

Lepidoptera of North America

10. Review of *Plebejus icarioides* and *Glaucopsyche lygdamus* in New Mexico with Four New Subspecies (Lycaenidae, Lycaeninae, Polyommattini)



**Contributions of the
C.P. Gillette Museum of Arthropod Diversity
Colorado State University**

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10. Review of *Plebejus icarioides* and *Glaucopsyche lygdamus* in New Mexico with four new subspecies (Lycaenidae, Lycaeninae, Polyommataini)

by

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Cover illustration: New Mexico taxa of *Plebejus icarioides* (see text for further details)

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ABSTRACT: The blue species *Plebejus icarioides* (Boisduval) and *Glaucopsyche lygdamus* (E. Doubleday) (Lycaenidae: Lycaeninae: Polyommataini) are reviewed for New Mexico. The Colorado Rockies subspecies of both species (*P. i. lycea* and *G. l. oro*) each dominate the state. A fraction of Catron County supports the White Mountains of Arizona subspecies of each species (*P. i. buchholzi* and *G. l. arizonensis*). The isolated Sacramento Mountains Complex support previously undescribed endemic subspecies (*P. i. sacre*, **n. ssp.** and *G. l. ruidoso*, **n. ssp.**), and Raton Mesa, in Colfax County near Raton on the Colorado line supports previously undescribed endemics (*P. i. nigrafem*, **n. ssp.** and *G. l. erico*, **n. spp.**).

Key Words: Lepidoptera, Lycaenidae, *Plebejus icarioides*, *Glaucopsyche lygdamus*, New Mexico, new subspecies

INTRODUCTION

Plebejus icarioides (Boisduval) and *Glaucopsyche lygdamus* (E. Doubleday) are variable species found throughout much of western United States and Canada. Pelham (2008) recognized 23 subspecies of *P. icarioides* and 17 subspecies of *G. lygdamus*. In New Mexico, both species are largely restricted to higher elevations, with occurrences below 6,900' being unusual. The Sacramento Mountains of south-central New Mexico represent the nominal southern and eastern limits of both species, although the first is occasionally reported from Chihuahua and Baja California. *Glaucopsyche lygdamus* is sparingly reported from Sonora, Baja California, and across the Great Plains, especially near major tributaries of the Mississippi and occurs in neither West Texas, southern Arizona, nor the northern border regions of Mexico (Stanford & Opler, 1993).

The recognized New Mexican subspecies of both species are similar. Most of the state is occupied, in the case of both species, by phenotypes clearly similar to the Rocky Mountain phenotypes, that is, *P. icarioides lycea* (W. H. Edwards) and *G. lygdamus oro* (Scudder). However, in both cases, a small fraction of the state has affinities to the White Mountains of Arizona. Specifically, the northwest corner of the Gila Mountains Complex in Catron County (see Fig.1 map and Table 3 for New Mexican place names) supports *P. icarioides buchholzi* dos Passos, and a larger part of the Gila Mountains Complex supports *G. lygdamus arizonensis* McDunnough. In all, at least 12 New Mexican montane islands (see Brown and Lowe 1985, Holland 2009) have *P. icarioides* populations, and at least 14 have *G. lygdamus*. I feel that four populations of *P. icarioides* and four populations of *G. lygdamus* merit subspecific status. As discussed above, two of each are already described. Presentation of the four remaining new taxa and discussion of their relationships to the other four already described taxa are the main objectives of this publication.

METHODS AND MATERIALS

The holotypes of the new subspecies are deposited in the Canadian National Collection, Ottawa, Ontario (CNIC). Other specimens are deposited in the C. P. Gillette Museum of Arthropod Diversity, Colorado State University (CSUC), and the United States National Museum (USNM). All specimens cited in this paper were collected by Richard W. Holland

(RWH) and Steve J. Cary (SJC) or unless stated otherwise.

RESULTS AND DISCUSSION

Plebejus icarioides in New Mexico

Populations of *P. icarioides* occurring in New Mexico were sampled and scored according to the following criteria. See top row of Table 2 for a summary of these criteria.

1. Is the dorsal forewing (DFW) terminated by a simple line?
2. Is the DFW black termen of the males unusually narrow but not just a line?
3. Is the DFW black termen of the males unusually broad?
4. Do some males possess a dorsal hindwing (DHW) aurora?
5. Are at least a few of the individuals nearly white dorsally?
6. Do a significant fraction of the specimens have a clear “blue checker spot” appearance dorsally?
7. Do some of the females lack a blue suffusion, giving a white, jet black or pure rust impression dorsally, or are the females 100% “Blue-Morph”?
8. Is the species common above 9,800’ (omit if the range summit is under 9,800’)?
9. Does the VFW lack or nearly lack subterminal chevrons in most individuals?
10. Does the VHW lack or nearly lack inner chevrons in most individuals?
11. Does the VHW lack well-ocellated eyespots?
12. Is the VHW discal cell noticeably darker basally in most specimens?
13. Is the VHW discal cell markedly darker basally or is the wing a uniformly darkish brown?
14. Is the wingspread relatively large (males with mean >28 mm)?
15. Are the sexes difficult to separate based on wing pattern alone?
16. Is the ventral tinting brownish or grayish?
17. Are the VHW eyespots ocellated -- do they consist of a dark background punctuated with circular white “eyes” enclosing a black “pupil,” or are the VHW black dots simple?

18. Do the Blue-Morph females have the usual black female-*icarioides* pattern dorsally (very wide ill defined black distal area occluding the outer 60% of the wings)?

19. When do the male and female flights peak?

Using the above criteria, I found the following geographical patterns:

1. Bicolored VHWs were present in eastern populations (Sacramento Mountains males, 10 of 10; Sacramento Mountains females, 5 of 7; Capitan Mountains males, 8 of 10; Capitan Mountains females, 7 of 10; Raton Mesa males, 3 of 9; Raton Mesa females, 4 of 6). They were mostly absent elsewhere (Gila Mountains Complex males, 1 strongly represented, 8 very weakly out of 31; Gila Mountains Complex females, 1 strongly, 1 very weakly of 13; Gallo-Mangas Complex both sexes, 0 of 16; Jemez Mountains both parts and both sexes, 4 of 40; Zuni Mountains both sexes, 3 of 27; Chuska Mountains both sexes, 3 of 41; Mt. Taylor both sexes, 2 of 10).
2. Only the Capitan and Sacramento females lacked the typical black suffused pattern dorsally on Blue-Morph specimens, but in these two populations, every bluish specimen suffered the loss totally.
3. In the White Mountains of Arizona, there is a population with greatly exaggerated chevrons ventrally (see Figs. 6 and 7) conforming to *P. i. buchholzi*. In adjacent areas of New Mexico, a similar exaggeration occurs—mostly in the Gallo-Mangas Complex (4 of 7 males and 3 of 9 females), but occasionally elsewhere; 3 of 44 of both sexes in the Chuska Mountains, 4 of 26 of both sexes in the Zuni Mountains, 2 of 40 in both parts of the Jemez Mountains, 2 of 44 in the Gila Mountains Complex in Catron County, 2 of 37 in the Sacramento-Capitan Complex, and 0 of 25 on Mt. Taylor combined with Raton Mesa. The frequency of this phenotype decreases as one recedes from the Gallo-Mangas Mountain Complex. While not evident in the above counts, the intensity of this phenon also diminishes as one recedes from the Gallo-Mangas Complex.
4. Especially in northwestern New Mexico, Blue-Morph females may have an aurora on the DHW. In the Chuska Mountains, 21 of 21 females were Blue-Morph, and 7 had aurorae; in the Zuni Mountains, 8 of 8 females were bluish and 2 had aurorae; in the Jemez Mts., 3 of 9 of the females were bluish, and none had aurorae; on Raton Mesa, only 1 of 6 females was bluish, but it and 1 brownish female had aurorae; in the Gallo-Mangas Mountain Complex, all 9 females were bluish, 5 with aurorae; in the Gila Mts. Complex, all 13 females were bluish, but just one had an aurora; in the Capitan Mts. 4 of 10 females were bluish, none with aurorae; and in the Sacramento Mountains, just 1 of 7 females was bluish, without an aurora.
5. From Item 4, it is evident that the frequency of Blue-Morph females decreases from east to west. The most dramatic alternative female morph is a white form found only on the Sacramento Mountains (2 of 7) and the Capitan Mountains (2 of 10), although I have a Gila Mountains male which is whitish (1 of 31). The other atypical female morph occurs only on Raton Mesa, and is jet black dorsally (2 of 6).

6. *Plebejus icarioides* is seldom found above 9,800 m in New Mexico. In my work, the only exceptions occurred on the Capitan (2 of 20) and the Sacramento Mountains (13 of 17); with one of the males actually taken atop the highest point in southern New Mexico at 12,000'.
7. Regarding sexual dimorphism, of the 6 specimens that I was unable to sex with certainty without dissecting, 3 were from the Gila Mountains (out of 44), and 3 were from the Sacramento-Capitan (out of 36). None of the more northerly occurring 140 specimens presented this sort of difficulty.
8. The average wingspread of the males from the ranges studied are Chuska Mountains, 26.6 mm \pm 1.8 ($n = 23$); Zuni Mountains, 25.9 mm \pm 1.4 ($n = 18$); Jemez Mountains, 27.9 mm \pm 2.1 ($n = 18$); Mt. Taylor, 25.8 mm \pm 1.2 ($n = 8$); N Jemez Mountains, 29.2 mm \pm 0.5 ($n = 8$); Raton Mesa, 25.6 mm \pm 1.7 ($n = 9$); Gallo-Mangas Mountain Complex, 28.0 mm \pm 2.5 ($n = 7$); Gila Mountains Complex, 27.1 mm \pm 1.2 ($n = 31$); Capitan Mountains, 29.4 mm \pm 1.9 ($n = 10$); Sacramento Mountains, 28.8 mm \pm 1.1 ($n = 10$). Thus, the Sacramento and Capitan Mountains host the only populations with an average wingspread exceeding 28.0 mm, the small North Jemez Mountains sample not counted.
9. The ocelli strength on the VHW does not obviously correlate with anything, including sex. Their subjectively evaluated average intensity, in increasing order, is Jemez Mountains males, 0.33, 0.34 ($n = 18$); N Jemez Mountains males, 0.50, 0.0 ($n = 8$); Raton Mesa males, 0.50, 0.00 ($n = 9$); Raton Mesa females, 0.58, 0.2 ($n = 6$); Mt. Taylor males, 0.63, 0.44 ($n = 8$); Sacramento Mountains females, 0.64, 0.22 ($n = 7$); Sacramento Mountains males, 0.70, 0.26 ($n = 10$); Capitan Mountains males, 0.75, 0.26 ($n = 10$); Mt. Taylor females, 0.96, 0.33 ($n = 23$); Gila Mountains Complex females, 0.80, 0.20 ($n = 7$); Capitan Mountains females, 0.80, 0.33 ($n = 10$); Gila Mountains Complex males, 0.84, 0.47 ($n = 31$); Zuni Mountains males, 1.50, 0.28 ($n = 18$); Chuska Mountains males, 0.96, 0.33, ($n = 23$); Gila Mountains Complex females, 1.00, 0.54 ($n = 13$); Zuni Mountains females, 1.25, 0.33 ($n = 8$); N Jemez Mountains females, 1.25, 0.33 ($n = 2$); Gallo-Mangas Complex males, 1.29, 0.33 ($n = 8$); Gallo-Mangas Complex females, 1.33, 0.50 ($n = 9$). A useful conclusion from the above is the distinctiveness of the *buchholzi* phenotype in the Gallo-Mangas Complex.

The summary presented in Table 2 and leads to the following conclusions: Each New Mexico range is geographically distinct, but only four populations warrant subspecific status. These are *P. i. buchholzi* from the Gallo-Mangas Complex, *P. i. lycea* (W.H. Edwards) from the Jemez Mts. and Mt. Taylor, *P. i. sacre n. spp.* from the Sacramento-Capitan Complex, and *P. i. nigrafem n. spp.* from Raton Mesa. The Gila Mountains-Black Range population has a mix of characters not unique to that geographical area. The Chuska and Zuni Mountains populations are best referred to *P. i. lycea* (northwestern New Mexico segregate).

***Plebejus icarioides sacre*, n. ssp.**
(Figs. 2 and 3)

Diagnosis. This subspecies is restricted to the upper reaches of the Sacramento and Capitan Mountain Complex in Lincoln and Otero Counties of southern New Mexico. Together with populations of *P. i. evius* (Boisduval) northern Baja California Norte (Brown et al. 1992), these are the southernmost populations of *P. icarioides*. My studies indicate isolation from other *P. icarioides* populations for about 10,900 years (Holland 2009). This pattern is further complicated by the division of the taxon into two separate clusters about 4000 years ago, one atop Sierra Blanca in the Sacramento Mountains and the other on the crest of the Capitan Mountains. Some divergence is evident between these two populations: most obviously, a tray of Capitan Mountains specimens is predominantly blue, while a tray of Sierra Blanca material is subjectively dirty white. This same divergence has been discussed by me in describing *Speyeria hesperis capitanensis* R. Holland (1988) and *Satyrium titus carrizozo* R. Holland (2010).

The following combination of characters will differentiate *P. i. sacre* from all other *P. icarioides* phenotypes if applied to a series of at least six or more specimens. As is often the case of subspecies, single individual can be difficult to place.

1. Ventral markings are brown, not gray, basally.
2. The discal region of the VHW is much darker than the rest of the ventral surface (bicolor morph). Ventrally, the subterminal chevrons are weakly expressed, not resembling the extreme maculation of *P. i. buchholzi*.
3. The female dorsal coloring frequently deviates from the typical blue found in most other populations. Many individuals will be either a dirty white or a powder blue. Those females that are blue dorsally usually lack the black suffusion that covers the apical half of the DFW and the distal half of the DHW in other populations.
4. Blue females very seldom have the DHW aurora.
5. These are relatively large blues—male wingspread averages over 28 mm.
6. This is the only subspecies frequently observed above 9,800’.
7. Unlike most *icarioides* populations, the blue females cannot be separated from males just based on maculation.
8. The flight period of *P. i. sacre* peaks in June, whereas most other populations not localized to the northern quarter of New Mexico peak in July, although the Gila Mountains flight peaks in May.

Holotype male: Capitan Mountains, Lincoln County, NM: Encinoso Can., NW slope, W of Capitan Gap, 1 mi. W of Sawmill Tank, 8,400’, 22-vi-97 (Fig. 2), CNIC 67950, RWH

20645). The holotype is deposited in CNIC.

Allotype female: Sacramento Mountains, Lincoln County, NM: N Slope, Sierra Blanca Ski Area, 10,000', 24-vi-72 (Fig. 3), CNIC 67951, RWH 6545). I here designate an allotype to describe the sexual dimorphism.

Paratype males: Capitan Mountains, Lincoln County, NM: Encinoso Can., NW slope, W of Capitan Gap, 1 mi. W of Sawmill Tank, 8,400', 22-vi-97 (7); 7 mi. up Copeland Can. from NM Hwy. 48, 8,000', 21-vi-80; 4 mi. E of Capitan Gap, crest ridge, 9,200', 14-vi-80; 2 mi. E of Capitan Gap, 8,600', 14-vi-80; Sacramento Mountains, Lincoln County, NM: Sierra Blanca Ski Area, 10,000', 24-vi-72 (5); Sierra Blanca, 15-vi-75, 11,000'; Sierra Blanca Ski Area, 24-vi-72, 10,500'; N slope, Sierra Blanca, 10,700', 20-vii-85 (2) (SJC); road up Sierra Blanca, 8,000', 26-vii-75; Sacramento Mountains, Otero County, NM: Summit, Sierra Blanca, 12,000', 24-vi-72. All specimens cited in this paper were collected by Richard W. Holland (RWH) or Steve J. Cary (SJC) unless stated otherwise.

Paratype females: Capitan Mountains, Lincoln County, NM: Encinoso Can., NW slope, W of Capitan Gap, 1 mi. W of Sawmill Tank, 8,400', 22-vi-97 (4); 2 mi E of Padilla Point, 9,800', 10-vii-82; crest ridge, W of Capitan Gap, Sawmill Tank, 8,000', 3-vi-95 (2); 2 mi. E of Capitan Gap, 8,600', 14-vi-80 (2); Padilla Point, 9,600', 10-vii-82; Sacramento Mountains, Lincoln County, NM: N slope, Sierra Blanca, 10,700', 20-vii-85 (2) (SJC); Sacramento Mountains, Otero County, NM. Pine Campground, Cloudcroft, 8,600', 12-vi-76; Sierra Blanca Ski Area, 10,000', 24-vii-72 (2); same data, but at 9,500'; same data, but at 10,500'.

The remainder of the type series will be divided between the USNM, CNIC and CSUC.

Etymology: This subspecies is so-named at the suggestion of Mike Toliver, as a multilingual pun. Its home is atop Sierra Blanca, the Sacred Mountain of the Mescalero Apaches. *Plebejus sacre* thus is fractured French for Sacred Blue, while I believe *sacre bleu* is some sort of French oath.

***Plebejus icarioides nigrafem*, n. ssp.**
(Figs. 4 and 5)

Diagnosis. The Raton Mesa Complex of Colfax County, New Mexico and adjacent Colorado, is an apparent area of endemism, including *S. hesperis ratonensis* Scott, *Poanes taxiles wetona* Scott, and now *P. i. nigrafem*. A melanic rate in females of *P. i. nigrafem* of 10% or greater distinguish populations. Males of *P. i. nigrafem* cannot be distinguished. The two known females are uniformly dorsally jet-black except for striking snow-white fringes.

Holotype female: Cherry Creek Canyon, southeast slope of Johnson Mesa, 8,000', NM 72 west of Folsom, Colfax Co., NM, 9-vi-97 (leg. RWH & Eric S. Caprisseca) (Fig. 5, CNIC 67947, RWH 20437). The holotype with one associated male is deposited in the CNIC.

Paratype female: Sangre de Cristo Mountains, Colfax Co., NM: Cimarron Can., below

Eagle Nest Dam, 8,000', 29-vi-85 (leg. SJC).

Associated males: Raton Mesa Complex, Las Animas County, CO: 4.5 mi. S of CO Hwy. 12.5 on CO Road 85.5, S slope, San Francisco Pass, S slope, Raton Mesa Complex, 8,800', 17-vii-97; 2 mi. S of CO Hwy. 12.5 on CO Road 85.5, N slope, San Francisco Pass, N slope, Raton Mesa Complex, 6,800', 5-viii-96 (Fig. 4, CNIC 67946, RWH 19581); Raton Mesa Complex, Colfax County, NM: tank on N side of Dale Mt. Road, Johnson Mesa, 8,200', 4-vii-96 (3); Dale Mt. Road, Johnson Mesa, 8,400', 4-vii-96. Sierra Grande, Union County, NM: parking area for Sierra Grande Crest Trail, NE slope, 7,200', 31-v-97 (2) (leg. SJC).

The above-listed specimens will be divided between the USNM, the CNIC, and CSUC.

Etymology: The subspecific name refers to the black wing coloration of the females.

***Plebejus icarioides buchholzi* dos Passos**

(Figs 6 and 7)

This subspecies is largely restricted in New Mexico to the mountains around Quemado in Catron County. The major distinction of *P. i. buchholzi* is the transmutation of the VHW submarginal chevrons into a second row of eyespots on both sexes (see Figs. 6 & 7).

Males examined: Gallo-Mangas Complex, Catron County, NM: Lyles Camp Spring, 8,200', 27-vi-94 (2); Porcupine Spring, nr. Quemado Lake, 8,200', 27-vi-94; Elderberry Spring, S slope, Fox Mt., 8,500', 31-vii-95 (3) (Fig. 6, CNIC 67944, RWH 19300); Black Range, Grant County, NM: 2 mi. W of Emory Pass, W slope, Black Range, 7,500', 12-vi-94; 2 mi W of Emory Pass, 7,800', 28-v-88; Black Range, Sierra County, NM: 1.5 mi. W of Continental Divide, Seventyfour Draw at USFS 226, 7,500', 12-vi-88; 1 mi E of Emory Pass, 9,000', 28-v-88; Black Range, Grant County, NM: N end of Black Range, Moore Can., at NM Hwy. 61 (Outer Loop Drive), 7,000', 13-vi-88; Signal Peak, Grant County, NM: Signal Peak Road, 7,900', 15-vi-84 (leg. C.D. Ferris).

Females examined: Gallo-Mangas Complex: Catron County, NM: Lyles Camp Spring, 8,200', 1-viii-95; same data, but taken on 27-vi-94 (2); Elderberry Spring, S slope, Fox Mt., 8,500', 31-vii-95 (2); USFS Road 13, 1 mi. E of USFS Road 73, near Slaughter Mesa, S slope, Mangas Mountains, 8,000', 8-vii-95; same data but taken on 31-vii-95 (2) (Fig. 7, CNIC 67945, RWH 19243); Black Range, Sierra County, NM: 1.5 mi. W of Continental Divide, Seventyfour Draw at USFS 226, 7,500', 12-vi-88; Black Range, Grant County, NM: N end of Black Range, Moore Can., at NM Hwy. 61 (Outer Loop Drive), 7,000', 13-vi-88 (3). Grant County, NM: Cherry Cr., 7,100', 30-vi-77 (2) (leg. C.D. Ferris).

All examined specimens will be donated to the CNIC, the USNM, and CSUC.

***Plebejus icarioides lycea* (W. H. Edwards)**
(Figs. 8 and 9)

Finally, I also illustrate *Plebejus i. lycea* (W. H. Edwards). Probably 85% of the *P. icarioides* in New Mexico can be referred to *P. i. lycea*.

Males examined: Chuska Mountains, San Juan County, NM, 5.
Chuska Mountains, McKinley County, NM, 2.
Chuska Mountains, Apache County, AZ, 14.
Zuni Mountains, McKinley County, NM, 17.
Zuni Mountains, Cibola County, NM, 3.
Mt. Taylor, McKinley County, NM, 0.
Mt. Taylor, Cibola County, NM, 21.
Jemez Mountains, Sandoval County, NM, 4 (Fig. 8, CNIC 67948, RWH 14847).
Jemez Mountains, Rio Arriba County, NM, 13.
North Jemez Mountains, Rio Arriba County, NM, 6.
Gila Mountains Complex, Grant County, NM, 15.
Gila Mountains Complex, Sierra County, NM, 16.

Females examined: Chuska Mountains, San Juan County, NM, 11.
Chuska Mountains, McKinley County, NM, 1.
Chuska Mountains, Apache County, AZ, 14.
Zuni Mountains, McKinley County, NM, 5.
Zuni Mountains, Cibola County, NM, 3.
Mt. Taylor, McKinley County, NM, 0.
Mt. Taylor, Cibola County, NM, 8.
Jemez Mountains, Sandoval County, NM, 1 (Fig. 9, CNIC 67949, RWH 15637).
Jemez Mountains, Rio Arriba County, NM, 5.
North Jemez Mountains, Rio Arriba County, NM, 2.
Gila Mountains Complex, Grant County, NM, 8.
Gila Mountains Complex, Sierra County, NM, 0.

All examined specimens will be labeled and deposited to the CNIC, the USNM and CSUC.

***Glaucopsyche lygdamus* in New Mexico**

In order to associate the different New Mexican populations of *G. lygdamus*, each population was sampled and examined according to the following criteria, which is a modification of the *P. icarioides* analysis.

1. Is the black DFW termen of the males unusually broad?
2. What is the dominant dorsal color (powder blue, silvery blue, aquamarine, violet, or brown to jet-black)? (Powder Blue is most frequent near the summit of Sierra Blanca, the highest point

in southern New Mexico).

3. Is the species common above 3,000 m (omit if the range summit is under 3,000 m)?
4. Does the VHW lack well-ocellated eyespots medially? Refer to Fig. 10.
5. Does the VHW lack well-ocellated eyespots posteriorly?
6. Does the VFW lack well-ocellated eyespots tornally?
7. Which ventral image of ocellus VFW bands in Fig. 10 does the specimen most closely resemble?
8. What color are the “whites” of the eyes on the VFW (white, yellow, gray, or lead)?
9. Is the overall ventral color gray, lead, or dark lead to brown?
10. Is the wingspread relatively small (males with <25 mm average)?
11. Are the sexes difficult to separate based on wing pattern?
12. Do the females have the usual black female-*lygdamus* pattern dorsally (very wide ill-defined black distal suffusion)?
13. Is there a known melanic female morph?
14. When do the male and female flights peak?

Table 3 presents the listing of this data. All non-melanic *G. lygdamus* can be separated into four iridescent morphs according to dorsal wing color: Powder-Blue Morph (*G. l. ruidoso* n. subspecies), Aquamarine Morph (*G. l. erico* n. subspecies), Silvery-Blue Morph (*G. l. oro* (Scudder)), and Violet Morph (*G. l. arizonensis* McDunnough).

1. The Violet Morph is largely restricted to the Gallo-Mangas Mountain Complex, although occasionally occurring elsewhere, especially in the San Mateo Mountains of Socorro County. This form is known as *G. l. arizonensis* and in many respects occupies a niche that is ecologically parallel to *P. i. buchholzi*.
2. *Glaucopsyche l. erico* **n. spp.** under the proper daylight is aquamarine, and is largely restricted to the Raton Mesa Complex, at least in New Mexico. The distribution of this taxon is unknown in Colorado. Ecologically, it occupies a space analogous to *P. i. nigrafem*.
3. *Glaucopsyche l. ruidoso* **n. spp.** is isolated to the Sacramento-Capitan Mountains Complex. It is characterized by some individuals being more paler or powder blue dorsally than *G. lygdamus* occurring anywhere else in New Mexico. The third morph fills the niche corresponding to that occupied by *P. l. sacre*.

4. By far the dominant form occurring in New Mexico is darker iridescent blue, *G. l. oro*, the fourth form, corresponding to *P. i. lycea*, and is well-named the Silvery Blue.
5. No population group except a few females from the Capitan-Sacramento Mountains lacked the typical black suffused pattern on Blue-Morph individuals, but in this population, every bluish specimen suffered the loss totally. (The Gallo-Mangas Mountains specimens also lack this suffusion, but these are almost never bluish.)
6. In the White Mountains of Arizona, there is a peculiar dorsally violet population with a greatly exaggerated black termen in the male. This is known by the name *G. l. arizonensis*. In adjacent parts of New Mexico, a similar form occurs--mostly in the Gallo-Mangas Complex (11 of 11 males and 10 of 11 females), and San Mateo Mountains (1 of 6 males and 1 of 5 females), but rarely (1 of 23 of both sexes) in the Capitan Mts, and in Taos County (1 of 5 of both sexes). The above numbers pertain to violet coloration. This is the Violet Morph.
7. Unlike *P. icarioides*, *G. lygdamus* is not elevation-constrained in New Mexico, the uppermost parts of the Sangre de Cristo Mountains possibly excepted. Of the 8 female specimens I was unable to sex with certainty without dissection of genitalia, 4 were from Gallo-Mangas Complex (out of 22), 2 were from the San Mateo Mountains (out of 11), 1 was from the Sacramento Mountains Complex (out of 24), and 1 was from the Gila Mountains Complex (out of 15). None of the more northerly originating 30 specimens presented this sort of difficulty. All specimens not easily determined to sex were the Violet Morph.
8. The average wingspread of the males from the ranges studied are Chuska Mountains, 26.2 mm \pm 2.1 ($n = 20$); Zuni Mountains, 25.3 mm \pm 1.3 ($n = 10$); Jemez Mountains, 24.6mm \pm 3.7 ($n = 8$); Mt. Taylor, 26.8mm \pm 1.4 ($n = 22$); Taos County, 25.3 mm \pm 0.6 ($n = 3$); Raton Mesa, 27.4 mm \pm 1.8 ($n = 17$); Gallo-Mangas Complex 26.1 mm \pm 1.3 ($n = 11$); Gila Mountains Complex, 25.7 mm \pm 1.9 ($n = 7$); Capitan Mountains 26.7mm \pm 1.3 ($n = 12$); Sacramento Mountains Complex, 27.3 mm \pm 0.8 ($n = 8$); San Mateo Mountains, 28.9 mm \pm 0.87 ($n = 6$). The Sacramento Mts and Raton Mesa are the only ranges with an average wingspread exceeding 27.0 mm. The significance of this statistic is not evident, except possibly to make the Raton Mesa and Sacramento Mountains isolates slightly more distinguishable. I note only the Mt. Taylor and Gila Mountains *G. lygdamus* populations average larger than the sympatric *P. icarioides* in the male forewing.
9. Additional information concerning the ocelli and female DFW sex mark is summarized in Table 4, along with observations concerning the black suffusion on Blue-Morph females.
10. One of the useful discriminates in *G. lygdamus* is the subterminal arrangement of ocelli on the VFW. Fig. 10 illustrates 8 of these arrangements. Arrangement 1 is prevalent in 4 ranges, Arrangement 2 is in 8 ranges, Arrangement 3 is never prevalent, Arrangement 4 is prevalent only in the Gallo-Mangas Complex and Capitan Mountains. The other four cases are of no concern here. Arrangement 4 is associated only with the Gallo-Mangas population (*G. l. arizonensis*) and the Capitan Mountains isolate population (*G. l. ruidoso* **n. ssp**).

This data are summarized in Table 4 indicates the following conclusions: each New Mexico range harbors a distinct population, but only four are subspecifically distinct. These are *G. l. arizonensis* from the San Mateo Mountains and the Gallo-Mangas Complex (Violet Morph), *G. l. ruidoso* **n. spp.** from the Sacramento-Capitan Complex (Powder-Blue Morphs), *G. l. erico* **n. spp** from Raton Mesa and at least one point in Mora County (Aquamarine Morph), and *G. l. oro* from everywhere else in New Mexico (Silvery Blue Morph). Each population may have light individuals and melanic females.

***Glaucopsyche lygdamus ruidoso*, n. ssp.**
(Figs 17, 18, 19, and 20)

Diagnosis: This is an endemic subspecies is localized to the higher parts of Lincoln and Otero counties in southern New Mexico. The overall population has been isolated about 11,000 years, and mixing of the populations in the northern and southern portions of the Sacramento Mountains has been restricted for about 4,000 years (Holland 2009). The occurrence of VFW ocellus Arrangement 4 (see Fig.10) in specimens from the Capitan Mts, but not from the central part of the Sacramento Mountains, around Sierra Blanca itself, attests to the restricted gene drift between the two bastions.

The following combination of characters should differentiate *G. l. ruidoso* from all other *G. lygdamus* populations if applied to a series of six or more. (One isolated individual may be difficult to place).

1. Males and Blue Morph females are paler “Powder Blue” than other populations, with about a third of the individuals being far paler than any specimens from elsewhere in New Mexico. Other populations tend to be darker blue with noticeably more iridescence, or structural color hue.
2. A few, 10%, of the females may lack the costal sex spot (see Fig. 20). Any series of *G. lygdamus* with a female in this condition makes the entire series “high-risk” for *G. l. ruidoso*. This trait is only seen in this Powder Blue Morph (and in the very distinct Violet Morph.)
3. The extensive black distal suffusion is missing on the females dorsally. This seldom occurs in other populations.
4. The ocelli are missing in cells R5 and Cu2 (Arrangement 4 in Fig. 10). This is a much rarer trait in other populations.

Holotype male: Capitan Mountains, Lincoln County, NM: 4 mi. E of Capitan Gap on crest ridge, 9,500', 22-v-81. (Fig. 17, CNIC 68051, RWH 17303).

Allotype female: Capitan Mountains, Lincoln County, NM: 4 mi. E of Capitan Gap on crest ridge, 9,500', 22-v-81. (Fig. 18, CNIC 68052, RWH 13740). I here designate an allotype to describe the sexual dimorphism.

Paratype males: Capitan Mountains, Lincoln County, NM: crest of Capitan Mountains, W of

Capitan Gap, Sawmill Tank, 8,000', 3-vi-95 (3); 4 mi. E of Capitan Gap, crest ridge, 9,500', 22-v-81 (2); same data, 22-vi-81; 5 mi. E of Capitan Gap, 9,200', 15-v-80; crest, Padilla Point, 6 mi. E of Capitan Gap, 9,600', 14-vi-80; Sacramento Mountains, Lincoln County, NM: Sierra Blanca Ski Area, 11,000', 15-vi-81 (2); Sierra Blanca Ski Area, 10,500', 24-vi-72 (Fig. 19, CNIC 68054, RWH 6588); above Bonito Lake, 7,500', 18-v-75; Sierra Blanca Ski Area, 10,000', 2-vi-95 (2); Sacramento Mountains, Otero County, NM: Head Spring, Mescalero Apache Indian Res., 7,500', 15-iv-95.

Paratype females: Capitan Mts., Lincoln County, NM: 4 mi. E of Capitan Gap, crest ridge, 9,500', 22-v-81(3); same data, 14-vi-80; crest ridge, Padilla Point, 6 mi. E of Capitan Gap, 9,500', 31-v-82; crest of Capitans, W of Capitan Gap, Sawmill Tank, 8,000', 3-vi-95; 8,400', 22-vi-97; crest ridge, 5 mi. E of Capitan Gap, 9,200', 15-vi-80; crest ridge road, Capitan Mountains, 2 mi E of Capitan Gap, 8,500', 31-v-82; Sacramento Mountains, Lincoln County, NM: Sierra Blanca, N slope, 11,000', 15-vi-75; Rio Bonito above Bonito Lake, 7,000', 5-v-74.

Sierra Blanca Ski Area, 10,000', 2-vi-95 (Fig. 20, CNIC 68055, RWH 19184); Sierra Blanca Ski Area, 11,500', 24-vii-72; Sierra Blanca Ski Area, 10,500', 24-vii-72.

The holotype is deposited in the Canadian National Collection. The remainder of the type series will be divided between the CNIC, USNM, and CSU.

This subspecies is named after the town of Ruidoso, the largest settlement in the Sacramento Mountains. Ruidoso is Spanish for noisy--presumably a reference to the fast-flowing mountain streams that carry the winter runoff.

Glaucopsyche lygdamus erico, n. ssp.

(Figs. 11 and 12)

Diagnosis: This is an endemic subspecies, largely localized to the Raton Mesa Complex on the New Mexico-Colorado state line. Its extent into the Sangre de Cristo Mountains is not known at this time, but at least one record exists from Mora County to the southwest of Raton Mesa. This species is primarily differentiated by the aquamarine hue of the dorsal surface, which is almost so iridescent as to be reminiscent of *Atlides halesus*. Also, there is a relatively high (3 of 14) incidence of melanic females. I have observed no trait of the ocelli (Fig. 10) that is useful in distinguishing this population.

Holotype male: Raton Mesa Complex, Colfax County, NM: Soda Pocket Can., S. slope, Sugarite St. Pk., 8,200', 26-v-97 (Fig. 11, CNIC 68047, RWH 20564). The holotype is deposited in the CNIC, Ottawa.

Allotype female: Raton Mesa Complex, Las Animas County, CO: 2 mi. S of CO Hwy. 12.5 on CO Road 85.5, N Slope, San Francisco Pass, 6,800', 29-vi-97 (Fig. 12, CNIC 68048, RWH 20477). I designate an allotype to draw attention to sexual dimorphism.

Paratype males: Raton Mesa Complex, Colfax Co, NM Soda Pocket Can., S. slope, Sugarite St. Pk., 8,200', 12-vi-97 (3); NM Hwy. 72, Cherry Creek Can., SE slope, Johnson Mesa,

8,100', 12-v-96; Dale Mt., Johnson Mesa, 8,200', 28-vi-97; same data, 10-vi-97; Raton Mesa Complex, Las Animas County, CO: 1 mi. S of CO Hwy. 12.5 on CO Road 85.5, N slope, San Francisco Pass, 6,700', 29-vi-97, (2); 2 mi. S of CO Hwy. 12.5 on CO Road 85.5, N slope, San Francisco Pass, 6,800', 29-vi-97, (3); same data, 10-iv-97, (3); 1 mi. S of CO Hwy. 12.5 on CO Road 85.5, N slope, San Francisco Pass, 6,000', 10-vi-97; Sierra Grande, Union County, NM: east summit, 8,300', 31-v-97 (leg. SJC); Sangre de Cristo Mountains, Mora County, NM: Manuelas Can., 11 mi. ESE of Black Lake on NM Hwy. 129, 7,500', 11-v-96 (leg. SJC).

Paratype females: Raton Mesa Complex, Colfax County, NM: 1 mi. W of Trinchera Pass, Trinchera Can., N slope, Johnson Mesa, Sec.13, T.31N, R. 27E, 6,900', 12-v-96; Dale Mt., Johnson Mesa, 8,200', 25-v-97; tank on N side of Dale Mt., Johnson Mesa, 8,200', 4-vii-96. NM Hwy. 72, Cherry Creek Can., SE slope, Johnson Mesa, 8,000', 25-v-97; Raton Mesa Complex, Union County, NM: Tollgate Can., NM Hwy. 551, 10 mi. N of Folsom, 6,100', 5-v-96 (3); same data, 29-iv-95 (3); Sangre de Cristo Mountains, Colfax County, NM. Cimarron Can, above Ute Park, 7,000', 29-vi-85 (leg. SJC).

This subspecies (name rhymes with Jericho) is named after Eric Caprisecca, who collected the holotype. The type series will be divided among the CNIC, the USNM, and CSUC.

Glaucomys lydamus arizonensis McDunnough

(Figures 15 and 16)

Males examined: Gallo-Mangas complex, Catron County, NM: 6 mi. E of Elderberry Spring, Fox Mt., 9,000', 18-v-96; 11 mi. N of NM 12 on USFS Road 11 (Alamocito Can.) at Indian Spr., 8,500', 7-vi-94; same data, 9-vi-94; USFS Road 11, 7.2 mi. N of NM Hwy. 12 (Alamocito Can, at Toro Can.) SE slope, Sec. 36, T.3S R14W, Mangas Mountains, 8,200', 28-vi-94; Porcupine Spring, nr. Quemado Lake, 8,200', 6-vi-94 (2) (Fig. 15, CNIC 68049, RWH 18828); same data 30-v-94 (2). Escondido Mountain., SE slope, 22-v-94, 8,000'; Patterson Tank, S slope, Mangas Mountains, 8,300', 30-v-94; Elderberry Spring, Fox Mt., 8,500', 29-vi-94.

Females examined: Gallo-Mangas complex, Catron County, NM; Can. de Lobo, Escondido Mt., 8,500', 5-v-94; Porcupine Spr., nr. Quemado Lake, 8,200', 6-vi-94; same data 30-v-94 (2) (Fig. 16, CNIC 68050, RWH 18636); same data 19-vi-94; Patterson Tank, S slope, Mangas Mountains, 8,300', 30-v-94; USFS Road 13, 3 mi. S of Slaughter Mesa Tank, S slope, Mangas Mountains, 8,000', 8-vii-95; Slaughter Mesa Tank, Slaughter Mesa, Sec.17, T. 3S, R15W, 8,000'; 7-vi-97; 1 mi SW of Fox Mt. Lookout, 9,000', 27-vi-94 (2); El Caso Spr. nr. Quemado Lake, 8,000', 29-v-94; Black Range, Gila Mountains Complex, Grant County, NM: 2 mi. W of Emory Pass; Gila Mountains Complex, Grant County, NM, (2); Gila Mountains Complex, Sierra County, NM, (11).

All examined specimens will be deposited in the CNIC, the USNM, or CSUC.

***Glaucopsyche lygdamus oro* (Scudder)**
(Figures 13 and 14)

This is the familiar Silvery Blue of the Rocky Mountains, which occupies the vast majority of New Mexico and Colorado.

Males examined: Taos County, NM, 0; Chuska Mountains, San Juan County, NM, 9; Chuska Mountains, McKinley County, NM, 3; Chuska Mountains, Apache County, AZ, 8; Zuni Mountains, McKinley County, NM, 4; Zuni Mountains, Cibola County, NM, 6; Mt. Taylor, McKinley County, NM, 0; Mt. Taylor, Cibola County, NM, 21; Jemez Mountains, Sandoval County, NM, 5; Jemez Mountains, Rio Arriba County, NM, 3; Gila Mountains Complex, Grant County, NM, 1; Gila Mountains Complex, Sierra County, NM, 6; Mt. Taylor, Cibola County, NM: Twin Springs, 7-V-66 (Fig. 13, CNIC 68046, RWH 2385)

Females examined: Torrance County, NM, 1; Taos County, NM, 2; Chuska Mountains, San Juan County, NM, 3; Chuska Mountains, McKinley County, NM, 3; Chuska Mountains, Apache County, AZ, 4; Zuni Mountains, McKinley County, NM, 0; Zuni Mountains, Cibola County, NM, 0; Mt. Taylor, McKinley County, NM, 0; Mt. Taylor, Cibola County, NM, 1; Jemez Mountains, Sandoval County, NM, 4; Jemez Mountains, Rio Arriba County, NM, 1; Jemez Mountains, Los Alamos County, NM, 0; Gila Mountains Complex, Catron County, NM, 0; Gila Mountains Complex, Grant County, NM, 2; Gila Mountains Complex, Sierra County, NM, 11. Chuska Mountains, Apache County, AZ: Lukachukai Creek Camp Ground, 28-v-71 (Fig. 14, CNIC 68045, RWH 6577).

All examined specimens will be deposited to the CNIC, the USNM, and CSUC.

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I wish to express my gratitude to Don Lafontaine and Jocelyn Gill at the Canadian National Collection for the splendid artwork in these plates. Mike Toliver has provided enthusiastic support for nearly half a century—this project was started with Mike on 7 May 66 on Mt. Taylor, and one of the figured *Glaucopsyche lygdamus oro* actually bears that data Toliver et al. 2001). However, the greatest debt is to Steve Cary for 20 years of incomparable friendship and companionship.

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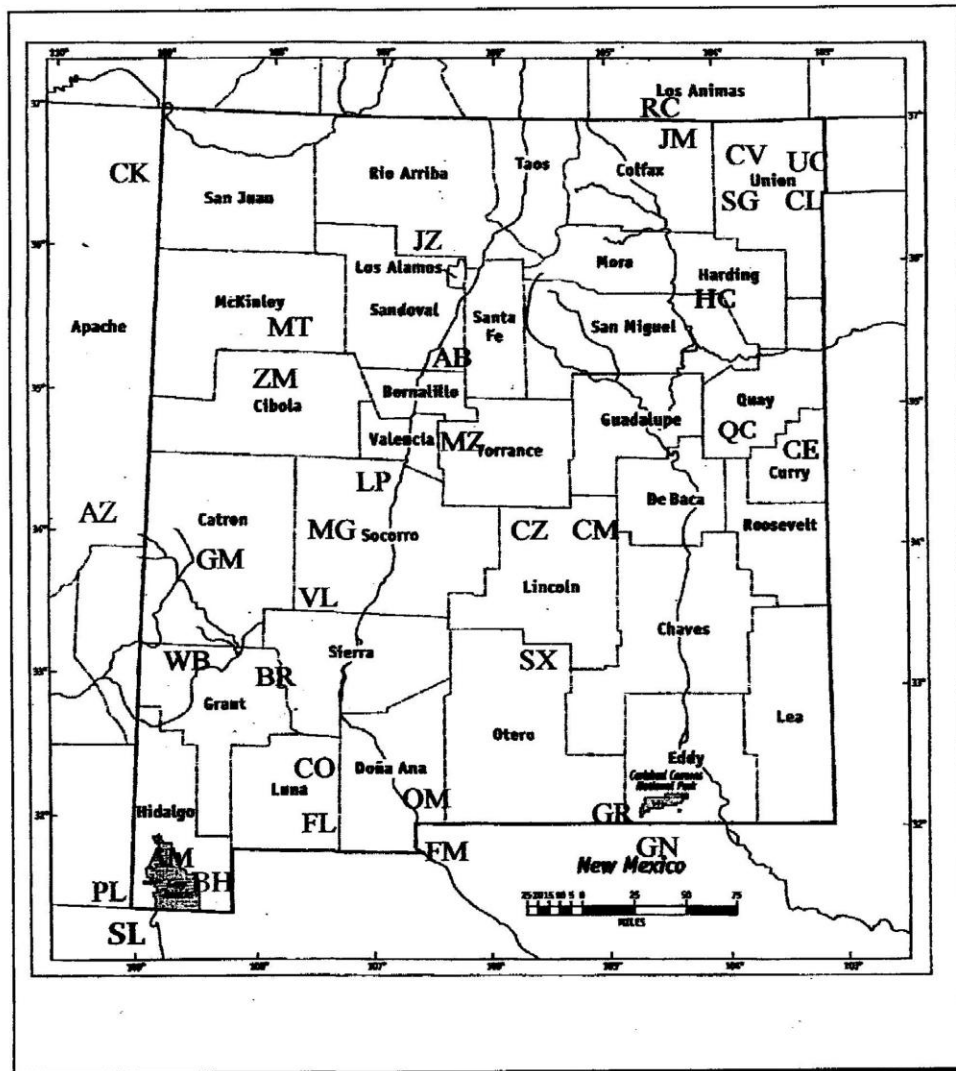


Figure 1. Map of New Mexico, showing the counties and mountain ranges referred to in the text as occupied by *Glaucopsyche lygdamus* and/or *Plebejus icarioides*.



Figures 2-9. The four New Mexican subspecies of *Plebejus icarioides*. Fig. 2. *Plebejus icarioides sacre*, ♂ holotype, Sacramento Mountains Complex. Note the pale coloration dorsally and the bicolor of the VHW with the fully ocellated eyespots. Specimen deposited in CNIC (RWH 20645, CNIC 67950), West Capitan Mountains, 22-vi-97; Fig. 3. *Plebejus icarioides sacre*. ♀ allotype, Sacramento Mountains Complex. Note the pale the coloration dorsally and the bicolor of the VHW with the complete eyespots (RWH 6545, CNIC 67951), Sierra Blanca, 24-vi-72; Fig. 4. *Plebejus icarioides nigrafem*, male topotype, Raton Mesa Complex (RWH 19581, CNIC 67946), Raton Mesa, 4-vii-96; Fig 5. *Plebejus icarioides nigrafem*, ♀ holotype, Raton Mesa Complex. Note the completely jet-black dorsum and contrasting snow-white fringe. Specimen deposited in CNIC (RWH 20437, CNIC 67947), Raton Mesa Complex 17-vii-97; Fig. 6. *Plebejus icarioides buchholzi*, ♂, Gallo-Mangas Mountains Complex. Note the extreme expression of the subterminal chevrons ventrally on both sexes, but especially the ♂ (RWH 19300, CNIC 67944), Mangas Mountains, 31-vi-95; Fig 7. *Plebejus icarioides buchholzi*, ♀, Gallo-Mangas Mountains Complex (RWH 19300, CNIC 67945), Mangas Mountains, 31-vii-95; Fig. 8. *Plebejus icarioides lycea*, ♂, Rocky Mountains Complex, New Mexico & Colorado (RWH 14847, CNIC 67948), Jemez Mountains, 12-v-84; Fig. 9. *Plebejus icarioides lycea*, ♀, Rocky Mountains Complex, New Mexico & Colorado (RWH 15637, CNIC 67949), Jemez Mountains, New Mexico.

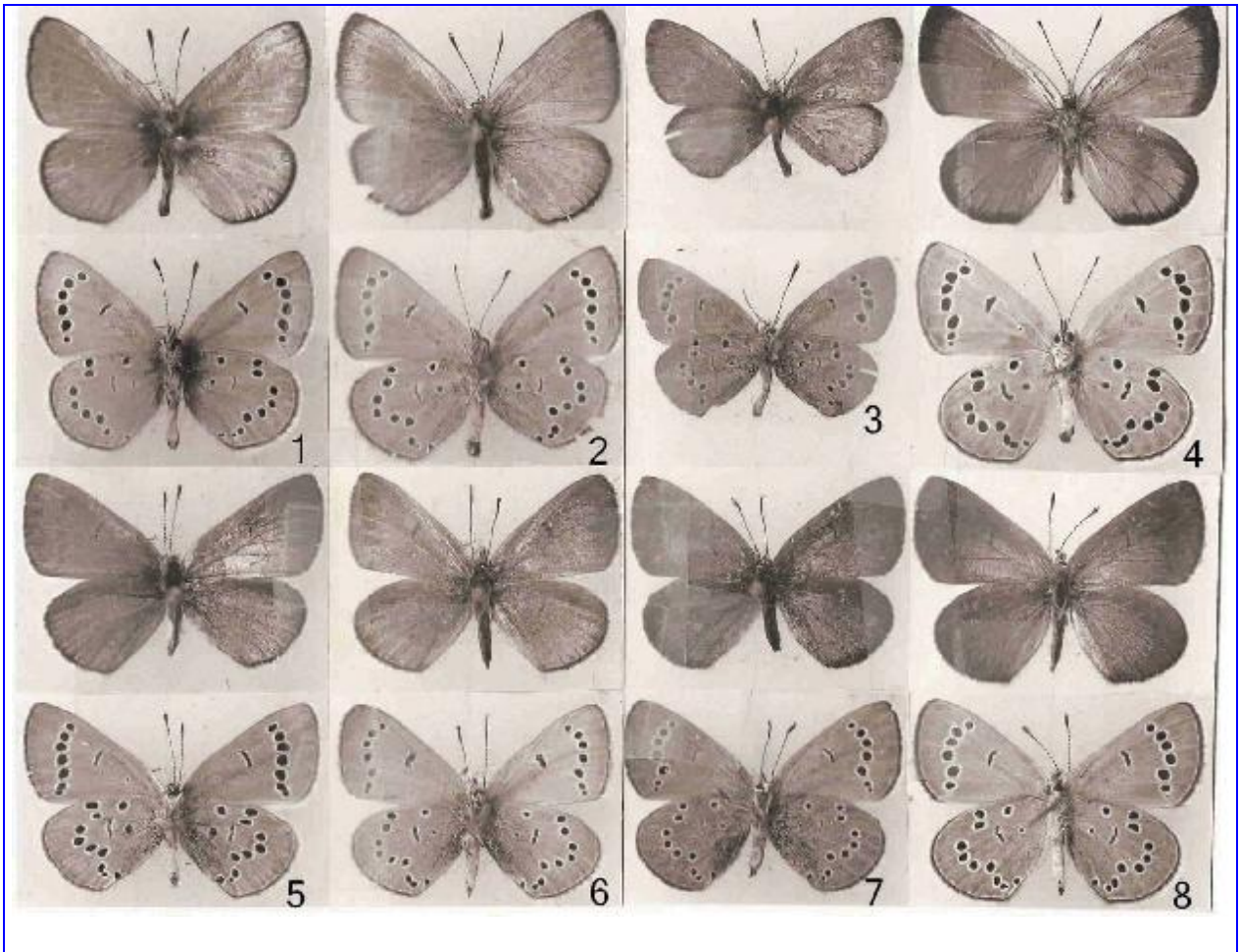


Figure 10. Terms for eight common eyespot arrangements of *Glaucopsyche lygdamus* in the mountain ranges of New Mexico.

1. Hooked at costa: Zunis ♂♂, Gila ♀♀.
2. Orthogonal at costa: Raton Mesa ♂♂, San Mateo Mts. ♀♀, Sacramento Mts. ♀♀, Zuni Mts. ♀♀. 3. No tornal ♂♂.
4. Very bold: Gallo Mts. ♀♀.
5. Cobra: Chuska Mts. ♀♀, Raton Mesa ♂♂.
6. Arched: Chuska Mts. ♀♀, Raton Mesa ♂♂, Mt. Taylor ♂♂.
7. Brown arched: Jemez Mts. ♂♂, Capitan Mts. ♀♀.
8. Disjunct: Gila Mts. Complex ♂♂.



Figures 11–20. The four New Mexican subspecies of *Glaucopsyche lygdamus*. Figure 11. *Glaucopsyche lygdamus erico*, ♂ holotype, Raton Mesa Complex. Note the slight iridescence and aquamarine hue dorsally. Specimen deposited in CNIC (RWH 20564, CNIC 68047), Raton Mesa 26-v-97. Fig. 12. *Glaucopsyche lygdamus erico*, ♀ allotype, Raton Mesa Complex. The ♂ is more markedly iridescent and aquamarine (RWH 20477, CNIC 68048), Raton Mesa Complex, 29-vi-97; Fig. 13. *Glaucopsyche lygdamus oro*, ♂, Rocky Mountains Complex, New Mexico & Colorado (RWH 2385, CNIC 68046), Mt. Taylor, 7-v-66; Fig. 14. *Glaucopsyche lygdamus oro*, ♀, Rocky Mountains Complex, New Mexico & Colorado (RWH 6577, CNIC 68045), Lukachukai Mountains, AZ, 28-v-71; Figure 15. *Glaucopsyche lygdamus arizonensis*, ♂, Gallo-Mangas Mountains Complex. Note heavy terminal black (CNIC 68049, RWH 18828), Mangas Mountains, 6-vi-94; Fig. 16. *Glaucopsyche lygdamus arizonensis*, ♀, Gallo-Mangas Mountains Complex. Note extensive black suffusion and violet shading on dorsal surface (RWH 18636, CNIC 68050) Mangas Mountains, 30-v-94; Fig. 17. *Glaucopsyche lygdamus ruidoso*, ♂ holotype, Capitan Mountains form of Sacramento Mountains Complex. This Powder Blue morph is the palest of all the *G. lygdamus* forms in New Mexico. Specimen deposited in CNIC (CNIC 68051, RWH 13703) East Capitan Mountains, 22-v-81; Fig. 18. *Glaucopsyche lygdamus ruidoso*, ♀ allotype, Capitan Mountains form of Sacramento Mountains Complex subspecies. This powder blue morph is the palest of all the *G. lygdamus* forms in New Mexico (RWH 13740, CNIC 68052), East Capitan Mountains, 22-v-81; Fig. 19. *Glaucopsyche lygdamus ruidoso*, ♂ paratype, Sierra Blanca form of Sacramento Mountains subspecies (RWH 6588, CNIC 68054), Sierra Blanca, 24-vi-72; Fig. 20. *Glaucopsyche lygdamus ruidoso*, ♀ paratype, Sierra Blanca form of Sacramento Mountains subspecies. These four lower-row specimens all have the VHW ocelli slightly less expressed than the VFW ocelli—a trait unique to Sacramento Mountains populations (RWH 19184, CNIC 68055), Sierra Blanca, 2-vi-95.

Table 1. Key to Figure 1, Mountain Range Designators and Associated *P. icarioides* and *G. lygdamus* subspecies.

| Mountain Range | Code Designation | <i>P. icarioides</i> ssp. | <i>G. lygdamus</i> ssp. |
|-------------------------|------------------|------------------------------|------------------------------|
| Chuska Mts. | CK | <i>lycea</i> | <i>oro</i> |
| Mt. Taylor | MT | <i>lycea</i> | <i>oro</i> |
| Zuni Mts. | ZN | <i>lycea</i> | <i>oro</i> |
| Jemez Mts. (main) | JZ | <i>lycea</i> | <i>oro</i> |
| Jemez Mts. (North) | not shown | <i>lycea</i> | <i>oro</i> |
| Taos Co. (minor ranges) | Taos | <i>lycea</i> | <i>oro</i> |
| Sangre de Cristo Mts. | not shown | <i>lycea</i> | <i>oro</i> |
| Raton Mesa | RC | <i>nigrafem & lycea</i> | <i>erico</i> |
| Gallo-Mangas Cmplx. | GM | <i>buchholzi</i> | <i>arizonensis</i> |
| Gila Mts. Cmplx. | WB | mixed affinity | <i>oro & arizonensis</i> |
| San Mateo Mts. | VL | <i>lycea & buchholzi</i> | <i>oro</i> |
| Sandia Mts. | AB | | <i>oro</i> (very rare) |
| Manzano Mts. | MZ | | <i>oro</i> (rare) |
| Capitan Mts. | CM | <i>scare</i> | <i>ruidoso</i> Capitan form |
| Sacramento Mts. Cmplx | SX | <i>sacre</i> | <i>ruidoso</i> Sacram. form |

Table 2. Characteristics of New Mexican *Plebejus icaroides* by mountain range.

| issue from feature → | m/f | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | Subspecies group |
|----------------------|-------|------------------------|-----------------|---------------|------------|----------------|-------------------|-------------------|-------------------|--------------------|------------------|--------------|--------------------|-------------------|-----------------|------------------|------------------|-----------------------------|-------------|------|------------------|
| | | DFW Bk II in narrow Bk | DFW I narrow Bk | DFW I wide Bk | DHW aurora | D White on few | Chester Spot Blue | Black above 10000 | VFW no clear tons | VHW few clear tons | VHW ocelli blind | VHW bi color | VHW deeply bicolor | large: ave > 28mm | not easy to sex | venter usually ? | Double ocellated | no D & wide black suffusion | Flight peak | | |
| Chuska Mts | 23/21 | | | | X | | X | N/A | | | | | | | | | G | | | vina | basin |
| Mt. Taylor | 8/2 | | | | X | | | | X | X | X | | | | | | G | | | vivi | basin |
| Zuni Mts. | 18/8 | | | | | X | | N/A | | | | | | | | | G | X | | vivi | basin |
| Jemez Mts. (main) | 18/7 | | | | | | | | | X | X | | | | | | G | | | vivi | delta |
| Jemez Mts. (North) | 6/9 | | X | | | | | N/A | | X | X | | | | X | | B | | | vivi | delta |
| Raton Mesa | 8/6 | | | | X | | X | N/A | X | X | X | | | | | | B | | | vivi | delta |
| Gallo-Mangas Cpx | 7/9 | | | X | X | | | N/A | | | | | | | | | G | X | | vivi | delta |
| Gile Mts Complex | 31/13 | X | | X | X | | | | X | X | | | | | | X | G | | | v/v | mix |
| Capitan Mts. | 10/10 | X | X | | | | | | X | X | | | X | X | X | X | B | X | X | vivi | delta |
| Sacramento Mts Cpx | 10/7 | X | X | | | | | | | | | | X | X | X | X | B | | X | vivi | delta |

Table 3. Characteristics of New Mexican *Glaucopteryx hydamus* by mountain range.

| Issue from feature → | m/f | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | Subspecies group |
|----------------------|-------|--|---------------|-------------|--------------------------|-----------------------|-----------------------|---------------------------|---------------|-------------------------------|----------------------|-----------------|--------------------------------------|----------------|-------------|--------------------|
| | | DFW ¹ wide Bk in ^d | D domin color | above 10000 | VIIW weak central ocelli | VIIW weak anal ocelli | VFW tonal ocelli weak | VFW str ocelli band shape | VFW eye shade | is the V more lead than grey? | small: ave of <25 mm | not easy to sex | no wide black & D suffusion distally | Black & exists | Flight peak | |
| Chuska Mts. | 20/10 | | SB | N/A | | X | | 2,6 | | | | | | | V/IV | oro |
| Mt. Taylor | 22/1 | | SB | X | | | | 6,8 | | | | | | | V/VI | oro |
| Zuni Mts. | 10/0 | | SB | N/A | | | | 1,2 | | | | | | | V/IIA | oro |
| Jemez Mts. | 8/5 | | SB | X | | X | | 1,6 | | | | | | | V/IV | oro |
| Taos Co. | 3/2 | | SB | N/A | | X | | 2,6 | | | | | | | V/VI | oro |
| Raton Mesa | 10/12 | | AQ, SB | N/A | | | | 2,6 | | | | | | X | VII/VII | erizo |
| San Mateo Mts. | 6/5 | X | SB, VI | X | | | | 2,6 | | | X | | | | VII/VII | arizon-ensis |
| Gallo-Mangas | 10/12 | X | VI | N/A | | | X | 4 | | | | X | | X | VII/VII | arizon-ensis |
| Gila-Black | 7/15 | | SB | ? | | XX | | 1,2,8 | | | | | | | V/IV | oro |
| Capitan Mts. | 12/11 | | PB, LPB | X | | X | | 1,2,4 | | | | X | X | | V/IV | rudos ^o |
| Sacramento Mts. | 8/5 | | SB, PB | X | | | | 2,6 | | | X | X | X | | V/VI | rudos ^o |

Table 4 Eyespot Intensity for Different Regions vs. Range for *Glaucopsyche lygdamus* in New Mexico

| Range | Specimen count | VHW medial ocellus intensity | VHW anal ocellus intensity | VHW toral ocellus intensity | Average of DFW with black suffusion (Blue morphs only) | females w/o DFW sex spot | VHW tint (white to grey to lead) |
|-------------------|----------------|------------------------------|----------------------------|-----------------------------|--|--------------------------|----------------------------------|
| Chuska ♀♀ | 10 | .55 ± .28 | .45 ± .37 | .65 ± .41 | 1.00 | | 2.70 ± .67 |
| Chuska ♂♂ | 20 | .57 ± .29 | .30 ± .34 | .50 ± .36 | | | 2.05 ± .39 |
| Zuni ♂♂ | 10 | .90 ± .57 | .65 ± .63 | .35 ± .53 | | | 1.90 ± .32 |
| Jemez ♀♀ | 5 | .70 ± .57 | .60 ± .55 | .60 ± .55 | 0.80 | | 2.0 |
| Jemez ♂♂ | 22 | .69 ± .37 | .19 ± .26 | .10 ± .18 | | | 2.38 ± .52 |
| Taos ♀♀ | 2 | .75 ± .35 | .50 ± .71 | .55 ± .64 | 1.25 | | 2.50 ± .51 |
| Taos ♂♂ | 3 | .83 ± .29 | .33 ± .29 | .50 ± .50 | | | 2.67 ± 1.15 |
| Taylor ♂♂ | 21 | .61 ± .65 | .80 ± .63 | .93 ± .54 | | | 2.50 ± .51 |
| Raton ♀♀ | 12 | .92 ± .47 | .67 ± .39 | .83 ± .54 | 1.00 | | 2.50 ± .52 |
| Raton ♂♂ | 17 | .65 ± .23 | .59 ± .32 | .68 ± .47 | | | 2.45 ± .70 |
| Gallo ♀♀ | 11 | .91 ± .30 | 1.00 ± .63 | .64 ± .45 | | four | 2.27 ± .47 |
| Gallo ♂♂ | 11 | 1.00 ± .32 | 1.05 ± .15 | .77 ± .34 | | | 2.55 ± .69 |
| Gila ♀♀ | 15 | 1.00 ± .38 | .70 ± .49 | .40 ± .39 | 1.00 | one | 2.89 ± .52 |
| Gila ♂♂ | 7 | .71 ± .27 | .36 ± .38 | .29 ± .27 | | | 2.29 ± .49 |
| Capitan ♀♀ | 11 | .84 ± .36 | 1.00 ± .55 | .73 ± .47 | .40 | one | 2.64 ± .50 |
| Capitan ♂♂ | 12 | .83 ± .33 | .71 ± .33 | .67 ± .33 | | | 2.33 ± .70 |
| Sacramento ♀♀ | 5 | 1.00 ± .35 | 1.00 ± .35 | .70 ± .45 | .40 | | 2.20 ± .45 |
| Sacramento ♂♂ | 8 | .93 ± .42 | .79 ± .27 | .93 ± .58 | | | 2.14 ± .35 |
| San Mateo ♀♀ | 5 | .40 ± .42 | .40 ± .55 | .40 ± .55 | | two | 2.20 ± .45 |
| San Mateo ♂♂ | 6 | .83 ± .41 | .67 ± .41 | .75 ± .27 | | | 2.17 ± .41 |
| all | 212 | 0.7535 ± | 0.622 ± | 0.5665 ± | | | |
| all ♀♀ | 76 | 0.76 ± | 0.69 ± | 0.611 ± | | | |
| all ♂♂ | 140 | 0.75 ± | 0.57 ± | 0.53 ± | | | |
| [all ♂♂ - all ♀♀] | | 0.16 ± | 0.22 ± | 0.22 ± | | | |