow populations to move across the landscape; larger natural areas can serve as the anchors, but interstitial areas of habitat are vital if we hope to protect butterflies as well as other pollinators. We also need to reduce stressors, and in particular we must minimize the use of pesticides.

Farms, roadsides, and your own garden all have a critical role to play. Whether you live in California's Central Valley, upstate New York, or the panhandle of Texas, you can act right now to help save the earth's butterflies. Your efforts will support countless other creatures as well, from lady beetles to songbirds—and, in the end, humanity itself will be a major beneficiary of a more conservation-minded approach.

Scott Hoffman Black, executive director of the Xerces Society, has been involved with butterfly conservation for more than two decades. He serves as chair of the International Union for Conservation of Nature (IUCN) Butterfly Specialist Group and as co-chair of the Monarch Joint Venture, and his several awards include the U. S. Forest Service Wings Across the Americas 2012 Butterfly Conservation Award.

From the Editor's Desk

James K. Adams

Thanks to all of you who have sent me contributions for the News. I have a couple of "Formative Experiences" articles in the queue, so be looking for that in the next issue. Also, let me reiterate that I now have backlog of nearly an issue by the time one gets published. That means that even if you meet the deadline for a particular issue, that is not a guarantee that your article will make it into that issue. So don't be surprised when I tell you that your article will appear in one or maybe even two issues down the road.

I have one fantastic recent lep experience to share. Larry Gall, from the Peabody Museum, Yale University, came to north Georgia this past weekend (Aug. 20) looking to extend the known range of the recently described *Catocala myristica*, that feeds on Nutmeg Hickory, a very local and least common *Carya*, found in a few locations in the SE U.S. There is one known area in Georgia for the tree, near Rome, GA, just a hop, skip and a jump from where I live. With the help of local botanist Richard Ware, we located the trees, and the moth! A new Georgia record!

Murderers touched by the magic of Monarchs

David G. James

Dept. of Entomology, Washington State University, Prosser, WA 99350 **david_james@wsu.edu**

I last seriously worked on Monarch butterflies back in the last century when a billion of the glorious creatures roamed the eastern US. Ironically though, in the late 1970s and 1980s I was working on a seriously declining population of Monarchs in eastern Australia. Further back in the 1960s overwintering populations in the Sydney area numbered in the tens of thousands at each of a dozen or so sites but by the time I began my research in 1978 each of these sites barely hosted 2-3,000 monarchs. During 1978-85 I studied Australian Monarchs which resulted in my PhD and 14 scientific papers, all summarized in a review paper on Monarch migration biology presented to the second MONCON conference held in Los Angeles in 1986 (James 1993). The upshot of my work was that the Australian Monarch had subtly adapted to Australian conditions in its little more than a century of occupying the land downunder. Most notable was the absence of a true reproductive diapause and the existence of more flexible reproductive strategies compared to North American Monarchs. This made good sense because no where in Australia is the need to escape winter as desperate as it is in say Minnesota or Chicago. Monarchs can survive in most parts of Australia during winter but flying to the coast could make things a little more comfortable. So a more flexible 'decision-making' process evolved whereby Australian Monarchs literally check the weather after eclosion and make their decision to migrate or not on whether its warm or cold! Daylength seems to have little to do with the decision.

Fast-forward to 1999 and I exchange the land downunder for the 'outback' of Washington State, that is, the arid part east of the Cascades. This 'outback' unlike the Australian version is not an acceptable home for Monarchs during winter with temperatures commonly remaining below freezing for weeks at a time. Washington is part of the summer range of North American Monarchs though and I was happy to see a few in the height of summer each year but disappointed not to see them 'everywhere' as I thought they might be. 'Old-timers' told me they did used to be 'everywhere' in the old days…..

As I wrestled with solving insect and mite problems in eastern Washington's irrigated agriculture by using less pesticide and more biocontrol (my day job). I pondered on the possibilities of working with Monarchs again. I was surprised to learn that in contrast to the thousands of Monarchs that had been tagged for decades in the eastern US to work out migration routes, virtually none had been tagged in the Pacific Northwest! Yet the idea that PNW Monarchs migrate to coastal California for overwintering was very much an accepted 'fact'. It was easy to see why wild Monarchs had not been tagged in the PNW.. there were hardly any that you could tag.. just one or two each year on your Buddleia bush if you were lucky! And of course there are fewer human beings per square mile in the PNW than just about anywhere else in the lower 48 states. Clearly there was a need to tag Monarchs in the PNW and get some data to support the notion that they all spend their winter vacation in California!

Bob Pyle was the first lepidopterist to welcome me to Washington and it wasn't long before I was reading his book "Chasing Monarchs" (Pyle 1999) which entertainingly documents his autumn of 1996 following Monarchs from British Columbia to Mexico. One of the discoveries he made was that not all apparently migrating Monarchs in the PNW head towards the California coast. Many of his observations indicated that a significant number flew southeast, putting them on a different track entirely, one that could end up with them arriving in Mexico. So we really did need to tag PNW Monarchs to determine their overwintering grounds!

Monarch tagging was not a priority for me from 2000-2012 but I did monitor the incidence and abundance of Monarchs in the PNW. I solicited and gathered online reports of Monarchs in the PNW from 2005-15 and until 2014 the number of reports did not exceed 20 per season. No Monarchs were reported in 2008, 2009 and 2011 (Fig. 1).

Clearly these kind of numbers are unlikely to support a significant tagging program. With considerable effort I could probably find and tag maybe 25 Monarchs during July-August. If I established a network of ten like-minded citizen scientists then maybe we could tag up to 200? If we did this for a decade, perhaps we would get 10 recovery data points?

As I pondered this mildly depressing scenario I received an email from Dr Tamara Russell, Clinical Director of the Residential Mental Health Unit at Washington State Penitentiary in Walla Walla, Washington who wondered if I had a project that could involve inmates in rearing butterflies? The Sustainability in Prisons Project (**http://sustainabilityinprisons.org/**) was already successful at connecting prisons with nature and I immediately saw that prison rearing of Monarchs could be the answer to my problem of getting sufficient numbers of Monarchs tagged to yield worthwhile data! Incarcerated Citizen Scientists indeed!

Thus was born the Washington State University-Washington State Penitentiary partnership that has seen almost 10,000 Monarchs reared, tagged and released by

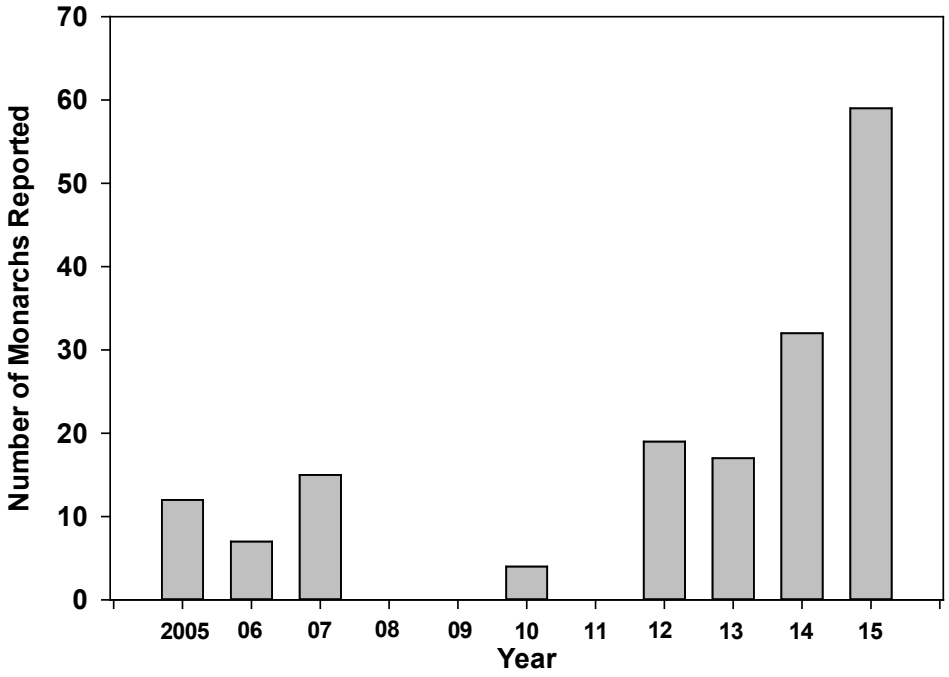


Figure 1. Number of Monarchs seen in the PNW during 2005-2015 as reported through internet email, Lepidoptera listserves and personal communications.

prison inmates during the past four years (**https://news.wsu.edu/2012/07/03/state-prisoners-give-monarch-project-wings/**). It is important to note that all of these reared Monarchs originated from locally caught wild Washington female Monarchs, so in effect the prisoners simply ensured that the substantial natural mortality which occurs in wild populations did not occur in protective custody caterpillars. It is a cliché but the prisoners had 'time on their hands' which they invested in providing the best care possible for their caterpillars and chrysalids. In 2012, they produced an astonishing 85% survival rate in Monarch caterpillars given to them as first instars! The inmates spent every moment they could with their caterpillars feeding them, removing frass as it fell and generally making sure that every individual had the best chance of making it to an adult Monarch (Figs 2-4).

So who are these inmates and why do they do such a great job of rearing Monarchs? Most of these guys are the worst of the worst. They are the highest risk prisoners and are held in close and protective custody. Many are murderers, life prisoners with no chance of release. You might think that these poor examples of human beings deserve nothing except misery and contempt and we should not give them a second thought. However, the reality is that they are living human beings that we as a society have chosen to maintain and look after, if not care for. So we have a responsibility to help them get through their lives in a way that is humane. These guys awaken everyday to an existence with rarely anything to look forward to and consequently the angst they feel frequently results in problems which impacts everyone around them, prisoners and wardens alike. The Monarch program changes that, it gives them something to look forward to. Monarchs literally weave their magic on the mental health of these inmates, helping alleviate depression. Monarchs give them focus and a purpose to their lives, they are involved in something bigger than themselves that has meaning.

Rearing Monarchs makes these guys think about themselves. Many of them look at the metamorphosis they see the Monarchs undergoing as something they can do…shedding the past to become something new. At least one of the original 'butterfly wranglers' as they call themselves, has actually improved his life a little. Not a 'lifer', he has transferred to a lower security prison where he is taking tertiary studies and he credits the Monarch rearing experience as the motivating factor!

Figure 2. David James explaining Monarchs to inmates at Washington State Penitentiary at Walla Walla.

Figure 3. A 'butterfly wrangler' in Washington State Penitentiary, Walla Walla

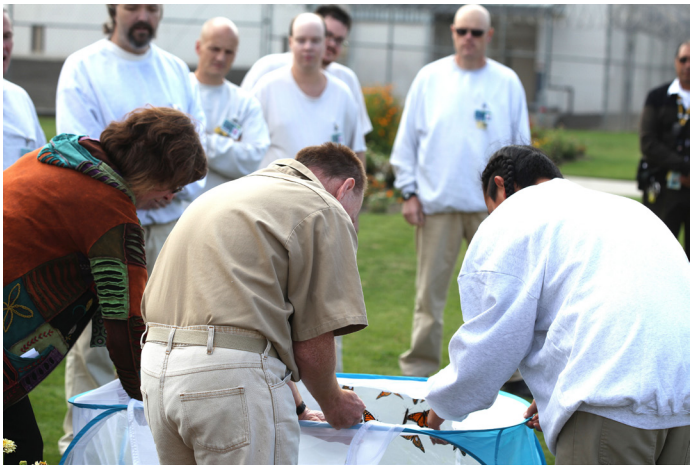


Figure 4. Inmates releasing the Monarchs they reared at Washington State Penitentiary, Walla Walla.

So the Penitentiary Monarch rearing program clearly has substantial mental health benefits for the participants as well as having a major impact on prison harmony. There is a waiting list to get on the Monarch program and you need to be a well-behaved prisoner to be considered for the program. The benefits to Monarch science are also accumulating. Six penitentiary-reared Monarchs have been recovered after having flown distances of 432 to 830 miles from the prison! I can imagine inmates traveling every one of these miles in their minds….. Five of these Monarchs turned up on the California coast in overwintering colonies at Santa Barbara, Morro Bay and Santa Cruz (Fig. 5). Another was found in a very small colony in some trees adjacent to a shopping mall south of San Francisco! The most intriguing recovery was one that traveled to Brigham City, Utah; this Monarch was clearly not interested in the delights of California….. The inmates love hearing about these recoveries!

Together with additional recoveries of other citizen-scientist tagged Monarchs in the PNW, the penitentiary recoveries are helping to improve our understanding of Monarch migration in the PNW. The jury is still out as to whether some PNW Monarch go to Mexico instead of California but the penitentiary-tagged Monarch that turned up in Utah is tantalizing evidence that some indeed do take this route. Our ongoing partnership with the inmates at Walla Walla is destined to ultimately provide the scientific data that will confirm or refute the Mexico hypothesis. And thanks to all of the citizen scientists involved in this project, incarcerated or not, this is a self-sustaining research project, operating without a cent of external grant funding! This is a remarkable achievement for this day and age.

I have known for a long time the magical effect Monarchs have on children when they are able to hold them and see them in all their close-up glory. I had no idea though that this magic extends to the other end of the human spectrum! Just more evidence I guess of the calming influence of nature's colorful ambassadors on our restless human souls.

Figure 5. A Monarch reared, tagged and released by inmates at Washington State Penitentiary, Walla Walla on September 7 2015 pictured amongst kin at an overwintering site at Santa Cruz, CA on February 5 2016 (Photo: John Dayton).

For more information on the PNW Monarch program visit our Facebook page: **https://www.facebook.com/MonarchButterfliesInThePacificNorthwest/?ref=aymt_homepage_panel.**

LITERATURE CITED

James, D.G. (1993). Migration Biology of the Monarch butterfly in Australia. In Biology and Conservation of the Monarch butterfly pp. 189-200 Eds. S. Malcolm and M. Zalucki. Natural History Museum of Los Angeles County.

Pyle, R.M.P. (1999). Chasing Monarchs: Migrating with the butterflies of passage. Houghton-Mifflin Co. New York.

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

Resident Monarchs in southwest Florida: Viable populations or vectors of disease?

The Southwest Florida Monarch monitoring program

James C. Dunford, Ph.D.[1], Kelly R. Dunford[2], Nick Bodven[3], and Gayle Edwards[4]

[1]Research Associate, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL **dunford@ufl.edu**
[2]EntoEndeavors, LLC **Entoendeavors@gmail.com**
[3]SW Florida's Butterflynet Blog: http://nickiebodv.blogspot.com
shandys@embarqmail.com and **butterflynet@embarqmail.com**
[4]**Flmonarch@gmail.com** and
https://www.facebook.com/Southwest-Florida-Monarch-Monitoring-Project-823213931125051/

About the authors: James Dunford received his Ph.D. at the University of Florida where he conducted research in the Entomology and Nematology Department and McGuire Center for Lepidoptera and Biodiversity. He is scientific advisor for the Southwest Florida Monarch Monitoring Program (SWFMMP) and has worked for Dr. Lincoln Brower monitoring the remigration of monarchs in north-central Florida. He is currently a medical entomologist in the U.S. Navy focusing on public health entomology and the prevention of arthropod-borne diseases. **Kelly Dunford** received her Ph.D. at the University of Florida where she conducted research in the Entomology and Nematology Department. She is also scientific advisor for the SWFMMP and owns an entomology consulting business. She currently works with Dr. Lincoln Brower on the monarchs of north-central Florida. **Nick Bodven** is a butterfly enthusiast residing in southwest Florida and co-founder of the monitoring program. Information about the program, becoming a participant, and general Florida butterfly information can be found at his SW Florida's Butterflynet Blog: http://nickiebodv.blogspot.com. He has delivered numerous educational butterfly seminars to teachers and students over the past 25 years and is currently scientific advisor of the Florida Native Butterfly Society. **Gayle Edwards** is also a butterfly enthusiast residing in southwest Florida and is co-founder and coordinator of the monitoring program. She has developed a Facebook page dedicated to the monitoring project: https://www.facebook.com/Southwest-Florida-Monarch-Monitoring-Project-823213931125051/.

Introduction

Monarch [*Danaus plexippus* (L.), Nymphalidae: Danainae] butterflies and their migratory patterns have been the subjects of many studies (Urquhart and Urquhart, 1978; Brower, 1995; Garland and Davis, 2002; Walton et al., 2005; Ries et al., 2015). A number of professional and citizen scientists have spent a significant, collective amount of time observing, tagging, and tracking monarch populations (e.g., Journey North, Monarch Health, Monarch Joint Venture, Monarch Watch, Monarch Monitoring Project, North American Butterfly Association); while several long term studies have provided insight on the movement patterns of their multi-generational trek to and from overwintering sites (Walton and Brower, 1996; Knight et al., 1999; Meitner, et al., 2004; Walton et. al, 2005; Crewe and McCracken, 2015; Howard and Davis, 2015; Steffy, 2015). Two of the most fascinating aspects of their life cycle across generations is the ability of the late summer-early fall cohort to navigate great distances to suitable resting sites in central Mexico or along the California coast, and to survive as an adult for greater than seven months when spring and summer generations have a lifespan similar to other temperate butterflies. While it has been documented that overwintering habitats in California and Mexico are shrinking (Brower, 1999; Brower et al., 2012b; Fallon, 2014), and internationally accepted that monarch populations are declining (Butler, 2014), it is unclear what role non-migratory populations play in the survival of this flagship butterfly species. In this article we summarize the significance of non-migratory monarch populations, citizen scientist efforts in southwest Florida to tag resident monarch populations and test them for the parasite *Ophryocystis elektroscirrha* (OE) McLaughlin & Myers, and discuss the potential link between an exotic milkweed species and increased prevalence of OE in Florida monarch populations. We also provide an overview of tagging efforts to date, our preliminary observations, and invite further collaboration with others interested in aspects of monarch biology and conservation.

During each generation, monarchs face a number of survival challenges in habitats that are geographically disjunct, and there are several hypotheses as to why this species is struggling in an increasingly modern world (Brower et al., 2012b; Pleasants and Oberhauser, 2013; Butler, 2014). For any species to survive it must adapt to changes to its natural surroundings via behavioral, physical, or genetic modifications. While ancestral and modern day danaines are largely tropical insects, a few, such as the monarch, have been able to exploit available niches in temperate climates. However, without having evolved the ability to

overwinter in a less vulnerable life stage, their ancestral requirement for tropical or sub-tropical conditions must be met for survival [note particularly cold and wet winters at overwintering sites in Mexico are also detrimental to monarch survival (Anderson and Brower 1996)].

Millions of eastern North America monarchs have evolved to escape winter conditions by heading south to Mexico behaving like one super-organism performing behavioral tasks together for the benefit of the species (i.e., group selection hypothesis); however, research has shown that there are also individuals who break diapause and remain along the U.S. Gulf Coast in southern states such as Florida (Brower, 1995; Knight, 1998; Knight and Brower, 2009). Some monarchs permanently reside in these regions where the weather is warm and host plants and nectar sources are readily available, avoiding the long-range migration altogether. Southwest Florida is one such place, and resident populations have been thriving there for decades (Knight, 1998; Brower, 1995; Howard et al., 2010). Southwest Florida provides environmental conditions for year around survival of monarchs who have otherwise adapted to escape cold conditions via long-range migration. The mean average monthly temperatures in the area's largest city, Ft. Myers, range from approximately 64^0 F to 84^0 (55^0 F to 75^0 F during winter months), and approximately nine native (and a few non-native) milkweed species are available in the region (i.e., Lee and Collier Counties) (Bodven, personal observations). Given diminishing overwintering sites and historical safe havens for millions of monarchs, it is not clear if non-migratory populations will ultimately play a role in the survival of the species.

Recently, there has been growing concern for the presence of an exotic milkweed species, *Asclepias curassavica* L. (tropical milkweed, scarlet milkweed), and its year around availability to typically transient monarchs (Satterfield et al., 2015). The tropical milkweed is native to the New World tropics (north to Mexico) and is frequently used as an ornamental plant (or naturalized 'weed') in the southern United States, especially by people interested in establishing butterfly gardens and sanctuaries to help declining monarch populations. It is the most commercially available milkweed species, and winter breeding monarchs are almost exclusively restricted to where this plant occurs (Howard et al., 2010; Satterfield et al., 2015) (but see Glassberg, 2014). Tropical milkweed is relatively toxic compared to its native milkweed congeners (native *Asclepias humistrata* Walter and *Asclepias perennis* Walter are also very toxic), but monarchs readily feed on this plant when native species are sparse (monarchs may often prefer this species over native milkweeds), which is frequently the case during fall and winter months. While native milkweed species are reportedly sparse and diminutive in size in the Ft. Myers area (Bodven, personal observation), this common, non-native milkweed species produces new leaves and flowers when other milkweed species have long senesced for the winter. This may be welcomed news for a species losing its winter homes in Mexico, but adaptation to conditions in southern Florida has not come without additional challenges.

Southwest Florida monarch populations also see the highest incidence of OE, a protozoan parasite infecting nearly 80% of monarchs in this area (Altizer et al. 2000; Altizer, 2001; Satterfield et al., 2015). This is five times greater than infection rates in other parts of North America, and some researchers believe it can be attributed to the presence of tropical milkweed (Satterfield et al., 2015). In some ways monarchs infected with OE are similar to other insect vectors that carry and transmit diseases, in this case OE relies on a vector (i.e., infected adult monarch) and close contact with offspring, other immature monarchs, or contact with the opposite sex during mating to transmit parasites to new hosts. Infective female monarchs scatter spores on eggs and milkweed leaves during oviposition, and larvae ingest the spores to become infected. Monarchs infected with OE suffer from wing deformities, smaller body size, reduced flight performance, and shortened adult life spans (Altizer and Oberhauser, 1999; de Roode et al., 2008).

Satterfield et al. (2015) noted that OE infection prevalence was markedly higher among sedentary monarch populations compared to migratory monarchs, demonstrating that diminished migration increases risk of infection. Typical monarch migratory patterns likely lower pathogen transmission by removing infected individuals along the migratory route allowing the butterflies to escape contaminated habitats. Similar Lepidopteran disease transmission dynamics have been noted under captive breeding conditions, such as those associated with the relatively sedentary and crowded environments in butterfly houses (Altizer and de Roode 2010). Altizer (2001) stated that in southern Florida, milkweed plants (e.g., tropical milkweed) are available year-round and monarchs can mate and lay eggs shortly after emergence. Her research demonstrated that seasonal, long-distance host migration affects the coevolution of host resistance and parasite virulence, generating host resistance in populations that migrate the farthest distance. While the prevalence of OE may be associated with the availability of an exotic milkweed, it is unclear if sedentary monarchs can eventually adapt to the presence of the parasite and maintain viable populations.

Monarch tagging programs have existed for decades, and currently there are a number of citizen scientist and professional projects tagging thousands of monarchs each year (see examples in first paragraph). Many of those programs focus on monarchs presumably headed north or south as part of the traditional long-range migration phenomenon, with few projects focusing on the behavioral patterns of non-migratory populations such as those in south Florida. There has been on-going tagging in Florida, a state that offers a flyway and respite for monarchs, for some time. Urquhart and Urquhart (1976) provided observations on the migration of butterflies along the Gulf Coast of Florida,

and others such as Journey North, St. Marks National Wildlife Refuge, and Eden Spring in Tallahassee have carried out monarch tagging studies in Florida since that time. Monarchs in north-central Florida have been tagged and studied since the 1980's (Knight et al., 1999). Knight et al. (1999) focused on the spring remigration of monarchs through north-central Florida noting the close association between monarchs and milkweed phenologies during the remigration process. The Florida Butterfly Monitoring Network, initiated in 2003 by the McGuire Center for Lepidoptera and Biodiversity (Gainesville), also conducts a citizen-based tagging program to determine if monarchs migrating through Florida stay, or move on to places such as Cuba or the Yucatan Peninsula.

A new tagging program was initiated in southwest Florida in 2011 by forward thinking citizen scientists to give insight into whether all southwest Florida monarchs permanently reside there or if some individuals are just passing through (perhaps on their way to Mexico or into the Caribbean in the fall; northward through the peninsula in the spring). The Southwest Florida Monarch Monitoring Program (SWFMMP) may be the most recent of the tagging projects established in the State. These tagging efforts may provide new answers to the co-evolution of monarchs and OE parasites and allow us to better determine the significance and sustainability of resident populations.

Tagging/Monitoring Efforts and Observations

The second author first began developing tags of various colors, shapes, and materials and tagging monarchs privately in 2000. While those efforts remained local and personal for several years, the serendipitous discovery and rare recapture of a monarch (Figure 1) tagged in Cape May, New Jersey (see Walton et al. 2005) at his suburban Ft. Myers backyard was the impetus to expand tagging efforts in the region. The Cape May monarch flew over 1200 miles, survived for at least 63 days along the way, and may someday prove to be a significant data point by which southwest Florida tagging efforts are validated. Was this an individual on its way to Mexico or the Caribbean, or an individual set on residing in south Florida? Whichever the case, the tag clearly denoted that this monarch was not originally a Florida resident; thus, we introduced the SWFMMP at the 2011 Annual Southwest Florida Butterfly Conference and outlined the program's objectives to better track the movements, phenologies, and adult life spans of resident monarchs. In 2012, the program added OE tracking to its tagging efforts, working with researchers at the University of Georgia Odum School of Ecology. Participants also choosing to conduct OE studies now carry out the swabbing protocol established by Altizer et al. (2000) when tagging monarchs.

Figure 1. Close up of tag on monarch tagged in Cape May, Jersey, and recovered in Ft. Myers, Florida (2009).

Monarch tagging and observation efforts conducted by the second author include the above-mentioned Cape May monarch, but also include recapture of one resident individual 81 days after initially being tagged. These two recaptures represent significant monitoring data; thus, the initial goals of the SWFMMP were to standardize a tagging and recapture protocol, increase the number of monarchs tagged, and improve reporting of these data (Figure 2). The program initially began with 15 volunteers signing up at the 2011 Annual Southwest Florida Butterfly Conference, and since that time the number of active taggers has reached 60. The program maintains 50 volunteers on average, with 47 also currently conducting OE sampling. There are also several annual events where tagging is conducted by temporary participants. Volunteers currently include members of the North American Butterfly Association's West Palm Beach Atala Chapter and Broward County Butterfly Chapter. The program also collaborates with the University of

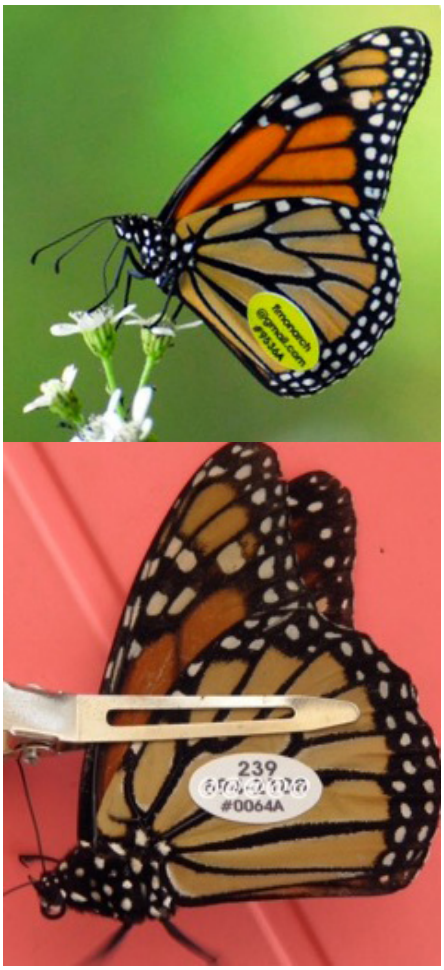


Figure 2. Tags with SWFMMP email or phone information.

Georgia (UGA) and University Minnesota (UM). Swabs are taken on monarchs and sent to UGA for OE analysis (Figure 3) and UM's Monarch Lab (www.monarchlab.org) conducts work on tachinid flies, which also parasitize monarchs. The program's success relies on public awareness, and monarch biology education and tagging training is provided during local butterfly meetings, nature walks, and conservation events (Figure 4). In addition, articles summarizing the program are published in various local magazines and newspapers. These media sources have helped to recruit new members, and have also increased reporting by residents not actively participating in the program.

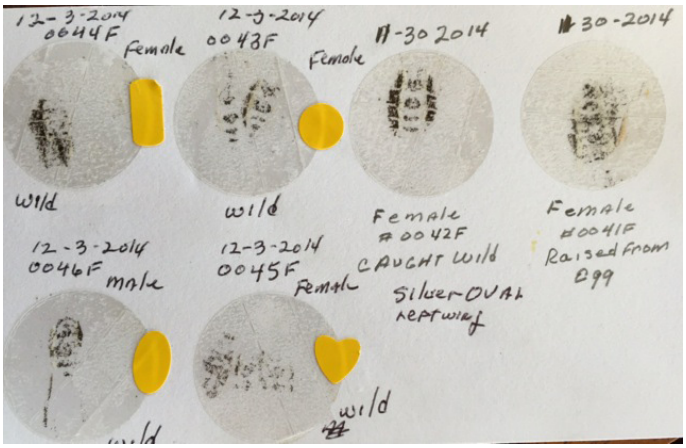


Figure 3. OE swabs taken using standard swabbing method. Image Nick Bodven.

The overarching objectives of the SWFMMP include the following:

1. Track the residential longevity and survival rates of adult monarchs in southwest Florida by maintaining locality/time data points for those tagged adults recaptured or observed.
2. Determine if monarchs tagged in southwest Florida migrate to Mexico or islands in the Caribbean during the fall migration.
3. Determine if monarchs that have overwintered or travelled through southwest Florida appear in northern parts of the State (or further north) during the spring remigration.
4. Better determine which milkweed species (native or non-native) are available at a given time of year and how these species influence monarch migration behaviors in southwest Florida.
5. Provide a better understanding of which habitats, host plants, and nectar sources should be conserved for monarchs residing in or migrating through south Florida.
6. Assess a variety of tag colors, shapes, text, and reflectivity to increase the chances of recapture or observation through camera or binocular lenses (when netting would not be required).
7. Make data available to other researchers, and assist with other projects related to host-parasite evolution and monarch conservation.

Approximately 4,000 monarchs have been tagged since the program started, and 170 individuals have been resighted/recaptured. As of January 2016, there have been 14 sightings of 30 days or more (one at 55 days) after initial tagging and one individual was observed 24 miles from initial tagging location. A monarch that was reared from the egg stage was tagged, released, and was recaptured 41 days later at the location it had eclosed. As of January 2016, 47 volunteers also took a total of 825 OE swabs, and an average infection rate of 79% was observed. While

Figure 4. Display at local event proving monitoring program information.

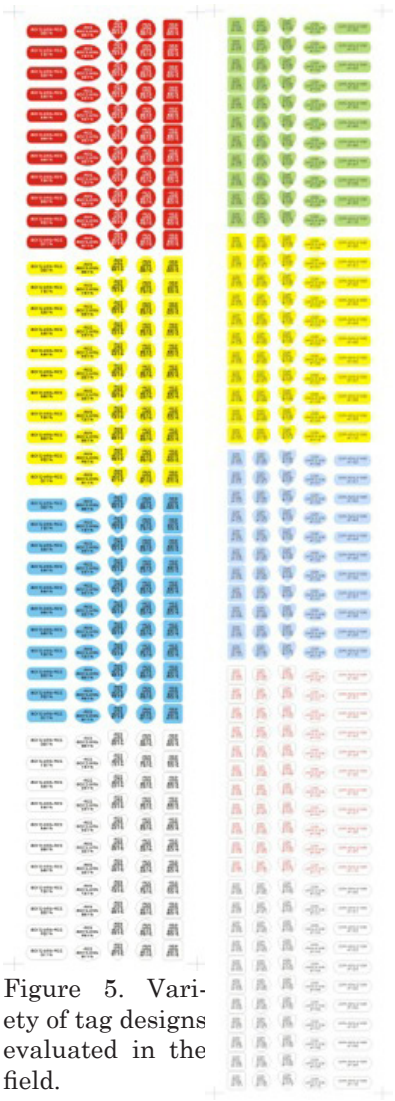


Figure 5. Variety of tag designs evaluated in the field.

tagging protocols need to be further streamlined and data formally analyzed, the second author has noted much of 2015 saw the most significant decline in monarch sightings since beginning tagging efforts; however, monarch sightings reached or exceeded previous years' sightings beginning late fall of 2015 through spring 2016.

The second author has also evaluated a number of tag variations in size, shape, color, thickness, and material (Figure 5) in order to improve tagging observations and recaptures. Reflective tags that camera flashes can illuminate or provide visible sun reflections have also been evaluated (Figures 6a,b). More work needs to be done, but the goal is to develop a more user friendly tagging system, and one that least hinders monarch flight. Currently, blocks of 20 tags and applying instructions are printed on a thin adhesive backed vinyl material using a desktop printer. The plain white or colored tags are waterproof, UV protected, and include consecutive ID numbers. Different shapes and colors are being tested to denote special tagging events and different regions (west, central, east) in southern Florida. These tags are distinguishable from a relatively short range, and make it possible to decipher what zone the monarch was originally tagged. These distinct tags allow participants to capture data without having to recapture the butterfly, which can be difficult for some. Using a telephone number or email on the tag seems to be the best identifier, but tags with colors or shapes as markers could be readily photographed with a cell phone camera. More details on tagging and on-going evaluations can be found at http://nickiebodv.blogspot.com.

The SWFMMP continues to distribute tags, data sheets, nets, native milkweed seeds, and OE kits at no cost to volunteers. We plan to gather data for years to come,

Figure 6a and b. Silver reflective tag photographed at night and during the day.

streamline mark and recapture protocols, and develop and maintain a centrally located database that researchers can utilize for their interests. This searchable database and web-site will contain information about the entire project, including identification of our volunteers (if they so desire), our staff, tag distribution, tag recovery, OE sampling results, and a Google mapping system for Lee County showing where butterflies were tagged, recaptured, and locations of butterfly gardens and parks in the county. The site will also contain yearly butterfly count information. When completed, we will be able to provide data of each aspect of the monitoring program in a format readily retrievable by interested researchers.

Discussion

The decline in monarch numbers has been estimated from migratory population counts (Rendón-Salinas et al., 2011; Brower et al. 2012b), but some researchers argue that the 'species' is doing just fine (Davis, 2012). Davis' work analyzed data taken from fall monitoring stations at Cape May, New Jersey and Peninsular Point, Michigan over a span of 15 and 19 years, respectively. The results showed no significant declines (but see Brower et al., 2012a); however, the author admitted that monitoring techniques were somewhat rudimentary. A classic Brower study currently

in preparation will shed further light on the migration puzzle, collating and analyzing over 30 years of remigration tagging data from a site in north-central Florida. This study will provide further evidence that monarchs are struggling to adjust to climate change and availability of locally available, native milkweed species, with population trends in north-central Florida correlating with evidence that populations are declining in Mexico. Brower (pers. comm.) has noted the importance of examining the phenology of all native Florida milkweed species to determine when and where they are available for monarchs. Even though some milkweeds may be present during winter months, they may not be suitable host plants for various, yet to be determined reasons.

Satterfield et al. (2015) encourages planting native milkweed plants or cutting back *A. curassavica* every few weeks within six inches above the ground during the fall and winter; however, they do support *A. curassavica* populations in southern portions of Florida where the plant has been present for decades, despite the high incidence of OE. Monarch Joint Venture (www.monarchventure.org) agrees that the availability of year-round *A. curassavica* is acceptable from Orlando, Florida and latitudes south. Other studies have noted high incidence of OE in California and Hawaii monarch populations where *A. curassavica* does not occur, and suggest temperature [and not *A. curassavica*] may play a role in OE prevalence (Leong et al., 1992; Pierce et al., 2014). Glassberg (2014) remarked that *A. curassavica* has been established for at least 100 years in extreme southern Florida, suggesting that resident monarch populations in these areas may have become dependent on this plant for survival. Further, he states that there is no evidence that *A. curassavica* is detrimental to monarch populations, and that the presence of this species may serve as a life-buoy by which the species can survive in the face of dwindling overwintering sites--removing it from these areas may also affect queen and soldier butterfly populations.

Monarchs may have the ability to eventually adapt to the presence of OE, and on-going tagging efforts in southwest Florida are key to better understanding if this is possible or already happening. It has been demonstrated that monarchs vary genetically in their levels of resistance to OE (Lefèvre et al. 2011). Sternberg et al. (2013) compared three populations of monarch butterflies (Hawaiian, south Floridian, and eastern North American) and found by conducting reciprocal cross-infection experiments between the three populations that Hawaiian monarch hosts were more resistant and tolerated more infective and virulent Hawaiian OE parasites. Perhaps genetic divergence of south Florida monarchs (see Lyons et al., 2012) and host-parasite coevolution dynamics will eventually separate them and their OE parasites from monarchs in other parts of North America. Molecular studies may also reveal the geographical origin of OE genotypes, allowing researchers to use them to determine where monarch individuals once resided. To further elucidate the effects of OE, future tagging and OE swabbing efforts in south Florida should also include body weight measurements and morphometric analyses (to include measurements of wing size) and be compared to parasite load. One of the effects of having OE is reduced wing and body size, and closer examination and statistical analyses of the prevalence of OE, parasite load, and disease symptomology is warranted. Unsanitary, captive breeding and release efforts may also increase disease transmission in naturally occurring monarch populations, and we caution against this practice. It should also be noted that other danaines occurring in southwest Florida such as the queen and soldier butterfly should also be examined for the presence of OE.

We urge readers to recognize the necessity for research on southwest Florida monarch populations, and invite those considering graduate studies focusing on Lepidoptera and conservation to use our data and conduct detailed studies on resident monarch populations. We also welcome additional citizen scientists interested in participating in the tagging and OE testing program. One of the goals of these tagging efforts is to not only better understand the impact of OE on resident populations, but also test several different tagging methodologies in hopes of improving recapture data and coordinating these efforts with other tagging programs. With additional tagging and recapture efforts in south Florida, participants focusing on tagged butterflies also increase the chances of recapturing a monarch tagged from another program in some other part of North America. Conversely, a monarch tagged in southwest Florida may be observed in some other part of the state such as north-central Florida or further south into the Caribbean or Mexico. Although recapture of a tagged monarch is extremely rare relative to the number of monarchs tagged, each recapture represents a significant data point.

Resident monarch populations in southwest Florida (or other parts of North America) are worthy of further study for many reasons; thus, the SWFMMP recently teamed up with the Florida Native Butterfly Society (http://www.thebutterflyestates.com/conservatory-rates.html), a non-profit organization located in Fort Myers to further explore research possibilities focusing on resident and migrating monarchs. Their mission is to develop and deliver educational programs to visitors and regional schools on native Florida butterflies. The 3,600 sq. ft. facility (Figure 7) raised over 4,000 native Florida butterflies in 2015 and is currently initiating projects involving resident species such as monarchs, to include further development of the SWFMMP. Resident monarch populations in southwest Florida may be evolutionary adaptations to human activities, but additional data is required to determine if planting tropical milkweed will be detrimental, or ultimately help conserve one of North America's most iconic butterfly species.

(Figures 1-6 images by Nick Bodven.)

Acknowledgements

The authors thank all of the taggers that have participated in the program to date and we hope to see more volunteers in the future. We also thank Dr. Lincoln Brower (Sweet Briar College), Dr. Dara Satterfield and Dr. Sonia Altizer (University of Georgia), and Dr. Karen Oberhauser (University of Minnesota) for sharing their expertise and providing guidance on studies in monarch biology and conservation.

Literature Cited

Altizer, S.M. 2001. Migratory behaviour and host-parasite co-evolution in natural populations of monarch butterflies infected with protozoan parasite. Evolutionary Ecology Research 3: 611-632.

Altizer, S.M. and J. de Roode 2010. When butterflies get bugs: The ABCs of Lepidopteran disease. American Butterflies Summer: 16-26.

Altizer, S.M. and K.S. Oberhauser. 1999. Effects of the protozoan parasite, *Ophryocystis elektroscirrha*, on the fitness of monarch butterflies (*Danaus plexippus*). Journal of Invertebrate Pathology 74: 76-88.

Altizer, S.M., K.S. Oberhauser, and L.P. Bower. 2000. Associations between host migration and the prevalence of a protozoan parasite in natural populations of adult monarch butterflies. Ecological Entomology 25: 125-139.

Anderson, J.B., and L.P. Brower. 1996. Freeze-protection of over wintering monarch butterflies in Mexico: critical role of the forest as a blanket and an umbrella. Ecological Entomology **21**:107-116.

Brower, L.P. 1995. Understanding and misunderstanding the migration of the monarch butterfly (Nymphalidae) in North America: 1857-1995. Journal of the Lepidopterists' Society 49: 304-385.

Brower, L.P. 1999. Oyamel forest ecosystem conservation in Mexico is necessary to prevent the extinction of the migratory phenomenon of the monarch butterfly in North America. In: Canevari P. ed. Endangered Migrations in the World. Bonn, Germany: International Union for the Conservation of Nature (IUCN) publication), 41-50.

Brower, L.P., O.R. Taylor, and E.H. Williams. 2012a. Response to Davis: choosing relevant evidence to assess monarch population trends. Insect Conservation and Diversity 5: 327-329.

Brower, L.P., O.R. Taylor, E.H. Williams, D.A. Slayback, R.R. Zubieta, and M.I. Ramirez. 2012b. Decline of monarch butterflies overwintering in Mexico: is the migratory phenomenon at risk? Insect Conservation and Diversity 5: 95-100.

Butler, C.A. 2014. The need for milkweed: report on the international initiative to address decline of the monarch butterfly (*Danaus plexippus*). News of the Lepidopterists' Society 56: 128-135.

Crewe, T.L. and J.D. McCracken. 2015. Long-term trends in the number of monarch butterflies (Lepidoptera: Nymphalidae) counted on fall migration at Long Point, Ontario, Canada (1995-2014). Annals of the Entomological Society of America 108: 707-717.

Davis, A.K. 2012. Are migratory monarchs really declining in eastern North America? Examining evidence form two fall migration programs. Insect Conservation and Diversity 5: 101-105.

de Roode, J.C., A.J. Yates, and S.M. Altizer. 2008. Virulence-transmission trade-offs and population divergence in virulence in a naturally occurring butterfly parasite. Proceedings of the National Academy of Sciences of the USA 105: 7489-7494.

Fallon, C. 2014. Report to the Monarch Joint Venture Monitoring of Monarch Overwintering Sites in California 2013. Report prepared by The Xerces Society for Invertebrate Conservation. February 2014. 7 pp.

Garland, M.S. and A.K. Davis. 2002. An examination of monarch butterfly (*Danaus plexippus*) autumn migration in coastal Virginia. American Midland Naturalist 146: 170-174.

Glassberg, J. 2014. Tropical milkweed, and the injurious effects of well-meaning people. American Butterflies Winter: 4-10.

Howard, E., H. Aschen, and A.K. Davis. 2010. Citizen science observations of monarch butterfly overwintering in the southern United States. Psyche: 1-10. doi:10.1155/2010/689301

Figure 7. Florida Native Butterfly Society conservatory, Fort Myers, Florida. Image provided by Rob Johnson.

Howard, E. and A.K. Davis. 2015. Investigating long term changes in the spring migration of monarch butterflies (Lepidoptera: Nymphalidae) using 18 years of data from Journey North, a citizen science program. Annals of the Entomological Society of America 108: 664-669.

Knight, A. 1998. A population study of monarch butterflies in north-central and south Florida. M.S. thesis. Univer sity of Florida.

Knight, A. and L.P. Brower. 2009. The influence of eastern North American autumnal migrant monarch butterflies (*Danaus plexippus* L.) on continuously breeding resident monarch populations in southern Florida. Journal of Chemical Ecology 35: 816-823.

Knight, A., L.P. Brower, and E.H. Williams. 1999. Spring remigration of the monarch butterfly, *Danaus plexippus* (Lepidoptera: Nymphalidae) in north-central Florida: estimating population parameters using mark-recapture. Biological Journal of the Linnean Society 68: 531-556.

Lefèvre, T., A.J. Williams, and J.C. de Roode. 2011. Genetic variation in resistance, but not tolerance, to a protozoan parasite in the monarch butterfly. Proceedings of the Royal Society B: Biological Sciences 278: 751-759.

Leong, K.L.H., H.K. Kaya, M.A. Yoshimura, and D.F. Frey. 1992. The occurrence and effect of a protozoan parasite, *Ophryocystis elektroscirrha* on overwintering monarch butterflies, *Danaus plexippus* from two California winter sites. Ecological Entomology 17: 338-342.

Lyons, J., A.A. Pierce, S.M. Barribeau, E.D. Sternberg, A.J. Monogue, and J.C. de Roode. 2012. Lack of differentiation between monarch butterflies with divergent migration destinations. Molecular Ecology 21: 3433-3444.

Meitner, C.J., L.P. Brower, and A.K. Davis. 2004. Migration patterns and environmental effects on stopover of monarch butterflies (Lepidoptera: Nymphalidae) at Peninsula Point, Michigan. Environmental Entomology 33: 249-256.

Pierce, A.A., J.C. de Roode, S.M. Altizer, and R.A. Bartel. 2014. Extreme heterogeneity in parasitism despite low population genetic structure among monarch butterflies inhabiting the Hawaiian Islands. PlosOne 13 June. DOI: 10.1371/journal.pone.0100061

Pleasants, J.M. and K.S. Oberhauser. 2013. Milkweed loss in agricultural fields because of herbicide use: effect on the monarch butterfly population. Insect Conservation and Diversity 6: 135-144. doi:10.1111/j.1752-4598.2012. 00196.x

Rendón-Salinas, E., C.A. Valera-Bermejo, M. Cruz-Piña, and F. Martinez-Meza. 2011. *Monitoreo de las colonias de hibernació de mariposa monarcas: superficie forestall de ocupación en Díciembre de* 2010. World Wildlife Fund. Mexico, Mexico City.

Ries, L., Taron, D. J., and E. Rendón-Salinas. 2015. The disconnect between summer and winter monarch trends for the eastern migratory population: Possible links to differing drivers. Annals of the Entomological Society of America 108: 691-699.

Satterfield, D.A., J.C. Maerz, and S.M. Altizer. 2015. Loss of migratory behavior increases infection risk for a butterfly host. Proceeding of the Royal Society of London B: Biological Sciences 282: 1-9. http://dx.doi.org/10.1098/rspb.2014.173

Steffy, G. 2015. Trends observed in fall migrant monarch butterflies (Lepidoptera: Nymphalidae) east of the Appalachian mountains at an inland stopover in southern Pennsylvania over an eighteen year period. Annals of the Entomological Society of America 108: 718-728.

Sternberg, E.D., H. Li, R. Wang, C. Gowler, and J.C. de Roode. 2013. Patterns of host-parasite adaptation in three populations of monarch butterflies infected with a naturally occurring protozoan disease: Virulence, resistance, and tolerance. The American Naturalist 182: E235-248. DOI: 10.1086/673442

Urquhart, F.A. and Urquhart, N.R. 1976. Migration of butterflies along the Gulf Coast of northern Florida. Journal of the Lepidopterists' Society 30: 59-61.

Urquhart, F.A. and Urquhart, N.R. 1978. Autumnal migration routes of the eastern population of the monarch butterfly (*Danaus plexippus*) (L.) (Danaidae: Lepidoptera) in North America to the overwintering site in the neovolcanic plateau of Mexico. Canadian Journal of Zoology. 56: 1754–1764.

Walton, R.K. and L.P. Brower. 1996. Monitoring the fall migration of the monarch butterfly *Danaus plexippus* L. (Nymphal idae: Danaidae) in eastern North America 1991-1994. Journal of the Lepidopterists' Society 50: 1-20.

Walton, R.K., L.P. Brower, and A.K. Davis. 2005. Long-term monitoring and fall migration patterns of the monarch butterfly (Nymphalidae: Danainae) in Cape May, New Jersey. Annals of the American Entomological Society 98: 682-689.

A confused pair. Female Juniper Hairstreak (*Callophrys g. gryneus*) mating with a male Coral Hairstreak (*Satyrium titus*).

This pair was found near Newfield, Cumberland County, NJ along a regional power line. This power line has historically (over past 3 years of surveying) held both Coral and Juniper Hairstreaks. Prior to this year, the area was not maintained for secondary growth during the recent years that I've searched, and held dense patches of bear scrub-oak and seasonal nectar plants (dogbane, butterfly weed and others). However this spring season saw the regional power line operator send in clearing crews to cut and chain the entire area between the private woods on either side of the right of way to about 6 inches of growth. Whether the impact of this clearing placed stress on the population of butterflies and led to some level of competition, I cannot speak to on any educated level. Other more common butterflies previously found in the area were dramatically reduced in numbers this year, presumably due to the clearing efforts in the spring.

This pair was found together, less than five yards from the property edge, with junipers/red cedars and seasonal growth of butterfly weed patches. Photos taken on July 11, 2016, with clear and warm weather conditions.

Steven Glynn, 347 Briar Drive, Millville, NJ 08332, www.flickr.com/southjerseybutterflier; ogcoll@aol.com

Membership Updates

Chris Grinter

Includes ALL CHANGES received by 17 August 2016. Direct corrections and additions to Chris Grinter, **cgrinter@gmail.com.**

New Members: *Members who have recently joined the Society, e-mail addresses in parentheses.. All U.S.A. unless noted otherwise.*

Alex Baranowski: Union Express, 50 Lower College Road Unit 243. Kingston, RI 02881 (alexbaran74@gmail.com)
Reed Barry: New College of FL. 5800 Bay Shore Rd. Sarasota, FL 34243 (reed.barry13@ncf.edu)
Allison Brackley: 2500 Wisconsin Ave NW Apt 727. Washington, DC 20007 (adb130@georgetown.edu)
José Cerdeña-Gutierrez: Calle Loreto 104. Arequipa 00001 PERU (erdenajoseal@yahoo.es)
Leslie Decker: [address redacted by request] (lesldeck@umich.edu)
Lance A. Durden: Dept. of Biology, Georgia Southern University. Statesboro, GA 30458 (Ldurden@Georgia-Southern.edu)
Matthew J. Faldyn: 107 LSU Life Sciences Bldg. Louisiana State University. Baton Rouge, LA 70803 (mfaldy1@lsu.edu)
Ruth Gruver: 451 Judith Ave. Roseville, MN 55113 (rahgruver@yahoo.com)
Josephine Grzeskowiak: [address redacted by request] (jgrzesko8@gmail.com)
Ravi Jambhekar: [address redacted by request] (ravijambhekar04@gmail.com)
Daisuke Kageyama (Ph.D.): Institute of Agribiological Sciences, NARO, 1-2, Owashi. Tsukuba, Ibaraki. 305-8634 JAPAN (kagymad@affrc.go.jp)
Elsita Kiekebusch: NC State Univ., 100 Eugene Brooks Ave. Campus Box 7617. Raleigh, NC 27695 (emkiekeb@ncsu.edu)
Megan Kobiela: [address redacted by request] (hobie003@umn.edu)
Jayme Lewthwaite: 1829 W 12th Ave. Vancouver, BC V6J 2E7 CANADA (jlewthwa@sfu.ca)
Jessica Linton: 245 Rodney Street. Waterloo, ON N2J 1G7 CANADA (jessicalinton86@gmail.com)
Vincent Maicher: Husova 87. České Budějovice, South Bohemia 37005 CZECH REPUBLIC (vincent.maicher@hotmail.fr)
Donald G. Miller (Ph.D.): California State University, Dept. of Biol. Sciences. Chico, CA 95929 (dgmiller@csuchico.edu)
Cyndi Moe: P.O. Box 253. Wellfleet, MA 02667 (ramblinmeadows@comcast.net)
Clay A. Nichols (M.D.): 901 North Stonewall Ave. Oklahoma City, OK 73117 (clayanichols@gmail.com)
Paola A. Olaya-Arenas (Ph.D.): [address redacted by request] (polayaar@purdue.edu)
Terry Peterson (Ph.D.): [address redacted by request] (tpeterson@email.com)
Victoria Pocius: 301 South 5th Street Unit 285. Ames, IA 50010 (pociusv@iastate.edu)
Susan Reigler: Dept of Biology, Indiana University, Southeast 4201 Grant Line Rd. New Albany, NY 47150 (sreigler@ius.edu)
Moria Robinson: 2236 Glacier Drive. Davis, CA 95616 (mrobinson@ucdavis.edu)
Cameron Thomas: [address redacted by request] (cameron.thomas@wsu.edu)
Thamara Zacca Bispo Taumaturgo: Rua Eduardo Aguirre Calabresi 161, Bloco 2, Apt 505 - Cristo Rei. Curitiba, Paraná 80050-390 BRAZIL (zacca.butterfly@gmail.com)
Annakie van Zyl: Posbus 7306, Flamwood. Klerksdorp, Noordwes 02572 SOUTH AFRICA (annakievanzyl@gmail.com)

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

Charles M. Barksdale (Ph.D.): 2006 East 8th Street. Austin, TX 78702-3432 (cmbarksdale@cox.net)
John "Hal" Donly: 1273 Abbey Road. Pickering, ON L1X1W5 CANADA (haldonly@gmail.com)
Michael W. Klein: 677 G Street, Space 158. Chula Vista, CA 91910 (michael@klein-edwards.com)
J. Donald Lafontaine (Ph.D.): 89 Burnbank St. Ottawa, ON CANADA (burnbank@sympatico.ca)
Megan McCarty: 18623 Boone Robinson Road. Patriot, IN 47038 (mccart31@purdue.edu)
Raymond A. Moranz (Ph.D.): 4514 N Davis Court. Stillwater, OK 74075 (raymond.moranz@okstate.edu)
Robert J. Nuelle, Jr.: 21603 Astipalia Drive. Spring, TX 77388 (bob.nuelle.jr@att.net)
Timothy T. Orwig: 11 Broadmarsh Avenue. Wareham, MA 02571 (Ttorwig@aol.com)
Jonathan P. Pelham: 6001 219th St. SW #F209. Mountlake Terrace, WA 98043 (zapjammer@comcast.net)
Stephen J. Parshall: 633 Sherman Ave, Apt 1. Evanston, IL 60202 (araneus9@hotmail.com)
Michael Rotter: 830 Turquoise Drive. Flagstaff, AZ 86001 (mcr268@nau.edu)

Metamorphosis

Chris Grinter

John Cleves Symmes, Jr. -- The *News of the Lepidopterists' Society* Number 3, 15 May 1973, "News and Notes," contained a one line sentence stating "John C. Symmes dies April 14 after a long Illness. Obituary articles are to appear later". Although forty-three years have passed, no promise should be broken and no member's obituary should be overlooked.

I did not know John Symmes and never recalled seeing his name in print until I obtained a copy of a letter dated July 25, 1946, from John to the late Arthur Ward Lindsey who was a well known authority on the skippers. The letter

began my quest to find out who this person was and what sort of lepidopterist he may have been.

After numerous internet searches which finally lead me to The Uncle Remus Library archives, his obituary was found in the April 19, 1973, edition of *The Madisonian*, the local newspaper published in Madison, Georgia. The front page article was titled, "John Symmes, naturalist and horticulturist, dies Saturday,". John passed away April 14, 1973. He was only fifty years old. After consulting *The Butterflies of Georgia* by Lucien Harris, Jr. published in 1972 it became apparent that John Symmes was an extraordinary lepidopterists without whom Harris would have had a great many fewer records to include in his book. Symmes' JCS initials can be found under eighty-six species accounts and he is credited with numerous field observations. According to Harris, Symmes had four Georgia state records. Harris and Symmes often collected together and their families were close. Symmes' name was mentioned in the Lucien Harris, Jr. obituary written by the late Irving Finkelstein in *The Journal of The Lepidopterists' Society* 37(4), 1983, 322-324. His exploits were still being noted in Volume 50 Number 3.4, 2008 *News of The Lepidopterists' Society* in a article about robber flies preying on butterflies that quoted a note from Harris' book about a collecting trip with Symmes and Dr. John M. Burns on August 22, 1967, where John netted a robber fly rapidly flying by while impaling a *P. m-album*. He often contributed to the Season Summary. In the 15 January 1961 Summary he reported taking *Polygonia faunus smythi*, ten or more specimens, attracted to a dead skunk and of collecting from the front fender of his car while his wife Jane drove slowly along mountain roads. In the 1 June 1963 Summary he reported collecting Megathymids along with H. L. King. On 22-24 May, 1963, Symmes and King took *Euphyes bimacula* a new record for the South Eastern U. S. He also submitted records for the 15 April 1968 Summary. Symmes also collected in Florida. In addition to Harris, Burns and King he collected with Bryant Mather and Col. S. S. Nicolay.

John Symmes attended the University of Georgia prior to his military service and went on to study under the renowned Professor J. R. Watson, graduating from the University of Florida, Gainesville with a B. S. and M.S. in Agriculture. It was during this time that he wrote to Lindsey at the age of twenty-three after reading, "A Primary Revision of Hesperia," published in the *Denison University Bulletin Journal of the Scientific Laboratories* Volume 42, No. 2, April 1942, offering to provide specimens from around Atlanta. According to *The Madisonian* his interest in butterflies began as a child. He went on to establish a very successful landscaping and wholesale nursery business in Atlanta. He served as President of the Georgia Nurseryman's Association, was a charter member of the Georgia Conservancy, a member of The Lepidopterists' Society and served in the U. S. Army during World War II. He was a skilled marksman once killing two deer within minutes.

John was married to Jane Campbell of Atlanta. Jane, who often accompanied John on his collecting trips, is still living and together they owned and restored the circa 1835 Cedar Lane Farm which is listed on the National Register of Historic Places, was open on the Madison Tour of Homes and was the subject of an article in *Georgia Magazine* in 1969. John and Jane had four daughters; Carol Symmes Mitchell, Holy Symmes Montford, Jeanne Symmes Reid and Ann Cleves Symmes. His daughter Jeanne has kindly provided me with information about her father's collection and his association with Lucien Harris, Jr. John's father passed away shortly after John, Jr. The Symmes family is related to President Andrew Jackson.

The location of the major part of John Symmes' butterfly collection is unknown at this time. The collection was donated to the Fernbank Science Center in Atlanta but it has been reported that there are no written records of the donation and the entire Lepidoptera collection at the Fernbank Science Center is in shrink wrap awaiting transfer to a new facility in 2017. His collection may have been integrated into the collection of Lucien Harris which also resides at Fernbank. There are eighty images of Symmes' specimens posted in the collection at Tall Timbers Research Station in Tallahassee. His family is still in possession of some of his collection of butterflies and a number of moths.

Submitted by: Joe Riddlebarger, 10 Greenspring Dr., Gibsonia, PA 16059; **jriddlebarger@earthlink.net**

John, his wife Jane and their daughter Jeanne.

Announcements:

Second Edition of Butterflies of Alaska

Butterflies of Alaska, A Field Guide, Second Edition, Kenelm W. Philip (Posthumous) and Clifford D. Ferris. iv + 110 pages, spiral bound with durable covers; 8.5" x 11". The now known 80 resident, 5 casual species, and one currently unconfirmed species are illustrated in full color. Each species entry includes information about geographic distribution, habitat, basic biology, flight period, diagnostic characters, and field behavior. A species index and plant index are included. The second edition includes the recently described (2016) *Oeneis tanana* as well as addressing several taxonomic issues; a flight-period graphic has been added. The book pages have been reformatted such that there is coverage of only one species per page. Maps have been updated to reflect additional records obtained after the first edition was published. $30 plus postage. ISBN 978-1-945170-60-7. Available from BioQuip and various Alaska booksellers.

PayPal is the easy way to send money 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. The process is simple: sign on to www.PayPal.com, and navigate to "Send Money", and use this recipient e-mail address: **kerichers@wuesd.org**; follow the instructions to complete the transaction, and be sure to enter information in the box provided to explain why the money is being sent to the Society. Thanks!

Kirby Wolfe's new website on the Tiger Moths of Costa Rica

"I want to bring to your attention my new site for the Tiger Moths of Costa Rica, with photographs of 370 species (so far) of identified live Arctiinae. They can be accessed by typing into the web address bar: **https://www.flickr.com/photos/kirbywolfemoths/collections,** or by Googling "Kirby Wolfe Tiger Moths", then in Flickr navigating either to Albums or better yet to More>Collections where you can find the moths divided into their respective tribes and subtribes. This can simplify specific searches significantly. I am frequently adding new material. The site format is very restrictive and I'm hoping to get some help for developing a better site in the future, but for now it kind of works and it's free." Enjoy the photos and the information!

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

Lepidopterists' Society Annual Meeting 2017 -- July 30 - August 1

The 66th Annual Lep Soc Meeting will be hosted by Katy Prudic at the University of Arizona in Tucson, Sunday, July 30 through Tuesday, August 1, 2017. Field trips, EC meeting, etc., have not been finalized yet. Be looking for the complete announcement in the Winter News.

The Southern Lepidopterists' Society invites you to join -- SLS-ATL meeting Oct. 28-30, 2016

The Southern Lepidopterists' Society (SLS) was established in 1978 to promote the enjoyment and understanding of butterflies and moths in the southeastern United States. Regular membership is $25.00. Student and other membership categories are also available. With the membership you will receive four issues of the Southern Lepidopterists' NEWS. Our editor J. Barry Lombardini packs each issue with beautiful color photos and must-read articles. SLS conveniently holds its annual meeting (this year Oct. 28-30) with the Association for Tropical Lepidoptera (ATL) at the Florida Museum of Natural History, McGuire Center for Lepidoptera and Biodiversity in Gainesville. The McGuire Center houses one of the largest collections of butterflies and moths in the world. The Florida Museum also offers viewing of living butterflies from around the world in the Butterfly Rainforest Conservatory. The SLS web page (http://southernlepsoc.org/) has more information about our group, how to become a member, archives of Southern Lepidopterists' NEWS issues, meetings, and more.

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

Society of Kentucky Lepidopterists -- Annual meeting Nov. 11-12, 2016

The Society of Kentucky Lepidopterists is open to anyone with an interest in the Lepidoptera of the Great State of Kentucky. We are a very active organization. Annual dues are $15.00 for the hard copy of the news; $12.00 for electronic copies only.

The society typically schedules three+ field trips yearly. The remaining (currently scheduled) field trip this year is 23 - 25 September, West Kentucky Wildlife Management Area, McCracken County.

The annual meeting is scheduled for Nov. 11-12 and will be at the University of KY, Lexington.

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

The Marketplace

IMPORTANT NOTICE to ADVERTISERS: If the number following your ad is "582" then you must renew your ad before the next issue if you wish to keep it in the Marketplace!

New Advertising Statement: The News of The Lepidopterists' Society accepts advertising related to Lepidoptera and consistent with the purposes of the Society free of charge. Other types of advertising will not be accepted, regardless of the source. Acceptability of advertisements for publication is at the discretion of the News editor.

Books

See Ernest William announcement of sale of library, directly above. Contact **ewilliam@hamilton.edu** 582

FOR SALE: Books from the collection of the late Mo Nielsen. Over 100 titles, pub. dates from 1889 to 2008. Includes complete sets of Scudder's 1889 Butterflies of the United States and Canada and Packard's 1896-1914 Bombycine Moths of North America. Also numerous fascicles from Moths of North America series. Send requests for list of books and prices to Duke Elsner at 8083 Barney Road, Traverse City, MI 49684 or **elsner@msu.edu.** Proceeds from sales will go to Mo's family. 582

Equipment

FOR SALE: Sold as a package (not separately), a large number of Elephant brand insect pins, 100 pins per pack: 2 pks of #00, 4 pks of #0, 2 pks of #1, 34 pks of #2, 9 pks of #3, 9 pks of #4, and 3 (unknown brand) pks of #5. Will accept a serious offer (I'm no longer collecting). Also for sale: most of my Lepidoptera library. Email me for a list. **ewilliam@hamilton.edu.** 582

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, hardboard 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.

For more information on any of the above, visit our web site at: **www.leptraps.com**, or contact Leroy C. Koehn, Leptraps LLC, 3000 Fairway Court, Georgetown, KY 40324-9454: Tel: 502-542-7091. 582

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.**

Notes on the status and distribution of the Wild Indigo Duskywing, *Erynnis baptisiae* (Forbes), in Maine

Robert E. Gobeil and Rose Marie F. Gobeil

6 Primrose Lane, Saco, ME 04072 **bob.gobeil@mainebutterflies.com**

The Wild Indigo Duskywing (*Erynnis baptisiae*) belongs to the family Hesperiidae and was first described in 1936 by William Forbes (1936) (Fig. 1). Four different species of Duskywings have been confirmed in Maine: Dreamy Duskywing (*Erynnis icelus*), Sleepy Duskywing (*Erynnis brizo*), Juvenal's Duskywing (*Erynnis juvenalis*), and the Wild Indigo Duksywing (*Erynnis baptisiae*) (deMaynadier et al. 2016). There are also two historical records of the Persius Duskywing (*Erynnis persius*) in Maine. One was collected by S. I. Smith in Norway, ME (Oxford Co.) around 1865 (Webster and deMaynadier 2005) and the other was collected by S. H. Scudder at Moosehead Lake in Maine (Scudder 1889). Neither of these records has been verified, so the species is still considered unconfirmed in Maine. Duskywings are very difficult to identify in the field and many of the early naturalists confused these species (Forbes 1936; Stichter 2014). This is especially true in the spring and early summer when all four species are flying in Maine. You can be fairly certain, however, that any Duskywing seen in Maine after August 1st is likely *E. baptisiae*.

The first confirmed record of *E. baptisiae* in Maine was found by Phillip deMaynadier and Steve Walker in Kennebunk, ME on May 25th, 2007 (deMaynadier et al. 2016). Based on our fieldwork and observations as members of the Maine Butterfly Survey (MBS) since 2007, *E. baptisiae* was probably established in Maine well before 2007 and likely overlooked. In nearby Massachusetts, the species has been confirmed as being present in the state since the late 1880s and is now considered "uncommon-to-common" when compared to all other butterfly species occurring in that state (Stichter 2014).

While actively involved with MBS (2007-2015), we recorded 52 confirmed sightings of *E. baptisiae* in 11 different Maine townships. All vouchers and township records were confirmed by MBS. Whenever we encountered the species, we also counted the number of individuals observed for a total of 247 individuals. Based on our 52 confirmed sightings (247 individuals), we were able to determine the brood periods for *E. baptisiae* in Maine (Fig. 2). There appears to be two distinct broods. The first flight is from mid-May to mid-June with the peak being in late May and early June. This early spring flight is small compared to the later flight. A second much larger flight occurs from mid-July to late August with the height being roughly the last two weeks of July and first two weeks of August. During certain years, there may also be a very small, partial third brood in mid-to-late September. On September 27th, 2012, which is the latest date the species has been recorded in Maine (deMaynadier et al. 2016), we counted a total of five individuals in Westbrook, ME. This gives further evidence of a possible smaller third brood in certain years. In Massachusetts, Stichter (2014) reported a fairly large number of *E. baptisiae* flying in September and October and believes that this "strongly suggests a partial third brood" in that state. In Connecticut, three broods have been recorded with the last flight from late August to late

Fig. 1. Wild Indigo Duskywing (Erynnis baptisiae), Scarborough, ME (Cumberland County), August 12, 2011. Photo by Rose Marie F. Gobeil.

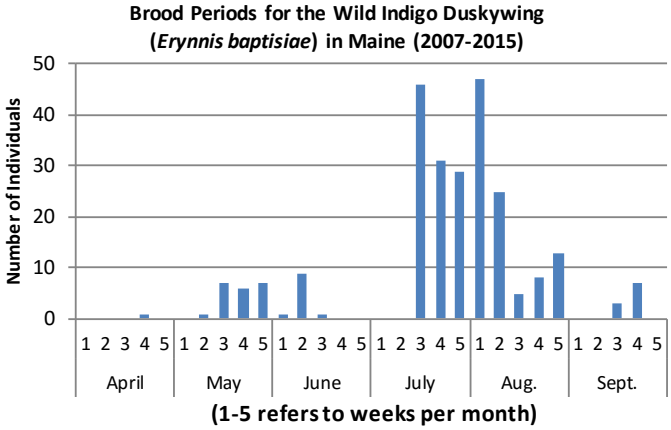


Fig. 2. Graph showing brood periods based on our 52 confirmed sightings (247 individuals).

Fig. 3. View of Crownvetch (*Coronilla varia*) in bloom at an I-95 overpass bridge in Saco, ME on July 1, 2012.

September (O'Donnell et al. 2007). The earliest sighting in Maine was a single individual we found on April 22, 2010, in Biddeford, ME, along an abandoned railroad bed (deMaynadier et al. 2016). The winter of 2009-2010 was unusually warm in Maine which may account for this early spring record.

Historically, the primary host plant for the species was Wild Indigo (*Baptisia tinctoria*) but Shapiro (1979) noted that *E. baptisiae* was able to adapt to a new host, the Crownvetch (*Coronilla varia*). This is an introduced species which has been extensively planted along major interstate highways in the US to stabilize the banks along roadsides to prevent erosion (Fig. 3). This switch to a new host plant has allowed *E. baptisiae* to expand its breeding range and increase in population size in the US (McMahon 2007). Among other places in Maine, crownvetch has been planted along Interstate 95 (I-95), including roadside edges at overpass bridges.

The Maine state map (Fig. 4) shows the approximate location of all townships (36) where the species has been observed and confirmed in Maine. Between 2007 and 2015, we recorded *E. baptisiae* in 11 different Maine townships. John Calhoun (pers. comm.) also supplied us with all of his Maine confirmed records and observations adding 12 different township records where we did not observe the species. We also included an additional 13 different townships where the species was confirmed by other MBS members during the survey period (deMaynadier et al. 2016).

As shown in Fig. 4, the majority of sightings for the species have been closely associated with I-95 (Maine Turnpike). The species tends to be especially common at overpass bridges where crownvetch is found. It appears that the species may also have expanded northward by way of I-295 colonizing towns such as Brunswick, Topsham, Bowdoinham, and Bowdoin. Interstate 295 connects directly to I-95 in two locations (Scarborough and Falmouth), then continues north until it rejoins with I-95 in West Gardiner, ME. There are also several larger power line rights-of-ways (ROWs) that connect between I-95 and I-295 which could also act as corridors for the movement of *E. baptisiae* between the two highways. Distribution patterns in nearby states appear to show that the species may have moved northward along the I-95 corridor. In Massachusetts, the highest concentrations of *E. baptisiae* have been in the eastern and central portions of the state (Stichner 2014). Interstate 95 is located in this area of the state, then heads directly north through New Hampshire into southern Maine.

Besides areas adjacent to I-95, we found *E. baptisiae* on power line ROWs in some inland townships. Over the past nine years, we have surveyed most major power line ROWs in southern Maine including York, Oxford and Cumberland Counties (Gobeil and Gobeil 2014a). There is a network of power line ROWs which cross I-95, especially near Portland, ME, and then continues inland. Once the species was established along I-95, these ROWs may have served as corridors for expansion into inland townships. Although typically limited to small patches, we have found crownvetch on inland ROWs some distance from I-95. On

Fig. 4. Map showing the approximate locations of the 36 confirmed township records (2007-2015) for the Wild Indigo Duskywing (Erynnis baptisiae) in Maine. Map courtesy of the U.S. Geological Survey.

a larger power line ROW in Westbrook, ME, located approximately 2½" miles from I-95, we observed a total of 16 individuals on July 20th, 2012. On August 6, 2015, John Calhoun (pers. comm.) also found the species approximately 3¼ miles east of I-95 in Winslow, ME, along a road where crownvetch was abundant. The furthest inland that we have recorded the species (one individual) is in Lebanon, ME, located around 15 miles on the westerly side of I-95. Most of our sightings on ROWs, however, have been limited to only one or two individuals. Assuming that the host plant is available, the species appears to be expanding inland by way of interconnecting power line ROWs that link with I-95.

In southern Maine (York and Cumberland Counties), *E. baptisiae* is the most common species of Duskywing encountered in the field. The species was especially abundant at a reclaimed municipal landfill Superfund site in Saco, ME, that we extensively surveyed during the summer of 2013 (Gobeil and Gobeil 2014b). We counted 78 individuals during the survey (May 1st to September 18th) with a high count of 31 on August 7th. Out of 47 different species recorded during that survey, *E. baptisiae* was the seventh most common species at the site. This site with large patches of crownvetch is located approximately half a mile from I-95 and has a direct link to I-95 by way of a narrow power line ROW.

Based on current patterns, the species will probably continue to expand northward along I-95 in upcoming years. In fact, John Calhoun (pers. comm., August 4, 2016) recently found the species in four new Maine townships along I-95 not listed on the map in Fig. 4. On July 27, 2016, he recorded the species in Plymouth, Etna, and Carmel, and on August 3, 2016, found *E. baptisiae* in Hampden, ME. All four of these townships are in Penobscot County. On August 6, 2016, he also observed the species in Norridgewock, ME (Somerset County) which is another new township record not shown in Fig. 4. This inland site is located approximately 8.75 miles NW of I-95 (J. Calhoun, pers. comm.) These recent records expands the range of *E. baptisiae* even further northward to Bangor, ME. Wilson (2015) indicates that crownvetch is also found in areas of northern Maine along Route 9 between Eddington and Calais. This shorter, more coastal highway (Route 9) may be the most logical pathway for the eventual expansion of the species into New Brunswick, Canada. The species may have more difficulty colonizing inland areas in northern portions of the state since this region has fewer interconnecting power line ROWs due to a lower population with less demand for power.

Acknowledgements

We especially wish to thank John Calhoun for kindly supplying us with all of his confirmed records and observations of the Wild Indigo Duskywing in Maine. He also reviewed the paper and made helpful comments and suggestions. We also want to thank Reginald Webster, one of the Coordinators of the Maine Butterfly Survey, for confirming the identification of all vouchers recorded during this study and for helpful information on Duskywings in Maine. We are also indebted to the countless number of volunteers who participated in the Maine Butterfly Survey.

Literature Cited

deMaynadier, P., R. Webster, R. Butler & H. Wilson. 2016. (MBS Coordinators) Maine Butterfly Survey. Maine Butterfly Species List. (Online) https://2d042df5ce2f94779d5a6c1b6c47d612202b3787.googledrive.com/host/0B985dSJVRA1mWm43NXVQWEhmVGM/Butterfly%20Species%20List%209.htm and Maine Butterfly Survey. Survey Results. https://2d042df5ce2f94779d5a6c1b6c47d612202b3787.googledrive.com/host/0B985dSJVRA1mWm43NXVQWEhmVGM/Survey%20Results.htm [Accessed 27 January 2016].

Forbes, W. T. M. 1936. The *Persius* group of *Thanaos* (Lepidoptera, Hesperiidae). Psyche 43:104-113.

Gobeil, R. E. and R. M. F. Gobeil. 2014a. The importance of power transmission line right-of-ways as habitat for butterflies in Maine. News of the Lepid. Soc. 56 (1):24-27, 12.

Gobeil, R. E. and R. M. F. Gobeil. 2014b. A survey of butterflies found at a reclaimed municipal landfill Superfund site in Saco, Maine (York county). News of the Lepid. Soc. 56 (4): 160-165.

McMahon, S. D. 2007. Preference and Performance of the Wild Indigo Duskywing (*Erynnis baptisiae*) on Its Native Host Yellow Wild Indigo (*Baptisia tinctoria*) and on the Introduced Plant Crown Vetch (*Securigera varia*). Master's Thesis. Eastern Michigan University, Ypsilanti, Michigan. vii+39 pp.

O'Donnell, J. E., L. F. Gall and D. L. Wagner. 2007. The Connecticut Butterfly Atlas. State Geological and Natural History Survey, Bulletin No. 118.

Scudder, S. H. 1889. The Butterflies of the Eastern United States and Canada, with Special Reference to New England. Vol. II, Cambridge, Massachusetts.

Shapiro, A. M. 1979. *Erynnis baptisiae* (Hesperidae) on Crown Vetch (Leguminosae). Journal of the Lepidopterists' Society 33(4):258.

Stichter, S. 2014. The Butterflies of Massachusetts. Wild Indigo Duskywing *Erynnis baptisiae* (Forbes, 1936). (Online) http://www.butterfliesofmassachusetts.net/wild-indigo-dskywng.htm [Accessed 27 January 2016].

Webster, R. P. and P. G. deMaynadier. 2005. A baseline atlas and conservation assessment of the butterflies of Maine. (On line) **https://2d042df5ce2f94779d5a6c1b6c47d612202b3787.googledrive.com/host/0B985dSJVRA1mWm43NXVQWEhmVGM/Maine%20Butterfly%20Atlas%20Report.pdf** [Accessed 13 May 2016].

Wilson, H. 2015. Maine Butterfly Survey, A Trio of Skippers. (On line) **http://web.colby.edu/mbsnews/2015/07/17/a-trio-of-skippers/** [Accessed 18 April 2016].

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

Plebejus melissa (Lycaenidae): lectotype and type locality

James A. Scott[1], Norbert G. Kondla[2], and Michael S. Fisher[2],

[1]60 Estes Street, Lakewood, CO 80226-1254 **JameScott@juno.com**
[2]Box 2060, Rimbey, Alberta, T0C 2J0, CANADA **nkondla@telus.net**
[2]6521 South Logan Street, Centennial, CO 80121-2329 **butterfliesofcolorado@hotmail.com**

The *P. melissa* (Edwards) lectotype designated by F. Martin Brown (1970) is invalid, because it belongs to a taxon different from that in the original publication. In the original description of *melissa*, William Henry Edwards (1873) clearly described *melissa* as the lowland taxon with large orange spots that are conspicuous even on ventral forewing, and listed it also from Nevada and Arizona where the orange spots are also large. Edwards contrasted his wider-orange-band *melissa* taxon with taxa with smaller orange spots such as *scudderii* (Edwards) and *anna* (Edwards), and Edwards deliberately picked wider-orange-band specimens that contrasted with those and with Mead's higher-altitude narrower-band specimens (Calhoun 2015). But Brown's invalid *melissa* lectotype is a small-orange-spotted male of *Plebejus melissa pseudosamuelis* (Nabokov) that was collected only several km from Nabokov's type locality of *pseudosamuelis*. The ICZN Code requires that a lectotype be designated from syntypes belonging to the taxon described in the original publication: Art. 72.4.1.1 allows one to use any evidence to determine what specimens constitute the type series, but 72.4.1.1 is numbered and indented as subservient to 72.4.1 so it permits specimens to be included in the type series only if those specimens belong to the taxon defined (as specified by 72.4.1) in the original publication. If the original publication included several taxa, then the lectotype will restrict the name to one, but if the original publication only includes *one* taxon as Edwards (1873) did, any lectotype must be of that taxon. If the original author's collection had several or even hundreds of taxa when he wrote the original description, the lectotype still must be a specimen of the taxon described in the original publication. *P. m. pseudosamuelis* is a different taxon than Edwards' *melissa*, so those cannot be part of the *melissa* type series, thus are not syntypes of *melissa*, and lectotypes can be designated only from syntypes, therefore Brown's *melissa* lectotype is invalid.

Brown believed that there are two taxa of *P. melissa*, at low and high altitudes in Colorado, as Calhoun (2015) clearly wrote, and Brown clearly read Nabokov's original description of *pseudosamuelis* (Nabokov 1949) that listed it from Lake Co. Colo., so Brown certainly knew that his lectotype from Twin Lakes was a different taxon than lowland *melissa* and that it would synonymize Nabokov's *pseudosamuelis* (Brown later listed *pseudosamuelis* as a synonym of *melissa*, in Miller & Brown 1981). We can only speculate whether competitive or negative feelings toward Nabokov were involved. Calhoun (2015) tried to determine what Brown and Nabokov were thinking at various times regarding the name *melissa*, but the only thing that matters is that the names *melissa* and *pseudosamuelis* as described in their original publications are clearly different taxa, both when described and now. We note here that as a subspecies, *pseudosamuelis* could be placed in another species, as were other taxa that have a gnathos intermediate to or closer to *melissa* including *P. atrapraetextus annetta* (Edwards) and the Bighorn Mts. *P. a. longinus* (Nabokov) and *P. a. sublivens* (Nabokov), see Scott 2006.

All competent taxonomists understand that a lectotype cannot be a different species (or subspecies) than the taxon described in the original publication. Doing otherwise would be like trying to designate a tiger as lectotype of the lion; nobody would accept that. As an example of another rejected lectotype, Brown, Miller & Clench (in Brown & Miller 1980, in an obscure non-indexed placement on p. 77) designated and labeled a lectotype of *Hesperia ruricola* Boisduval. Emmel, Emmel, & Mattoon (1998, Systematics of W N.A. Butterflies p. 22) rejected that lectotype because the original publication described it as yellow while the *ruricola* lectotype is brown so probably belongs to some other taxon, thus they considered the name *ruricola* to be unidentifiable.

At any rate, Brown's *melissa* lectotype is clearly invalid because it obviously does not belong to the *melissa* taxon clearly described in the original publication. As Calhoun (2015) notes, Downey (1975) ignored Brown's *melissa* lectotype, and later Brown himself in Miller & Brown (1983) also rejected his own lectotype by restoring *pseudosamuelis* as a valid subspecies.

Because Brown's lectotype is invalid, we must turn to later lectotype designations. Calhoun (2015) rejected Holland's (1931) designation of the *melissa* lectotype, a female with wide orange bands on plate 66=LXVI #17 [labeled only "Col.º" for Colorado] that Holland singled out as the only specimen on the plates called "type", a female which Brown (1970) wrote was a syntype thus was available for lectotype designation. Calhoun was wrong, as shown below. The same female specimen was clearly stated to be lectotype by Scott (2006, p. 58-60). We will be very clear on this here: we hereby intentionally and deliberately designate the lectotype of *melissa* as the female figured by Holland (1931) plate 66 #17. So, whether or not Holland designated it (he did), the valid lectotype is that female

on Holland's plate. The specimen has only "Col.º" locality and no date, so its collection location cannot be determined from Mead's letters or Mead's rediscovered journal that Calhoun's (2015) purchased. Scott (2006) restricted the type locality to the present-day town of Tinytown, Jefferson Co. Colorado, a fairly low altitude site along Turkey Creek in the mountain foothills that Mead visited. But Calhoun found that Mead's locality of "Turkey Creek Junction" (a name no one else used) actually meant "Bradford Junction", where the head of South Turkey Creek comes near North Turkey Creek, just north of the current town of Conifer. That locality is at higher altitude than Tinytown, and Mead might have gotten to Tinytown only on the Denver-South Park Stage or during an occasional long walk from Bradford Junction, so we hereby restrict the type locality to the lowest-altitude that Mead collected: we hereby intentionally and deliberately designate the type locality as Denver Colorado, 5,280 feet=1605m altitude. Mead spent several days in Denver after his arrival in 1871, and collected along the South Platte River and along Cherry Creek just south of Denver [within the current city of Denver--Denver was founded next to Cherry Creek just south of its junction with the South Platte River] on June 1 and 3, 1871, during the first generation of *melissa*. Mead was also in Denver in September during another generation, but his journal mentioned very few butterflies after midsummer. Edwards described the low-altitude butterflies, so this type locality best fits Edwards' description, as confirmed by specimens collected in the metropolitan Denver area by Fisher and Scott.

Holland's (1931) text p. 264 listed a male [a *melissa* syntype according to Brown 1970] and female [which is actually *Plebejus anna* Edwards] on plate 31=XXXI, and a female [another *melissa* syntype] on plate 66, followed by the word "types", so the text does not single out "the type". But later in the book, he did not list either the male or female on plate 31as types, but in the legend of plate 66 he wrote the word "type" for the female #17, so that restriction does single out that female as "type", thus is a valid lectotype designation. Kondla first recognized that valid lectotype designation. Calhoun (2015) claimed that this restriction was "nothing more than an editorial artifact", and claimed that Holland just did not go back and redo the legends of the original plates 1-48 (plates 49-77 were new in the 1931 edition) and that is why the two specimens on plate 31 were not labeled as types. That claim is incorrect because Holland made more than a thousand changes to the legends of the original 48 plates in his 1931 book, including changes of names and types, especially the nomenclature: there were 50 changes just on the legend of that one plate 31 containing the *melissa* male and *anna* female, where Holland changed the names for #10-12, 19-20, & 31, and changed the & symbol to a dash – on #1-10 and 27-28, and the publisher made the male and female symbols smaller on all #1-32. With all those changes Holland would have added the word "type" on plate 31 if he had wanted to. There are few types listed in the original plates because he did not figure many types in the 1898 book, but for the new 1931 book he deliberately borrowed many types from other museums to illustrate, and illustrated the types of butterflies that he recently named (in Holland 1930); the prefaces of his book clearly indicate that he intentionally determined and borrowed and figured as many butterfly types as he could so users of the book could see what those taxa looked like.

Calhoun (2015 p. 35) complained several times that Holland lacked any intent to designate the plate 66 fig. 17 female as the unique name-bearing type. That is too much to ask when looking at old publications, because the requirement to designate any kind of type in an original description only appeared in the ICZN Code in 1931, the word lectotype only appeared in the Code in 1958-1960, and the requirement to use the word "lectotype" in a valid designation of lectotype only appeared in the Code in 2000; a current publication must contain "an express statement of deliberate designation of a lectotype" (merely citing a specimen as "lectotype" is insufficient), thus only current publications must contain clear intent. But people thought differently back then; they just looked at an author's specimens and picked out the ones they thought fit well the species that the author named. "Intent" cannot be used to decide old lectotypes, because it is not operational; we cannot read people's minds. We must use only what is published. To determine whether an author designated a lectotype, this operational procedure must be followed: if one individual specimen of the type series is singled out and called the "type" in a publication dated prior to the current Code, that is a valid lectotype designation; if two or more specimens are called types and are not winnowed down to one "type" in that publication, then neither is a lectotype. For example, that operational procedure tells us that Gunder (1929) did not designate a lectotype of *Euphydryas bernadetta* Leussler, contrary to Pelham (2008), because Gunder called two specimens types and never later restricted them to one. Barnes & McDunnough (1916) is about the most professional designation of lectotypes that existed in old publications. They designated lectotypes for Scudder's *Pamphila* (now *Hesperia*) names *nevada*, *colorado*, and *manitoba*, each of which had been named from multiple locations, and their paper indicates that their main desire was to restrict the type localities of these names because Scudder had listed each from widely divergent localities; they recognized the value of male genitalia in classification, so they ended up choosing as the type, figured males from localities where the genitalia had been illlustrated. Thus their intention was to restrict type localities, and their lectotypes were a byproduct of those localities; only today are authors clearly required to state their intention to designate a lectotype.

Holland (1931) has another similar example: on p. 371 he listed *Erynnis* [*Hesperia*] *colorado* on plate 52=LII #1 male and #2 female, then wrote "types"; but on plate 52 he listed only #1 as "type", so he restricted it to one specimen, so #1 would be a valid Holland lectotype, except that Barnes

and McDunnough (1916) already designated the lectotype of *colorado* in 1916 (and #1 is a male of *Hesperia nevada* Scudder so is doubtfully a syntype of *colorado*, though it might be found to be a syntype if that specimen can be found and its labels studied, because one of Scudder's female paralectotypes of *colorado* has been identified as *H. nevada* thus Scudder's type series evidently contained both species). Scott (2008) found 75 lectotype designations in Holland's books by carefully studying his type statements and determining whether those specimens were syntypes, etc. (a 76th *Coenonympha tullia brenda* Edwards was added in 2014 with the realization that it was a syntype).

Literature Cited

Barnes, W., & McDunnough, J.H. 1916. Notes on North American diurnal Lepidoptera. Contributions to the Natural history of Lepidoptera of North America 3:53-152, 11 plates.

Brown, F. M. 1970. The types of the lycaenid butterflies described by William Henry Edwards. Part III. Plebejinae. With four neotypes established by John C. Downey. Trans. Amer. Ent. Soc. 99:353-433 (p. 372-375)

Brown, F. M., & L. D. Miller. 1980. The types of the Hesperiid butterflies named by William Henry Edwards. Part II. Hesperiidae: Hesperiinae, section II. Trans. Amer. Ent. Soc. 106:43-88 (p. 77).

Calhoun, J. V. 2015 "2014". An updated itinerary of Theodore L. Mead in Colorado in 1871, with type locality clarifications and a lectotype designation for *Melitaea eurytion* (Nymphalidae). J. Lepid. Soc. 69:1-38.

Downey, J. C. 1975. Genus *Plebejus* Kluk. Pp. 227-350 *in* Howe, W. H. (ed.). The butterflies of North America. Doubleday & Co., Inc., Garden City, New York.

Edwards, W. H. 1873. Descriptions of diurnal Lepidoptera found within the United States. Trans. Amer. Ent. Soc. 4:343-348 (p. 346-348).

Emmel, T. C., J. F. Emmel, & S. O. Mattoon. 1998. The types of California butterflies named by Jean Alphonse Boisduval: designation of lectotypes and a neotype, and fixation of type localities. Pp. 3-76 in: Systematics of western North American butterflies. Mariposa Press, Gainesville, Fla. 878 p.

Gunder, J. D. 1929. The genus *Euphydryas* of boreal America (Lepidoptera, Nymphalidae). Pan-Pacific Entomologist 6:1-8, 16 pl.

Holland, W. J. 1930. X. New species and varieties of North American butterflies. Ann. Carnegie Mus. 19:155-166.

Holland, W. J. 1931. The butterfly book. New and thoroughly revised edition. A popular and scientific manual, describing and depicting all the butterflies of the United States and Canada. Doubleday & Co., Inc., Garden City, New York. 424 p., 77 plates.

Miller, L. D., & F. M. Brown. 1981. A catalogue/checklist of the butterflies of America north of Mexico. Lepid. Soc. Memoir #2, vii+280 p.

Miller, L. D., & F. M. Brown. 1983. Hesperioidea and Papilionoidea. Pp. 42-65 *in* Hodges, R. W. (ed.). Check list of the Lepidoptera of America north of Mexico, including Greenland. E. W. Classey Ltd., London, England.

Nabokov, V. 1949. The nearctic members of the genus *Lycaeides* Huebner (Lycaenidae, Lepidoptera). Bull. Harvard Mus. Comp. Zool. 101:486-541, 9 pls. (p. 529-530, plates 1, 6, 9).

Pelham, J.P. 2008. A catalogue of the butterflies of the United States and Canada, with a complete bibliography of the descriptive and systematic literature. Journal of Research on the Lepidoptera, 40:1-658 (pp. 196-197).

Scott, J. A. 2006. *Plebejus* (*Lycaeides*) classification in North America. Pp. 52-64 & pl. IV *in*: Taxonomic studies and new taxa of North American butterflies. Papilio (New Series) #12:1-74. Free pdf at **http://digitool.library.colostate.edu**, click on Colorado State University, search for Papilio (New Series)

Scott, J. A. 2008. A study in lectotypes [designated in W. J. Holland's three butterfly books]. Pp. 2-20 *in*: J. Scott. Corrections/reviews of 58 North American butterfly books. Papilio (New Series) #19:1-129. Free pdf at **http://digitool.library.colostate.edu,** click on Colorado State University, search for Papilio (New Series)

Ctenucha cressonana, Florrisant area, July 8, 2016. Photo by James Adams.

Top: *Oeneis polixenes*, Horseshoe Mountain, July 7, 2016; Bottom: *Parnassius smintheus*, Florrisant area, July 8, 2016. Photos by Jeff Pippen, accompanying article on next page.

65th Lep Soc Meeting News

Field Trips -- Ranger Steve (Mueller)

Ody Brook Nature Sanc., 13010 Northland Dr., Cedar Springs, MI 49319 **odybrook@chartermi.net**

Not everyone is able to participate in Lep Soc meetings. Enjoy vicariously our collective sightings. Hopefully the butterfly species lists provided annually during the last decade offer locations that members might have the opportunity to experience on their own during a later visit. This year's field trips allowed for great learning and exchange. That is always a highlight of our gathering.

Creating a moth list is overwhelming and often requires specimen examination after departing to gain positive identification. I have not attempted to compile a list. Jim Vargo compiled a list from his sightings and those interested might want to contact him.

Collecting and observing at The Nature Place and off site field trips provided good results with 85 species plus one likely Grizzled Skipper. More than one subspecies was sighted for the Anica Checkerspot and the Chryxus Arctic. See **Table 1** species data for each field trip area. Site lists for the same location from different days have been combined. Collecting dates were from 7 -13 July 2016.

Thank you to field trip coordinators: Charlie Covell, Tom Emmel, Peter Eliazer, Chuck Harp, and Andrei Sourakov. Thanks to the following people that contributed data for species compilation: John Beck, John Calhoun, Mike Fisher, Caitlin LaBar, Ranger Steve (Mueller), Jeff Pippen, and Brian Scholtens. Special thank you to Jeff Pippen and John Calhoun for tallying and submitting sightings.

List order follows Opler from the Peterson Field Guide to Western Butterflies.

Colorado Site locations: (A) The Nature Place - Teller County, (B) Leavick Valley and Horseshoe Mountain - Park County, (C) Rock Creek – El Paso County, (D) Shelf Road and Four Mile Creek – Teller County, (E) Royal Gorge - Fremont County, (F) Cottonwood Pass – Gunnison and Chaffee Counties, (G) Boreas Pass – Summit County

Look forward to next year's Lep Soc meeting and field trips near Tucson AZ.

Table 1. Lep Soc Field Trip Sightings

Common Name	**Species**	A	B	C	B	D	E	F	G
Date: 8-13 July 2016		8-13	8	9	10	11	11	13	13
Papilionidae (6 species)									
Rocky Mountain Parnassian	*Parnassius smintheus sayii*	X	X			X			
Black Swallowtail	*Papilio polyxenes asterius*	X							
Old World Swallowtail	*Papilio machaon*						X		
Anise Swallowtail	*Papilio zelicaon nitra*							X	
Western Tiger Swallowtail	*Papilio rutulus*	X		X		X	X		
Two-tailed Swallowtail	*Papilio multicaudata*			X			X		
Pieridae (13 Species)									
Checkered White	*Pontia protodice*	X	X	X	X	X	X	X	
Western White	*Pontia occidentalis*		X						
Margined White	*Pieris marginalis*		X		X				
Cabbage White	*Pieris rapae*			X					
Large Marble	*Euchloe ausonides*		X		X				
Orange Sulphur	*Colias eurytheme*	X	X	X	X	X	X		
Queen Alexandra's Sulphur	*Colias alexandra alexandra*	X	X		X	X			
Mead's Sulphur	*Colias meadi*				X			X	X
Scudder's Sulphur	*Colias scudderi*		X		X				
Southern Dogface	*Colias cesonia*			X					

Common Name	**Species**	A	B	C	B	D	E	F	G
Mexican Yellow	*Eurema mexicana*	X		X					
Sleepy Orange	*Eurema nicippe*	X	X						
Dainty Sulphur	*Nathalis iole*	X	X	X					
Lycaenidae (20 species)									
Tailed Copper	*Lycaena arota*			X		X			
Ruddy Copper	*Lycaena rubidus sirius*	X							
Behr's Hairstreak	*Satyrium behri*					X			
Coral Hairstreak	*Satyrium titus*					X			
Banded Hairstreak	*Satyrium calanus*					X			
Western Green Hairstreak	*Callophrys affinis*	X	X						
Thicket Hairstreak	*Callophrys spinetorium*	X							
Juniper Hairstreak	*Callophrys gryneus siva*					X	X		
Western Pine Elfin	*Callophrys eryphon*					X			
Gray Hairstreak	*Strymon melinus franki*	X		X			X		
Marine Blue	*Leptotes marina*			X					
Reakirt's Blue	*Hemiargus isola*	X							
Hops Azure	*Celastrina humulus*					X			
Central Blue	*Euphilotes centralis*					X			
Arctic Blue	*Agriades glandon rustica*	X	X		X	X		X	
Melissa Blue	*Plebejus melissa melissa*	X	X						
Greenish Blue	*Plebejus saepiolus whitmeri*	X	X		X	X			X
Shasta Blue	*Plebejus shasta*		X						
Lupine Blue	*Plebejus lupinus*					X	X		
Cotundra Blue	*Plebejus cotundra*							X	
Nymphalidae (31 species)									
Variegated Fritillary	*Euptoieta claudia*	X	X	X	X				X
Aphrodite Fritillary	*Speyeria aphrodite*			X		X	X		
Northwestern Fritillary	*Speyeria hesperis*			X					
Frigga Fritillary	*Boloria frigga*		X		X				
Purplish Fritillary	*Boloria montanus*		X		X			X	X
Rockslide Checkerspot	*Chlosyne damoetas*		X		X				
Field Crescent	*Phyciodes pulchella camillus*			X		X			
Mylitta Crescent	*Phyciodes mylitta*						X		
Anicia Checkerspot	*Euphydryas anicia capella*	X							
Anicia Checkerspot	*Euphydryas anicia brucei*		X		X			X	
Anicia Checkerspot	*Euphydryas anicia eurytion*		X						
Hoary Comma	*Polygonia gracilis zephyrus*	X		X		X			
Milbert's Tortoiseshell	*Aglais milberti subpallida*	X							

Common Name	Species	A	B	C	B	D	E	F	G
Red Admiral	*Vanessa atalanta*	X							
American Lady	*Vanessa virginiensis*	X		X		X			
Painted Lady	*Vanessa cardui*	X	X	X					
West Coast Lady	*Vanessa annabella*		X						
Common Buckeye	*Junonia coenia*	X							
Weidemeyer's Admiral	*Limenitis weidemeyerii*			X		X			
Arachne Checkerspot	*Polydryas arachne arachne*	X				X			
Common Ringlet	*Coenonymph tullia ochracea*	X	X			X	X		
Common Wood Nymph	*Cercyonis pegala*			X		X	X		
Small Wood Nymph	*Cercyonis oetus charon*	X							
Magdalena Alpine	*Erebia magdalena*		X		X			X	
Common Alpine	*Erebia epipsodea*		X		X				
Riding's Satyr	*Neominois ridingsii*					X			
Chryxus Arctic	*Oeneis chryxus*	X				X			
Alticordillera Arctic	*Oeneis chryxus alticordillera*		X		X				
Uhler's Arctic	*Oeneis uhleri*							X	
White-veined Arctic	*Oeneis bore taygete*							X	
Melissa Arctic	*Oeneis melissa*		X		X			X	
Polixines Arctic	*Oeneis polixenes*				X			X	
Monarch	*Danaus plexippus plexippus*	X							
Hesperiidae (15 species)									
Silver-spotted Skipper	*Epargyreus clarus*			X					
Mexican Cloudywing	*Thorybes mexicana nevada*	X							
Horace's Duskywing	*Erynnis horatius*			X					
Persius Duskywing	*Erynnis persius fredericki*	X							
Common Checkered Skipper	*Pyrgus communis*	X		X		X	X		
Russet Skipperling	*Piruna pirus*			X					
Garita Skipperling	*Oarisma garita*	X				X			
Pahaska Skipper	*Hesperia pahaska*					X			
Draco Skipper	*Polites draco*		X		X				
Tawny-edged Skipper	*Polites themistocles*					X			
Taxiles Skipper	*Poanes taxiles*			X		X			
Morrison's Skipper	*Stinga morrisoni*	X							
Snow's Skipper	*Paratrytone snowi*					X			
Dun Skipper	*Euphyes vestris*			X		X			
Common Roadside-Skipper	*Amblyscirtes vialis*			X					
85 Species									
Possible Grizzled Skipper	*Pyrgus centaureae*	?							

2016 Lep Soc Awards -- *James K. Adams*

The student awards presented at this year's meeting of the Lep Soc include the following: the Harry K. Clench awards for student papers (1st Place $500.00, 2nd Place $250.00) and the Alexander B. Klots awards for student posters (only one was awarded this year for $350.00). There were seven student presentations and four student posters. First Place for the Clench Award went to Elizabeth Barnes for her presentation "Competition and community interactions of two web building caterpillars: the Western Tent Caterpillar (*Malacosoma californicum*) and the Fall Webworm (*Hyphantria cunea*)". Crystal Klem was awarded second place for her presentation "A preliminary phylogeny of the fruit-piercing moth genus *Eudocima* based on morphological data (Lepidoptera: Erebidae: Calpinae)". The one Klots award was given to Logan Locasio for his poster "Influence of temperature and diet on development of the Bella Moth, *Utetheisa ornatrix*". Congratulations to the winners!! Photos by James K. Adams.

Logan Locasio, winner of the Alexander B. Klots award for best student poster, with President John V. Calhoun.

Elizabeth Barnes, winner of the Harry K. Clench award for best student paper, with President John V. Calhoun.

Crystal Klem, second place winner of the Harry K. Clench award, with President John V. Calhoun.

Nominations for Karl Jordan Medal 2017

The Karl Jordan Medal is an award in recognition of published original research on the Lepidoptera that may be given biennially by the Lepidopterists' Society at the Annual Meeting. Nominations of publications must be of exceptional quality and focus on the morphology, taxonomy, systematics, biogeography and natural history of Lepidoptera. The criteria (*J. Lep. Soc.*, 26: 207-209) emphasize that the work may be based on a single piece of research or on a series of interrelated works. These publications must be at least three but not more than 25 years old. The latter is to assure that the awarded work(s) have been used by the scientific community and stood the test of time. The Jordan Medal is not intended to be a career award for service rendered to the study of Lepidoptera inasmuch as the Society already has such an award, Honorary Life Member. In addition, the nominee does not have to be a member of the Society in order to qualify. A complete list of lepidopterists who have previously received the Karl Jordan Medal is available on the Lepidopterists' Society website http://www.lepsoc.org/society_news.php.

Formal nominations for the Karl Jordan Medal will be accepted from any member of the Lepidopterists' Society and should be sent to Dr. Jacqueline Y. Miller, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, P.O. Box 112710, Gainesville, FL 32611-2710 or via email (jmiller@flmnh.ufl.edu). Please include a list of the specific publications for which the candidate is nominated, a support letter outlining the significance of the work(s), and if possible, a copy of the nominee's curriculum vitae, no later than 15 February 2017.

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

Summary of the Executive Council Meeting, 65th Annual Meeting of the Lepidopterists' Society The Nature Place, Florissant, CO

The Executive Council of the Lepidopterists' Society met on 6 July 2016 to conduct the business of the Society. Eleven members of the Council were represented either in person or by proxy, with a twelfth member joining by Skype at the relevant portion of the meeting.

Minutes of the 2015 meeting were approved, and reports from the various officers and committee chairs were reviewed. President Calhoun began by presenting the President's Report and requested that the Council review our fundamental purpose and address perceptions of our Society as a welcoming organization for both amateur and professional.

Treasurer Richers reported that the Society is in its best financial condition ever. That doesn't mean we can spend recklessly! As a part of the financial discussion, page charges for authors of articles in the *Journal* were addressed and a new policy may be rolled out soon.

Assistant Secretary/Treasurer Grinter noted that membership is slightly up, but that is the result of aggressive efforts by the Membership Committee, led by Carol Butler, to recruit students. The Society still faces a decline in traditional members. The Society needs to develop a code of conduct, and that task will be undertaken soon.

Other reports included the Education Committee, the Membership Committee, Budget and Publications Committee, Meetings Committee, Web and Technology Committee; Awards Committee, and editors of the *News*, *Journal*, *Memoirs* and Season Summary. All of the reports were unanimously approved by the Council.

Highlights of these reports include mechanisms for increasing memberships, including monetary awards and outreach; developing an effective meetings committee, which will possibly include a paid position for a meeting organizer; a new web page, which will include a members-only login to access the most recent issues of the *Journal* and the *News* online; and discussion of how to handle the thousands of records submitted for the Season Summary.

New business included developing job descriptions for the officers of the Society, further development of the 5-year plan, honorary life membership for Julian Donahue, a special award in the name of Ron Leuschner, and the 2017 meeting (to be held in Tucson, Arizona).

Respectfully submitted, Mike Toliver, Secretary, as proxy for Chris Grinter, who took the minutes in my absence.

Meeting Resolutions 2016 Jen Zaspel's Lab

We thank the EC for coming together
To try to make our society better
But with all the blathering like baboons
It was pretty helpful having John Calhoun

We thank the Nature Place; they've been great!
Just look at all their food we ate!
They have so many amenities, like their pool
Just ask Suzette, she's really cool!

The observatory was neat; we saw many things
Our personal favorite was Saturn's rings
On the quarry trip, many fossils were found
For the low price of ~~6~~ 8 pounds

The British Museum dudes really set the mood
With their truck full of wine in the high altitude
Seeing Christi Jaeger wandering caused many alarm
However, it was only Pokémon receiving any harm

Thanks to all the vendors for feeding our addiction
And converting anyone who needed more conviction
Nick Grishin showed us something X-rated, not once but twice
I'm sure he'll show you again for the right price!

The 20-minute talks were great, concise, and on time
The moderators did a good job of keeping us in line
But Tom Emmel's talk went on and on
And we all thought the Monarch migration was long!

Get ready for the field trips, there's no hanging about
Let's all hope and pray Harry Zirlin didn't clean us out
This poem wouldn't have happened but for James Adams' behest
We blame Jen Zaspel for getting us into this mess

We thank all the organizers for a fabulous meeting
There were lep species here all of us were needing
Though the fun's almost over, no need for a tear
Because we'll all be together in Tucson next year!

Nick Grishin, Sally Warren, Andy Warren, and Jeff Pippen.

2016 Lep Soc photos on this and previous page by James K. Adams

Stefani Harrison and Jade Badon.

Akito Kawahara and Caitlin LaBar.

David Lees (apparently blowing a "raspberry"), Jen Zaspel and Alessandro Giusti.

Jim Vargo, Chris Grinter, and David Bettman examining some specimens.

The Brazilian contingent, Eduardo Carneiro and Diego Dolibaina, showing off their doorprizes.

The Lep-themed tie crew: Charlie Covell, John Calhoun, David Lees, Kelly Richers (front), David McCarty, and Tim Anderson.

The doorprize crew: Megan McCarty, Charlie Covell, Misha Sourakov, and Jonathan Xing.

Vazrick Nazari, at Horseshoe Mountain, July 10, 2016.

Membership

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

Kelly Richers, Treasurer
The Lepidopterists' Society
9417 Carvalho Court
Bakersfield, CA 93311

Dues Rate

Active (regular)	$ 45.00
Affiliate (same address)	10.00
Student	20.00
Sustaining	60.00
(outside U.S., for above add 5$ for Mexico/Canada, and 10$ elsewhere)	
Life	1800.00
Institutional Subscription	60.00
Air Mail Postage, **News** ($30.00 outside North America)	15.00

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

Change of Address?

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

Chris Grinter, Assistant Secretary
Illinois Natural History Survey
1816 S. Oak Street, Champaign,
IL 61820-0904; cell: 847-767-9688
cgrinter@gmail.com

Our Mailing List?

Contact Chris Grinter for information on mailing list rental.

Missed or Defective Issue?

Requests for missed or defective issues should be directed to Chris Grinter. Please be certain that you've really missed an issue by waiting for a subsequent issue to arrive.

Memoirs

Requests for Memoirs of the Society should be sent to Publications Manager, Ken Bliss (address opposite).

Submissions of potential new Memoirs should be sent to:

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

Journal of The Lepidopterists' Society

Send inquiries to:

Keith Summerville
(see address opposite)
ksummerville@drake.edu

Book Reviews

Send book reviews or new book release announcments to either of the following (do NOT send new books; authors will be put in contact with reviewers):

James K. Adams
(see address opposite)
jadams@daltonstate.edu

Carol A. Butler
60 West 13th Street
New York, NY 10011
cabutler1@verizon.net

WebMaster

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

Submission Guidelines for the News

Submissions are always welcome! Preference is given to articles written for a non-technical but knowledgable audience, illustrated and succinct (under 1,000 words, but will take larger). Please submit in one of the following formats (in order of preference):

1. Electronically transmitted file and graphics—in some acceptable format —via e-mail.

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

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

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

Submission Deadlines

Material for Volumes 58 must reach the Editor by the following dates:

Issue		Date Due
58	4 Winter	Nov. 15, 2016
59	1 Spring	Feb. 15, 2017
	2 Summer	May 12, 2017
	3 Fall	August 15, 2017

Be aware that issues may ALREADY BE FULL by the deadlines, and so articles received by a deadline may have to go in a future issue.

Reports for Supplement S1, the Season Summary, must reach the respective Zone Coordinator (see most recent Season Summary for your Zone) by Dec. 15. See inside back cover (facing page) for Zone Coordinator information.

Executive Council

President

John Calhoun
977 Wicks Drive, Palm Harbor, FL 34684-4656
(727)785-0715
bretcal1@verizon.net

Past President

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

Vice Presidents

Gregory Pohl (1st VP)
Natural Resources Canada
5320 - 122 St., Edmonton, AB T6H 3S5 CANADA
(780)435-7211
micromothman@gmail.com

Geoff Martin
Department of Life Sciences
The Natural History Museum, Cromwell Road
London SW7 5BD
UNITED KINGDOM
+44 20 7942 5716
g.martin@nhm.ac.uk

Mari Kekkonen
Centre for Biodiversity Genomics, Biodiversity Institute of Ontario, Univ. of Guelph, 50 Stone Road East, Guelph, ON, CANADA N1G 2W1
519-824-4120 ext.55672
kekkonen@uoguelph.ca

Secretary

Michael Toliver
Division of Math and Science, Eureka College
300 E. College Ave.
Eureka, IL 61530-1500
miketol@eureka.edu

Treasurer

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

Assistant Secretary & Assistant Treasurer

Chris Grinter
Illinois Natural History Survey, 1816 S. Oak Street, Champaign, IL 61820-0904;
847-767-9688
cgrinter@gmail.com

Publications Manager

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

Editor, News of The Lepidopterists' Society

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

Editor, Journal of The Lepidopterists' Society

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

Editor, Memoirs of The Lepidopterists' Society

Kelly Richers
(see Treasurer, above)

WebMaster

Todd Gilligan
(see WebMaster opposite)

Members-At-Large

David Bettman, Shannon Murphy, Brigette Zacharczenko, Christi Jaeger, Caitlin LaBar, Erik Runquist, Megan McCarty, Kathleen Prudic, Mark Walker

Season Summary Zone Coordinators

Refer to Season Summary for Zone coverage details.

Chief Season Summary Coordinator and Editor

Leroy C. Koehn
3000 Fairway Court
Georgetown, KY 40324
(502) 542-7091
leptraps@aol.com

Zone 1, The Far North:

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

Zone 2, The Pacific Northwest:

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

Zone 3, The Southwest:

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

Zone 4, The Rocky Mountains:

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

Zone 5, The Plains:

Michael M. Ellsbury
70855 Highway 8
Fairbury NE 68352-5565
(402) 300-1969
bugsnrails@gmail.com

Zone 6, Texas:

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

Zone 7, Ontario and Quebec:

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

Zone 8, The Midwest:

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

Zone 9, The Southeast:

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

Zone 10, The Northeast:

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

Zone 11, Mexico & the Caribbean:

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

Attendees at the 65th annual meeting of The Lepidopterists' Society, July 6 - 10, 2016, The Nature Place, Florissant, Colorado
(Photo by Ian Sagebarth, McGuire Center for Lepidoptera and Biodiversity)