

A REVIEW OF *APODEMIA HEPBURNI*
(LYCAENIDAE: RIODININAE) WITH A DESCRIPTION
OF A NEW SUBSPECIES

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ABSTRACT. *Apodemia hepburni* Godman and Salvin (Lycaenidae: Riodininae) is reviewed. A new subspecies, *Apodemia hepburni remota* Austin, is described from southern Baja California, Mexico, based on 112 specimens. Both taxa of the species exhibit biphenism.

Additional key words: Baja California Sur, Sonora, Mexico, *A. palmerii*, *A. murphyi*.

Apodemia hepburni is a small metalmark (Lycaenidae: Riodininae) described from Chihuahua, Mexico (Godman & Salvin 1886). In conjunction with a study of the phenotypically similar *Apodemia palmerii* (W. H. Edwards) (Austin 1987), I had the opportunity to examine series of *A. hepburni* in several major museums in the United States and those in a number of private collections. The degree of seasonal and geographical variation I noted prompted this review.

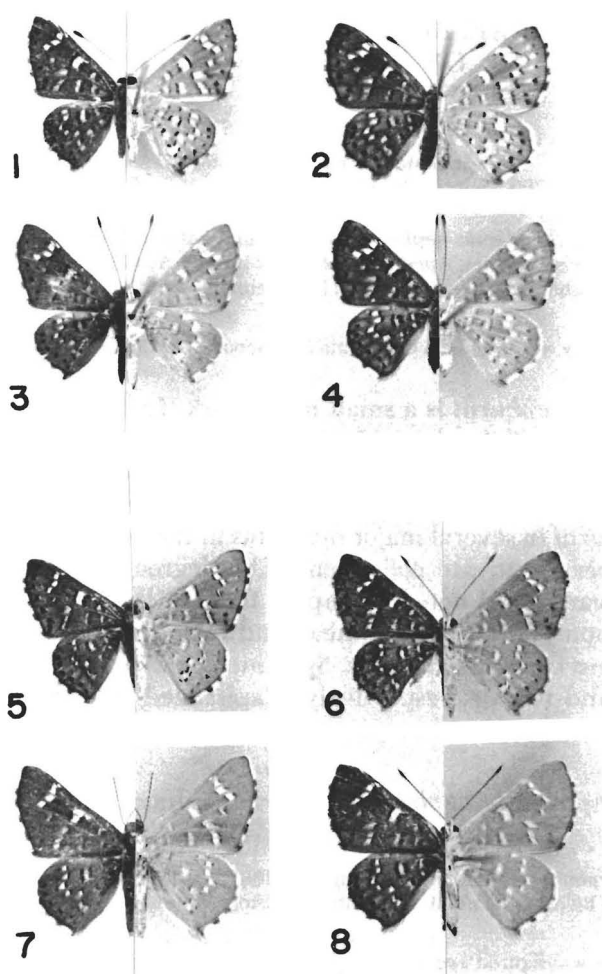
Throughout, butterfly size (mean and range in mm) is the length of the forewing from base to apex. Specimens indicated by "M" and "F" are male and female, respectively. Capitalized color names are after Smithe (1975, 1981).

Apodemia hepburni hepburni Godman and Salvin
(Figs. 1-4)

Apodemia hepburni Godman and Salvin 1886:468 (type locality: Pinos Altos, Chihuahua, Mexico); holotype male at The Natural History Museum, London (Miller & Brown 1981).

The species was figured and very briefly described from a single male by Godman and Salvin (1886). I examined photographs of the type, a somewhat worn male without antennae and with a phenotype of the first brood. This specimen has six labels: a white hand-lettered label "HOLOTYPE/Apodemia/hepburni/Godman & Salvin/det. P. Ackery, 1989"; printed white labels with "B.C.A.Lep.Rhop./Apodemia/hepburni/G. & S./Godman-Salvin/Coll. 1914.-5.", "Pinos Altos,/Chihuahua,/Mexico/Buchan-Hepburn.", "Type./Sp. figured.", and a small label with a male symbol; and a round white label with a red border printed with "Type/H.T."

Male. July-October, size = 10.9 (10.4-11.1, N = 13). Dorsum blackish-brown (Sepia, color 119); marginal row of black dots often with faint white points proximally especially towards forewing apex; forewing with four quadrate subapical white spots, continued submarginally as irregular row of small and poorly defined white spots; large quadrate white bar at end of discal cell with smaller, less distinct bar below it in cell CuA₂; postbasal white bar in discal cell and similar one below it in cell CuA₂; subapical, submarginal and cell-end white marks indistinctly outlined distally and proximally with black; similarly, postbasal bar outlined distally and bar below cell-end bar outlined proximally. Hindwing with markings as forewing except entire submarginal row of approximately equal-sized



FIGS. 1-8. *Apodemia hepburni* subspecies (dorsal surface on left, ventral surface on right of each figure). 1-4, *A. h. hepburni* (all MEXICO: Sonora)—(1) male, Rt. 16, 8.5 mi W Rio Yaqui, 26 Aug. 1984, leg. D. Mullins, (2) female, 36 mi W Moctezuma, 3 Aug. 1984, leg. D. Mullins, (3) male, Hwy. 16, 17 mi E Tecoripa, 15 March 1984, leg. J. P. Brock, (4) female, same data as fig. 3; 5-8, *A. h. remota* (all MEXICO: Baja California Sur)—(5) holotype, data in text, (6) allotype, data in text, (7) male, Mulege, $\frac{1}{2}$ mi E, 23 March 1974, leg. G. S. Forbes, (8) female, 3 mi S Loreto, leg. Faulkner, Brown.

spots; slight reddish-brown area at middle of costal margin, sometimes extending medially into discal cell; fringes of both wings white, lightly checked with black at vein tips.

Ventral surface dull reddish-brown; forewing near Pratt's Rufous proximally grading to Robin Rufous distally; hindwing Pratt's Rufous throughout; hindwing and base of forewing overscaled with white (often heavily); white marks as on dorsum but larger, especially submarginally; submarginal row of hindwing forming continuous, irregular

band; white spots outlined with black as on dorsum but more prominent against paler ground color; marginal black dots with indistinct white smudges proximally; hindwing anal margin whitish.

March, size = 11.7 (10.9–12.4, N = 7). Dorsum paler (near Hair Brown), forewing subapical and cell-end white marks prominent; posterior spots faint to nearly obsolete, position indicated by their black outlines; hindwing white marks similarly faint, most persistent in submarginal series; marginal black spots small, nearly disappearing anteriorly on forewing; hindwing flush of reddish-brown tending more prominent. Ventral surface paler (near Salmon Color, color 106) proximally, grayer distally; black markings obsolete; white marks less contrasting.

Female. August–October, size = 11.1 (10.3–11.8, N = 14). Wings more rounded than male; ground color as male; white marks as male; forewing with indistinct Pratt's Rufous margin; marginal black spots with proximal indistinct points of white apically; hindwing with anterior $\frac{1}{3}$ and margin Pratt's Rufous.

Ventral surface similar to male but slightly paler; ground color near Cinnamon Rufous throughout, less overscaled with white except between marginal black dots and submarginal white spots giving appearance of whitish band.

March, size = 12.2 (11.9–12.4, N = 2). As male, anterior $\frac{1}{3}$ of hindwing with reddish-brown flush, forewing with more restricted marginal reddish-brown than later in year.

Distribution and phenology. The distribution of this taxon apparently is incompletely known. Nearly all records that I know of are from Sonora, Mexico (Fig. 9) where it may be locally common. It was described from western Chihuahua, Mexico; there are old records from southern Arizona (various museums), additional, more recent, Arizona records from northeast of Douglas, Cochise County (*vide* R. Bailowitz) and at Sycamore Canyon, Santa Cruz County (Langston 1991), and it was taken in the Chisos Mountains, Brewster County, Texas (Carnegie Museum). The flight period in Sonora is from late February to late March and late July to late October reflecting at least two broods. Arizona records are for May and June (one in August) and the Texas record is for July.

Discussion. This taxon is at least bivoltine in spring and again in autumn and strongly biphenic. The spring brood is pale with reduced markings; the fall phenotype is smaller, darker and the ventral surface is relatively heavily overscaled with white and appears mottled.

Apodemia hepburni remota, new subspecies

(Figs. 5–8)

Male. August–November, size = 11.6 (10.2–12.6, N = 25). Dorsum dark brown (Sepia, color 219); submarginal row of black spots on both wings as on *A. h. hepburni* but without associated white points; white marks and black outlines as on *A. h. hepburni* but narrower; hindwing usually with medial flush of reddish-brown anteriorly, extending into discal cell.

Ventral surface nearly uniform Pratt's Rufous with little white overscaling; white spots as on dorsum, their black outlines thin; black marginal dots small, often obsolete anteriorly on forewing, and with associated white very vague or absent.

February–April, size = 12.3 (11.9–13.4, N = 7). Dorsal ground color paler (Hair Brown), posterior white marks on forewing and basal marks on hindwing faint to obsolete; marginal black spots very small (may be absent on forewing); reddish-brown on hindwing present or absent.

Ventral ground color pale (near Orange-Rufous); very little whitish overscaling basally, white marks very thin with black outlines faint to obsolete; marginal black spots reduced to points or entirely absent.

Female. August–November, size = 12.4 (11.0–14.1, N = 30). Wings more rounded than male; hindwing with relatively heavy flush of reddish-brown anteriorly; margins with smudges of similar color in each cell; white markings thin as on male.

Ventral surface paler than male (near Orange-Rufous); markings as on male.

April, size = 12.6 (12.3–12.9, N = 2). Dorsum similar to later in year but tending

towards more reddish-brown on hindwing. Ventral surface very pale (near Flesh Ocher), markings as on male.

Types. Holotype M—MEXICO: Baja California Sur; Arroyo San Bartolo, 28 Aug. 1982, leg. [J. W.] Brown and [D. K.] Faulkner. Allotype F—same data as holotype. Paratypes (60M, 50F, all MEXICO: Baja California Sur)—same data as holotype (1M, 10F); same location as holotype, 28 Nov. 1980, leg. J. Brown (1F); San Bartolo, 3 Oct. 1981, leg. F. Andrews & D. Faulkner (2F); 30 Nov.–1 Dec. 1979, leg. Brown & Faulkner (2M, 3F); A. San Bartolo, 2 Nov. 1961, leg. Cary-Carnegie Expedition [=CCE] (1F); 3 Nov. 1961, leg. CCE (3M, 2F); 12 Nov. 1961, leg. CCE (1F); San Bartolo microwave tower, 28 Nov. 1980, leg. J. Brown (1M); 3 mi SE San Bartolo, 15 March 1974, leg. G. S. Forbes (1M); 2 mi SW Caduano, 26 Aug. 1982, leg. Faulkner & Brown (7M, 1F); 7 km S Caduano, 26 Aug. 1982, leg. Faulkner and Brown (1M, 1F); Caduano, 25 Nov. 1961, leg. CCE (1M); Ro. Palmarito 4 Nov. 1961, leg. CCE (2F); 5 Nov. 1961, leg. CCE (1M), 30 Nov. 1961, leg. CCE (1F); 31 Nov. 1961, leg. CCE (1M, 1F); Rancho San Bernardo de Sierra Laguna, 14 Nov. 1961, leg. CCE (1M, 1F); 17 Nov. 1961, leg. CCE (1M); Bahia de Palmas, 20 Nov. 1961, leg. CCE (1M, 2F); 33 mi N Todos Santos, 4 Oct. 1981, leg. D. Faulkner & F. Andrews (1M); 28 km N Todos Santos, 29 Nov. 1980, leg. Brown & Brown (1F); 31 km N Todos Santos, 29 Nov. 1980, leg. J. Brown (1F); 4 mi E La Barrera (nr. Todos Santos), 21 March 1974, leg. R. Holland (1M); 8 mi W La Paz, 30 Oct. 1946, leg. E. Y. Dawson (1M); Ramel de Naranjas, 6 mi W Hwy. 1 nr. Santa Anita, 11 Oct. 1983, leg. Andrews & Faulkner (2M); San Antonio microwave, 13 Oct. 1983, leg. D. Faulkner & F. Andrews (3F); Boca de la Sierra, 13 Nov. 1961, leg. CCE (4M); 17 Nov. 1961, leg. CCE (4M, 1F); 22 Nov. 1961, leg. CCE (1M, 1F); 24 Nov. 1961, leg. CCE (2M, 2F); 28 Nov. 1961, leg. CCE (3M, 2F); Puerto Chileno, 22 Nov. 1961, leg. CCE (2M, 1F); Guaycura Hotel, La Paz, 29 Nov. 1961, leg. CCE (1M); 15 mi S La Paz, 1 Nov. 1946, leg. E. Y. Dawson (16M, 2F); 2 mi S Buena Vista, 30 Nov. 1979, leg. Brown & Faulkner (1F); 5 km S R Buenavista, 25 Oct. 1961, leg. CCE (2F); Santiago, 6 Nov. 1946, leg. E. Y. Dawson (2F); 3 mi S Santiago, 25 Oct., leg. ? (1F); San Jose del Cabo, 23 Nov. 1961, leg. CCE (1F).

Deposition of types. The holotype, allotype, and 58 paratypes are deposited at the Natural History Museum, San Diego, California; 49 paratypes are at the Carnegie Museum of Natural History, Pittsburgh, Pennsylvania; one paratype is in the private collection of G. S. Forbes, Las Cruces, New Mexico, and two paratypes are retained by the author.

Type locality. MEXICO: Baja California Sur; Arroyo San Bartolo. San Bartolo is on Mexico Highway 1 between La Paz and San Jose del Cabo.

Distribution and phenology. *Apodemia h. remota* occurs only in Baja California Sur from Mulege south to the southern tip (Fig. 9). Specimens have been taken from mid February to mid April and from late August to early December, about 70% (of 117 examined) in November.

Etymology. This subspecies is named after its isolated distribution at the tip of the Baja California peninsula.

Diagnosis and discussion. *Apodemia h. remota* is seasonally biphenic in size, color, and pattern; this is similar in form but somewhat less pronounced than for nominotypical *A. hepburni*. *Apodemia h. remota* differs in several respects from *A. h. hepburni*. It is a larger insect (averaging 0.5 mm larger in the first brood and 1 mm in the second), both the ventral and dorsal ground colors are paler, the white markings and their black outlines are thinner (especially on the ventral surface where they are about twice as broad on *A. h. hepburni*), the black marginal spots are smaller, and there is considerably less whitish overscaling on the ventral surface (see Figs. 1–8). Overall, the ventral surface of *A. h. remota* appears uniformly colored; that of *A. h. hepburni* has a mottled appearance, especially on late season specimens. *Apodemia h. remota* tends to have more red-brown medially on the dorsal hindwing (this sometimes extends distally to the outer margin on females) and along the margins on both wings than *A. h. hepburni* and rarely has white associated with the black marginal spots.

It is curious that most references do not mention the occurrence of *A. hepburni* in Baja California Sur. Hoffmann (1976) acknowledged the occurrence of the species only on the mainland. He, Rindge (1948), and Holland (1972) reported only *A. palmeri* (= *Apodemia*

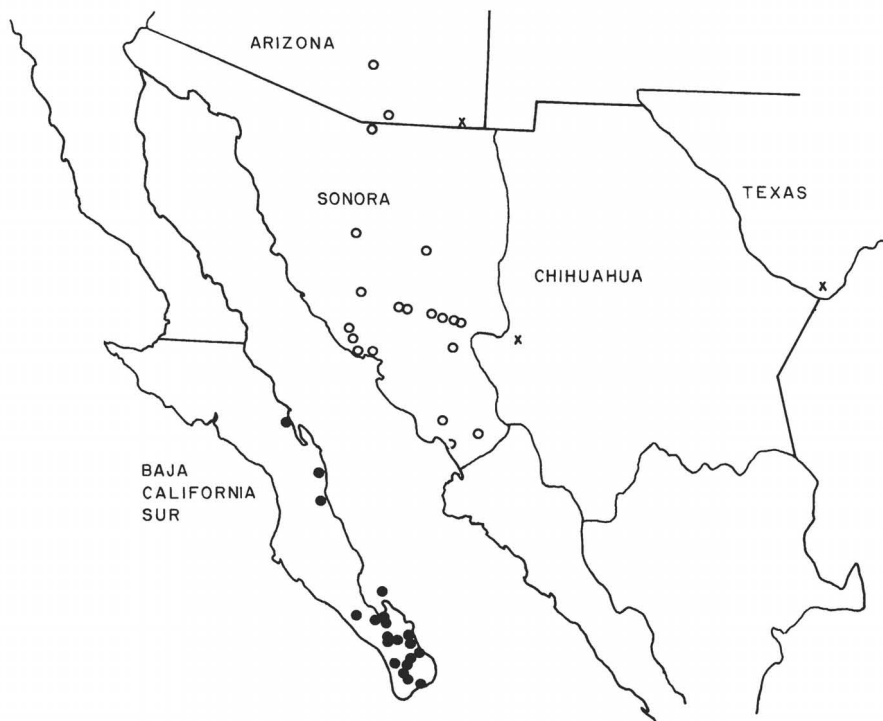


FIG. 9. Known distribution of *Apodemia hepburni*. Open circles = *A. h. hepburni*, closed circles = *A. h. remota*, "x" = specimens not seen.

murphyi Austin) of this group in Baja California. Of other general references, Howe (1975) reported its occurrence in Baja California but Scott (1986) did not.

DISCUSSION

Both taxa of *A. hepburni* are relatively rare in collections although the species appears to be common locally. The dates of collection seem to reflect two well defined and disjunct flight periods in both Sonora and Baja California Sur, Mexico. It is unknown how much of the known phenology reflects collector phenology. In Baja California, however, there are records for *A. murphyi* from every month, suggesting that the absence of *A. hepburni* records in some months is real. The few records for Arizona and Texas bridge the phenological gap in Mexico, perhaps reflecting a single brood at the northern extreme of the distribution. I have found no information on the early stages or larval food plant of *A. hepburni*.

Seasonal variation of both *A. hepburni* taxa is parallel. Individuals from early in the year (spring) are large and pale with small white markings; those from later in the year (late summer-fall) are of a smaller,

TABLE 1. Characteristics of species of the *Apodemia palmerii* complex.

Character	<i>A. palmerii</i>	<i>A. murphyi</i>	<i>A. hepburni</i>
FW shape	not produced	produced	produced
FW apex	rounded	subfalcate	subfalcate
Dorsal margin	prominent series of white spots	prominent series of white spots	no or inconspicuous white spots
Dorsal maculation	prominent	prominent	vague, esp. posteriorly on forewing
VHW postmedian band	medium width	very broad	narrow to medium width
Distribution	SW US to central Mexico	southern Baja California, Mexico	southern Baja California and western Mexico

darker phenotype with more extensive white spots. Seasonal biphenism was noted in size and color of *A. p. palmerii* and in color for *A. murphyi* although none was detected for two other *A. palmerii* taxa (Austin 1987).

Apodemia hepburni occurs sympatrically and synchronically with *A. palmerii* or *A. murphyi*; the two have been taken together at several locations in Sonora and Baja California. The known distribution and flight period of *A. palmerii* and *A. hepburni* are practically identical in Sonora. In Baja California, *A. hepburni* has a shorter flight period and does not extend as far north as *A. murphyi*.

Apodemia hepburni is sometimes confused (in collections) with *A. palmerii*. *Apodemia palmerii* always has a prominent row of white spots just proximal to the marginal black dots on both wings; these are absent or represented at most by inconspicuous white points on *A. hepburni*. The white marks of the submarginal series on the ventral surface are usually conspicuously outlined with black on both sides on late season *A. hepburni*; this black outline is usually absent distally on spring *A. hepburni* and all *A. palmerii* (some *A. palmerii* may have a darker shade here but never a well-defined line of black). Additionally, the forewings of both sexes of *A. hepburni* are more produced apically than those of *A. palmerii*. *Apodemia h. remota* likewise resembles *A. murphyi*. The wing shape of the two is similarly produced. *Apodemia hepburni*, however, has smaller dorsal spots, no reddish-brown basally on the forewing (occasional female *A. hepburni* have a hint of this but it is never prominent as on some *A. murphyi*), lacks the marginal white spots, and has a very narrow white postmedian band on the ventral hindwing (very broad and prominent on *A. murphyi*). These characters are summarized in Table 1.

The male genitalia of the two subspecies of *A. hepburni* are identical; they are also very similar to those of *A. palmerii*. The processes of the

valvae diverge at a greater angle on *A. hepburni* than on *A. palmerii* and the lower process is slightly shorter and twisted outward. The vinculum of *A. hepburni* appears more upright compared to the sloping aspect of *A. palmerii*. The male genitalia of *A. murphyi* are more robust than those of either *A. hepburni* or *A. palmerii*.

ACKNOWLEDGMENTS

I thank various curators and others for loans of specimens: L. D. and J. Y. Miller (Allyn Museum of Entomology), F. H. Rindge (American Museum of Natural History), D. K. Faulkner (Natural History Museum, San Diego), J. P. Donahue (Natural History Museum of Los Angeles County), R. K. Robbins (National Museum of Natural History), J. E. Rawlins (Carnegie Museum of Natural History), J. A. Powell (California Insect Survey), and T. W. Davies (California Academy of Sciences). I am grateful for specimen loans and data from the private collections of J. Brock, G. S. Forbes, R. W. Holland, R. O. Kendall, D. Mullins, and M. J. Smith. I also thank P. R. Ackery of the Natural History Museum, London, for sending photographs of the type of *A. hepburni*. I thank Scott Klette of the Nevada State Museum for the photographs in the text.

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Received for publication 8 March 1990; revised and accepted 13 June 1991.