

A NEW SPECIES OF *PHILOTIELLA* FROM THE OREGON CASCADE RANGE (LEPIDOPTERA: LYCAENIDAE)

PAUL C. HAMMOND AND DAVID V. McCORKLE

Dept. of Entomology, Oregon State University, Corvallis, Oregon 97331 USA

Dept. of Biology, Western Oregon University, Monmouth, Oregon 97361 USA

abstract.— *Philotiella leona* Hammond & McCorkle, n. sp. (Lycaenidae), is described from the volcanic ash fields of the Oregon Cascade Range. Both sexes are compared with *P. s. speciosa* in wing color pattern and genitalia. In addition, preliminary comparisons suggest that the *bohartorum-purissima* complex of subspecies now assigned to *P. speciosa* may prove to be a third species of *Philotiella* for North America. The larval foodplant and ecology of *P. leona* are also discussed.

key words: behavior, California, distribution, ecology, *Euphilotes*, flight behavior, hostplants, *Icaricia*, Nearctic, Nevada, North America, Onagraceae, oviposition, *Philotiella leona* n. sp., Polygonaceae, Polyommatinae, taxonomy.

The volcanic ash and pumice fields located along the summit and east slope of the Cascade Range from northern California to southern British Columbia represent a unique habitat for many types of plants and animals including unusual butterfly and moth faunas. The most extensive of these volcanic habitats is found between Mt. Shasta and the Medicine Lakes volcano system in northern California, and along the east slope of the Oregon Cascades between Crater Lake and Newberry Crater from Klamath Co. north to Black Butte, in Jefferson Co. The catastrophic eruption of Mt. Mazama about 6600 years ago creating modern Crater Lake produced particularly deep ash fields to the east. Tilden (1963) and Hammond (1983) have discussed this area at length with respect to the local butterfly fauna. An endemic subspecies of *Speyeria egleis* (Behr) (Nymphalidae) is entirely limited in distribution to this area (Hammond and Dornfeld, 1983).

In July of 1995, Harold and Leona Rice conducted additional exploration of this area to investigate the late spring and early summer fauna of butterflies. At this time, they collected the first specimens of the genus *Philotiella* (Lycaenidae) ever found in Oregon and the Pacific Northwest, some 400 km northwest of the previously known northern limit of the genus in Pershing County, Nevada.

The genus *Philotiella* was described and discussed by Mattoni (1977), and only two taxa were included within the genus at that time. These are *P. speciosa speciosa* (H. Edwards), from the deserts of southern California and western Nevada, and *P. speciosa bohartorum* (Tilden), from the west slope of the Sierra Nevada in California (Tilden, 1967). Recently, two additional subspecies of *P. speciosa* have been described, including *P. s. septentrionalis* Austin (1998) from northwest Nevada, in Pershing, Churchill, and Lyon Counties, and *P. s. purissima* Priestaf & J. Emmel (1998), from coastal Santa Barbara Co., California, near Lompoc. The Oregon specimens of *Philotiella* are very distinct in both wing color pattern and genitalia structure from *P. speciosa* and are, thus, described as a new species. Note that male genitalia of *Philotiella* species have a highly elaborate three-dimensional complexity.

Philotiella leona Hammond & McCorkle, new sp.

MALE.— Length of forewing ($n = 80$) 9-12mm ($\bar{x} = 11$ mm). Dorsal wing ground color black in distal half of wings, dark dusky blue heavily suffused with dark scales in basal half of wings. Dorsal hindwing with only a basal

patch of blue costal and submarginal areas black. Boundary between black and blue areas diffuse, not clearly delineated. Ventral wing ground color white with very large black discal and median spots on forewing and strongly developed black median spots on hindwing. Median spots of ventral forewing elongate or rectangular in shape.

Male genitalia: tegumen and vinculum long and narrow, distal ends of falces slightly recurved; juxta arms long and cylindrical; valva long and slender with process visible in outer lateral view, valval process long and deeply notched from valva, process with long prominent teeth; a large ventral tumescence covered with long bristles on inner surface of valva; no keel or distal thickening on inner surface of valva.

FEMALE.— Length of forewing ($n = 50$) 9-12mm ($\bar{x} = 11$ mm). Dorsal wing ground color black with a slight brownish cast, spots showing dorsally as a deeper black. Ventral wing color and pattern similar to male.

Female genitalia: lodex (lamella antevaginalis) large, bag-like around ductus bursae, lodex mostly membranous and only weakly sclerotized.

Etymology.— The name chosen for this new species honors one of its co-discoverers.

Types.— *Holotype* male: milepost 226 along U.S. Highway 97, Klamath Co., Oregon, 19 June 1996 (H. E. Rice, leg.). *Allotype* female: same data. Types deposited in the American Museum of Natural History.

Paratypes: 79 males and 49 females, all from the same locality. Dates: 19 Jun 1996, 19 Jun 1997, 24 Jun 1996, 25 Jun 1997, 29 Jun 1998, 9 Jul 1998 (H. E. Rice, leg.).

Disposition as follows: one pair each to the U.S. National Museum of Natural History, the California Academy of Sciences, the Natural History Museum of Los Angeles County, and the Allyn Museum of Entomology (Sarasota), Florida Museum of Natural History; 9 males and 7 females in the Oregon State Arthropod Collection, Oregon State University; 35 males and 16 females in the collection of Harold Rice, 14 males and 2 females in the collection of Ray Albright, 14 males and 12 females in the collection of Don Severns, and 3 males and 8 females in the collection of David McCorkle.

DISCUSSION OF CHARACTERS

Genitalia.— Both the male and female genitalia show major divergence between *P. leona* and *P. s. speciosa*, differing in 11 characters of the male and 2 characters of the female. In addition, the male of *P. s. purissima* is also highly divergent from both of the above. Specimens examined include 6 males and 2 females of *P. leona* from Klamath Co., Oregon, 4 males and 2 females of *P. s. speciosa* from San Bernardino Co., California, 1 male near *P. s. septentrionalis* from Inyo Co., California, and 1 male of *P. s. purissima* from Santa Barbara Co., California. These various differences are outlined as follows. The genitalia of *P. s. bohartorum* have not been examined.

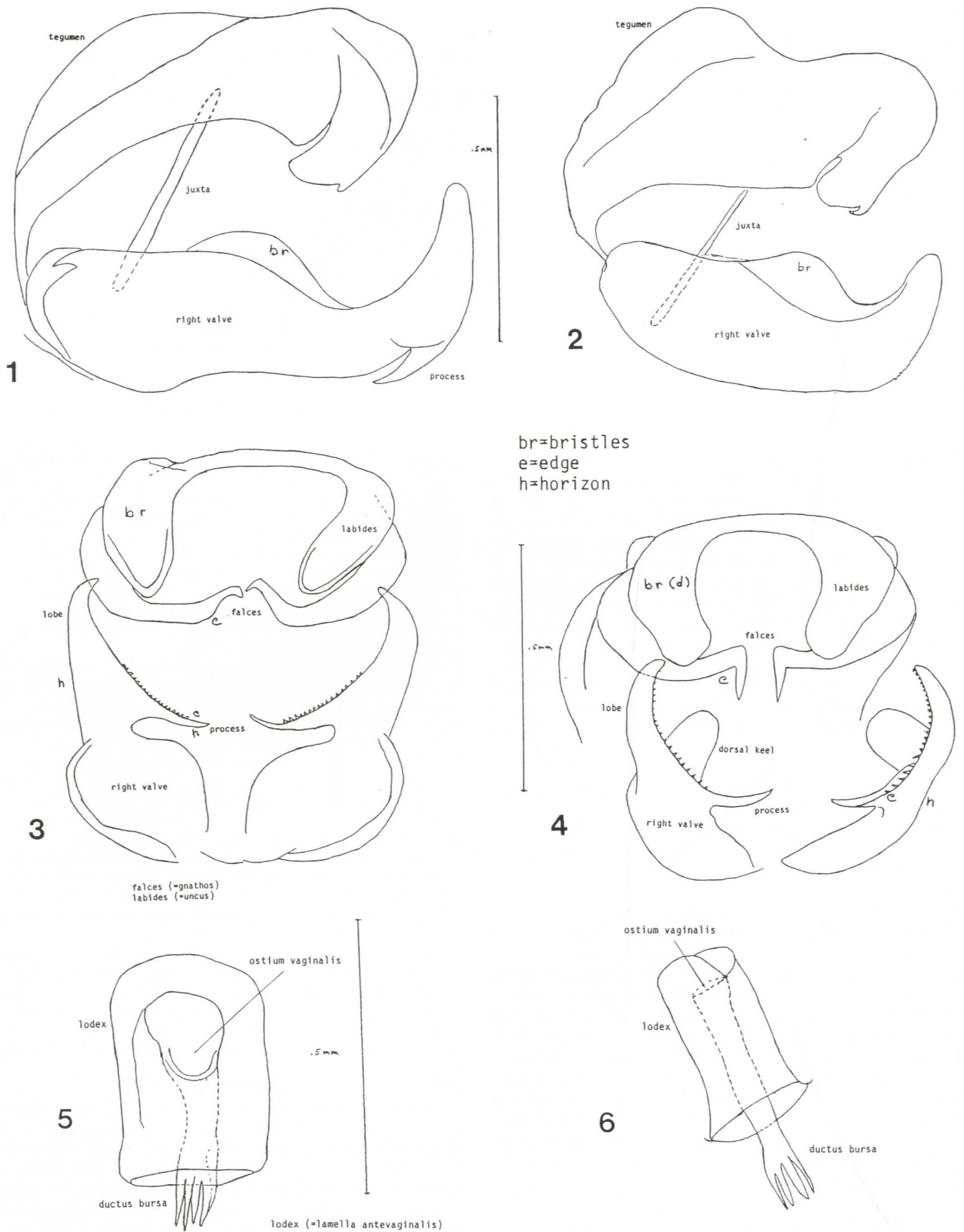


Fig. 1-4. Male genitalia: 1. *Philotiella leona* n. sp., lateral view. 2. *P. s. speciosa*, lateral view. 3. *P. leona*, posterior view. 4. *P. s. speciosa*, posterior view. Fig. 5-6. Female genitalia (partial): 5. *P. leona*, dorsal view, 6. *P. s. speciosa*, dorsal view.

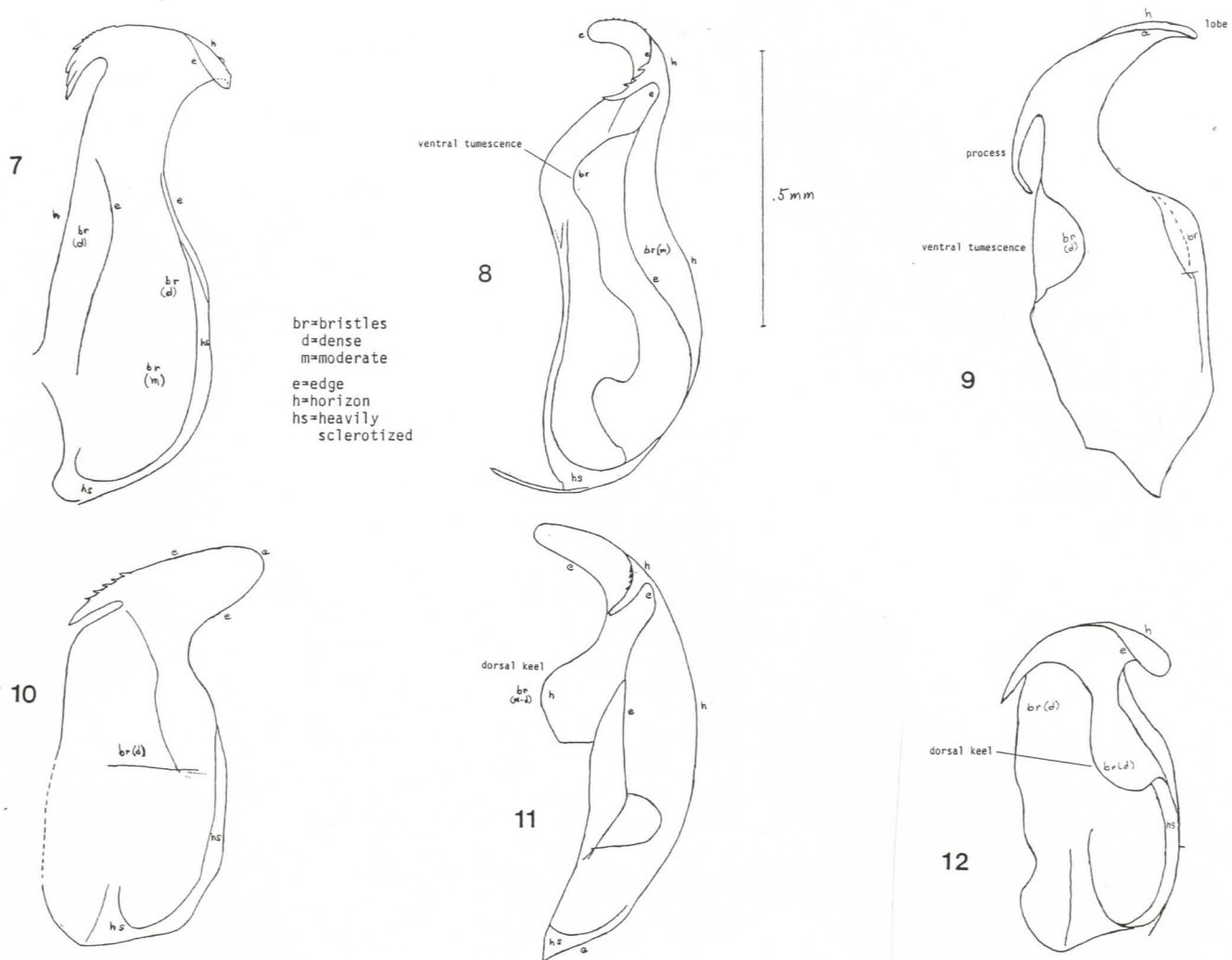


Fig. 7-12. Valve details: *P. leona*: 7) right valve, inside view; 8) left valve, ventral view; 9) right valve, semiapical view (inside surface). *P. s. speciosa*: 10) right valve, inside view; 11) left valve, ventral view; 12) right valve, semiapical view (inside surface).

1. Tegumen and vinculum in lateral view long and narrow in *P. leona*, medium in *P. s. purisima*, short and broad in *P. s. speciosa* (Fig. 1-2, 13).

2. Juxta long in *P. leona* and *P. s. purisima*, short in *P. s. speciosa* (Fig. 1-2, 13).

3. Juxta arms cylindrical in *P. leona*, laterally flattened in *P. s. purisima* and *P. s. speciosa*.

4. Distal ends of falces slightly recurved in *P. leona*, abruptly curved downward in *P. s. purisima* and *P. s. speciosa* (Fig. 3-4, 14).

5. Valva long and slender with process visible in outer lateral view of *P. leona*, medium with process not visible in *P. s. purisima*, short and broad with process not visible in *P. s. speciosa* (Fig. 1-2, 13).

6. Upper lobe of valva long and narrow in *P. leona*, short in *P. s. purisima*, and broad in *P. s. speciosa* (Fig. 7-12, 15-17).

7. Process of valva long, deeply notched from valva in *P. leona* and *P. s. purisima*, short and not deeply notched in *P. s. speciosa* (Fig. 3-4, 14).

8. Process with long, prominent teeth in *P. leona*, and only fine teeth in *P. s. purisima* and *P. s. speciosa* (Fig. 7-8, 10-11, 15-16).

9. Prominent ventral tumescence covered with long bristles on inner surface of valva in *P. leona*, prominent ventral keel in *P. s. purisima*, and no tumescence or ventral keel in *P. s. speciosa* (Fig. 8-9, 11-12, 16-17).

10. No dorsal keel on inner surface of valva in *P. leona*, prominent dorsal keel that projects perpendicular to plane of valva in *P. s.*

purisima and *P. s. speciosa* (Fig. 8-9, 11-12, 16-17).

11. Distal end of valva not greatly thickened in *P. leona*, greatly thickened along dorsum from dorsal keel to lobe and base of process in *P. s. speciosa*, greatly thickened from both dorsal keel and ventral keel to lobe and process base in *P. s. purisima* (Fig. 7, 9-10, 12, 15, 17).

12. Distal teeth present on inner surface of valva in *P. s. purisima*, teeth absent in *P. leona* and *P. s. speciosa* (Fig. 7, 10, 15).

13. Inner surface of valvae and labides densely covered with long bristles in *P. s. purisima*; bristles more sparse in *P. s. speciosa* and *P. leona*.

14. Female lodex broad, bag-like in *P. leona*, narrow and cylindrical in *P. s. speciosa* (Fig. 5-6).

15. Female lodex weakly sclerotized in *P. leona*, strongly sclerotized in *P. s. speciosa*.

Wing characters.— It is also useful to compare the wing characters of *P. leona*, *P. s. speciosa*, and *P. s. purisima* (characters of *P. s. bohartorum* are similar to those of *P. s. purisima*):

1. Dorsal blue ground color in male violaceous to silvery blue in *P. s. speciosa* and *P. s. purisima*, dark dusky blue in *P. leona* (Fig. 18, 20, 22).

2. Extent of male dorsal blue color approximately 100% in *P. s. speciosa*, 75% in *P. s. purisima*, and 50-75% in *P. leona* (Fig. 18, 20, 22).

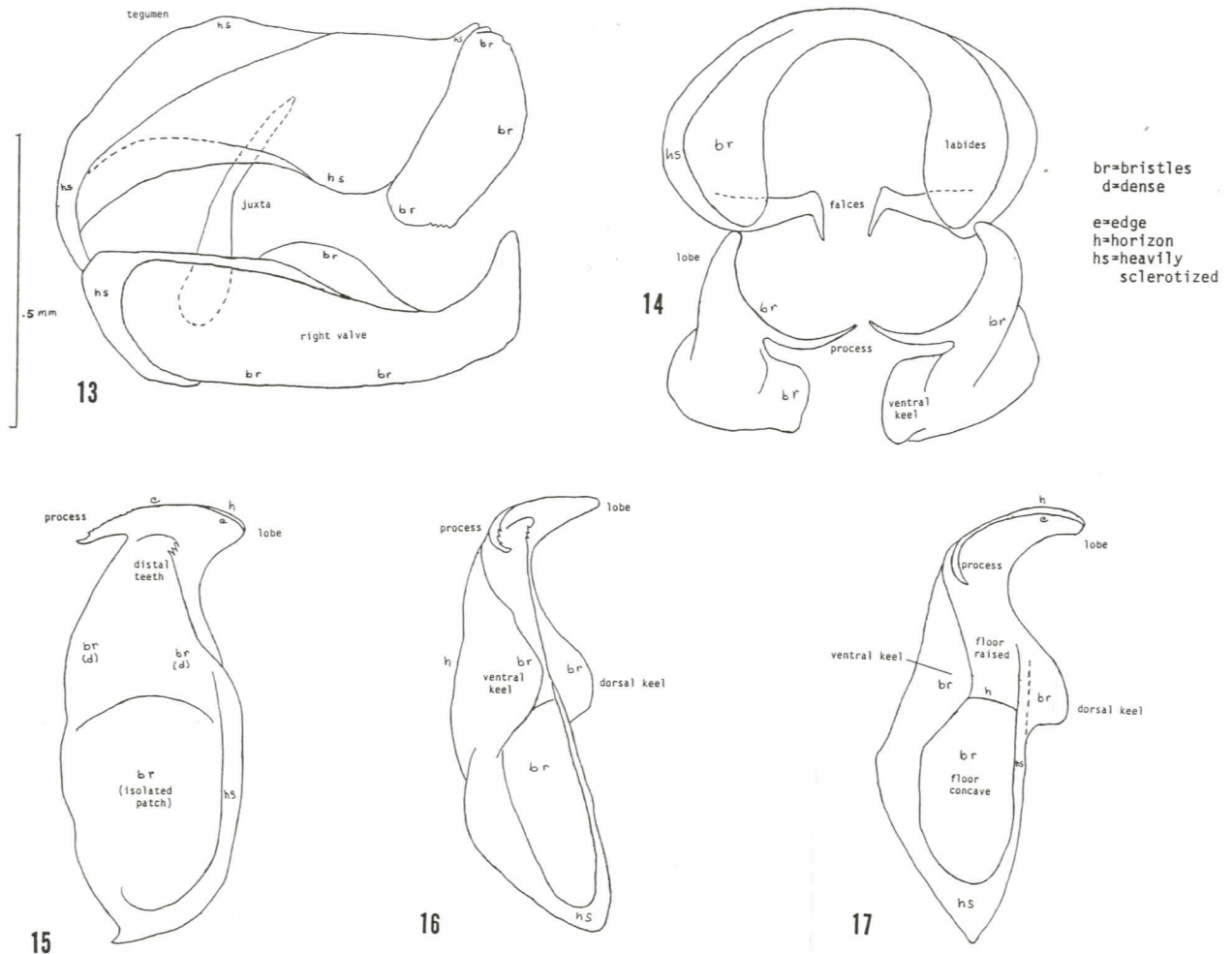


Fig. 13-17. Male genitalia, *Philotiella speciosa purisima*: 13. lateral view. 14. posterior view. 15. right valve, inside view. 16. right valve, ventral view. 17. right valve, semiapical view (inside surface).

3. Costal area of dorsal hindwing blue in *P. s. speciosa*, black in *P. s. purisima* and *P. leona* (Fig. 18, 20, 22).
4. Boundary between black and blue diffuse in *P. leona*, and more clearly delineated in *P. s. speciosa* and *P. s. purisima* (Fig. 18, 20, 22).
5. Female dorsal ground color dark brown in *P. s. speciosa* and *P. s. purisima*, and nearly black in *P. leona* (Fig. 24-25).
6. Shape of black median spots on ventral forewing nearly round in *P. s. speciosa*, round to slightly elongate in *P. s. purisima*, and strongly elongate to rectangular in *P. leona* (Fig. 19, 21, 23).
7. Black median spots on ventral hindwing strongly developed in *P. s. speciosa* and *P. leona*, but very small in *P. s. purisima* (Fig. 19, 21, 23).
8. Average forewing length 9mm in *P. s. speciosa*, 10mm in *P. s. purisima*, and 11mm in *P. leona*.

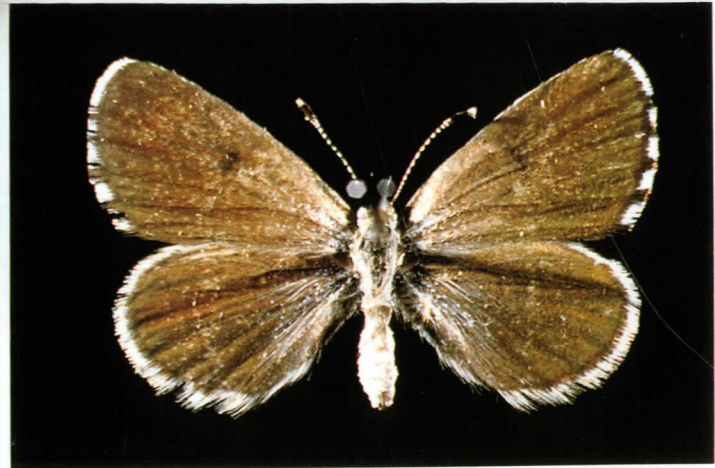
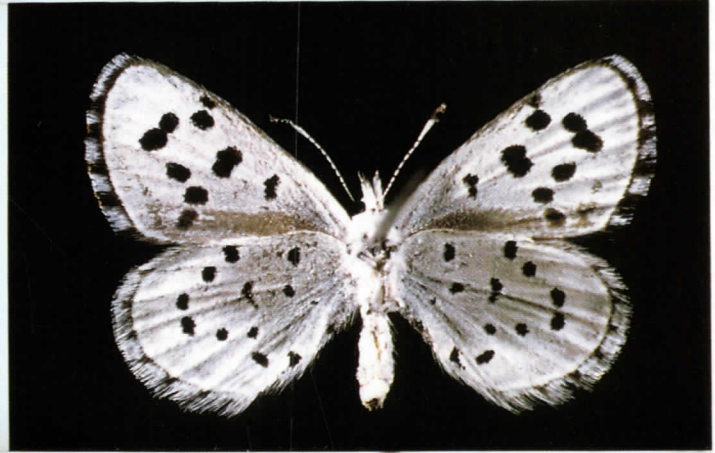
DISTRIBUTION AND ECOLOGY

At present, *Philotiella leona* is only known from the type locality along U.S. Highway 97 near Sand Creek in Klamath Co., Oregon. Based upon observations of female oviposition in the field, the larval foodplant of *P. leona* is *Eriogonum spergulinum* A. Gray (Polygonaceae). This is a common annual plant that is closely related to *E. reniforme* Torrey & Fremont, a larval foodplant of *P. speciosa* in southern California (Emmel and Emmel, 1973). In this section of *Eriogonum*, all plants are annuals found in deserts or other very dry habitats (Hickman, 1993). Based upon herbarium records of *E.*

spergulinum at Oregon State University, robust growth forms of this species in Oregon are restricted to the Mazama ash fields east of Crater Lake, in Klamath Co. However, Hickman (1993) reports this plant as widespread in the mountains of California, suggesting that additional populations of *E. spergulinum*, and *P. leona*, may be expected in volcanic areas of northeastern California.

Consequently, the butterfly probably has a wide distribution east of Crater Lake, at least from the Gilchrist-Beaver Marsh area south to Fort Klamath. It may occur north to Newberry Crater, in Deschutes Co., but this requires further exploration. In addition, this same habitat type is extensive in northeastern California from the east slope of Mt. Shasta to the Medicine Lakes volcanoes. All of this area should be explored in the future for the possible presence of *P. leona*, possibly extending as far south as Mt. Lassen.

Fig. 18. Comparison of *Philotiella* species: TOP ROW LEFT, *P. leona*, holotype male, forewing length 11mm, dorsal surface. TOP ROW RIGHT, *P. leona*, allotype female, forewing length 11mm, ventral surface. SECOND ROW LEFT, *P. s. speciosa purisima*, male, forewing length 10mm, dorsal surface, Calif. Santa Barbara Co. Lompoc, 11 May 1997, L. Muller. SECOND ROW RIGHT, *P. s. purisima*, male, ventral surface. THIRD ROW LEFT, *P. s. speciosa*, male, forewing length 9mm, dorsal surface, Calif. San Bernardino Co. Red Mountain, 28 Apr 1974, P. G. Nice. THIRD ROW RIGHT, *P. s. speciosa*, female, forewing length 9mm, ventral surface, same data as male. BOTTOM ROW LEFT, *P. leona*, allotype female, dorsal surface. BOTTOM ROW RIGHT, *P. speciosa*, female, dorsal surface.



By contrast, a large, perennial yellow-flowered *Eriogonum* of the *umbellatum* species-group is also sympatric in the same habitat, and supports populations of *Euphilotes enoptes* (Boisduval), *E. battoides* (Behr), and *Icaricia lupini* (Boisduval). However, *P. leona* was never observed to associate with this perennial *Eriogonum* and appears to be limited to *E. spergulinum*.

In behavior, adults of *P. leona* exhibit a very low flight, close to the ground, as described for *P. speciosa* (Emmel and Emmel, 1973). Because the males are blackish in color like the females, the sexes are not easily distinguished in flight. Both nectar on a small weedy *Epilobium* species (Onagraceae) that superficially has an extremely close resemblance to *Eriogonum spergulinum*. Females are not particularly active flyers, and spend long inactive periods resting in vegetation with wings closed. In general, the butterflies are very difficult to see in the field because of their small size, flight low to the ground, dark colors, and rather sedentary behavior. It is probably for these reasons that this distinctive species has remained undiscovered until now.

TAXONOMIC DISCUSSION

Although the size and wing coloration of *Philotiella leona* and *P. s. speciosa* are very different, we were particularly impressed with the great divergence in male and female genitalia between these two species. They are definitely not closely related, and appear to belong to distinctly different species groups within the genus. By contrast, we found the genitalia of *P. s. speciosa* to be essentially uniform across a 400 km distance between San Bernardino Co. and Inyo Co., California, with no observable differences.

The single male of *P. s. purissima* that we examined from coastal Santa Barbara Co., California, near Lompoc, also has very distinctive genitalia. The greatest divergence is clearly between *P. leona* and *P. s. speciosa*, differing in eleven male genitalic characters and two female characters. By contrast, *P. s. purissima* is somewhat intermediate between these taxa in characters of both genitalia and wing color pattern, in addition to having several unique characters of its own. In male genitalia, *P. s. purissima* shares two characters with *P. leona*, four characters with *P. s. speciosa*, and four characters are intermediate. Three characters are unique to *P. s. purissima* alone, the most prominent being the ventral keel on the valva.

Indeed, the inner surface of the valva is highly distinctive in all three taxa. *Philotiella leona* has no keels at all, *P. s. speciosa* has a very large dorsal keel, and *P. s. purissima* has both dorsal and ventral keels. For *P. leona*, the inner surface is completely thin except for the large ventral tumescence. In *P. s. speciosa*, the inner surface is greatly thickened dorsally from the dorsal keel to the distal lobe and process. In *P. s. purissima*, the entire distal end of the valva is greatly thickened from the dorsal keel to the ventral keel and out to the lobe and process. The general shape of the valva and development of the teeth and notch of the process are also quite distinctive for each of the three taxa.

In summary, *P. s. speciosa* and *P. s. purissima* cluster more closely together and away from *P. leona* in sharing a number of prominent characters including, 1) the strongly recurved falces, 2) the large dorsal keel on the valva, 3) the distal end of the valva is greatly thickened beyond the keel, and 4) the absence of long teeth on the valval process present in *P. leona*.

Based on the literature, the genitalia of *P. s. bohartorum* from the Sierra Nevada have apparently never been examined (Tilden, 1967), and we have not yet seen the female genitalia of *P. s. purissima*. Thus, any conclusions regarding the status of these taxa are premature at present, but preliminary evidence does suggest that the *bohartorum-purissima* complex is likely a third distinct species of *Philotiella*. It is clear that the genus *Philotiella* is far more diverse

in North America than previously suspected.

Philotiella leona is the largest and darkest species of the genus. In genital structure, the more narrow tegumen and slightly recurving falces in the male genitalia and bag-like lodex in the female genitalia of *P. leona* have a closer resemblance to *Euphilotes* species such as *E. enoptes* than does *P. speciosa*.

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