A New Name for Alpine Populations of Hesperia colorado (Scudder) (Hesperiidae, Hesperiinae) in Colorado

Authors: Warren, Andrew D., and Calhoun, John V.

Source: The Journal of the Lepidopterists' Society, 69(1) : 39-49

Published By: The Lepidopterists' Society

URL: https://doi.org/10.18473/lepi.69i1.a2

Journal of the Lepidopterists' Society
69(1), 2015, 39–49

A NEW NAME FOR ALPINE POPULATIONS OF *HESPERIA COLORADO* (SCUDDER) (HESPERIIDAE, HESPERIINAE) IN COLORADO

ANDREW D. WARREN

McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, 3215 Hull Road, P. O. Box 112710, Gainesville, Florida 32611-2710, email: hesperioidea@yahoo.com

AND

JOHN V. CALHOUN

977 Wicks Drive, Palm Harbor, Florida 34684; Research Associate: McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, Florida, email: bretcal1@verizon.net

ABSTRACT. A reevaluation of the lectotype and type locality of *Pamphila* (=*Hesperia*) *colorado* Scudder indicates that populations in Colorado which were described as *Hesperia comma oroplata* Scott (=*H. colorado oroplata*) are synonymous. Based on an examination of numerous specimens, a new subspecies is described for alpine (mainly above timberline) populations in Colorado, which were previously attributed to the nominotypical subspecies. Patterns of geographic variation observed among subspecies of *H. colorado* in Colorado and bordering states are also reviewed.

Additional key words: cline, Colorado, *Hesperia comma oroplata*, *H. colorado idaho*, *H. colorado ochracea*

Based on the 1871 journal of Theodore L. Mead (1852–1936), the type locality of *Pamphila colorado* Scudder (now recognized as *Hesperia colorado*) was clarified by Calhoun (2015) to "Twin Lakes, along the northern shore of Upper Twin Lake (the western lake), Lake County, Colorado." A male specimen, figured by Scudder (1874, Pl. 10, fig. 18) as "collected July 13, by T. L. Mead," was designated as the lectotype by Barnes and McDunnough (1916). The claspers of a male paralectotype, collected by Mead on the same date as the lectotype, also were figured by Scudder (1874, Pl. 11, figs. 10, 11). Both of these specimens are deposited in the Museum of Comparative Zoology (Harvard University, Cambridge, Massachusetts; MCZ).

The lectotype (Fig. 1), and its type locality, are inconsistent with the popular notion that nominotypical *colorado* is a dark, biennially-brooded taxon that occurs in Colorado above 3048 m (10,000 ft.) in elevation (Calhoun 2015) (Figs. 2, 4-12). Rather, the lectotype fundamentally agrees with populations now recognized as *Hesperia colorado oroplata*, originally described by Scott (1981) as *Hesperia comma oroplata* to define more brightly-colored, lower-elevation populations "from the Arkansas River Valley south of Buena Vista to the Royal Gorge [in Colorado], south to the Sangre de Cristo Mts. of New Mexico, and the San Luis Valley of Colorado." The lectotype of *colorado* was collected at an elevation of roughly 2819 m (9250 ft.), within an area that Scott (1975) identified as a transition zone between *oroplata* and higher-elevation populations, which he and other authors attributed to nominotypical *colorado.* Populations within the purported transition zone (which includes the corrected type locality of *H. c. colorado*), as well as those within the range of *oroplata*, should all be considered to represent *H. c. colorado*. They form a smooth, subtle cline, with populations at lower elevations (i.e., *oroplata*, sensu Scott 1981) producing slightly larger and tawnier adults with somewhat reduced dark maculation.

We believe that the dusky, biennially-brooded populations at higher elevations in Colorado, previously identified as nominotypical *colorado*, should continue to be recognized on the basis of consistent morphological and biological differences. Scott (1975a, 1975b, 1986) likewise considered such populations to be genetically discrete. We therefore describe a new subspecies to characterize alpine populations that occur near and above timberline in north-central Colorado.We also review the general distributions of adjacent subspecies in Colorado and bordering states: *Hesperia colorado colorado*, *H. colorado ochracea* Lindsey and *H. colorado idaho* (W. H. Edwards).

METHODS

Specimens were examined (see below) from several collections, most notably the extensive holdings of *Hesperia* in the McGuire Center for Lepidoptera and Biodiversity (Florida Museum of Natural History, University of Florida, Gainesville, Florida; MGCL), and the C. P. Gillette Museum of Arthropod Diversity (Colorado State University, Fort Collins, CO; CSU), as well as the personal collection of Andrew D. Warren (Castle Pines, Colorado; ADW). Images of relevant specimens were obtained from other collections,

including MCZ. Fieldwork on various *H. colorado* populations has been conducted throughout Colorado nearly annually by the senior author since 1989, with a special focus on alpine habitats in the Mosquito and Front ranges since 2006. Elevations and coordinates cited herein were obtained from Google Earth.

RESULTS

Hesperia colorado sublima A. Warren & Calhoun, **new subspecies**

(Figs. 2-12)

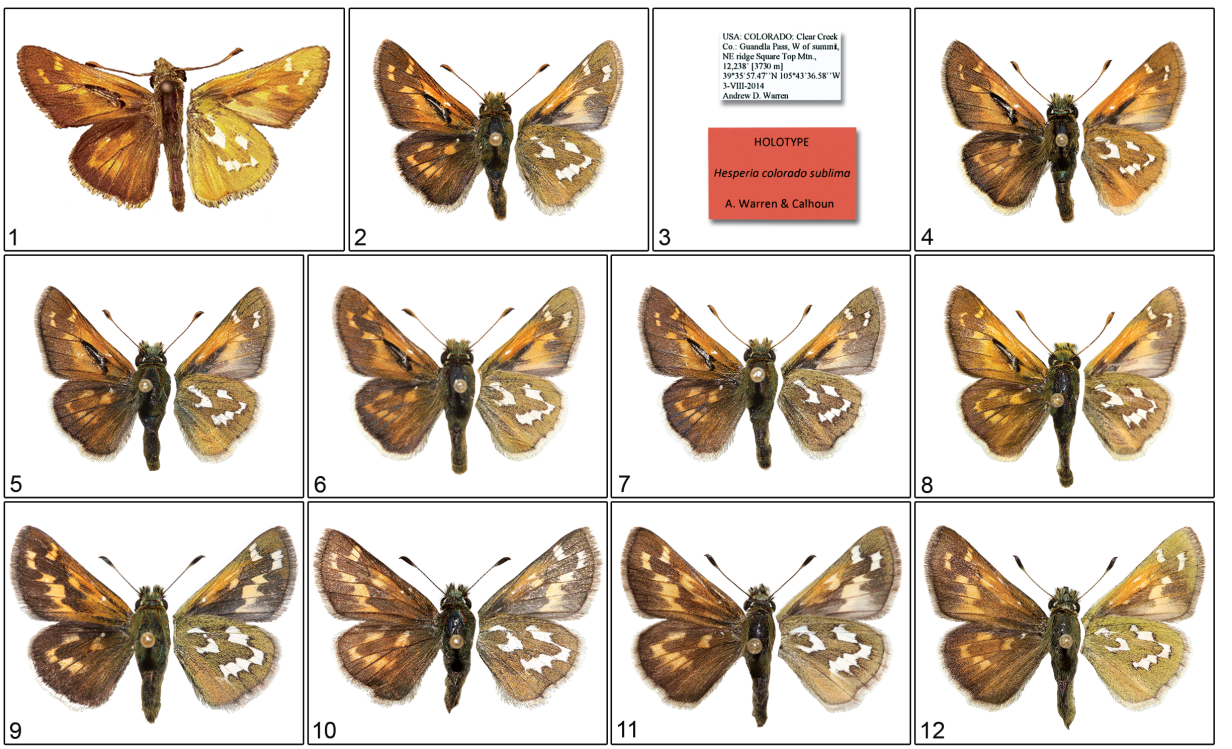
Diagnosis. This taxon is well recognized in the literature, thus we do not believe that a lengthy diagnosis is necessary here (but see remarks below). In general, *sublima* is separated from other subspecies of *Hesperia colorado* by its dark ground coloration on the dorsal and ventral surfaces, well-developed white ventral markings somewhat intermediate between those of *H. c. ochracea* and *H. c. idaho*, smaller adult size, alpine distribution (above about 3146 m/10,321 ft.), and mostly or entirely biennial voltinism. The ventral coloration of *sublima* is more olivaceous, sometimes significantly more greenish-brown, than in other subspecies. Its known distribution to date includes alpine habitats in the Front and Mosquito ranges of Colorado.

Description. Male (Figs. 2, 4–8), mean forewing length = 14.0 mm (13.7–14.3 mm, n = 10); *dorsal forewing* ground color dark orange, with broad brown-black outer margin variably extending into basal two-thirds of wing, often completely encircling the subapical spots; entire wing surface covered with sparse orange overscaling in fresh individuals; small, pale orange spots as follows: rectangular, subapical, in cells R_3, R_4 and R_5; square, distad in M_1 and M_2; trapezoidal, larger, in M_3, frequently conjoined with broad medial and basal orange areas, which extend to base of wing; broad, shiny, gray bipartite stigma in basal portions of cells CuA2 and CuA1, bordering the discal cell; stigma surrounded on all sides by dark black scales; fringe grayish brown, paler towards tornus. *Dorsal hindwing* with reduced tawny coloration, dark orange ground color may be poorly- or well-developed; costal margin dark black, outer margin brown-black, often with indistinct border basad; most of wing, save costal and anal margins, covered with sparse orange overscaling in most individuals when fresh; small, pale orange spots as follows: trapezoidal, in mid cell Rs; trapezoidal, rectangular or hourglass-shaped, distad, in M_1–M_2; trapezoidal, in mid M_3; rectangular, in mid CuA1, generally aligned with spot in M_3; rectangular or linear, poorly defined and often nearly concolorous with ground color in CuA2, usually aligned slightly basad of that in CuA1; trapezoidal, round or rectangular, at distal end of discal cell; fringe mostly grayish, as on forewing tornus. *Ventral forewing* pattern mostly like that of dorsal surface, orange ground color more restricted, stigma replaced by dark black patch, extending diffusely distad along vein CuA1; costal cell darkest orange, markings paler distad to yellowish or whitish in cell CuA2; distal third of wing with dense olivaceous or greenish-brown overscaling; spots positioned as on dorsal surface, but are white in color, save that in cell M_3, which is pale orange to whitish; pale areas in cells CuA1 and CuA2 with ill-defined to well-defined distal borders; fringe as on dorsal surface. *Ventral hindwing* ground color entirely olivaceous or greenish-brown to grayish; spots mainly as on dorsal surface but slightly larger, white, with very distinct borders, usually surrounded by blackish scales; an additional small, triangular spot variably present in cell $Sc+R_1$, aligned with or just basad of spot in Rs; spot at distal end of discal cell variably enlarged, often arching basad (or sometimes bipartite) into basal parts of cells Rs and $Sc+R_1$, and into the basal part of cells M_3 and/or CuA2; fringe as on dorsal surface.

Female (Figs. 9-12), mean forewing length = 15.1 mm (14.7 – 15.7 mm, n = 10); *dorsal forewing* largely like that of male, wings somewhat more produced and rounded at distal margin; orange ground color generally reduced to basal third of wing (though may be more extensive distad); stigma replaced by broad dark brown-black patch, medial orange areas replaced by variably well-defined spots; spots generally as on male, usually larger and paler, with additional large, rectangular or irregularly-shaped yellowish to pale orange spots in cells CuA1 and CuA2; yellowish spots at distal end of discal cell, often conjoined; fringe as on male. *Dorsal hindwing* generally patterned as on male, spots usually paler, additional triangular spot in cell $Sc+R_1$ sometimes present; fringe as on male. *Ventral forewing* as on male, but with broader median dark area and additional spots as on dorsal surface in CuA1, CuA2 and discal cell; fringe as on male. *Ventral hindwing* as on male, spots generally larger and bolder; fringe as on male.

Types. Holotype ♂ (Fig. 2) with the following labels (Fig. 3): white, printed: / **USA: COLORADO: Clear Creek / Co.**: Guanella Pass, W of summit, / NE ridge Square Top Mtn., / 12,238' [3730m], / 39°35'57.47"N 105°43'36.58"W / 3-VIII-2014 / Andrew D. Warren /; red, printed: HOLOTYPE / *Hesperia colorado sublima* / A. Warren & Calhoun /. The holotype is deposited at the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, Florida, USA (MGCL). **Paratypes.** All from **USA: COLORADO**. **Boulder Co.**: Arapahoe Pass, 17-VIII-1968, R. Stanford (1♂, CSU); nr. Ward Dam, Indian Peaks, 29-VII-1952, F. M. Brown (1♂, MGCL); Rollins Pass Rd., 8.6–9.4 rd. mi. NE Jct. East Portal Rd. (Rd. 16), 10,500'-11,000', 3-VII-2012, A. Warren (1♂, ADW); **Clear Creek Co.**: below Loch Lomond Res., Steuart Rd., 1.8 rd. mi NW Alice Rd., 11,033' [3363 m], 39°49'42"N 105°40'24"W, 3-VIII-2012, A. Warren (1♀, ADW); Grays Peak, 27-VIII-1941, R. Whittaker (1♀, MGCL); Guanella Pass, hilltop just W of summit, 11,700' [3566 m], 39°35'44.81"N 105°42'48.87"W, 18-VII-2006, A. Warren (10♂, 2♀, ADW); 18-VII-2012, A. Warren (3♂, 2♀, ADW); Guanella Pass, W of summit, NE ridge Square Top Mtn., 12,139'–12,238' [3700–3730 m], vic. 39°35'57.47"N 105°43'36.58"W, 22-VII-2012, A. Warren (54♂, ADW); 3-VIII-2014, A. Warren (61♂, 3♀, ADW) (Figs. 4–7, 9, 10); Loveland Pass, 29-VII-2000, T. Stoddard (2♂, ADW); Loveland Pass, 12,000–13,000', 12-VIII-1973, M. Fisher (1♂, MGCL); 10-VIII-1975, M. Fisher (1♂, MGCL); 22-VII-1989, M. Fisher (2♂, MGCL); Mt. Goliath, Mt. Evans Rd., 11,000', 6-VIII-1976, M. Fisher (1♂, MGCL; 1♂, ADW); **Clear Creek – Summit Cos.**: Loveland Pass, 12,000', 10-VIII-1975, M. Fisher (1♂, MGCL); **Gilpin Co.**: Corona Pass Rd., 10–12,000', 19-VIII-1973, R. Stanford (1♂, CSU); **Park Co.**: Boreas Pass, 11,500', 16-VIII-1957, A. C. Allyn (2♂, MGCL); Gold Dust Trail, Trout Creek trailhead, 1.7 mi WNW jct. Boreas Pass Rd. (FR 404), 10,348' [3154 m], 39°21'37"N 105°57'09"W, 14-VII-2006, A. Warren (1♂, ADW); Guanella Pass Rd. (FR 118), ca. 1 air mi S Clear Creek Co. line, along Duck Creek, 10,321' [3146 m], 39°33'13"N 105°43'16"W, 18-VII-2006, A. Warren (3♂, ADW); Hall Valley, 17-VIII-1941, R. Whittaker (2♂, MGCL); Hall Valley, 10,500-11,500', 29-VII-1968, M. Fisher (2♂, 1♀, MGCL); Hoosier Pass, 12,500', 12-VII-1985, M. Minno (1♂, MGCL); Hoosier Pass summit, 2-VIII-1994, R. Romeyn (2♂, MGCL); Horseshoe Mountain, NE ridge, 12,060' [3675 m], 39°11'42.66"N 106°09'30.94"W, 8-VII-1994, A. Warren (3♂, 1♀, ADW); 23-VII-1994, A. Warren (15♂, ADW); 1-VII-2006, A. Warren (1♀, ADW) (Fig. 12); 13-VII-2006, A. Warren (2♂, 1♀, ADW) (Figs. 8, 11); Jct. of FS 416 & 415, W of Alma, 30-VII-1980, L. Dorr (1♂, MGCL); Pennsylvania Mt., 18-VIII-1977 (1♂, CSU); Selkirk Campground, along upper Tarryall Ck., below Boreas Pass Rd., 10,466' [3190 m], 39°22'14"N 105°57'04"W, 14-VII-2006, A. Warren (1♂, ADW); W above Hoosier Pass, 11,500', 30-VII-1982, J. Scott (2♂, MGCL); 3-VIII-1982, J. Scott (8♂, MGCL); **Summit Co.**: W side Loveland Pass, 11,500', 16-VIII-1993, R. Stanford (1♂, CSU).

Etymology. Alluding to the occurrence of this taxon at high elevations, the name *sublima* (pronounced "sub-



FIGS. 1-12. Specimens of *Hesperia c. colorado* and *H. c. sublima* from Colorado (dorsal/ventral). Forewing lengths are base to apex. **1**, lectotype of *Pamphila colorado* (slightly enlarged), 13.vii.1871, [Twin Lakes, Lake Co.], ca. 2819 m (9250 ft.) (14.4 mm) (MCZ-ENT0015299). **2**, holotype of *H. c. sublima* (male), 3.viii.2014, Guanella Pass, Clear Creek Co., 3730 m (12,238 ft.) (14.3 mm) (MGCL). **3**, labels of holotype (slightly enlarged). Paratypes of *H. c. sublima*: **4**, male, 3.viii.2014, Guanella Pass, Clear Creek Co., 3700-3730 m (12,139-12,238 ft.) (13.8 mm) (ADW); **5**, male, 3.viii.2014, Guanella Pass, Clear Creek Co., 3700-3730 m (12,139-12,238 ft.) (13.9 mm) (ADW); **6**, male, 3.viii.2014, Guanella Pass, Clear Creek Co., 3700-3730 m (12,139–12,238 ft.) (14.0 mm) (ADW); **7**, male, 3.viii.2014, Guanella Pass, Clear Creek Co., 3700-3730 m (12,139-12,238 ft.) (13.9 mm) (ADW); **8**, male, 13.vii.2006, Horseshoe Mtn., Park Co., 3675 m (12,060 ft.) (14.1 mm) (ADW); **9**, female, 3.viii.2014, Guanella Pass, Clear Creek Co., 3700-3730 m (12,139-12,238 ft.) (14.7 mm) (ADW); **10**, female, 3.viii.2014, Guanella Pass, Clear Creek Co., 3700-3730 m (12,139-12,238 ft.) (15.7 mm) (ADW); **11**, female, 13.vii.2006, Horseshoe Mtn., Park Co., 3675 m (12,060 ft.) (14.8 mm) (ADW); **12**, female, 13.vii.2006, Horseshoe Mtn., Park Co., 3675 m (12,060 ft.) (15.0 mm) (ADW).

lime-a") is a feminine Latin adjective meaning lofty or elevated. It is in gender agreement with the feminine noun *Hesperia*. The English derivative "sublime" is a fitting tribute to the grandeur of this butterfly's montane habitat.

Remarks. *Hesperia colorado* displays considerable geographic variation in Colorado, largely corresponding with the major river drainages in the state. East of the Continental Divide and below timberline, two main groups of populations are found. *Hesperia colorado ochracea* occupies the South Platte River drainage in Larimer, Boulder, Gilpin, Clear Creek, Jefferson, Douglas, and eastern Park counties, and extends into Teller and El Paso counties. As suggested by Scott (1975), populations in far southern Teller County (Cripple Creek area) and far northeastern Fremont County (if present), may be intermediate between *H. c. ochracea* and *H. c. colorado*; we've examined just one male specimen from this area, which indeed does look intermediate. Records from Adams and Arapahoe counties (Stanford 2002) represent single individuals, presumably strays from the west or south. The distribution of *H. c. ochracea* includes montane habitats in the Front Range, including the Rampart Range, Kenosha Mountains, Tarryall Mountains, and the Pikes Peak area to the south. As with all sets of *H. colorado* populations in Colorado and neighboring states, adults from the lowest-elevation populations of *H. c. ochracea* (1676–2591 m/ 5500–8500 ft.) are the largest and tawniest, progressively becoming smaller and darker, above and below, with increasing elevation. Reports of *H. comma manitoba* (Scudder) from Colorado (Brown et al. 1956, Stanford 1981) represent higher-elevation populations of *H. c. ochracea* (2591-3048 m/ 8500-10,000 ft.), which appear to interact or intergrade with *H. c. sublima* in a few Front Range localities (e.g.,

Tolland [= East Portal], Gilpin Co., 2810 m/ 9220 ft.). To the north, in northern Larimer and Weld counties, Colorado, as well as all of southern Wyoming and far western Nebraska, *H. colorado idaho* replaces *H. c. ochracea.* There is a narrow zone of intergradation between these taxa in northwestern Larimer County, Colorado, roughly from north of the Cache la Poudre River to the Wyoming state line, which is the area where the southern end of the Laramie Mountains meets the northern end of the Front Range.

To the south of *H. c. ochracea* in Colorado, in the Arkansas and Rio Grande River drainages, flies *H. c. colorado* (including *oroplata*, sensu Scott 1981), in Lake, Chaffee, Fremont, Custer, Pueblo, Huerfano, Las Animas, central and eastern Saguache, Alamosa, Costilla, Conejos, Mineral and Rio Grande counties, extending into the upper San Juan River drainage in Archuleta and La Plata counties. Smaller, darker adults are found at higher elevations (roughly above 2896 m/ 9500 ft.), but below timberline, in the San Juan Mountains (San Juan, Hinsdale, southern Ouray and presumably Mineral counties; see below). *Hesperia c. colorado* also occurs in northern New Mexico, in Colfax, Los Alamos, Mora, Rio Arriba, Sandoval, San Miguel, Taos, and Union counties (Toliver et al., 2001). The distribution of *H. c. colorado* includes montane and canyon habitats in the upper Arkansas River Valley, Wet Mountains, Sangre de Cristo Mountains, Raton Mesa Complex, the eastern and southern slopes of the San Juan Mountains, and the Jemez Mountains in New Mexico. As with *H. c. ochracea* and *H. c. idaho* (see below), adults of *H. c. colorado* are largest and tawniest at lower elevations (2050–2740 m/ 6725–9000 ft.), where occasional adults, especially females, resemble *H. c. ochracea* (e.g., Wet Mountains, Custer County; Raton Mesa Complex, Las Animas-Colfax counties). Adults become somewhat smaller and darker above and below with increasing elevation, up to about 3500 m (11,483 ft.) in the Sangre de Cristo Mountains of Taos County, NM (Wheeler Peak). It is unclear exactly where *H. c. colorado* is replaced to the west by *H. c. idaho.* Specimens examined from the upper San Juan River drainage, on the south slope of the San Juan Mountains (e.g., Archuleta and La Plata counties, CO; western Rio Arriba Co., NM) are consistent with the phenotype of *H. c. colorado*, as are occasional adults from the western slope of the San Juan Mountains (e.g., Dolores and San Miguel counties, CO) and the La Sal Mountains of Utah. Material from the vicinity of Mesa Verde National Park, Montezuma County, CO (ca. 2591 m/ 8500 ft.), more closely resembles *H. c. idaho* than *H. c. colorado*, although very little material from this area has been examined. The few specimens seen from the Cochetopa Hills (Saguache Co., CO), a low point in the Continental Divide separating the Rio Grande and Gunnison River drainages northeast of the San Juan Mountains, as well as more extensive series from Monarch Pass, separating the Arkansas River drainage from the Gunnison River drainage, are analogous and could be assigned to either subspecies. For now, other than populations from the upper San Juan River drainage (listed as *H. c. colorado*), specimens from all of these areas are listed under *H. c. idaho* (see below), although relationships between the two taxa should be studied in more detail. Further research may suggest that these taxa are best considered synonymous.

Specimens from higher elevations (above 2835 m/ 9300 ft.) in the San Juan Mountains of Colorado, as seen elsewhere in the range of *H. colorado*, are smaller and darker than adjacent populations at lower elevations. A few of these specimens generally resemble *H. c. sublima*, but overall they have better-developed ventral markings, suggesting a closer affinity to *H. c. colorado* and/or *H. c. idaho.* We don't know if *H. colorado* flies above timberline (roughly 3530–3650 m/ 11,581–11,975 ft.) in the San Juan Mountains, or if any populations there are biennially-brooded; no such material has been encountered to date. For now, we consider all material in the San Juan Mountains above about 2835m (9300 ft.) to represent dark *H. c. colorado* and/or *H. c. idaho* "montane forms" (sensu Warren 2005), with the caveat that if biennial, truly alpine populations exist there, they may be more closely allied with *H. c. sublima.*

West of the Continental Divide in Colorado and north of the San Juan Mountains, throughout the Uncompahgre, Gunnison, Colorado, White and Yampa River drainages, and east of the Continental Divide in the North Platte (Jackson Co.) and potentially the Laramie River (far northwestern Larimer Co.) drainages, as well as in far northern Weld County, all populations below about 3200 m (10,500 ft.) are referable to *H. c. idaho.* This butterfly is very widespread in the state, flying in northwestern Saguache, Gunnison, Ouray, Montrose, Delta, Mesa, Pitkin, Summit, Eagle, Garfield, Rio Blanco, Moffat, Routt, Grand, Jackson, and perhaps far northwestern Larimer counties. Throughout the extensive overall range of this taxon, including essentially all of the Columbia and Great basins and most of the southern Rocky Mountains, patterns of altitudinal variation resemble those seen in Colorado, with larger, paler adults at lower elevations, and smaller, darker adults at higher elevations. The higher-elevation forms in the Pacific Northwest were termed "montane forms" (Warren 2005).

Finally, in Colorado's Front and Mosquito ranges starting at about 3146 m (10,321 ft.) and becoming common above timberline (3400–3650 m/ 11,155–11,975 ft.), flies *H. c. sublima.* In the Guanella Pass area of Clear Creek and Park counties, as well as along the northern edge of South Park (below Boreas Pass), individuals are rarely found as low as 3146 m (10,321 ft.), but *H. c. sublima* is far more abundant above timberline. The upper elevational limit for this taxon remains to be determined. The largest population with which we are familiar is that at the type locality, situated at 3700–3730 m (12,139–12,238 ft.) in elevation, but it surely ranges higher, perhaps up to 4200 m (13,780') or greater. We know of populations in Boulder (Indian Peaks Wilderness, Rollins [= Corona] Pass), Gilpin (Rollins [= Corona] Pass), Clear Creek (vic. Loch Lomond Reservoir, Loveland Pass, Grays Peak, Guanella Pass area, Mt. Goliath), Summit (Loveland Pass) and northern and western Park (Boreas Pass area, Hall Valley, Hoosier Pass, Horseshoe Mtn., Pennsylvania Mtn., W of Alma, possibly Craig Park) counties, and it likely also occurs in far southwestern Larimer (Longs Peak area) and far eastern Grand (Rollins [= Corona] Pass) counties at and above timberline. It is unknown if *H. c. sublima* extends into the Gore or Sawatch Ranges, and material examined from timberline in the Sangre de Cristo Mountains (Wheeler Peak, Taos Co., NM) represents typical *H. c. colorado.*

As far as we are aware, populations of *H. c. sublima* are mostly or entirely biennially-brooded, based on recent annual studies at Guanella Pass, Clear Creek County (see below). However, even in Clear Creek County, not all populations are synchronized to fly in the same year, and adults fly annually at some sites. We have records from Loveland Pass from even- and odd-numbered years. To the southeast on Mt. Goliath and Guanella Pass, adults apparently only fly in even-numbered years. Most records from the Mosquito Range (Hoosier Pass, Horseshoe Mountain, W of Alma) are from even-numbered years, but the record from Pennsylvania Mountain is from an odd-numbered year, and one of the specimens from Hoosier Pass, likewise, is from an odd-numbered year. Records exist from both even and odd-numbered years from Hall Valley (far northern Park Co.). Sites where adults occur annually may indicate the presence of two discrete biennial populations occurring sympatrically, as has been noted for other alpine and arctic butterfly taxa (e.g. Ferris & Brown 1981).

The population of *H. colorado* at the summit of Tennessee Pass, Eagle-Lake counties, at about 3170 m (10,400 ft.), is interesting in several respects. This population, about 380 m (1250 ft.) below timberline, is significant in that it was employed by Scott (1975, 1981) as a baseline of comparison when developing his concept of the lower-elevation subspecies *H. c. oroplata.* To define *H. c. colorado* as a dark high-elevation taxon (distinct from *oroplata*), Scott (1998) suggested Tennessee Pass as its type locality. However, most adults that we examined from this locality, especially reared adults mentioned by Scott (1975), are closer to topotypical *H. c. colorado* or *H. c. idaho* than they are to *H. c. sublima* as defined herein, although several (about 35%) are indistinguishable from *H. c. sublima.* From the summit of Tennessee Pass, populations at lower elevations to the south are typical *H. c. colorado*, and those at lower elevations to the north, in Eagle County, are *H. c. idaho*, although these two sets of populations, as elsewhere where the ranges of *H. c. colorado* and *H. c. idaho* meet, are quite similar in appearance. Just above the summit of Tennessee Pass, to the southeast, is Ski Cooper ski area, with ski runs extending southeast nearly to timberline on Buckeye Peak, which constitutes the southernmost end of the Gore Range, although it is essentially attached to the Mosquito Range via Climax and Fremont Pass; to the west of Tennessee Pass lies the Sawatch Range. Tennessee Pass therefore appears to represent a unique population of *H. colorado*, with apparent influences from *H. c. colorado* to the south, *H. c. idaho* to the north, and probably, *H. c. sublima* at higher elevations to the east. Collection records suggest that adults fly every year on Tennessee Pass. Variability in this population suggests that continued surveys for *H. colorado* at and above timberline in the Gore and Sawatch ranges should be conducted to determine the western and southern distributional limits of *H. c. sublima.* Most of the potential habitats in these ranges lie within wilderness areas that are off limits to motor vehicles, thus surveys there would require significant effort.

Hesperia colorado sublima is apparently endemic to Colorado. In Wyoming, all material we've examined from at and above timberline in the Snowy and Wind River ranges corresponds with smaller, darker "montane forms" of *H. c. idaho*; the population above timberline on the Beartooth Plateau, on the Wyoming-Montana border, appears closest to *H. comma manitoba.* Given that we haven't detected *H. c. sublima* from alpine habitats in the Sangre de Cristo Mountains (populations there are referable to *H. c. colorado*, as noted above), and populations at higher elevations in the San Juan Mountains appear to be "montane forms" of *H. c. idaho* and or *H. c. colorado*, it appears not to extend into New Mexico. To date, all known populations of *H. c. sublima* occur along or near the Continental Divide, in ranges

where, in a broad sense, *H. c. ochracea* occurs at lower elevations to the east and *H. c. idaho* (or *H. c. colorado* further south) occurs at lower elevations to the west. It is possible that *H. c. sublima* evolved through mixing between *H. c. ochracea* and *H. c. idaho*. While its overall morphology and distribution generally supports this idea, *H. c. sublima* has clearly developed a unique biology, with respect to *H. c. ochracea*, *H. c. idaho* and *H. c. colorado*, in being mostly or entirely biennially-brooded.

The integrity of *H. c. sublima* as a taxon is perhaps best seen in Park County. *Hesperia colorado* is apparently absent from the floor of South Park, constituting one of the only major gaps in the montane distribution of the species in Colorado. Thus, populations on the far southeastern side of the Front Range and east side of the Mosquito Range in Park County (western and northern parts of the county) don't directly abut *H. c. ochracea* to the east, as they do farther north in the Front Range in Clear Creek, Gilpin and Boulder counties. The population of *H. c. sublima* on Horseshoe Mountain is at least 48 km (30 mi) from the nearest populations of *H. c. ochracea* to the east (Wilkerson Pass, potentially Tarryall Creek, potentially E side of Kenosha Pass). These Park County populations have enabled us to define an unambiguous lower distributional limit for *H. c. sublima*, and demonstrate that the taxon is not merely part of a gradual cline between *H. c. ochracea* and *H. c. idaho* or *H. c. colorado*.

The senior author has studied populations of *H. c. sublima* on multiple occasions, mainly at two sites: Horseshoe Mountain, west of Fairplay in Park County (Mosquito Range), and at the type locality above Guanella Pass in Clear Creek County (Front Range). On Horseshoe Mountain, at around 3675 m (12,060 ft.), adults are found primarily on a gently sloping ridgeline just above timberline. Males vigorously defend hilltop perches, and females are usually found nearby, in relatively dry, grassy areas. Adults were sampled in 1994 and 2006, each year in small numbers.

The type locality of *H. c. sublima*, above Guanella Pass in Clear Creek County, has been the focus of field studies on this taxon since 2006. Adults have been found here in 2006 (18 July), 2012 (18 and 22 July) and 2014 (3 August), and were not found, despite intensive searches under ideal field conditions, in 2009 (17 July), 2011 (25 August- a very delayed season), or 2013 (20 and 31 July), suggesting that adults fly only on even-numbered years at this site. Here, males are usually encountered on hilltops or ridgelines above timberline and females may be found anywhere in the landscape, but usually on drier hillsides and ridges. Small numbers of individuals regularly occur on the hilltop 0.2 km (0.12 mi) to the south-southwest of the upper (west) summit parking lot, at 3566 m (11,700 ft.), but adults are far more abundant on the northeastern ridge of Square Top Mountain, about 1.17 km (0.73 mi) to the west of the upper parking lot, at 3700-3730 m (12,139-12,238 ft.). In 2012, adults were very abundant on the northeastern ridge of Square Top Mountain on 22 July, when up to 8 males could frequently be seen at one time, flying around perching sites along the ridgeline, and in pursuit of passing females. On 3 August 2014, adults of *H. c. sublima* were again very abundant on the northeastern ridge of Square Top Mountain, active from 1000 hrs. to about 1300 hrs., when clouds terminated butterfly activity for the day.

Perhaps due to the shorter overall season for butterfly activity in alpine habitats, adults of *H. c. sublima* normally fly two weeks to one month earlier than populations of *H. colorado* below timberline. Mid-July to early August is usually the peak flight period for *H. c. sublima*. Depending upon elevation, annual variation in snowpack, and summer weather, the normal peak flight period for *H. c. colorado*, *H. c. idaho* and *H. c. ochracea* in Colorado is mid-August to early September, with fresh males first beginning to emerge in mid- to late July. For example, in 2014 (a somewhat delayed season), when *H. c. sublima* was at or near its peak flight on Guanella Pass, adults of *H. c. idaho* on the West Slope were just beginning to emerge, and no adults of *H. c. colorado* or *H. c. ochracea* had yet been seen on the East Slope. Despite this, under extreme conditions, adults of all subspecies may fly long before or after the typical peak periods. Evidence from T. L. Mead's 1871 journal, as well as his collected specimens, suggests that some butterfly flight periods were considerably advanced that season compared to modern average norms (Calhoun 2015.). This presumably explains the seemingly early collection date of 13 July for the lectotype and a paralectotype of *Pamphila colorado*. It is also worth noting that Mead apparently collected above timberline in Colorado only in the Mosquito and Sawatch ranges. While we have yet to confirm *H. c. sublima* from the Sawatch Range, adults have mainly been found in even-numbered years in the Mosquito Range, suggesting that Mead would not likely have encountered this taxon in 1871.

Additional material examined. The following specimens were examined during the course of this study, in addition to type material of *H. c. sublima* listed above. For *H. c. colorado* and *H. c. idaho*, we list data from all specimens examined, but for *H. c. ochracea*, which is very abundant in collections, we only list complete data from populations immediately adjacent

to *H. c. sublima* or otherwise discussed in the text.

***Hesperia colorado sublima*: USA: COLORADO: Boulder Co.:** "Sunset", 30-VII-1951, B. Weber (1♂, 1♀, MGCL) [excluded from type series since site could not be located]; **Park Co.**: Craig Park, 10,500', 27-VI-1939, R. Whittaker (1♂, MGCL) [while like *sublima*, this is the only high-elevation specimen examined from the Kenosha-Platte River ranges, territory dominated by *ochracea* at slightly lower elevations to the east; the locality should be revisited to study variation there]; **County unknown**: "Kingston" [possibly referring to a former mining town by this name in Gilpin Co.], 12-VIII-1951, H. A. Freeman (1♂, 1♀, MGCL) [excluded from type series due to imprecise locality information].

***Hesperia colorado sublima / H. c. colorado / H. c. idaho* transition zone: all from USA: COLORADO. Eagle-Lake Cos.**: Tennessee Pass, 10,424', 23-VIII-1969, J. Scott (1♂, MGCL); 15-VIII-1971, J. Scott (13♂, 4♀, MGCL); 9-VIII-1972, J. Scott (11♂, 7♀, MGCL); egg laid about 10-VIII-1972, pup. 29-IX-1972, emg. 14-X-1972, J. Scott (1♂, MGCL); egg laid about 10-VIII-1972, pup. 29-IX-1972, emg. 16-X-1972, J. Scott (1♂, MGCL); egg laid about 10-VIII-1972, pup. 5-X-1972, emg. 21-X-1972, J. Scott (1♀, MGCL); egg laid about 10-VIII-1972, pup. 7-X-1972, emg. 21-X-1972, J. Scott (1♂, MGCL); egg laid about 10-VIII-1972, pup. 7-X-1972, emg. 24-X-1972, J. Scott (1♀, MGCL); egg laid about 10-VIII-1972, pup. 8-X-1972, emg. 22-X-1972, J. Scott (1♂, MGCL); egg laid about 10-VIII-1972, pup. 8-X-1972, emg. 24-X-1972, J. Scott (1♀, MGCL); egg laid about 10-VIII-1972, pup. 9-X-1972, emg. 26-X-1972, J. Scott (1♀, MGCL); egg laid about 10-VIII-1972, pup. 10-X-1972, emg. 26-X-1972, J. Scott (1♀, MGCL); egg laid about 10-VIII-1972, pup. 11-X-1972, emg. 27-X-1972, J. Scott (1♀, MGCL); egg laid about 10-VIII-1972, pup. 12-X-1972, emg. 28-X-1972, J. Scott (1♀, MGCL); 1-VIII-1982, J. Scott (2♂, MGCL); 9-VIII-1996, R. Stanford (1♂, 1♀, CSU).

***Hesperia colorado colorado* "montane form" (San Juan Mts. above 2835 m (9300 ft.): all from USA: COLORADO. Hinsdale Co.**: Mill Creek Campground [2885 m/ 9465 ft.], 10 mi SW Lake City, 27-VII-1996, P. Opler & E. Buckner (1♀, CSU); North Creek, 20-VII-1993, D. & J. Lindsley (3♂, 1f, MGCL); nr. N. Clear Creek Falls, 10,000', 6-VIII-1983, R. Klopshinske (1♂, MGCL); Quiet Valley, Hwy. 149, 9600', 31-VIII-1955, F. M. Brown (6♂, 16♀, MGCL); **San Juan Co.**: Silverton, 16-23-VIII (1♀, MGCL); 2 mi N Silverton at Mineral Ck., 9500', 4-IX-1983, R. Klopshinske (5♂, 3♀, MGCL).

***Hesperia colorado colorado* (incl. *oroplata*, sensu Scott 1981): USA: COLORADO: Alamosa Co.**: Great Sand Dunes, 20-VIII-1958 (1♂, MGCL); Great Sand Dunes Nat. Mon., 8300', 31-VIII-1977, F. M. Brown (1♂, MGCL); 26-VIII-1980, F. M. Brown (8♂, 4♀, MGCL); 18-IX-1980, F. M. Brown (3♂, 1♀, MGCL); Sand Dunes, 7800', 20-VIII-1976, B. Weber (5♂, 1♀, MGCL); **Archuleta Co.**: vicinity of Blanco River Campground, 7200', 28-VII-1988 (1♂, 1♀, MGCL); **Chaffee Co.**: Bear Creek, 5-IX-1997, R. Romeyn (4♂, 2♀, MGCL); big hilltop, 2 mi E Buena Vista, 17-VIII-1971, J. Scott (6♂, MGCL); Greens Creek, 8800', 27-VIII-1974, J. Scott (1♂, MGCL); Lost Creek, 2 mi W Maysville, 9200', 6-IX-1974, J. Scott (2♂, 1♀, MGCL); Otero Pumping Station, between Riverside and Princeton, 17-VIII-1971, J. Scott (1♂, MGCL); Pine Creek, 17-VIII-1971, J. Scott (3♂, 1♀, MGCL); Salida, Spiral Drive, 10-IX-1971, J. Scott (1♂, MGCL); Trout Creek, off Rt. 285, 4-IX-1993, B. Kondratieff (1♂, CSU); 1.6 mi N Granite, 16-VIII-1971, J. Scott (23♂, 1♀, MGCL); 2 mi SE Salida, 2-VIII-1965, J. Scott (2♂, MGCL); 4 mi S Poncha Springs, 29-VIII-1972, J. Scott (1♂, MGCL); **Conejos Co.**: Aspen Glade Campground, 21-VIII-1965, J. Scott (1♀, MGCL); Bighorn Creek, 8900', 16-VIII-1999, P. Pineda (1♂, CSU); Conejos River, near River Springs Guard Station, 14-IX-1968, G. Scott (1♀, MGCL); FS Rd. 250 at Alamosa C.G., above Terrance Res., 8950', 20-VIII-1996, A. Warren (3♂, 3♀, ADW); FS Rd. 271 nr. Cat Ck., N of Terrance Res., 8950', 20-VIII-1996, A. Warren (1♀, ADW); Rd. to Platoro, 20.8 mi W of Hwy. 15 jct. 9300', 13-VIII-1971, T. Emmel (4♂, 1♀, MGCL); Rito Hondo, 21-VIII-1965, J. Scott (1♂, CSU); **Costilla Co.**: nr. Fort Garland, 5-IX-1969, M. Fisher (1♀, MGCL); 5-IX-1969, R. Stanford (1♂, CSU); W La Veta Pass, US 160, 9200', 18-VIII-1992, R. Stanford (1♀, MGCL); **Custer Co.**: Bigelow Divide, 16-VIII-1952, D. Eff (2♂, MGCL; 2♂,1♀, ADW); 24-VIII-1952, D. Eff (1♂, MGCL); Hardscrabble Canyon, 22-VIII-1972 (2♂, CSU); Querida, 1-IX-1962, J. Scott (1♂, MGCL); Silver Park, 1-IX-1962, J. Scott (1♀, MGCL); **Fremont Co.**: Cotopaxi, 23-VIII-1969, R. Stanford (5♂, CSU); Currant Ck., 15 mi NW Canyon City, 1-IX-1974, M. Fisher (2♀, MGCL); Kerr Gulch, 19-VIII-1973, J. Scott (1♂, MGCL); Kuntz Gulch, 26-VIII-1970, J. Scott (1♀, MGCL); nr. Cotopaxi, 5-VIII-1969, M. Fisher (2♂, MGCL); Oak Creek, 19-IX-1968, J. Scott (2♂, MGCL); Oak Creek, nr. Cotopaxi, 23-VIII-1969, M. Fisher (10♂, 2♀, MGCL); Spring Ck., 15-VIII-1965, J. Scott (2♂, MGCL); 31-VII-1969, J. Scott (1♂, MGCL); 2-VIII-1969, J. Scott (1♂, MGCL; 1♂, CSU); 7-VIII-1969, J. Scott (1♀, MGCL); 1 mi NE Calcite, 29-VII-1965, J. Scott (3♂, MGCL); 3 mi SW Cotopaxi, 3-VIII-1965, J. Scott (1♂, MGCL); **Huerfano Co.**: nr. La Veta, 7600', 9-IX-1973, R. Stanford (2♀, CSU); **Lake Co.**: Mt. Massive Trout Club, 15-VIII-1971, J. Scott (1♂, MGCL); 16-VIII-1971, J. Scott (31♂, MGCL); **La Plata Co.**: Radio Hill, SW of Durango, 20-VIII-1980, J. Scott

(1♂, MGCL); Rockwood, Elbert Ck., at N end Shalona Lake, 7500', 19-VIII-1996, A. Warren (2♂, 6♀, ADW); **Las Animas Co.**: Lift to peak on Raton Pass, 13-IX-1969, M. Fisher (6♀, MGCL); N of Rd. to Sugarite Ski Lodge, 7550', 9-VIII-1988, J. & F. Preston (1♂, MGCL); North Lake, 8-IX-1973, M. Fisher (1♂, 1♀, MGCL); nr. North Lake, 86-9000', 8 mi N Stonewall, 9-IX-1973, R. Stanford (10♂, 11♀, CSU); Raton Pass, 13-VIII-1951, H. A. Freeman (3♂, MGCL); 13-IX-1969, R. Stanford (1♂, CSU); S side San Francisco Pass, S slope, Raton Mesa Complex, N of Sugarite Canyon SP, 4.5 mi S CO Rd. 12.5 on Co. Rd. 85.5, 8000', 6-VIII-1996, R. Holland (3♂, CSU); Stonewall, 21-VIII-1980, J. Scott (1♂, MGCL); **Mineral Co.**: Wolf Creek Camp, 8400', 20-VII-1952, J. & F. Preston (1♂, MGCL); **Rio Grande Co.**: Del Norte area, "D" Mt., 7-VIII-1976, M. Fisher (1♂, MGCL); **Saguache Co.**: Bonanza Rd., 1 mi S Villa Grove, 7800', 20-VIII-1966, S. Ellis (1♀, MGCL); Harry Ck., E side Marshall Pass, 5-IX-1975, J. Harry (2♂, 2♀, MGCL); Poncha Pass, 9000', 11-VIII-1979, J. & F. Preston (1♂, 1♀, MGCL); Raspberry Ck., 8200', 22-VIII-1965, J. Scott (2♂, MGCL); Rito Alto Ck., 9-VIII-1970, J. Scott (1♂, MGCL); Wild Cherry Ck., 16-VIII-1974, J. Scott (1♂, MGCL); 1 mi E of North Cochetopa Pass, CO 14, 9500', 11-VIII-1996, R. Stanford (2♂, ADW); 1 mi W Villa Grove, 7800', 20-VIII-1966, S. Ellis (1♀, MGCL); 5 mi W Villa Grove, 4-VIII-1969, J. Scott (1♂, MGCL); 7 mi W La Garita, 4-VIII-1970, J. Scott (1♂, CSU; 1♂, MGCL); 13 mi S Parlin, 8800', 30-VII-1933, Chadwick & Davenport (1♂, MGCL); **NEW MEXICO: Colfax Co.**: Bartlett Mesa, 8100', 22-VIII-1980, J. Scott (1♂, MGCL); NM 21, 5 mi NW Rayado, 6800', 17-IX-1995, S. Cary (1♂, CSU); Porcupine Trail Camp, Philmont Scout Ranch, nr. Cimmaron, 24-VIII-1958, C. P. Slater (1♂, MGCL); Raton Mesa, 24-VIII-1969, J. Scott (2♂, MGCL); 24-VIII-1979, J. Scott (2♂, MGCL); 21-VIII-1980, J. Scott (8♂, 4♀, MGCL; 1♀, CSU); Red Hill, Johnson Mesa, E of Raton, 8400', 27-VII-1996, R. Holland, S. Cary (1♂, CSU); Sodapocket Campground, Sugarite State Park, 8000', 3-IX-1992, J. & F. Preston (10♂, 8♀, MGCL); **Los Alamos Co.**: nr. Los Alamos, 8000', 16-IX-1973, R. Stanford (3♂, 5♀, CSU); USFS Rd. 1, 8000–9000', 4 mi W Los Alamos, E slope, Jemez Mts., 31-VII-1984, S. Cary (1♂, CSU); **Mora Co.**: Chacon, 26-VIII-1978, J. Scott (1♂, 1♀, MGCL); Ocate Mesa, 10 mi NW Ocate, 16-VIII-1987, S. Cary (2♂, CSU); **Rio Arriba Co.**: Bear Spring, FS 64, 2 mi N FS 77, 9000', 31-VIII-1985, R. Holland (1♀, CSU); FS 77, 0.5 mi N NM 96, Santa Nino, nr. Gallena, N Jemez Mts., 8000', 31-VIII-1985, R. Holland (2♂, 1♀, CSU); Tusas Ridge, W of Tres Piedras, 5-IX-1969, R. Stanford (1♂, CSU); 2 mi E NM 112 on NM 96, N Jemez Mts., 1-IX-1985, R. Holland (1♀, CSU); 2 mi N Gallina on FS 8, 8000', Jemez Mts., 1-IX-1985, R. Holland (2♀, CSU); 4 mi W Deadman Lookout, N. ext. Jemez Mts., 8700', 8-IX-1984, R. Holland (5♂, 11♀, CSU); 14 mi NW Chama, 21-VIII-1969, J. Schaffner (1♀, ADW); **Sandoval Co.**: Agua Sarca, nr. Mesa Poleno, 8000', N slope Jemez Mts., 12-VIII-1984, R. Holland (1♀, CSU); 9-IX-1984, R. Holland (3♂, 2♀, CSU); Bear Paw Lake, NW slope Jemez Mts., 7600', 31-VII-1984, R. Holland (1♂, CSU); 9-IX-1984, R. Holland (5♂, 3♀, CSU); Sec. 20, 5 mi N NM 126 on FS 376, W-cent. Jemez Mts., 8200', 1-VIII-1984, R. Holland (2♂, CSU); 1 mi S Regina, 7500', NW slope Jemez Mts., 9-IX-1984, R. Holland (2♂, 5♀, CSU); **San Miguel Co.**: Santa Fe Nat. For., Pecos, 31-VII-1989, P. Milner (1♂, MGCL); **Taos Co.**: Arroyo Hondo, 1 mi NE Nat. For. boundary, 7500', 24-VIII-1985, R. Holland (2♂, CSU); Big Arsenic Spring, Rio Grande Gorge, 9-VIII-1986, S. Cary (1♀, CSU); Chawa Lama Overlook, E side, Rio Grande Gorge, 7000', 24-VIII-1985, R. Holland (5♂, CSU); Ranchito, 27-VIII-1978, J. Scott (1♂, 2♀, MGCL); Red River, 8900', 27-VIII-1960, H. A. Freeman (2♂, 1♀, ADW); 28-VIII-1960, H. A. Freeman (1♂, ADW); Red River Pass, 9850', 27-VIII-1960, H. A. Freeman (2♀, ADW); Wheeler Peak Tr., 3500m, 2-VIII-1989, P. Milner (1♂, MGCL); **Union Co.**: Capulin Mt., Crater Rim Trail, 8000', 20-VIII-1969, F. M. Brown (4♂, MGCL); Capulin Volcano, summit, 8700', 22-IX-1996, R. Holland (1♂, 2♀, CSU); Sierra Grande, E slope, 16-VIII-1997, S. Cary (1♂, 1♀, CSU); trail from Sierra Grande parking area to summit, NE slope, 7200'–8700', 20-VII-1997, S. Cary (1♂, CSU); 17-VIII-1997, S. Cary (2♂, CSU).

***Hesperia colorado idaho*: USA: COLORADO. Delta Co.**: Coal Creek, nr. Somerset, 2-VIII-1969, M. Fisher (1♀, MGCL); Crystal Creek Campground, 6600', 20-VIII-1965, M. Fisher (2♂, MGCL); Crystal River Canyon, 6600', 20-VIII-1965, M. Fisher (1♂, 1♀, MGCL); Leroux Ck. Rd., 7500', 9-VIII-1962, S. Ellis (1♂, 2♀, MGCL); 23-VIII-1962, S. Ellis (4♂, 3♀, MGCL); 3-IX-1962, S. Ellis (3♂, 4♀, MGCL); 25-VII-1964, S. Ellis (1♀, MGCL); 7-VIII-1964, S. Ellis (2♂, MGCL); 15-VIII-1964, S. Ellis (4♂, MGCL); 21-VIII-1964, S. Ellis (1♂, MGCL); 31-VIII-1964, S. Ellis (1♂, MGCL); Ponkey's Peak, 0.5 mi N Crawford, 7386', 17-VIII-1966, M. Fisher (1♂, 1♀, MGCL); 10–15 mi E Somerset, 18-VII-1971, D. Lindsley (3♂, MGCL); **Eagle Co.**: Hwy. 141, ca. 5.5 mi N of Wolcott, 2317m, 39°46'11"'N 106°40'52"W, 28-VII-2014, A. Warren (13♂, ADW); Hwy. 141, ca. 8.5 mi N of Wolcott, 2496m, 39°48'30"N 106°40'35'W, 10-VII-2012, A. Warren (2♂, ADW); Hwy. 141, mi. 17.2, along Colorado River just NW of Bond, 2038m, 39°53'03"N 106°41'46"W, 10-VII-2012, A. Warren (1♂, ADW); 28-VII-2014, A. Warren (4♂, ADW); Minturn, 1-VIII-1984, D. L. Bauer (1♂,

MGCL); W of Wolcott, 8500', 27-VII-1964, S. Ellis (2♂, MGCL); 5 mi W Gypsum, 6500', 11-VIII-1972, M. Fisher (15♂, 13♀, MGCL); 5 mi W jct. 131 & Rd. to Burns, 13-VIII-1972, M. Fisher (1♀, MGCL); 7 mi NE State Bridge, 7000', 13-VIII-1972, M. Fisher (1♂, 2♀, MGCL); **Garfield Co.**: Rim Road above Tichner Dr., 9200', 9-VIII-1996, C. Slater (1♂, 1♀, CSU); Roan Plateau, JQ5 Trail, 6000', 7-VIII-1996, C. Slater (2♂, 2♀, CSU); **Grand Co.**: Beaver Creek Jct., 12-VIII-1967, R. Stanford (5♂, CSU); Co. Rd. 50, 0.2-2.2 rd. mi SE Hwy. 40, 2330–2435m, from 40°03'06''N 106°07'42''W to 40°01'57''N 106°06'42''W, 25-VII-2014, A. Warren (4♂, ADW); Co. Rd. 50, 3 mi SE jct. US Hwy. 40 (8 mi SW Hot Sulphur Spgs.), 7-VII-1989, A. Warren (1♂, ADW); E side Gore Pass, milepost 21, SH 134, 8600', 15-VIII-1980, J. & F. Preston (9♂, 10♀, MGCL); Lake Granby, 19-VIII-1978, M. Minno (5♂, MGCL); Lost Bob Gulch, Shadow Mtn., 10,000', 6-VIII-1955, F. M. Brown (1♂, MGCL); Parshall, 19-VIII-1911 (1♂, CSU); 21-VII-1974, T. Dickel (1♂, MGCL); 6-VIII-1974, T. Dickel (1♂, 1♀, MGCL); Shadow Mtn. Dam, 8375', RMNP, 27-VII-1999 (1♂, CSU); 6-IX-1998 (1♂, CSU); Soda Springs Ranch, Hwy. 34 at S end Grand Lake, 17-IX-1998, S. J. Warren (6♀, ADW); Vasquez Mountain summit, ca. 4 air mi SE Hot Sulphur Spgs., 10,118' [3084 m], 40°02'28''N 106°02'33''W, 2-IX-2011, A. Warren (12♂, 1♀); W side Gore Pass (Hwy. 134), vic. mi 12, Jct. NF 250 & NF 241, ca. 1 mi SE Routt Co. line, 2680m, 40°04'20''N 106°37'08''W, 2-VIII-2014, A. Warren (1♂, ADW); **Gunnison Co.**: Almont Summit, 25-VII-1993, D. Lindsley (1♂, 1♀, MGCL); Black Sage Pass, FR 887, vic. summit, 2970m, 39°29'28''N 106°27'07''W, W of Tomichi Creek, 8-VIII-2014, A. Warren (6♂, 2♀, ADW); Blue Mesa Reservoir, 31-VII-1972, T. Scovell (1♂, MGCL); Blue Mesa Summit, 22-VIII-1970, M. Fisher (3♂, 3♀, MGCL); bottom of Black Canyon, 6500', 30-VIII-1955, F. M. Brown (5♂, 3♀, MGCL); Coal Creek, nr. Somerset, 21-VIII-1968, M. Fisher (3♂, MGCL); East Muddy Creek, 7-VIII-1964, S. Ellis (1♀, MGCL); Gothic, 6-VIII-1954, F. M. Brown (1♀, MGCL); 7-VIII-1961, W. Howe (1♂, MGCL); 12-VIII-1962, B. Baker (1♂, MGCL); 27-VII-1971, D. Lindsley (2♂, MGCL); Hwy. 92, 9800', 19-VIII-1976, B. Weber (1♂, MGCL); Marcellina Mtn., 30-VII-1971, D. Lindsley (1♀, MGCL); Mt. Crested Butte, 3000m, 17-19-VII-1998, V. Lukhtanov (3♂, 8♀, MGCL); Muddy Creek, 10-VIII-1961, S. Ellis (1♀, MGCL); 15-VIII-1961, S. Ellis (1♀, MGCL); N end Paonia Reservoir, 7500', 25-VII-1989, M. Fisher (1♂, MGCL); nr. Chair Mtn., Muddy Creek, 10-VIII-1961, K. Tidwell (1♀, MGCL); nr. Somerset, 8-VIII-1961, R. & C. Kendall (6♂, 1♀, MGCL); Old Monarch Pass Rd., 8000', 19-VIII-1952, F. M. Brown (7♂, 7♀, MGCL); Old Monarch Pass, W side, 9000', 21-VIII-1983, M. Fisher (8♂, MGCL); Rte. 50 nr. Blue Mesa, 1-VIII-1981, E. Olson (1♂, 1♀, MGCL); S end Hwy. 50 bridge, Blue Mesa Reservoir, 8000', 17-VIII-1970, F. M. Brown (17♂, 12♀, MGCL); Taylor Park, 2860m, 1-2-VIII-1983, P. F. Milner (5♂, 1♀, MGCL); Tomichi Creek, Co. Rd. 888, 2 mi N Hwy. 50, 2641m, 38°27'03''N 106°24'20''W, 8-VIII-2014, A. Warren (12♂, 7♀, ADW); West Muddy Creek, 27-VII-1964, R. Davis (2♂, 2♀, MGCL); **Jackson Co.**: North Dunes SRA, 18-VIII-1996, P. Opler (1♂, 1♀, CSU); **Mesa Co.**: Lands End Rd., between SOB and Coal Creeks, Grand Mesa, 10,200', 12-VIII-1985, J. & F. Preston (1♂, 1♀, MGCL); Lands End Rd., Grand Mesa, 9600', 21-VIII-1966, M. Fisher (2♂, 2♀, MGCL); Unaweep Canyon, West Creek, 5400', 4-VIII-1969, M. Fisher (1♂, 1♀, MGCL); 19-VIII-1968, M. Fisher (1♂, MGCL); 25-VIII-1967, M. Fisher (1♂, MGCL); 2 mi S Mesa, 6500', 31-VII-1971, S. Steinhauser (1♂, MGCL); 6 mi S Mesa, 6600', 25-VII-1971, S. Steinhauser (1♂, 1♀, MGCL); **Moffat Co.**: Craig, 30-VIII-1994, D. L. Bauer (1♂, 1♀, MGCL); Entrance, Dinosaur Nat. Mon., 6600–7000', 25-VII-1969, M. Fisher (4♂, MGCL); Hwy. 40, 0.3 mi E Elk Springs, 10-IX-1996, I. Leeuw (3♀, ADW); 5-IX-1997, I. Leeuw (4♂, 3♀, ADW); Vermillion Ck., Co. Rd. 10, 4 mi SE mi. 9 (9 mi N Jct. 318), 1-IX-1991, A. Warren (1♂, 2♀, ADW); 1.5 mi E Maybell, 31-VIII-1991, A. Warren (1♀, ADW); 4 mi E Elk Springs on US 40, 20-VIII-1978, M. Minno (3♂, MGCL); **Montezuma Co.**: Mesa Verde National Park, 23-VIII-1958, D. Eff (2♂, 1♀, MGCL); 30-VII-1972, M. Fisher (1♂, MGCL); **Montrose Co.**: Black Canyon, 13-VIII-1964, S. Ellis (14♂, 2♀, MGCL); 18-VIII-1964, S. Ellis (2♂, MGCL); S Rim Black Canyon, 8200', 28-VIII-1955, F. M. Brown (17♂, 24♀, MGCL); 17-VIII-1962, T. W. Davies (6♂, 11♀, MGCL); **Ouray Co.**: Canyon Creek, Ouray, 8500–9000', 22-VIII-1970, F. M. Brown (12♂, 3♀, MGCL); East Dallas Creek, end of Ouray Co. Rd. 7, 24-VIII-1970, F. M. Brown (2♂, 1♀, MGCL); Hayden Mtn., 9300', 29-VIII-1955, F. M. Brown (4♂, 8♀, MGCL); Log Hill Mesa, N of Ridgewood, 19-VIII-1996, A. Warren (1♂, 1♀, ADW); NE Cedaredge at Surface Ck., 7500', 28-VIII-1983, R. Klopshinske (6♂, 1♀, MGCL); nr. Ouray, 7500–7800', 16-20-VIII-1959, F. M. Brown (6♂, 7♀, MGCL); nr. Ouray, 7800', 7-VIII-1960, F. M. Brown (1♂, MGCL); nr. Ridgeway, jct. US 550 & Ouray Co. Rd. 8, 23-VIII-1970, F. M. Brown (5♂, MGCL); Ouray, 8000', 28-VIII-1969, F. M. Brown (3♂, 2♀, MGCL); Owl Creek Pass, 8000', 28-VII-1963, S. Ellis (1♂, MGCL); SE Ridgeway, 7000', 27-VIII-1983, Klopshinske (1♀, MGCL); Willow Swamp, 9000', E Fork Dallas Creek, 5-VIII-1998, P. Pineda (1♂, CSU); 1 mi E Ridgeway, 21-VIII-1964, S. Ellis (8♂, 3♀, MGCL); 22-VIII-1970, M. Fisher (5m, 1♀, MGCL); 2.5 mi N Ouray, 7500', 20-VIII-1970, F. M.

Brown (13♂, 4♀, MGCL); 3 mi S Ridgeway, 7000', 20-VIII-1983, R. Klopshinske (1♂, 1♀, MGCL); 4 mi N Ouray, 7500', 19-27-VIII-1970, F. M. Brown (14♂, 7♀, MGCL); **Pitkin Co.**: Aspen, 7-VIII-1968, R. Stanford (6♂, MGCL); 15-VIII-1971, R. Stanford (1♀, CSU); Conundrum Creek Trail, Aspen, 18-VIII-1988, L. Harris (3♀, MGCL); Redstone area, 3-VIII-1983, P. F. Milner (1♂, MGCL); 7 mi N Redstone, 29-VII-1976, D. Eff (1♂, MGCL); Rio Blanco Co.: Rd. 64 at White Riv., 22-VIII-1991, Kondratieff & Kippenhan (2♀, ADW); 6 mi E Meeker, 5-VIII-1985 (1♂, CSU); **Routt Co.**: W side Gore Pass on CO 134, 9000', 15-VIII-1997, B. Brinkman (2♂, 2♀, ADW); **San Miguel Co.**: Leopard Ck., 8500', 20-VIII-1959, F. M. Brown (6♂, 2♀, MGCL); **Summit Co.**: Boulder Creek CG, 23-VII-1967, R. Stanford (1♂, CSU); CO 91, 1 mi S Wheeler Jct., 9-VIII-1996, R. Stanford (1♂, 1♀, CSU); Keystone, 9300', 16-VIII-1993, R. Stanford (1♂, 1♀, CSU); Montezuma, 30-VII-1984, D. Bauer (1♀, MGCL); nr. Keystone, 9600', 4-VIII-1973, R. Stanford (2♂, CSU); nr. Keystone Ski Area, 9300', 4-VIII-1973, M. Fisher (1♂, MGCL); 10-VIII-1975, M. Fisher (5♂, MGCL); **Weld Co.**: Pawnee Nat. Grassland, 12 mi E Grover, 1-IX-1973, R. Stanford (1♂, 3♀, CSU); 1 mi S Wyoming line, due N of Raymer, 30-VIII-1985, J. Scott (4♂, 3♀, MGCL); **UTAH: Grand Co.**: Gateway (state line) Rd., 10.5 mi E jct. La Sal Mtn. Loop Rd., 18-VIII-1996, A. Warren (4♀, ADW); La Sal Mtn. Loop Rd., 0.6 mi SW jct. Castleton Rd., 16-VIII-1996, A. Warren (1♂, ADW); La Sal Mtn. Loop Rd., 2.4 mi S jct. Castleton Rd., 16-VIII-1996, A. Warren (8♂, 4f, ADW); La Sal Mtn. Loop Rd., 5.3 mi S jct. Castleton Rd., 16-VIII-1996, A. Warren (1♂, ADW); La Sal Mtn. Loop Rd., 6.2 mi S jct. Castleton Rd., 16-VIII-1996, A. Warren (6♂, 4♀, ADW); La Sal Mtn. Loop Rd., 8.9 mi S jct. Castleton Rd., 16-VIII-1996, A. Warren (1♂, ADW); **San Juan Co.**: La Sal Mtn. Loop Rd., 13 mi E jct. US Hwy. 191, 16-VIII-1996, A. Warren (1♂, ADW).

***Hesperia colorado idaho / H. c. ochracea* transition zone: all from USA: COLORADO. Larimer Co.:** Cherokee Park SWA, Middle Unit, Rd. 80C, 10 mi WNW Hwy. 287, 31-VIII-2008, A. Warren (7♂, 2♀, ADW); Cherokee Park SWA, Rd. 80C, 6 mi W Hwy. 287, 31-VIII-2008, A. Warren (1♂, 1♀, ADW); Hewlett's Gulch, 7-X-1997 (1♀, CSU); Middle Cherokee Park, 6000', 31-VIII-1987, J. Keeler (1♂, MGCL); Virginia Dale, 14-VIII-1980, L. Brown (2♂, 3♀, MGCL); 15-VII-1982, J. M. Nelson (1♀, MGCL).

***Hesperia colorado ochracea:* all from USA: COLORADO. Boulder Co.**: 7♂, 3♀ (CSU); 47♂, 46♀ (MGCL); **Clear Creek Co.**: Clear Creek Canyon, 21-VIII-1977, I. Finkelstein (1♂, 1♀, MGCL); Fall River Rd., 9000', 7-IX-1968, R. Stanford (1♂, CSU); hill SE of Empire, 9400', 22-VIII-1971, J. Scott (5♂ , MGCL); Idaho Springs, 3 mi E, 3-VIII-1984, D. L. Bauer (2♂, MGCL); 2 mi E Idaho Springs, 13-VIII-1968, R. Stanford (1♂, CSU); **Douglas Co.**: 71♂, 39♀ (ADW); 12♂, 34♀ (CSU); 82♂, 42♀ (MGCL); **Elbert Co.**: 3♂, 7♀ (ADW); 34♂, 15♀ (MGCL); **El Paso Co.**: 4♂, 2♀ (ADW); 9♂, 3♀ (CSU); 74♂, 31♀ (MGCL); **Gilpin Co.**: Blackhawk, 2440m, 1-IX-1983, C. Slater (1♀, CSU); Chase Creek, 2500m, 12-VII-1977, C. Slater (1♂, CSU); 18-IX-1973, C. Slater (1♂, CSU); CR 7 at Smith Gulch, 10-VIII-1996, C. Mills III (14♂, 3♀, MGCL); Golden Gate Canyon State Park, Smith Hill Rd., 4-VII-1996, C. Mills III (5♂, 1♀, MGCL); Macy Gulch, 8200', 30-VIII-1987 (1♂, 2♀, CSU); **Jefferson Co.**: 49♂, 11♀ (ADW); 10♂, 6♀ (CSU); 128♂, 56♀ (MGCL); **Jefferson-Douglas Co.**: 2♂, 1♀ (CSU); **Larimer Co.**: Bear Lake Rd., below Eagle Cliffs, 8075', RMNP, 25-VIII-1999 (1♂, CSU); Big Thompson Cyn., Round Mtn. Trail, 10-VIII-1996, D. Leatherman (1♂, CSU); Black Canyon Trail, 7800', RMNP, 3-IX-1997 (2♂, CSU); Cow Creek, 7850', RMNP, 3-IX-1997 (1♀, CSU); Cow Creek Trail, 8150', RMNP, 6-IX-1998 (1♀, CSU); 14-VIII-2002 (1♂, CSU); Deer Ridge Trail, 8875', RMNP, 15-VIII-1998 (1♂, CSU); Fern Lake Trail, 8200', RMNP, 13-VIII-1998 (1♂, CSU); 20-VIII-2002 (1♂, CSU); Fort Collins, 20-IX-1975, M. Epstein (1♀, CSU); Glacier View Meadow, 7000', 30-VIII-1985, H. & M. Evans (2♂, CSU); Kelly Flats Campground in Cache la Poudre Canyon, 6750', 7-VIII-1987, J. & F. Preston (1♂, MGCL); Lory SP, 4 mi W Fort Collins, 13-X-1991, P. Opler (1♀, CSU); Moraine Park, Fern Lake, 8100', RMNP, 3-4-IX-1994, R. Muckenthaler (1♂, CSU); Pennock Pass, 7500', 31-VIII-2002, P. Opler & E. Buckner (1♂, 3♀, CSU); RMNP Headquarters, 3-IX-1995, P. Opler (1♂, CSU); Viestenz-Smith Park, 12-X-1991, P. Opler (1♂, 1♀, CSU); **Park Co.**: Bailey, 25-VIII-1941, R. Whittaker (1♀, MGCL); Eleven Mile Canyon, 8000–8400', SW of Lake George, 2-IX-1973, R. Stanford (1♀, CSU); Little Blue Mountain, 25-31-VII-1989, A. Warren (1♂, ADW); near Pipe Springs Campground, E of Wilkerson Pass, 9450', 16-VIII-1980, J. & F. Preston (2♂, 1♀, MGCL); Tappan Creek, 8000', 23-VIII-1948, F. M. Brown (6♂, 15♀, MGCL); **Teller Co.**: Big Spring Ranch, 4 mi SW Florissant, 8600', 8-VIII-1971, T. Emmel (1♀, MGCL); 15-VIII-1971, T. Emmel (1♂, MGCL); Cripple Creek, 31-VIII-1975, B. H. (1♂, MGCL- intermediate towards *colorado*?); Crystola Canyon, 8000', 25-VIII-1973, M. Fisher (2♂, 3♀, MGCL); 3-IX-1973, M. Fisher (2♀, MGCL); Crystola Creek, 8-9000', 3-IX-1973, R. Stanford (1♂, 5♀, CSU); Florissant Fossil Beds, 8400', R71W T13S sec 14, 17-IX-1976, F. M. Brown (1♂, MGCL); Pikes Peak Research Station, 7 mi S Florissant, 11-VIII-1985, M. Minno (2♂, 1♀, MGCL); Trail Creek, 84-8800', 2-IX-1973, R. Stanford (1♂, 1♀, CSU); 3 mi N Florissant,

8250', 3-IX-1973, M. Fisher (1♂, MGCL); 4 mi W Divide, 9500', 21-VIII-1948, F. M. Brown (10♂, 6♀, MGCL); **Teller-Park Co**.: S Platte River, 72-7500', 3-IX-1973, R. Stanford (1♂, 3♀, CSU).

Hesperia colorado ochracea / H. c. sublima **transition zone: all from USA: COLORADO. Gilpin Co**.: East Portal, 21-VIII-1968, R. Stanford (4♂, CSU); 2-VIII-1969, R. Stanford (2♂, CSU); 3-VIII-1969, R. Stanford (1♂, CSU); 22-VIII-1969, M. Fisher (2♀, MGCL); 22-VIII-1969, R. Stanford (1♂, CSU); 27-VIII-1969, R. Stanford (2♂, CSU); 29-VII-1972, R. Stanford (1♂, CSU); 30-VII-1972, R. Stanford (1♂, CSU); 19-VIII-1973, R. Stanford (1♂, CSU); Tolland, 12-VIII-1951, H. A. Freeman (2♂, 3♀, MGCL); Toll Ranch [Tolland?], 28-VII-1977, J. Scott (1♂, MGCL); 30-VII-1977, J. Scott (1♂, MGCL); 4-VIII-1977, J. Scott (2♀, MGCL). Tolland (= East Portal) is situated at about 2810m (9220'), around 39°54'11'N 105°38'37''W.

ACKNOWLEDGMENTS

We thank Paul A. Opler and Boris C. Kondratieff for access to specimens in the C. P. Gillette Museum of Arthropod Diversity, Colorado State University, and William W. McGuire for making large series of *Hesperia* specimens available for study at the McGuire Center for Lepidoptera and Biodiversity, University of Florida. For images of the type material, we thank Rodney Eastwood and Rachel Hawkins (MCZ). The senior author thanks William Bernstein, Joel Cox, Tom Ortenburger, Ray Stanford and Sally Warren for assistance with fieldwork in Colorado and bordering states. We also thank Jonathan P. Pelham and two anonymous reviewers for reviewing and improving this manuscript.

LITERATURE CITED

BARNES, W. & J. H. MCDUNNOUGH. 1916. Notes on North American diurnal Lepidoptera. Contr. Nat. Hist. Lepid. No. Amer. 3:53-152, [4], 11 pls.

BROWN, F. M., EFF, D., AND B. ROTGER. 1956. Colorado butterflies. Part V. Hesperiidae and Megathymidae. Proc. Denver Mus. Nat. Hist. 7:239-332.

CALHOUN, J. V. 2015. An updated itinerary of Theodore L. Mead in Colorado in 1871, with type locality clarifications and a lectotype designation for *Melitaea eurytion* Mead (Nymphalidae). J. Lepid. Soc. 69:1–38.

FERRIS, C. D. & F. M. BROWN. 1981. Butterflies of the Rocky Mountain States. University of Oklahoma Press, Norman. xix + 442pp.

SCOTT, J. A. 1975a. Clinal intergradation of *Hesperia comma colorado* (Hesperiidae). J. Lepid. Soc. 29:156-161.

———. 1975b. Early stages of seven Colorado *Hesperia* (Hesperiidae). J. Lepid. Soc. 29:163-167.

———. 1981. New Papilionoidea and Hesperioidea from North America. Papilio (n.s.) 1:1-12.

———. 1986. The butterflies of North America. Stanford Univ. Pr., Stanford, California. 583 pp., 64 pls.

———. 1998. New western North American butterflies. *Papilio* (n.s.) 11:1-12.

SCUDDER, S. H. 1874. The species of the lepidopterous genus *Pamphila* . Mem. Boston Soc. Nat. Hist. 2: 341-353, pls. 10, 11.

STANFORD, R. E. 1981. Superfamily Hesperioidea Latreille, 1802 (skippers). Pp. 67-144. *In* Ferris, C. D. & F. M. Brown (eds.), Butterflies of the Rocky Mountain States. Univ. Oklahoma Pr., Norman, Oklahoma.

———. 2002. Millenial Update on Western USA/ Southern Canada/ Northern Mexico Butterflies and Skippers. Second Edition. Author, Denver, Colorado. [121] pp.

TOLIVER, M. E., R. HOLLAND & S. J. CARY. 2001. Distribution of butterflies in New Mexico (Lepidoptera: Hesperioidea and Papilionoidea). Third edition. R. Holland, Albuquerque, New Mexico. 449 pp.

WARREN, A. D. 2005. Lepidoptera of North America 6. Butterflies of Oregon: Their Taxonomy, Distribution and Biology. Contrib. C. P. Gillette Mus. Arth. Div. (Colorado St. Univ., Fort Collins). 408pp.

Submitted for publication 15 September 2014; revised and accepted 23 October 2014.