

# DENVER MUSEUM OF NATURE & SCIENCE REPORTS

NUMBER 1, NOVEMBER 7, 2014



## Program and Abstracts 25th Annual Meeting of the High Country Lepidopterists

November 7 and 8, 2014  
Denver Museum of Nature & Science

Frank-Thorsten Krell (Ed.)

# DENVER MUSEUM OF NATURE & SCIENCE REPORTS

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25th Annual Meeting of the High Country Lepidopterists

November 7 and 8, 2014, Denver Museum of Nature & Science

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Edited by  
Frank-Thorsten Krell<sup>1</sup>

### **CONTENTS**

**Program** 2

**Abstracts** 3

**Krell, F.-T. & Stephenson, J.T.:** The Entomology Collection  
at the Denver Museum of Nature & Science Has a New Home 8

**List of all 25 High Country Lepidopterists Meetings** 11

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## PROGRAM

**Friday, November 7, 6:00pm**

**Potluck dinner** at the home of Frank Krell, 552 S. Deframe Ct., Lakewood, CO 80228 (Green Mountain Estates); 39.70708° N, 105.15440° W. Home phone: 303-279-3424

**Saturday, November 8**

**9:00am–11:00am: Open House in the DMNS Entomology Collection (RMSCC, Level B2)**

**11:00am–12:00pm: Contributed Talks (Zoology Workshop, RMSCC)**

11:00am–11:10am: **Frank Krell:** Welcome and Introduction

11:10am–11:25am: **Rob Schorr & Callie Punttenney:** Beer Money: How Rare Partners Produced Conservation Population Modeling for the Hops Blue Butterfly

11:25am–11:45am: **Paul A. Opler:** Searching for Western Blue Butterflies: the Case of the Owen River Drainage in California

11:45am–12:00pm: **Laurel Cepero:** The Relative Importance of Flower Color and Shape for the Foraging Monarch Butterfly (Lepidoptera: Nymphalidae)

**12:00pm–1:00pm: Lunch (old Zoology Department, food provided)**

**1:00pm–2:20pm: Contributed Talks (Zoology Workshop, RMSCC)**

1:00pm–1:15pm: **Sarah Garrett:** Year Two of Colorado Butterfly Monitoring Network (CBMN)

1:15pm–1:30pm: **Richard O. Bray:** Rocky Mountain National Park Butterfly Project, 1995–2011

1:30pm–1:45pm: **Janet Chu:** Butterfly Inventories over a Nine Year Period in Boulder County Open Space Properties (Colorado)

1:45pm–2:05pm: **Shannon Murphy:** Increasing Voltinism in a Temperate Moth Species: A Result of Global Change?

2:05pm–2:20pm: **Suzy Hiskey, Ted Heron, Levi Coleman & Jennifer Jennings:** Lepidoptera Abundance and Diversity on an Extensive Green Roof

**2:20pm–3:00pm: Break (old Zoology Department, coffee and snacks provided)**

**3:00pm–4:45pm: Contributed Talks (Zoology Workshop, RMSCC)**

3:00pm–3:20pm: **Eric H. Metzler:** Collecting as a Tool of Conservation and Preservation

3:20pm–3:40pm: **Paul A. Opler, Ken Davenport, Chris Nice & Maureen Spencer:** The *Aricia acmon* Species Group (Lycaenidae: Lycaeninae) in Southern California and Baja California

3:40pm–4:00pm: **Ray Stanford:** Butterflies of the 20 Mainly Prairie Counties of Colorado Located East of the Rocky Mountains

**4:10pm–4:40pm: Business Meeting (Zoology Workshop, RMSCC)**

**after 5:00pm: Dinner at a local restaurant**

## ABSTRACTS

**Rocky Mountain National Park Butterfly Project, 1995–2011**

Richard O. Bray

*643 Aspen Ave., P.O. Box 1260, Estes Park, Colorado 80517; mtlep@earthlink.net*

A brief look at fifteen years of butterfly data gathered during this citizen science inventory and monitoring project in Rocky Mountain National Park. The database holds 78,765 butterfly sightings from 3,796 transect surveys in the Montane, Subalpine and Alpine zones, as well as 20 years of daily weather data from the National Weather Service Cooperative Station, Estes Park 1SSE.

**The Relative Importance of Flower Color and Shape for the Foraging Monarch Butterfly (Lepidoptera: Nymphalidae)**

Laurel Cepero

*Department of Biological Sciences, University of Denver, F.W. Olin Hall - Room 102, 2190 East Iliff Avenue, Denver, Colorado 80208; LCepero@du.edu*

Flowers attract and guide pollinators via a wide array of sensory stimuli, including colors, odors, textures, and even sounds. Bees are known to respond to and learn multimodal and multicomponent floral cues, whereas, historically, studies of learning in butterflies have focused on a single visual stimulus component, most often color. In this study, we examine whether Monarch butterflies (*Danaus plexippus* (L.)) can learn to associate a compound visual stimulus, i.e., color and shape together, with a nectar reward. We also examine the relative importance of color and shape as cues to foraging butterflies. Our results indicate that within the visual modality, foraging Monarchs learn color more readily than shape. Monarchs, however, are capable of learning to associate shape with a sugar reward

independent of color, and they may also be capable of learning the compound stimulus of color and shape in the context of foraging. We suggest that the hierarchical importance of cues is likely to vary depending on ecological context, and that although color may be most relevant for a nectar-foraging butterfly, shape may be a more useful cue for a butterfly searching for an oviposition substrate.

**Butterfly Inventories over a Nine Year Period in Boulder County Open Space Properties (Colorado)**

Janet Chu

*964 Ravenwood Road, Boulder, Colorado 80303; chubouse@hotmail.com*

The ninth consecutive year of butterfly inventories in Boulder County Open Space properties concentrated on six of ten study sites; Southeast Buffer, Heil Ranch (Geer Watershed and North Point), Walker Ranch (Meyer's Homestead Trail), Reynold's Ranch and Mud Lake-Caribou Ranch. The flood of September, 2013 made three of our study sites inaccessible: Anne U. White Trail, Heil Ranch (Plumely Canyon) and Hall II Open Space.

The Anne U. White Trail along Fourmile Canyon was severely damaged by the '100 year' flood and remained scoured of its sands and soils. Many torn trees and bushes were left hanging on ten-foot stacks of debris. We were able to check butterflies only once in August. Cabbage Whites (*Pieris rapae*) flew in greater numbers in August than shown by the past five-year August average in this small canyon. Also in Anne U. White numbers of local emergent butterflies were higher in August 2014 than during August averages the past four previous years.

In Heil Ranch (Geer Watershed) during half of the eight years (2007-2014) higher than the average numbers of Individual Butterflies per Research Hour (I/RH) including 2014 were counted. Also in 2014, in

Geer, the number of Species per Research Hour (S/RH) was higher than the eight year average.

Heil Ranch (North) sustained the total number of I/RH higher in 2014 than in the past four years because of large numbers of Cabbage Whites (110 on 7/4), Orange Sulphurs (*Colias eurytheme*) (50 on 7/4), Field Crescents (*Phyciodes pulchella*) (80 on 6/3). In Heil (North) the highest number of species identified in 2014, was above the five-year average (50 species as compared with the average number 33 of species found annually).

### **Year Two of Colorado Butterfly Monitoring Network (CBMN)**

Sarah Garrett

*Butterfly Pavilion, 6252 West 104th Ave., Westminster, Colorado 80020; sgarrett@butterflies.org*

Colorado Butterfly Monitoring Network (CBMN) began in 2013 with a total of eight volunteers monitoring nine sites within the Colorado Front Range. In 2014 CBMN grew to include over 70 volunteers monitoring 60+ sites both within and outside the Front Range. The methods for CBMN, which include the Pollard Walk protocol, were adopted from the Illinois Butterfly Monitoring Network and have been implemented by nine other programs in the continental United States. The goal of CBMN, as well as other monitoring networks, is to expand the scale at which we are collecting data, allow for greater participation, and greater data access so we can track distributions, yearly changes, unusual events, and dynamics at local, regional, and continental scales.

### **A Season Without Drought. Unusual Collection Records for Moths (Noctuoidea) along the Front Range of Colorado**

Charles E. Harp

*8834 West Quarto Avenue, Littleton, Colorado 80128; cebmoth@aol.com*

Early and persistent rains fell across much of Colorado's central and western region again this season, giving the area enough moisture to slow the recent years of drought. The renewed health in vegetation with more moisture and cooler temperatures allowed expansions in the range of several members of our fauna, including members of the noctuid moths. Several species of moths are showcased in this talk that show substantial range increases or that have appeared lower in elevation than previously observed.

### **Lepidoptera Abundance and Diversity on an Extensive Green Roof**

Suzy Hiskey, Ted Heron, Levi Coleman & Jennifer Jennings  
*Department of Biology, Metropolitan State University, Campus Box 53, P.O. Box 173362, Denver, Colorado, 80217-3362; shiskey@msudenver.edu*

The ecology and biodiversity of green roofs – building tops that are partially or completely covered in vegetation – in the western high plains of the United States is an emerging field. This observational biodiversity survey is part of an interdisciplinary study regarding the MSU Denver extensive sedum green roof. We examined the arthropod fauna using multiple sampling methods on a regular schedule, intended for an all-inclusive survey that accounted for diurnal and seasonal patterns. This presentation reports preliminary results on Lepidoptera and Trichoptera diversity and abundance. The greatest abundance of Lepidoptera and Trichoptera were trapped using the Malaise intercept trap and light sheet.



## Collecting as a Tool of Conservation and Preservation

Eric H. Metzler

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metzler@msu.edu*

I've been a moth collector all my adult life and I often reflect: "Do my collecting activities contribute to conservation?" I'm killing hundreds of moths in non-discriminating bucket traps each time I go out. Is this conservation or am I satisfying some need to accumulate as many goodies as possible? Am I rationalizing? Perhaps the most critical time I was asked about my catch-all traps was by law enforcement officers. I knew more about moths than they would ever know, yet they were reluctant for me to take samples in sensitive habitats for fear I could do damage to a population which relied on the habitat I wanted to sample. I replied that they'd never know which species of moths they were protecting unless I took some samples and reported the results. In this paper I cite case histories of the resolution to my dilemma and several others where collectors earn gold stars in their files for their next permit application.

## Increasing Voltinism in a Temperate Moth Species: a Result of Global Change?

Shannon Murphy

*Department of Biological Sciences, University of Denver, 2050 E. Iliff Avenue, Denver, Colorado 80208; Shannon.M.Murphy@du.edu*

Climate change can have significant effects on the life history strategies of animals. For insects, it has been suggested that global warming may allow populations to increase their voltinism or the number of generations that they have per year. While the development rates of insects do rely heavily on temperature, the decision to diapause for the winter or to pupate and continue with another generation is thought to depend greatly on photoperiod.

Moths in the family Limacodidae that are found in temperate regions are typically uni-voltine and have only one generation per year. Recently, however, we have found an increasing incidence of facultative bi-voltinism for the species *Euclea delphinii* (Limacodidae) around Washington, DC; this shift in voltinism may be associated with global warming. To test which cues *E. delphinii* larvae use to determine whether they pupate for the winter or emerge for a second generation, we designed a full-factorial experiment in which we tested for the effects of photoperiod, temperature and host plant quality. We found a significant effect of photoperiod on voltinism, but no direct effect of host plant quality. However, host plant quality has a significant indirect effect on voltinism because development rate determines the time period during which the larvae enter the dormant phase and thus whether they experience a long or short photoperiod during this crucial "decision-making" phase.

## Searching for Western Blue Butterflies: the Case of the Owen River Drainage in California

Paul A. Opler

*C.P. Gillette Museum of Arthropod Diversity,  
Department of Bioagricultural Science and Pest  
Management, Colorado State University, Fort Collins,  
Colorado 80523-1177; PAULOPLER@comcast.net*

An amazing diversity of blues (Lycaenidae: Lycaeninae) occur in the Owens River drainage of California between the crest of the southern Sierra Nevada and the crest of the White and Inyo Mountains of southern Mono County and Inyo County. I count 27 species of blue in 10 genera to be found in this area. The amazing diversity is explained by the diversity of the terrain and the suitable diversity of potential host plants. The presentation includes a summary of each species, its caterpillar host plant and preferred habitat. The most frequently used host plants are wild buckwheats, genus *Eriogonum*, and various genera of papilionoid legumes.

## The *Aricia acmon* Species Group (Lycaenidae: Lycaeninae) in Southern California and Baja California

Paul A. Opler\*, Ken Davenport, Chris Nice & Maureen Spencer

\*C.P. Gillette Museum of Arthropod Diversity, Department of Bioagricultural Science and Pest Management, Colorado State University, Fort Collins, Colorado 80523-1177; PAULOPLER@comcast.net

The *Plebejus acmon* species group occurs widely in western North America and presents many difficulties to those who seek to understand its intricacies. The key to understanding the group is presented in southern California where most taxa were described. Included taxa are *Plebejus acmon* (Doubleday), *Plebejus neurona* (Skinner), *Plebejus monticola* (Clemence), *Plebejus chlorina* (Skinner), *Plebejus chlorina argentata* (Emmel, Emmel & Mattoon), *Aricia dedeckera* (Emmel, Emmel & Mattoon), and *Aricia lupini alpicola* (Emmel, Emmel & Mattoon), **new combination**, occurring in this region. Species-level decisions are based on an examination of adult facies, genitalia, temporal distribution, spatial distribution, and DNA barcodes. The resultant treatment includes six species-level taxa instead of the three currently recognized in this region. Additional taxa occur in adjacent regions and will be considered in future studies.

## Beer Money: how Rare Partners Produced Conservation Population Modeling for the Hops Blue Butterfly

Rob Schorr & Callie Punttenney

Colorado Natural Heritage Program, Colorado State University, 240 General Services Bldg, Fort Collins, Colorado 80523-1475; Robert.Schorr@ColoState.edu

Funding conservation research for rare species can be challenging. I present a novel relationship that was used to fund conservation research on *Celastrina humulus*,

and develop young conservation biologists. Given *C. humulus*'s affinity for wild hops, the craft brewing community provided a partner with enthusiasm for Colorado environments and conservation. Seed money allowed undergraduate researchers to predict landscape occupancy of *C. humulus* along Monument Creek at the U.S. Air Force Academy. These data will be part of an on-going monitoring program to understand trends in occupancy and to learn more about the general ecology of the species.

## Butterflies of the 20 Mainly Prairie Counties of Colorado Located East of the Rocky Mountains

Ray Stanford

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Until the mid-20<sup>th</sup> century, nearly all research and collecting of Colorado Lepidoptera was limited to the exciting biodiversity and geology of the mountains and less so of the western plateaus. The first expedition to the region was the Long expedition of 1819, with the Philadelphia biologist Thomas Say as part of that trip. *Parnassius smintheus sayii*, and several plants and other animals in the Rockies are named for this pioneer American biologist. In 1937 the DMNS, with an earlier name then, published the first paper giving any records for prairie butterflies, authored by Frank Clay Cross, curator of entomology at that time. There were 21 species known from Denver and one or two each from just 6 other counties. Between 1954 and 1957 the Museum published *Colorado Butterflies* by Brown, Eff and Rotger. By then there were several active lepidopterists on the prairies. Counties were led by Prowers with 46 species, Denver with 40, but still 7 counties with zero. *Butterflies of the Rocky Mountain States*, edited by F. M. Brown and C. D. Ferris, with several authors including me, was published by University of Oklahoma Press in 1981. Then all Colorado prairie counties were into

double digits, led by Arapahoe with 90 and an average of nearly 50 butterfly species. Over the next 26 years I led or encouraged multi-party groups to learn even more about this. Since we moved to Medford, OR in 2007, others have obtained 9 more county records there. Current numbers include 1724 total butterfly county records, raising county total species to 139 for Elbert Co., 126 for Arapahoe Co., 119 for Denver Co., 118 for Weld Co. and 104 for Adams Co. (a large effort by many folks), down from there to a low of 46 species in Kiowa Co. The current ratio of average known to average projected species is 94.2%, which is higher than that for the entire State which is 93.7%. So, although there are far fewer species on the plains than in the mountains, they are better known! The highest county butterfly species totals in the State are El Paso Co. with 207, Larimer Co.

with 203, and Boulder Co. with 202. All of these go from prairie to above treeline, and have many outstanding habitats, most of them protected. These are the only 3 counties not along the Mexican border in the entire country to have over 200 known butterfly species.

#### Literature Cited

- Cross, F.C. 1937. Butterflies of Colorado. Proceedings of the Colorado Museum of Natural History 16: 1–28.
- Brown, F.M., Eff, D. & Rotger, B. 1954–1957. Colorado Butterflies. Proceedings of the Denver Museum of Natural History 3–7: i–viii, 1–368.
- Ferris, C.D. & Brown, F.M. 1981. Butterflies of the Rocky Mountain States. Norman, OK: University of Oklahoma Press.

**Table.** Colorado eastern prairie butterfly species known in each county, 1937 to 2014.

County	Cross (1937)	Brown et al. (1954–1957)	Ferris & Brown (1981)	Stanford 2014 (unpubl.)	Projection (Stanford, unpubl.)	ratio [% known]
Adams	2	8	64	104	106	98.1%
Arapahoe	3	10	90	126	128	98.4%
Baca	2	6	58	88	93	94.6%
Bent	0	0	30	66	71	93.0%
Cheyenne	0	3	13	53	56	94.6%
Crowley	0	0	24	59	63	93.7%
Denver	21	40	86	119	121	98.3%
Elbert	1	7	87	139	144	96.5%
Kiowa	0	1	12	46	53	86.8%
Kit Carson	0	0	28	82	88	93.2%
Lincoln	0	0	32	87	89	97.8%
Logan	0	5	52	86	96	89.6%
Morgan	0	2	50	84	88	95.5%
Otero	0	0	36	71	79	89.9%
Phillips	0	0	28	66	71	93.0%
Prowers	1	46	73	89	93	95.7%
Sedgwick	0	1	63	76	82	92.7%
Washington	0	0	25	79	82	96.3%
Weld	1	10	73	118	126	93.7%
Yuma	0	1	67	86	92	93.5%
<b>Total</b>	31	140	991	1724	1821	n/a
<b>Avg. sp./Co.</b>	1.6	7.0	49.6	86.2	91.1	94.2%



## The Entomology Collection at the Denver Museum of Nature & Science Has a New Home

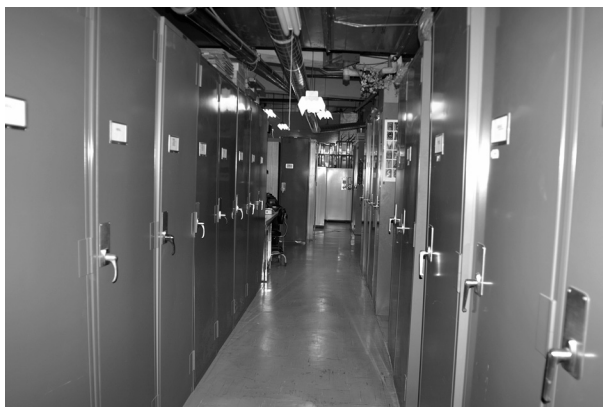
Frank-Thorsten Krell & Jeffrey T. Stephenson

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For the third time, after 1992 and 2009 (Krell 2009), the High Country Lepidopterists meet at the Denver Museum of Nature & Science. This year, the DMNS Entomology Collection approaches one million specimens, but the reason for holding the meeting here is the most significant improvement for DMNS collections in its 114 years history (Johnson et al. 2013): In 2014, the Denver Museum of Nature & Science has completed its largest building project ever, adding, for the first time, a dedicated single space for all collections. A two story underground facility, the *Rocky Mountain Science Collections Center*, was built between September 2011 and February 2014. It comprises 63,000 square feet of collection and work spaces and mechanical rooms, securing an energy-efficient, climate controlled environment with dedicated collections storage and separate work space. The entomology collection is preserved at 68°F ( $\pm 2^\circ$ ) and 45% (winter) to 50% (summer) relative humidity ( $\pm 5\%$ ), with the adjacent work space providing 72°F.



**Figure 1.** The DMNS entomology collection in 2007.



**Figure 2.** The new Zoology collections area in September 2013, still without cabinetry.

The history of the entomology collection was outlined by Krell & Stephenson (2012) in the Program and Proceedings volume of the International Lepidopterists' Conference that we hosted at DMNS in July 2012. From the late 1970s or the early 1980s, the entomology collection was stored in the Zoology Main Range (Fig. 1), a space that was available under what is now IMAX Theater. This space was not purpose-built for collection storage and provided hardly any opportunity for the growth required by re-curation and incorporation of new material. This area is not climate controlled, proved a challenge for clean-up and pest management, and crowded working spaces and aisles into tight quarters. The collection was first stored mostly in old wooden cabinets, and then from the 1980s in Lane and a few Bioquip® cabinets. Before we received our collections improvement grant in 2012, we had 37 cabinets (1,534 sq ft) holding 1,069



**Figure 3.** Moving cabinets with drawers through the new Zoology workshop into the collections area.

Cornell drawers (Fig. 1), with an increasing number of drawers in open storage. With the arrival of the grant, we could add limited additional cabinetry, but ran out of space quickly. By moving into the new collections facility, we went to a storage capacity of 4,792 Cornell drawers in 138 custom-built steel cabinets by Delta Designs, stacked 10 ft high on Spacesaver<sup>®</sup> compactors (5,314 sq ft).

Between 18 and 22 September 2014, 2,200 Cornell drawers were moved into the new storage cabinets in the new building. We started moving the drawers in two 5ft high, double-wide cabinets strapped to flat-bed carts and cushioned inside to avoid horizontal movement of the drawers. Because of a glitch with the freight elevator, we finalized the move with regular, soft tired carts that could fit into person elevators, with thin layers of foam between the stacked drawers. We did not notice breakage of specimens in either mode of transport. Systems that we had devised to keep order in the move had to be reversed when we changed modes of transport, but this was accomplished smoothly. In

major moves, an ability to switch gears rapidly and intelligently when faced with changing circumstances is a plus. The collection is now stored completely in the new building. We placed the current collection in the lower part of the cabinets and use the upper part as growth space for re-curation and future accessions. Types will ultimately be stored in a stationary cabinet on the back wall of the collections room.

Because the main growth areas in the DMNS Entomology program are focused for the foreseeable future on Coleoptera and Lepidoptera, emphasis on planning expansion space for these two orders is accommodated by placing beetles first; all the rest of the collection is in phylogenetic order.

This move accounts for only the dry portion of the insect collection; a separate fluid storage room located two floors above will house all specimens in alcohol, including insects, other than arachnids, which have dedicated fluid storage rooms on the floor between the lower basement and ground floor.



**Figure 4.** Arriving in the new collections area.

### Acknowledgments

We are grateful to staff and volunteers who have helped us with this move: Meghan Truckey, Chris Grinter, David Bettman, Andrew Doll, Kizra Sullivan; and the volunteers Chuck Harp, Heather Luethe, Michael Barger, Tim Johnson, Haley Kline, Kendra Occhipinti, Elaine Perry, Lily Johnson, and Morgana Eckman. A collections improvement grant from the National Science Foundation (NSF DBI-1203367) enabled us to purchase new cabinetry for the DMNS Entomology Collection. This grant, together with a digitization grant (NSF EF-1207186), helped databasing the collection and integrating our data in the Symbiota Collections of Arthropods Network (SCAN).

### Literature Cited

- Johnson, K., Armstrong, B., Colwell-Chanthaphonh, C., Kruger, F., Haglund, K.A. & Krell, F.-T. (eds) 2013. Denver's Natural History Museum: A History. Denver Museum of Nature & Science Annals 4: 1–427.
- Krell, F.-T. (ed.) 2009. Program and Abstracts, High Country Lepidopterists 20th Annual Meeting, October 23 and 24, 2009, Denver Museum of Nature & Science. Denver Museum of Nature & Science Technical Report 2009-8: 1–11.
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## 25 Years High Country Lepidopterists' Meetings

- 1990:** 1<sup>st</sup> meeting (High Plains Lepidopterists), September 14–15, Holiday Inn University Park, hosted by Colorado State University, Entomology Department, Fort Collins
- 1991:** 2<sup>nd</sup> meeting (High Plains Lepidopterists), October 4–5, University of Colorado Museum, Boulder
- 1992:** 3<sup>rd</sup> meeting, September 11–12, Denver Museum of Natural History, Denver
- 1993:** 4<sup>th</sup> meeting, September 18, University of Wyoming, Department of Entomology Insect Collection, Laramie
- 1994:** 5<sup>th</sup> meeting, October 28–29, Holiday Inn University Park, hosted by C.P. Gillette Museum of Arthropod Diversity Colorado State University, Fort Collins
- 1995:** 6<sup>th</sup> meeting, October 20–22, University of Colorado Museum, Boulder
- 1996:** 7<sup>th</sup> meeting, October 25–26, Butterfly Pavilion, Westminster
- 1997:** 8<sup>th</sup> meeting, September 19–20, Holiday Inn University Park, Fort Collins
- 1998:** 9<sup>th</sup> meeting, October 23–24, University of Colorado Museum, Boulder
- 1999:** 10<sup>th</sup> meeting, October 22–23, C.P. Gillette Museum, Colorado State University, Fort Collins
- 2000:** 11<sup>th</sup> meeting, November 3–4, C.P. Gillette Museum, Colorado State University, Fort Collins
- 2001:** 12<sup>th</sup> meeting, September 7–8, C.P. Gillette Museum, Colorado State University, Fort Collins
- 2002:** 13<sup>th</sup> meeting, October 11–12, University of Colorado Museum, Boulder
- 2003:** 14<sup>th</sup> meeting, November 7–8, C.P. Gillette Museum, Colorado State University, Fort Collins
- 2004:** 15<sup>th</sup> meeting, November 5–6, University of Colorado Museum, Boulder
- 2005:** 16<sup>th</sup> meeting, October 21–22, C.P. Gillette Museum, Colorado State University, Fort Collins
- 2006:** 17<sup>th</sup> meeting, October 27–28, University of Colorado Museum, Boulder
- 2007:** 18<sup>th</sup> meeting, November 2–3, C.P. Gillette Museum, Colorado State University, Fort Collins
- 2008:** 19<sup>th</sup> meeting, October 24–25, University of Colorado Museum, Boulder
- 2009:** 20<sup>th</sup> meeting, October 23–24, Denver Museum of Nature & Science, Denver
- 2010:** 21<sup>st</sup> meeting, November 5–6, C.P. Gillette Museum, Colorado State University, Fort Collins
- 2011:** 22<sup>nd</sup> meeting, October 14–15, University of Colorado Museum, Boulder
- 2012:** 23<sup>rd</sup> meeting, October 20, Butterfly Pavilion, Westminster
- 2013:** 24<sup>th</sup> meeting, November 1–2, C.P. Gillette Museum, Colorado State University, Fort Collins
- 2014:** 25<sup>th</sup> meeting, November 7–8, Denver Museum of Nature & Science

# DENVER MUSEUM OF NATURE & SCIENCE REPORTS



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**Cover photo:** *Melemaea magdalena* Hulst  
(Geometridae), collected by DMNS Associate,  
Barbara Bartell, at her house in Gilpin County,  
Colorado (DMNS collection). Photo: Chris Grinter.

*The Denver Museum of Nature & Science inspires  
curiosity and excites minds of all ages through  
scientific discovery and the presentation and  
preservation of the world's unique treasures.*

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Frank Krell, PhD, Editor and Production

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