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NEWS OF THE LEPIDOPTERISTS' SOCIETY

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Inside:

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Contents

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Front Cover:

Brephidium exile male on *Buddleia marrubifolia,* June 27, 2009, Hereford, Arizona (photo by Robert Parks)

Central and South American Skippers

George O. Krizek

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Tropical forests (specifically for this article I am referring to tropical American jungle) are a paradise for lepidopterists, both collectors and photographers. If a photography enthusiast enters the virgin jungle in the morning, he/she automatically expects that by the time he/she returns to the lodge or other facility that the camera will be full of "once in a lifetime" pictures. However, one day in 1988, in the Mexican jungle while looking for satyrs, I was reminded about the dangers of untamed nature when I came across a human skeleton on the ground. It was not fresh, but it was very well recognizable. This "memento mori" reminded me that almost everything is unpredictable in the tropical wilderness. On another occasion, April 7, 1992 in Rondonia, Brazil, I was very slowly, and as always silently, walking through the forest, watching for butterflies. Suddenly, without provocation or disturbance, a big snake (later identified by Dr. Kenneth Dodd as the non-venomous colubrid *Spilotes pullatus*) came charging at me from the left. My curiosity overcame my fight or flight instinct, and I got one not-so-great photograph (see below) before I ran away. Coursing through my mind at the time were thoughts of the very venomous Fer-de-Lance (*Bothrops atrox*) or Bushmaster (*Lachesis muta*) that occurred in the area, and that their bites could be deadly if the antivenin is not quickly available. This can certainly happen in areas far from civilization. Turns out, as indicated, that my snake was the tropical Yellow Rat Snake *S. pullatus*, which is "an aggressive snake with a defensive display; it will bite but it is not dangerous" (Dr. Ken Dodd, pers. comm.).

The tropical Yellow Rat Snake, *Spilotes pullatus*

Let us finally talk about the tropical South American skippers. Our pictures show only a very small sample of them (but you can see several more in Garwood's recent stunning articles on Bolivia, particularly Lep Soc News, Vol. 57:4, pp. 196-200). Normally, when thinking about the American tropical day-flying species, one often thinks of the very big *Morpho*s, *Caligo*s and others that are larger than their cousins in North America, but the skippers in the tropics are similar in size, but just more diverse, than those in North America (see Krizek, Lep Soc News, Vol. 58:1, pgs. 20-23). Of course, in the tropics the coloration is in many cases much brighter than those in the North. I hope that the examples selected will please the eye of the reader. Enjoy!!

Codatractus alcaeus, Feb 20, 1988, Boca Tomatlan, Mexico

Urbanus pronta, June 24, 2003, Antigua, Guatemala

Urbanus doryssus, Feb 23, 1988, Puerto Vallarta, Mexico

Astraptes anaphus, June 27, 2003, Antigua, Guatemala

Achalarus albociliatus, Jan 26, 1999, Acapulco, Mexico

Autochton cellus, June 27, 2003, Antigua, Guatemala

Spathilepia clonius, May 7, 1990, Tinalandia, Ecuador

Autochton zarex, May 5, 1990, Tinalandia, Ecuador

Marela tamyroides, April 24, 1992, Rondonia, Brazil

Myscellus nobilis, Nov 10, 1989, Rondonia, Brazil

Jemadia fallax, Nov 10, 1989, Rondonia, Brazil

Gorgythion begga, Feb 24, 1988, Puerto Vallarta, Mexico

Sostrata bifasciata, May 11, 1990, Tinalandia, Ecuador

Ebrietas evanides, Nov 4, 1989, Rondonia, Brazil

Theagenes aegides, June 24, 2003, Antigua, Guatemala

Eantis mithridates, March 15, 1991, Rondonia, Brazil

Quadrus lugubris, Feb 18, 1988, Puerto Vallarta, Mexico

Quadrus contubernalis, May 11, 1990, Tinalandia, Ecuador

Pythonides grandis, Nov 4, 1989, Rondonia, Brazil

Paches loxus, Nov 10, 1989, Rondonia, Brazil

Xenophanes tryxus, Feb 24, 1988, Puerto Vallarta, Mexico

Antigonus erosus, July 19, 1989, Explorama Inn, Peru

Helioptes alana, May 19, 1985, Monte Verde, Costa Rica

Possible new sesiid from southeastern Arizona

William H. Taft, Jr.

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During the 2006-2011 summer field seasons, Ned Schaper and I collected hundreds of sesiid adults throughout southeast Arizona using both aerial nets and Multipher ® #1 traps baited with a variety of unique synthetic pheromones (Taft & Schaper, 2014). This area is well known by both birders and lepidopterists as an area that harbors a number of rare northern Mexican species. These collecting trips resulted in the capture of 28 species of Sesiidae including rarely collected species that included *Carmenta englehardti, Carmenta rubricinta, Carmenta pallene, Osminia rubricornis, Osminia donahueorum* and *Paranthrene fenestrata*. We also encountered several species that we were unable to identify, due to the lack of available keys and images of known adult species of northern Mexican sesiids. I was able to show the late Dr. Eichlin some of these undetermined specimens, but he was only able to provide tentative identifications.

One specimen is a small (10mm) female species (Figure 1), collected mid-morning with an aerial net on August 7, 2007 in the Patagonia Mountains at the base of Red Mountain, along the riparian corridor of Harshaw Creek (Figure 2a). The moth was hovering around scattered clumps of brickellbush, a species near *Brickellia floribunda* (Figure 2b,c). The plants were growing on rocky desert soil under stands of large Emory oak (*Quercus emoryi*) and Mesquite (*Prosopis sp*.), at an elevation of about 4650 feet.

To date, I have only collected this one specimen of this species. I submitted a leg from this specimen to Dr. Frans Puhringer in Austria for barcoding in the global survey of sesiids located at the University of Guelph – Barcode of Life Data System (BOLD) (Ratnasingham and Hebert 2007). Dr. Puhringer reported that in the sesiid phylogenetic tree, this unidentified moth (ABY0907) is closest to *Carmenta pyralidiformis*; but the sequence is 11.54-12.09% different from that of C. *pyralidiformis,* and thus is likely an undescribed species.

Dr. Marc Epstein of the California Department of Agriculture has taken on the challenge to finish a manuscript of the Mexican Sesiidae that Dr. Eichlin was working on at the time of his death. Hopefully this work will result in providing a name for this species.

Literature Cited

Ratnasingham, S. & Hebert, P. D. N. (2007). BOLD: The Barcode of Life Data System (www.barcodinglife.org). Molecular Ecology Notes 7, 355-364. DOI: 10.1111/j.1471-8286.2006.01678.x

Taft, W.H. and N. Schaper, 2014. Uncommon Clearwing Moths (Sesiidae) from southeast Arizona. News Lepidopterists' Soc. Vol. 56. Num. 2, pp. 59-61.

Figure 1. Unidentified female sesiid.

Figure 2. (a) Harshaw Creek riparian corridor, south of Patagonia, Arizona. (b) Close-up of the brickellbush plant. (c) The scattered plants found under the oak canopy.

New records of Lepidoptera from Kentucky

Loran D. Gibson[1], Charles V. Covell, Jr.[2], and Ellis L. Laudermilk[3]

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ABSTRACT

The authors add 69 species in 18 families to the Kentucky list of moths and butterflies (Lepidoptera). The total known from the Commonwealth is now 2,562 species. The number of species added in each of the 18 families is: Tineidae (3), Oecophoridae (1), Elachistidae (1), Coleophoridae (1), Cosmopterigidae (1), Gelechidae (2), Sesiidae (1), Tortricidae (8), Papilionidae (1), Nymphalidae (2), Limacodidae (2), Crambidae (10), Pyralidae (7), Pterophoridae (1), Geometridae (1), Erebidae (10), Nolidae (1), and Noctuidae (16).

INTRODUCTION

The annotated checklist of Kentucky Lepidoptera (Covell, 1999) documented 2,388 species of moths and butterflies from the state. Three subsequent supplements adding 105 species to the Kentucky list were published in the *Journal of the Kentucky Academy of Science* in 2000, 2006, and 2008 bringing the species total to 2,493 (Covell, *et al.*, 2000; Gibson and Covell, 2006; Covell and Gibson, 2008). During the nearly eight years since our last supplement was published substantial field work has been carried out in Kentucky by several dedicated people. Survey projects by members of the Society of Kentucky Lepidopterists and the Kentucky State Nature Preserves Commission on the Big Rivers Wildlife Management Area (WMA) in Crittenden and Union Counties and near the summit of Big Black Mountain in Harlan County (Co.) have been especially productive for adding previously unrecorded species. Gerald Burnett's amazing one-year-long light trapping project on the Doug Travis WMA in Carlisle Co. was also very productive. Other individual collecting ventures and descriptions of several new species provided many more additions. Results of this work are documented here where we add 66 moth species in 16 families and 3 new butterfly species in 2 families to the Kentucky list, bringing the total to 2,562.

ADDITIONS TO THE SPECIES LIST

Numbers preceding generic names refer to the Hodges *et al.* (1983) check list.

Family TINEIDAE

262 *Nemapogon angulifasciella* (Dietz, 1905)
Carlisle Co., Doug Travis WMA, 23 August 2009, collected and determined by Gerald Burnett, determination confirmed by Jim Vargo.

284 *Homosetia argentinotella* (Chambers, 1876)
Union Co., Big Rivers WMA, 5 June 2015, sighted and determined by Jim Vargo.

305 *Mea bipunctella* (Dietz, 1905)
Carlisle Co., Doug Travis WMA, 23 & 25 August 2009, collected and determined by Gerald Burnett; Union Co., Big Rivers WMA, 5 June 2015, collected and determined by Jim Vargo.

Family OECOPHORIDAE

874.1 *Agonopterix alstroemeriana* (Clerck, 1759)
Jefferson Co., Louisville, 5 August 2009 and 17 July 2010, photographed and determined by Eddie Huber.

Family ELACHISTIDAE

1121 *Elachista madarella* (Clemens, 1860)
Union Co., Big Rivers WMA, 5 June 2015, collected and determined by Jim Vargo.

Family COLEOPHORIDAE

1257 *Coleophora atromarginata* Braun, 1914
Union Co., Big Rivers WMA, 5 June 2015, sighted and determined by Jim Vargo.

Family COSMOPTERIGIDAE

1508 *Stagmatophora sexnotella* (Chambers, 1878)
Union Co., Big Rivers WMA, 5 June 2015, sighted and determined by Jim Vargo.

Family GELECHIIDAE

2294.3 *Dichomeris laetitia* Hodges, 1986
Union Co., Big Rivers WMA, 5 June 2015, collected and determined by Jim Vargo.

2297.2 *Dichomeris bolize* Hodges, 1986
Union Co., Big Rivers WMA, 5 June 2015, collected and determined by Jim Vargo.

Family SESIIDAE

2545 *Osminia ruficornis* (Henry Edwards, 1881)
Garrard Co., Reynolds Barrens, 6.2 air miles SW of Lancaster, 30 July 2010, collected and determined by Loran Gibson.

Osminia ruficornis

Eucosma paregoria

Grapholita orbexilana

Cydia marita

Family TORTRICIDAE

2830 *Olethreutes auricapitana* (Walsingham, 1879)
Union Co., Big Rivers WMA, 5 June 2015, collected and determined by Jim Vargo.

No MONA # *Eucosma paregoria* R. Brown, 2014
Hardin Co. in barrens habitat, 15 August 2003 and 14 July 2014, in black light trap, Loran Gibson and Ellis Laudermilk.

3170.2 *Pelochrista milleri* D. Wright, 2007
Bath Co., Cave Run Recreation Area, Rt. 129 & Zilpo Road, 17 August 1990, collected by Loran Gibson; Campbell Co., A. J. Jolly County Park, 23 July 1991, collected by Loran Gibson; Laurel Co., Daniel Boone National Forest (DBNF), Marsh Branch Road, 25 June 1997, collected by Loran Gibson; Rowan Co., west side of Co. Rd. 1274, 16 July 1994, collected by Loran Gibson, 26 August 1994, collected by Loran Gibson & Donald Wright. All designated as paratype specimens by Wright (2007).

No MONA # *Pelochrista lynxana* D. Wright, 2015
Bullitt Co., north side of CR 480, 6.9 miles east of Shepherdsville, 8 September 1988; same location 22 July 1989, in black light traps, collected by Loran Gibson, both designated as paratype specimens by Wright (2015).

No MONA # *Hystrichophora* undescribed species
Gallatin Co., Ohio River river-bottom forest SW of Markland Dam, 11, 15 & 22 June 1989 & 21 June 1990; Bracken Co., Ohio River bank S of Meldahl Dam, 23 May 2007, 10 & 21 June 2007, all collected at sheet light combination of MV/UV lights by Loran Gibson. This species is very closely associated with *Amorpha fruticosa* L.

No MONA # *Grapholita orbexilana* Harrison, 2014
Lincoln Co., near Stanford, larva collected 23 May 2010 on new growth of *Orbexilum onobrychis*, adult male emerged 8 April 2011; same location, 3 males and 3 females collected sweep netting at dusk over new growth of *O. onobrychis,* 14 April 2011, all collected by Loran Gibson, all designated as paratype specimens by Harrison *et al.* (2014).

No MONA # *Cydia marita* R. Brown, 2014
Owsley Co., near Booneville, 10 May 1980; Laurel Co., DBNF, Forest Service Road 615A, 6 April 1991 and 11 April 1992, collected and determined by Loran Gibson.

3631 *Choristoneura obsoletana* (Walker, 1863)
Union Co., Big Rivers WMA, 5 June 2015, collected and determined by Jim Vargo.

Family PAPILIONIDAE

No MONA # *Papilio appalachiensis* (Pavulaan & D. Wright, 2002)
Harlan Co., Lynch,11 May 2004, two males collected and determined by Michael L. McInnis.

Family NYMPHALIDAE

4480 *Phyciodes phaon* (W.H. Edwards,1864)
Fulton Co., E side of Sutton Road and the Mississippi River levy, along the west side of Lake # 9, 10 August 2010, discovered by Mark Monroe. A substantial population of this species proliferated during late summer 2010 along the Mississippi River in western Fulton Co., and was closely associated with mat plant or frogfruit *Phyla* (=*Lippia*) *lanceolata* (Michx.). Apparently, the population could not survive the winter of 2010-2011 as no subsequent records have been reported.

No MONA # *Phyciodes cocyta incognitus* Gatrelle, 2004
Rowan Co., DBNF, Clack Mountain Road west, 20 May 2006, collected and determined by Loran Gibson. This species was common on this date along this Forest Service road, flying with *P. tharos*. Laurel Co., DBNF, near Laurel Lake, 20 May 2011, photographed and determined by Loran Gibson. Menifee Co., various locations, many photographed by Rita Adkins, mostly in May.

Phyciodes phaon

Phyciodes cocyta incognitus

Family LIMACODIDAE

4652.1 *Tortricidea* undescribed species
Union Co., Big Rivers WMA, 5 June 2015, collected and determined by Jim Vargo.

4658 *Packardia albipunctata* (Packard, 1864)
Laurel Co., DBNF, west side of Marsh Branch Road, three males in black light trap, 21 May 2009, collected and determined by Loran Gibson, determination confirmed by James Adams.

Family CRAMBIDAE

4826 *Mimoschinia rufofascialis* (Stephens, 1834)
Rowan Co., DBNF, 17 August 2010, collected and determined by Jonathan Smith, confirmed by C. V. Covell, Jr. and Loran Gibson. Details of the capture can be found in Smith (2012).

4937 *Nascia acutella* (Walker, 1866)
Oldham Co., Goshen, 1 May 1991, collected at light by Robert V. Gregg, determined by C. V. Covell, Jr.

4957 *Anania mysippusalis* (Walker, 1859)
Harlan Co., Big Black Mountain above 3850 ft. elev., three in black light traps, 12 August 2015, collected by Loran Gibson and Ellis Laudermilk, determined from digital photo by Brian Scholtens.

4984 *Helvibotys pucilla* (Druce, 1895)
Carlisle Co., Mississippi River bank W of Berkley, two males and one female in black light trap, 29 June 2010, collected and determined by Loran Gibson.

Anania mysippusalis

Helvibotys pucilla

Packardia albipunctata

Lamprosema canacealis

5105.2 *Lamprosema canacealis* Walker, 1859

Carlisle Co., Doug Travis WMA, 7 October 2009, collected and determined by Gerald Burnett. This is apparently a rare species, especially as far north as Kentucky!

5187 *Heleithia magualis* (Guenée, 1854)

Carlisle Co., Doug Travis WMA, 20 June 2009, collected and determined by Gerald Burnett, determination confirmed by Jim Vargo.

5225 *Palpita freemanalis* Monroe, 1952

Ballard Co., Ballard/Boatwright WMA, Prairie Lake Field, 12 August 2007; Ballard Co., Blandville Cemetery, 31 August 2008; Carlisle Co., Doug Travis WMA, 23 August 2009, all collected by Gerald Burnett; Carlisle Co., Sandy Branch, 1.7 miles south of Laketon, 29 June 2010, collected by Loran Gibson; Union Co., Big Rivers WMA, 5 June 2015, sighted by Jim Vargo; Crittenden Co., Big Rivers WMA, 6 June 2015, sighted by Jim Vargo.

5274 *Herpetogramma phaeopteralis* (Guenée, 1854)

Ballard Co., Ballard WMA, 11 September 2010, collected by C. V. Covell, Jr., determined by James Hayden.

5276 *Herpetogramma abdominalis* (Zeller, 1872)

Harlan Co., Big Black Mountain, above 3850 ft. elev., 2 September 2015, in black light trap, collected by Loran Gibson and Ellis Laudermilk, determined from digital photo by James Hayden.

5279.1 *Herpetogramma sphingealis* Handfield & Handfield, 2011

Material from Kentucky was mentioned in the original description (Handfield & Handfield, 2011) under "other material examined". Owsley Co.: W side of CR 1411 .75 mi. N of SR 30, McIntosh Farm, 22 July 2005, one male, collected by Loran Gibson, determined from digital photo by James Hayden; E side CR 1411, .85 mi. N of SR 30, 30 July 1977, one male, collected and determined by Loran Gibson. Menifee Co., DBNF, Indian Creek, Forest Service Rd. 9A, 20 July 1979, one male, collected and determined by Loran Gibson.

Family PYRALIDAE

5470 *Chilo plejadellus* Zincken, 1821

Ballard Co., Ballard WMA, 11 September 2010, in black light trap, collected by Loran Gibson, determined by Jim Vargo.

5540 *Basacallis tarachodes* (Dyar, 1914)

Rowan Co., DBNF, 9 July 2005, collected by Gerald Burnett, determined by C. V. Covell, Jr., confirmed by James Hayden.

5555 *Penthesilea sacculalis* Ragonot, 1891

Carlisle Co., Doug Travis WMA, 18 July 2009, collected and determined by Gerald Burnett; Crittenden Co., Big Rivers WMA, 10 September 2015, three in black light trap and at mercury vapor/black light combination, collected and determined by Loran Gibson.

5591 *Tallula atrifascialis* (Hulst, 1886)

Carlisle Co., Westvaco WMA, Sandy Branch, 15 October 1999, one worn individual collected by Loran Gibson, determined from digital photo by Brian Scholtens, 2016.

5629 *Aphomia sociella* (Linnaeus, 1758)

Jefferson Co., Louisville, 5001 Thurman Road, many observed, photographed and three collected by Eddie Huber from 29 May through 31 July 2010. Determination confirmed by Loran Gibson and James Adams.

Penthesilea sacculalis

Herpetogramma sphingealis

5773.1 *Salebriaria roseopunctella* Nuenzig, 2003
Crittenden Co., Big Rivers WMA, 6 June 2015, collected and determined by Jim Vargo.

5774.2 *Salebriaria bella* Nuenzig, 1988
Laurel Co., DBNF, E side of Marsh Branch Road, 1 June 2011, one in black light trap, collected and determined by Loran Gibson.

Family PTEROPHORIDAE

6163 *Oidaematophorus cretidactylus* (Fitch, 1854)
Larue Co., in barrens habitat, 23 September, 2006, collected by Loran Gibson, determined by Reed Watkins.

Oidaematophorus cretidactylus

Cepphis decoloraria

Family GEOMETRIDAE

6834 *Cepphis decoloraria* (Hulst, 1886)
Menifee Co., DBNF, Leatherwood Fork of Indian Creek, 30 July 2007, one in black light trap, collected by Loran Gibson, determined by James Adams.

Numbers preceding generic names below refer to the check list of Lafontaine & Schmidt (2010).

Family EREBIDAE

93-0300 *Virbia rubicundaria* (Hübner, [1831])
Carlisle Co., Doug Travis WMA, 27 May 2009, collected by Gerald Burnett, determined by Jennifer Zaspel.

Idia laurenti

93-0479 *Idia laurenti* (Smith, 1893)
Harlan Co., Big Black Mountain, above 3850 ft. elev., 24 June and 12 August, 2015 one each night in black light traps, collected by Loran Gibson and Ellis Laudermilk, determined by Loran Gibson, confirmed by Eric Metzler and James Adams from digital photo.

93-0608 *Anomis illita* Guenée, 1852
Carlisle Co., Doug Travis WMA, 12 October 2003, 7 & 15 November 2009, all collected and determined by Gerald Burnett; Hart Co., Millerstown Road near Upton, 21 September 2014, collected and determined by Richard Healy.

93-0611.1 *Dinumma deponens* Walker, 1858
Whitley Co., Alsile Road off KY. Rt. 92 W of Williamsburg, 10 June 2015, at sheet light, collected and determined by Bill Garthe. This Asian species was first discovered in the U.S. by James Adams, in northern Georgia, in 2012. The larval host is *Albizia julibrissin* Durazz, also an Asian species, locally known as mimosa tree. Since discovery, the moth has spread quickly, and has now been reported (James Adams, pers. comm.) from seven southeastern states, including Kentucky.

93-0669 *Dyspyralis illocata* Warren, 1891
Union Co., Big Rivers WMA, 5 June 2015, collected and determined by Jim Vargo.

93-0693 *Eublemma minima* (Guenée, 1852)
Ballard Co., Ballard WMA, Little Turner Lake area, 20 October 2004, collected and determined by Gerald Burnett.

93-0695 *Eublemma recta* (Guenée, 1852)
Carlisle Co., Doug Travis WMA, 7 November 2009, collected and determined by Gerald Burnett.

93-0849 *Catocala pretiosa* Lintner, 1876
McCracken Co., Paducah, 15 June 1996, one collected by Phillip Sisto, determined by Lawrence Gall; several collected more recently in bait traps in the Littleville section of Paducah by William R. Black Jr.

Bulia deducta

Nycteola metaspilella

93-0885 *Bulia deducta* (Morrison, 1875)

Carlisle Co., Doug Travis WMA, 12 May 2010, collected and determined by Gerald Burnett.

93-1044 *Zale curema* (Smith, 1908)

A Powell Co., KY specimen of this species is illustrated in Rings et al., 1992, plate XII, fig. 27. The first author asked Eric Metzler, the second author of Rings et al., 1992, if he knew where the specimen is housed. Eric could not provide a location. The specimen could be in The Ohio State University collection, or if it was a borrowed specimen, it could have been returned to the owner. Additional inquiry will be required in order to learn the Powell Co, KY location, the collection date, and the collector.

Family NOLIDAE

93-1145 *Nycteola metaspilella* (Walker, 1866)

Carlisle Co., Doug Travis WMA, 7 June 2009, collected and determined by Gerald Burnett, determination confirmed by Jim Vargo.

Family NOCTUIDAE

93-1254.1 *Cydosia majuscula* (H. Edwards, 1881)

Union Co., Big Rivers WMA, 5 June 2015, a specimen was collected by Jim Vargo and later determined by James Adams. This species was recently considered to be a "dark form" of *C. aurivitta* Grote & Robinson. Lafontaine & Schmidt (2015) resurrected the Henry Edwards name from the synonymy using barcode evidence.

93-1261 *Tripudia rectangulata* Pogue, 2009

Owsley Co., near Booneville, 22 August 1980; Boone Co., Big Bone Lick State Park, 31 May 1980, 25 August 1981; Christian Co., Pennyrile State Forest, 22 August 1986, all collected by Loran Gibson. These specimens were reported as *Tripudia quadrifera* (Zeller, 1874) in Covell, 1999. Christian Co., Pennyrile State Forest, 20 August 1999, collected and determined by Loran Gibson; Union Co., Big Rivers WMA, 5 June 2015, collected and determined by Jim Vargo. *T. rectangulata* is a replacement name for the species previously determined as *T. quadrifera*. *T. quadrifera* is unreported from Kentucky so this taxon does not count as new.

93-1268 *Tripudia flavofasciata* Grote, 1877

Fulton Co., Mississippi River bank near Elbow Slough, 24 August 2010, common in black light traps, collected and determined by Loran Gibson; Meade Co., Otter Creek WMA, 23 August 2011, a few in black light traps, collected and determined by Loran Gibson.

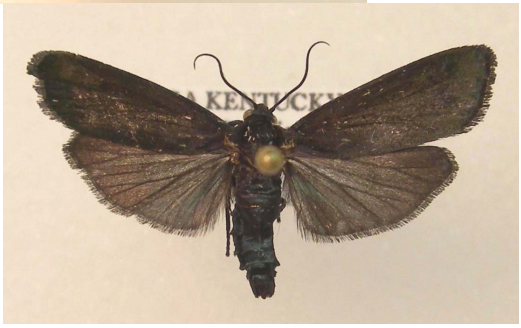
93-1472 *Acronicta brumosa* Guenée, 1852

Crittenden Co., Big Rivers WMA, 6 June 2015, sighted and determined by Jim Vargo.

93-1824 *Sympistis kappa* (Grote, 1874)

Crittenden Co., Big Rivers WMA, 6 June 2015, collected and determined by Jim Vargo.

Sympistis kappa



Cydosia majuscula

93-2206 *Pseudeustrotia indeterminata* (Barnes & McDunnough, 1918)

Hickman Co., Chalk Bluff Road, 2.5 miles SW of County Road 123, 26 July 2008, in black light trap, collected by Loran Gibson, determined by James Adams; Carlisle Co., Mississippi River bank W of Berkley, 29 June 2010, in black light trap, collected by Loran Gibson, determined by James Adams.

Apamea devastator

Protapamea danieli

Apamea dubitans

93-2261 *Caradrina multifera* (Walker, [1857])

Harlan Co., Big Black Mountain, above 3700 ft. elev., one in black light trap, collected and determined by Ellis Laudermilk and Loran Gibson.

93-2344 *Apamea dubitans* (Walker, 1856)

Harlan Co., Big Black Mountain, above 3700 ft. elev., 12 August 2015; 2 September 2015, in black light traps, collected by Loran Gibson and Ellis Laudermilk, determined by Loran Gibson, confirmed by James Adams from digital photo.

93-2350 *Apamea devastator* (Brace, 1819)

Harlan Co., Big Black Mountain, Benham Spur, above 3700 ft. elev., 2 September 2015, in black light trap, collected by Ellis Laudermilk and Loran Gibson, determined from digital photo by Donald Lafontaine.

93-2360 *Protapamea danieli* Quinter, 2009

Harlan Co., Big Black Mountain, 14 July 1979, collected by Loran Gibson; Owsley Co., near Booneville, 22 June 1984, collected by Loran Gibson; Ballard Co., Stovall Creek, 15 June 1999, collected by E. Quinter, W. R. Black, Jr. & J. Wiker; Carlisle Co., Sandy Branch, 14 June 1999, collected by E. Quinter, W. R. Black, Jr. & J. Wiker; Carlisle Co., Sandy Branch, individuals emerged 1-4 June 1999, reared by E. Quinter & W. R. Black Jr. All of the above designated as paratype specimens (Mikkola *et al*., 2009).

93-2537.1 *Lithophane* undescribed species near *L. disposita* Morrison, 1874

Jackson Co., DBNF, Sheltowee Trace Trail near McKee, 4 November 2014, two collected at sugar-baited tree trunks by Loran Gibson & Ellis Laudermilk, determination confirmed by Kyle Johnson.

93-2539 *Lithophane lanei* Troubridge, 2006

Boone Co., Big Bone Lick State Park, 22 October 1987, collected at sugar-baited tree trunks by Loran Gibson; Harlan Co., Kingdom Come State Park, 28 October 1987, collected at sugar-baited tree trunks by Loran Gibson; Powell Co., DBNF, E side of KY Route 77 near Nada Tunnel, 5 November 1989, collected at sugar-baited tree trunks by Loran Gibson. All determined by Jim Vargo, confirmed from digital photos by J. Troubridge.

93-2551 *Lithophane scottae* Troubridge, 2006

Powell Co., DBNF, E side of KY Route 77 near Nada Tunnel, 7 March 1987; Harlan Co., Kingdom Come State Park, 28 October 1987, collected at sugar-baited tree trunks by Loran Gibson; Jackson Co., DBNF, Sheltowee Trace Trail near McKee, 4 November 2014, four collected at sugar-baited tree trunks by Loran Gibson & Ellis Laudermilk, determined by Kyle Johnson.

93-2699 *"Platypolia" mactata* (Guenée, 1852)

Menifee Co., Red River Gorge, 11 October 1984, 3 October 1986; Boone Co., Big Bone Lick State Park, 23 October 1989, all collected by Loran Gibson, determined as probably this species by Loran Gibson, confirmed by Donald Lafontaine from digital photos. Harlan Co., Big Black Mountain, above 3700 ft. elev., 30 September 2015, in black light traps, collected by Loran Gibson & Ellis Laudermilk, determined as probably this species, possibly a new subspecies by Donald Lafontaine from digital photos.

93-3231 *Dichagyris grotei* (Franclemont & Todd, 1983)

Carlisle Co., Doug Travis WMA, 13 September 2009, collected by Gerald Burnett, determined by Jim Vargo.

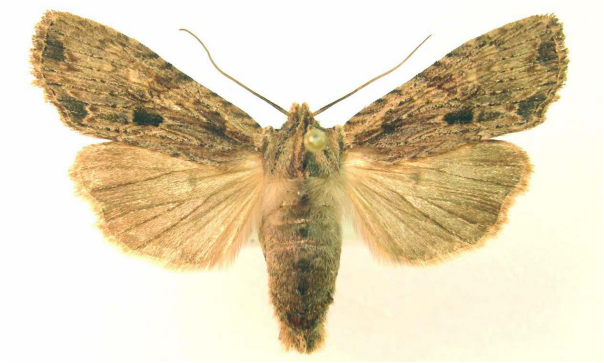
93-3309 *Euxoa auxiliaris* (Grote, 1873)

Carlisle Co., Doug Travis WMA, 22 November 2003, collected in black light trap by Gerald Burnett, determined from digital photo by Donald Lafontaine.

93-3683 *Abagrotis brunneipennis* (Grote, 1875)

Powell Co., DBNF, Tunnel Ridge Rd., 25 July 2013, one male, collected by Loran Gibson, determined by Loran Gibson with instructional help from Donald Lafontaine, 2016.

Abagrotis brunneipennis



Lithophane lanei

Lithophane scottae

Photos with dark backgrounds are by Gerald Burnett; all other photos by Loran Gibson.

ACKNOWLEDGEMENTS

We wish to thank the following for reporting their captures, photographic information, and sight records: Rita Adkins, William R. Black, Jr., Gerald Burnett, Bill Garthe, the late Robert V. Gregg, Richard Healy, Eddie Huber, Michael L. McInnis, Mark Monroe, Eric Quinter, Jonathan A. Smith, Phillip Sisto, James Wiker, and especially Jim Vargo whose two-night count of new state records from Crittenden and Union Counties on 5-6 June 2015 tallied 17 species! We are very grateful to many for help with difficult determinations including: James Adams, Lawrence Gall, Terry Harrison, James Hayden, Kyle Johnson, Donald Lafontaine, Debbie Matthews Lott, Eric Metzler, Brian Scholtens, James Troubridge, Jim Vargo, Reed Watkins, Donald Wright, and Jennifer Zaspel. We thank the Kentucky Department of Fish and Wildlife Resources, Gregory K. Johnson, Commissioner, and the Kentucky State Nature Preserves Commission, Donald S. Dott, Jr., Director, for permission to sample Lepidoptera on lands under their management. We also thank the Kentucky Department of Parks for permission to collect Lepidoptera on Park lands through a permit issued by former Chief Naturalist, Carey Tichenor.

LITERATURE CITED

Covell, C. V. , Jr., 1999. The butterflies and moths (Lepidoptera) of Kentucky: an annotated checklist. Kentucky State Nature Preserves Commission Technical Series 6: 1, 220 pp.

Covell, C. V., Jr., L. D. Gibson, and D. J. Wright. 2000. New state records and new available names for species of Kentucky moths (Insecta: Lepidoptera). Journal of the Kentucky Academy of Science 61: 105-107.

Covell, C. V., Jr., and L. D. Gibson. 2008. More new moth records (Lepidoptera) from Kentucky. Journal of the Kentucky Academy of Science 69: 193-196.

Gibson, L. D., and C. V. Covell, Jr. 2006. New records of butterflies and moths (Lepidoptera) from Kentucky. Journal of the Kentucky Academy of Science 67: 19-21.

Handfield, L. and D. Handfield. 2011. A new species of Herpetogramma (Lepidoptera, Crambidae, Spilomelinae) from eastern North America. ZooKeys 149: 5-15 (24 Nov. 2011), doi: 10.3897/zookeys.149.2344.

Harrison, T. L., L. D. Gibson, & T. M. Gilligan. 2014. A new species of *Grapholita* Treitschke (Lepidoptera: Tortricidae) from the midwestern USA. Zootaxa 3755 (3): 287-294.

Hodges, R. W. *et al*. 1983. A check list of the Lepidoptera of America north of Mexico. Wedge Entomological Research Foundation, Washington D.C., 284 pp.

Lafontaine, J. D. and B. C. Schmidt. 2010. Annotated check list of the Noctuoidea (Insecta, Lepidoptera) of North America north of Mexico. ZooKeys 40: 1–239, doi: 10.3897/zookeys.40.414.

Lafontaine, J. D. and B. C. Schmidt. 2015. Additions and corrections to the Noctuoidea (Insecta, Lepidoptera) of North America north of Mexico III. ZooKeys 527: 127–147, doi: 0.3897/zookeys.527.6151.

Mikkola, K., J. D. Lafontaine, and J. D. Gill, 2009. Noctuoidea, Noctuidae (part): Xyleninae (part):Apameini (part--*Apamea* group of genera) *in* Hodges, R. W., et al. *The Moths of North America* fasc, 26.9, 192 pp.

Rings, R. W. et al. 1992. The owlet moths of Ohio order Lepidoptera family Noctuidae. Ohio Biological Survey Bulletin N. S. 9 (2). 219 pp

Smith, J. 2012. New state record *Mimoschinia rubofascialis* [*sic*]. Newsletter of the Society of Kentucky Lepidopterists. 38: 9.

Wright, D. J. 2007. A new species of *Pelochrista* Lederer from eastern North America (Tortricidae). Journal of the Lepidopterists' Society, 61: 84-86.

Wright, D. J, 2015. Two new species of *Pelochrista* Lederer (Tortricidae) from eastern United States, with reviews of five similar species. Journal of the Lepidopterists' Society. 69: 63-71.

Variation in *Colias tyche thula* from Cambridge Bay, Victoria Island, Nunavut, Canada

Takashi Hino

3-4-4 Wada, Higashitokorozawa, Tokorozawa, Saitama 359-0023, Japan **takashihino@mua.biglobe.ne.jp**

The Far North of North America is a very attractive area for butterfly lovers who have interest in Arctic species. I have great interest in *Colias* species in this area and have visited Alaska, Yukon and Nunavut. I did visit Cambridge Bay, Victoria Island, Nunavut in July 2012 and 2014. It is necessary to get a Wildlife Research Permit from the Canadian Dept. of Environment to collect butterflies in Nunavut. I made an application for the Permit and received it each time in advance. When I visited there in 2014, I was lucky enough to see many *Colias tyche thula* which were just emerging in mid-July. The typical habitat is the tundra whose altitude is close to the sea level (Fig.1). I observed interesting variation in the specimens when I mounted them later.

The male dorsal variations are shown in Fig.2. The normal feature of the male dorsal in the Far North is a monotone pale grey or pale yellow-green color as seen in the top two specimens. Other types as shown in the bottom two specimens are also observed. The bottom right has an orange color on the dorsal and the bottom left has black borders. The ventral variation of the same specimens as in Fig.2 are shown in Fig.3. There are not large ventral differences as compared with the dorsal.

The female dorsal variations are shown in Fig.4. They can roughly be grouped into two forms. One has a pale yellow-green color and less black pattern as shown in the right two specimens, somewhat similar to the male normal pattern. The other has grey color and large black margins as shown in the left two specimens. It is obviously different from the male pattern and probably similar to the normal female dorsal pattern in other areas, e.g. Nome, Alaska. The ventral variation of the same specimens as in Fig.4 are shown in Fig.5.

The dorsals of *C. tyche thula* from Nome are shown in Fig.6. The top two are males and the bottom two are females.

Other *Colias* species observed in Cambridge Bay are below.

- *Colias johanseni* : This species was recorded in Cambridge Bay in 2007 by Yukinobu Ujiie. More than ten males and a few females were collected in late July 2012. I cannot be certain of the number of females because of difficulty to distinguish them from *hecla*.
- *Colias hecla* : Many males and some females were observed in late July 2012 and a few males and one female were observed in mid-July 2014.
- *Colias nastes*: Some males and a few females were observed in late July 2012 and mid-July 2014. Some butterflies having intermediate features between *thula* and *nastes* were observed.
- *Colias palaeno*: One female was observed in late July 2012.

There seem to be some uncertainties in distinctness and range for *Colias tyche thula* and *boothii* in North America.

Fig.1. Typical habitat of *Colias tyche thula* at Cambridge Bay

Fig.2. Male dorsal variations of *Colias tyche thula* from Cambridge Bay.

Fig. 3. Male ventral variations of the same specimens as in Fig. 2.

Fig. 4. Female dorsal variations of *Colias tyche thula* from Cambridge Bay

Fig. 5. Female ventral variations of the same specimens as in Fig. 4.

Is *tyche* the species for subspecies *thula* and *boothii* ? Is the boundary clear between *thula* and *boothii*? Are there any possibilities of hybridization with other *Colias* species, e.g. *nastes* or *canadensis* ?

I intend to continue researching these butterflies. Any information and comments would be appreciated.

References

Layberry, R.A., P.W.Hall, and J.D.Lafontaine. 1998. The butterflies of Canada. University of Toronto Press, Toronto, Ontario, CANADA. 280pp.

Verhulst, J.T. 2000. Les *Colias* du Globe. Monograph of the Genus *Colias*. Goecke & Evers, Keltern, Germany

Ujiie,Yukinobu. 2008. A record of *Colias johanseni* from Victoria Island, Canada. Butterflies No.47: 45-47.

Fig. 6. *Colias tyche thula* dorsal from Nome. Top two: males, Bottom two: females.

Announcements:

The 65th Annual Meeting of The Lepidopterists' Society, July 6-10, 2016, at Florissant, Colorado

The 2016 Annual Meeting of The Lepidopterists' Society will be held from Wednesday, July 6, to Sunday, July 10, at The Nature Place, a superb conference center sponsored by the Colorado Outdoor Education Center and located near the tiny town of Florissant at 8800 feet elevation, a few miles west of Pikes Peak in the Colorado Rockies. For full details, please see the Spring issue of the News (58:1, pages 42-44).

Seminar on Lepidoptera in Maine

Hugh McGuinness and Bryan Pfeiffer will be teaching a weeklong seminar on Lepidoptera this summer at Eagle Hill in Steuben, Maine. The course, which is titled "Moths and Butterflies: Identification, Specimen Preparation and Taxonomy," will emphasize identification of macrolepidoptera; the current state of taxonomy in Lepidoptera; the techniques used for observing, studying and surveying butterflies and moths; and various aspects of Lepidopteran conservation. Each day will include a lecture topic, lab work and plenty of field time, both during the day and at night. Because we have two instructors we have a lot of flexibility in the nature of the course and we plan to adapt the course depending on the interests of the students. Eagle Hill is a wonderful biological station with great food and ample accommodations set on hillside in coastal Maine about 1 hour from Bar Harbor. The course is scheduled to run from the 19th to the 25th of June, 2016. For more information, go to **http://www.eaglehill.us/programs/nhs/nhs-calendar.shtml.**

Corrections to items in the Spring 2016 News (Vol. 58:1)

Due to an error in copying by me (the Editor), "Russel" of Alfred Russel Wallace fame was mispelled as "Russell" in the title of the Birdwing article by Gary Noel Ross (58:1, pp. 9 - 15). The mistake was repeated on both the cover of the News and in the Index. I apologize profusely to Gary for the mistake!

Zone Coordinator Needed!

The position of Season Summary Coordinator for Zone 7 (Ontario and Quebec) is currently vacant. If you have any interest in providing this sevice to the Society, please contact the Chief Season Summary Editor, Leroy C. Koehn for a complete description and requirements.

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

MOTHAPALOOZA 2016

Mothapalooza 2016 will be a full weekend of mothing, diurnal field trips, workshops, keynote presentations and camaraderie! This year's conference will be held in southeastern Ohio near West Portsmouth at the beautiful Shawnee Lodge & Conference Center in the heart of the 65,000 acre Shawnee State Forest. A few miles to the west is the expansive 16,000 acre Edge of Appalachia Preserve. This region harbors Ohio's richest biodiversity and is chockfull of rarities, both plant and animal. The date is set for August 5-7th, 2016. Please join us!

Mothapalooza is a celebration of the rich and stunningly beautiful world of moths. Their much better known diurnal counterparts the butterflies are dwarfed by the diversity of moths. Fewer than 140 butterfly species have been recorded in Ohio; there are an estimated 3,000 species of moths. We know from the previous three Mothapalooza's that participants can expect to see a blizzard of moths, numbering into hundreds of species.

The weekend program features an interesting range of talks by leading experts, workshops and field trips to experience moths and other elements of natural history firsthand.

Sponsored in large part by the Ohio Division of Wildlife, the 2016 Conference will feature well-known keynote speakers and guides including Seabrooke Leckie, Co-author of The Peterson Field Guide to Moths of Northeastern North America and Samuel Jaffe, a New England-based Naturalist and Founder of The Caterpillar Lab.

Expert-guided field trips, both day and night, will explore the best habitats in the area. Attendees can expect to compile huge lists of moths, butterflies, myriad other insects, birds, plants, and more.

Registration opened March, 2016. Details at www.mothapalooza.org. Join our mailing list if you would like to be notified when registration opens, http://eepurl.com/bR9Yoz.

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!

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

The Southern Lepidopterists' Society invites you to join

The Southern Lepidopterists' Society (SLS) was established in 1978 to promote the enjoyment and understanding of butterflies and moths in the southeastern United States. With the beginning of another year we are seeking to broaden our membership. Our new Chairman, John Douglass, has planned an exciting spring field trip to the Perdido Bay area of the western Florida Panhandle. This little known area has fabulous pitcherplant savannahs and who knows what you may find there. It's never been collected!

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 (Fig. 1). Our editor J. Barry Lombardini packs each issue with beautiful color photos and must-read articles. SLS conveniently holds its annual meeting, usually in October, with the Association for Tropical Lepidoptera 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 to me, Marc C. Minno, Membership Coordinator, at **marc.minno@gmail.com** if you have any questions. Dues may be sent to Jeffrey R. Slotten, Treasurer, 5421 NW 68th Lane, Gainesville, FL 32653.


Southern Lepidopterists' NEWS

EST. 1978 Official Newsletter of the Southern Lepidopterists' Society (ISSN 2167-0285)

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THE OFFICIAL PUBLICATION OF THE SOUTHERN LEPIDOPTERISTS' SOCIETY ORGANIZED TO PROMOTE SCIENTIFIC INTEREST AND KNOWLEDGE RELATED TO UNDERSTANDING THE LEPIDOPTERA FAUNA OF THE SOUTHERN REGION OF THE UNITED STATES (WEBSITE: www.southernlepsoc.org/)

J. BARRY LOMBARDINI: EDITOR

DASYCHIRA MATHERI FERGUSON, 1977 (LEPIDOPTERA: EREBIDAE: LYMANTRIINAE) IN LOUISIANA

BY

VERNON ANTOINE BROU JR.

Fig. 1. *Dasychira matheri*: a. male, b. female.

Fifth Annual (Inter)National Moth Week July 23-31, 2016

This Year's Event Spotlights Underwing Moths (*Catocala*)

The fifth annual (Inter)National Moth Week is being held July 23-31around the world. National Moth Week is a global event and last year there were more than 400 participating locations in all 50 states and 39 countries. Since its inception in 2012, there have been events in 66 countries. National Moth Week encourages "moth-ers" of all ages and abilities to learn about, observe, and document moths in their backyards, parks, and neighborhoods. The event is open to anyone, anywhere around the world. Surveys, moth-watching and educational events have been held throughout Europe, Asia, Africa, South, Central, and North America.

National Moth Week recognizes that late July may not be ideal for mothing everywhere around the world and also encourages events and participation at any other time that will be productive. Simply register those dates and locations on the website and we will be sure to spotlight them as well.

National Moth Week (NMW) shines a much-needed spotlight on moths and their ecological importance as well as their incredible biodiversity. Through partnerships with major online biological data depositories such as BAMONA, Project Noah, BugGuide, Encyclopedia of Life, Discover Life, Biodiversity Bhutan, DiversityIndia, Moth Photographers Group, LepiMap – Atlas of African Lepidoptera, and iNaturalist, National Moth Week encourages participants to record moth distribution, submit data and photographs and to provide information on other aspects of their life cycles and habitats.

Participants submitted more than 10,000 moth records and held thousands of moth nights in backyards, inner cities and some of the most remote places on Earth. Many of these were attended by the public and by families and children that have never been exposed to moths or Lepidoptera survey methods.

National Moth Week 2016 is designated "The Year of the Underwing Moth" to encourage participants to look for and learn about these fascinating moths.

National Moth Week is always interested in partnering with organizations and can spotlight events through our website and Facebook pages. For more information about National Moth Week and to register a location at any time of the year please visit nationalmothweek.org. To contact us about the event, please reach out to Dave Moskowitz @ **dmoskowitz@ecolsciences.com** .

David Moskowitz, Ph.D., Co-Founder – National Moth Week, www.nationalmothweek.org

Continued on p. 101

The Cocoa Pod Borer, *Carmenta foraseminis* (Busck) Eichlin: observations about life cycle stages and emergence index of adults

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Compañía Nacional de Chocolates S.A.S. (Grupo Nutresa)

Abstract

The purpose of this work is to discuss some aspects of the stages of the life cycle of the Cocoa Pod Borer, *Camenta foraseminis* (Busck) Eichlin. Additionally, we examined the levels of success in breeding of adults from immature stages, from infested fruits covered with tulle bags and from infested fruits deposited in boxes covered in tulle.

Observations and monitoring of harvests were made at Támesis municipality, department of Antioquia, Colombia S.A., at Granja Agrícola la Nacional (Nutresa Group). This locality is at 1040 meters above sea level, with an average temperature of 23°C and 75% relative humidity.

From the larvae and pupae recovered from the injured fruits in this study, we obtained 40% adult emergence.

Key words: Cocoa Pod Borer, *Carmenta foraseminis*, life cycle, breeding of adults, index of breeding of adults.

Introduction

The Cocoa Pod Borer (CPB), *Carmenta foraseminis* (Busck) Eichlin, is a clear-wing moth whose larvae drill in the cocoa fruits. To get a meal, they build galleries, and make an exit hole when they emerge as adults. Humidity and secondary biological agents enter this hole into the fruit and compromise the commercial value. The moth's biological cycle was studied by Leal and Hernández (1990) and Delgado (2007). However, here I present some new details on the moth life stages, habits and emergence index of adults.

All observations about the immature stages of CPB and some of its habits, monitoring and breeding of adults from immature stages, and bagging/boxing of fruits were performed at the Granja Agrícola La Nacionale, owned by the Compañía Nacional de Chocolates (Group Nutresa), Támesis municipality, Antioquia department, Colombia S.A. This site is at 1040 meters above sea level, with an average temperature of 23° C, 75% of relative humidity and 2400 mm of rain annually.

Stages of the Cocoa Pod Borer

Eggs: Placed individually on the skin of fruits, apparently without preferential sites, and especially when fruit is near to ripe (more than 4 months old, Figures 1 and 2). Eggs are almost invisible to the naked eye. Between 1 and 6 eggs per fruit were generally found but it is possible to observe as many as 14 eggs on a single fruit.

Under laboratory conditions, Leal and Hernández (1990) found that eggs take 7 days to hatch. Figure 3 shows the appearance of an egg before hatch: ovate, dark brown in color, with cross ridges and with a slight depression in the middle.

Figure 1. Eggs of the Cocoa Pod Borer viewed with a naked eye.


Figure 2. Eggs of the Cocoa Pod Borer, magnified 6 X.

Larvae: Emerge from the eggs and immediately drill the fruits to enter inside. They are whitish and yellowish in color with dark brown head (Figures 4 and 5). They are negatively phototactic and, consequently, when they are in a lit environment, they move away from the light and seek the darkness. According to Leal and Hernández (1990), larva proceed through 9 instars that span 36 days.

Pupae: Larvae in the pre-pupal stage make a cocoon with silk and frass in order to protect the pupae until adults emerge (Figure 6). The cocoon is made underneath the fruit epidermis. Pupae leave the cocoon and move to the fruit surface, leaving part of the cocoon fastened to interior when adults emerge (Figure 7). Leal and Hernández (1990) measured the length of the pupal stage at 21 days.

Adults: Are clearwing moths that mimic wasps. They are characterized by a dark brown thorax with two thin yellow stripes at the notum borders. The abdomen is dark brown to black with two thin yellow or white transverse dorsal stripes bordering each one of the segments (Delgado, 2007). Males differ from females by a tapering conical abdomen with a fanned tuft of scales on the end (Figure 8). Female abdomens are shorter and broader with a much smaller tuft of scales (Figure 9).

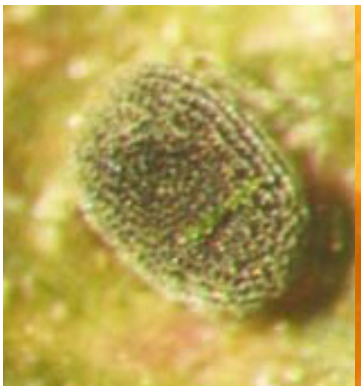

Figure 3. Egg of the Cocoa Pod Borer under stereoscopic microscope.

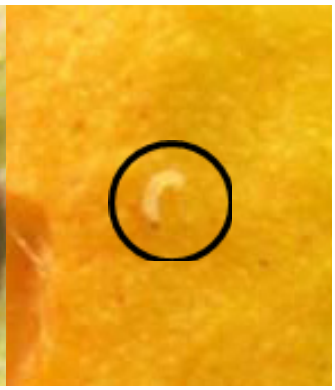

Figure 4. Larva of the Cocoa Pod Borer less than six days old.

Figure 5. Pre-pupa stage of the Cocoa Pod Borer larva.

Figure 6. Pupae inside their cocoons.

Figure 7. Pupa at its point of emergence from the Cocoa Pod.

Figure 9. Male adult of the Cocoa Pod Borer.

Figure 9. Female adult of the Cocoa Pod Borer.

Adult lifespan is short, and, according to Leal and Hernández (1990), it is 7 days in the laboratory when fed on a diet of 30% honey solution (in water). The entire life cycle (egg - adult) is about 71 days (Leal y Hernández, 1990). The normal sex ratio upon emergence is 1:1.

During the day, no adults were found on any part of the Cocoa, nor in nearby trees. Thus, is it assumed that the insect has crepuscular or nocturnal habits. Adults are very placid during daylight hours, to the point of being manipulated without flight (Figure 10). For that reason, they are apparently easy prey for predators, as you can see in Figure 11, where an adult has been captured by a spider.

Figure 10. Female Cocoa Pod Borer on palm.

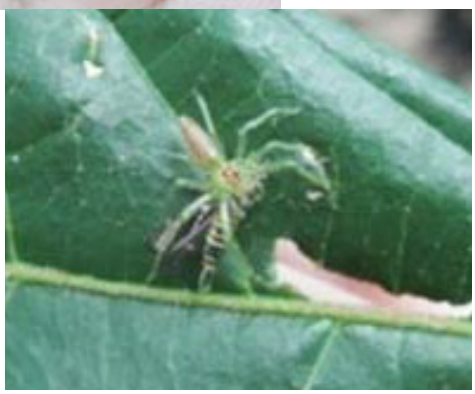

Figure 11. Adult Cocoa Pod Borer captured by a spider.

In captivity, various sex ratios all seem to result in mating followed by oviposition, and the eggs may be laid on plastic trays near fruits. You can see scattered eggs on the bottom of a tray in Figure 12. However, this pattern of behavior is not fully understood.

Adult breeding under controlled conditions

Immature stages

Table 1 shows results of recovery of immatures from infested fruits and adults obtained from those immatures.

Table 1. Numbers of infested fruits with immatures recovered, and number and percentages of adults and females emerged from the immatures in infested fruits.

Date	Number of infested fruits	Number of immature stages recovered	% immature stages recovered	Number of adults emerged	Number of females emerged	% adults emerged from immature stages	% adults emerged from infested fruits	% females emerged from infested fruits
17/03/2011	1.375	222	16,1	34	18	15,3	2,5	1,2
22/03	870	96	11,0	30	15	31,3	3,4	1,7
06/04	422	161	38,1	59	23	36,6	14,0	7,0
28/04	508	106	20,9	17	5	16,0	3,3	1,7
06/05	349	99	28,4	13	8	13,1	3,7	1,9
13/05	1.061	147	13,8	25	9	17,0	2,4	1,2
17/05	356	71	19,9	14	7	19,7	3,9	2,0
31/05	338	100	29,6	66	38	66,0	19,5	9,8
09/06	532	122	13,0	60	37	49,2	11,3	5,6
15/06	589	139	23,6	78	29	56,1	13,2	6,6
24/06	370	106	17,8	67	30	63,2	18,1	9,1
30/06	265	47	15,8	24	12	51,1	9,1	4,5
07/07	335	53	29,6	23	15	43,4	6,9	3,4
13/07	341	101	25,0	57	33	56,4	16,7	8,4
21/07	472	118	28,1	80	44	67,8	16,9	8,5
28/07	480	101	21,0	65	31	64,4	13,5	6,8
03/08	262	70	26,7	35	17	50,0	13,4	6,7
10/08/2011	270	71	26,3	25	6	35,2	9,3	4,6
TOTAL/ AVERAGE	9.195	1.930	21,0	772	377	40,0	8,4	4,2

Figure 12. Eggs of the Cocoa Pod Borer laid on a tray bottom.

These results represent eighteen consecutive rounds of cocoa harvests in the Granja Agrícola La Nacional, municipality of Támesis (department of Antioquia), between March 17 and August 10, 2011.

From 9195 infested fruits 1930 immature stages were recovered. Assuming the presence of one immature stage per fruit, which is typical, this means that we recovered immatures from only 21% of infested fruit. Although 79% of the remaining fruits showed damage, we found no immature stages, probably because parasitism of larvae-pupae or previous emergence of adults.

From the 1930 immature stages (larvae-pupae), reared under controlled conditions, 772 emerged as adults of which 377 were females. That means a recovery of 40% of adults from immature stages with a sex ratio of 1:1.

Accordingly, the populations of CPB in natural conditions is relatively low but clearly sustains itself at a level that is potentially causes economic damage to cocoa crops.

Of confined fruit in tulle bags: from 33 fruits bagged with tulle sacks (Figure 13), 8 adults emerged equivalent to 24% of the fruits in observation. Adults emerged between 27 - 35 days after fruits bagging.

Of confined fruits in angeo boxes: From 38 fruits infested, 3 adults emerged between 28 and 30 days in angeo baskets (Figure 14), equivalent to 4% of infested fruits.

In conclusion, percentages of adults reared from immature stages recovered from infested fruits (21%) did not differ substantially from number recovered from fruits bagged in tulle sacks (24%). Consequently, due to ease of use, it is advisable to choose the first method.

Considering that life cycle of CPB is 71 days, the effects of any treatment for their control cannot be seen for two and a half months.

Treatments for control of the CPB must focus on reducing the adult's population or elimination of eggs that, because they are laid on exposed surfaces, are the most vulnerable stages of the insect.

Acknowledgements

The author is grateful to the Compañía Nacional de Chocolates (Nutresa Group) for funding and for the facilities provided for the completion of the studies presented here. The author also acknowledges Sergio Cadavid and Gabriel Jaime Merizalde, who revised the Spanish and English versions of the text, and anyone else I may have missed for their invaluable support.

Bibliography

Leal, C. C. y Hernández, M. L. (1990). Aspectos bionómicos del perforador de la mazorca del cacao *Synanthedon theobromae* (Busck) (Lepidóptera: Sesiidae). Tesis de grado. Universidad Nacional de Colombia, Facultad de Ciencias Agropecuarias. Medellín.

Delgado, Daisy Zamira (2007). Bioecologia de los perforadores del fruto de cacao (*Theobroma cacao L.*) en los municipios de Arboledas, Cúcuta y el Zulia del departamento Norte de Santander. Universidad Francisco de Paula Santander, Facultad de Ciencias Agrarias y del Medio Ambiente Ingeniería de Producción Agrícola. Cúcuta. 74 p.


Figure 13. Infested fruit bagged to obtain adults of the Cocoa Pod Borer.


Figure 14. Infested fruits deposited in tulle boxes to obtain adults of the Cocoa Pod Borer.

Sthenopis auratus (Grote, 1878), a junior and subjective synonym of *Sthenopis pretiosus* (Herrich-Schaffer, [1856]) (Lepidoptera: Hepialidae)

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A recent description of the new species *Pallas reynaudi* Mielke & Grehan, 2016 from Guatemala and the new species *Phassus violetteae* Mielke & Grehan, 2016 from Costa Rica required consideration of the taxonomic composition and phylogenetic scope of the Mexican-Central American genus *Phassus* Walker, 1856 (Mielke & Grehan, 2016). An earlier review of Latin American Hepialidae by Mielke & Grehan (2012) lead to the conclusion that several species did not conform to or show evidence of close affinity with the type species (*Phassus triangularis* Edwards, 1885). These names were therefore classified as *incertae sedis* pending further investigation. Two of the problematic species were *Phassus eldorado* Pfitzner, 1906 from Venezuela and *Epialus* [*sic*] *pretiosus* Herrich-Schäffer, [1856] from Brazil. In our review of *Phassus* characteristics we realized that these two seemingly enigmatic species were in fact conspecific with each other and with a species found in the eastern United States and Canada.

The original publication of *Epialus* [*sic*] *pretiosus* illustrated the species but provided no written description whereas the first publication of *P. eldorado* did not illustrate the species, although Pfitzner (1906) did note that the forewings were shiny with gold glazing and patches of golden brown. Both species were subsequently illustrated by Pfitzner (1937-1938). The original illustration of *E.* [*sic*] *pretiosus* (Fig. 1a) shows a distinctive wing pattern that is unlike any other Hepialidae of South America. The illustration of *Phassus eldorado* (Fig. 1b) by Pfitzner (1937-1938) is less detailed, but it shows the same general wing pattern as illustrated for *E.* [*sic*] *pretiosus*. Pfitzner's (1937-1938) illustration of *Hepialus pretiosus* (Fig. 1c) is very similar to that presented by Herrich-Schäffer (1850–[1858]).

The holotype of *P. eldorado* (Fig. 2a) at the Senckenberg Museum, Frankfurt am Main, was examined by CGCM and although the abdomen was missing the body and wings were found to have an external appearance conforming in every apparent detail to *Sthenopis auratus* (Grote, 1878) of the eastern United States and Canada (Fig. 2b). The type specimen of *E.* [*sic*] *pretiosus* has not been located, but the features illustrated for *E.* [*sic*] *pretiosus* show a detailed correspondence to the pattern found in *Sthenopis auratus*. We concluded that the same species is represented under the three names and that *P. eldorado* and *E.* [*sic*] *pretiosus* represent mislabelled specimens from the United States or Canada.

Since their original publication, the names *P. eldorado* and *E.* [*sic*] *P. pretiosus* were included in several major taxonomic

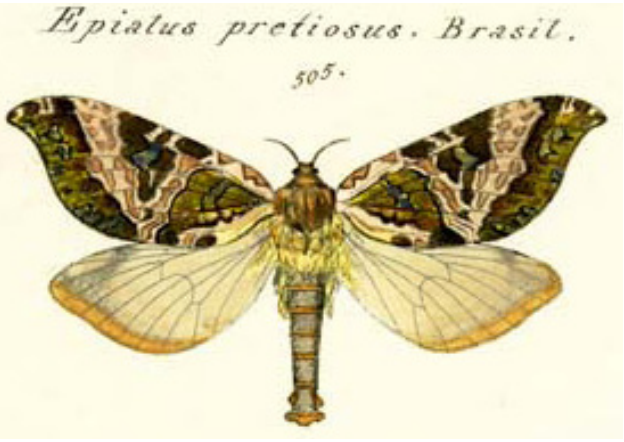


Fig. 1a. *Epialus* [*sic*] *pretiosus* as illustrated by Herrich-Schäffer (1850–[1858]). Photo scan by John Rawlins.

Fig. 1b. *Phassus eldorado* as illustrated by Pfitzner (1938, Plate 99g).

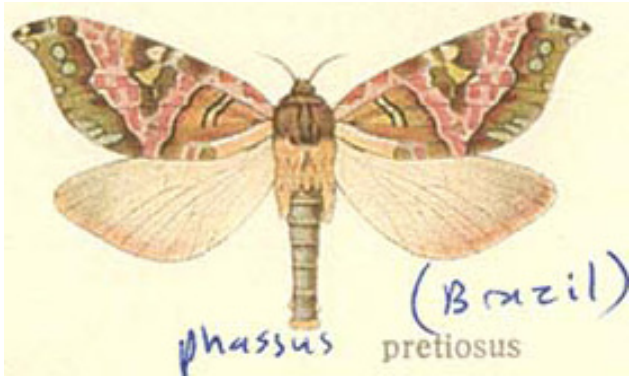


Fig. 1c. *Hepialus pretiosus* as illustrated by Pfitzner (1938, Plate 185a).

Fig. 2b *Sthenopus pretiosus* (Herrich-Schäffer, [1856]). Photo Carlos Mielke.

Fig. 2a Holotype of *Phassus eldorado*. Photo Carlos Mielke.

publications including Kirby (1892: 884), Wagner & Pfitzner (1911: 9), Pfitzner (1937-1938: 1291), Nielsen & Robinson (1983: 18), Robinson & Nielsen (1984: 16), Nielsen et al. (2000: 841), and Mielke & Grehan (2012). Under the rule of priority we therefore concluded that *Hepialus auratus* Grote, 1878 and *Phassus eldorado* Pfitzner, 1906 are junior and subjective synonymies of *Sthenopis pretiosus* (Herrich-Schaffer, [1856]). We anticipate the future possibility that the type specimen for *S. pretiosus*, if it still exists, will be found 'hidden' in plain sight among *Sthenopis* specimens in one of the European collections.

ACKNOWLEDGEMENTS

We are grateful to John Rawlins (Carnegie Museum of Natural History, Pittsburgh) for scanning the Herrich-Schäffer and Pfitzner images, to Wolfgang Nässig for access the Senkenberg Museum collection, and to Ernst Brockmann (Lich) for imaging the holotype of *P. eldorado*.

REFERENCES

Herrich-Schäffer, G. A. W. (1850–[1858]): Sammlung neuer oder wenig bekannter aussereuropäischer Schmetterlinge. — Regensburg (G. J. Manz), 84 pp., 120 pls.

Kirby, W. F. 1892. A synonymic catalogue of Lepidoptera Heterocera (moths). Vol. I, Sphinges and Bombyces. — London (Guerney & Jackson), Berlin (R. Friedländer), xii + 951 pp.

Mielke, C.G.C. & Grehan, J. R. (2012): Catalogue of the Latin American Hepialidae with taxonomic remarks (Lepidoptera). *NEVA* (N.F.) 32: 131–158.

Mielke, C.G.C. & Grehan, J.R. 2016. Description of a new species of *Phassus* Walker, 1856 from Costa Rica, *Pallas*, gen. n., with a new species from Guatemala, and taxonomic notes on *Sthenopis* Packard, [1865] (Lepidoptera, Hepialidae). European Journal of Entomology 7: 113-134.

Nielsen, E. S. & Robinson, G. S. 1983. Ghost moths of southern South America (Lepidoptera: Hepialidae). Entomograph 4: 1–192.

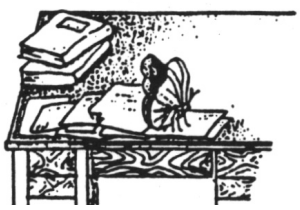
Nielsen, E. S., Robinson, G. S. & Wagner, D. L. 2000. Ghost-moths of the world: a global inventory and bibliography of the Exoporia (Mnesarchaeoidea and Hepialoidea) (Lepidoptera). Journal of Natural History, London 34: 823–878.

Pfitzner, R. (1906): Zwei neue Hepialiden aus Süd-Amerika. Deutsche Entomologische Zeitschrift "Iris", 18: 276–277.

Pfitzner, R. (1937–1938): Familie: Hepialidae, pp. 1289–1302, pls. 99–100 + 185. *In*: Seitz, A. (ed.) (1913–1940), *Die Gross-Schmetterlinge der Erde* 6. Band. Die Amerikanischen Spinner und Schwärmer. Stuttgart (A. Kernen).

Robinson, G.S. & Nielsen, E. S. 1984. Hepialidae. *In* Heppner, J. B. (ed.), Atlas of Neotropical Lepidoptera. Checklist: Part 1. Micropterigoidea–Immoidea. — Den Haag (W. Junk), xxvii + 112 pp.

Wagner, H. & Pfitzner, R. 1911. Hepialidae. *In* Aurivillius, C., & Wagner, H. (eds.), Lepidopterorum Catalogus 4. — Berlin (W. Junk), pp. 1–26.



From the Editor's Desk

James K. Adams

I've got nothing earthshaking to share, so I thought I'd share an image of a moth species, to go along with Alex Bic's images on the back. Thanks as always for all of the contributions. My job of filling pages of these Newsletters has been remarkably easy (not that the JOB is easy, but certainly filling the pages can be).

Malacosoma disstria bilateral gynandromorph, Micanopy, Alachua Co., FL, April. Photo by James K. Adams.

"Entomological tools" for Theodore L. Mead's 1871 Expedition to Colorado

John V. Calhoun

977 Wicks Drive, Palm Harbor, FL 34684 **bretcal1@verizon.net**

On 17 May 1871, Theodore L. Mead (1852-1936) left his home in New York City to embark on an ambitious journey with his older brother, Samuel, to collect butterflies in Colorado. After spending four months in Colorado, where they collected thousands of butterflies, they continued west to California, then southward to Panama and Jamaica. The brothers returned home on 14 December 1871, having traveled over 12,000 miles (Calhoun 2015). Remarkably, Mead was only 19 years old.

Rarely are we privy to the details that went into planning a journey like that taken by Mead. Travel can be difficult today, but it pales in comparison to an extended excursion during the nineteenth century, when the threat of danger was more profound and a return trip was far less certain. Insufficient planning could result in tragedy. Some supplies could be replenished during the trip, but insect collecting equipment was too specialized and could not be purchased at general mercantile stores or stage stops along the way.

Preserved among Mead's manuscripts at Rollins College (Winter Park, Florida) is a folded sheet of paper with the heading "Entomological Tools" in Mead's handwriting. It comprises a list of all the items he needed for his journey, most marked with an "x" to indicate their procurement. Although one of Mead's aunts (on his mother's side) constructed some of his butterfly nets, he purchased the bulk of his entomological equipment from John Akhurst (1815-1902), an English-born entomologist, taxidermist, and natural history dealer who resided in Brooklyn, New York (Fig. 1) (Calhoun 2015). Some of the items on Mead's list are figured in a photograph of the Portuguese entomologist António Augusto Carvalho Monteiro (1848-1920) (Fig. 2). Taken in 1870, the image portrays Monteiro when he was 22 years old. Slung across his back is a knapsack, which is a simplified version of the modern-day backpack. Dangling from his left hand is an old-fashioned scissors net. On the adjacent chair are various tins, boxes, and notebooks. These items were also used by Mead, who probably looked very much like the young Monteiro when he explored Colorado in 1871.

Mead prepared for every possible contingency, even packing dressier clothes. Mead disclosed in his personal journal that on the evening of 20 September 1871 he enjoyed a theater production of "Marie Antoinette" in Salt Lake City, Utah. This performance was also attended by seventeen of Brigham Young's children, who watched from a private box. In addition to being a famous polygamist who led the Mormon Church in America, Young founded

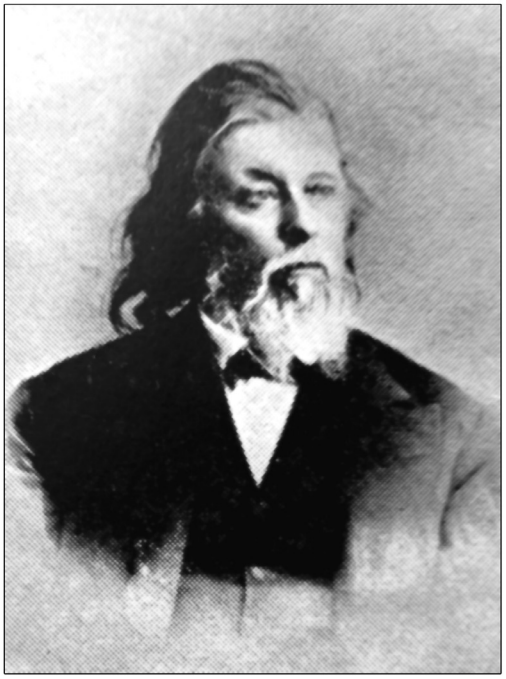


Fig. 1. John Akhurst (1815-1902), who sold entomological supplies to Mead (from Osborn (1937)).

Salt Lake City and was the first governor of the Utah Territory (he ultimately fathered over 50 children by 16 of his 55 wives). Mead couldn't help noticing that some of Young's daughters were "quite good looking." He was surely relieved that he had packed suitable attire!

Mead's "Entomological Tools" are listed below in their original order.

-50 small square tin boxes
-20 larger square tin boxes
-10 larger round tin boxes
-Pill boxes 50 cents worth
-3 nests paste board boxes (square)
-4 dozen 4 dram vials
-4 dozen 2 dram vials
-4 dozen 1 dram vials
-14 cotton bags
-4 once glycerin (refined)
-12 1 once wide mouth bottles
-12 2 once wide mouth bottles
-Cotton wool
-Corks
-6 straight forceps (S.M. style)
-Forceps "de la Brulerie" [apparently a reference to the French entomologist Charles Jacob Piochard de la Brûlerie (1845-1876)]

Fig. 2. António Augusto Carvalho Monteiro, 1870, posing with many of the same supplies that Mead used during his expedition in 1871 (Fundação Cultursintra, Portugal).

-500 No. 4 Insect pins
-500 No. 5 insect pins
-500 No. 2 insect pins
-Fish line
-Beating net
-Beating net ring
-Beating umbrella
-Sheet
-Semicircular net
-Bark trowel (straight)
-Pin box
-Knapsack
-10 butterfly nets
-6 butterfly net rings
-2 forceps "a raquettes" [scissors nets]
-2 tin corked boxes
-2 straps for corked boxes
-Common writing paper
-Entomological diary
-Sharp pocket knife
-2 quarts alcohol 95%
-4 corked boxes
-1 pint sugaring mixture
-Bull's eye lantern & oil
-Blotting paper
-Handkerchiefs
-1 pair strong heavy walking boots
-1 pair strong heavy walking shoes
-2 pair woolen socks
-2 pair cotton socks
-3 pair drawers
-3 undershirts
-2 towels
-Soap
-Comb & brush
-Toothbrush
-1 dark thick cassimere or flannel shirts with turnover collar & pocket in the breast
-Winter trousers & coat & 2 vests
-Rubber & cloth overcoats
-Thin mixed suit (for Frisco etc.)
-6 white shirts
-Collars & cravats
-Revolver, belt & cartridges
-Canteen
-Ink, pens, paper, stamped paper, stamped & monogrammed envelopes
-Diary, letter book, extra letter book
-Entomological note book
-Printed directions [from] William H. Edwards
-Map of Colorado & [the book] "Colorado its Parks & Mountains" [=*A Summer Vacation in the Parks and Mountains of Colorado* by Samuel Bowles, 1869]

Acknowledgments

Thanks are extended to Wenxian Zhang and Darla Moore (Rollins College) for permitting access to the manuscripts of T. L. Mead.

Literature Cited

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

Osborn, H. 1937. Fragments of entomological history. Including some personal recollections of men and events.Author, Columbus, Ohio. 394 pp., 47 pls.

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The Marketplace

IMPORTANT NOTICE to ADVERTISERS: If the number following your ad is "581" 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.

Research Requests

WANTED: Observations, photos, specimens of larvae and adults of the Spotted Tussock Moth, *Lophocampa maculata*, from all areas of North America, recent or old data. Records from far northern Canada, the desert SW, southern Appalachians and Pacific Coast are especially needed to define range. Records of early or late season observations are particularly valuable. All larval photographs are useful, especially if they show unusual patterns of coloration. Specimens are desired for future genetic analysis. Contact Ken Strothkamp, Lewis & Clark College and Portland State University (**kgs@lclark.edu** or **kstrot2@pdx.edu**) for more information on the project. 581

WANTED: Buckeye butterflies (genus *Junonia*) of all 3 *Junonia* species from the Florida counties of Collier, Broward, Monroe, and Miami-Dade for a Masters project trying to reconstruct the invasion history of tropical buckeyes into Florida. Historical material of any vintage very valuable to our study. 1990's currently under-sampled by the project, but all dates needed. We genotype using DNA from single legs, so if desired, precious specimens can be returned largely intact. Jeffrey Marcus, Dept. Biological Sciences, Univ. Manitoba, Winnipeg, Manitoba R3T 2N2, Canada; 1-204-474-9741; **marcus@cc.umanitoba.ca** 582

Equipment

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

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

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

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

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!**

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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.**

two Card Holder with a Knob Pull. Foam pinning bottom is available.

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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

Books

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

FOR SALE: ***English*** version of Seitz ***Macrolepidoptera of the World***—the complete series on the butterflies (does *not* include the moth volumes): Volume 1: Palearctic butterflies; Volume 5: American butterflies; Volume 9: Indo-Australian butterflies; Volume 13: African butterflies; Palearctic butterflies supplement (last volume from the library of Francis Hemming). Asking $5000.00 PLUS: Entire set of B. D'Abrera's ***Butterflies of the World*** volumes for an extra $3,000. These include all volumes on the butterflies except the last two (of three) of the new revised Afrotropical volumes. The set includes all three editions of the ***Butterflies of the Australian Region***. If purchased together with Seitz, total price: $7,300. Also available: ***Butterflies of California*** by John Comstock, $150.00 and 23 volumes (fascicles) of ***MONA*** (***Moths of North America***) Shipping costs to be borne by purchaser. Contact: Rosser Garrison at **rosser.garrison@cdfaca.gov** for more details. 581

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

Notes on the State of the Society

A lot has been happening in the Society during the past year. First, we had a significant change in venue for the 2016 Annual Meeting. After much discussion starting at the 2014 meeting in Park City, we accepted an offer to host the 2016 meeting in Whitehorse, the capital of Yukon, Canada. Unfortunately, due to some unforeseen circumstances, it was decided at the 2015 meeting in Purdue that we needed to find a new location for the upcoming year. Luckily, with the help of Jackie Miller and Charlie Covell, we were able to contact Tom Emmel at the last minute to see if he could arrange to use the venue planned for the 2017 meeting. Tom was able to work his magic, and thanks to him, Jackie, and everyone at the McGuire Center for Lepidoptera & Biodiversity, the 2016 Annual Meeting is being held July 6–10 at The Nature Place near Florissant, Colorado. We are aware that prices for the meeting are higher than normal, but please keep in mind that this meeting was organized in a matter of months versus the 2–3 years that is usually required to arrange a successful meeting, and lodging at The Nature Place is all inclusive of registration and food costs. Without the assistance of Tom and the McGuire Center we would likely to have had to cancel the Annual Meeting for 2016, so we greatly appreciate their help and efforts! We are currently working toward the 2017 and 2018 meetings, and more information will be available soon.

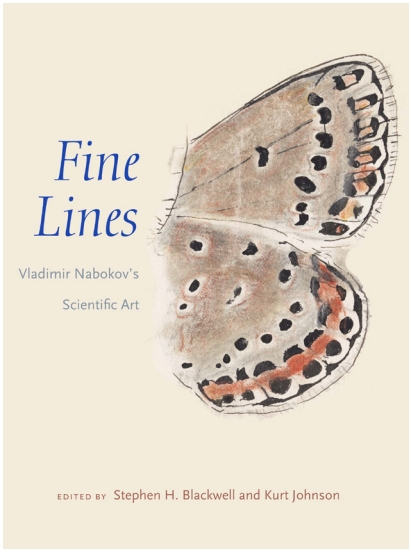
Second, we had a change in leadership that was a first for the Society in its almost 70-year history. Jonathan Pelham was elected President of the Lepidopterists' Society for 2015–2017. Due to unanticipated demands on his time, Jonathan had to reluctantly step down as President in late January. Although the Constitution stipulates that the First Vice-President shall assume the duties of President in the event that the President resigns, the Society had never tested this clause. As First VP, John Calhoun stepped in to serve as President for the remainder of Jonathan's term. The Executive Council expresses its appreciation to Jonathan for all he has contributed toward the study of Lepidoptera, and for his willingness to serve the Society. Due to Jonathan's early resignation, Todd Gilligan will serve as Past President.

Third, we would like to announce that the Society has rented a display booth at the International Congress of Entomology (ICE), which will be held September 25–30 in Orlando, Florida. The International Congress of Entomology convenes every four years, and it has not been held in the United States since 1976. The 2016 ICE is estimated to be the largest entomological meeting in history, with more than 6,000 attendees expected. This is an excellent opportunity to promote the Lepidopterists' Society to a very wide audience, including thousands of students. We will have two members manning the booth during the meeting with lots of promotional items and sample publications to give away. If you plan on attending ICE 2016 and would like to assist with the booth, please let us know. In the meantime, we hope to see you this July at the annual meeting in Florissant, Colorado!

John Calhoun, President; Todd Gilligan, Past President; Mike Toliver, Secretary

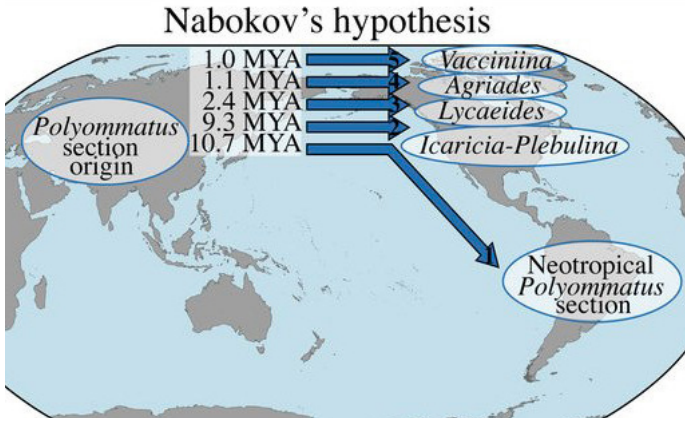
New Publications

Fine Lines: Vladimir Nabokov's Scientifi Art. A New Book from Yale University Press on Vladimir Nabokov's Scientific Legacy, by Kurt Johnson and Stephen Blackwell.



On these pages in 2011, Kurt Johnson reported what we thought would be the "last word" on Vladimir Nabokov's Lepidoptera legacy (*News Lepid. Soc.* 53(1): 22-23 (2011)). In fact, that article stated "So perhaps the Nabokov butterfly saga is finally "put to bed"." Well, as it turns out, "Not so fast!".

That 2011 article reported, as refreshed briefly herein below, the "going viral" international web response to the widespread media reports that DNA studies from Harvard DNA labs had confirmed Nabokov's 10 million year scenario for the origin of South American blue butterflies -- by successive migrations across a Bering Land Bridge -- were in fact correct, in every detail.



Beringian migrations proposed by Nabokov in 1945 as the origins of South American Blues and verified in 2011 by Harvard DNA studies published by Pierce, Vila et al. Permission from Roger Vila and co-authors.

What has not since been reported is that, soon after, writers from both the scientific and literary arenas who had previously written on topics concerning Nabokov's legacy with Lepidoptera had been asked to assemble another new book. Given what was now known of Nabokov's work, and the DNA results, the new book was projected to put a capstone on the scientific and literary careers of this celebrity-level figure who was a colleague of ours for several decades in the Lepidopterists' Society.

The New Book

The new book, *Fine Lines: Vladimir Nabokov's Scientific Art (http://www.amazon.com/Fine-Lines-Vladimir-Nabokov%C2%92s-Scientific/dp/0300194552/ref=sr_1_1?s=books&ie=UTF8&qid=1452718710&sr=1-1&keywords=Blackwell+and+Johnson+Fine+Lines)*, was initially conceived by Stephen Blackwell in 2009 as a collection of Nabokov's scientific drawings, with essays by relevant specialists. The publicity surrounding the Vila et al. findings created an opportunity to expand the book's scope by including this definitive new information. Kurt Johnson joined as co-editor in 2011, and helped shape the book's eventual collection of ca. 150 scientific drawings, six whimsical inscription drawings, and ten essays plus an introduction. The contributors include field workers who have continued Nabokov's line of research (after much delay), other lepidopterists who have taken a special interest in Nabokov over the years, and humanities scholars who have attempted to bridge the science-art divide in their work. In the introduction, we lay out an overview of how Nabokov's taxonomic proposals were conceived, how Nabokov worked with evidence to establish his claims, and how those claims were treated over time.

We situate Nabokov's taxonomic practice within the scientific context of his day, and attempt to shed some light on why his work was overlooked for decades. We also explore and elucidate important commonalities between Nabokov's scientific methods and his artistic vision of the world. The drawings themselves, with detailed captions (mostly) by Johnson, tell the parallel story of how Nabokov worked to discover new structures and patterns in nature, and why these methods were particularly noteworthy.

Refreshing Your Memory

On Jan 26, 2011, the front page of the *The New York Times* (international issue) reported that Vladimir Nabokov's long-neglected theory on the trans-Bering Strait origin of the Latin American Polyommatus Blue Butterflies had been vindicated by an elaborate DNA-based study just published in the *Proceedings of the Royal Society* of London. The following Tuesday's issue of *The New York Times*, *Science Times* (February 1, 2011) printed a page-long article about those findings. The research was done by a team of eleven scientists, working through Dr. Naomi Pierce's Harvard DNA lab using DNA-sequencing and state-of-the-art computer modeling. It indicated that not only was Nabokov correct in his hypothesis put forward in 1945 (and long forgotten) but he was also precisely right, in the order and timing of the events. Dr. Naomi Pierce was quoted as saying "I was blown away". Today, Googling "Nabokov Vindicated" will bring up nearly 150,000 entries regarding how this development was followed in the media.

The team publishing the Royal Society paper included Pierce along with lepidopterists Kurt Johnson, Zsolt Balint

and Dubi Benyanimi whose work had been summarized in the book *Nabokov's Blues: The Scientific Odyssey of a Literary Genius* [McGraw-Hill 2000]. Lead author on the DNA research was Roger Vila, and additional co-authors were Charles D. Bell, Richard Macniven, Benjamin Goldman-Huertas, Richard H. Ree and Charles R. Marshall. See: **http://www.nytimes.com/2011/02/01/science/01butterfly.html?pagewanted=2&_r=1**

The paper was entitled "Phylogeny and palaeoecology of *Polyommatus* blue butterflies show Beringia was a climate-regulated gateway to the New World" and was later chosen by Proc. Royal Society to be made available free of charge at **http://rspb.royalsocietypublishing.org/content/early/2011/01/22/rspb.2010.2213.full**

Thus, some ten years after Kurt Johnson, Zsolt Balint and Dubi Benyamini's work (summarized in Johnson and Coates' book) had finally re-established the correctness of Nabokov's taxonomic work, his evolutionary and biogeographical views had also been able to be tested. As *Fine Lines* also shows, general skepticism about Nabokov's skill as a scientist had remained even after the publication of *Nabokov's Blues* and *Nabokov's Butterflies* (B. Boyd and R. M. Pyle, eds., Beacon Press) in 2000. A common theme of some reviews of these books, particularly in professional entomological circles, was that Nabokov's scientific abilities were always subject to hyperbole and exaggeration because of his celebrity. However, as *Fine Lines* shows, a number of professional entomological experts changed their views upon seeing the DNA data.

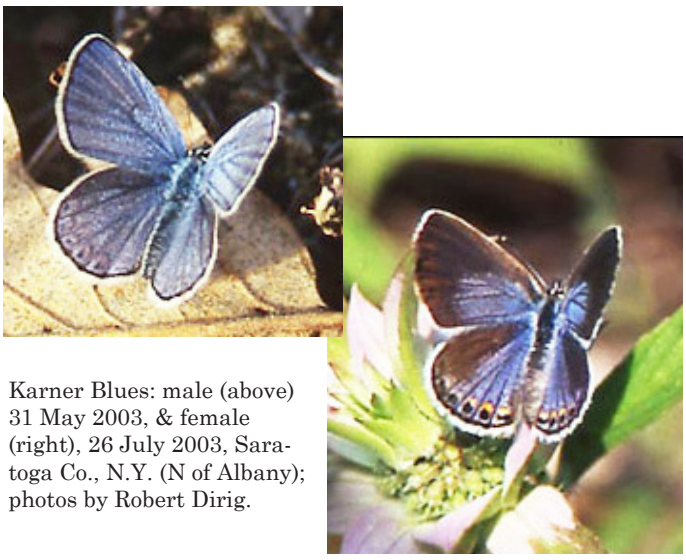
"New News" in the New Book

In brief there are several threads within the pages *of Fine Lines* which are new to the Nabokov legacy. One is a comprehensive treatment of his systematic and evolutionary methods and results, now based on the co-editors' thorough review of nearly 3000 pages of lab notes, draft manuscripts, measurement tables, and black & white and color drawings in the Nabokov Papers held in the Berg Collection at the New York Public Library.

Initially this comprehensive study of the archive was done not only to decide what should go into the new book, but also in order to ascertain how Nabokov—without modern methods like DNA analysis and computers—was able to piece together such a comprehensive account of the evolution of the New World Blues. The study of Nabokov's lab notes offered up a number of unexpected discoveries, which are all recorded within *Fine Lines*. One very surprising one is that Nabokov had, on his own, figured out much of the modern cladistic paradigm through his own search for a phylogenetic method for evolutionary analysis and classification. Like the founder of cladistics, Willi Hennig, Nabokov (1) analyzed lineages by considering primitive and derived shared characters, and (2) pondered (and made drawings based on) parallel data sets of branching diagrams of evolution *and* their biogeographical counterpart, spatial splitting.

On one card Nabokov even discusses the enigma of resolving the three taxon statement—the seminal methodological issue that cladistics tackled. What Nabokov did not do, which the later phylogenetic systematics *did*, was to state a set of principles upon which evolutionary analysis and classification could be constructed based on a refined method for understanding nested sets of derived characters. He fell short of that, but came surprisingly close, *before* Hennig's first publication on the matter. The book also sheds important light on Nabokovs' confusing legacy with regard to mimicry.

In other chapters, seasoned experts on various aspects of Nabokov's legacy weigh in on the tricky questions about his dual pursuits in science and the arts. Victoria Alexander of the Dactyl Foundation addresses Nabokov's understanding of nature in light of more current "post-Darwinian" views of evolutionary process. Dorion Sagan adds perspective on modern scientific sensibility in artistic traditions and the link between Nabokov's art and his scientific skepticism during the formative time of Neo-Darwinism. To these, James Mallet a Harvard-based expert on mimicry, provides important commentary regarding Nabokov and the traditional science of Nabokov's time. Invertebrate biologist Victor Fet of Marshall University analyzes Nabokov's childhood fascination with Lepidoptera and the development of his para-professional expertise. Bringing the Nabokov legacy completely up to date, the team of scientists who pursued DNA studies confirming the species status of Nabokov's endangered Karner Blue Butterfly —Lauren Lucas, Matthew Forister, James Fordyce and Chris Nice-- describe the course of their research, proving his original hunches were right. And, the Harvard University team headed by Naomi Piece and Roger Vila recount Nabokov's years at Harvard and their DNA studies that confirmed his long ignored hypothesis on the origin of the Blues of South America.



Karner Blues: male (above) 31 May 2003, & female (right), 26 July 2003, Saratoga Co., N.Y. (N of Albany); photos by Robert Dirig.

Expanding the breadth of the book to opening new horizons on the role of Lepidoptera in Nabokov's fiction, Robert Dirig of the Cornell Herbarium provides surprising new details of the significance of *Pieris virginiensis* to the metaphor, imagery, setting and plot of Nabokov's *Pale Fire*. Robert Michael Pyle traces the roles of *Erebia magdalena* and *Lycaeides idas sublivens* in the lore of Nabokovian characters, and Nabokov biographer Brian Boyd does the same for the role of the Diana Fritillary in Nabokov's most famous novel, *Lolita*. Stephen Blackwell caps the discussion with a morphological overview of Nabokov's creative work.

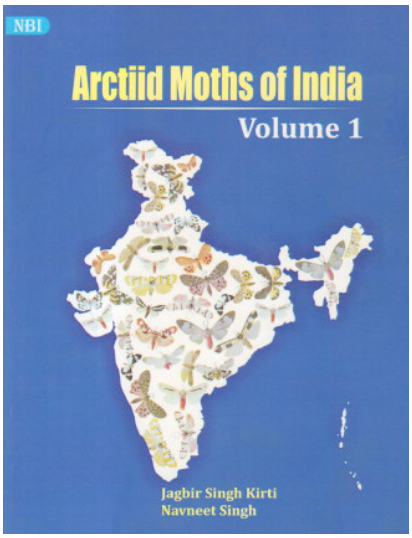
Over 150 color and black and while illustrations from Nabokov's scientific note cards are woven into a pictorial depiction of Nabokov's research strategy and discoveries with detailed captions by Kurt Johnson and various of the book's contributors. As Blackwell and Johnson state in their Preface, "this book represents a landmark moment in the understanding of Vladimir Nabokov as a scientist. After three decades of neglect and two decades of scientific confirmation and revision, it is finally possible to present a comprehensive review of his achievement…. Never before has any appraisal of Nabokov's research been based on a thorough review of his laboratory notes, which, combined with his published scientific papers and the recent DNA-based confirmations of two of his most controversial hypotheses, allow new clarity in understanding the significance of his work and locating it in the contexts of evolutionary biology and systematics."

Vladimir Nabokov pursuing montane Blues; permission from Demitri Nabokov to Kurt Johnson, in perpetuity.

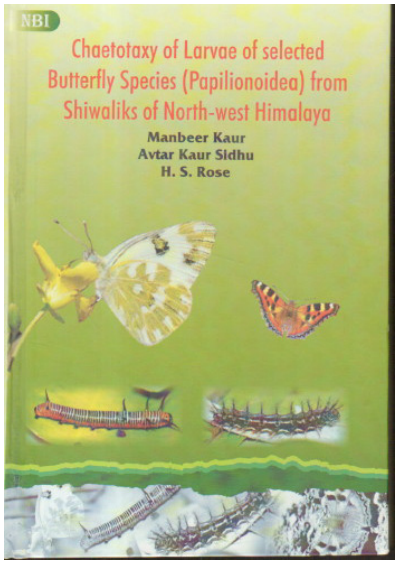
Scores of new South American species of Blues are named from characters in Nabokov's fiction; this one after Lolita; public domain image of *Itylos lolita*.

Arctiid Moths of India, Volume 1, Jagbir Singh Kirti and Navneet Singh, Nature Books India, 2015, iii, 205 p, col plates, ISBN : 9789382258216. US $95.00

Contents: Preface. Acknowledgements. 1. Introduction. 2. Systematic Account: i. Arctiidae. ii. Arctiinae. iii. Lithosiinae. 3. References. Index.



The book covers the first consolidated work on the taxonomy of family Arctiidae from the India. It deals with a total number of 181 Indian species in 76 genera of two subfamilies, Arctiinae (50 species and 26 genera) and Lithosiinae (131 species and 50 genera). This book is the outcome of extensive and intensive surveys conducted in the North West Himalayas, North East India and Western Ghats. For each of the included species, photographs of adults and external genitalia, first reference, diagnosis, distribution in India and larval host plants (wherever known) are provided. All the scattered information on the taxonomy of Indian Arctiidae is compiled in this work. It will lay a strong and sound foundation for future workers interested in working on this group. To order online, go to **http://www.vedamsbooks.com/no116337/arctiid-moths-india-volume-1-jagbir-singh-kirti-navneet**

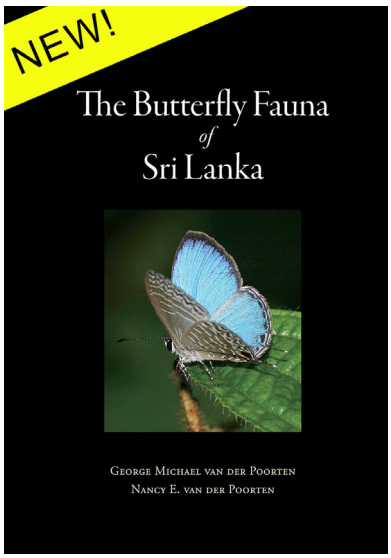


Chaetotaxy of Larvae of Selected Butterfly Species (Papilionoidea) from Shiwaliks of North-West Himalaya, Manbeer Kaur, Avtar Kaur Sidhu and H.S. Rose, Nature Books India, 2015, vi, 234 p, 31 b/w plates, ISBN: 9789382258209. US $70.00

Contents: 1. Introduction. 2. Review of literature on Chaetotaxy in the order Lepidoptera with emphasis on Butterflies. 3. Material and methods. 4. Observations on the Chaetotaxy of various species. i. Castalius rosimon (Fabricius). ii. Euchrysops cnejus (Fabricius). iii. Vanessa (Aglais) cashmiriensis Kollar. iv. Vanessa (Vanessa)

indica (Herbst). v. Vanessa (Cynthia) cardui (Linnaeus). vi. Hypolimnas bolina (Linnaeus). vii. Junonia almana Linnaeus. viii. Phalanta phalantha (Drury). ix. Acraea issoria (Hubner). x. Acraea terpsicore (Linnaeus). xi. Ypthima inica (Hewitson). xii. Euploea core (Cramer). xiii. Colotis amata (Fabricius). xiv. Pontia daplidice (Linnaeus). xv. Cepora nerissa (Fabricius). 5. Discussion. 6. Key to the presently studied families of the superfamily Papilionoidea. 7. References. Abbreviations. To order online go to **http://www.vedamsbooks.com/no116338/chaetotaxy-larvae-selected-butterfly-species-papilionoidea-shiwaliks-northwest-himalaya-manbeer-kaur-avtar-sidhu-hs-rose.**

The Butterfly Fauna of Sri Lanka, George Michael van der Poorten and Nancy van der Poorten. March 2016. Hardcover. 418 pp. + vi; 8.5 in x 11 in. ISBN: 978-1-77136-189-7.



This comprehensive work describes and discusses the lives of all 247 species of butterflies in Sri Lanka and illustrates the adults of both sexes and the immature stages with over 3000 colour photographs taken mostly in the field. Several images portray rare species and behaviours that have not been documented before.

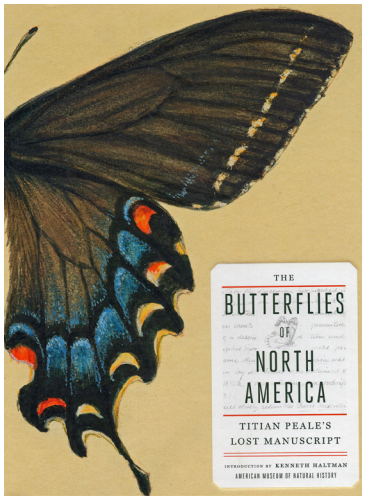
The first few chapters cover the history of the study of butterflies in Sri Lanka and their biogeography, classification, morphology, distribution, and conservation. An account of each species details identification, similar species, status, distribution, habitat, adult behaviour, immature stages, larval food plants, and, for threatened species, conservation concerns. Supplemental material includes a species list with the common name, scientific name and authorities, endemic status, and distribution by climatic zone, as well as a list of larval food plants and adult nectar sources. The book rounds off with a bibliography, a glossary and an index of the scientific and common names of the butterflies.

As a reference and an essential guide to the butterfly fauna of Sri Lanka, this book will interest, not only Sri Lankans and butterfly enthusiasts, students, professional entomologists, biologists and conservationists around the world, but also the general reader who will be fascinated by these beautiful creatures.

To order your copy and for details about the book including sample pages, go to **www.Lepodonbooks.com** or email us at: **Lepodonbooks@gmail.com**

Book Reviews

Titian Ramsey Peale. 2015. *The Butterflies of North America: Titian Peale's Lost Manuscript.* Foreword by Ellen V. Futter, Preface and Scientific Captions by David A. Grimaldi, Introduction by Kenneth Haltman. American Museum of Natural History in Association with Abrams, New York. 256 pp. $40.00.



I first learned of Titian Ramsay Peale II in October 2002. A butterfly enthusiast and friend living in New Orleans forwarded me a hand-written note from her husband's colleague at Tulane University, Dr. Jessie Poesch. Dr. Poesch was an art history professor who previously had published "Titian Ramsay Peale,1799-1885, And His Journal of The Wilkes Expedition" in MEMOIRS OF THE AMERICAN PHILOSOPHICAL SOCIETY (Volume 52, 1961). At the time, Dr. Poesch was trying to locate a local lepidopterist who could look at and comment on what she considered a remarkable but unpublished manuscript by Peale: THE BUTTERFLIES OF NORTH AMERICA, DIURNAL LEPIDOPTERA: WHENCE THEY COME, WHERE THEY GO, AND WHAT THEY DO, illustrated and described by Titian R. Peale between 1873 and 1885. The work was in the Rare Book Collection of the American Museum of Natural History's Research Library. Because my friend could offer no assistance, she passed the note to me.

In April 2003 I was able to travel to New York to visit the AMNH. The Peale work was housed in three boxes containing 164 leaves of plates of illustrations and one case containing 145 leaves of descriptive text—an indication that the work was still unfinished. I was instructed to don a pair of gloves to handle the aged pages. The meticulous and artful renditions of Peale's "Audubonesque" paintings were mesmerizing. But my mind was equally excited by the handwritten texts on notebook paper—often with an original relevant painting affixed by glue. Some of Peale's empirical comments offered valuable insight into the state of knowledge regarding butterfly biology in the nineteenth century. Specifically, the historical texts indicated that butterfly taxonomy and behavior were still nascent disciplines. For example, Peale concluded that the absence of monarch butterflies during the winter throughout the eastern U.S. indicated that the butterflies hibernated in situ (we now know they migrate to Mexico each autumn). And because he recognized that male and female fritillary butterflies are active at different times throughout summer

and fall, he concluded that the species had two generations a year (we now understand that *Speyeria* butterflies have but a single generation each year, with males and females responding to different ecological determinants). But in addition, the organization of the material indicated that natural history writing and publishing in the bygone era were less exacting than they are today. For example, although Peale's title indicated "butterflies of North America," Peale had included (1) several species that were at the time known only from the American tropics, e.g., Mexico, Central America, South America and The Caribbean (pages 34,43, 46, 50, 51, 52, 53, 56, 57, 58, 60, 72, 81, 82, 86, 87, 90, 107, 108, 109, 116, 121, 122, 132, 134); (2) several species of moths (pages 136, 137, 138, 142, 143, 144, 145, 146, 148, 149, 150, 11, 152, 153, 154, 155). By day's end, I had concluded that because of the work's preliminary status, publishing would be difficult. Nevertheless, I scribbled several pages of notes for future reference, and upon my return to Louisiana I shared my thoughts with Dr. Poesch. And that was that.

Now after over 100 years of silence, ABRAMS and AMERICAN MUSEUM OF NATURAL HISTORY in New York teamed to publish much of the Peale work. No doubt the publishing of the book was quite an undertaking since the original pages were not as yet organized for a publisher and printer. Having viewed both the originals and the final product, I am amazed with the transformation that occurred. Many of the original plates containing images, for instance, had to be trimmed so that they could be combined with small texts that were on separate pages. And the publishers included two important bonuses. The first of these is a "Prospectus"—a printed advertisement for a proposed book, generally one that is to be sold by subscription—titled *Lepidoptera Americana*. The second is "The Caterpillar Album," the first publication of Peale's *Lepidoptera: larva, Food-Plant, Pupa, Etc.* Abrams and AMNH included more than 100 of the 111 small and detailed paintings, which while lacking substantial formal texts, contain important hand-written details about the subjects. This caterpillar album concludes with "a premature draft of a letter from Peale offering detailed instruction on how best to print the illustrations." The original "caterpillar album" was also donated to the American Museum of Natural History.

The tome concludes with a section labeled "Notes," Peale's hand-written first page to his "Index to Illustrations," and the publisher's index.

All in all, the final work reflects not only the original artistry of Peale but how the Nineteenth Century mind worked in what was then a technological vacuum. Lepidopterists, nature artists, and historians should all be indebted to both Abrams and AMNH for their diligence. My copy now adorns a prominent table in my living room. I only regret that Dr. Jessie Poesch, who first made me aware of the Peale manuscript, did not live to see her wish materialize. This early champion of Titan Ramsay Peale who has been described as "the foremost scholar of the arts in the South." died on April 23, 2011 at the age of 88.

[NOTE: Abrams and AMNH have published three companions to the Peale book: *2016 Calendar* ($14.99), *Journal* ($14.95), and *Note Cards* ($16.95). All are illustrated with images by Peale.]

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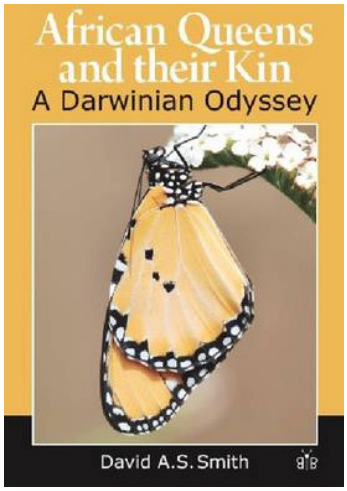
David A. S. Smith. 2014. *African Queens and their Kin: a Darwinian Odyssey*. Brambleby Books, Harpenden, Herts, U. K. 812 pp. $88.80 (on Amazon.com)



This is a long, rambling book about *Danaus chrysippus* and its congeners that contains a cornucopia of interesting history and theory, a lot of raw data, and some rather candid and boldly-stated personal views about science and its practitioners. Smith, a former biology teacher at Eton College (perhaps the most prestigious of Britain's "public" schools) is not to be confused with David Spencer Smith, former Hope Professor of Entomology at Oxford. He is the author or coauthor of some thirty journal articles focusing on the ecological genetics, speciation and systematics of *D. chrysippus* and other butterflies, based on a 40-year research program in Dar es Salaam, Ethiopia, and around the world. *African Queens* is an apotheosis of this work, and quite a bit of the book seems to be paraphrased from or even word-for-word reproduction of Smith's published articles. For example, large sections of chapter 3 were cut-and pasted almost verbatim from Smith et al. (2005), as were parts of chapter 12 from Gordon et al. (2010).

The book is presented in 14 chapters. After an introduction which muses on the origins of the Latin names for various *Danaus* taxa in Greek mythology, these chapters address life history and migration, phylogenetics and speciation, the Mendelian genetics of wing pattern polymorphism, review of the role of male-killing *Spiroplasma* bacteria, intra- and interspecific hybridization, chemical ecology of pyrrolizidine alkaloids and cardiac glycosides, and mimicry (both in general terms and in the context of *Hypolimnas misippus* and *Acraea* species). There is also a glossary, a large literature cited section, 14 appendices and 3 indices (geographical, subject and taxonomic).

I found that the organization of the text made the book difficult to read. Smith is a scholar, and likes to quote long paragraphs from historical authors such as Charles

Darwin, A. R. Wallace and E. B. Poulton, and to describe concepts in ecology and genetics at length, before diving into tables of raw data. He routinely reports statistical significance values in the text, and refers to tables and figures that are either embedded in the text or located in a color plate supplement in the middle of the book. These are not necessarily cited in numerical order, and the reader has to jump around quite a bit to find them. The level of detail, for example regarding experimental broods of butterflies, is at times exhausting.

Smith is opinionated, and few of his fellow *Danaus* researchers are left unscathed by his provocations. In chapters 2 and 9, he goes after Lincoln Brower at almost every turn, disagreeing about interpretations on everything from mating behaviors to chemical ecology to migration. He attributes Brower's (1967) idea of automimicry, to a book chapter by Gibson (1984). In Chapter 3, he takes me to task at some length for excluding some of his controversial sequences from a molecular systematics paper on relationships among danaine genera (Brower et al. 2010). Smith maintains, based on mitochondrial 12S rRNA and COI sequences, that *D. chrysippus* is paraphyletic, with some individuals of one subspecies or semispecies, *D. chrysippus dorippus*, occurring in a polytomy with clades leading to all other species in the genus. A recent molecular systematic paper by Braby et al. (2015) does not support Smith's results and shows a monophyletic *D. chrysippus* including African and Asian forms with very low levels of sequence divergence. As Brower et al. (2010) stated, "additional sampling will inform this problem."

In sum, this is a challenging, irritating and at times highly rewarding book. Chapter 10, on mimicry theory, presents an insightful historical perspective, for example. Overall, though, I think Smith would have been well-served by a parsimonious editor, who might have detected redundancies (such as the replication of almost identical paragraphs on p. 268 and again on pp. 269-271), encouraged the foregoing of self-plagiarism, and in general shortened the book by at least half its length.

References

Braby, M.F., Farias Quipildor, G.E., Vane-Wright, R.I., Lohman, D.J. 2015. Morphological and molecular evidence supports recognition of *Danaus petilia* (Stoll, 1790) (Lepidoptera: Nymphalidae) as a species distinct from *D. chrysippus* (Linnaeus, 1758). Systematics and Biodiversity 13, 386-402.

Brower, A.V.Z., Wahlberg, N., Ogawa, J.R., Boppré, M.,Vane-Wright, R.I. 2010. Phylogenetic relationships among genera of danaine butterflies (Lepidoptera: Nymphalidae) as implied by morphology and DNA sequences. Systematics and Biodiversity 8, 75-89.

Brower, L.P., Brower, J.v.Z.,Corvino, J.M. 1967. Plant poisons in the terrestrial food chain. Proc. Natl. Acad. Sci. USA 57, 893-898.

Gibson, D.O. 1984. How is automimicry maintained? In: Vane-Wright, R.I. Ackery, P., (Eds.), The Biology of Butterflies. Academic Press, London, pp. 163-165.

Gordon, I.J., Edmunds, M., Edgar, J.A., Lawrence, J., Smith, D.A.S. 2010. Linkage disequilibrium and natural selection for mimicry in the Batesian mimic *Hypolimnas misippus* (L.) (Lepidoptera: Nymphalidae) in the Afrotropics. Biological Journal of the Linnean Society 100, 180-194.

Smith, D.A.S., Lushai, G., Allen, J.A. 2005. A classification of *Danaus* butterflies (Lepidoptera: Nymphalidae) based upon data from morphology and DNA. Zoological Journal of the Linnean Society 144, 191-212.

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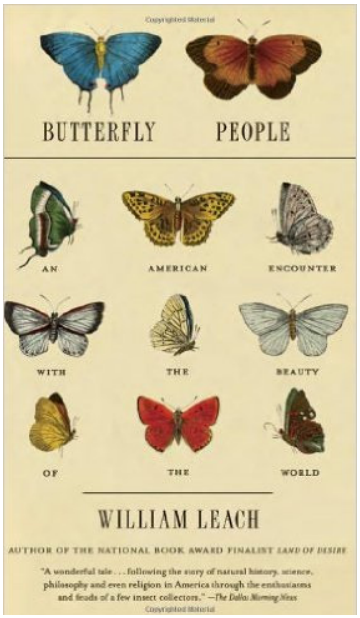
William Leach. 2015. *Butterfly People: An American Encounter With The Beauty Of The World*, Pantheon $32.50.



Here is a book that was written with you in mind. While others can, and will, enjoy this book, I doubt that those who have not spent a significant portion of their lives contemplating the beauty, complexity and mystery of butterflies will be as captivated by this work as you will be. In a way, Professor Leach (he is a professor of history at Columbia University) has set out to explain us to ourselves. That is, why are we so fascinated (obsessed) with butterflies? He explores this question by focusing on the great "butterfly people" in the United States who worked and published after the Civil War; primarily William Henry Edwards, Samuel Scudder, Henry Edwards, Herman Strecker and Augustus R. Grote but with intriguing chapters on the lives and work of Will Doherty, William Jacob Holland and others as well.

Leach's writing is neither ponderous nor breezy as he sets out in detail (283 pages and another 88 pages of notes) how the Nineteenth Century American lepidopterists advanced all of the life sciences both here and abroad through meticulously studying butterfly life histories, distributions and behaviors. Some of this material has been covered before, e.g., Brethren of the Net: American Entomology 1840-1880, by W.C. Sorensen (University of Alabama Press 1995) but Leach's work is more focused on butterflies and moths and the periods covered do not completely overlap. While the progress made in butterfly studies during this period was a collective effort of many men and women, all given their due, it is W.H. Edwards and Scudder who dominate Leach's account. Indeed, W.H. Edwards continues to exert a strong influence over the study of Lepidoptera to this day.

Scudder, who almost certainly was the intellectual equal of W.H. Edwards, was, according to Leach, hampered by the bond to his mentor Louis Agassiz, who harbored an antipathy to Darwin's theories and Scudder did not free himself from that leash until after the death of Agassiz in 1873. W.H. Edwards, in contrast, embraced Darwin's theory immediately and understood that butterflies had to be understood as living (evolved and evolving) animals and not as "desiderata" and "offerata" to be acquired and bartered after their deaths. Herman Strecker, a stonecutter of burial monuments by trade, and brought back to life here by Leach's vivid portrayal of him through his correspondence, apparently did not care about theories. He comes across as a man determined to possess as many kinds and examples of butterflies and moths from as many places on the planet as it was humanly possible to do so at the time and he probably succeeded in this. Leach's account of Strecker's work here is very favorable and, to be fair to Strecker, he described many species of moths new to science (particularly Catocala) and his massive collection, in large part acquired from contacts throughout the world, is still an important scientific resource at the Field Museum in Chicago. Indeed, Strecker's acquisitiveness resulted in accusations that he stole specimens, but Leach's extensive research turned up no hard evidence to back up the allegations and, in fact, turned up correspondence in which the original allegation was retracted by his accuser (Grote). But whatever Strecker's talents at building a collection, and whatever his talents as an artist (and they were considerable as the color plates here – alone worth the price of the book -- attest) Strecker was not on the same intellectual plane as W.H. Edwards and Scudder. Impulsive, eccentric and temperamental, Strecker's personality and exploits make for great reading here, but he was a romantic at bottom. Scudder sensed the problem inherent in the romance associated with butterflies and even wrote that the beauty of butterflies was getting in the way of science, although Leach notes that he backed away from this view later.

While I had a hard time putting this book down, it was not a quick read either. So many times I sat with the book in my lap, pondering what we have lost. Leach believes that much of the American connection to nature during the Nineteenth Century, made manifest in the works of lepidopterists, stemmed from farming and farm life. The untidy edges of farm fields, the unmowed grazing land and the haphazard patchwork of woods and meadows was good for butterflies and those who would study them. Each technological advance caused a corresponding decrease in butterfly diversity and a decrease in people's (particularly children's) opportunities to connect with butterflies. Whether or not you wind up accepting that explanation, it still hurts to read of the "clouds" of butterflies that would rise into the air from puddle parties disturbed by a passing carriage or fields of clover covered with speyeria two and three to a blossom.

For all that is gone, both W.H. Edwards (Butterflies of North America) and Scudder (Butterflies of the Eastern United States and Canada) produced lasting works that are masterpieces on the North American fauna. Above all, it was W.H. Edwards' and his followers' insistence on studying living butterflies from egg to the adult, their concern for conservation of butterfly populations (Edwards himself attempted to reintroduce Baltimore Checkerspot to a West Virginia fen that had been drained) and the rigor they applied to science, that makes this book so relevant to us -- the "butterfly people" of today.

(This review is slightly modified from one that first appeared in the summer 2013 issue of American Butterflies.)

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Membership Updates

Chris Grinter

Includes ALL CHANGES received by 28 April 2016. Direct corrections and additions to Chris Grinter, **cgrinter@gmail.com.**

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Hemileuca peigleri ovipositing on *Quercus minima* on Powderhorn Ranch, Calhoun County, Texas, on 13 December 2015. Photo by Ric Peigler, namesake of the species.

Conservation Matters: Contributions from the Conservation Committee

A conservation concern: how many Monarchs are there?

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Monarchs have been in the news a lot lately because of concerns that we are seeing fewer of them than we used to. The decline in their overwintering numbers, first brought to attention by Brower et al. (2012), has spurred a petition to the USFW Service to list them as threatened under the Endangered Species Act (the petition can be found at Center for Biological Diversity et al., 2014), and many other actions have begun on behalf of monarch conservation (e.g., a petition to UNESCO; Natural Resources Defense Council et al., 2015). Monarchs are beloved by many people, many of whom have little interest in other Lepidoptera or in broader conservation concerns. All of this interest raises the question: Just how many monarchs are there? The focus of this column is the eastern migratory population that migrates southward in the fall to overwinter in the mountains of central Mexico and then each summer repopulates North America east of the Rocky Mountains.

Size of the Mexican overwintering colonies

Many of us were eager to hear the report of the size of the overwintering monarch colonies this past winter. Monarchs are far too numerous to count individually, so instead the area of forest they occupy is quantified and used as a correlate of actual abundance. Colony areas are measured in December of each year because by that time, the butterflies have coalesced into dense aggregations in very localized places, and then staff from World Wildlife Fund-Mexico and the Monarch Butterfly Biosphere Reserve can record the perimeter of each colony using GPS, a compass, and a meter tape (Vidal & Rendon-Salinas, 2014). These measurements let them calculate the area of each colony. They then add together calculations from all colonies to produce the total area occupied by the overwintering monarchs.

Much is made in media reports about comparisons of the current and the previous winter's total area. The report for 2015-16 gave the measurement as 4.01 ha (each hectare equals 2.47 acres, an area that is less than 2 football fields). The measurement of 4.01 ha is three and a half times greater than the previous winter's measurement of 1.13 ha (recorded in December, 2014), and the media have celebrated this positive comparison. For example, NPR reported the following: "And now an environmental story with good news. After years of decline, monarch butterflies appear to be on the rebound" (Garvia-Navarro, 2016).

Much that underlies this optimistic report, however, is not so positive. Short-term changes are immediate and obvious, and that is what the media emphasize. Left unspoken is that monarch abundance remains in a long-term decline despite year-to-year variability in measurements (Fig. 1). The total overwintering area from 1994-95 through 2015-16 shows a continuing downward trend that is statistically significant. The average decrease each year over that 22-year span is 9% (this is the annual percentage decrease given by an exponential regression).

Annual weather patterns play an important role in these yearly fluctuations. When surviving female monarchs migrate northward in spring from the Mexican colonies, they oviposit on emerging milkweeds in Texas and other southern states (Malcolm et al., 1993). The monarchs that develop from these southern eggs, the first spring generation, continue the journey northward and repopulate the summer range. The summer population then continues to grow through another two or three summer generations (Flockhart et al., 2013). If the weather is cold and rainy in the area of springtime reproduction or so hot and dry that milkweeds and nectar sources are scarce, the first spring generation is smaller, leading to slower growth of the population and ultimately reduced abundance during the summer. Thus, variability in the weather from year to year has a strong effect on how many monarchs are produced. The long-term decline in overwintering abundance remains despite these annual fluctuations.

Limitations in measuring the overwintering colonies.

The current method of estimating abundance is to use a compass and measuring tape to determine the perimeter of each colony and then calculate its area (details given in Vidal & Rendon-Salinas, 2014). But one should understand the limitations of this method.

(1) Are all colonies known and measured? Brower and colleagues (Slayback et al., 2007; Slayback & Brower, 2007) surveyed the region by airplane to search for unknown colonies and did not find more. Occasionally, on-the-ground surveys have found additional small colonies, and the WWF-Mex reports do include them. If any existing colonies were unknown and not measured, then the reported area would be an underestimate of actual abundance,

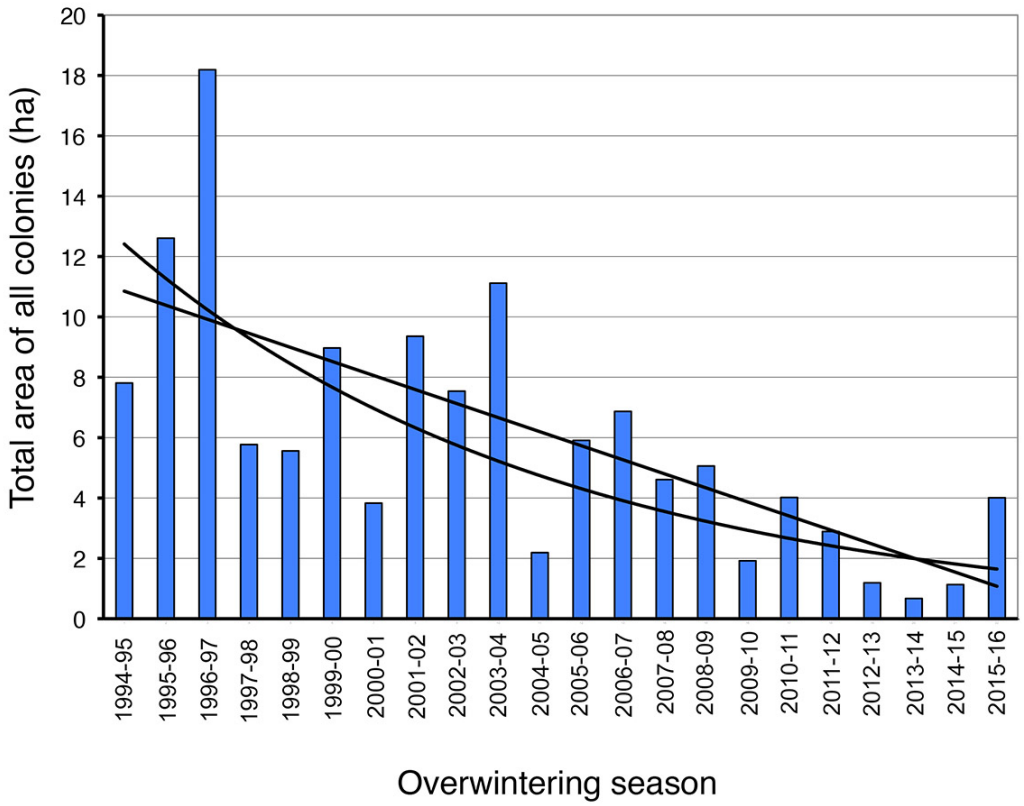

Fig. 1. Aggregate area of monarch overwintering colonies since 1994. The long-term downward trend is clear despite annual variability. The solid lines are linear and exponential regression lines.

but locations are pretty well known and consistent, so the question of completeness is a minor concern. The colonies were not all well known or visited only sporadically before the 1994-95 winter, which is why Fig. 1 begins with that year's measurement.

(2) What are the borders of the colonies? There aren't exact edges to the areas occupied by the butterflies; colonies include clusters on numerous contiguous trees as well as on nearby outlying trees, so determination of the area occupied by all the butterfly-festooned trees requires judgment by the measurers. Also, because small variations in measurements from each of multiple colonies are combined, the aggregate report includes some additional imprecision.

(3) Are the colonies measured at the same time each winter? While Mexican personnel measure the colonies in mid- to late-December, the measurements take place over several days. Because of several factors – flights to find water, movement of the colonies downslope as spring approaches (Calvert & Brower, 1986), and colony reformation after storms (Brower et al., 2004) – the shape and area of the colonies change over time. Even if one were to measure the colonies on the same date in two successive winters, the form, density, and precise locations of the aggregations will differ.

(4) Is the density of monarchs within these measured colony areas constant? While we assume that the density of monarchs within the reported aggregate overwintering areas is the same, it actually varies, though by how much we do not know. A more accurate measure of colony density would require recording the number and sizes of trees with clusters and an estimate of the number of clusters per tree.

The above considerations illustrate the limits to how precisely one can estimate monarch numbers. The official reports give the aggregate colony area to hundredths of a hectare. While one may be able to calculate colony area to two decimal places, it is beyond reason to think that there is significance to such reported precision. The aggregate measurement of the 2015-16 winter is around 4 ha, but it's misleading to think that the report of 4.01 ha gives real precision. Limitations 2 through 4 described above increase the variability of the reported aggregate area but in an unbiased fashion. However, if the density of the colonies has decreased in recent years, as we think is the case, then limitation 4 means that monarch abundance is being overestimated. Furthermore, an intense storm in March, 2016, with a drop in temperature to -4.5˚C, killed many of the butterflies (measurements of mortality are currently underway). If only half survived, then this winter's aggregate area may actually be closer to 2 ha. Weather events like this add further uncertainly to the annual colony measurements.

Converting area to abundance

If we knew the actual density of overwintering monarchs, we could convert annual measurements of total overwintering colony area to absolute abundance. After seeing the colonies in Mexico, Brower estimated the density of the butterflies there to be at least ten times the California density (Brower et al., 1977), which Tuskes and Brower (1978) had estimated through mark-release-recapture study to be about one million monarchs per hectare. Therefore, the first estimate in the Mexican colonies was 10 million/ha. Next, Calvert (2004) tried two methods to assess the absolute density of monarchs in Mexico. Using tree size and the weight of monarchs he measured on sample branches,

he estimated 10 million monarchs/ha, though he used low estimates of tree size. Using mark-release-recapture techniques, his second method, he estimated from 7 to 61 million/ha, a wide range that reflected differences in timing, location, and analytical methods. Many assumptions went into making these estimates. Brower et al. (2004) took a different approach; following a severe storm, this group counted dead monarchs in sample plots on the forest floor (29 plots in each of two colonies) and from those measurements estimated nearly 50 million/ha.

All of these studies were conducted in dense colonies, but anecdotal reports and photographs suggest that overwintering densities may currently be less than they were when total monarch abundance was much higher. In any case, it seems reasonable to assume that overwintering colonies contain from 10 to 50 million monarchs/ha. Both the widely used figure of 30 million/ha and the estimate of 37.5 million/ha used by U.S.F.W. fall within that range, so both are reasonable choices within the range of estimated abundance. Thus, based on the total area covered by the overwintering colonies, winter-time monarch abundance peaked at around 600 million in 1996-97, fell to 35 million a year ago, and increased up to about 120 million this past winter (December, 2015), a number that is less than one-quarter of their abundance 20 years ago.

Summer monitoring

In contrast to the straight-forwardness of estimating total abundance from the area covered by dense winter aggregations, monarchs are spread widely and unevenly throughout eastern North America during the summer months. Some monitoring does take place at select areas during the summer and fall, however. This past year, a collection of seven papers presenting survey data collected during the breeding season and fall migration were published as a set in the *Annals of the Entomological Society of America*. The preface to this set (Davis & Dyer, 2015) emphasized that three of the papers pointed to lack of evidence for a summer decline. This claim was important because if no decrease were seen during the summer, then the decline in overwintering monarch numbers would have to be attributed to death or loss during the fall migration rather than due to loss of summer breeding habitat.

Several flaws invalidate the interpretation of no summer decline based on these three papers, however (see Pleasants et al., 2016). Instead, the decline of milkweeds in much of the traditional monarch breeding area remains a correlative factor (Pleasants & Oberhauser, 2013; Freese, 2015). Still, the summer and fall monitoring programs are providing valuable information about regional changes in monarch abundance. In a follow-up to this back and forth exchange about summer monitoring, Dyer & Forister (2016) emphasized the need for continuing studies of monarch population dynamics using a range of models and analytical tools.

Future assessments

The complexity of the multigenerational biology of the monarch butterfly remains a challenge to understanding what determines the numbers of monarchs that arrive in Mexico each fall. Dyer & Forister (2016) are correct that much remains to be learned of monarch population dynamics by following all stages of the life cycle. Much can be learned from citizen science projects, too, such as those run by Journey North (**www.learner.org/jnorth**) and the Monarch Larval Monitoring Project (**http://www.mlmp.org**). Summer and fall monitoring of adults takes place mostly outside the primary reproductive area of Midwestern states; if long-term monitoring could begin within that area and, even more importantly, in the migration corridor through Texas, then we would better understand the changes in summer-time abundance.

The emergence of drone technology provides a possibly more accurate way to assess the actual abundance of overwintering monarchs. If a drone provided color photos taken directly over a colony, analysis of the intensity of orange color in the images might allow one to quantify the density of monarchs more accurately. Photos taken from satellite or airplane have not provided sufficient resolution (Slayback et al., 2007), but photos from a drone would. The images could be taken in the early afternoon on sunny days, which is when sunbasking monarchs display a strong orange color that contrasts with the surrounding green forest.

This column describes what we know about the abundance of monarchs; it is another matter what one does about the well-documented long-term decline. A recent study (Semmens et al., 2016) estimates a probability of 11-57% that the migratory population of monarchs will die out during the next 20 years. The threatened species petition, which remains under review by U.S.F.W., engendered mixed opinions among lepidopterists, but whatever the outcome of that review, more people have become aware of monarchs, the decline in their overwintering numbers, and the challenges faced by these extraordinary creatures. That increased understanding has led to numerous initiatives in support of monarchs and pollinators in general (e.g., U.S.F.W., 2014; Texas Pollinator Powwow, 2016). A big concern remains on the minds of many people: how many monarchs will there be five or ten years from now?

Acknowledgements.

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References

Brower, L.P., W.H. Calvert, L.E. Hedrick, & J. Christian. 1977. Biological observations on an overwintering colony of monarch butterflies (*Danaus plexippus* L., Danaidae) in Mexico. J. Lepidop. Soc. 31:232-242.

Brower, L.P., D.R. Kust, E. Rendon Salinas, E. Garcia-Serrano, K.R. Kust, J. Miller, C. Fernandez del Rey, & K. Pape. 2004. Catastrophic winter storm mortality of monarch butterflies in Mexico during January 2002. pp. 151-166 in K.S. Oberhauser & M.J. Solensky (eds.), The Monarch Butterfly: Biology and Conservation, Cornell Univ. Press, Ithaca.

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

Calvert, W.H. 2004. Two methods of estimating overwintering monarch population size in Mexico. pp. 121-127 in K.S. Oberhauser & M.J. Solensky (eds.), The Monarch Butterfly: Biology and Conservation, Cornell Univ. Press, Ithaca.

Calvert, W.H., & L.P. Brower. 1986. The location of monarch butterfly (*Danaus plexippus* L.) overwintering colonies in Mexico in relation to topography and climate. J. Lepidop. Soc. 40:164-187.

Center for Biological Diversity, Center for Food Safety, Xerces Society, & L.P. Brower. 2014. Petition to protect the monarch butterfly (*Danaus plexippus plexippus*) under the Endangered Species Act. http://www.xerces.org/wp-content/uploads/2014/08/monarch-esa-petition.pdf

Davis, A.K., & L.A. Dyer. 2015. Long-term trends in Eastern North American monarch butterflies: A collection of studies focusing on spring, summer, and fall dynamics. Ann. Entomol. Soc. Am. 108:661-663.

Dyer, L.A., & M.L. Forister. 2016. Wherefore and whither the modeler: Understanding the population dynamics of monarchs will require integrative and quantitative techniques. Ann. Ent. Soc. Amer. DOI: 10.1093/aesa/sav160.

Flockhart, D.T.T., L.I. Wassenaar, T.G. Martin, K.A. Hobson, M.B. Wunder, & D.R. Norris. 2013. Tracking multi-generational colonization of the breeding grounds by monarch butterflies in eastern North America. Proc. Royal Soc. B 280:1-8

Freese, B., & M. Crouch. 2015. Monarchs in peril: herbicide-resistant crops and the decline of monarch butterflies in North America. Center for Food Safety, Washington, D.C. http://www.centerforfoodsafety.org/reports/3708/monarchs-in-peril-herbicide-resistant-crops-and-the-decline-of-monarch-butterflies-in-north-america.

Garcia-Navarro, L. 2016. "Monarch butterflies are on the rebound." National Public Radio broadcast, March 5, 2016.

Malcolm, S.B., B.J. Cockrell, & L.P. Brower. 1993. Spring re colonization of eastern North America by the monarch butterfly: successive brood or single sweep migration? pp. 253-267 *in* S.B. Malcolm & M.P. Zalucki (eds.). Biology and Conservation of the Monarch Butterfly. Nat. Hist. Museum Los Angeles Co., Los Angeles.

Monarch Watch. 2016. Monarch waystation program. http://www.monarchwatch.org/waystations/

Natural Resources Defense Council et al. 2015. Report on the status of the monarch butterfly migration and petition to include the Monarch Butterfly Biosphere Reserve on the list of World Heritage [sites] in danger. http://docs.nrdc.org/wildlife/wil_15040901.asp

Pleasants, J.M., & K.S. Oberhauser. 2013. Milkweed loss in agricultural fields because of herbicide use: Effect on the monarch butterfly population. Insect Conserv. Divers. 6:135-144.

Pleasants, J.M., E.H. Williams, L.P. Brower, K.S. Oberhauser, & O.R. Taylor. 2016. Conclusion of no decline in summer monarch population not supported. Ann. Entomol. Soc. Am. 2016, 1-3 on-line, DOI: 10.1093/aesa/sav115.

Semmens, B.X., D.J. Semmens, W.E. Thogmartin, R. Wiederholt, L. Lopez-Hoffman, J.E. Diffendorfer, J.M. Pleasants, K.S. Oberhauser, & O.R. Taylor. 2016. Quasi-extinction risk and population targets for the Eastern, migratory population of monarch butterfliues (*Danaus plexippus*). Scientific Reports DOI: 10.1038/srep23265

Slayback, D.A., & L.P. Brower. 2007. Further aerial surveys confirm the extreme localization of overwintering monarch butterfly colonies in Mexico. Am. Entomol. 53:146-149.

Slayback, D.A., L.P. Brower, M.I. Ramirez, & L.S. Fink. 2007. Establishing the presence and absence of overwintering colo nies of the monarch butterfly in Mexico by the use of small aircraft. Am. Entomol. 53:28-40.

Texas Pollinator Powwow. 2016. A pollinator conference for Texas and beyond. http://www.texaspollinatorpowwow.org/

Tuskes, P.M., & L.P. Brower. 1978. Overwintering ecology of the monarch butterfly, *Danaus plexippus* L., in California. Ecol. Entomol. 3:141-153.

U.S.F.W. 2014. Joint memorandum regarding collaborative efforts to conserve the monarch butterfly and other native pollinators. http://wsfrprograms.fws.gov/Subpages/Pollinators/FWS_AFWA%20Letter%20Supporting%20Monarch%20and%20Pollinator%20Conservation_10March2015.pdf

Vidal, O., & E. Rendon-Salinas. 2014. Dynamics and trends of overwintering colonies of the monarch butterfly in Mexico. Biol. Conserv. 180:165-175.

A monarch-draped oyamel fir bough in the Sierra Chincua colony, January, 2007. Photo by E.H. Williams.

Proposed amendments to the Lep Soc Constitution

The Executive Council has reviewed the Constitution and By-laws and proposes the following amendments. The Council voted unanimously to support these amendments and submit them to the membership for a formal vote. These amendments will appear on the ballot in November. They require support from 80% of the members voting in order to be adopted.

Respectfully submitted,

Mike Toliver, Secretary

Proposed Constitutional Amendments:

Current wording (Article IV, section 1).

Section 1. The officers of the Society shall consist of a President, President-elect, three Vice-Presidents (not more than one Vice-President shall reside in one country), a Secretary, and a Treasurer.

Proposed wording (Article IV, section 1).

Section 1. The officers of the Society shall consist of a President, ~~President-elect~~, the most recent available Past President, three Vice-Presidents (not more than one Vice-President shall reside in one country), a Secretary, and a Treasurer. The First Vice-President shall be the Vice-President from the United States or Canada who receives the most votes.

Rationale:

Historically, the President-elect has not had any substantial role in the running of the Society until (s)he takes office. However, the most immediately available Past President has recently had a substantive role to play, both as an advisor to the incoming President and in Society deliberations. That person also has the most relevant experience. We would certainly encourage the President-elect to attend the Executive Council meeting before (s)he takes office (see proposed revision of Section 2 below). Also, the institution of two-year terms for the President means that a President-elect will only be present 50% of the time in future meetings.

We have had no formal definition of who constitutes the First Vice-President. As recent events have shown us, there is a need for such a precise definition. Having the First Vice-President be from the U.S. or Canada increases the likelihood that that person will be able to attend the annual meeting.

Current wording (Article IV, section 2).

Section 2. The business and affairs of the Society, not otherwise provided for, shall be controlled by an Executive Council, consisting of the President, President-elect, the most recent available Past President, three Vice-Presidents, the Secretary, the Treasurer, the editors of the *Journal* and the *News*, and nine other members of the Society. Action on all amendments to the By-Laws and all appointments and elections by the Executive Council shall be obtained by a canvass by the Secretary of all members of the Council.

Proposed wording (Article IV, section 2).

Section 2. The business and affairs of the Society, not otherwise provided for, shall be controlled by an Executive Council, consisting of the President, President-elect (ex officio; non-voting), the most recent available Past President, three Vice-Presidents, the Secretary, the Treasurer, the Assistant Secretary and/or Assistant Treasurer, the editors of the *Journal* and the *News*, and nine other members of the Society. Action on all amendments to the By-Laws and all appointments and elections by the Executive Council shall be obtained by a canvass by the Secretary of all members of the Council.

Rationale:

The addition of the Assistant Secretary/Assistant Treasurer to the Council is important as that person (or persons) has historically taken on substantial duties (such as the membership database, mailing labels etc.) vital to the functioning of the Society. However, adding that person or persons adds another member (or members) to the Executive Council and makes attaining a quorum at the annual meetings even more difficult. Thus, removing the President-elect as a voting member counteracts to some extent the addition of the Assistant Secretary/Assistant Treasurer. At the same time, we certainly benefit from the input of the President-elect, so (s)he should be encouraged to attend.

The proposed amendment to Article VII, section 3, defining a quorum as 6 members of the EC should also help alleviate the problems we've experienced in being able to conduct Society business at the annual meetings.

Current wording (Article IV, section 3).

Section 3. The Executive Council may appoint one or more Assistant Secretaries or Assistant Treasurers to serve during the pleasure of the Council. The offices of Assistant Secretary and Assistant Treasurer may be filled by the same person.

Proposed wording (Article IV, section 3).

Section 3. The Executive Council may appoint one or more Assistant Secretaries or Assistant Treasurers to serve as directed by the Council. The offices of Assistant Secretary and Assistant Treasurer may be filled by the same person.

Rationale:

This is simply an effort to clarify the terms under which the Assistant Secretaries serve.

Current wording (Article VI, section 2):

Section 2. The First Vice-President shall assume the duties of the President in the case of his/her death, resignation, absence, or disability.

Proposed wording –as suggested by President Calhoun (Article VI, section 2):

Section 2. The First Vice-President shall assume the duties of the President in the case of his/her death, resignation, absence, or disability. If deemed necessary, the fourth (unelected) Vice-Presidential nominee from the same election cycle as the former First Vice-President will be asked to fill the vacant position of Vice-President, but will not automatically be considered First Vice-President. In the unlikely event that more than one President is unable to fulfill his/her duties during a given two-year term, the Executive Council will, if needed, determine how to fill the vacancy.

Current wording (Article VII, Meetings, section 3)

Section 3. A quorum of the Executive Council shall consist of a majority of the active members of the Executive Council.

Proposed wording (Article VII, Meetings, section 3)

Section 3. A quorum of the Executive Council shall consist of ~~a majority of the~~ 6 members of the Executive Council.

Rationale:

In recent years, it has been difficult to obtain a quorum as currently defined in the Constitution. This has made it difficult to accomplish Society business in a timely manner. The proposed amendment would hopefully eliminate that difficulty.

Current wording (Article X, Auditing Committee)

Section 1. The President shall appoint an Auditing Committee consisting of three members who shall audit the accounts of the Treasurer and render their report to the Secretary before March 31st.

Proposed wording (Article X, Auditing Committee):

Section 1. ~~The President shall appoint an Auditing Committee consisting of three members~~ The Executive Council shall serve as an Auditing Committee who shall audit the accounts of the Treasurer and render their report to the Secretary before April 15th."

Rationale:

This amendment would reflect current practice and relieve the President of appointing one more committee.

Proposed amendment to the By-Laws:

Current wording (Article IV, Meetings, Section 2)

Section 2. A majority of members present at an annual meeting, or represented by proxy, shall provide a quorum for the transaction of business, not otherwise provided for.

Proposed Wording – as amended by Julian (Article IV, Meetings, Section 2)

Section 2. A majority of members present at the Business Meeting of the Annual Meeting, or represented by proxy, shall provide a quorum for the transaction of business, not otherwise provided for.

Rationale:

This clarifies the distinction between the quorum required for a meeting of the Executive Council and the quorum required for a Business Meeting at the Annual Meeting. Note that if we approve this amendment, it would take effect immediately, unlike amendments to the Constitution.

Blue Metalmark, (*Lasaia sula*). This species is routinely spotted at Resaca De La Palma State Park, Brownsville, TX. Photo by Bryan Reynolds.

Mexican Bluewing, (*Myscelia ethusa*). This male was visiting one the many feeding stations at Resaca De La Palma State Park, Brownsville, TX. Photo by Bryan Reynolds.

Formative Experiences:

Sal Levinson

Berkeley, CA sal.levinson@gmail.com

It started with a dream about beetles when I was about seven years old. In the dream, I was out doing errands with my mother in southern California. We went to the shoe shop, the butcher, and the thrift store. Each location had a huge, live ladybug displayed in the window. I looked at the insects, but we didn't buy any. My mother bought shoes and meat and vintage clothes. However, when we got home, each bag contained only a huge lady bug. Similarly, entomology has seemed to pursue me, instead of me pursuing it. Luck led the way.

My interest in insects did not really begin until college where I happened to see some red and black bugs swarming in a ground cover of ivy. I didn't even know that they were true bugs at the time, but I wanted to learn their name and the reason there were so many in one place. So I decided to take an entomology class. Lucky for me, I was at UC Berkeley, which had an entomology department. If I had gotten into my first choice school, no telling where I would have ended up. Since I was a Conservation of Natural Resources major, insects fit easily into my studies. As you might guess, I became fascinated, and one entomology class led to several others. Eventually, in one of those classes, I figured out that the insects in the ivy were boxelder bugs.

As luck would have it, the job market was lousy when I graduated from college in 1973. I would have liked to have worked for the Forest Service or the Environmental Protection Agency. Nope! But my knowledge of insects did get me a summer job in the Central Valley of California. It was the first year that my boss hired women. The crew was three women and a dozen men checking for *Lygus* bugs and other pests in triple digit temperatures. Sweaty work, but I was glad to have a job.

I had several other insect jobs before I started grad school. Working in the forests of Connecticut and Idaho, the insects seemed tangential to getting paid to be out in such beautiful places. I also worked in a Forest Service lab in Berkeley, California, counting stream insects killed by pesticides. My last insect job was at the Weeds Lab in Albany, California doing research on using insects to destroy unwanted plants.

I never particularly looked for jobs in entomology. I would have been happy with something botanical. But since I found so many insect jobs, I decided to go to grad school in entomology. I researched hormone regulation in moths at UC Riverside. Before I even finished my masters, I started a PhD program at UC Berkeley.

Then, as so often happens in life, unexpected events changed my priorities. Both my parents and one of my thesis readers all died in quick succession. This took the wind out of my sails, and at the same time cushioned my finances. I needed to take a breath, and reflect. I realized it was time to turn from my own formative experiences and help others with theirs. I started a family.

Next, I started a butterfly garden. When I was at the Weeds Lab, a coworker had shown me the Anise Swallowtails in the fennel. I used that as a starting point, planting fennel in the strip between the sidewalk and the street. Then I tore up the front lawn and replaced it with passion vine, milkweed, nasturtiums and other butterfly host plants. Thus began a more intense involvement with lepidoptera.

When my kids were in elementary school, their teachers were eager for volunteers to help. It seemed natural for me to bring caterpillars in to become classroom pets. All the teachers and students loved learning about butterfly life cycles. I was so enthusiastic that I developed a presentation for local schools.

Soon after, I met Andy. He was another butterfly enthusiast who also did presentations at schools. Another lucky break: he lived only a block away. Together we went to schools and fairs and led butterfly walks. He makes the most beautiful caterpillar displays! We also did teacher trainings and taught classes at Albany Adult School together. We still volunteer together regularly.

Andy showing caterpillars to some kids and their parents during a Garden Day Celebration at Children's Fairyland in Oakland, CA.

When caterpillars were introduced to the classrooms, the students enjoyed watching the caterpillars eat, but they generally missed the exciting moments like hatching, molting and eclosing. I needed a film! Since my brother had made many films as a semi-professional, I leaned on him. At first he thought it was a boring topic, but once he got started, he was unstoppable. I couldn't seem to get live specimens to him fast enough. In fact, instead of the short life cycle film I requested, he ended up making a 45 minute

Continued on p. 99

On adult-caterpillar mimicry: cases from the moth world

Andrei Sourakov

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When reading the article in the recent issue of the News (Wheye & Ehrlich, 2015) and the recent book by Howse (2014), both of which deal with caterpillar images being present in butterfly wing patterns, it occurred to me that there are several additional cases found among moths, specifically in the genus *Utetheisa*, where adult-caterpillar mimicry is quite plausible.

In *Utetheisa ornatrix*, for example, the caterpillars and adults are found in similar settings: they are either on or nearby their host plants of the genus *Crotalaria*. Both stages are unpalatable (Eisner & Eisner, 1991; pers. obs.), and can be found in large numbers simultaneously. While the coloration of both the adults and larvae are quite variable (Fig. 1), they are for the most part orange and black (sometimes with a bit of white), and the pupa displays similar colors, suggesting that it too is unpalatable.

The similarity in colorations between immatures and adults of *U. ornatrix* are likely not coincidental and the stages may be imperfect Müllerian mimics of each other. In the old world's *Utetheisa pulchella*, the aposematic coloration of the larvae is black-and-white with a bit of red - just like the coloration of its adults (Fig. 2). A photo of *U. pulchella*

Fig. 1. *Utetheisa ornatrix bella* (Erebidae). Alachua Co., Florida. (A-D) © Andrei Sourakov; (E) © Lary Reeves.

Fig. 2. *Utetheisa pulchella*. (A-B) Fiumicino (Roma), Italy, © Paolo Mazzei; (C-D) Els Poblets, Alicante, Spain, by Katja Schulz from Washington, D. C. CC BY 2.0 via Wikimedia Commons; (E) Muscat, Oman, © Hanne & Jens Eriksen / **www.BirdsOman.com**.

from Oman (Fig. 2E) depicts both larva and adults in a single frame clearly projecting identical signals to the potential predators. Less colorful (on average), *U. pulchelloides* in Asia has less colorful larva, and in the Galapagos, adults and larvae of the endemic small *Utetheisa* species are grey and cryptic, even though still distasteful to some predators (Garrett et al., 2008).

The adult-larval mimicry among moths can be exemplified by *Abraxas grossulariata* (Geometridae) (Howse, 2014 (p. 52-53)). Not only are its caterpillars and adults similarly and aposematically patterned (Fig. 3), but both have also been demonstrated to be distasteful (Butler, 1868; Plateau, 1894).

While seemingly useless, pareidolia (the innate property of the human mind to see patterns in meaningless noise) is deeply rooted in our hunter-gatherer ancestry, and has evolved to keep us safe from danger. After all, it is safer to mistake a stick for a snake than to lose the ability of making this association at all. Mathematical models show that it is safer not only for us, but also for the birds hunting caterpillars (e.g., Castellano & Cermelli, 2015). Perhaps, in the part of the brain that makes such associations, we are not too different from birds, and if something looks similar to us, there is a likelihood that it looks similar to other predators even if their visual abilities are different from ours.

It was enjoyable to ponder over the hidden meanings of the butterfly wing designs following reading the Wheye & Ehrlich's article. The exercise reminded me of the lines in the poem "Butterfly" by Joseph Brodsky, a Russian-American who won the 1987 Nobel Prize in literature and who, to my knowledge, had no scientific interest in Lepidoptera:

. . . "Your little wings display
big pupils, lashes.
Whose faces do these splashes
of dye portray?
Is it a belle, a bird?
Or maybe neither,
and on your flitting easel,
a Nature Morte
is painted: dishes, breads,
or beans of coffee,
and even – look! – a trophy
of fishing spreads.

Fig. 3. *Abraxas grossulariata* (Geometridae). Vivaro (Roma), Italy. © Paolo Mazzei.

Perhaps, armed with a lens,
I would discover
a landscape: meadows, flowers,
a group of friends.
Tell, is it daylight bright?
or filled with graveness
like night? And on your canvas,
what astral lights
illuminate the view?
what constellations?
Which real life location
inspired you?" . . .

"Butterfly" by Joseph Brodsky, Printed with permission of A. Givental and E. Wilson-Egolf (translators)

References

Butler, A. G. 1868. The larva of *Abraxas grossulariata* distasteful to frogs. *Ent. Month. Mag.* 5:131–132.

Castellano, S., Cermelli, P. 2015. Preys' exploitation of predators' fear: when the caterpillar plays the Gruffalo. *Proceedings of the Royal Society B* 282(1820): 20151786.

Eisner, T., Eisner, M. 1991. Unpalatability of the pyrrolizidine alkaloid-containing moth, *Utetheisa ornatrix*, and its larva, to wolf spiders. *Psyche* 98(1): 111-118.

Garrett, S. E., Conner, W. E., Roque-Albelo, L. 2008. Alkaloidal protection of Utetheisa galapagensis (Lepidoptera: Arctiidae) against an invertebrate and a vertebrate predator in the Galápagos Islands. *Galápagos Research* 65: 2-6.

Howse, P. E. 2013. Lepidopteran wing patterns and the evolution of satyric mimicry. *Biological Journal of the Linnean Society* 109(1): 203-214.

Howse, P. E. 2014. *Seeing Butterflies. New Perspectives on Colour, Patterns and Mimicry*. Papadakis. 176 p.

Mazzei, P., Morel, D., Panfili, R. 2016. Moths and Butterflies of Europe and North Africa. **www.leps.it.** (last accessed 2016).

Plateau, F. A. J. 1894. Observations et expériences sur les moyens de protection de l'*Abraxas grossulariata* L. *Au siège de la Société Zoologique de France*. 18 p.

Shermer, M. 2008. Patternicity: Finding meaningful patterns in meaningless noise. *Scientific American* 299(5).

Wheye, D., Ehrlich, P. R. 2015. Are there caterpillars on butterfly wings? *News of the Lepidopterists' Society* 57(4): 182-195.

www.231naturfotos.de. 2016. http://www.123naturfotos.de/Bilder/Insekten/Raupen_und_Larven/Utetheisa_pulchelloides_larva_Baerenspinner_Raupe_Heliotrope_Moth_Caterpillar_Thailand.html

www.birdsoman.com (2016) http://www.birdsoman.com/Insects/35-Butterflies/CrimsonspeckledMoth/CrimsonspeckledMoth.htm

www.Jungledragon.com. 2016. http://www.jungledragon.com/image/34203/heliotrope_moth.html

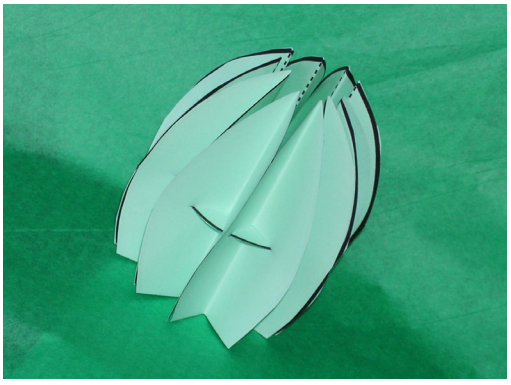
Sal Levinson

Continued from p. 96

film on butterflies that included information on predation, conservation, etc. He completed In the Company of Wild Butterflies in 2006. It is available from Bullfrog Films. Along the way, he made several silent lifecycle films for me to take into classrooms and narrate myself. Finally, in 2010, he completed a life cycle with narration (my voice!): "The Secret Lives of Monarchs" is available from Amazon.

My classroom presentations include several parts: the film, the live menagerie, and a papercraft. I do only one papercraft with the students, but I have developed many over the years, each being a lesson about lepidoptera. I have now gathered them together in a book, Butterfly Papercrafts: 21 Indoor Projects for Outdoor Learning. It is also available from Amazon.

I have spent time and energy and money creating and promoting the films and book. I am, of course, invested in the success of these products. But my main goal is convincing children to become lepidopterists, entomologists and conservationists. I hope that years from now lepidopterists contributing to this column will have fond memories of my book, movies and presentations and will write about how my products contributed to their formative experiences.



Sal Levinson Papercraft: velvet paper butterfly egg

Meris alticola (Geometridae), a poisonous Mullerian mimic moth, and its co-mimic moths and *Euphydryas* and *Poladryas* butterflies (Nymphalidae)

James A. Scott

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Mature larvae on *Besseya plantaginea*, Como, Park Co. Colorado, late June, 2015

Pupae removed from loose silk mesh brown "cocoon", Como, Park Co. Colorado

I found conspicuous beautiful larvae of *Meris alticola* geometrids on top of *Besseya plantaginea* plants near Como, Park Co. Colorado. They fed on this plant in the lab and spun a loose brown silk mesh network and pupated inside (3 adults reared are deposited in Gillette Museum, Colorado State University, Fort Collins, Colo.). Poole (1970) illustrated in b/w larvae of *Meris alticola* he collected from *Penstemon virgatus* near Flagstaff, Arizona and the similar larva of *Neoterpes graefiaria* lab-reared on *Penstemon barbatus* by John G. Franclemont from Cochise Mts., Ariz. Poole wrote that last-instar *M. alticola* larvae overwinter (my larvae produced pupae in lab). The poisons in larvae and hostplants were unknown then. Gardner (1987) found *Meris alticola* on *Besseya plantaginea* and studied the iridoid glycosides in the plants that the larvae sequester, and also studied *Euphydryas anicia eurytion* larvae also found on it which sequester iridoid glycosides. The iridoid glycoside catalpol is sequestered by *Meris alticola* larvae eating *Penstemon virgatus* and *Neoterpes graefiaria* (Geometridae) larvae eating *Penstemon barbatus* (Stermitz et al. 1988), but the iridoid glycoside mostly disappears in the pupa or meconium as adults have little iridoid glycoside. A larva of *M. alticola* was found on *Penstemon* sp. in North Park Colorado by William Ciesla of USDA (internet photo). *Meris alticola* is basically a boreal mountains moth, although Paul Opler caught one in Fort Collins on the Colorado plains near Wyoming. A related species *Meris paradoxa* sequesters the iridoid glycoside antirrhinoside from its hostplant *Maurandya antiriniflora* (Scrophulariaceae) in southern Arizona (Boros et al. 1991).

M. alticola larvae are very conspicuous as they often rest on top of the *Besseya* plants using the prolegs and raising the rest of the body away from the plant in very conspicuous fashion. They resemble a bent stick, but evidently also advertise poisonous qualities to ensure that predatory birds etc. eat no more than one.

These moths and several sympatric butterflies are Mullerian mimics. *Neoterpes graefiaria* is very similar. The *Neoterpes graefiaria* larva is black with a white side stripe like *Meris alticola*. And *Euphydryas anicia eurytion* larvae (which usually feed on *Besseya plantaginea* in South Park, sometimes on *Castilleja integra* despite several erroneous claims that they frequently feed on it) are also white with black spines and a small to moderate band of small black spots and rows of orange scolus bases, somewhat resembling these moth larvae; they also sequester catalpol. The moun-tain butterfly *Poladryas minuta arachne* is obviously also a Mullerian mimic in this system. Older larvae have wide white and black bands, orange subdorsal scoli, and an orangish head, closely resembling *M. alticola*. The *P. minuta arachne* larvae eat various *Penstemon* species including a favorite *P. virgatus* (Scott 1992) so *arachne* larvae also possess iridoid glycosides. On the Great Plains prairie east of the mountains in New Mexico and Texas, where those montane moths evidently do not occur and Mullerian mimicry is not involved, *P. minuta near-minuta* older larvae feeding on other *Penstemon* are mostly unstriped orange and thus must rely on bright warning coloration to repel predators such as birds. Scott (1974) found larvae of ssp. near-*minuta* in Texas and reared adults and released females in front of *arachne* males in Colorado, and did the same with F1 females. These crosses resulted in many offspring, proving that there is no reproductive isolation (prezygotic or postzygotic) between *minuta* and *arachne*, which are therefore conspecific. Wing pattern characters

show a cline (in amount of unh white vs. red and unh black margin edging) from California *monache* to *arachne* to near-*minuta* in NE New Mexico (where the black unh margin edging is weak) to *minuta* in central Texas to *simador* in NE Mex. (very wide black edging), thus also demonstrating that there is just one species, despite the shocking difference between larvae of mountains *arachne* versus plains *minuta* butterflies that is caused by different systems of mimicry and predator deterrence. (Note that at Raton Mesa in northern New Mexico where the ranges of arachne and near-minuta nearly overlap, the near-minuta larva is oranger-red {Glassberg et al. 2005} like the F1 hybrid arachne X central Texas minuta I reared.) Without predator-avoidance help from the Mullerian moth larvae, the plains *minuta* evidently advertises its iridoid glycoside unpalatability more conspicuously by becoming oranger.

Top: *Euphydryas anicia eurytion*, Park Co., CO
Middle: *Poladryas minuta arachne,* Jefferson Co., CO
Botom: *P. minuta* near *minuta,* W of Dallas TX

Literature Cited

Allen, Thomas J., Jim P. Brock, Jeffrey Glassberg. 2005. Caterpillars in the field and garden. Oxford University Press. 232 p.

Boros, Christie A., Frank R. Stermitz, Noel McFarland. 1991. Processing of iridoid glycoside antirrhinoside from *Maurandya antiriniflora* (Scrophulariaceae), by *Meris paradoxa* (Geometridae) and *Lepipolys* species (Noctuidae). J. Chem. Ecology 17:1123-1133.

Gardner, D. R. 1987. Iridoid chemistry of some *Castilleja* and *Besseya* plants and their hosted checkerspot butterflies. PhD thesis, Colorado State University, Fort Collins, Colorado.

Poole, Robert W. 1970. Convergent evolution in the larvae of two Penstemon-feeding Geometrids. J. KS Ent. Soc. 43:292-297.

Scott, James A. 1974. Adult behavior and population biology of *Poladryas minuta* (Lepidoptera, Nymphalidae) and the relationship of the Texas [ssp. near-*minuta*] and Colorado [ssp. *arachne*] populations. Pan-Pacific Entomologist 50:9-22.

Scott, James A. 1992. Hostplant records for butterflies and skippers (mostly from Colorado), 1959-1992, with new life histories and notes on oviposition, immatures, and ecology. Papilio (New Series) #6:1-185, free printable pdf from http:digitool.library.colostate.edu, click on Colorado State Univ., search for Papilio (New Series).

Stermitz, Frank R., D. R. Gardner, N. McFarland. 1988. Iridoid glycoside sequestration by two aposematic *Penstemon*-feeding geometrid larvae. J. Chemical Ecology 14:435-441.

More Announcements:

Continued from p. 71

Classes at Sierra Nevada Field Station and Rocky Mountain National Park

Hope you all had a great year. We are excited to again be teaching in 2016 and thought we'd share the information about this year's butterfly class activities with you.

- Yuba Pass butterfly count announced for June 18
- We will be back teaching our San Francisco Field Campus SNFC butterfly class this summer from June 20-24
- Moth workshop the following weekend June 24-26, taught by Paul Opler and Jerry Powell

- All of this will take place at the Sierra Nevada Field campus, which has a wonderful website, also offering other interesting classes: **www.sfsu.edu/~sierra**
- All classes also can be used for teacher recertification. Inquire with JR Blair at **jrblair@sfsu.edu**

We also will again be teaching classes in Rocky Mountain National Park (also for recertification through BOCES):
- July 30th, 2016: **Rocky Mountain National Park Butterflies: East of the Divide**
- August 13th, 2016: **Rocky Mountain National Park Butterflies: West of the Divide**

For More info contact Rocky Mountain Conservancy: https://rmconservancy.org/events/ or call 970-586-3262

Field Seminar at Golden Gate Canyon State Park, CO:
- July 24th Colorado Native Plant Society
https://conps.org/mfm-event-calendar/#!event/2016/7/24/butterfly-natural-history-paul-opler-evi-buckner-opler-golden-gate-canyon-state-park

Paul Opler & Evi Buckner-Opler

Society of Kentucky Lepidopterists

The Society of Kentucky Lepidopterists is open to anyone with an interest in the Lepidoptera of the Great State of Kentucky. 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 two remaining (currently scheduled) field trips this year are: 29 - 31 July, Big Black Mountain, Harlan County; and 23 - 25 September, West Kentucky Wildlife Management Area, McCracken County.

The annual meeting has yet to be scheduled but will be in November at the University of KY, Lexington.

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

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
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WebMaster

Todd Gilligan, Colorado State University, Bioagricultural Sciences and Pest Management, 1177 Campus Delivery, Fort Collins, CO 80523-1177, (970)490-4478
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Submission Guidelines for the News

Submissions are always welcome! Preference is given to articles written for a non-technical but knowledgable audience, illustrated and succinct (under 1,000 words, 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	3	Fall	Aug. 15, 2016
	4	Winter	Nov. 15, 2016
59	1	Spring	Feb. 15, 2017
	2	Summer	May 12, 2017

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

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More gynandromorphs from the collection of Alex Bic

(photos by Alex Bic; see also back cover of News of the Lep Soc, 57:2., Summer 2015)

Ancyluris sp. - Peru: Atalaya. October 2009

Rhetus periander- Peru: Junin. Satipo, Rio Shanqui July 2012

Papilio astyalus - Peru: Junin. Satipo. July 2013

Papilio dardanus tibullus - Coastal Tanzania Oct. 2008

Phoebis rurina - Peru: Junin. Calabaza August 2011

Callosamia promethea - NJ: Whiting - Manchester Township May 2015