Utah Lepidopterist

Bulletin of the Utah Lepidopterists' Society

Volume 7 - Number 1 **February 1997**

UTAH LEPIDOPTERISTS' SOCIETY HOSTS 43rd MEETING OF THE LEPIDOPTERISTS' SOCIETY PACIFIC SLOPE SECTION

Initiated by President John Richards during the January, 1995 U.L.S. Meeting and then orchestrated by member Joel Johnson, the Utah Lepidopterists' Society hosted the 43rd Annual Meeting of the Pacific Slope Section of The Lepidopterists' Society. The successful gathering was held between 19 and 21 July, 1996 at the Great Basin Environmental Education Center in Ephraim Canyon, Sanpete County, Utah.

Nestled at an elevation of 8600' in the Manti-La Sal National Forest, the Great Basin Environmental Education Center was originally built as a Forest Service Experimental Station. Today, it is managed by Snow College, which currently oversees the many workshops and seminars held there during the summer months.

The forested scenery of the camp for the three-day meeting was breathtaking. Those who attended the meeting had plenty of opportunities to collect both at GBEEC as well as along Skyline Drive--the popular north-south road traversing the Wasatch Plateau. Some of the species of lepidoptera encountered in the area were *C. cephalica, C. barnesi, G. williamsi, G. vermiculata, L. weidemeyeri*, *S. atlantis, E. anicia*, *N. menapia*, as well as others.

Although the preparation for the meeting was handled by Joel, a number of other U.L.S. members participated as well. Tom Spalding and John Richards headed up the welcoming committee and handled registration for the meeting at Snow College on Friday afternoon. Friday night activities included a Turkey barbeque and a "bring-your-own" slide presentation. (A complete summary of the meeting agenda is available on page 20.)

The Saturday meeting was conducted by the 1996 U.L.S. President, John Richards. Ten major presentations represented the bulk of the Saturday meeting; three of which were given by U.L.S. members' Tom Spalding, Bob Mower, and Todd Stout. Other members attending the meeting were Steve Sommerfeld, Ken Tidwell, and Bob Hardbarger. Tom Spalding gave an interesting history of his grandfather Thomas U. Spalding who was one of the state's three main early collectors. Bob Mower provided a thorough slide presentation on the Arctiidae of Utah (see page 12.)

Also included in this edition of ***Utah Lepidopterist***—see page four--is a complete copy of the paper that Todd Stout submitted on the four Utah varieties of *P. indra*. One of the reasons why Todd selected *Papilio indra* as his paper is because of the butterfly's varying habitats mirroring Utah's wonderfully diverse scenery. Todd's paper and slide presentation also included suggestions on how to find and take care of *indra* immatures. The presentation also prompted several others in attendance to make the short venture from GBEEC down to Utah's San Rafael Swell to search for larvae of *P. indra minori* and *P. bairdi*. (Please see Vern Covlin's article.)

Perhaps one of the biggest treats of the meeting was the banquet held on Saturday Night at Snow College. The banquet was conducted by Joel. This year's recipient of the Comstock Award was John Hinchliff of Portland, Oregon. John recently published his latest book, "An Atlas of Washington Butterflies" to accompany his earlier work on the butterflies of Oregon. A written pamphlet honoring John's accomplishments was written and handed out by Dr. David McCorkle while the award was presented by Ron Leuschner.

Joel Johnson also was a recipient of an unannounced award presented by the Utah Lepidopterists' Society for all of his devotion and dedication in putting the meeting together. The banquet later held a door prize where an interesting array of lepidoptera books, specimens, T-shirts, and other knick-knacks were distributed to those present in a randomized drawing.

Sunday morning marked the conclusion of the meeting with the business portion being conducted by Julian Donahue at the Center. During the meeting, June Preston was nominated the Comstock Award recipient for 1997. The 1997 meeting will be held between June 6 and June 8 at Meadow Valley, Plumas County, California. The meeting was then adjourned until that time.

B→F; L→R: Julian Donahue, Floyd Preston, Richard Gillmore• Ron Leuschner, Sheryl Stout, Todd Stout• John Vernon, Ray Albright, Vern Covlin, Patti Ensor• Richard Brown, John Lane, Don MacNeill• and John Hinchliff. (Photo by John Richards.)

Utah Lepidopterists' Society
Monthly Meetings - 1997

Date:	Place:	Presenter/Subject
8 Feb 1997	Salt Lake City*	Jack Harry--1996 Collecting Trip in Alaska
8 Mar 1997	Provo**	Joel Johnson--Flower Moths of Utah.
12 Apr 1997	Salt Lake City	Clyde Gillette--Observations of *A. phyciodoides* in MX..
10 May 1997	Provo	Bob Hardbarger--Collecting in Europe.
13 Sep 1997	Salt Lake City	John Richards--Pacific Slope Section Meeting 1997.
11 Oct 1997	Provo	Todd Stout--Raising Utah Melitaeinae.
8 Nov 1997	Salt Lake City	**Annual Business Meeting.** Clyde Gillette. Topic open.
14 Dec 1997	Provo	Joel Johnson Topic open.

* Meetings in Salt Lake City at the Utah Museum of Natural History are still to be held in Room 319.

** Meetings in Provo at the Monte L. Bean Life Science Museum are scheduled to be held in Room 315. However, arrive prepared to be relocated to another nearby room at the discretion of the University. (I.e, the museum library.)

Thank You!

1996 marked the highest membership rate in many years with 30 paid members! Dues for 1997 are now due! Please send $10.00 to our new treasurer, Bob Hardbarger in care of the the Utah Lepidopterists' Society. Bob's address is 279 West 205 North, Orem, UT 84057. Thanks. The Editor

1997 U.L.S. EXECUTIVE OFFICERS

President:	Todd L. Stout
Vice President:	Joel M. Johnson
Secretary:	Robert J. Hardbarger
Treasurer:	Robert J. Hardbarger
Editor:	Todd L. Stout
Past President:	John Richards

The *Papilio indra* complex in Utah

By Todd L. Stout

20 July 1996

Introduction:

Previous lepidoptera publications describing the *Papilio indra* complex have labeled it as rare, fragile[1], isolated, and so forth. For example, William H. Howe describes it as follows: "*The Papilio indra complex shows a considerable degree of geographic variation, especially in the southern parts of its range. Throughout its range the species is generally uncommon and specimens are rare in collections.*[2]"

Clifford D. Ferris and F. Martin Brown add, "*Because of its isolated habitats, indra is poorly represented in collections.*[3]" Furthermore, according to John Adams Comstock, speaking of *P. indra indra* in Calif, "*is one of our rare species, occurring in the higher altitudes of the Sierras...It is a difficult butterfly to capture, being rapid and erratic in flight.*[4]" (Italics added.)

But today, because of work by researchers and by many collectors who have become impassioned with *indra*, we know that it is not only more common than previously perceived, but also, it is well represented in some collections. In fact, according to C.F. Gillette[5], *P. indra* has been recorded in every county in Utah save four; Sanpete, Iron, Wasatch, and Piute.

The *Papilio indra* complex in Utah flies in a variety of habitats from desert swells, reefs, and limestone hills to the tops of the Wasatch Mountains. In fact, the butterfly has even been seen crossing valley floors between mountain ranges! It is true that *indra* does fly in some hostile environments. Its population numbers have been known to fluctuate drastically from year to year depending upon climate and parasitism. The large colony of *P. indra minori* just south of the San Rafael River, Emery County, was all but depleted between 1993 and 1995 due to heavy parasitism. Fortunately, this year (1996), *minori* has made a recovery there. (Please see page 13.) One of the population stabilizing mechanisms of *indra* is the fact that their pupae can prolong diapause for several years in order to insulate against harsh or unfavorable conditions.

One of the attributes that gives *indra* such an appeal to some collectors is its beauty coupled with its geographic variation. The indra swallowtail's geographic variation is peculiar in the effect that colonies which fly in moist montane habitat such as *P. indra indra* show much less individual variation than do colonies from the desert or from a semi-arid origin such as *P. indra nevadensis* or *P. indra minori*. The same phenomenon also seems to occur in California as montane colonies of *pergamus* and *indra indra* show a lower degree of individual variability as compared to the desert races of *fordi* and *martini*.

Utah currently has four varieties of *indra*; three named subspecies which include the typical race, *minori, nevadensis*, and one unnamed variety, "bonnevillei." Unlike like its cousins from the *machaon* group, *Papilio indra* adults are not sexually dimorphic. In many Utah habitats, excepting most colonies of *P. indra minori* and *P. indra nevadensis*, *indra* flies sympatric with *Papilio zelicaon*; the former usually flying 7 to 10 days after the latter. The two species also share many of the same larval foodplants. However, *zelicaon* generally has a broader range of foodplants as compared to *indra*.

Although difficult and time-consuming, many collectors have been able to obtain attractive series of the different varieties of *indra* through rearing its caterpillars. One of the difficulties of rearing *indra* in the lab is the few species of plants--usually in the *Lomatium* and *Cymopterus* genera--which the caterpillars will accept. Obtaining these specific plants many times requires long distance travel. Another problem with raising *indra* in the lab, which can be overcome through practices later.

Others have obtained a decent series of some races of *P. indra* by collecting adults on the wing. Although Comstock describes the butterfly as being difficult to capture and erratic in flight, a little patience can overcome this obstacle through observation. In other words, *indra* males oftentimes will repeat their "erratic" courses as they fly similar aerial routes and land generally in the same spots. By predicting this repetitious behavior, specimens can be netted more easily. Some higher altitude males of *P. indra indra* exhibit this repetitive flying behavior, and have even been known to pause from their aerial stunts in order to land and bask on snow banks! (I.e. Bountiful Peak, Davis County, Utah.)

Females, on the other hand, are much easier to capture as they more casually flitter in the vicinity of their larval hostplants. (The only exception to this is females of *P. indra minori* which tend to traverse their habitat in search of larval hostplant with much more haste.)

Left: *P. i. indra* 4th instar on *L. kingii* from Bountiful Peak, Davis County, UT.
Middle: *P. i. minori* 4th instar on *C. terebinthinus* from San Rafael Swell, Emery County, UT.
Right: *P. i.* "bonnevillei" 5th instar on *L. grayi* from Little Drum Mountains, Juab County, UT.
Bottom: *P. i. minori* 5th instar on *L. junceum* from Window Blind Peak, San Rafael Swell, UT.

5

PART II: THE FOUR UTAH VARIETIES OF *PAPILIO INDRA*

Papilio indra indra

General:

The Type Locality of *P. indra indra* is vicinity of Empire, Clear Creek County, Colorado; Reakirt 1866. It is the shortest tailed race; some individuals exhibiting nothing more than a "stub." The nominate race is univoltine. The flight period in Utah varies depending upon elevation, snowfall, and larval hostplant. In the Bear River Mountains and in other isolated locations along the Wasatch Front where *indra indra* utilizes *Lomatium grayi var. grayi* between the elevations of 5000' to 7000', *indra* flies from mid-May to late July.

On the other hand, higher up in the Wasatch Mountains, where the larval hostplant (*L. kingii*) grows at around 8000' to 10,000', the flight period varies from around mid June to early September.

Utah Distribution and Habitat:

As discussed previously, the montane habitat of *P. indra indra* includes the Wasatch, Oquirrh, Stansbury, Bear River, and Uinta Mountain Ranges. Higher altitude males patrol and perch all day in search of females. Some of these males have been known to descend several thousand feet to canyon floors to nectar near rivers. (I.e, Provo Canyon, Utah County, and Big Cottonwood and Millcreek Canyons, Salt Lake County.)

Bionomics:

As stated earlier, the principal larval foodplant for *P. indra indra* in the Wasatch Mountains is *Lomatium kingii* (narrowleaf lomatium), and the larval foodplant in the Bear River Mountains is *Lomatium grayi var. grayi* (milfoil lomatium.)

The ova is yellow-green and is laid principally on healthy plants' peripheral ventral stalks. After a day or so, the ova develops rings and then turns black before hatching. From the time an egg is laid to the time it hatches is roughly six days in nature and five days in the lab. (Assuming room temperature.)

The young first instar larva is black with a thin, white saddle. As the larva moults into later instars, small white and yellow-orange speckles appear. Larvae of *P. indra* are much more timid than those of *P. zelicaon.*

The mature larva varies from black with off-white stripes to nearly all black with small yellow-orange dots. Hibernation is as pupa. For some reason, most lab-reared pupae emerge after two years of winter. Some pupae have been known to diapause for up to seven years.

Papilio indra minori

General:

The Type Locality of *P. indra minori* is Black Ridge Breaks, Mesa County, Colorado; Cross 1936. *Minori* is one of the most beautiful races of *P. indra*. Its large size with long tails combined with thin to intermittent cream bands and generous blue dorsal hindwing scales are diagnostic. Adults display a significant amount of individual variation. The bands on some individuals of *minori* are completely obsolete; showing the phenotype of what essentially is a black and blue swallowtail. It is the opinion of the author that this form *kaibabensis* which most authorities treat as a distinct subspecies really is a genetic drift morph of *minori* for two reasons. First, the *kaibabensis* form appears at least seldomly in mostly all *minori* populations. Again, its just an example of individual variation. Second, the habitat and bionomics of the two taxa are virtually indistinguishable.

Males hilltop on the tops of reefs, buttes, or even sheer peaks in search of females. In fact, *minori* males have shown intense aerial battles against one another in competition for females. Females, on the other hand, oftentimes fly in lower portions of buttes, or even in desert floors or swells in search of its larval hostplant. (Females only hilltop once to mate.) It is multivoltine depending upon rainfall; with up to three broods per year.

Utah Distribution and Habitat:

The distribution of *minori* in Utah is extensive. According to W.H. Whaley[6], over 50 distinct colonies can be found over Central to South-Southeastern Utah badlands. This distribution includes, but is not limited to, the West Tavaputs Plateau, Cedar Mountain, San Rafael Swell, San Rafael Reef, Capitol Reef National Monument, Henry Mountains, Cockscomb Ridge, La Sal Mountains, Abajo Mountains, and Monument Valley south to Northern Arizona.

Bionomics:

The larval hostplants of *minori* differ depending upon venue. In the San Rafael Swell, Cedar Mountain, San Rafael Reef, Capitol Reef National Monument areas, larvae utilize *Lomatium junceum* (rush lomatium.) At the Cockscomb Ridge, Monument Valley, and Abajo Mts, larvae use *Lomatium parryi* (parry desert parsley.) Also at Monument Valley and areas adjacent to Moab, larvae use *Cymopterus terebinthinus* (rock springparsley.) All of these larval hostplants are unique because they, for the most part depending upon rainfall, stay green and healthy from spring until fall; which accounts for the butterfly's ability to have multiple generations in one year.

The ova is yellow-green; developing rings and then turning black before hatching. The young larva is black with a white saddle. It is interesting to note that young *minori* larvae have a broader white saddle than young *indra indra* larvae have. The large mature larva is gorgeously arrayed with bright pink and black stripes strewn with orange dots. Immatures, unfortunately, are heavily subjected to several varieties of parasites. Egg parasites have recently been discovered in addition to the ever-so-prevalent small wasp parasites that kill third instar larvae and maggot parasites that kill fifth instar larvae. Hibernation is as pupa.

Papilio indra nevadensis

General:

The Type Locality of *P. indra nevadensis* is Jett Canyon, Nye County, Nevada; Emmel and Emmel 1971. In Utah, *P. indra nevadensis* is also known as *P. indra nr. nevadensis.* It is a long tailed race of *indra*. Amongst all the varieties of *indra* in Utah, *nevadensis* shows the most drastic example of individual variation with specimens looking like *fordi, martini, panamintensis,* and even *pergamus*. *Nevadensis*, for the most part, is univoltine with less than 1 percent of lab-reared pupae emerging during the same year. Adults of the Nevada Swallowtail fly early in the year; from mid to late March to early May.

Utah Distribution and Habitat:

The distribution of *nevadensis* in Utah is restricted to Washington County. Among other habitats, the butterfly is most easily encountered in Navajo sandstone hill country North and Northeast of St. George. It is also found in the Beaver Dam Mountains, Leeds Canyon and rumored to fly in the Pine Valley Mountains as well. One type of habitat where *nevadensis* seems to be less common is the Lava Ridges because of the absence of its larval hostplants there.

Bionomics:

Nevadensis immatures utilize two species of *Lomatium* in Washington County. In the vicinity of St. George, *Lomatium scabrum* (cliff lomatium) is the larval hostplant. Leaflets of *L. scabrum* burn off by mid to late May; which accounts for its one brood. However, leaflets of *Lomatium parryi,* which is its foodplant in the Leeds Canyon area, do not burn off until the fall. As such, it is plausible that *nevadensis* could at least have a partial second brood in the vicinity of Leeds Canyon. Admittedly, more research needs to be done in this area.

Under typical conditions, females will only lay on healthier *L. scabrum* plants located between rocks or at the base of desert washes because these plants will thrive long enough to support the larva to maturity. However, in certain years, when population numbers are extremely high, it is interesting to note that females sometimes will oviposit on plants that cannot support the larva to maturity. Some Navajo Sandstone hills North of St. George do not have *Lomatium scabrum* on them except for North-facing washes and slopes. These hostplants only exist and survive there for two reasons: First, these washes and slopes accumulate more moisture and can support the roots of these plants. Second, plants in this area receive less direct desert sunlight as compared to south, east and west facing slopes.

The mature larva is similar to *P. indra minori* and is striped with bright pink-peach and black bands with yellow-orange spots. The pupa is salmon in color and camouflages well against Navajo Sandstone. As is true with all subspecies of *indra*, hibernation is as pupa.

***Papilio indra* "bonnevillei"**

General:

Currently, "bonnevillei" is an unnamed race of *Papilio indra*. The subspecies name was originally created by C.F. Gillette[7] prior to 1986, but was never formally described. Currently this unnamed race, also regarded as "West Desert *indra*" by local collectors, is being researched and considered to be named as a subspecies by W.H. Whaley[8].

The presenter of this paper feels that "bonnevillei" should have subspecific recognition for several reasons: First, "bonnevillei" is geographically isolated from *nevadensis* or *nr. nevadensis*. Second, *P. indra nevadensis* never have short-tailed morphs; *P. indra* "bonnevillei" does. Third, over a long series, "bonnevillei" has consistently more blue in the dorsal hindwings as compared to *nevadensis.* Fourth, some "bonnevillei" females exhibit extremely wide dorsal forewing bands that rival even *P. indra fordi* let alone *nevadensis*. Fifth, *nevadensis* documented larval hostplant *Lomatium scabrum* grows where "bonnevillei" flies. However, to date, "bonnevillei" immatures have not been found on it. Sixth, mature larvae of "bonnevillei" are drastically different to Washington County *nevadensis*.

"Bonnevillei" is short to medium tailed, and has one flight per year. The flight varies depending upon winter precipitation. At 5000', "bonnevillei" generally flies from mid to late April through to mid to late May.

Utah Distribution and Habitat:

Colonies of "bonnevillei" exist in many North-South ranges in Utah's West Desert including but not limited to the Dugway Range, Thomas Range, Fish Springs Range, House Range, Confusion Range, Little Drum Mountains, and Wah Wah Mountains. All of these mountain ranges contain Limestone and exist in the vicinity of what was Lake Bonneville. These limestone hills is where the larval hostplant grows.

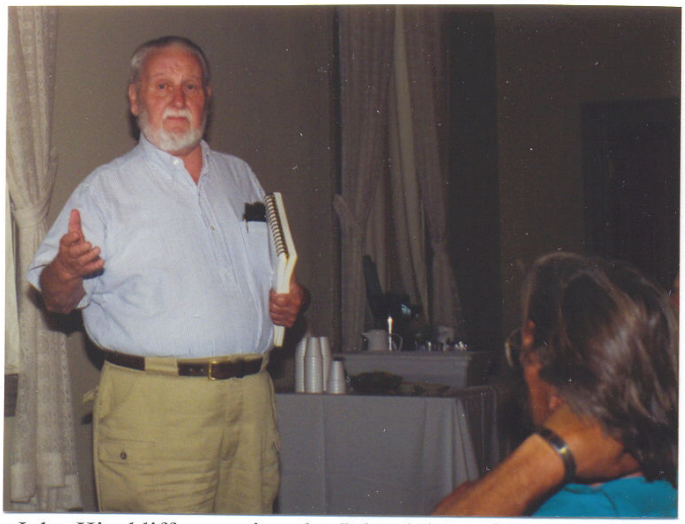
Bionomics:

The larval hostplant is *Lomatium grayi var. depauperatum.* This plant seems to die off faster than any other host of *indra*. The young larva has perhaps one of the most slender white saddles as compared to other subspecies of *indra*. As the larva matures, this saddle has been known to disappear altogether. Third instar larvae of "bonnevillei" change their resting position to the base of the hostplant where they are difficult to find. The mature larva has two basic forms from mostly black with tiny yellow dots to black with medium cream bands. The mature larva somewhat resembles the larva of *P. indra indra.*

Continued on Page 15.

1996 PACIFIC SLOPE SECTION MEETING OF THE LEPIDOPTERISTS' SOCIETY

U.L.S. Members' Ken and Donna Tidwell.



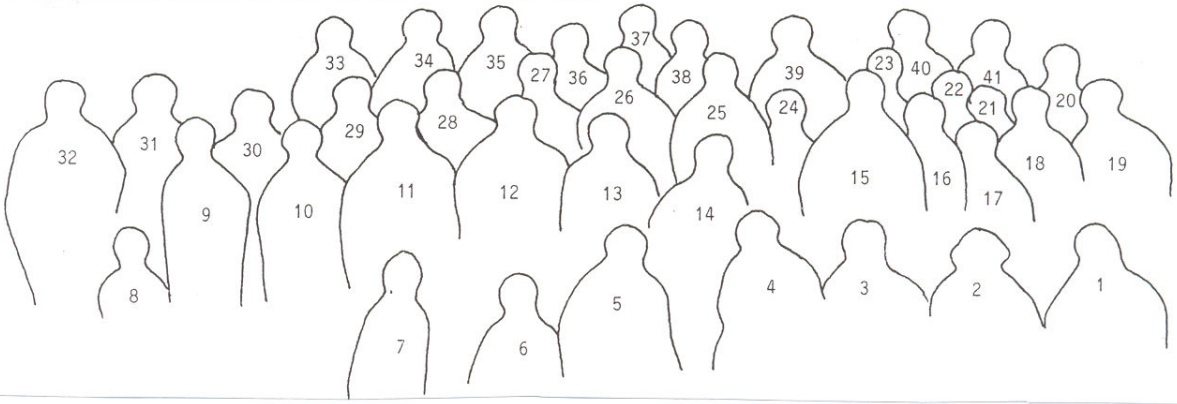
John Hinchliff accepting the John Adams Comstock Award.

Todd Stout posing his new *A. sara* T-Shirt.

(Back) Felix Sperling, Ronald Robertson, and John Brown.
(Middle) Ray Stanford.
(Front) Philip Krutzch, Donna and Ken Tidwell.

Photos by John Richards.

1996 PACIFIC SLOPE SECTION MEETING GROUP PHOTOGRAPH:



1. John Vernon, California
2. Robert Mower, Utah
3. John Richards, Utah
4. John Lane, California
5. Joel Johnson, Utah
6. Evelyn Langston, Calif.
7. Patti Ensor, Oregon
8. Douglas Hansen's son, Cal.
9. Dorothy Krutzsch, Arizona
10. Florence Hinchliff, Oregon
11. John Hinchliff, Oregon
12. Richard Gillmore, Arizona
13. Robert Langston, Calif.
14. June Preston, Kansas
15. Kenneth Tidwell, Utah
16. Donna Tidwell, Utah
17. Jeanne Leuschner, Calif.
18. Beth Brinkman, Colorado
19. Bart Brinkman, Colorado
20. Todd Stout, Utah
21. Sheryl Stout, Utah
22. Floyd Preston, Kansas
23. Andrew Baier, California
24. Ray Albright, Oregon
25. Ray Stanford, Colorado
26. Philip Krutzsch, Arizona
27. Ronald Robertson, Calif.
28. Richard Brown, California
29. Vern Covlin, Oregon
30. Don MacNeill, Calif.
31. Douglas Hansen, Calif.
32. Thomas Spalding, Utah
33. David McCorkle, Oregon
34. Samantha Brown, Calif.
35. Jeromy Guy, California
36. Felix Sperling, Calif.
37. Julian Donahue, Calif.
38. Jerry Powell, Calif.
39. Ron Leuschner, Calif.
40. Jeff Baier, California
41. John Brown, California

Photo: Steve Sommerfeld, Utah

CHECKLIST OF UTAH ARCTIIDAE 1996

Pericopinae:

8037 *Gnophaela vermiculata*

Lithosiinae (Lichen moths:)

8050 *Crambidia impura*
8051 *Crambidia casta*
8053 *Crambidia cephalica*
8066 *Cisthene tenuifascia*
8070 *Cisthene angelus*
8074 *Cisthene barnesii*
8083 *Lycomorpha grotei*
8084 *Lycomorpha regulus*
8086 *Lycomorpha splendens*
8087 *Lycomorpha pholus*
8091 *Hypoprepia cadaverosa*
8092 *Hypoprepia inculata*
8094 *Bruceia pulverina*
8095 *Bruceia hubbardi*
8125 *Homomelina fragilis*

Arctiinae (Tiger moths:)

8126 *Leptarctia californiae*
8127 *Parasemia plantaginis*
8129 *Pyrrharctia isabella*
8131 *Estigmene acrae*
8137 *Spilosoma virginica*
8138 *Spilosoma vagans*
8140 *Hyphantria cunea*
8144 *Hypercompe permaculata*
8152 *Arachnis picta*
8153 *Arachnis apachea*
8154 *Arachnis midas*
8162 *Platarctia parthenos*
8165 *Platarctia lapponica*
8166 *Arctia caja*
8168 *Kodiosoma otero*
8174 *Grammia obliterata*
8175 *Grammia virguncula*
8177 *Grammia ornata*
8179 *Grammia nevadensis*
8180 *Grammia geneura*

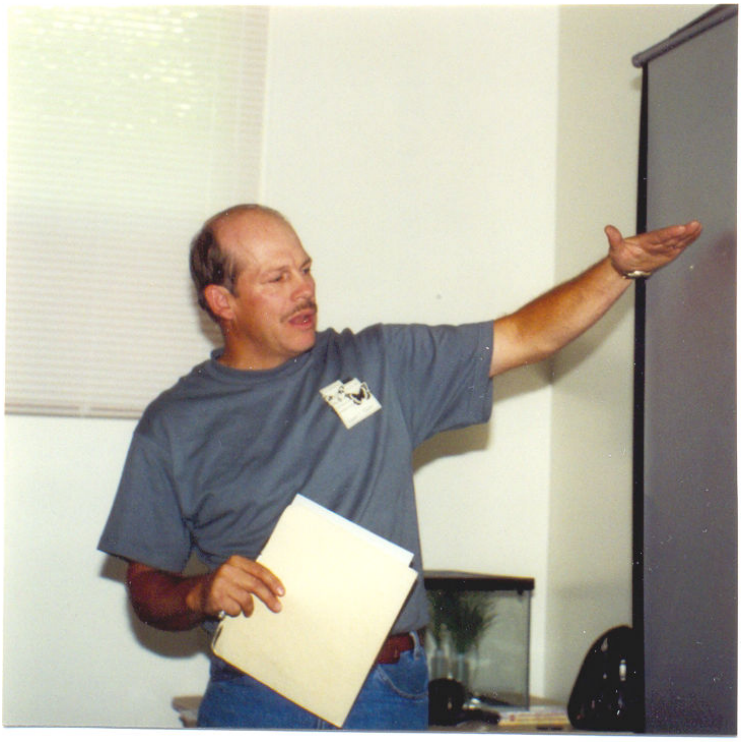
Arctiinae (ct.:)

8186 *Grammia williamsi*
8189 *Grammia f-pallida*
8194 *Grammia phyllira*
8196 *Grammia parthenice*
8197 *Grammia virgo*
8181 *Notarctia proxima*
8203 *Halysidota tessellaris*
8208 *Lophocampa ingens*
8209 *Lophocampa argentata*
8214 *Lophocampa maculata*
8218 *Aemelia ambigua*
8221 *Hemihyalea labecula*
8231 *Cycnia oregonensis*
8249 *Ectypia clio*
8250 *Pygarctia murina*
8254 *Pygarctia spraguei*
8258 *Bertholdia trigona*

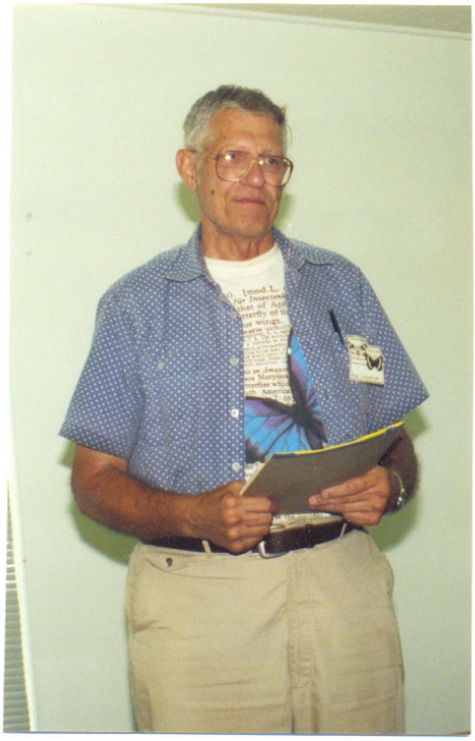
Tenuchinae (Wasp moths:)

8267 *Cisseps fulvicollis*

Robert C. Mower
July 1996



U.L.S. Member Bob Mower



L.S. Publications Mgr. Ron Leuschner

A Utah Afternoon
with Dr. David McCorkle and Patti Ensor

On the afternoon of July 21, after the end of an excellent Pacific Slope meeting of The Lepidopterists' Society, Dr. McCorkle suggested to Patti Ensor and myself that we should look for caterpillars of *P. indra minori* at a location 2 miles south of the bridge on the San Rafael River, Emery County, Utah.

We started by traveling east over the Wasatch Plateau from the Great Basin Environmental Education Center (elevation 8,600'), cresting the pass at 10,150 feet. We stopped to enjoy the view and visit a moment with Floyd and June Preston and Julian Donahue. Patti noticed that Julian's personalized license plate is "ARCTIID" and she couldn't resist taking a picture.

We headed down the mountain side, stopping a few times to explore interesting sites. We drove past Joes Valley Reservoir through Orangeville to Highway 10, then south a couple miles to the unpaved Green River cutoff road. Now heading east away from Highway 10, the road traveled through very desolate country along dry waterways.

After traveling some 10 to 15 miles, I noticed a plant, *Artemisia dracunculus*, that hosts the Oregon swallowtail (*P. bairdi* f. *"oregonius."*) along the Columbia River in Oregon. We stopped to check the plants for larvae and found a large green caterpillar on the first plant! Looking around, there were many more host plants; so, we thought we had really hit it good. After almost an hour of looking on prime condition plants, we still hadn't found another caterpillar. Since we were really looking for *indra*, we decided to move on.

Around a couple of corners, we came to a large over-hanging sandstone cliff with beautiful Indian paintings on it. We stopped for Patti to take pictures of them. While she was doing that, I looked for more caterpillars with no success.

In about 8 to 10 more miles, we came to the bridge that had been *identified* as a key marker. We traveled past it exactly 2 miles, finding ourselves on a flat with dry hills to the east, a dry river wash to the west and very little greenery. We found two different plants that looked like this area's *P. indra minori* host, *Lomatium junceum*; so, David pulled out a sample food plant from his briefcase. We decided the smaller of the two plants was correct. We started looking, and looking, and looking. After ½ to ¾ of an hour, Patti yelled that she had found one larva. I came running to see. It was a newly hatched, black and white patched caterpillar much like the Oregon swallowtail's first instar. Dave came over, looked, and informed us (with a delighted smile) that he had found a fifth instar black and pink (yes, pink) caterpillar after digging deep into the middle of a plant that looked like it had been eaten.

We found two or three more small caterpillars near Patti's first find. Dave called us over and showed us how to more quickly locate newly hatched caterpillars*. After hatching, the larvae chew a notch on one side of a plant's leaf, then on the other side, alternating long the leaf. The blade eventually looks like a saw blade. Within another hour or two, we found several more caterpillars--most small and newly hatched, two or three medium sized, and one additional large pink and black fifth instar caterpillar.

By now, the sun was setting, painting the hills with vibrant desert colors. It was time to leave and start back to Ephraim. As we drove south to Interstate 70, we came across a herd of wild donkeys which quickly moved off the road so that we could continue. We drove west on I-70 into the sunset with our memories of a successful CCT (Caterpillar Capturing Trip.)

Vern Covlin
Pendleton, OR

Editor's Note: *Special thanks go out to Patti Ensor and Vern Covlin who gave permission to re-print this article which originally appeared in Volume 11--Number 2 of the "Northwest Lepidopterists' Association Newsletter." It's a lot of fun to see visitors of the state discover (or re-discover) the popular collecting sites known by local collectors as the "Buckhorn Wash spot for P. bairdi" and the "San Rafael River Bridge/Window Blind Peak spot for P. indra minori." Credit is also due to Jack Harry who directed Dr. McCorkle as to where to find the most well-known minori population in the state, and to Col. Clyde F. Gillette who originally found larvae in the area in June of 1982.*

THE JOHN ADAMS COMSTOCK AWARD 1996
The Person We Honor: John (NMI) Hinchliff

For his 34 years as a Lepidopterists' Society member, for his countless hours of tabulating NW lepidoptera distribution data resulting in two atlases, and especially for sharing his wealth of information, unfailing enthusiasm and good humor, we honor John Hinchliff with the John Adams Comstock Award.

John was born January 14, 1915, at Hampstead Heath, a suburb of North London. He caught his first butterfly, a cabbage white, at the age of six. At 13, he attended a boarding school, Dover College, at Dover, Kent, in the south of England. A year later, in 1929, he caught his first and only English *Papilio machaon*, even then a rare species in that country.

Upon completion of boarding school, John aspired to enroll at Cambridge in Entomology; but, for primarily economic reasons, took instead a five-year course at the Architectural Association School of Architecture in London, enrolling in 1933 and receiving his Honorary Diploma in 1938.

To finish his education, he visited the U.S. to study building techniques in New York and Boston for two months. After completion of this period and at a friend's suggestion, he traveled to the West Coast in a 1935 Ford Roadster Convertible he purchased for $325. He spent two months traveling to Los Angeles via Montreal, Chicago, and a good many National Parks. This was during the depression; so he had little competition on the road. Living in then smog-free L.A. was "addictive" to John; so he stayed and got a job. It was here in 1939 that he met his wife-to-be, 17 year-old Florence O'Brien, a ballet dancer who had come to L.A. from Sydney, Australia, with her mother.

Three years later, John found himself in the armed services, seeing duty in Italy, Corsica, France, and Germany. After the war, he returned to L.A. where he worked in architecture for four years. It was in 1949 during a stopover in New York on a trip to England to visit his parents that John again encountered Florence, who was working for Cande Nast (Vogue) Publications as a fashion editor.

After returning to the U.S. from his England visit, he stayed in N.Y. to court and finally marry Florence in 1952. Soon they put their belongings in a U-Haul and headed for the Pacific Coast, looking for the ideal place to raise a family. Traveling via L.A., they went on to San Francisco. That city, however, was saturated with architects. Through a contact in Portland, Oregon, he learned that there was an opportunity there. Within two days of his arrival, he had three job offers. He chose to work for Skidmore, Owings and Merrill, a firm with branches in other major cities which had recently been associated with Pietro Bellaschi, Oregon's most noted architect. During his illustrious career in Portland, John worked on the design of shopping centers, the Memorial Coliseum, and the Hilton Hotel while with S.O. & M. Later, in his own practice with two partners, he designed libraries, a community center, and dormitories at Reed and Marylhurst Colleges, as well as churches, commercial buildings, and residences. Meanwhile, three daughters were born. Pamela in 1953, Melanie in 1955, and Rosalind in 1956.

In 1959, on architectural business, John went to Australia and New Guinea. He took his net along, and had opportunity to collect butterflies extensively. A notable catch was a specimen of the ullyses swallowtail at Bulolo. All this material was lost, however, by an unfortunate loan after his return to Australia. While there, John was influenced by a lepidopterist, David Crosby, who recommended that he join the Lepidopterists' Society, which he did upon his return to Oregon. He also me John Landy in Australia, the second to break the 4 minute mile and thus a national hero. Landy was also well known as "the butterfly man." (Undoubtedly chasing fast butterflies had something to do with his prowess as a runner.)

In 1962, John returned to Oregon with his interest in butterflies rekindled. Here he began serious collecting. He was encouraged and helped by people such as Stan Jewett Jr., Bill Neill, and Ernst Dornfeld--the 1985 Comstock Award recipient. Bill Neill has been an especially close butterflying friend with whom John has spent many pleasant hours afield over the years.

In 1980, a group of lepidopterists who, in addition to John, included Bob Pyle, Jonathan Pelham, Jon Shepherd, and David McCorkle, met at the Burke Museum on the University of Washington campus to formulate plans for a survey of the butterflies of the Pacific NW.

(Cont. on page 20.)

PART III: HINTS ON FINDING IMMATURES OF *PAPILIO INDRA:*

Hint #1

Females prefer to oviposit on the underside of short--sometimes very short--stalks or leaflets along the periphery of the larval host plant; basically belonging to the genera *Lomatium* or *Cymopterus*. Many times these short, peripheral stalks point tangentially away from the general direction of the rest of the stalks on the plant.

Hint #2

Many plant species in these two genera are rock formation or soil specific. For example, in order to find any larval host plant for *Papilio indra minori*, it is first necessary to find the appropriate type of Moenkopi Shale, Chinle, or Navajo Sandstone.

Hint #3

As *indra* immatures grow, they change their preferred resting places.

Ova through third instar:

Look first for where an egg is most likely to be have been laid. (See Hint #1.) If an empty eggshell is found, then look nearby for *indra* chew marks. Young *indra* larval chew marks show a unique skeletonizing effect on the leaflet, and can assure you that either a young larva either is, or recently was on the host plant. If chewmarks are found, turn over that leaf. If the larva is not in sight, one of two possibilities exist: Either it has died, or it has grown and become at least a third instar, and has changed its preferred resting position. **Note: Third instar is the phase when an *indra* larva most drastically changes its resting preference.**

Third and Fourth instar:

As stated earlier, third instar larvae move away from the periphery of the food plant. They then prefer to rest on the bottom one-fifth portion of more centralized stalks of the host plant. Finding them can be difficult; even for experienced collectors! At this point, a technique of getting on your hands and knees and patiently sifting through every stalk is required. Sometimes this sifting can become a long and tedious task. However, patience and skill usually will enable you to find the larva. As larvae grow and become fourth instar, looking again for chew marks and even frass can be helpful. Instead of seeking out the peculiar skeletonizing chew marks of a first or second instar, look for stalks with entire leaflets missing and stalks chewed down. Also, using tweezers is especially critical while seeking out third and fourth instars as larvae fall off of the plant when disturbed.

Fifth instar:

When a fourth instar moults into its final stage, it may, for a day or so, maintain a rest position similar to that of a typical third or fourth instar; on a center stalk at the base of the plant. However, fifth instars also may leave the plant altogether and rest on the dirt, in a shallow crevice, or on a rock adjacent to the host plant. During this stage, fifth instars can be equally as difficult to find as third or fourth instars, or they can be surprisingly easy to encounter.

Hint #4

Seek out large, healthy, and lush host plants within a colony. Females prefer to oviposit on healthy host plants because it increases the chance that the larva will thrive and pupate. (Obviously, female oviposition preference is an instinctive process; not a cognitive one.) These plants are healthy because of their root systems. Host plants with unusually healthy root systems are such because of two reasons: First, they received more water; second, they are more protected from direct sunlight as compared to other individual plants. Healthy host plants are most commonly manifested as plants situated between rocks, plants located in desert washes or at the base of a desert wash protected from the sun by a rock cliff, or plants on mountain slopes which receive more hours of shade than do other individual host plants. Other host plants which thrive; but not necessarily due to healthy root systems, are plants that have been pruned. By pruning plants in the summer or fall, whether it be by livestock or by collectors creating egg traps, new growing stalks thrive because they are not impeded by the previous year's dead stalks.

Hint #5

Look for isolated host plants within a colony. Many times, if the colony is large and host plants for *Papilio indra* are plentiful, finding larvae by looking on all of the healthy host plants can still be monotonous. In order to alleviate this problem, it is best to seek out small pockets within the colony where host plants are more scarce. With fewer host plants to lay on, it is more likely that a larva would be found on any given plant within the pocket.

Hint #6

Examine the peripheral plants in a colony. An experienced collector oftentimes will map out where the host plants start and where they stop in order to assess the host plant's distribution boundary. With females flying in and out of the boundaries of the distribution of the larval host plant, many times plants scattered along this periphery are visited much more often than are similar plants located in the interior of the colony.

Hint #7

Most of the time, from generation to generation, or from year to year, *P. indra* females tend to oviposit on the same individual plants. Therefore, if your collecting needs requires repeated visits over a few years, first investigate individual plants that you know have yielded immatures on previous visits.

Hint #8

Bring tweezers. As briefly discussed earlier, *indra* larvae fall off the host plant with the uttermost slightest disturbance. (Always use your hand to secure the larva in the event that it falls as you pull the stalk.)

Distance shot (Above) and closeup (Right) of *P. indra minori* host *Lomatium junceum* taken in San Rafael Swell, Emery County, UT. Note *minori* ova in lower right portion of closeup photo.

PART IV: HINTS ON REARING IMMATURES OF *PAPILIO INDRA*:

Introduction:

Those who have reared *P. indra* in the lab know that it is a learning yet frustrating experience because of how easily immatures can die. Whether to rear *indra* in a closed or open container basically is a function of numbers. For those who are into "mass rearing," you may want to consider the "open aquarium method." This method tends to be much riskier yet less labor intensive than the "closed container method." However, because of the author's repeated success in rearing *indra* in closed containers, the hints that follow will focus on that discipline.

The two main airborne microorganisms that can aggressively infect and kill any lepidoptera larvae--including *P. indra*--are viruses and bacteria. Microbial death is most commonly caused by two major problems; feeding larvae unsuitable foodplant--See Hint #2--and overexposing them to their own frass--See Hints #4 and #5.

It is true that viruses and bacteria thrive in a closed container type of environment. However, the hints that follow show how you can easily neutralize this disadvantage. The **huge** advantage of rearing *indra* in a closed container; one that justifies all the extra time it requires, is the fact that the status of microbial contamination in any given container is independent to that of any other container. Let's assume for a moment that you closely adhere to the following hints, and, although unlikely, one caterpillar and later the remaining two or three caterpillars in that container became infected with a virus and died. That misfortune would have no bearing on the health of all the rest of your caterpillars because their environmental conditions are isolated from one another.

Contrast this to the "open aquarium method." If one larva somehow became infected and died, not only is there a good chance that every larva in that aquarium will eventually get sick and die, but also, the same fate likely would happen to all the rest of your larvae in other aquariums in your lab. Unfortunately, this catastrophic dominos effect has been known to happen. The hints that follow should be able to get 95 percent of your immatures successfully to adult.

Hint #1

Plan out well in advance when and how you are going to obtain your supply of larval hostplant.
It is profitless to collect *indra* immatures without foreknowledge and a committment of how you are going to obtain hostplant on subsequent visits.

Hint #2

Obtain and **replace** fresh hostplant every seven days. This is critical because the chances for microbial contamination for larvae utilizing refrigerated lab hostplant that is over seven days old is three to four times greater than using hostplant that has been refrigerated for less than a week (all other variables remaining equal.) The problem is that collectors oftentimes will rationalize and continue to feed their caterpillars 10-day or 14-day old plant because it appears to be holding up. They then are bewildered as to why their *indra* larvae are dying. Again, hostplant which is over one week old causes much more problems than it is worth. Just throw it away! (Refrigerate freshly-cut host plant as quickly as possible, and keep it airtight in a refrigerator. Eliminate the roots as much as possible.)

Hint #3

If your lab foodplant is one other than a documented larval foodplant for your variety of *indra*, first make sure that your larvae will accept that variety of plant. (If you are rearing Utah *indra* larvae, consult the Utah *Papilio indra* subspecies and larval foodplant matrix diagram on page 19.)

Hint #4

For rearing *indra* caterpillars in closed containers, carefully adhere to the following procedures:

Morning procedure:

1. Clean out all of the frass and marginal plant sprigs, and eliminate all moisture with clean paper towel.

Evening procedure:

1. Remove all larvae from foodplant. Remove all plant sprigs and frass with clean paper towel and dispose.

2. Spray down the empty container and lid with Lysol or any other suitable quat or phenolic aeresol disinfectant for 3 seconds or until wet from a distance of about 12 inches. Let the container and lid sit for 30 seconds, and then wipe down with a clean paper towel. (This sanitizes your container.)

3. Replace empty dry container with fresh sprigs (without roots) and put larvae back in container and seal lid. Only place just enough fresh plant in your container to sustain your few larvae for 24 hours. Placing more foodplant than is necessary risks condensation in the container; which may result in microbial contamination--even if you follow the previous steps. (Note: if your foodplant has obtained moisture from the refrigerator, let it air dry before using it.)

4. **Repeat procedure every 24 hours. This is critical for *P. indra*.** It only takes 26 days or so to get young first instar larvae to pupae. By making these sacrifices for this short period of time, you greatly enhance your chances of ending up with reared adults.

Hint #5

Keep *indra* larvae separated!! As stated earlier, one of the biggest enemies in killing larvae is their own frass. By overcrowding your closed container, you risk contamination--even if you clean it daily! For a standard 2.2 Quart Rubbermaid container, place no more than 5,4,4,2,2 larvae of first, second, third, fourth, and fifth instars in any single container respectively.

1996 PACIFIC SLOPE SECTION MEETING AGENDA:

Friday, July 19:

7:00 P.M. Turkey barbeque dinner. Served at South House at GBEEC. Discussions and Introductions.
8:00 P.M. "Bring Your Own Slide Show" in classroon building. Blacklighting preparation.

Saturday July 20:

7:00 A.M. Country breakfast at the South House, GBEEC.
8:30 A.M. Meeting begins in Classroom Building. Welcome by ULS President--John Richards.
8:40 A.M. "A Brief History of the Great Basin Environmental Education Center." By David Lanier, Director.
9:00 A.M. "Notes on Thomas Utting Spalding, a Noted Early Utah Collector." By grandson Thomas Spalding.
9:30 A.M. "The *Papilio indra* complex in Utah." By Todd Stout.
10:30 A.M. "Update on Western North American Butterfly Distributions, by State and Province." By Ray Stanford M.D.
11:00 A.M. "Interspecific Hybrids and X-Linked Genes." By Felix Sperling. Comparing reciprical hybrids between lepidoptera easily detects the genes for species differences located on the X chromosomes.
11:30 A.M. "Notes on Utah Arctiidae." By Robert Mower.
1:30 P.M. "The Pawnee Montane Skipper--An Endangered Species?" By Barton Brinkman.
2:00 P.M. "State Moth Lists: Who is doing what and associated problems." By Ronald Leuschner.
2:45 P.M. "Results in breeding studies of *Papilio machaon* species, and also of *Speyeria* species." By Dr. David McCorkle.
3:15 P.M. "Projecto ALAS." By Jerry Powell. First effort to inventory the microlepidoptera of a Neotropical Rain Forest.
3:45 P.M. Free Time. Visiting, identifications, collecting, exploration of camp, etc.
7:00 P.M. **Banquet at Social Hall at Snow College in Ephraim.** Conducted by Joel Johnson. Master of Ceremonies by Thomas Spalding. Presentation on Costa Rican Lepidoptera given by Jerry Powell. The John Adams Comstock Award is presented to John Hinchliff. Drawing and awarding of door prizes is conducted by ULS Editor, Todd Stout.

Sunday, July 21

9:00 A.M. Business Meeting at Classroom Building conducted by Julian Donahue.
11:00 A.M. Brunch at South House. Meeting formally concluded.

COMSTOCK AWARD: John Hinchliff cont.

Calling themselves "The Evergreen Aurelians," they were later joined by Paul Hammond and Nelson Curtis.) It was at that meeting that John committed to be the data compiler. Whereas not all of the Evergreen Aurelians' plans have come to fruition, John has been faithful to his committment, resulting in his atlases--first of the butterflies of Oregon, published in 1994, and then of those of Washington; just off the press in 1996. The format of these atlases is patterned after a system pioneered by John and Joan Heath of England, friends of John and Florence. These atlases promise to be of considerable significance, not only to Lepidopterists, but also to natural resource managers and others. John has done a great service to biogeography in bringing order to these many records, most made by a host of amateur collectors over the years.

At 81, John still spends time in the field, ever seeking new records, and poring over books on lepidoptera. He aspires to pass on his interest in the enjoyable hobby of butterfly study to at least one of his grandchildren. It is most fitting that we honor John Hinchliff this year with the John Adams Comstock Award.

Dr. David V. McCorkle
July 1996

Utah *Papilio indra* Subspecies and Larval Foodplant Matrix

	P. indra indra	*P. indra minori*	*P. indra nevadensis*	*P. indra* "bonnevillei"
Lomatium grayi var. *grayi*	**dLF**	**NO**	**NO**	**YES**
Lomatium grayi var.*depauperatum*	**YES**	**NO**	**NO**	**dLF**
Lomatium junceum	**YES**	**dLF**	**YES**	**YES**
Lomatium kingii	**dLF**	**YES!**	**YES!**	**YES!**
Lomatium parryi	**???**	**dLF**	**dLF**	**???**
Lomatium scabrum	**???**	**???**	**dLF**	**NO**
Cymopterus terebinthinus	**YES**	**dLF**	**dLF**	**YES**

dLF==Documented Larval Foodplant.
YES==Suitable Lab Foodplant.
NO==Not Suitable Lab Foodplant.
???==Unknown

Editor's Note: For the latest update on this 1996 paper, please see http://www.utahlepsociety.org/indra2.html

---

1. **Emmel, Thomas C. and Emmel, John F. 1973. The Butterflies *of Southern California* p. 12.**
2. **Howe, William H. 1975. The Butterflies of North America p. 396.**
3. **Ferris, Clifford D. and Brown, F. Martin 1981. Butterflies of the Rocky Mountain States p. 184.**
4. **Comstock, John Adams. 1927. The Butterflies of California. p. 21.**
5. **Gillette, C.F. Col. Utahensis: Journal of the Utah Lepidopterists' Society 1984 4·2, p. 34.**
6. **Whaley, W.H. Personal Communication. 17 Jul 1996.**
7. **Gillette, C.F. Col. Personal Communication. 5 Jul 1996.**
8. **Whaley, W.H. *ibid.***