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Oregon Entomological Society

Life History of Oregon's Imperiled Leona's Little Blue Butterfly, *Philotiella leona* (Lycaenidae)

David G. James[1]

Leona's little blue butterfly, *Philotiella leona* Hammond and McCorkle, is arguably the most restricted and endangered butterfly species in the United States. Discovered in 1995, *P. leona* is restricted to less than 32 km² in the Antelope Desert of south central Oregon (Hammond & McCorkle 2000, Pyle 2002, Warren 2005, Miller & Hammond 2007, Ross 2008, 2009, Matheson et al. 2010). It is a highly specialized species occupying a volcanic ash and pumice ecosystem and dependent upon a similarly specialized larval host plant, Spurry buckwheat, *Eriogonum spergulinum* A. Gray. *Philotiella leona* is currently being considered for listing under the Endangered Species Act (Matheson et al. 2010). Apart from brief and fragmentary notes presented by Hammond and McCorkle (2000), Ross (2008, 2009) and Matheson et al. (2010), little is known of the biology of *P. leona*. James (in review) provides the first detailed study on the biology and life history of *P. leona*. Additional photographs and a summary of the life history of *P. leona* are presented here.

Philotiella leona was reared in the laboratory from gravid females, eggs, and larvae collected from the Antelope Desert in Klamath County, Oregon during June–July 2011. Details on rearing methodology are presented in James (in review). Photographs were taken of eggs, all instars and pupae using a Canon digital SLR camera (EOS 1DS Mark II) mounted on a tripod. A Canon MP-E 65mm 1×–5× macro lens was used together with a Macro Twin Lite MT–24 EX flash lighting system.

The immature stages of *P. leona* show typical lycaenid characters particularly those found in the related genus *Euphilotes*. The egg appears to be smooth but on close inspection has fine undulating, irregular surface ridges. The micropyle-containing depression on the top of the egg appears to be unique among lycaenid species in the Pacific Northwest (James & Nunnallee 2011). The first in-

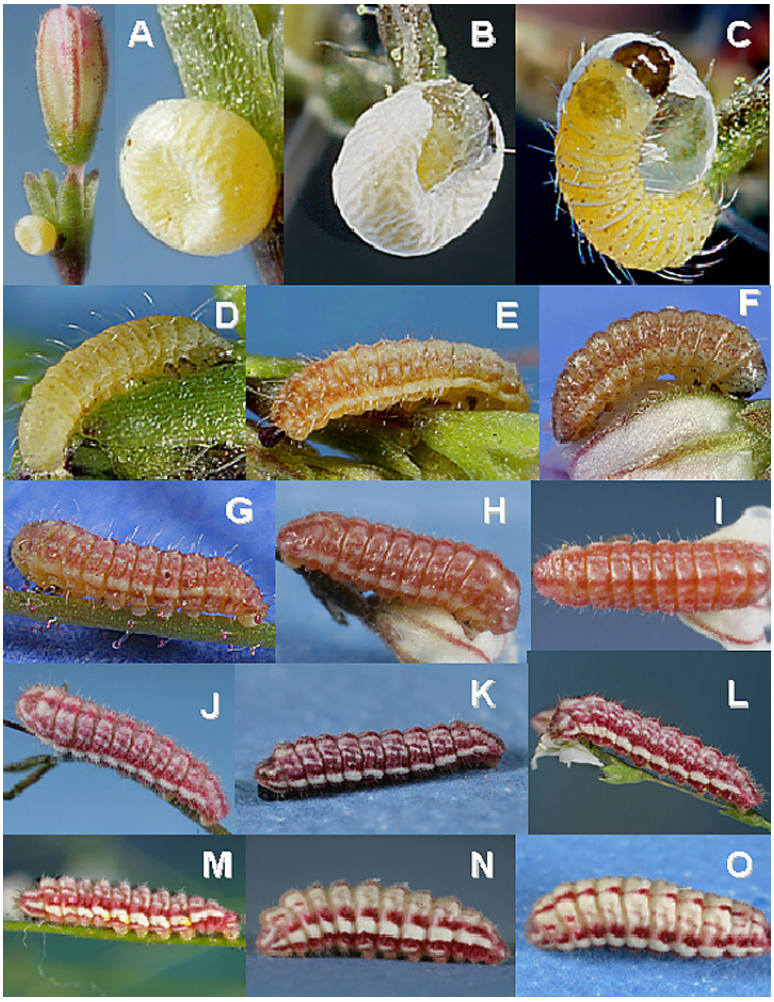

Figure 1. Images of the life history of *Philotiella leona*: egg–fourth instar. A: Newly laid egg 0.5 mm, B: egg hatching, C: newly hatched first instar 0.8 mm, D: early first instar 1.0 mm, E: mid first instar 1.5 mm, F: late first instar 2.0 mm, G: early second instar 2.0 mm, H: mid second instar 3.0 mm, I: late second instar 4.0 mm, J: early third instar 4.0 mm, K: mid third instar 5.0 mm, L: late third instar 6.0 mm, M: early fourth instar 6.0 mm, N and O: late fourth instar 8.0 mm.

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star, in common with *Euphilotes* spp., is maggot-like initially but develops color after feeding. The vibrant and contrasting red and white marked third and fourth instar larvae are cryptic on the reddish host plant and bear some resemblance to the last instar larvae of *Euphilotes columbiae* (Mattoni) and *E. enoptes* (Boisduval) (James & Nunnallee 2011). The apparent fourth instars of *P. leona* shown in Ross (2008, 2009) and Matheson et al. (2010) are identical to ours. The larva shown in Miller and Hammond (2007) is greener than ours but has a similar mid-dorsal dark red stripe. The apparent low incidence of green form larvae is unsurprising given their conspicuousness on the predominantly red host plant. Mature larvae of the related *P. speciosa* may be similar, but in Allen et al. (2005) the larva of *P. speciosa* is dull red and lacks strongly contrasting white markings. Ballmer and Pratt (1988) described the ground color of *P. speciosa* larvae as "green or yellowish".

The information presented here and in James (in review) provide the basis for further laboratory and field studies on the biology and ecology of *P. leona*, urgently needed before effective and robust conservation strategies for this imperiled lycaenid can be developed.

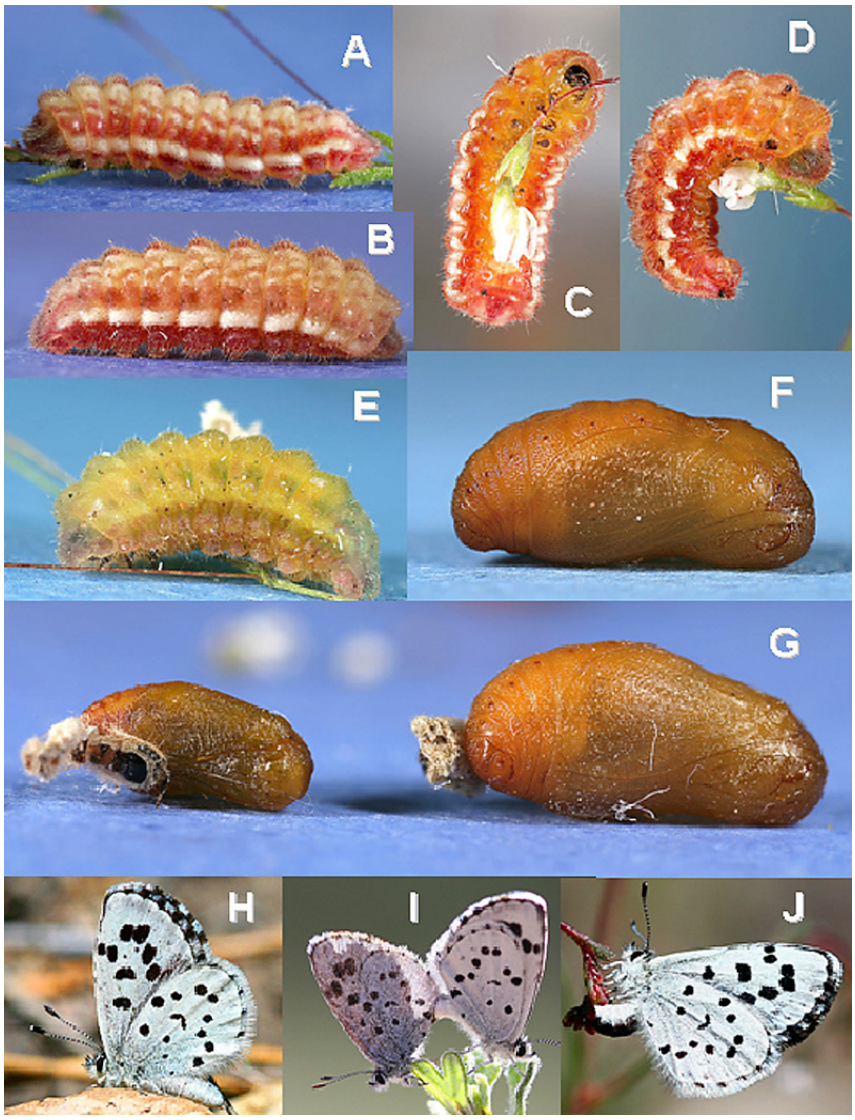

Figure 2. Images of the life history of *Philotiella leona*: late fourth instar–adult. A-D: late fourth instar showing color change, E: pre-pupa, F: pupa, G: pupae showing size range 4.0 mm (left) – 7.0 mm (right), H: adult female, I: copulating pair, J: ovipositing female.

Acknowledgments

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Literature Cited

Allen, T.J., J.P. Brock and J. Glassberg. 2005. Caterpillars in the Field and Garden—A Field Guide to the Butterfly Caterpillars of North America. Oxford University Press, 232 pp.

Ballmer, G.R. and G.F. Pratt. 1988. A survey of the last instar larvae of the Lycaenidae of California. J. Res. Lepid. 27: 1–80.

Hammond, P.C. and D.V. McCorkle. 2000. A new species of *Philotiella* from the Oregon Cascade Range (Lepidoptera: Lycaenidae). Holarctic Lepidoptera, 6: 77–82.

James, D.G. (in review). Life history and biology of an imperiled butterfly, *Philotiella leona* (Lepidoptera: Lycaenidae) from south central Oregon. Ann. Entomol. Soc. Am.

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

Matheson, B., S. Jepsen and S. Hoffman Black. 2010. Petition to list Leona's Little Blue Butterfly *Philotiella leona* as endangered under the US Endangered Species Act. Submitted by Xerces Society for Invertebrate Conservation, D.V. McCorkle and Oregon Wild.

Miller, J.C. and P.C. Hammond. 2007. Butterflies and Moths of Pacific Northwest Forests and Woodlands: Rare, endangered and Management-sensitive species. USDA Forest Health Technology Enterprise Team, FHTET-2006-07, 234 pp.

Pyle, R.M. 2002. The Butterflies of Cascadia. Seattle Audubon Society. 420 pp.

Ross, D. 2008. Surveys for Leona's Little Blue (*Philotiella leona*) in the Antelope Desert of Klamath County, Oregon. Report for High Desert Museum (Bend) and USFW (Portland, OR). 10 pp.

Ross, D. 2009. 2009 surveys for Leona's Little Blue (*Philotiella leona*). Report to the Xerces Society and United States Fish and Wildlife Service. 21 pp.

Warren, A.D. 2005. Butterflies of Oregon, Their Taxonomy, Distribution, and Biology. C.P. Gillette Museum of Arthropod Diversity, Dept. of Bioagricultural Sciences & Pest Mgmt., Colorado State Univ., Fort Collins, CO. Lepidoptera of North America 6, 408 pp.

Pacific Northwest Lepidopterists' Workshop 2011

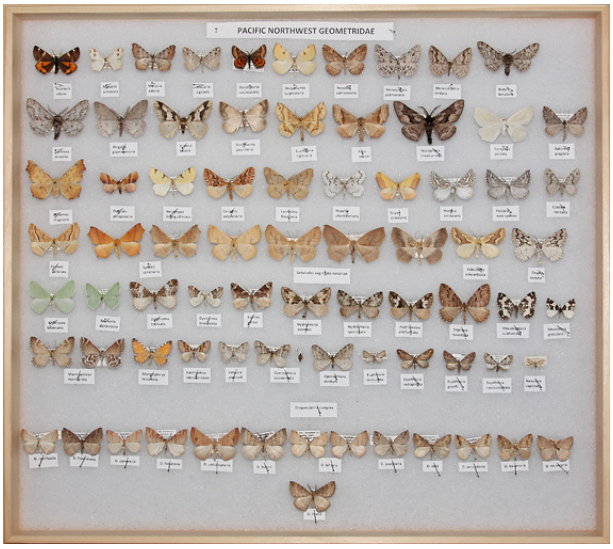
On 29–30 October 2011, over 40 people gathered in Cordley Hall on the campus of Oregon State University for the 33rd annual workshop meeting of lepidopterists of the Pacific Northwest. The meeting was hosted by Drs. Paul Hammond and David McCorkle and sponsored by the Oregon State Zoology Department and the Oregon State Arthropod Collection.

Oral presentations were made by David Maddison, Gary Brown, Dave Nunnallee, Dave Specht, Carol Specht, David Lee Myers, Paul Hammond and David McCorkle. There was a special session on photography led by Rik Littlefield and myself, Ron Lyons. In the pages that follow I have summarized their presentations, as well as some of the other business discussed. Resources (in print and online) mentioned at the meeting are in a separate item in the Bulletin.

The lepidopteran groups for emphasis this year were:

- Butterflies: *Papilio* (Swallowtails) and *Eriogonum* butterflies including *Euphilotes*
- Moths: general moths, especially Geometridae, Microlepidoptera

In connection with this, Paul Hammond prepared the drawer of geometrid moths, shown in the accompanying figure, for exhibit.



"Common Geometrids of the Pacific Northwest" selected by Paul Hammond from specimens in the Oregon State Arthropod Collection (OSAC) (click to view full size image). Photo by Ron Lyons

David Maddison—Tribute to Harold Rice

David gave a tribute to Harold Rice, and the many ways Harold contributed to the Lepidoptera community, and systematic entomology more generally.

His collection of specimens from all around the world, which now resides in the Oregon State Arthropod Collection, is a notable donation. Harold also contributed money that has improved the collection in many ways, including money that purchased the new cabinetry and drawers that house his material. His donation endowed the Harold E. and Leona M. Rice Professor in Systematic Entomology, a position currently held by David.

Harold understood through these donations, both the physical donation of specimens and the monetary donation, that collections are important. Since they store the biodiversity legacy we have today, in some ways, you could view collections as time machines for the future.

Harold's donation has had a major impact on how systematic entomology and the arthropod collection are viewed by the University. They use donations as signals of what is important to the community at large. For the same reason, these donations are also very important at the national, and even the international level.

David related a couple of stories about collecting with Harold in recent years. He was impressed by Harold's extensive knowledge of the back roads of Oregon and his knowledge of the habitat requirements necessary for David's species of interest, carabid beetles in the genus *Bembidion*.

Bembidion to be named after Harold Rice. Copyright 2011 David R. Maddison, released under a Creative Commons Attribution license, CC-BY-3.0.

In thanks for what Harold had done for him and systematic entomology, David indicated that he would be naming an unusual *Bembidion* (see accompanying figure) he had discovered in the cloud forests of Ecuador after Harold.

As an additional tribute to Harold, David announced that plans were underway to start a Lepidoptera Fellowship specifically for non-professional lepidopterists to help defray costs (e.g. field work, museum visits, equipment, publication charges) for work on Lepidoptera of the Pacific Northwest. It would also be open to non-professional lepidopterists working on other Lepidoptera who live in the Pacific Northwest.

Pacific Northwest Lepidopterists' Workshop 2011 (cont.)

Gary Brown—APHIS

Gary Brown from APHIS (Animal Plant Health Inspection Service, a small part of the USDA) spoke about the authority for regulating what APHIS regulates, the type of permits APHIS issues, and how to apply for those permits.

APHIS's mission is to protect US agriculture and the natural environment from the risks associated with the introduction of exotic pests and diseases. In addition to that, they also try to facilitate the export of agricultural commodities by doing surveys to prove that we don't have some pest in the United States that would cause trade partners to say, "We don't want to let this produce or product in because we think you have xxxx". Also, APHIS conducts exotic pest surveys to try to detect new pests as early as possible, while eradication or containment are still possible, and to delimit the distributions of established pests that require either quarantine or control. APHIS writes the agriculture regulations that the Department of Homeland Security's Customs and Border Protection enforces at the ports of entry to keep those things out. APHIS also regulates zoos, pet stores, things like that for the humane treatment of animals, and deals with pests and diseases that have gotten through inspection at the borders. (Regulations, if they are followed, in combination with inspection, can greatly reduce exotic pest introductions.)

APHIS's regulatory authority stems from the Plant Protection Act of 2000 which rolled together a number of different regulations that were previously in force.

You need a permit from APHIS to move regulated articles:

- anytime you want to import from outside the US or any of its outlying territories into the mainland US
- for **domestic movement interstate** you need an APHIS permit to move live plant pests and soil.

(Note that Lepidoptera are generally considered plant pests.) Some of the arthropods requiring permits don't fit the definition of plant pest, such as some bees, mantids, millipedes, cockroaches, etc., and that is where confusion comes in. If there is any question, it is best to call and see if you need a permit before you transport because the species that require permits sometimes change.

The APHIS permit application process has moved online. For APHIS permits, Gary strongly recommends using APHIS's e-permit system. You need e-authentication to access e-permits, a one time registration, but after that e-permits simplifies the process and allows the applicant to track their application's progress. Go to `<http://www.aphis.usda.gov/>` and click on the link for permits for information on permit requirements and access to e-permits.

State Departments of Agriculture may have their own regulations pertaining to the possession, movement or sale of plant pests. Oregon Department of Agriculture recently passed a rule creating a list of invertebrates approved for the pet trade, biocontrol, education and research and a permitting process for non-approved species. For Oregon you should consult the ODA Plant Division, Insect Pest Prevention and Management page at `<http://www.oregon.gov/ODA/PLANT/IPPM/appr_insects.shtml>`.

Dave Nunnallee—Buckwheats (*Eriogonum*) of the Pacific Northwest and Their Butterflies

Buckwheats (genus *Eriogonum*) are important nectar plants used by many kinds of butterflies. In addition, they are also very good larval host plants for a number of butterflies including some that are rather puzzling.

There are 253 species of *Eriogonum* in North America, mostly in the west (over 90%). *Eriogonum* is the fourth largest genus in North America, after *Carex*, *Astragalus* and *Penstemmon*. Currently *Eriogonum* is divided into seven subgenera, four of which occur in Washington and Oregon (the other three only have a few species). (The genus is badly in need of revision so changes can be expected sometime in the future.) Washington state has 21 species of buckwheats, Oregon has twice this number and down in California there are well over 100 species. Buckwheats are southern plants which reach their maximum northern extent in northern Washington and southern BC (Dave's talk specifically concerned the buckwheat species found in Washington and the northern portion of Oregon.)

Buckwheats are divided into two groups (perennial and annual), each of which is composed of two subgenera. The perennial subgenera are the *Oligogonum*, the so-called showy buckwheats, and the *Eucycla*, somewhat less showy. Butterfly usage is much smaller among the annual subgenera, but there are a few species that are used. It is important to note that the various buckwheat species don't all bloom at the same time. There's a seasonal sequence that they follow and the sequence seems to be pretty much the same no matter where you are. The time of year is going to change, the length of bloom is going to change, but the sequence is generally pretty good.

Buckwheats appear to be used as larval host plants by only one group of butterflies, the Lycaenids—coppers, blues, hairstreaks and metalmarks. In Washington, there are at least 44 Lycaenid - buckwheat host relationships. For example:

- all 3 of our green hairstreaks use some combination of buckwheat hosts, not necessarily all of them as their primary host, but there is a combination of 5 different butterfly-plant host relationships there
- Blue Copper uses 7

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- Gray Hairstreak uses a couple of species, maybe more
- the lupine/acmon complex uses at least 13 buckwheat species
- the buckwheat blues, *Euphilotes*, one of our really difficult genera, use at least 10 buckwheat hosts (the exact number of buckwheat blue species we have is uncertain)
- and the Morman Metalmark uses 7.

Including northern Oregon in this, we can easily add some additional host combinations.

Some of our most confusing butterflies rely on buckwheats as their larval host plants. Principal among these are *Euphilotes*, which use only buckwheats as their host plants and some of the *Plebejus*. Both *Euphilotes* and *Plebejus* are thought to include new, undescribed species in both Washington and Oregon. Understanding the buckwheat plants that these butterflies use will help us understand quite a bit about where to divide these different groups of butterflies into species. The first step is to get the information together and that is partly what Dave has been trying to do by collecting the *Euphilotes* from the different host plants. If we have these groups of butterflies side by side then we can pick up differences in the various wing patterns and genitalia. Genetic analysis may help a lot in the future but at the moment we don't have adequate material.

In the *Euphilotes* we have two groups of buckwheat blues, the *battoides* group and the *enoptes* group (considered as species in most field guides). After Andy Warren's work in Oregon and Gordon Pratt's work in California and some other folks, we've come to understand these groups are actually complexes of species and we are just starting to understand how many species there are and how to divide them. The problem is that often there are many intermediates and they often kind of fuzz together. However, when you look at the genitalia, the two groups are very, very different (see accompanying figure).

Dave discussed a number of buckwheat species and their associated buckwheat blue butterflies. A couple of these are presented below.

Eriogonum heracleoides, the parsley buckwheat, in the subgenus *Oligogonum*, is one of the most widespread buckwheats in Washington. Our most common buckwheat blue uses these plants. When Andy Warren (2005) did his work here in Oregon, he split this species apart from *Euphilotes battoides*, the Square-spotted Blue, but he didn't describe it or give it a name. So right now we are just calling it *Euphilotes* on *heracleoides*. (Steve Kohler and Andy Warren are working on a paper on *Euphilotes* and one of the things they are going to do is give this species a name.)

Eriogonum compositum, northern buckwheat, in the subgenus *Oligogonum*, is the plant that is used by our primary *enoptes* group, *Euphilotes columbia*, the Columbia Blue. This same butterfly is also believed to use *Eriogonum elatum*, tall buckwheat, in the subgenus *Eucycla*. Conventional wisdom says if two buckwheats are used as host plants, they will be closely related, meaning they will be in the same subgenus. However, Andy Warren did quite a lot of work on this in Oregon and was pretty well convinced that they are the same species. Dave showed two examples of specimens of the Columbia Blue collected from each of these host plants. In the first example, the specimens were collected in the same area, on the same day, but the elevation difference between the host plants was 1600 ft. This difference is equivalent to around 5–6 weeks of plant development time. So, even though they were collected the same day, these two groups of specimens were separated in time by quite a bit—the sequence of plants that the butterflies had to follow was pretty far apart. In the second example, Dave showed another set of specimens, both supposedly the Columbia Blue, one group collected on *compositum*, the other on *elatum*, from the same location. In this case, the collection dates were six weeks apart. How does the

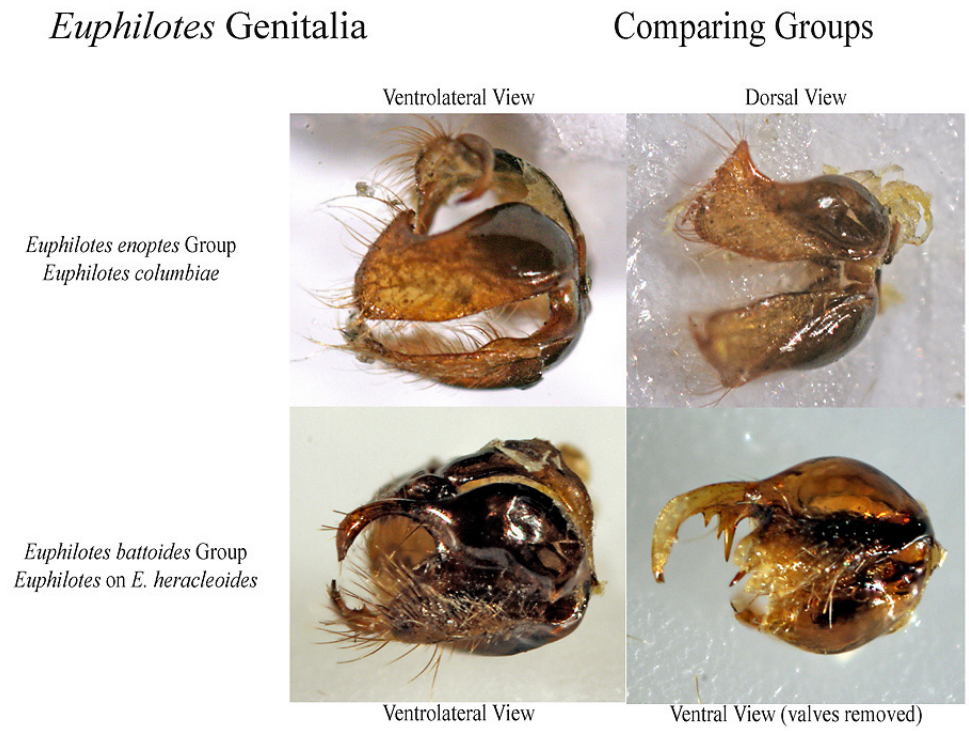

Diagram courtesy of Dave Nunnallee, genitalia images taken by Dave Nunnallee

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butterfly accomplish that? Here again, we have this butterfly, that we are calling the Columbia Blue, on two host plants growing six weeks apart and the butterfly appears on both of these plants at the right time. This is a single brooded butterfly; they only live about two weeks, but these two populations are about 6 weeks apart. If these are the same species, the Columbia Blue has to have hatched twice at the same spot, eclose or hatch, in one case in late May, in the other case in early July. If these are the same species, we have to figure out how they are fitting into this pattern of using these two different host plants essentially six weeks apart.

For the most part, the annual buckwheats are not terribly important as butterfly host plants, but one of these, *Eriogonum spergulinum*, is the host plant for Leona's Little Blue, *Philotiella leona*. (For more information on Leona's Little Blue see David James's article in this issue of the Bulletin and references therein.)

There was a good discussion afterwards during which Paul Hammond noted that there is one whole complex in the Noctuid genus *Drasteria* (these are the little underwing moths) that feeds on *Eriogonum* as well and the same type of taxonomic problems found with the *Euphilotes* blues seem to exist with these moths. It would be interesting to look at these moth larvae in relationship to the various species of *Eriogonum* too.

Reference

Warren, A.D. 2005. Lepidoptera of North America 6: Butterflies of Oregon Their Taxonomy, Distribution and Biology. Contributions of the C.P. Gillette Museum of Arthropod Diversity. Colorado State University, Fort Collins, CO. 408 pp.

Paul Hammond—*Colias alexandra* Group Food Plants

As it turns out *Colias alexandra* is really a complex, polytypic species. There are three major subspecies groups that are sometimes considered to be separate species, but Paul and Dave McCorkle are not finding any evidence that they are reproductively isolated. They all intergrade with each other.

Nevertheless there are three major clusters of the *alexandra* group and these are:

- the *christina* group in the northern Rocky Mountains, basically east of the continental divide and across Canada
- the *edwardsii* group west of the continental divide through the intermountain and great basin regions
- the typical *alexandra* group in the southern Rocky Mountains and particularly east of the continental divide and on the Great Plains.

In our local *alexandras*, there is a spring brood and a summer brood. It appears that they represent two different subspecies or temporal subspecies, the spring type is the true *edwardsii* and the name *emelia* applies to the summer type. The phenotypes of the spring brood and the summer brood are very different. (We used to think that was a case of seasonal polyphenism—they had different color patterns and characteristics because the larva developed under different temperatures. However, when the larvae were grown in the lab

Dave Specht—Observations of Oregon Butterflies

Dave updated the group on his continuing study of the Lepidoptera of Powell Butte Nature Park in Portland. The extended winter weather this year impacted the findings. Based on comparison with results from 2005–2009, the early appearing butterflies were the ones most affected by weather; the ones later in the season were hardly affected at all. For example, the Mylitta Crescent, expected in April, actually appeared May. Normally they appear in moderate numbers (too many to count), but this year only 28 were seen. Another early species, the Ochre Ringlet, expected in May, appeared in June and was not as numerous as expected either.

Dave also presented observations from three other field trips—two to Deschutes River Recreation Lands and one to multiple sites along US Forest Road 4410 east of Mt. Hood.

Carol Specht—South Florida and Crater Lake Field Trips

Carol showed pictures from a couple of butterfly field trips this past year. She used Bob Pyle's book, Mariposa Road, as a source for butterfly sites on the south Florida trip. Later, on the other excursion, she and Dave followed Bob's suggestion and took Highway 138 out of Roseburg on a trip to Diamond Lake and Crater Lake National Park. While traveling through these areas they saw large numbers of Pine Whites. At Crater Lake, they spent time along the rim and on the Castle Crest Wildflower Trail, seeing Lorquin's Admiral, Painted Lady, a number of Parnassians, Hoary Comma, Milbert's Tortoiseshell and others.

David Lee Myers—Images of Butterflies

David is interested in creating artistic views of butterflies in their environment. He showed a selection of images from his website <http://www.davidleemyersphoto.com>.

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under identical conditions, they still produced totally different phenotypes, indicating that the differences were genetically determined not just environmentally induced.)

The spring brood has an unusual type of larva in that it can break diapause at very cold temperatures in late winter or early spring; typically the larva starts feeding on early growing *Astragalus* and *Oxytropis* species in late February–March. Adult butterflies begin flying towards the end of April–May into early June so they are very early. The common food plant for the spring type *edwardsii* is *Astragalus lentiginosus*, a very common *Astragalus* that grows very early in the spring, all over western North America in very dry, deserty areas.

By contrast the summer type feeds on *Astragalus* sp. that grow later in the season, so they don't really break diapause until quite a bit later, in late May and June to produce adults in late June and July. If enough moisture is available, *lentiginosus* can continue to grow and produce green foliage all summer long, so the *emelias* can use it too. Under the right conditions, they can actually be bivoltine on this plant. However, in many areas, the *emelias* use a completely different food plant than the spring type—these are *Astragalus* species that grow really late in the season. The most common food plant for the *emelias* across central Oregon and central Idaho is *Astragalus filipes*, which doesn't really get growing until the middle of May or early June. *A. filipes* remains green and growing well into August so it too can support a second generation of *emelias*.

Generally, in those areas where the spring and summer broods use totally different food plants (*lentiginosus* and *filipes*), their flight seasons tend to be very widely separated. But in many areas the only food plant available is *lentiginosus* and this is used by both broods. In this case, the flight seasons overlap broadly and the butterflies right in the middle seem to have a phenotype intermediate between the spring and summer broods. This is an indication that they are not reproductively isolated, but actually interbreed with each other.

It raises the question how can we deal with these taxonomically. If there are really unique, unusual populations involved, adapted to local conditions, we need to kind of recognize them somehow and it seems like giving them a formal taxonomic name at a subspecies level has a certain value.

Dave McCorkle—*machaon* group Swallowtails

Dave discussed some observations made near the Maryhill Museum where the habitat structure is such that three of the *machaon* group swallowtails—*Papilio zelicaon* (Anise Swallowtail), *P. indra* (Indra Swallowtail) and *P. oregonius* (Oregon Swallowtail)—can be found close together.

At this spot, he found larvae of the closely related *Papilio zelicaon* and *P. indra* on the same host plant, *Lomatium grayi*. On this plant the two occupied different niches. The *zelicaon* larvae develop faster because they sit on top of the plant in the sunlight where it is warm. The caterpillar has a white saddle marking that makes it look like avian fecal matter. The *indra* larvae, however, develop down in the shadows. Unlike their counterparts in California, the *indra* larvae here lack the white saddle marking. These larvae weren't in the sunlight and so developed more slowly. Later in the season as the plants began to turn colors and shrivel, the *indra* larvae, hiding down in the leaves, displayed varying amounts of black. In one of Dave's pictures, the caterpillar was almost all black.

In an experiment, Dave found that the female *indras* would lay eggs on some of the host plants that they had previously ignored, if he added a few rocks around the base of the plant to act as a heat sink.

Dave also found larvae of *P. oregonius* on a nearby sage plant, *Artemesia dracunculus*. These young larvae had the white saddle like *zelicaon*. Interestingly, the larvae will feed on umbelliferids if placed on these, but the females will not oviposit on these plants.

Finally Dave showed a mutant form of *oregonius* that generated much discussion. He had bred these using some specimens with enhanced orange on them to try to increase the amount of orange. This attractive butterfly was the subject of a paper Dave wrote with Paul Hammond (Genetic experiments with a *calverleyi*-like mutation isolated from *Papilio bairdi oregonius* [Papilionidae]. Journal of Research on the Lepidoptera. Winter 1988/1989. v. 27 [3/4]).

This paper is available over the internet from `<http://lepidopteraresearchfoundation.org/>`. Click on the "JRL online" link, then follow the "JRL archive" link to download a PDF of the paper.

Remembering Nelson Curtis

At the Lepidopterists' Workshop, Jon Shepard paid tribute to his good friend, Idaho lepidopterist, Nelson Curtis, who passed away about a week before the meeting. Nelson's collection of some 10,000 spread specimens, mainly collected between 1965 and 1995, will be deposited at the University of Idaho. Jon will attempt to edit/re-write Nelson's manuscript and publish at least a technical manual on Idaho butterflies.

Idaho Public Television has a brief write-up on Curtis and some pictures at `<http://idahoptv.org/outdoors/shows/neverquit2/curtis.html>`.

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Rik Littlefield and Ron Lyons—Special Session on Photography

One of the biggest problems in macrophotography is focus. If the object of interest has a significant thickness, it is often difficult to get the whole object in focus. Traditionally, one decreases the aperture size. While this helps (often not enough), after a certain point the image's overall sharpness degrades due to optical effects. Rik addressed these issues and demonstrated the vastly improved results one could achieve by taking a series of images at different focus settings with a relatively large aperture size and processing them with software that extracts and combines the best parts of the images, a process called focus stacking. He showed some images obtained with sophisticated and not-so sophisticated setups and processed with the software he had written. For more information on Rik's focus stacking software and equipment visit <http://www.zerenesystems.com/stacker/> and <http://www.photomacrography.net/forum/viewtopic.php?t=11474>.

Rik is the editor and lead administrator of <http://www.photomacrography.net>, a web forum dedicated to the photography of small things. Last year Rik gave an invited talk about focus stacking at the national meeting up in Leavenworth.

Ron discussed various aspects of composition and some problems that arise in field photography.

A lot of money, time and effort goes into the insect photographer's work. As more people become involved, a lot of valuable information is being gathered photographically. Each photograph is a specimen record. Photographically, we have state, county and other locality records, various date records, plant host records, variation and behavioral information, etc. Images that would not be considered "good" for technical reasons (composition, focus, exposure, etc.), might provide valuable scientific information if the insect is identifiable. However, at the moment, there is no real way to preserve this information and the associated photographer's notes in the same way that we have for physical specimens. Electronic formats change; storage methods change; programs we have for organizing our work change. The format/location for storing user supplied data differs between software programs. Raw acquisition formats, so popular with many people, are proprietary, and at some point may no longer be supported. How much of this data will be available/readable 10, 20, 50 years from now? (For some additional thoughts, see Dennis Paulson's article Dragonfly Records—Collecting and Photography in Argia vol. 23[4], pages 14–17, 2011. Argia is the news journal of the Dragonfly Society of the Americas.)

Since there are a number of people in the group with an interest in photography, Ron suggested that a photography group meet informally during the annual workshops to share thoughts on various issues.

Activity Reports

Dana Ross—Leona's Little Blue Butterfly Project

Leona's Little Blue, *Philotiella leona*, (discovered by Harold Rice and named after his wife) is so far only known from a single site at Sand Creek in Klamath County, Oregon. Gary Pearson and Dana visited the area five times between late June and late August to sample butterflies, moths, ground predators (through pitfall traps), various other groups of obvious predators—dragonflies and damselflies, robberflies, hornets—and pollinators and other insects associated with the flowers that *leona* had been reported as using as nectar sources. Dana is currently identifying the butterflies and moths among the collected material.

Part of the value of this study, other than purely the community ecology and what's going on with *leona* at the site, is that one could apply this sort of community insect concept when looking for potential introduction sites for the butterfly.

Dana Ross—Oregon Season Summary

During the last couple of years Dana has had refuge biologist, Faye Weekley, do moth trapping on the Klamath Marsh NWR. This has turned up a number of interesting records both county and state, with nice range extensions of species that have shown up there. The site of the Leona's Little Blue study area, Sand Creek, is very close to that area so what he was seeing in part is just a little bit of spillover of those unusual things that showed up there as well as new things associated with aspen stands that they hadn't found in Klamath County before.

Ray Stanford reported an Oregon state record for the Mournful Duskywing, *Erynnis tristis*. On 20 May, on a hilltop just off of the old road through Siskiyou Pass in Jackson County he found a number of *Erynnis* flying. While most of these were *Erynnis persius*, he was able to net a male *Erynnis tristis* and thought he saw a couple of others. *E. tristis* is known from the Lake Shasta area of California.

Jon Shepard—Washington Season Summary

Jon reported a county record for the European Skipper, *Thymelicus lineola*, in Ferry County. He indicated that Edith's Copper, *Lycaena editha*, is well established farther north than it used to be.

continued next page...

Pacific Northwest Lepidopterists' Workshop 2011 (cont.)

Activity Reports (cont.)

David Lee Myers passed on a range extension from Bob Pyle. On 2 July, Bob had seen the Silver-spotted Skipper, *Epargyreus clarus*, in Pacific County in the Naselle area, the westernmost record for that species.

Steve Kohler (reported by Paul Hammond)—Montana Records

Steve is concentrating on getting into the alpine zone in Montana's mountains, hiking across country on remote forest service trails in wilderness areas. Steve added three new county records for the Magdalena Alpine, *Erebia magdalena*, indicating that it was more widespread in Montana than previously known.

Next Year: Pacific Northwest Lepidopterists' Workshop 2012

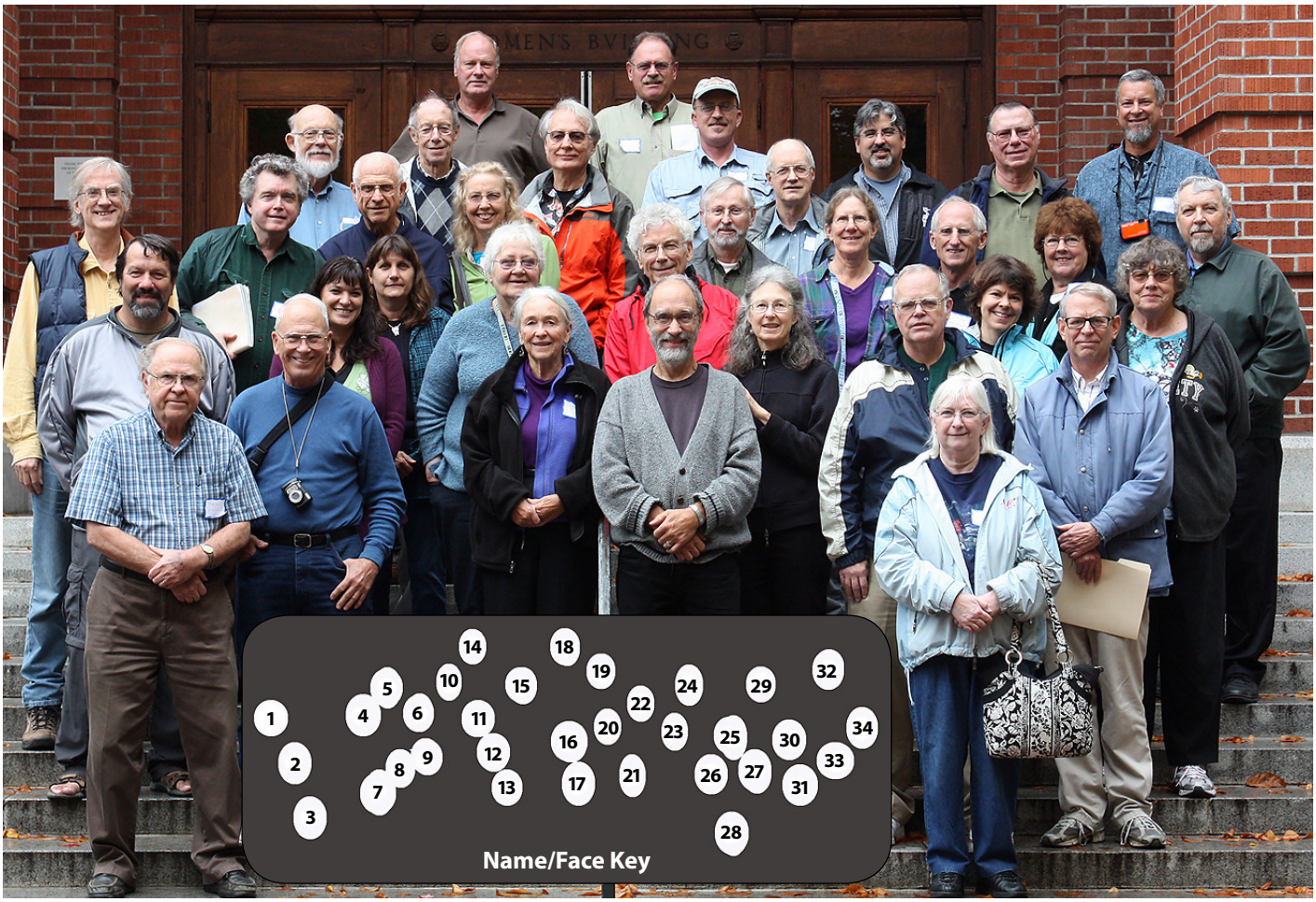
In 2012 the groups of emphasis will be:

- Butterflies: Hairstreaks and Coppers, Anglewings
- Moths: Arctiidae

In addition, a special session is scheduled on public education/outreach.

Acknowledgements

At this point, I would like to extend my many thanks to the presenters for their comments, corrections, and changes to the various summaries I prepared from the meeting record. I would also like to thank David Maddison and Dave Nunnallee for providing their images for inclusion in this material. I know all the feedback improved the accuracy and usefulness of the material. Thank you very much.

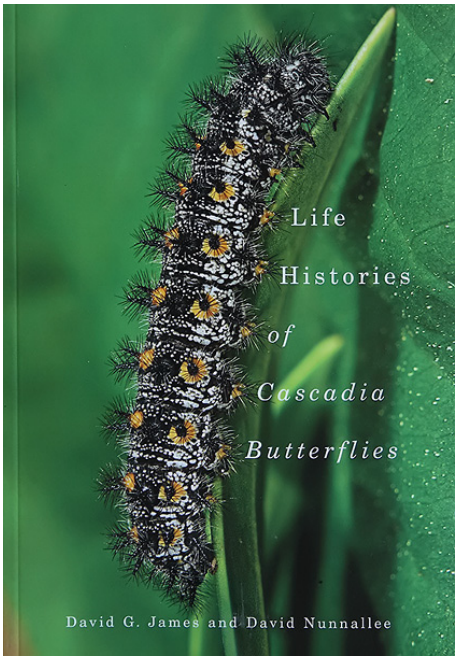


Pacific Northwest Lepidopterists' Workshop 2011 attendees: Ron Lyons (1), Jim Reed (2), Dave McCorkle (3), Ross Tewksbury (4), Jon Shepard (5), Dave Specht (6), Terry Stoddard (7), Jill Hamilton (8), Linda Kappen (9), Bill Neill (10), Carol Specht (11), Marianne Kaplan (12), Ellie Ryan (13), David McNeese (14), David Lee Myers (15), Donald Gudehus (16), Alan Richards (17), Gary Lindberg (18), Gary Pearson (19), John Davis (20), Ann Musché (21), Rik Littlefield (22), Lori Humphreys (23), Ray Davis (24), David Hagen (25), Dennis Strenge (26), Kelli Van Norman (27), Beverly Strenge (28), Vern Covlin (29), Jo Nunnallee (30), Paul Hammond (31), Dana Ross (32), Ann Albright (33), David Nunnallee (34). Photo by Ron Lyons.

Resources About Pacific Northwest Lepidoptera

Just Published from OSU Press—Life Histories of the Cascadia Butterflies

David G. James and David Nunnallee
Foreword by Robert Michael Pyle
7 × 10 inches. 448 pages.
2011. ISBN 978-0-87071-626-3. Paperback, List Price $35.00



The following description was excerpted from the OSU promotional notice:

> "Life Histories of Cascadia Butterflies is a unique volume in the history of books dealing with Lepidoptera. For the first time in North America (and most of the world), the life histories of the entire butterfly fauna of a geographic region are presented in exceptional and riveting detail, both photographically and biologically.
>
> High quality photographs of every stage (egg, every larval instar, pupa, adult) of virtually all of the 158 butterfly species occurring in Cascadia (southern BC, WA, ID, northern OR) grace the pages of this book. In addition, an extraordinary wealth of new information on the biology, ecology and rearing of all of these species is also provided. Most species were reared multiple times and the book is the product of almost 20 combined years of painstaking research by the two authors."

It's a must have for anyone interested in our species!

Butterflies of British Columbia

The species accounts and distribution maps published by Crispin Guppy and Jon Shepard in The Butterflies of British Columbia (published by UBC Press, 2001) are available over the internet. However, their photos of the butterflies are not reproduced online. Go to `<http://www.geog.ubc.ca/biodiversity/efauna/TheButterfliesofBritishColumbia.html>`.

The URL above will bring up an introductory page by Crispin Guppy. I ran into an error trying to access the atlas pages directly from this page when I clicked on the link "visit the atlas pages . . ." However, the species material could be accessed using the "Search for an atlas page" field at the top of this same page.

These online pages are contained in:

Klinkenberg, Brian. (Editor) 2011. E-Fauna BC: Electronic Atlas of the Fauna of British Columbia [`<www.efauna.bc.ca>`]. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver, Canada [accessed December 2011]

Update on the Pacific Northwest Macromoth Online Database

At the recent Lepidoptera Workshop, Jon Shepard indicated that the website called Pacific Northwest Moths should be available to the public around next July. Since the grant started, Jon has computerized about 50,000 moth collection records. People who take photos are invited to submit their records and/or photos for identification so the information can be included in the database. (See the Spring 2011 issue of the Bulletin for more information on this project.)

Johnson's Hairstreak (*Callophrys/Mitoura johnsoni*)

At the recent Lepidoptera Workshop, Ray Davis announced that the survey protocol for Johnson's Hairstreak developed with FS/BLM agency biologists in mind, was finished this past spring and is available on the web. If you are interested, go to `<http://www.fs.fed.us/rb/sfpnw/issssp/species-index/fauna-invertebrates.shtml>` and download the Survey Protocol Version 1.2 May 2011 (this is a PDF file; the size as listed, 1.1 MB, is incorrect—the file is just over 5 MB) (ISSSSP = Interagency Special Status/Sensitive Species Program)

Johnson's Hairstreak along Pacific Crest Trail in Crater Lake National Park, July 29, 2004. Photo by Ron Lyons

Adult and larval surveys were tested. Larval surveys seemed to work the best in terms of detectability. Unfortunately, larvae found on the host plant, dwarf mistletoe, may not be those of Johnson's Hairstreak. However there is a DNA marker that can be used to identify these larvae.

The protocol document contains a considerable amount of biological information, including a map of the potential distribution of the species in the Pacific Northwest based on a habitat model. The full range actually goes down into southern California and there are even historical records into Baja California.

Kelli Van Norman of the BLM/USFS ISSSSP team asked for help in finding more sites for this species, particularly in Washington where searches using this protocol have not been successful. Some other methodology may be necessary.

Want to help out? If you come across a Johnson's Hairstreak that is definitively confirmed to species, collect the basic information such as locality data (preferably including GPS coordinates), observer, date, and any important habitat information and submit it to your state coordinator. Thanks.

A New Stonefly from Oregon *Cary Kerst*

While traveling to the Dragonfly Society of the Americas meeting in Fort Collins, Colorado in July, I stopped at some sites along the way to collect aquatic insects. One of those sites was Fry Meadows Creek, a stream at 4100 feet elevation in Union County, Oregon. I collected some adult Chloroperlidae at the stream which I gave to Dr. Boris Kondratieff of Colorado State University when I arrived in Fort Collins.

After returning to Oregon, I heard from Dr. Kondratieff that this was a new species, which was surprising to him due to a recent review of a large amount of material from the western US. He and Dr. Richard Bauman had published a review of the genus *Triznaka* in this family a few years ago (Baumann, R.W. and B.C. Kondratieff. 2008. A review of the western North American genus *Triznaka* (Plecoptera: Chloroperlidae) with a new species from the Great Basin, U.S.A. Proc. Entomol. Soc. Wash. 110: 345–362). Drs. Kondratieff and Bauman will be describing the new species. This new species will be the fourth species in this nearctic genus, three of which are found in Oregon.

I returned to the stream on 15 August this summer hoping that I might collect larvae and found it dry so it is a seasonal stream.

Find the Bulletin Online

Currently, you can find PDFs of the latest issues of the Bulletin of the Oregon Entomological Society (since Spring 2011) at `<http://odonata.bogfoot.net/oes/>`. Contact Jim Johnson (jt_johnson @ comcast.net) if you have trouble with access.

Invertebrates in Education and Conservation Conference

Tucson, Arizona
31 July to 5 August 2012

Hosted by
Sonoran Arthropod Studies Institute
PO Box 5624 Tucson, Arizona 85703
520-883-3945

Call for Papers, Workshops, Round Tables, Field Trips and Posters

Conference Program Topics include but are not limited to:

- Terrestrial, Freshwater and Marine Invertebrate Husbandry
- Education Programs using Invertebrates
- Insect Zoos, Butterfly Houses and other Invertebrate Exhibitions
- Invertebrate Conservation Programs and Issues
- Professional Development
- Administrative and Regulatory Issues

Further information can be found at `<http://www.sasionline.org>`

Deadline for all proposals: 1 February 2012 or until Program is filled

The Xerces Society

The Xerces Society recently moved their offices. They can now be found at:
628 NE Broadway, Suite 200
Portland, OR 97232-1324

Other contact information, such as telephone, fax and, email, were not changed.

Sarah Foltz Jordan of the Xerces Society recently gathered records for the odonate species *Aeshna subarctica* and *Coenagrion interrogatum* in the Pacific Northwest for distribution maps and fact sheets. Sarah and the Xerces Society would like to thank all of those who shared their records and conservation information for this project. Sarah said "Your collective knowledge of PNW odonates is incredible!"

The Xerces Society celebrated its 40th birthday this past December. Congratulations!

To learn more about the Society and its invertebrate conservation work, please visit `<http://www.xerces.org>`.

Termites of Oregon

Ron Lyons

This fall, 2 October 2011 to be exact, a small black species of termite was flying around my place on the coast near Bandon. Since alates, which had shed their wings, began dropping into the kitchen from the overhead skylight, my interest in these little fellows accelerated exponentially, especially since females were calling on the countertops and male-female pairs were running around on the floor. This was one of the *Reticulitermes* species, presumably *Reticulitermes hesperus*. The only other documented record I have is 19 September 2004, when a number of reproductives emerged in the lawn.

Earlier in September, a larger reddish colored *Zootermopsis* species was flying. Many of them were consumed by spiders as evidenced by all the loose wings in their webs. The specimens I collected on 21 September 2008, based on the color—a dark reddish-brown, and the wing veins, are *Zootermopsis nevadensis*.

Snyder (1954) listed four species of termites from Oregon:

- *Zootermopsis angusticollis* (Hagen) (Light Pacific Coast Rottenwood Termite)
- *Zootermopsis nevadensis* (Hagen) (Dark Pacific Coast Rottenwood Termite)
- *Reticulitermes hesperus* Banks (Western Subterranean Termite)
- *Reticulitermes tibilalis* Banks (Arid Land/Rocky Mountain Subterranean Termite)

Of Oregon's neighboring states Snyder listed four species for Washington, four species for Idaho, eight species for Nevada and 15 species for California. Washington lacked *Reticulitermes tibialis* but added, in the Tacoma area, *Kalotermes minor* (Hagen). The species in Idaho were the same as those in Oregon. Nevada and California added a number of species, presumably from the southern part of these states.

Incisitermes minor (Hagen), formerly *Kalotermes minor* (Western Drywood Termite), is a southern species which is easily transported in timber. This species was eventually found in Oregon. (I am not sure when this was first reported, but its natural range along the west coast only seems to reach as far north as central California.) McKern et al. (2006) found this species in Oregon in their work. See Cabrera and Scheffrahn (2011) for more information on *Incisitermes minor*.

A search of the internet turned up several recent papers which added three more species to the list of those known in Oregon.

McKern et al. (2006) added . . .

- *Reticulitermes flaviceps* (Eastern Subterranean Termite)
- *Reticulitermes hageni* (Light Southern Subterranean Termite)

. . . and later (McKern et al. 2007) also added . . .

- *Reticulitermes okanaganensis* (a new species identified in Szalanski et al. [2006])

. . . to the Oregon list, bringing the total to eight recognized species.

References

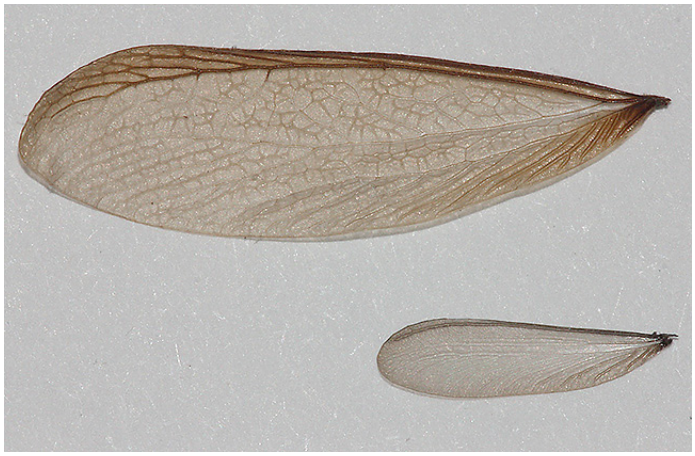
Cabrera, J. and R.H. Scheffrahn. 2001. Western Drywood Termite, *Incisitermes minor* (Hagen) (Insecta: Isoptera: Kalotermitidae). Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida document EENY-248 (online at <http://edis.ifas.ufl.edu/in526>).

McKern, J.A., A.L. Szalanski, and J.W. Austin. 2006. First Record of *Reticulitermes flavipes* and *Reticulitermes hageni* in Oregon (Isoptera: Rhinotermitidae) Florida Entomologist 89(4): 541–542 (online at <http://www.fcla.edu/FlaEnt/>, browse issues)

McKern, J.A., A.L. Szalanski, J.W. Austin, M.T. Messenger, J. Mahn, and R.E. Gold. 2007. Phylogeography of Termites (Isoptera) from Oregon and Washington. Sociobiology 50(2): 607–622 (online at <http://comp.uark.edu/~aszalan/Site/Publications_files/socio50p607.pdf>)

Snyder, T.E. 1954. Order Isoptera—The Termites of the United States and Canada. National Pest Control Association Technical Bulletin, 64 pp.

Szalanski, A.L., J.W. Austin, J. McKern, and M. T. Messenger. 2006. Genetic evidence for a new subterranean termite species (Isoptera: Rhinotermitidae) from western United States and Canada. Florida Entomologist 89: 299–304. (online at <http://www.fcla.edu/FlaEnt/>, browse issues)



Left: Calling female *Reticulitermes* on counter top, right: Sample *Zootermopsis* (top, 19.5 mm) and *Reticulitermes* (8.5 mm) wings. Photos by Ron Lyons