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A NEW SPECIES OF *SCHINIA* FROM CENTRAL CALIFORNIA (NOCTUIDAE: HELIOTHINAE)

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ABSTRACT. *Schinia carrizoensis* **new species**, is described from specimens collected on the Carrizo Plain National Monument, San Luis Obispo County and northeastern Santa Barbara County, California. This new *Schinia* is a member of the S. cupes (Grote) complex and is remarkable in the group for having subtle maculation with rusty coloration and a limited distribution.

Additional key words: *Ericameria linearifolia*, *Schinia mexicana*, genitalia, host plant, Asteraceae, interior coast range, *Schinia carrizoensis* n. sp., systematics.

In his canonical monograph to the Heliothinae of North America, Hardwick (1996) provided comprehensive coverage of the large North American Genus *Schinia* Hübner. The extensive descriptions of adult and larval characters, life histories, flight phenologies and distributions, along with color depictions of the larvae and adults, provided an easy means for identifying most species and recognizing new ones. Three new species of *Schinia* (Opler 2000), perhaps related to wide ranging *Schinia jaguarina* (Guenée), *Schinia miniana* (Grote), and *Schinia tuberculum* (Hübner), were subsequently described on the basis of differences in wing coloration of the few specimens examined. Several additional cryptic species of *Schinia* have been described, or resurrected out of synonymies, based on substantial anatomical characters examined in large series of specimens. Such characters include presence or absence of a well-developed second abdominal sternite hair pencil, genitalic characters, structures of frons, labial palps, and foretibial spination (Pogue & Harp 2003a, b, c, 2004, 2005; Knudson *et al*. 2003).

While conducting a survey of Lepidoptera on the Carrizo Plain National Monument in San Luis Obispo County, California, I collected numerous specimens of large, rust colored *Schinia* at the blacklight. These moths resembled no other *Schinia* and I immediately recognized this species as a new member of the *S. cupes* complex. During preparation of this manuscript, Mr. Thomas Dimock advised me of specimens he collected on the Carrizo Plain National Monument and a nearby portion of Santa Barbara County. Two of the Dimock specimens, also slightly worn, were sent first to Chuck Harp, then to Michael Pogue, both of whom found the moth new, Pogue initially concluding that maculation did not place it with the *S. cupes* group (Harp and Pogue, pers. comm.). This new *Schinia* is here described and a key to species of the *S. cupes* complex provided. My research of this group has lead me, in contrast to Pogue and Harp (2003a), to make the further addition of *Schinia mexicana* (Hampson) to the *Schinia cupes* complex.

Schinia carrizoensis, **new species**

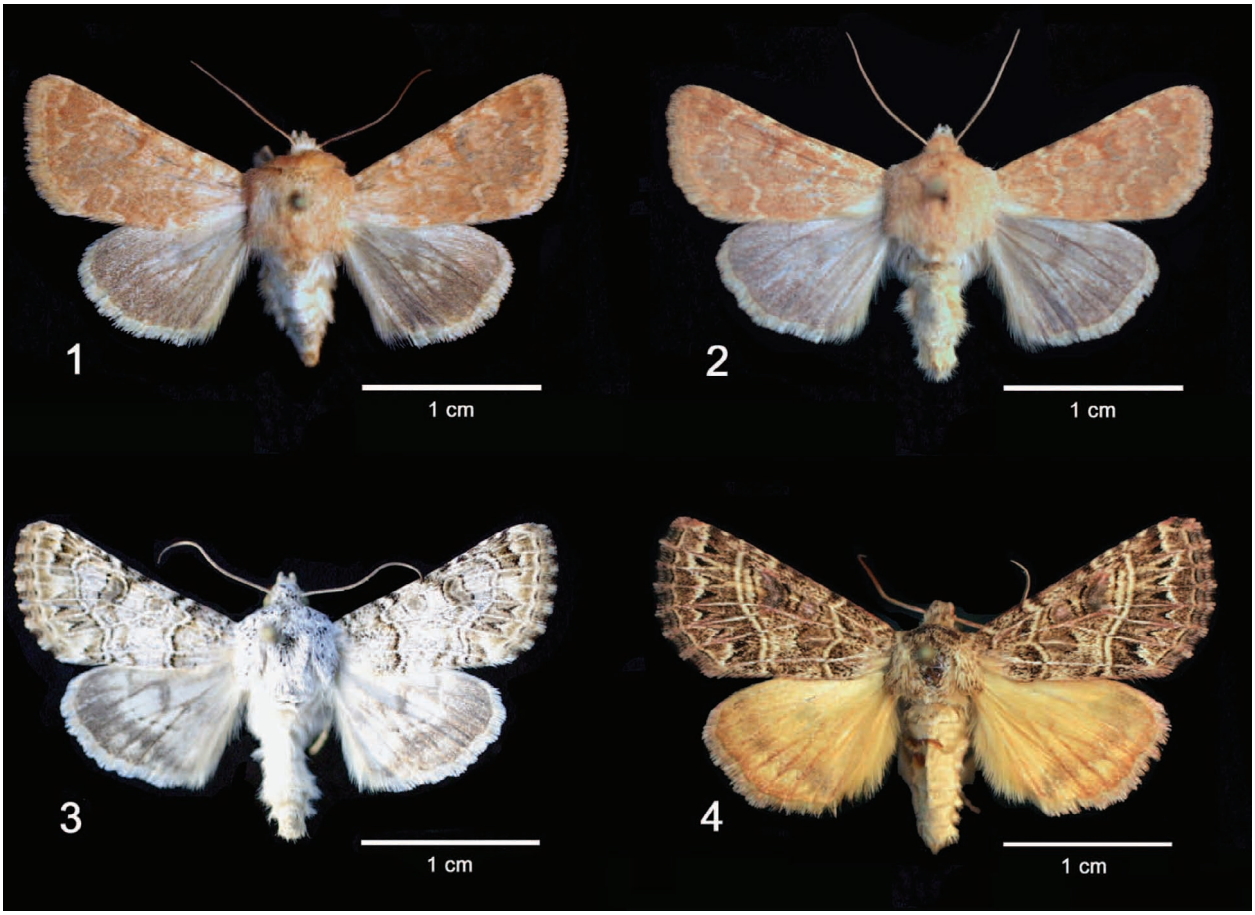
(Figs. 1–2, 6–10)

Description. Adult Male. (Fig. 2) *Head*: Frons cream and rust brown with short narrow scales; vertex mixed cream and rust hairlike scales. Labial palpus cream with some light gray scales on middle and at apex of outer surface. Eyes large and globular. Antenna orange thinly covered with flattened tan scales and abundant ventrally directed closely spaced short tan setae. *Thorax*: Mixture of cream and rust, hairlike and (few) spatulate scales with tapered stalks, many tapered scales cream with rust subterminal band and cream tip. Foreleg femur and ventral fringe cream; tibia cream and light gray; largest and stoutest spine on inner side and closest to basitarsus; slender dorsal setae absent; lateral tibia with three (sometimes 4, N=1) stout spines, the dorsal being slightly shorter and less robust; tarsi light gray with tan-cream apical rings. Mid- and hindlegs tan-cream with some gray scales but mid tibia with some rust scales; tarsi gray with tan-cream apical rings. Underside tan-cream. *Forewing*: Length 11.8–13.0 mm, mean=12.3, (n=11). Ground color rusty-tan-cream; antemedial line tan-cream and sinuate; claviform spot absent; orbicular spot rust brown, outlined with darker rust brown, with some gray at center; reniform spot rust brown outlined with darker rust or rust-brown, with some gray on central portions; postmedial line tan-cream and sinuate; subterminal line tan-cream distally, irregular darker rust brown medially; costal markings tending to dark brown in some; fringe uniform rusty-tan-to tan-cream, dark tipped scales tending apically. Underside light gray basally with dark gray orbicular and reniform spots; tan-cream on costa and marginally. *Hindwing*: Ground color light gray, discal spot and broad marginal band dark gray brown; veins in light discal area highlighted with dark gray-brown scales. *Abdomen*: Tan-cream dorsally, lighter cream to tan-cream ventrally; hair pencils and associated scent pockets on second sternite present. *Genitalia*: Uncus approximately 0.34 times the length of valve; valve elongate, length approximately 5 times width; ampulla elongate approximately 0.1 times length of valve; vesica with three coils.

Female. (Fig 1) As in male except antenna without abundant short ventral setae, but with one pair of short ventral setae at base of antennal segments. Forewing length 12.0–13.5 mm, mean=12.8 mm (n=l1). *Genitalia*: Not telescopic; papillae anales slightly sclerotized, triangular with an angled ventral margin, apex round; surface of ninth segment with fine, minute spiculi; eighth segment with short, fine setae in irregular rows around distal margin; appendix bursae with three coils; signa consisting of four elongate scobinate ribbons.

Type material. HOLOTYPE: ♀, CALIFORNIA: San Luis Obispo County, Carrizo Plain National Monument, Caliente Range, 1 mi SE Painted Rock, 2555' Lat. 35° 07.639' Long. 119° 50.561', at BL and MV lights, 9 March 2005, to 2400 hrs, K. H. Osborne. USNM ENT 148333. Deposited in USNM.

PARATYPES: CALIFORNIA: Same locality and date as type (6♂ 10♀): San Luis Obispo County, Carrizo Plain National Monument,



FIGS. 1–4. Adults. 1. *Schinia carrizoensis*, Holotype female. 2. *Schinia carrizoensis*, paratype male. California, San Luis Obispo County Co., Carrizo Plain National Monument, Caliente Range, 1 mi SE Painted Rock, 9 March, 2005. 3. *Schinia deserticola*, male, California, Imperial Co., Algadones Dunes, 7 mi. SE of Glamis, 6–7 March, 2005. 4. *Schinia mexicana*, male, Arizona, Cochise County, Huachuca Mountains, Copper Canyon, 0.5 mi S Montezuma Canyon Rd., 30–31 July, 2009.

FIG. 5. Noctuid larva found on *Ericameria linearifolia*, California, San Luis Obispo County Co., Carrizo Plain National Monument, Caliente Range, 1 mi SE Painted Rock, 2–3 April, 2006.

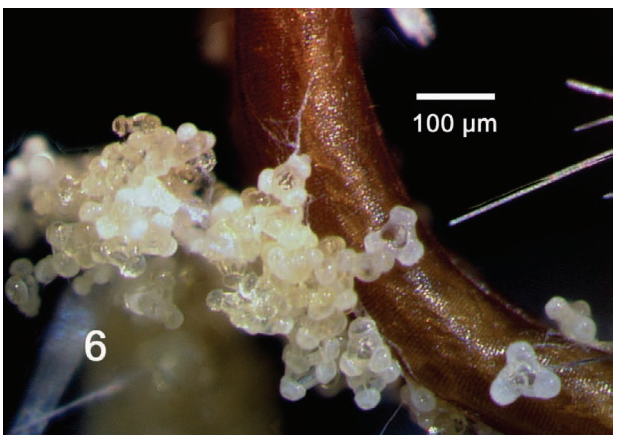
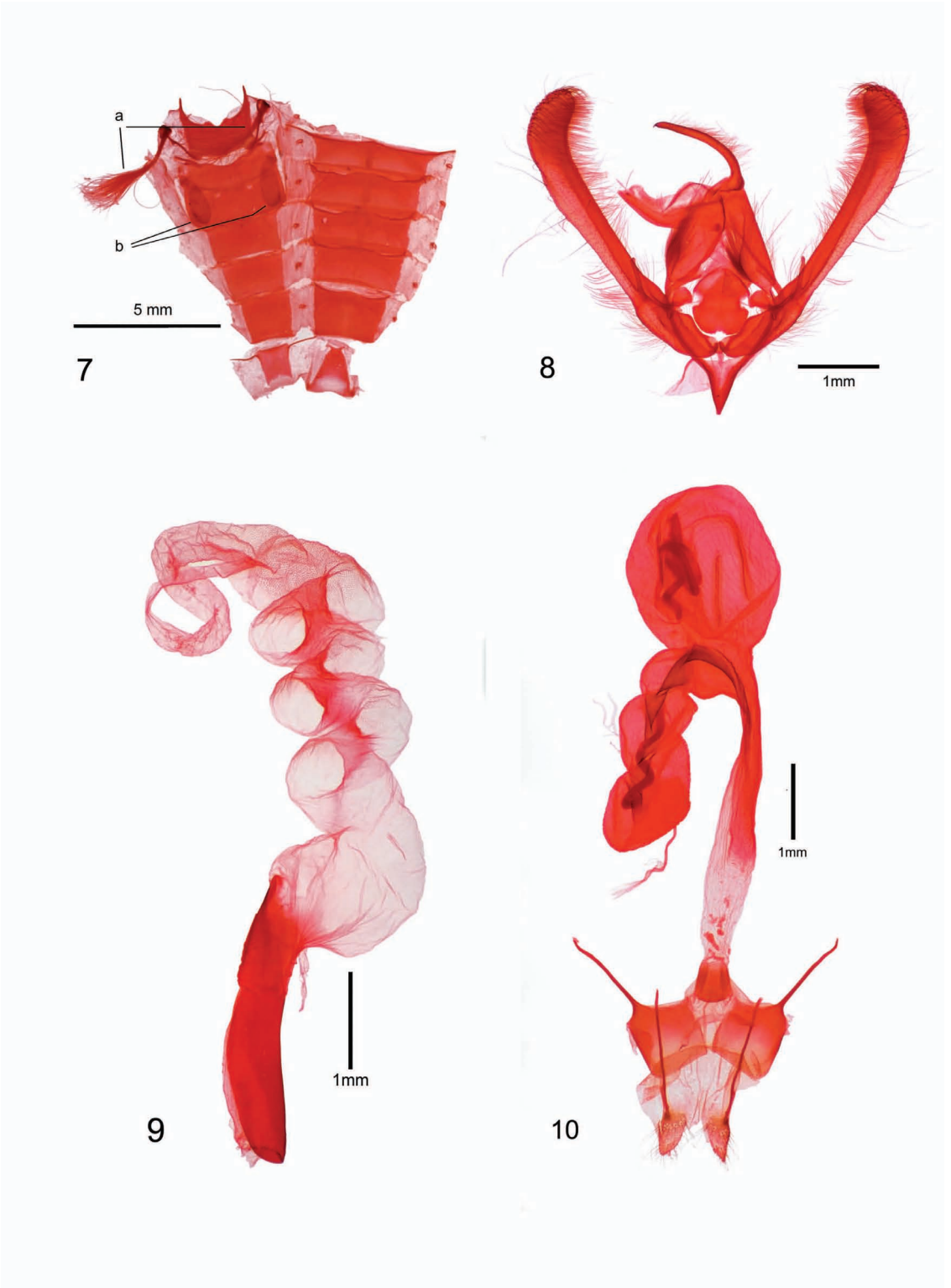


FIG. 6. Pollen on proboscis of *Schinia carrizoensis* (male of Fig. 2), California, San Luis Obispo County Co., Carrizo Plain National Monument, Caliente Range, 1 mi SE Painted Rock, 9 March, 2005.



FIGS. 7–10. Genitalia. 7. *Schinia carrizoensis*, male, California, Santa Barbara County, Ballinger Cyn., abdomen, flattened, showing hair pencils (a) and associated scent pockets (b) on ventral second sternite, Genitalia slide USNM 51382. 8. Male genital capsule of same specimen. 9. Aedoeagus of same specimen. 10. *Schinia carrizoensis*, female, California, Santa Barbara County, Ballinger Cyn., Genitalia slide USNM 51383.

Lat. 35.04644° N Long. 119.66029° W, at UV lights and traps. 29 March 2003, Thomas E. Dimock (1♂): San Luis Obispo County, Carrizo Plain National Monument, 2350' Lat. 35° 7.732' N Long. 119° 38.042' W, at UV lights and traps. 24 March 2008, David L Wikle and Peter Jump (1♂ 3♀): Santa Barbara County, Cuyama Valley, Deer Park Canyon 1.5 mi E Hwy 33, 3082 ft., 14 May 2005, Thomas E. Dimock (5♂): Santa Barbara County, Ballinger Cyn Rd, at National Forest boundary, 3025' Lat. 34° 52.851 N Long. 119° 27.194' W, at MV and UV light traps. 17 April 2009, David L Wikle (3♂ 2♀): Santa Barbara County, Ballinger Cyn Rd, east of National Forest boundary, 3070' Lat. 34° 52.983 N Long. 119° 26.952' W, UV light trap. 17 April 2009, David L Wikle (1♂).

Larval host plant: Unknown.

Etymology. The moth is named for the region from which specimens were collected.

Flight period. This species flies at least from early March to mid May.

Distribution (Fig. 11). Known only from southeastern San Luis Obispo County and adjacent northeastern Santa Barbara County, California, in the region of the Carrizo Plain and the southern Cuyama Valley. It is expected in adjacent Kern and Ventura Counties.

Diagnosis. Maculation subtle and lacking contrast. Head, thorax, upper forewing, with overall aspect of rust and tan coloration. The ground color is rusty-cream, maculation has elements with variable mixtures of cream, rust and light brown. Related *S. cupes*, *S. crotchii* Hy. Edw. and *S. deserticola* B. & McD all have ground colors of white or light gray with contrasting maculation of dark brown or dark gray.

DISCUSSION.

The pattern of maculation in *S. carrizoensis*, although subtle and colored differently, is homologous with and identical to the pattern of maculation in *S. deserticola* (Fig 3), *S. cupes*. and *S. crotchii*, indicating membership in the *S. cupes* species complex. Due to the subtlety of maculation, worn specimens would be more difficult to place with the *S. cupes* complex. Like all others of this species complex, *S. carrizoensis* is nocturnal and easily attracted to light.

A few interesting observations may facilitate further investigation of the *S. carrizoensis* host association. One male specimen of *S. carrizoensis* has pollen with fine threads entangled on the proboscis (Fig. 6). This pollen was carefully examined under magnification and compared with similar pollen and fine threads also entangled on the proboscis of a specimen of *S. deserticola* from Riverside County, CA. These pollen samples appear to be indistinguishable and compare very well with pollen of *Camissonia* Link (Onagraceae) specimens examined at the U. C. Riverside Herbarium. The strands or threads associated with this pollen are diagnostic of Onagraceae (Andy Sanders pers. comm.). Since both *S. deserticola* and *S. cupes* use Onagraceae (*Camissonia* and *Calylophus* Spach respectively) (Hardwick 1996; Pogue & Harp 2003a), it appears plausible that *S. carrizoensis* may use *Camissonia* as larval host. However, *Camissonia* is the

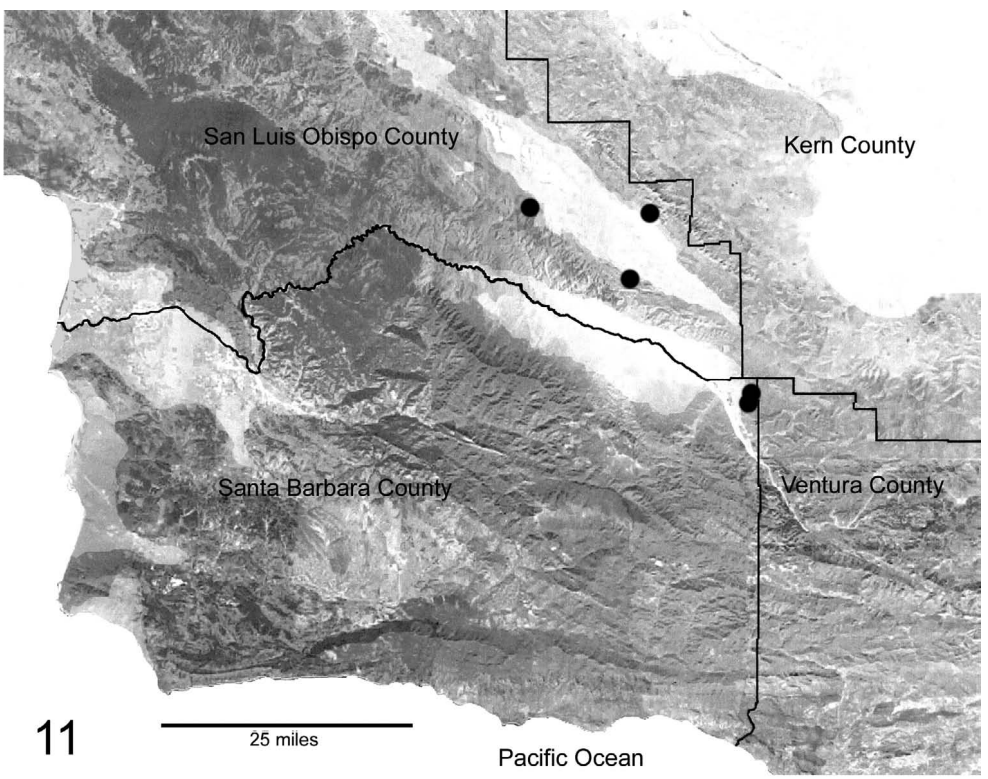


Figure 11. Map of central California showing distribution (black dots) of *Schinia carrizoensis*.

most abundant Onagraceous plant on the Carrizo Plain, and may merely function as a nectar source for *S. carrizoensis*.

Nocturnal noctuid larvae, suspected as potential *Schinia* larvae, were found by the author (but not successfully reared) 2–3 April 2006 (Fig. 5) at the type locality, feeding on flowers of *Ericameria linearifolia* (DC.) Urbatsch & Wussow (Asteraceae), an abundant shrub at the site. This is a host not previously recorded for any *Schinia* and the phenology of these larvae and flowers are appropriate for *S. carrizoensis*. *Castilleja exserta* (A. A. Heller) Chuang & Heckard (Scrophulariaceae), host to related *S. crotchii* (Hardwick 1996), also occurs in abundance at the type locality of *S. carrizoensis*.

Regarding host associations among species of the *S. cupes* complex, a number of confusing editorial errors (Harp pers. comm.) from the work of Pogue & Harp (2003a) warrant clarification: Hardwick 1996 correctly associated *C. crotchii* with, and reared this on *Castilleja exserta* [as *Orthocarpus purpurascens* Benth.] (Scrophulariaceae).

I include *Schinia mexicana* (Hampson) with the *S. cupes* species complex due to substantial, apparently homologous, similarities in maculation among its congeners in the complex. Pogue (pers. comm.; Pogue & Harp 2003a) removed *S. mexicana* from the group based on anomalous proportional differences in genitalic anatomy (broad male valve of *S. mexicana*) and cites the preponderance of pattern convergence in lepidopteran maculation. Alternatively, I contemplate the prospect of these genitalic differences to be potentially more superficial (for their taxonomic implications) and derived from the interaction of more profound evolutionary selective pressures acting indirectly on linked male and female genitalic structure through (perhaps and for example) hostplant imposed pressures on female ovipositor structure. If female *S. mexicana* genitalic and ovipositional structures have been evolutionarily modified to accommodate some peculiarity of host inflorescence, then the male genitalic structure may be forced to concurrently track the female changes—perhaps in ways we cannot yet understand. With respect to patterns of forewing maculation, the *S. mexicana* duplication of every detail found generally in the *S. cupes* complex: Sinuate patterns of the antemedial, postmedial, and subterminal lines; same patterns and arrangements of various irregular medial, subcostal, costal, and apical markings (see Figs. 1–4), argue to me that these similarities are more probably congeneric and species group homologies rather than convergence by evolutionary coincidence. With *S. mexicana*, the *S. cupes* complex includes five species.

KEY TO SPECIES OF THE *SCHINIA CUPES* COMPLEX

1. Forewing with dirty white, gray or light brown background, maculation with contrasting light gray or white and dark gray, brown or black elements; many dark brown to black tipped spatulate scales on dorsal thorax; lateral foretibia with three to five stout spines.....2
1'. Forewing predominantly of mixed tan, rust or golden brown color.....4
2. Forewing ground color white to dirty white; maculation light gray (Fig. 3); lateral foretibia with three stout spines, hair pencils in the male abdomen are present; ventral margin of papillae anales angulate; hostplant *Camissonia claviformis* (Torr. & Frem.) Raven (Onagraceae), of desert and arid environments SE Oregon to Utah and south through Arizona, SE California, and northern Mexico.....*deserticola*
2'. Forewing ground color light brown with most maculation contrasting whitish against dark browns, grays and black; lateral foretibia with three to five, usually four stout spines; central hair pencils in the male abdomen may be present or absent; ventral margin of papillae anales with the ventral margin straight.....3
3. Hair pencils in the male abdomen present; distribution Colorado and New Mexico, and east; may be associated with *Calylophus berlandieri* Spach (Onagraceae).....*cupes*
3'. Hair pencils in the male abdomen absent; Utah, Idaho, west to California and northern Baja California Mexico; may be associated with *Castilleja exserta* (Scrophulariaceae).....*crotchii*
4. Maculation of mixed dark brown or golden brown color, tan markings contrasting (Fig. 4); upper hindwing predominantly golden brown with darker marginal markings; lateral foretibia with one stout spine; male valve not elongate, length approximately 3x width; southeastern Ariz., central and southern Mexico.....*mexicana*
4'. Maculation of mixed tan and rust color, markings subtle and subdued (Figs. 1–2); upper hindwing of predominantly dark gray; lateral foretibia with three (sometimes two) stout spines; male valve elongate, length greater than 5x width; interior coast range of central California.....*carrizoensis*

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