

The Lepidopterists' Society



*Sandia
mcfarlandi*

40th
Annual Meeting

❖ Albuquerque ❖

July 27-30, 1989

SHOPPING EXCURSIONS

Thursday, July 27

Santa Fe

(contact Steve Cary at 505/473-0830 to make advance arrangements)

Friday, July 28

Juarez, Mexico

Albuquerque Old Town

Saturday, July 29

Taos

Hispanic Weaving Villages (Chimayo, Truchas, Coyote)

Sunday, July 30

Albuquerque Flea Market (real bargains on mid-range weaving,
pottery, and SW silver jewelry)

Indian Pueblos & pottery (Santa Clara, San Juan, San Ildefonso)

Monday, Aug 1

Indian pottery at Jemez Pueblo (in conjunction with Jemez
Mts. field trip)

Rerun of "most-missed" excursions

Airport Transportation to the UNM

The taxi fare from the Albuquerque airport to Hokona Hall at the UNM runs about \$7.00. Hokona Hall does not have a street number. It is a bit south of Lomas Blvd., across Lomas Blvd. from the UNM Hospital.

Registration

Registration will be held from 10 AM to 5 PM on Thursday, July 27, at the Hokona Hall front desk or in the lobby. Guests may also register at the Open House on July 27, or Friday morning during the meeting in the Education Classroom Building.

Residence Hall Check In

Those who opted for the Hokona Hall package and have paid in advance should go to the front desk upon arrival and tell the desk attendant they are with the Lepidopterists' Society. Check-in will be difficult after 10 PM, and attendees should make an effort to arrive before that hour.

Breakfast and lunch are available at the Student Union Building Monday through Friday. There meals are not included by the Residence Hall Package.

The basic Residence Hall package covers room occupancy from 8 AM, Thursday, July 27 to 1 PM, Sunday, July 30. It includes catered breakfast and lunch Saturday and Sunday.

Linen and towels will be provided. Each room has two single beds, mirrors, bookshelves, a work area, and wall lights. A very few rooms have private baths. (These generally are available only to the handicapped.) Each floor has single sex bathrooms with showers, toilets, and wash basins. Rooms are air conditioned.

The catered breakfasts and lunches, Saturday and Sunday, will be served at the Cellar in Hokona Hall. Breakfast will be from 7:00 to 8:15 AM. Lunch will be at 12:30 PM. Meal vouchers will be issued upon check in.

Emergency phone messages may be left at (505) 277-2806. After 10 PM, emergency messages should be phoned to the Campus Police at (505) 277-8255. Outgoing calls can be made from phones located near the Hokona Hall front desk.

Early Arrival/Extended Stay

Hokona Hall operates more or less like a hotel during the summer. If you plan to arrive before July 27 or stay after July 29, tell the front desk attendant when you arrive. Room rates are \$20 per night for two persons sharing a room and \$13 per night for single occupancy.

Late Arrival/Late Registration

It will probably be possible to stay at Hokona Hall on a walk-on basis if you have not pre-registered. The basic package will be \$130 per room double occupancy or \$75 per room single occupancy. Rooms will not be available without the meal package or on a night-by-night basis during the meeting (Thursday night through Saturday night).

Parking

All participants can park in the lot on the north side of Hokona Hall. Parking arrangements should be confirmed at Residence Hall check-in or when you register if you arrive late.

Climate

In late July, daily highs in Albuquerque average about 90°F, and night time lows about 70°F. Afternoon thunderstorms are frequent. Humidity is very low (usually under 20%). The nearby mountains will be about 10° cooler, and more prone to afternoon showers. Don't forget, Albuquerque is at 5000'. Visitors sometimes tire quickly. If you have a heart condition, it would be wise to consult your doctor about the altitude.

Thursday Morning & Afternoon, July 27

10:00 - 5:00 OPEN HOUSE AT DICK HOLLAND'S "CRITTER ROOM"
1625 Roma NE
(2 houses west of University Blvd.)

10:00 - 5:00 REGISTRATION & RESIDENCE CHECK-IN
Lobby, Hokona Hall, or 1625 Roma NE

Thursday Afternoon, July 27

1:00 EXECUTIVE COUNCIL MEETING
Downstairs Conference Room, La Posada

Thursday Evening, July 27

7:30 WINE, CHEESE, & MARGARITAS
At the home of Gloria Caprisicca and Dick Holland
1625 Roma NE
(2 houses west of University Blvd.)

Friday Morning, July 28

8:30 - 12:00 104 Education Classroom Bldg.
LATE REGISTRATION

8:30 (1) WELCOME AND ANNOUNCEMENTS
Steven J. Cary (Santa Fe, NM)

Session 1

Biogeography of Northwestern Mexico and New Mexico

Julian P. Donahue - presiding

8:45 (2) BIOGEOGRAPHY OF NEW MEXICAN BUTTERFLIES
Michael E. Toliver (Eureka College, Eureka, IL)

Based on information gathered for the preparation of a state-wide checklist of New Mexican butterflies, some ideas on the biogeography of these insects will be presented. Community similarity indices and other statistical methods, comparing the faunas of regions within the state, and comparing regions within the state to regions outside the state's boundaries, will be presented. Preliminary results indicate six broad biogeographic regions: 1) A fauna associated with the Rocky Mountain region; 2) A fauna associated with the Great Plains; 3) A fauna associated with the Chihuahuan Desert; 4) A fauna associated with elements from the Sonoran Desert and the Mexican Plateau; 5) A Mogollon Rim fauna and 6) A fauna associated with the Great Basin. A striking fact of New Mexico's butterfly fauna is the complete lack of endemic species. Not even the famous *Sandia mcfarlandi* Ehrlich & Clench is limited to regions within New Mexican boundaries.

9:10 (3) SONORAN ARTHROPOD STUDIES, INC. (SASI) THREE YEARS OLD AND GROWING FAST

Steven J. Prchal (Sonoran Arthropod Studies, Tucson, AZ)

Founded in 1986, SASI brings together the general public and both amateur and professional entomologists sharing common ideas and goals in environmental education and conservation. SASI's programs focus entirely on the arthropods (90% of life on earth) and their relationships with plants, other animals and humans. Through living exhibits and a variety of educational programs, SASI encourages its members and visitors to take a close look at the fascinating world of the arthropods. An Arthropod Discovery Center with butterfly gardens, nature trails, exhibits and research facilities is being developed in Tucson Mountain Park. The facility will house the synoptic collection of the Sonoran Lepidoptera Survey and other collections being developed by SASI. An insect zoo in the city features a variety of living Sonoran Desert arthropods, including leafcutter ant colonies, aquatic insects, and an observation honey bee colony. Volunteers lead groups through the exhibits and provide additional interpretation.

9:30 (4) BUTTERFLIES AND SKIPPERS OF SONORA

Douglas D. Mullins (Tucson, AZ)

Due largely to the efforts of the Sonoran Lepidoptera Survey, more than 290 species of butterflies and skippers have been recorded from Estado Sonora. An overview of this fauna is presented. Since many Sonoran species are not illustrated in any of the popular butterfly books, they are emphasized both in slides and discussion. As this region contains substantial floral diversity, Sonoran plant communities are briefly analyzed.

9:55 COFFEE BREAK

(5) POSSIBLE APPLICATIONS OF DNA-DNA HYBRIDIZATION STUDIES TO ISSUES IN LEPIDOPTERAN PHYLOGENY (POSTER)

Benjamin H. Landing (Woodland Hills, CA)

Possible applications of DNA-DNA hybridization methods in confirming or resolving issues in lepidopteran phylogeny include:

1. Divergences in food-plant and lepidopteran genomes related to segments of Gondwanaland (e.g., Solanaceae-feeders in S. America; *Passiflora*-feeders in S. America and Africa; *Aristolochia*-feeders in S. America and Australian-S. Asian region).

2. Relations of larval-feeders on specific toxic plant groups, e.g., :

euryteline nymphalids: Euphorbiaceae-Sapindaceae-Moraceae
danaids: Asclepiadaceae-Apocynaceae-Moraceae
acraeids: Passifloraceae-Asteraceae
heliconians: Passifloraceae
ithomiins: Solanaceae-Apocynaceae
sphingids: Rubiaceae-Apocynaceae-Solanaceae

3. Are the Australian-S. Asian *Passiflora*-feeding *Cethosia* heliconians?

4. Which of the four possible phylogenetic schemes of DeVries, et al. for the satyrids, morphids, brassolids, amathusids, vanessids and charaxids is preferable? (= are the satyrids, the morphids, charaxids, etc., monophyletic)?

5. Are the Hedyloidea (or Hedyliidae) butterflies or geometroid moths?

6. Are the sphingids the sister-group of the butterfly stem-line (Hesperioidea plus Papilionoidea)?

Numbers 1, 2 and 3 have bearing on aspects of coevolution of plants and herbivores.

Session 1
(continued)

10:15 (6) BAJA CALIFORNIA BUTTERFLIES: A BIOGEOGRAPHIC SCENARIO
John W. Brown (Smithsonian Institution, Washington, DC)

Owing to its unique geographic configuration and latitudinal position, the peninsula of Baja California embraces the transition between the Neotropical and Nearctic biotas. Consequently, the 179 species recorded from the peninsula can be categorized as primarily temperate or tropical in origin, with the number in each category nearly equal. A scenario is presented for the origin of the butterfly fauna incorporating features of dispersal and vicariance, associated with 1) plate actions along the San Andreas fault, 2) Miocene elevations in sea level, and 3) Pleistocene glaciations.

10:40 (7) BIOGEOGRAPHICAL REGIONS OF SONORA, MEXICO
Michael J. Smith (Citrus Heights, CA)

The northwestern Mexican state of Sonora, has a surprisingly rich variety of biogeographical habitats. Understanding these habitat regions, their relationships to each other, and their associations with the rest of Mexico and southwestern United States aids in understanding the varied lepidopteran fauna currently being surveyed there. Five major biogeographical regions dominate Sonora: Sonoran Desertscrub, Sinaloan Thornscrub, Sinaloan Deciduous Forest, Madrean Evergreen Woodland, and Madrean Montane Conifer Forest. In addition to these major regions, several sub-regions seem to influence the distribution of Sonoran

lepidoptera; including the subregions of the Sonoran Desert-scrub, Chihuahuan Desertscrub, Semi-Desert Grassland, and Plains Grassland. These regions are discussed and their relationships to each other and to the associated lepidopteran fauna is characterized. Of special interest is the apparent separation of the Sierra Madre Occidental habitats into two segments, with many lepidopteran species not crossing the separation, or having evolved into sibling species or subspecies.

Session 2
The Genus *Catocala*

Lawrence F. Gall - organizer & presiding

- 11:05 (8) MOTHS MIGRATION, CATOCALA STYLE
Douglas C. Ferguson (U.S. National Museum, Washington, DC)

Nocturnal migration is difficult to detect unless it can be shown clearly that the moths crossed a barrier such as water, or entered an inhospitable region such as one without food plants. Data are presented to show that *Catocala unijuga*, *relictata*, *ilia*, *subnata*, and *cerogama* have made such flights. The first three were collected on Sable Is., Nova Scotia, a treeless sandbar 155 km (97 mi.) from the mainland; *C. ilia* is reported from Newfoundland, where there is no oak; and *C. subnata* and *C. cerogama* were collected in Nova Scotia, where hosts are absent. Possible sources of the moths are discussed.

- 11:25 (9) TAXONOMIC DECISION-MAKING IN WESTERN SALICACEAE-FEEDING UNDERWING MOTHS
David C. Hawks (University of California, Riverside, CA)

The primarily western complex of willow- and cottonwood-feeding Underwing Moths (Noctuidae: *Catocala*) is the source of the greatest degree of taxonomic confusion among North American *Catocala* species. An analysis of geographic variation and of available reliable characters suggests that this complex consists of about 20 recognizable full species rather than 28 as are usually assigned to it.

- 11:50 (10) THORNS AMONG THE ROSACEAE-FEEDING CATOCALA, WITH MONA NOTES
Lawrence F. Gall (Yale University, New Haven, CT)

The monophyletic array of small-bodied Rosaceae-feeding Nearctic *Catocala* is argued to contain only 11 full species. The nomenclature of the array is analyzed, including pending type designations that will stabilize usage. In addition, progress on the Moths of North America (MONA) *Catocala* fascicle is discussed, including demonstrations of computerized county-level mapping schemes, and photographic plans.

- 12:15 GROUP PHOTOGRAPH

Friday Afternoon, July 28
104 Education Classroom Bldg.

Session 3

Endangered Species and Environment Modification
Christopher D. Nagano - presiding

- 1:45 (11) ECOLOGY OF CHESTNUT LEPIDOPTERA (INVITED)
Paul A. Opler (U.S. Fish and Wildlife Service, Fort Collins, CO)

The near extinction of the American chestnut (*Castanea dentata*) due to introduction of the chestnut blight disease from Europe caused the virtual disappearance of mature trees throughout its North American range. The current status of the host and relatives is described. A list of Lepidoptera reported to have fed on American chestnut is presented. A related study on the relationship between tree size and species richness of leaf miners that feed on *Castanea* species in northern Virginia shows a positive relationship akin to those reported that support island biogeographic principles.

- 2:10 (12) INSECT CONSERVATION IN CALIFORNIA: A FEDERAL PERSPECTIVE
Christopher D. Nagano (U.S. Fish and Wildlife Service, Sacramento, CA)

California is the epicenter of species extinction in the continental United States. This is due to the impact of a skyrocketing human population on a flora and fauna with a large number of endemic species. A half dozen Californian insects are known to have become eradicated since the turn of the century. Many of the endemic arthropods are found in specific habitats such as vernal pools, coastal and inland sand dunes, desert and mountain springs, salt marshes, coastal beaches, and free-flowing rivers. There are eleven California insects listed as endangered or threatened species under the Endangered Species Act of 1973, as amended, by the federal government. The ecology and biogeography of these animals are discussed along with information on their past and current status.

Session 4

Everything You Wanted to Know about Monarchs (But Were Afraid to Ask)
Christopher D. Nagano - presiding

- 2:35 (13) IS DOGBANE A HOSTPLANT OF THE MONARCH BUTTERFLY, *DANAUS PLEXIPPUS*?
Susan Sullivan Borkin (Milwaukee Public Museum, Milwaukee, WI)

Dogbane and other members of the genus *Apocynum* (Apocynaceae) have been reported to be *D. plexippus* hostplants, along with members of the milkweed family (Asclepiadaceae), since 1873. Hostplant selection by *D. plexippus* is determined by the female's choice of plants on which to oviposit and by larval acceptance or rejection of plants for feeding. I conducted a series of feeding experiments, along with surveys in the field, to examine the acceptability of two *Apocynum* species to *D. plexippus*. The

results indicate that *Apocynum* spp. are not hostplants of *D. plexippus*.

2:55 COFFEE BREAK

- 3:15 (14) HAIRPENCIL CHEMICALS, MILKWEED BUTTERFLY CLADISTICS & EVOLUTION - WHAT ARE THE QUESTIONS?
R.I. Vane-Wright (British Museum [Natural History]) and M. Boppre' (University of Freiburg, West Germany)

All milkweed butterflies (Nymphalidae, Danainae) appear to be aposematic in both larval and adult stages. Up to 20 or more species can occur in a single habitat. Such local assemblages are usually divisible into a maximum of about seven adult mimicry groups with, in some cases, up to eight or more species belonging to a particular ring. This suggests that non-visual communication amongst these insects is likely to be very important, at least for mate recognition and mate choice.

Work over the past 20 years has revealed that sexual communication amongst danaines is complex, involving a number of special co-adaptations. Based on this knowledge, a wide array of fundamental evolutionary problems can be recognized. In addition to widespread pyrrolizidine-alkaloid-derived pheromones such as danaidal and hydroxydanaidal, many species have highly complex and specific pheromonal "bouquets" - do these play a critical role in species-specific signalling or not?

- 3:40 (15) WIND, A KEY ENVIRONMENTAL FACTOR ASSOCIATED WITH THE MONARCH BUTTERFLY OVERWINTERING HABITAT
K.L.H. Leong (Cal Poly University, San Luis Obispo, CA)

Wind velocity was the key environmental factor separating cluster, post cluster and non-cluster sites. Cluster sites had low wind, light intensity, solar radiation and higher vapor pressure deficit values that either the post or non-cluster sites. The non-cluster site had the highest values for wind, light intensity and solar radiation.

- 4:05 (16) NOTES ON MONARCH BUTTERFLY (*DANAUS PLEXIPPUS*) WINTERING ECOLOGY IN THE SANTA MONICA MOUNTAINS OF SOUTHERN CALIFORNIA
Walter H. Sakai (Santa Monica College, Santa Monica, CA) and Christopher D. Nagano (U.S. Fish and Wildlife Service, Sacramento, CA)

Monarch butterflies spend the fall and winter months at the mouths of a number of coastal canyons in the Santa Monica Mountains of southern California. We have conducted extensive field studies of the ecology of these sites since 1985. Information on the population sizes, sex ratios, intercolony movement patterns, spring migration behavior, and other information is presented.

- 4:30 (17) A NEW EARLY RECORD OF THE MONARCH BUTTERFLY [(*DANAUS PLEXIPPUS* (L.): *DANAIDAE*)] IN CALIFORNIA
John Lane (Santa Cruz City Museum) and Julian P. Donahue (Los Angeles County Museum of Natural History)

A Monarch butterfly captured by Chamisso and Eschscholtz when the von Kotzebue expedition visited the San Francisco Bay region in October, 1816, appears to be the earliest record of the species in the state. This record is among the earliest butterfly records from the state, and suggests the Monarch is a native California species. Implications for Vane-Wright's "Columbus Hypothesis" of the Monarch's spread beyond North America are discussed.

Informal Discussion

- 4:55 (18) THE ASSOCIATION FOR TROPICAL LEPIDOPTERA AND THE ATLAS OF NORTH AMERICAN LEPIDOPTERA
John B. Heppner (Florida Dept. of Agric., Gainesville, FL) and Thomas C. Emmel (University of Florida, Gainesville, FL)

The new Association has been formed for the support of studies on all aspects of tropical and subtropical Lepidoptera worldwide. The association is a non-profit organization that will publish "Tropical Lepidoptera" beginning in 1990 as a semi-annual (or quarterly) journal for scientific articles and more popular articles reporting on studies within the goals of the Association. Profits that may accrue to the Association, through member donations, will be used for the support of studies and projects on tropical and subtropical Lepidoptera. Current projects of the Association include the Atlas of Neotropical Lepidoptera, the new Atlas of North American Lepidoptera, and the Lepidoptera of Taiwan, with a private publisher involved for publication of these book series. The Association also publishes a Newsletter, "Tropical Lepidoptera News".

The Atlas of North American Lepidoptera will commence in 1990 as a subscription series of loose-leaf species pages on North American butterflies and moths, each species covering 2 or more pages of text and color illustrations of adults and larvae. The initial set will include all the Papilionidae and a checklist of the family for North America (to Mexican border). Format will be 8½ x 11 inches for all Association publications noted above.

- 5:20 ORGANIZATIONAL MEETING FOR THE FIELD TRIPS AND SHOPPING EXCURSIONS

Friday Evening, July 28
Home of Gloria Caprisecca and Dick Holland
1625 Roma NE

7:00

Barbecue

- 8:30 Slide Feast (please bring 6-8 35mm slides of species or trips of interest)

Saturday Morning, July 29

104 Education Classroom Bldg.

Session 5

Revisions and Descriptions

Jacqueline Y. Miller - presiding

- 8:30 (19) *AMBLYSCIRTES*: PROBLEMS WITH SPECIES, SPECIES GROUPS, LIMITS OF THE GENUS, AND GENUS GROUPS BEYOND (HESPERIIDAE)
John M. Burns (Smithsonian Institution, Washington, DC)

The taxonomic rank of two similar appearing, closely related, allopathic differentiates which, at present, are variously treated as species or subspecies is critically analyzed. Most closely related to this pair is another, rather different looking pair of differentiates currently misplaced in a separate species group of *Amblyscirtes*. Yet another species that looks very like an *Amblyscirtes* assuredly is not! Some neotropical skippers to which *Amblyscirtes* has clear ties are nowhere near it in Evans's arrangement of genus groups within New World hesperiines. In detecting and correcting errors at all these levels, I lean heavily on genitalia.

- 8:55 (20) FURTHER ADVENTURES WITH WEST INDIAN HESPERIIDAE: A REEVALUATION OF THE GENUS *RHINTHON*
Jacqueline Y. Miller and Lee D. Miller (Allyn Museum, Sarasota, Florida)

The paucity of documented specimens of the genus *Rhinton* from the West Indies has presented a problem for a complete revisionary study. Our recent discovery of *Rhinton cubana* in eastern Puerto Rico lead to the reevaluation of the taxonomy of the genus, and the preliminary results question the current taxonomic assignment of *R. bushi*. The biogeographic implications and the possible affinities of *Rhinton* with the endemic West Indian genus *Holguinia* are discussed.

- 9:15 (21) MOLECULAR PHYLOGENY OF THE HIGHER DITRYSIA: PRELIMINARY RESULTS
Tim Friedlander and Dorothy Pashley (Louisiana State University, Baton Rouge, LA)

Phylogenetic hypotheses of higher ditrysiian relationships are being constructed and tested using nucleic acid sequence data. Homologous, short portions of both the large and small subunit ribosomal RNA molecules have been sequenced for representatives of the major lineages of Ditrysia, with special emphasis on the non-tineoid superfamilies. Some degree of resolution in the phylogeny of higher Ditrysia is already apparent, and these hypotheses will be presented with regard to Scott's [*J. Res. Lepid.* 25(1,1986):30-38] treatment of macrolepidopterans and

other phylogenies based on morphological data. A plea for additional material to be included in this study will be voiced.

9:40 (22) REVISION OF *EUNICA* (NYMPHALIDAE) AND CRITERIA FOR DIAGNOSING SPECIES AND SUBSPECIES IN EURYTELINAE

Dale W. Jenkins (Allyn Museum, Sarasota, FL)

Eunica is a relatively large neotropical genus of the subfamily (or tribe) Eurytelinae. Of the 126 described taxa, 62 were synonymized and 45 species and 22 subspecies are recognized, including four new taxa. *Eunica* is a well-characterized monophyletic genus which includes the monotypic genus *Libythina*, here newly synonymized. It is most closely related to *Cybdelis* and to the African genus *Sallya* from which it is clearly separate.

While revising twelve genera of neotropical Eurytelinae, distinct infraspecific populations were observed frequently. Ten diagnostic criteria were used for distinguishing species from valid subspecies, including range distribution, intergrades, and morphological characters. Subspecies recognition excluded clinal, seasonal, and phenotypic variation, "75% rule", and minor microgeographic or local races, hybrids, intergrades, polytypes and aberrations. Of 428 described taxa nearly 200 (mostly subspecies) were synonymized with a need for describing only 20 new taxa.

10:10 COFFEE BREAK

10:30 (23) DOES *MITOURA MILLERORUM* OCCUR IN NEW MEXICO?

Robert K. Robbins (Smithsonian Institution, Washington, DC)

There are 3 published hypotheses concerning the identity of specimens in the *Mitoura spinetorum* complex with a ventral hindwing basal line from the Sacramento Mountains, New Mexico. (1) These specimens are aberrants of *M. spinetorum*. (2) They are *M. millerorum* while those specimens without the basal line are *M. spinetorum*. (3) They are *M. spinetorum* because it and *M. millerorum* are the same species. I determine whether there are 1 or 2 species in the *M. spinetorum* complex in the Sacramento Mountains and make preliminary remarks on the relationship of *M. spinetorum* to *M. millerorum*.

10:55 (24) TWO NEW SUBSPECIES OF *CALLOPHRYS APAMA* FROM NEW MEXICO & MEXICO

Glenn A Gorelick (Citrus College, Glendora, CA)

Within a subgenus I earlier termed a superspecies, the two described subspecies of *Callophrys* (*Callophrys*) *apama* are allied within the *C. dumentorum* complex. They are characterized by a relatively consistent complete white submedial band of punctations on the hindwing undersides or the mere presence of only several such markings. Specimens under study since 1981 from the Sacramento Mountains of New Mexico and the Sierra Madre Occidental of Mexico exhibit wing scaling features which suggest that

they are from differing populations. Bionomic and distributional data accumulated for these four rather isolated phenotypes representing this taxon suggest that clinal variation is not a factor.

- 11:20 (25) A NEW SPECIES OF *COLIAS* FROM THE INTERMOUNTAIN REGION
Clifford D. Ferris (University of Wyoming, Laramie, WY)

A new species of *Colias* related to the *C. alexandria* complex has been described from Utah. It also occurs sporadically in Idaho and extreme eastern Washington. The males manifest an ultraviolet reflectance pattern unique among the North American *Colias*. This species occupies a distinctive environment niche. Photographs of the adults and several habitats will be presented.

- 11:40 (26) TESTING NOMINAL SPECIES BOUNDARIES USING GENE FLOW STATISTICS: THE ADMIRAL BUTTERFLIES (*LIMENITIS*, NYMPHALIDAE) IN WESTERN NORTH AMERICA(S)
Adam H. Porter (University of California, Davis, CA)

Butterfly taxonomy has been particularly controversial and subjective at the species level. The contact area between *Limenitis lorquini* and *L. weidemeyerii latifascia* was analyzed electrophoretically at 18 enzyme loci, and analyzed using gene flow statistics (N_m) to test the prevailing taxonomic interpretation that they maintain separate gene pools. A gene flow rate above one individual exchanged among populations every two generations ($N_m = 0.5$) is sufficient to unite strongly the gene pools of the two taxa. Gene flow was high within taxa, (between *weidemeyerii* subspecies; $N_m = 0.70$; between *lorquini* segregates, $N_m = 133.9$) as well as between *w. latifascia* and *lorquini* ($N_m = 0.98$). *Weidemeyerii* and its subspecies are best considered as univoltine subspecies of *lorquini*.

Saturday Afternoon, July 29
104 Education Classroom Bldg.
Session 6
Life Histories, Usual and Unusual
John Lane - presiding

- 1:10 (27) THE EXPERIMENT WITH PROLONGED DIAPAUSE IN *PRODOXUS Y-INVERSUS*: THE 20TH YEAR CLASS IS THE LARGEST
J.A. Powell (University of California, Berkeley, CA)

Several species of prodoxid moths have emerged after spending 4-8 years in diapause, a time span that is similar to the maximum reported for various other insects. Emergences of 120 and 61 *P. y-inversus*, synchronized within 14-16 day periods, were obtained in 1985 and 1986, from cocoons of the 1969 generation, collected from *Yucca baccata* in Nevada in April, 1970. During April and May, 1989, 150 adults of *P. y-inversus* eclosed, 20 years after their larval feeding. The delayed development was correlated with exposure to colder winters than in preceding years. A series of suboptimal winters may condition larvae to develop more

readily in circumstances that would not have been effective in promoting development in an early year.

1:35 (28) LIMACODIDS IN MOTION: BIOLOGY AND ACROBATICS OF SLUG CATERPILLARS

Marc E. Epstein (Natural Museum of Natural History, Washington, DC)

Larval stages in limacodid moths are unique among free feeding Lepidoptera in the absence of abdominal prolegs, moving by peristaltic waves of their ventral surface. A film made in collaboration with Kjell Sandved will show locomotion, feeding and cocoon building behaviors.

2:00 (29) INFESTATION OF *DASYLIRION* (LILLIACEAE) BY LARVAE OF *DARTIS HOWARDI* HY. EDW. (ARCTIDAE; PERIOPINAE)

Gregory S. Forbes (New Mexico State University, Las Cruces, NM)

In April of 1986, numerous late instar larvae of *Dartitis howardi* Hy. Edw. were observed feeding on *Dasyilirion wheeleri* Wats. (sotol) in the Dona Ana Mts. north of Las Cruces, New Mexico. In the infested area, damage to sotol leaves was extensive. Larvae chewed through the indurate leaf edge, cutting off the marginal spines, and consumed adjacent fibrous tissue. This large arctiid appears to overwinter as a mid-to-late instar larva and seems able, at least locally, to switch from composite (e.g., *Brickellia*) hosts to the rigid, fibrous leaves of Lilliaceae.

2:20 (30) JUVENILE BIOLOGY AND SYSTEMATICS OF THE AMERICAN KITE SWALLOWTAILS (PAPILIONIDAE: GRAPHIINI)

Keith S. Brown, Jr. (UNICAMP, Brazil)

The species relationships of the American kite swallowtails are still unclear, since adult morphology permits only very tentative groupings and most juveniles have not yet been described. Recently, over 20 of the 40 species have been reared in Mexico, Panama, Colombia, Venezuela and Brazil. Larval and pupal characters show that *agesilaus* and *asius* are members of the *marcellus*-group, with the former very close to *philolaus* (*oberthueri* is probably a hybrid between them), while *epidaus* may be as close to *thyastes* as to *marcellus*, and *bellerophon* is near *dolicaon*. The remaining *protesilaus*-group and mimetic *ariarathes*-group form well-segregated, compact monophyletic units. The rearing out of several "species" from single egg lots requires a number of synonymizations; larvae can also be strongly polymorphic.

- 2:50 (31) AN ESTIMATE OF THE NUMBER OF LARVAE IN THE SPRING CATERPILLAR COMMUNITY OF *QUERCUS AGRIFALIA* IN AN URBAN SITUATION
J.A. Powell (University of California, Berkeley, CA)

After 2 seasons of severe spring defoliation, California Coast Live Oaks were sprayed with Sevin. Samples of fallen caterpillars were taken from 3 areas that comprised 2 m², from under 3 trees judged to be in poor, good, and intermediate condition. In excess of 2,900 larvae were counted; the total was made up of at least 17 species of Lepidoptera, including 51.4% Tortricidae, 37.7% Geometridae and 5.4% Gelechiidae, and 2 or 3 species of Hymenoptera (Tenthredinidae) (3.6%). Assuming the samples represent a random distribution of larval density in the canopy, an average sized *Q. agrifolia* support more than 75,000 caterpillars during the height of spring foliation. Most of the Microlepidoptera species, but only a few of the macromoth fauna found in nearby natural areas, were present.

- 3:10 COFFEE BREAK

Session 7
Evolution

Steven J. Cary - presiding

- 3:30 (32) DEVELOPMENTAL EFFECTS OF SOME COLOR PATTERN GENES IN *HELICONIUS* (INVITED)
H.F. Nijhaut (Duke University, Durham, NC), G.A. Wray (Duke University, Durham, NC), and L.E. Gilbert (University of Texas, Austin, TX)

The color patterns of *Heliconius*, like those of other butterflies, are built up of an array of serially homologous pattern elements known as the nymphalid groundplan. An analysis of the phenotypic effects of a number of color pattern genes has revealed that each alters the expression (color, position, size) of only a single element of the groundplan or of a row of serially homologous elements.

- 3:55 (33) DIVERSITY AND AFFINITIES OF HIGH ANDEAN AND AUSTRAL SOUTH AMERICAN THECLINAE--IMPLICATIONS ON OUR VIEW OF THE SOUTH AMERICAN HAIRSTREAK FAUNA
Kurt Johnson (American Museum of Natural History, New York, NY)

Revisionary results on fourteen thecline genera with primarily high Andean or austral distributions (or major components in these regions) are reviewed. Old ill-studied material plus recent collections by Herrera, Eisele, MacPherson and Shapiro show (1) much higher diversity than expected; (2) divergent, undescribed, sister taxa of many hairstreaks hitherto considered limited to the "nuclear" South American fauna. Sister groups of high Andean and austral Theclinae are generally other widespread Neotropical groups; high Andean and austral Theclinae are often

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- 4:20 (34) INTRASPECIFIC SIZE VARIATION IN EASTERN NORTH AMERICAN LEPIDOPTERA(S)
Marc C. Minno (University of Florida, Gainesville, FL)

Moths and butterflies exploit a considerable range of resources during the larval stages. Most species are external leaf feeders, but some eat beeswax, dead leaves, fungi, mosses, lichens, seeds, flowers, and other insects. Although diet is an important factor contributing to intraspecific size variation in Lepidoptera, the largest and smallest adults of most species differ only by 1.5 times or less. Very few species show intraspecific size differences greater than a factor of 1.5, and these belong to diverse taxonomic and feeding guild groups.

- 4:40 (35) HOW *CYDIA* SPECIES GOT THEIR BODY SIZES (TORTRICIDAE)
William E. Miller (University of Minnesota, St. Paul, MN)

Cydia comprises some 240 species on six continents. Larval habits are known for one-third of the species. Half eat seeds, half other host tissues. Forewing length averages 7.0 mm among seed eaters, 1.2 mm more than among the others. This difference is significant ($P < 0.01$, Wilcoxon two-sample test), and denotes 75% heavier bodies. Seed eaters also vary more in forewing length ($P < 0.01$, variance-ratio test), a condition accounted for by correlation with host seed-weight ($\tau = 0.32$, $P < 0.01$). Seeds are more nutritious than other host tissues, enabling seed eaters to grow larger. *Cydia* body sizes are genetically fixed adjustments to food quality and food content per host seed.

- 5:00 (36) GEOGRAPHIC DISTRIBUTIONS OF INFERIOR WING SURFACE PATTERNS OF *CALLICORE* AND ALLIED GENERA -- ? MIMICRY SYSTEMS
Benjamin H. Landing (Woodland Hills, CA)

The seventy neotropical butterfly species in genera *Callicore*, *Diathria*, *Cyclogramma*, *Paulogramma* and *Catacore* show regional differences in frequency of inferior hind wing patterns. Four categories can be proposed:

<u>Property</u>	<u>Regions of High Frequency</u>	<u>General Category</u>
High # spots	Mexico, Central America, Colombia, Ecuador, Peru, Bolivia	Montane/Andean pattern
Low # spots	Mexico, CA, Venezuela, Guianas, Brazil	Caribbean coast pattern
Intermediate # spots	Central Northern SA	Amazonian/ Orinocan pattern
Low # spots	Paraguay, Uruguay, Argentina	Southern pattern

These relations differ from those for upper wing surface patterns, for which high altitude and abequatorial patterns are similar. The data raise the question of mimicry systems, using inferior wing surface patterns, directed at predators of sitting butterflies.

Saturday Evening, July 29

Holiday Inn

2020 Menaul Blvd. N.E.

(corner of University Blvd. and Menaul Ave.)

6:30

Attitude Adjustment Hour

7:30

Banquet

8:30

Presentation of Awards

Karl Jordan Medal

John A. Comstock Award

9:00

Presidential Address

(37) WHY CAN'T LEPIDOPTERISTS BE MORE LIKE BOTANISTS?

Julian P. Donahue (Natural History Museum of Los Angeles, Los Angeles, CA)

An exploration of the similarities and differences between lepidopterists and botanists and their respective roles in understanding, interpreting, and conserving our natural environmental heritage, with a proposal for establishing a national Lepidoptera agenda.

9:30

Door Prizes
Charles V. Covell, Jr.

Sunday Morning, July 30
104 Education Classroom Bldg.

Session 8

Distributions

Lee D. Miller - presiding

- 8:30 (38) REPRODUCTIVE DIAPAUSE AND SEASONAL MIGRATION PATTERNS IN THE COSTA RICAN PIERID, *EUREMA DAIRA*
Boyce A. Drummond (Natural Perspectives, Woodland Park, CO), Thomas C. Emmel (University of Florida, Gainesville, FL), William A. Szelistouski, (Universidad de Costa Rica)

In the seasonal deciduous forests of Guanacaste Province in NW Costa Rica, *Eurema daira* passes the dry season in the adult stage. Although widespread during the wet season, adults migrate to moist areas at the onset of the dry season, forming large aggregations in brushy areas along streams. Individuals in these aggregations appear to be in reproductive diapause, as no courtship, mating, or oviposition occurs. In this study, weekly samples of male and female *E. daira* were collected across the dry season/wet season boundary in 1987 and 1988 and were dissected to determine reproductive status: fat storage, egg loads, and number of spermatophores in females; spermatogenesis in males. Our results show that *E. daira* adults enter reproductive diapause at the beginning of the dry season, regain reproductive capacity at the onset of the wet season, and that the diapause has both a behavioral and physiological basis.

- 8:55 (39) WESTERN MOTH ATLAS PROJECT
Paul A. Opler (U.S. Fish and Wildlife Service, Fort Collins, CO)

A project to produce distributional atlases for families of moths that occur in the West has been initiated. These atlases should help fill the void that exists due to the absence of other publications that give specific information on the occurrence of western moths. Unlike similar butterfly atlases, records will be included in the atlas only on the basis of authoritative revisions or determinations of actual specimens contained in, or destined to be deposited in institutional collections. Sight records or data from material in collections not slated for deposition in an institutional collection will not be included.

- 9:15 (40) A COMPARISON OF THE BUTTERFLY FAUNAS OF THE SOUTHERN BAHAMAS; ARE THE BAHAMAS HOMOGENEOUS?
Lee D. Miller (Allyn Museum of Entomology, Sarasota, FL)

Whereas, the butterfly faunas of the northern Bahamas almost all lie on the Great Bahamas Bank, probably were connected in the Pleistocene and are homogenous, the faunas of the southern Bahamas are highly diverse because they lie on separate banks. Crooked and Acklins share a bank, but Mayaguana and both Inaguas

lie on their own separate banks, and each set of islands harbors butterflies derived from diverse sources. Possible mechanisms to explain present butterfly distribution in the southern Bahamas are analyzed and discussed.

- 9:35 (41) NOTES ON THE MICROLEPIDOPTERA OF KENTUCKY
Charles V. Covell, Jr. (University of Louisville, Louisville, KY)

The historical contributions of V.T. Chambers and Annette F. Braun are outlined in the context of the Kentucky Lepidoptera Survey, begun in its present form in 1964. Progress in collection, identification, and data collection for Kentucky microlepidoptera from 1964 to present is presented in the context of the 66 families and 2,230 species now on record from the Bluegrass State.

In Memoriam

- 10:00 (42) ALEXANDER (BILL) BARRETT KLOTS
David L. Wagner (University of Connecticut, Storrs, CT)

Perhaps more than any other worker during his time, Bill popularized lepidopterology. His writings and excellent photographs are familiar to generations of butterfly and moth collectors around the world. His works ranged from popular articles in magazines and encyclopedias to taxonomic revisions and six books on butterflies and other insects. Best known was his "Field Guide to the Butterflies."

Bill was an avid field man, and among the few lepidopterists to collect all families of North American butterflies and moths, from minute nepticulids to his favorites, the pierids and Crambinae. He had a special passion for arctic, alpine, and bog Lepidoptera, especially *Colias* and *Boloria*. Aspects of his life are discussed, emphasizing those lepidopterological.

- 10:20 COFFEE BREAK

Session 9

Reproductive Curiosities

Charles V. Covell, Jr. - presiding

- 10:40 (43) PARTHENOGENESIS AND VIVIPARITY IN LEPIDOPTERA (INVITED)
Donald Ray Davis (Smithsonian Institution, Washington, DC)

Although generally rare among Lepidoptera, parthenogenetic reproduction does occur in several species of Psychidae. The cytological mechanism in Lepidoptera, automatic parthenogenesis, whereby the zygotid condition of the egg is restored after normal meiosis by fusion of two zymoid nuclei, will be reviewed. Polyploidy, which is often associated with parthenogenesis in Psychidae, will also be briefly discussed. Viviparity likewise is frequently associated with parthenogenesis and occurs sporadically among Lepidoptera and most commonly within the Tineoidea.

- 11:00 (44) BUTTERFLY CHASTITY BELTS: DO THEY WORK?
Boyce A Drummond (Natural Perspectives, Woodland Park, CO)

Chastity belts first appeared in the Middle Ages, their invention no doubt spurred by anxious crusaders reluctant to trust in the conjugal faithfulness of their wives and mistresses during an extended absence. Similar, if less invidious, structures occur in the animal world, the result of selection on males to delay or prevent remating by their mates. In many Lepidoptera, the female's genital opening is temporarily blocked after mating by a male-produced plug, which serves to retain seminal fluids in the female reproductive tract. In Parnassiinae (Papilionidae), however, these plugs (called sphragides) are quite large and are presumed to prevent additional copulations, although this hypothesis has never been tested. Here I report on a survey of female Parnassiinae, in which spermatophore counts were used to determine the efficiency of the sphragis.

- 11:20 (45) THE MATING SYSTEMS OF PRIMITIVE LEPIDOPTERA
David L. Wagner (University of Connecticut, Storrs, CT)

Available information on the mating systems of basal lepidopteran lineages and assorted Trichoptera suggests that Lepidoptera primitively possessed a female-released, long-range sex attractant, and that cases to the contrary represent special derivations. Support for this position obtains from a review of published literature, field observations, and the apparent absence of male scent structures and recognizable male calling behaviors among the pre-Neolepidoptera.

- 11:45 (46) BUTTERFLIES AND BEEFBURGERS? IN PRAISE OF AN INTERNATIONAL CUISINE!
P.R. Ackery (Natural History Museum, London)

Studies on the relatively depauperate butterfly fauna of Australia suggest that diversity is not associated with endemic plant novelty at the family level. The butterfly fauna of Africa is some ten times larger than that of Australia. Hostplant data accumulated for the late R.H. Carcasson's forthcoming *Catalogue of Afrotropical butterflies* facilitates a direct comparison between the African and Australian butterfly faunas. The diversity of the African butterfly fauna will be surveyed in relation to the known hostplant preferences.

12:10

Business Meeting
104 Education Classroom Bldg.

Sunday Afternoon, July 30

1:30 FIELD TRIP (WEATHER PERMITTING)
Sandia Crest via Sandia Tramway

Tram fare is \$9.00. It often rains in Albuquerque on July afternoons. Be prepared for spectacular scenery and possibly marginal collecting conditions.

Monday, July 31
8:30 FIELD TRIP TO JEMEZ MTS.
(Pajarito Peak and Jemez Springs Areas)

8:30 FIELD TRIP TO MAGDALENA MTS.
(Water Canyon and Rio Grande)

August 1-7(?)
FIELD TRIP TO CHIHUAHUA
Copper Canyon and Basaseachic Falls Areas

Some camping may be involved. Don't plan to do this trip hurriedly. A train ride through the spectacular Copper Canyon to the Pacific is a possibility. Bring proof of citizenship and something for digestive upsets. If you plan to drive, be sure to obtain Mexican insurance, or you can be detained in a Mexican jail indefinitely. Also, bring the title to your vehicle and, if you don't own your vehicle outright, a letter of permission from the lien holder to take the vehicle into Mexico.

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Sponsor: UNM Biology Department

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