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NEW *CALLOPHRYS* (LYCAENIDAE) FROM NORTH AND MIDDLE AMERICA

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Editors' Note

The manuscript that follows was left in a draft form at the time of Harry Clench's unfortunate death in 1979. It was originally to include a "discussion of the phylogeny and zoogeography of the genus "*Callophrys.*" That portion of the manuscript was not finished, and there was insufficient indication of Mr. Clench's intention for us to complete it. Therefore, it has been necessary to shorten the original paper to the basic descriptions contained herein.

Descriptions appear as in the original manuscript. Mr. Clench had not completed labelling the type series nor recorded all of the specimens in his draft but had made marginal notes concerning these specimens. Material sent to Mr. Clench in 1974 was not incorporated into the original manuscript and was discussed in personal correspondence and/or telephone conversations with us. We have undertaken to label the type-specimens in accordance with Mr. Clench's wishes and have included their data in this manuscript. Other specimens that we felt should have been included, but were not included by Mr. Clench, have not been labelled as types.

Problems arise in the posthumous publication of research. Changes in the manuscript to conform to the *Bulletin* style and format had not been indicated in the manuscript. Insertions of additional material for completeness are indicated by brackets and "— ed." These are relatively few and generally refer to the deposition of material and genitalic drawings.

Mr. Clench's genitalic drawings were fragmentary in some cases and unavailable in others. For the sake of completeness, proper genitalic drawings of both sexes in most cases have been prepared by Jacqueline Y. Miller from material in the Allyn Museum collection. Some of the material illustrated is not from the type series. Discussions of various genitalic characters in the text are solely those of Mr. Clench. The manuscript was read and commented upon by Dr. Mary H. Clench. Mr. A. C. Allyn prepared the photographs. The bibliography was compiled by the editorial staff.

It is not the general practice of this journal to publish descriptions in a vacuum without reference to other members within a genus or to related genera. However, we feel that these taxa originally diagnosed by Mr. Clench should not remain undescribed and accordingly, this paper is offered to make the names available to colleagues.

Lee D. Miller and Jacqueline Y. Miller

Within the past several years a number of new *Callophrys* have come to hand, from a variety of sources and from localities ranging from the United States to Guatemala. Several new species in the subgenus occupy a pivotal position in the genus [and are described below — ed.]

ACKNOWLEDGEMENTS

I thank the following individuals whose help in various ways has been indispensible in preparing this paper: Dr. Lawrence E. Gilbert, [Austin Texas — ed.] for the loan of the only Tamaulipan speciman of *xami* that I have seen; Dr. Richard Holland, Albuquerque, New Mexico, for his generous gift to the Carnegie Museum of the type series of *estela;* Dr. Lee D. Miller, Allyn Museum of Entomology (AME), Sarasota, Florida, for the loan of material of several forms; Dr. Frederick H. Rindge, American Museum of Natural History (AMNH), New York, for kindnesses extended during my several visits to the museum and for the loan of critical specimens for study; Dr. Oakley Shields, Mariposa, California and Dr. Terry Sears, Davis, California, for the valued gift of the type series of *dospassosi searsi;* Sr. Eduardo Welling, Merida, Yucatan, Mexico, for the original specimens of *dospassosi* and *guatemalena,* and for supplementary information on the habitat of the former that enabled Dr. Miller and me to locate it on our joint trip in 1966; [the late — ed.] Robert G. Wind, San Cristobal de las Casas, Chiapas, Mexico, for material of several of the forms, particularly *xami scaphia.*

Carnegie Museum of Natural History is abbreviated CM.

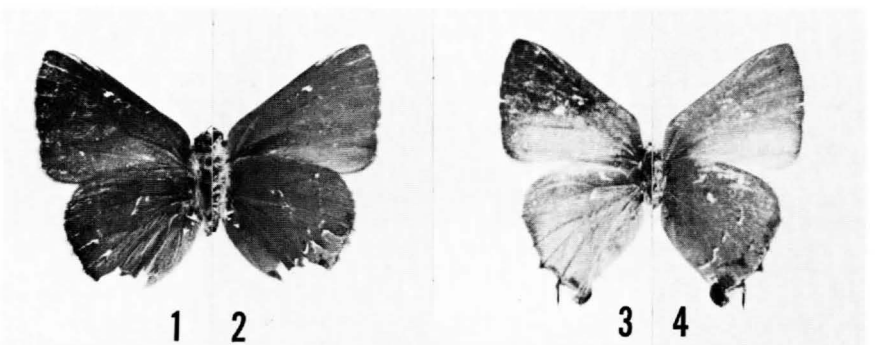
Callophrys (Cyanophrys) miserabilis simplex, new subspecies

Figures 1, 2 (♂), 3, 4 (♀), 5 (♂ genitalia), 6 (♀ genitalia)

Differs from nominate *miserabilis* Clench (1946, Entomologist 79: 156) as follows:

Frons similarly brown. Both sexes with tails as in the nominate subspecies; fore wing length averages a little smaller.

Male with blue above a little lighter and more extensive, but the boundary with the terminal and apical fuscous is so vague that detailed comparison is not possible. The most conspicuous differences are on the underside: on the fore wing the inner marginal gray extends costad beyond Cu_2, sometimes as far as Cu_1, but usually to the middle of the Cu_1-Cu_2 interspace in its basal half or two-thirds, whereas in *miserabilis* the gray



Figures 1-4: *Callophrys* (*Cyanophrys*) *miserabilis simplex,* new subspecies. 1-2, Holotype ♂ upper (1) and under (2) surfaces; MEXICO: JALISCO: Ajijic, 6000 ft., 5.xii.1966 (R. Wind); Allyn Museum photos 810622-1/2. 3-4, Paratype ♂ upper (3) and under (4) surfaces; MEXICO: JALISCO: Ajijic, 5800 ft., 6.xii.1966 (R. Wind); Allyn Museum photos 810622-3/4. Both specimens in CM.

extends costad to Cu_2 or, rarely, to no more than one-third of the interspace beyond. As in *miserabilis* there is no trace of a pm line on this wing. On the hind wing the pm line is about the same as in *miserabilis,* but perhaps more consistently present in all

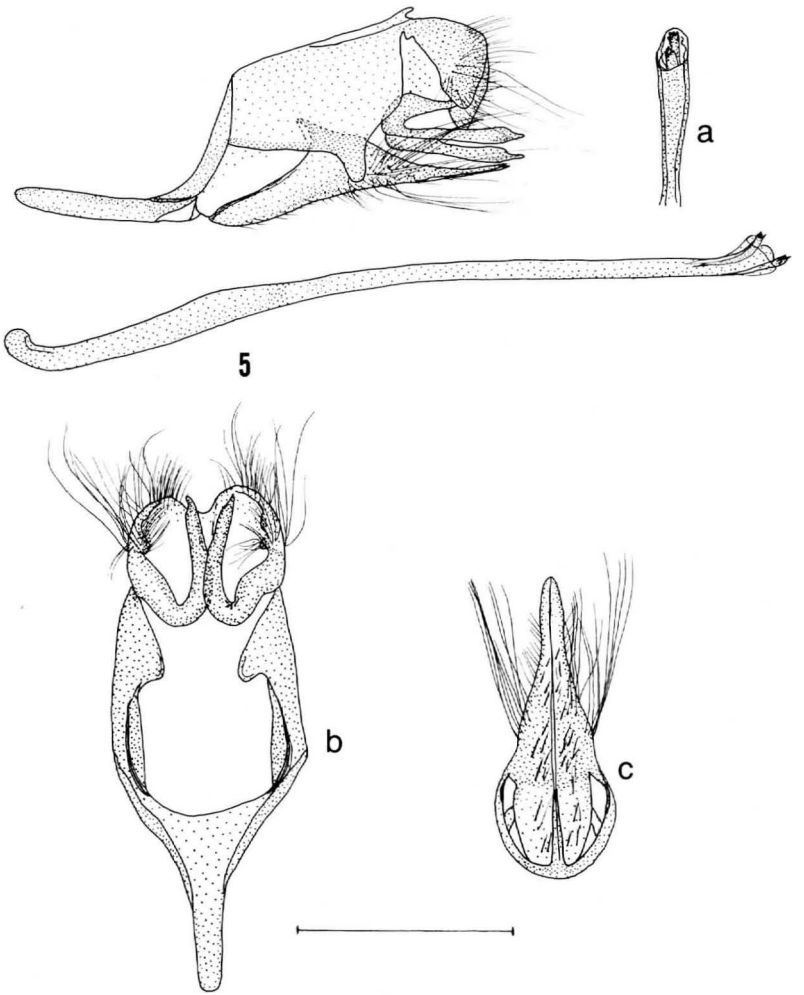


Figure 5: ♂ genitalia of *Callophrys* (*Cyanophrys*) *miserabilis simplex,* new subspecies, Holotype (same specimen as Figs. 1-2). 5, lateral view of genitalia with penis below; a, tip of penis; b, ventral view of genitalia with valvae removed; c, ventral view of valvae; ♂ genitalia preparation M-3477 (Jacqueline Y. Miller). (Scale line = 1 mm. in all illustrations.)

interspaces (*miserabilis* is variable in this respect, sometimes complete and sometimes with segments from Rs to Cu_1 almost or completely suppressed). The segments of this line posterior to Cu_2 appear to be a little straighter and more evenly continuous. The Thecla spot in Cu_1-Cu_2, present in *miserabilis*, is almost completely suppressed in *simplex*; the core, a black or dark maroon spot in *miserabilis*, is absent entirely; the cap, a heavy maroon (rarely admixed with orange) bar in *miserabilis*, with almost equally heavy counterparts in each adjoining interspace is here reduced to a very slender line only a few scales wide and the counterparts are fainter still or absent completely. As in *miserabilis* these bars are straight and transverse, by which they differ from other *Cyanophrys*. The marginal row of maroon and white irrorated lunes is the same as in *miserabilis* but appears more regular because of the absence of the Thecla spot core.

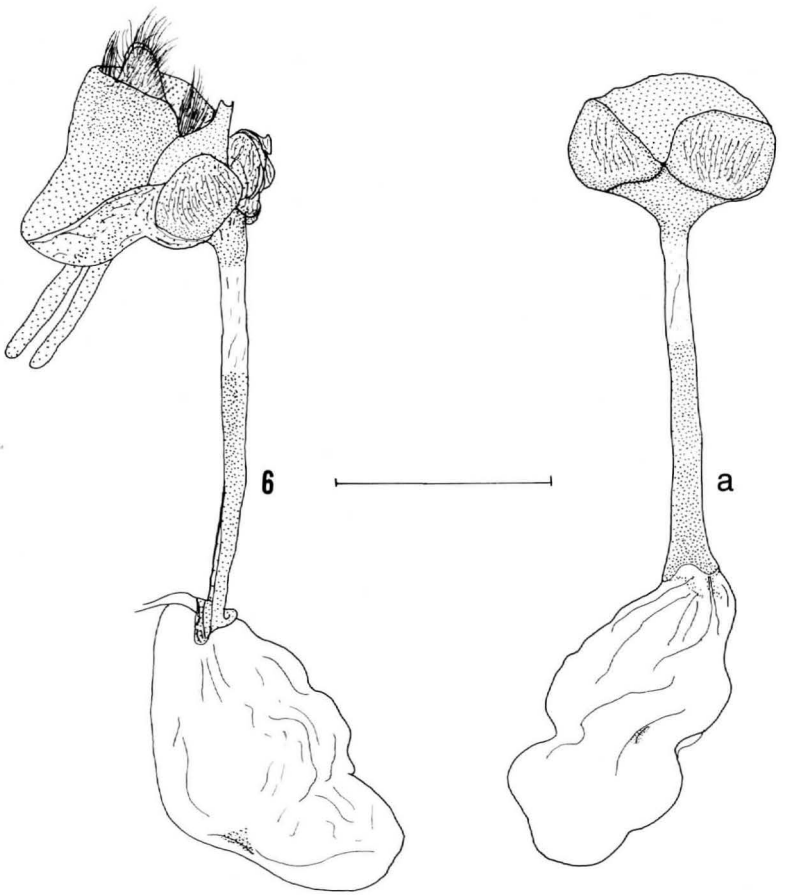


Figure 6: ♀ genitalia of *Callophrys* (*Cyanophrys*) *miserabilis simplex*, new subspecies, Paratype (same specimen as Figs. 3-4). 6, lateral view of genitalia; a, ventral view of genitalia with papillae anales removed; ♀ genitalia preparation M-3478 (Jacqueline Y. Miller).

Female: Differs distinctly from *miserabilis* on the upperside (unusual in this subgenus) on both wings, the basal blue is much paler and more extensive. On the fore wing it fills the posterior half of the wing, including the cell, the basal third of M_3-Cu_1, the basal half or two-thirds of Cu_1-Cu_2 and all of Cu_2-2A to within 2 to 5 mm). On the hind wing the blue extends distad to nearly fill the whole wing save for the gray costal and inner marginal areas and a narrow, almost linear, edge of terminal fuscous, inclined to break into bars below M_3. In *miserabilis* this terminal border is usually 2 mm. or more thick.

(Male (Fig. 5) and female (Fig. 6) genitalia as illustrated — ed.]

Length of forewing: male, 12.5 - 15.0 mm., mean (of 12) 13.7 mm.; female, 13.0 mm. (2 specimens).

Holotype, male, Ajijic, 6000 ft. [ca. 1850 m.], Jalisco, Mexico, 5.xii.1966 (leg. R. G. Wind), C.M. Acc. 23125.

Paratypes 11 ♂ and 2 ♀ same locality and collector, elevation from 5300-5400 ft. [1630-1660 m] various dates between 4-17.xii.1966.

Holotype and all paratypes, C.M. Ent. type series no. [696 — ed.]

Remarks. C. (Cyanophrys) miserabilis, the nominate subspecies, one of the most widley distributed members of the subgenus in Mexico, is known from the Brownsville area of southern Texas and from the following Mexican localities:

Tamaulipas: Cd. Victoria; W. of Cd. Victoria, 5000 ft.; Tampico. — San Luis Postosí: El Salto; Tamazunchale. — Veracruz: Córdoba; Jalapa; 2 mi. NE Catemaco, 1100 ft. [338 m.] — Puebla: Xicotepec Juárez. — Yucatán: Pisté; Chichén Itzá; Mérida. — Durango; La Ventana [= Villa Corona], 2000 ft. [615 m.] Sinaloa: 19 mi. E. Concordia, ca. 3000 ft. [923 m.] — Colima: Colima. — Michoacán: Acahuato, 3000 ft. [923 m.] — Morelos: south end Lago Tequesquitengo, 1140 m. [3710 ft.]; 10 mi. S. Cuernavaca, 1100 m. [3575 ft.]; Canyon de Lobos, 10 mi. E. Cuernavaca, 1440 m. [4680 ft.] — Guerrero: 2 mi. N. El Treinte, 220 m. [715 ft.]; Acapulco; Rincón, 2800 ft. [860 m.] (type locality); Savana Grande, 3000 ft. [923 m.] — Oaxaca: 3 mi. SE Tapanatepec, 150 m. [487 ft.] — Chiapas: vic. Lagos de Montebello, 1300-1500 m. [4225-4875 ft.] — Farther south is known from Guatemala, Nicaragua and Costa Rica.

Two specimens of *miserabilis*, both taken by Lee D. Miller and in the AME collection, appear somewhat transitional to *simplex*. One of these is from Morelos (Canyon de Lobos) and one is from Chiapas (Lagos de Montebello). Were it not for these specimens, I would be inclined to view *simplex* as a closely allied but distinct species. Its oddly small range is surrounded by nominate *miserabilis*, and it occupies higher elevations, above 5000 ft. (ca. 1500 m.), than does *miserabilis*, which occurs from the lowlands, usually up to about 4700 ft. (1440 m.), rarely a little more. These two specimens, however, open up the possibility that intermediate populations will be found eventually.

Callophrys (Xamia) xami xami Reakirt

Thecla xami Reakirt "1866" [1867], Proc. Acad. Nat. Sci. Philadelphia: 332; Godman & Salvin 1887, Biol. C.-Amer. Rhop. 2: 48; ibid. 1901, op. cit.: 717; Draudt 1920, *in* Seitz, Grossschmett. Erde 5: 772, pl. 154 g.; Comstock & Hungtington 1964, J. New York Ent. Soc. 72: 188.

Thecla (Mitoura) xami: Hoffman 1941, An. Inst. Biol. Mex. 11: 710.

C. [Callophrys?] (Mitoura) xami: Draudt 1924, op. cit.: 1043

Mitoura xami: of authors

Callophrys (Xamia) xami: Clench 1961, in Ehrlich & Ehrlich How to Know the Butterflies: 205, fig. 389 (in part, but including figure).

Callophrys xami: Ziegler & Escalante 1964, J. Lepid. Soc. 18:85 (life history).

Thecla blenina Hewitson 1868, Decr. new spp. Lycaenidae: 12: ibid. 1869, Ill. D. Lep Lycaenidae: 127, pl. 50, figs., 256-257; Comstock & Huntington 1959, J. New York Ent. Soc. 67: 94.

The type locality of *xami* is "near Vera Cruz"; of *blenina*, "Mexico."

Localities. Veracruz: Jalapa (Godman & Salvin 1887). — Distrito Federal: Mexico City [ca. 7000 ft.] (Tacuba); Mexico City, viii. 1946 (*leg.* T. Escalante) (both CM); same, xi. 1967 (*leg.* A. Diaz F., AME). — Hidalgo: 5 mi. NW Zimapán, 2140 m., 22, 25.i.1969 (*leg.* L. D. & J. Y. Miller, AME). Guerrero: Amula [6000 ft.] (Godman & Salvin 1901). — Tamaulipas: on road from Julilo to La Joya de Salas, 5300 ft., ca. 15 km. NW Encino, 11.viii.1965 (*leg.* and *coll.* L. E. Gilbert).

Hoffman (1941) gives the distribution of *xami* as "Sierra Madre" Occidental (de Sonora[1] a Jalisco). Estados del Centro. Valle de Mexico. Montañas de Veracruz. Valle de Tehuacán. Sierra Madre del Sur (Guerrero). Oaxaca. (Tierras fría y templada)."

Length of forewing (Mexico City series): males, 13.0-15.0 mm., mean (of 4) 14.1 mm.; females, 14.0-16.0 mm., mean (of 6) 15.0. mm.

Nominate *xami* occurs primarily, if not exclusively, in central Mexico, in forests at moderate elevations (Upper Austral and Transition zones, with rather low annual temperature amplitude). The Tamaulipas specimen is the northernmost of which I have knowledge and was taken in humid pine-oak forest. The Hidalgo specimens (2 ♀) were collected in a drier, lower forest, also of pine and oak but with admixture of piñon and juniper.

Callophrys (Xamia) xami texami, new subspecies

Figures 7, 8 (♂), 9, 10 (♀)

Thecla blenina: Aaron & Aaron 1885, Papilio 4: 179.

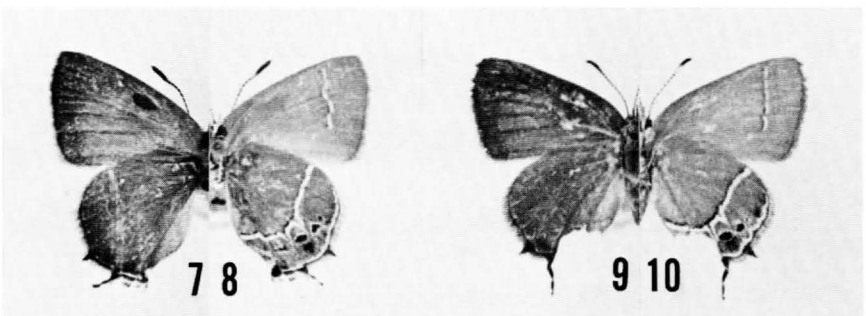
Thecla (Mitoura) xami: Holland 1931, Butterfly Book, (rev. ed.): 231, pl. 64, fig. 20 [figured specimen is holotype of *texami*].

Thecla xami: Cockerell 1934, Ent. News 45: 51

Mitoura xami: Stallings & Turner 1946, Ent. News 57: 49; Klots 1951, Field Guide: 142.

Callophrys (Xamia) xami: Clench 1961, in Ehrlich & Ehrlich, How to know the butterflies: 205 [in part, and excluding fig. 389 which is of nominate xami]; Howe 1975, Butterflies of North America: 290, pl. 49, figs. 20,21.

This subspecies differs in several respects from nominate *xami:* the upperside ground [color — ed.], especially of male, is yellow, more brassy or washed out; the fuscous terminal border of the male is thicker on the fore wing (about as thick as the costal fuscous; in *x. xami* it is about half as thick), and about equally thick on the hind wing (in *x. xami* almost absent); it is considerably smaller (length of fore wing: males, 11.5-13.5 mm., mean (of 8) 12.1 mm.; the one female is 12.5 mm.); the green of the fore



Figures 7-10: *Callophrys (Xamia) xami texami,* new subspecies. 7-8, Holotype ♂ upper (7) and under (8) surfaces; TEXAS: Corpus Christi; Allyn Museum photos 810622-5/6 (CM). 9-10, ♀ upper (9) and under (10) surfaces; TEXAS: Pharr (H. A. Freeman); Allyn Museum photos 810622-7/8 (AME).

wing underside is more extensive proximad of the pm line, often extending from costa to Cu_2 (in *x. xami* rarely if ever so, and often with green only in the extreme base of the wing); the Thecla spot in Cu_1-Cu_2 of the hind wing below is larger and blacker than in nominate *xami,* where it is often barely indicated; on the hind wing underside the pm line posterior to Cu_2 is sinuate (straight in *x. xami).*

Holotype, male, Corpus Christi [Nueces Co.], Texas. In addition, this specimen bears the following labels: (1) Blenina/var. Holland [pen, writer unknown]; (2) xami Reakirt [pencil, by W. J. Holland]; (3) 30 [boldface letterpress; significance unknown to me]; (4) Butterfly Book/ P. 64 Fig. 20 [letterpress, figures in pen].

Paratypes: 3 ♂, Texas, S. F. A. 1884 [probably *leg.* S. F. Aaron in the vicinity of Corpus Christi; see Aaron & Aaron 1885], *ex coll.* Skinner, ex coll. Acad. Nat. Sci. Philadelphia; 4 ♂ 1 ♀, Texas, *ex coll.* Acad. Nat. Sci., Philadelphia; Pharr [Hidalgo Co.], 22.x (2 ♀), 24.x (1 ♂), 28.x (2 ♂), 9 xi 1 ♀? all 1944, *leg.* H. A. Freeman, *ex coll.* H. A. Freeman; 6.5 mi. E Los Fresnos, Cameron Co., 25.vi.1964 (7 ♂ 1 ♀), 2.viii.1964 (1 ♀), all *leg.* H. A. Freeman, *ex coll.* H. A. Freeman.

Holotype and preceding paratypes, CM Ent. type series no. [697 — ed.]. The following paratypes, all from Texas, are in the AMNH:

Paratypes: Corpus Christi [Nueces Co.], 2 ♂ (one det. "xami (=blenina Hew.)" by Barnes & McDunnough); San Benito [Cameron Co.], 16-23.vi (♂), 8-15. vii (1 ♂); Rockport [Aransas Co.], 16.x.1927 (1 ♂); Pharr Hidalgo Co., 22.x.1944 (3 ♀), 28.x.1944 1 ♂, 1 ♀), 9.xi.1944 (2 ♀), 23.xi.1946 (1 ♂), 1.xii.1946 (1 ♂).

Remarks. This subspecies appears to be confined to southernmost Texas (Subtropical zone). It may also occur in adjacent Tamaulipas, but there are no records. The environment with which *texami* is associated is considerably warmer and drier than that in which nominate *xami* occurs.

Callophrys (Xamia) xami subspecies

Thecla (Mitoura) xami: Holland 1931, Butterfly book (rev. ed.): 231 (in part); Hoffman 1941, An. Inst. Biol. Mexico 11: 710 (in part).

Callophrys (Xamia) xami: Clench 1961, in Ehrlich & Ehrlich, How to know the butterflies: 205 (in part); Opler 1966, J. Lepid. Soc. 20: 212.

It long has been known that *C. (X.) xami* occurs in northwestern Mexico and in Arizona, but it seems to be exceptionally rare or local there and specimens are few. I have seen only two, both in AMNH: Arizona: S. Fork Cave Creek, 5 mi W. Portal, 5000-5500 ft., Cochise Co., 11.xi.1950, *leg.* T. Cohn, P. Boone & M. Cazier (1 ♂, fw length 12.5 mm.) — "California:Providence Mts., 5.iv.1934, *leg.* G. H. & J. L. Sperry" (1 ♀, fw length 13 mm.) The latter specimen was reported by Opler (1966), but Mr. Kilian Roever tells me that this record, and the record of *Erora quaderna* Hew. from the same mountains are both to be viewed as suspect (see Emmel & Emmel, 1973). Many collectors have visited these mountains but no additional specimens of either species have turned up. It seems likely that the Sperry specimens were of Arizona origin and were somehow mislabelled. Both species occur together in Arizona, and the characters of this supposed "California" *xami* seem to be the same as those of the Arizona specimen.

These two specimens of *xami* do not appear to belong to subspecies *xami, texami* or *scaphia,* although not surprisingly, they most resemble the first two. I believe them to represent another subspecies, but additional material is needed.

Callophrys (Xamia) xami scaphia, new subspecies

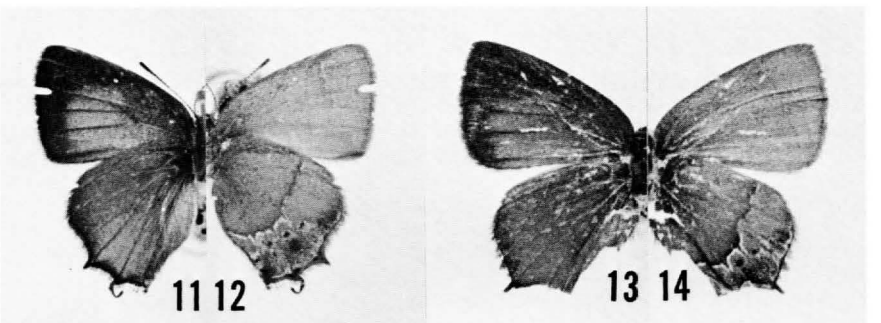
Figures 11, 12 (♂), 13, 14 (♀), 15 (♂ genitalia), 16 (♀ genitalia)

Size about that of *xami texami,* smaller than *x. xami*; fulvous ground color above duller and grayer (♂) or darker and ruddier (♀) than in corresponding sexes of *x. xami,* much darker than in *texami*; the fuscous terminal border on the fore wing is about as

thick as in *texami*, but on the hind wing it is about as thin as in *x. xami*. The differences on the underside are much more striking: the ground color is dull olivaceous green rarely somewhat brighter but never the bright grass-green of either *X. xami* or *texami*. On the fore wing the pm line is much reduced, the outer white edging being thin or absent altogether and the darker inner part so faint that occasionally the entire line may seem absent; on the hind wing the pm line, though reduced, never appears absent. the white is less than half as thick at best, and often may be absent costad of M_3, but the inner dark part is always present; costad of Cu_1 this line is more sinuous than in *xami* or *texami*, the section from M_1-Cu_1 in particular being consistently concave outward; the two sharp, distally directed teeth that this line forms at Cu_1 and Cu_2 are much smaller than in either *xami* or *texami*, sometimes barely visible, but there is a third tooth on 2A (in *xami* and *texami* this appears rarely, but always much more feebly than the other two teeth); the st row of spots from M_3 to the inner margin on the hind wing, which are large, black and white-ringed in both *xami* and *texami*, are reduced to two minute remnants in M_3-Cu_1-Cu_2, smaller, paler, and with the white edging barely visible; the hoary field just distad extends farther and thicker towards the costa; in Cu_1-Cu_2 the rufous Thecla spot, which is small and dark, often black, in both *xami* and *texami*, is here paler (never black) and so enlarged that it often nearly fills the interspace; the terminal white line of the hind wing is usually vague and grayish, sometimes lost in the hoary field (in both *xami* and *texami* it is always crisp and pure white).

Length of fore wing: male, 11.5-13.5 mm., mean (of 12) 12.7 mm.; female, 12.0-13.5 mm., mean (of 6) 12.5 mm.

Holotype, male near San Cristobal de las Casas, 8000 ft., Chiapas, Mexico, 7.i.1969, *leg.*R. G. Wind; ♂ genitalia slide C-1168



Figures 11-14: *Callophrys* (*Xamia*) *xami scaphia*, new subspecies. 11-12, ♂ upper (11) and under (12) surfaces; MEXICO: CHIAPAS: Las Casas, 8.viii.1968 (T. Escalante); Allyn Museum photos 810622-9/10 (AME). 13-14, Paratype ♀ upper (13) and under (14) surfaces; MEXICO: CHIAPAS: San Cristobal las Casas, 8000 ft., 9.i.1969 (R. Wind); Allyn Museum photos 810622-11/12 (CM).

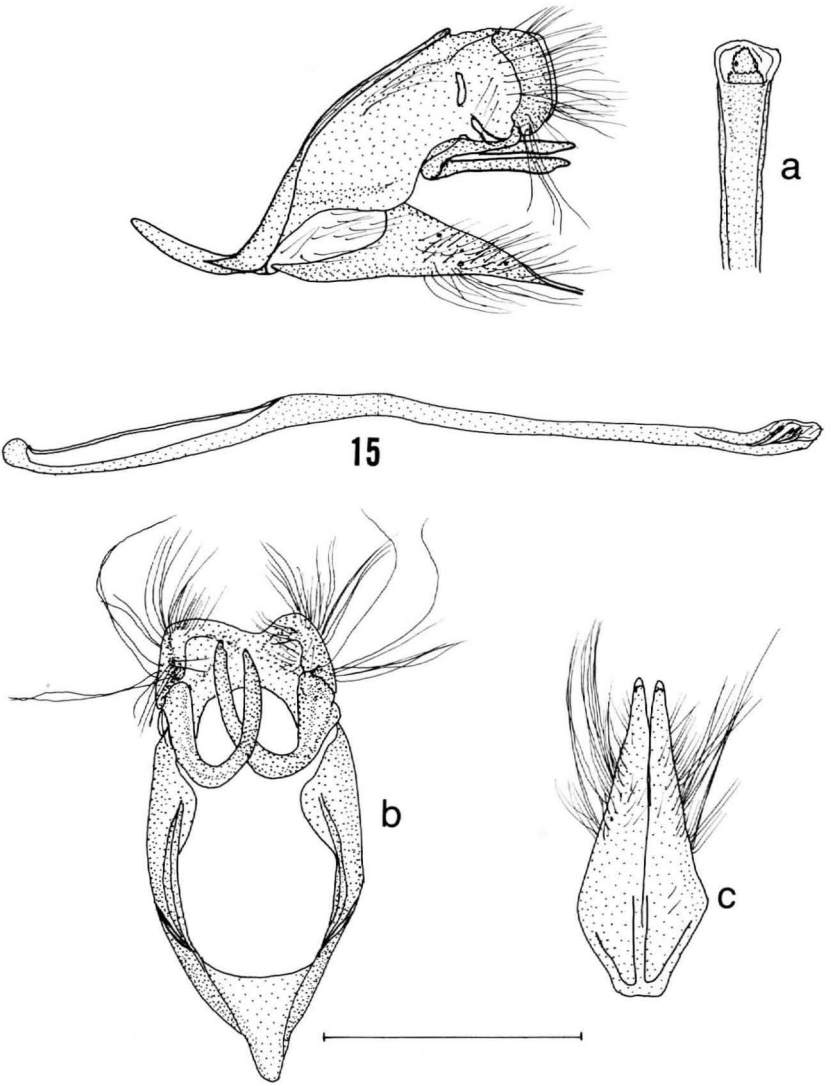


Figure 15: ♂ genitalia of *Callophrys* (*Xamia*) *xami scaphia,* new subspecies (same specimen as Figs. 11-12). 15, lateral view of genitalia with penis below; a, tip of penis; b, ventral view of genitalia with valvae removed; c, ventral view of valvae; ♂ genitalia preparation M-3479 (Jacqueline Y. Miller).

[*Paratypes:* 3 ♂, 4 ♀, same locality and collector, 3-17.i. 1969; 1 ♀, same locality and collector, 4.i.1970; 1 ♂, same locality and collector, 6.x.1971; 1 ♀, same locality and collector, 16.xi.1974; 5 ♂, 1 ♀, same locality and collector, 17.xi.1974; 24 ♂, 2 ♀, same locality and collector, 24.xi.1974; 2 ♂, same locality, 25,vii,1971 (*leg.* H. L. King); 4 ♂, same locality, 27.vii.1971 (*leg.* H. L. King); 2 ♂, 1 ♀, moist forest; vic. Lagos de Montebello, 1300-1500 m., Chiapas, Mexico, 8.ii. 1969 (*leg.* L. D. and J. Y. Miller).

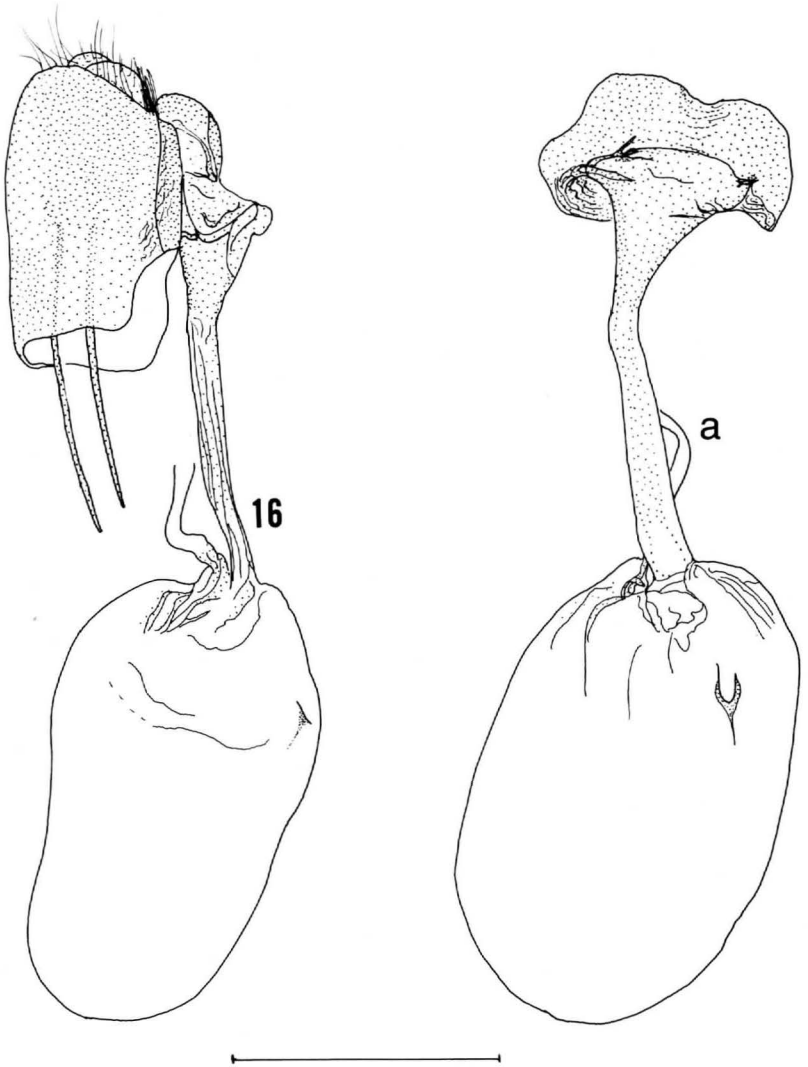


Figure 16: ♀ genitalia of *Callophrys* (*Xamia*) *xami scaphia*, new subspecies, Paratype. 16, lateral view of genitalia; a, ventral view of genitalia with papillae annales removed; ♀ genitalia preparation M-5416 (Jacqueline Y. Miller); MEXICO: CHIAPAS: Lagos de Montebello, 4600 ft., 16.v.1970; R. Wind (AME).

Holotype and 1969 topoparatypes, C.M. Ent. Type series no. [698 — ed.], all other paratypes in AME.

A specimen (♂) in AMNH is referable to the present subspecies. It bears the label, "L. Atitlan, Guat. 2.24.40" and was determined by Comstock and Huntington as "I. rhodope'. [This specimen is not a paratype. — ed.]

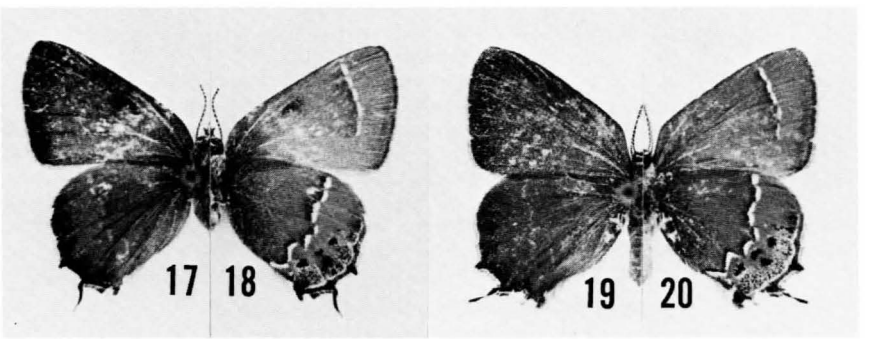
Dr. Miller, who visited the type locality, a hilltop near San Cristobal de las Casas, describes the area as nearly treeless grassland, with oak-pine forest below. The Lagos de Montebello specimens were taken in a similar forest but richer and better watered. Dr. Miller suspects that at the type locality, the specimens may have been hilltopping (Shields, 1967).

It is curious that of three subspecies of *xami* now known, *texami* departs least from the nominate in appearance, most in environmental choice; *scaphia* departs from the nominate most in appearance, least in environmental choice.

Callophrys (Mitoura) siva chalcosiva, new subspecies

Figures 17, 18 (♂), 19, 20 (♀), 21 (♂ genitalia), 22 (♀ genitalia)

Male: Upperside about as in nominate *siva:* variable in the amount of fulvous above. Of 15 males in the type series, 6 (40%) have extensive fulvous, 4 (27%) have little fulvous and the remaining 5 (33%) are variously intermediate. The most distinctive characteristic is on the underside, where all the green areas of nominate *siva* are replaced by a coppery brown. In strong light and glancing view this brown is iridescent sometimes violet, sometimes greenish. The color is much like that of the far western species *Callophrys nelsoni* Boisduval. Occasional specimens show a slight amount of green basally on both wings. Unlike *nelsoni,* and like nominate *siva,* the pm line of the hind wing has the white thick and strong. The course of this line, although individually variable, is in general about as in *s. siva* and *nelsoni:* less irregular than in *siva juniperaria,* more irregular than in *siva rhodope* (see below). As in *s. siva, siva juniperaria* and *nelsoni* the Thecla spot (hind wing underside in Cu_1-Cu_2) consists of a minute black dot, a small orange cap and a thin crescent basally edging the latter. On the hind wing is a short tail at Cu_1, about half as long as the apical width of Cu_1-Cu_2, and a longer one at Cu_1, about twice as long; the tails are as long as in nominate *siva* and longer than those of *siva juniperaria* and *nelsoni.*



Figures 17-20: *Callophrys (Mitoura) siva chalcosiva,* new subspecies. 17-18, Holotype ♂ upper (17) and under (18) surfaces; UTAH: Tooele Co.: S. Willow Creek, Stansbury Mtns., 30.vi.1965 (K. Tidwell); Allyn Museum photos 810629-5/6. 19-20, Paratype ♀ upper (19) and under (20) surfaces; UTAH: Tooele Co.: S. Willow Creek, Stansbury Mtns., 5.v.1966 (K. Tidwell); Allyn Museum photos 810629-3/4. Both specimens in AME.

[Length of fore wing: male, 12.5 - 14 mm., mean (of 14), 13.5 mm.; female, 13.5-15.5 mm. mean (of 15), 14.1 mm. (Series deposited in AME) — ed.]

Female as in the male except that the upperside is always extensive bright orange fulvous. The tail at Cu_1 is about as long as in the male, that at Cu_2 perhaps a little longer.

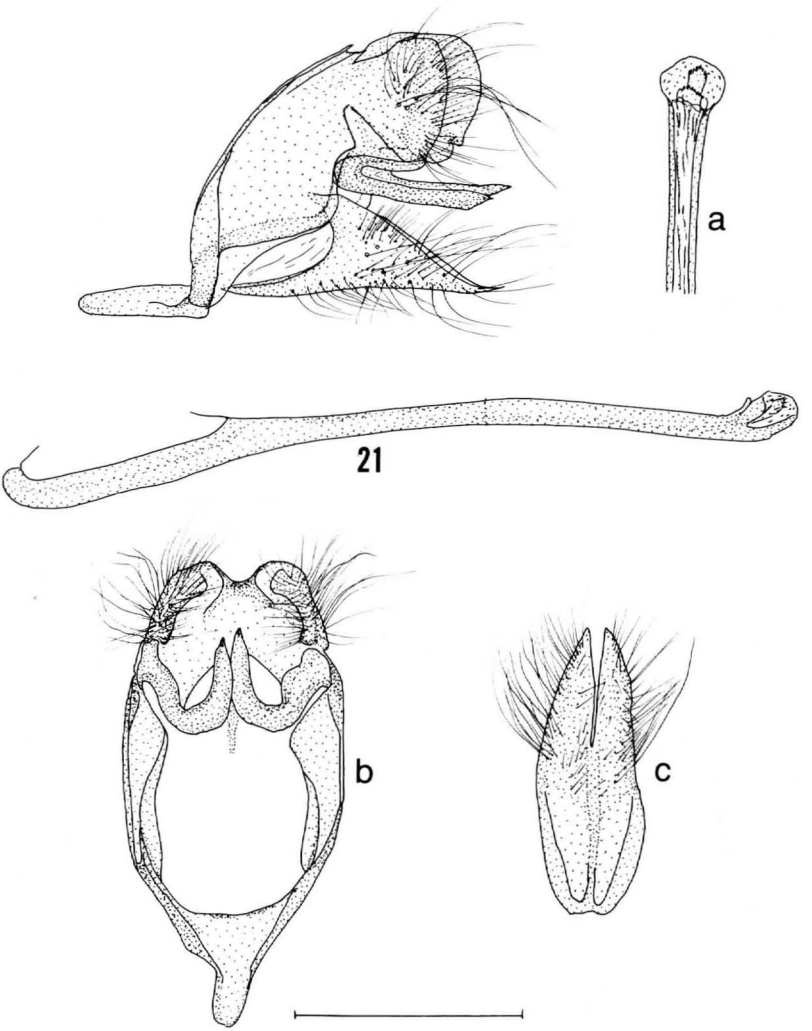


Figure 21: ♂ genitalia of *Callophrys* (*Mitoura*) *siva chalcosiva*, new subspecies, Holotype (same specimen as Figs. 17-18). 21, lateral view of genitalia with penis below; a, tip of penis; b, ventral view of genitalia with valvae removed; c, ventral view of valvae; ♂ genitalia preparation M-5412 (Jacqueline Y. Miller).

Holotype, male S. Willow Creek, Stansbury Mts., Tooele Co., Utah, 30.vi.1965, *leg.* K. Tidwell; Allyn Mus. Acc. 1969-20.

Paratypes, all Stansbury Mts., Tooele Co., Utah: 3 ♂, as holotype; 2 ♂, S. Willow Creek, 1.vii.1965, *leg.* K. Tidwell, AME Acc. 1970-2; 1 ♀, S. Willow Creek, 5.v.1966, *leg.* K. Tidwell, AME Acc. 1969-20; 5 ♂ S. Willow Creek, 7200 ft., 1.vii.1965, *leg.* "J. A. J.," AME Acc. 1970-2 [and AME Acc. 1974-4 — ed.]; 7 ♂, 2 ♀, S. Willow Creek, 7500 ft., 19.vii.1965, *leg.* "J. A. J.," AME Acc. 1970-2; 2 ♂, 4 ♀, 17.vi.1965, 3.vii.1965, 6.v.1966, *leg.* C. Callaghan, AME Acc. 1971-16; 2 ♂, 6 ♀, no further data, 3.vii.1966, *leg.* K. Tidwell, AME Acc. 1969-20; 1 ♀, Johnson's Pass [6200 ft.], 1.vi.1965, *leg.* C. Callaghan, AME Acc. 1971-16. In all 31 ♂, 14 ♀ paratypes.

Holotype and most paratypes in Allyn Museum of Entomology. Three ♂ and two ♀ paratypes in CM.

Remarks. In addition to the type series I have examed the following specimens, all geographically relevant but not all *chalcosiva:*

(1) Utah: Weber Co.: Ogden, 24.vii.1895 (CM, *ex* ANSP), 1 ♂. Nominate *siva.*

(2) Utah: Uintah Co.: Camp Douglas, 21-22.iv.1910, *leg.* W. J. Holland (CM), 2 ♀. Nominate *siva.*

(3) Utah: Uintah Co.: Lower Ashley Canyon, 6900 ft., 30.vi-7.vii.1937, *leg.* G. E. Wallace (CM), 1 ♂, 5 ♀. Nominate *siva.*

(4) Utah: Tooele Co.: Sheeprock Mts., 17.v.1969, 31.v.1970, *leg.* C. Callaghan (AME), 2 ♂, 2 ♀. Ssp. *chalcosiva,* but one ♂ has more green than usual.

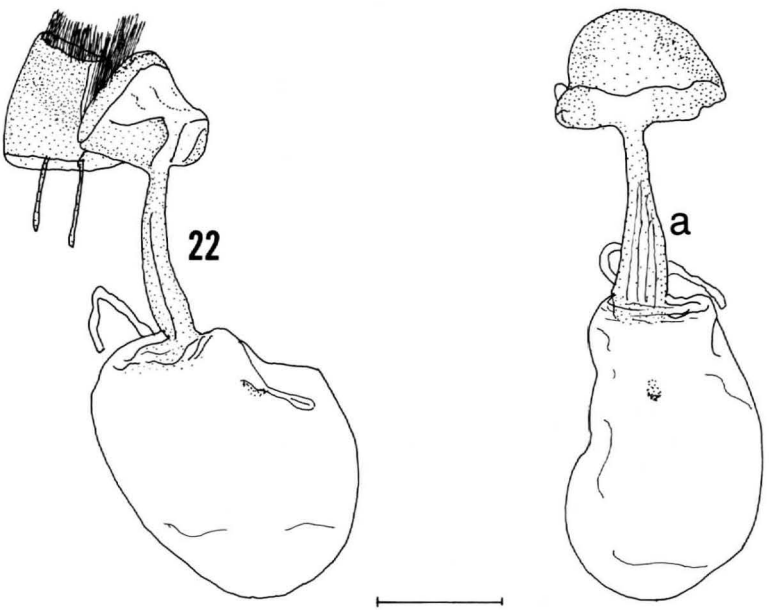


Figure 22: ♀ genitalia of *Callophrys* (*Mitoura*) *siva chalcosiva,* new subspecies, Paratype (same specimen as Figs. 19-20). 22, lateral view of genitalia; a, ventral view of genitalia with papillae annales removed; ♀ genitalia preparation M-5414 (Jacqueline Y. Miller).

(5) Utah: Tooele Co.: Cedar Mts., 16.v.1970, *leg.* C. Callaghan (AME), 1 ♀. Ssp. *chalcosiva.*

(6) Utah: Tooele Co.: S. Willow Creek, Oquirrh Mts., 30.vi.1961, 15.vii.1965, *leg.* K. Tidwell (AME), 1 ♂, 2 ♀. *s. siva/chalcosiva* intermediates.

(7) Utah: San Juan Co.: La Sal Mts., 19.vii.1920, *leg.* H. Skinner (CM, *ex* ANSP), 1 ♂. Nominate *siva.*

(8) Utah: San Juan Co.: Park Creek, La Sal Mts., 7.vi.1969, *leg.* C. Callaghan (AME), 2 ♂. Nominate *siva.*

(9) Utah: Garfield Co.: Bull Creek, Henry Mts., 6.vii.1968, *leg.* C. Callaghan (AME), 1 ♂, 1 ♀. The ♂ seems to be *chalcosiva,* the ♀ a *s.siva/chalcosiva* intermediate, closer to *s. siva.*

(10) Utah: Washington Co.: Bellevue, 4000 ft., 22.vi.1917, *leg.* ? (CM, *ex* Cleveland Mus.), 1 ♀ *s. siva/chalcosiva* intermediate.

(11) Utah: Washington Co.: Kolop [=Kolob] Mts. [in or near present Zion National Park], 8000 ft., 2.vii.1917, *leg.* ? (CM, *ex* Cleveland Mus.), 1 ♂. Nominate *siva.*

(12) Nevada: Clark Co.: 5 mi W. Goodsprings [Spring Mts.], 23.iii.1968, *leg.* ? (AME), 1 ♂. Nominate *siva,* but dark below.

So far as now known, *chalcosiva* appears to be restricted to a few mountain ranges in Tooele Co., Utah. The presence of intermediates as far south as Garfield Co. (9, above) and Washington Co. (10,11. above) suggests that *chalcosiva* may occur southward in the mountain ranges of Juab, Millard and Beaver counties. What may occur in the ranges of eastern and central Nevada, which lie between *siva chalcosiva* and *nelsoni,* would be interesting to learn.

Despite the facts that *chalcosiva* resembles *nelsoni* in one conspicuous and unusual trait, the brown instead of green underside, and that geographically it lies more or less between nominate *siva* and *nelsoni,* its relationships seem to be entirely with *s. siva.* This is shown by: the similarity in the thick white pm line of the hind wing below, as in *s. siva* and unlike the thin and often evanescent or even absent white of the line in *nelsoni*: by the presence of a thin white terminal line in Cu_2-2A of the hind wing above; by the longer tails and by the more extensive fulvous above in the male. These characters show no difference at all from nominate *siva* and no variation in the direction of *nelsoni.* I believe therefore, that the brown underside color was independently acquired in both *nelsoni* and *chalcosiva,* an instance of convergence rather than consanguinity.

Callophrys (Mitoura) siva rhodope Godman & Salvin (new status)

Thecla rhodope Godman & Salvin 1887, Biol. C. — Amer., Lep. Rhop. 2:48, pl. 54 figs. 3,4 (TL: northern Sonora Morrison; type speciman 1 ♂.)
Thecla (Mitoura) siva siva (Edwards 1874): Hoffman 1941, An Inst. Biol. (Mexico) 11:710

What has passed for many years as nominate *siva* in the western United States comprises, in truth, two rather distinct subspecies. One of these occurs in central and southern Arizona, possibly southern New Mexico and southward; the other occurs in northern New Mexico and northern Arizona northward to the limit of the species in southern Saskatchewan.

Brown (1970) has designated a neotype of *siva* Edwards from the type locality, for Wingate [McKinley Co.], New Mexico. This locality is unequivocally within the range of the second of the above mentioned subspecies, which is therefore nominate *siva.* The name *rhodope,* long placed in the synonymy of *siva,* is available for the southern subspecies as is shown by a comparison of the figures of Godman & Salvin with specimens from southern Arizona. The two subspecies may be distinguished as follows:

Subspecies *siva:* unhw Thecla spot with black core small, sometimes absent, capped with small st black bar or none; pm line rarely forming a distinct "W" because the anterior point is much smaller than the posterior and may be absent, and these points are usually well retracted from the st line; unfw with no fulvous band along termen, the

green extending distad to termen; unhw terminal area from apex to M_2 may be green or narrowly fulvous or dark.

Subspecies *rhodope:* unhw Thecla spot with black core large and jet black, often capped (basad of fulvous lunule) by a thick, heavy st bar and in M_3-Cu_1, a counterpart st bar nearly or quite as large; pm line forming a distinct "W," the anterior point about as well developed as posterior and both of them touching the st line; unfw usually with a fulvous band along termen, replacing the green; unw terminal area broadly fulvous or dark from apex to M_2. Most of the specimens I have seen are from the Chiricahua Mts., Cochise Co., Arizona (Paradise); Chiricahua Nat. Monument; Pinery Canyon, 6500 ft.). In addition I have seen specimens from: Oak Creek Canyon, Sedona (Coconino Co.); Mt. Graham (Graham Co.); the Santa Rita Mts., 5-8000 ft. (Santa Cruz Co.); Onion Saddle [not located], 7400 ft.; all in Arizona. Series from Carlsbad (Eddy Co.), New Mexico, and a single worn specimen from 2 mi N Pine Springs [Smith Spring], 5700 ft., Guadalupe Mts., Culberson Co., Texas, seem to represent *siva/rhodope* intergrades. To my knowledge no Mexican records have been published since Godman & Salvin's description of *rhodope.* The following, therefore, are of interest.

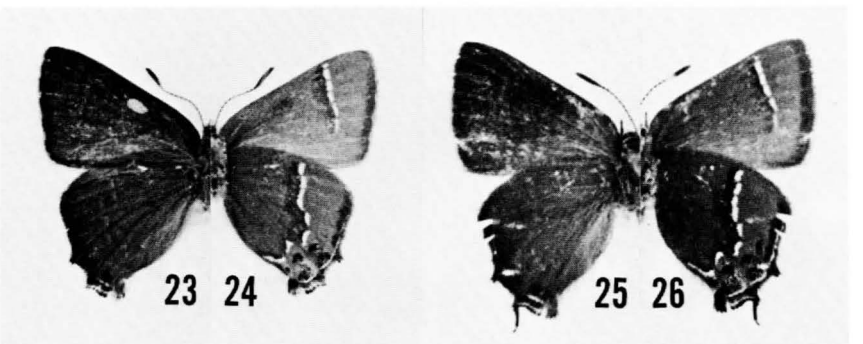
Callophrys (Mitoura) dospassosi, new species

Figures 23, 24 (♂), 25, 26 (♀), 27 (♂ genitalia), 28 (♀ genitalia)

Male. Frons and vertex fuscous; eyes mesially edged with white; antennae black, white annulate, the club black with a small fulvous tip.

Upperside. Both wings fuscous, obscurely steel blue in the basal area of each. A terminal white bar between tornus and Cu_2 and a similar but much fainter bar in Cu_1-Cu_2. Fringe fuscous. A tail at Cu_2 of hind wing, about as long as the distal width of interspace Cu_1-Cu_2, white tipped; at Cu_1 only a small tooth. Tornus with a small spot of red brown. Fore wing scent pad pale tan, contrasting the fuscous wing, rounded but slightly longer (distobasally) than wide. Androconial scales with ends rounded, or with a single apical notch, both types about equally common.

Underside. Both wings dull blue-green, often turning dull greenish-brown in worn specimens. Fore wing with a nearly straight pm line of white, narrowly cut by brown at the veins, from costa at 3/4 to Cu_2 at about 2/3 out from its origin. This line is broadly



Figures 23-26: *Callophrys* (*Mitoura*) *dospassosi,* new species. 23-24, Paratype ♂ upper (23) and under (24) surfaces; MEXICO: HIDALGO: 5 mi. NW Zimapan, 1980-2140 m., 22.i.1969 (L. D. and J. Y. Miller); Allyn Museum photos 810622-15/16. 25-26, Paratype ♀ upper (25) and under (26) surfaces; MEXICO: HIDALGO: 5 mi. NW Zimapan, 1980-2140 m., 24.i.1969 (L. D. and J. Y. Miller); Allyn Museum photos 810622-A-2/3. Both specimens in AME.

edged basally with red-brown, about two or three times as wide as the white. Termen edged about as thickly with red-brown. Inner margin below Cu_2 gray, becoming tinged with brownish distad. Fringe brown. Hind wing with no postbasal marks; pm line white, edged inwardly with red-brown as on fore wing, beginning on vein Sc a little beyond middle of wing, proceeding slightly concave outwardly to Cu_1, where it is about 3/4 out

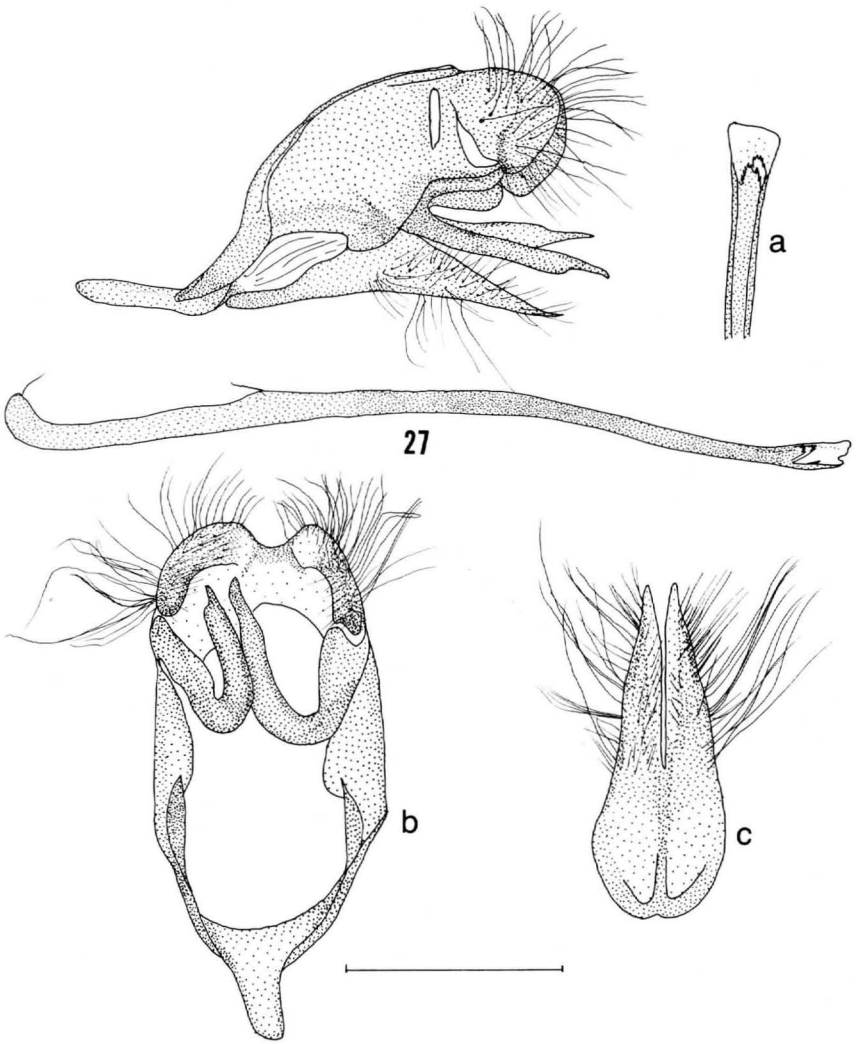


Figure 27: ♂ genitalia of *Callophrys* (*Mitoura*) *dospassosi*, new species, Paratype (same specimen as Figs. 23-24). 27, lateral view of genitalia with penis below; a, tip of penis; b, ventral view of genitalia with valvae removed; c, ventral view of valvae; ♂ genitalia preparation M-5440 (Jacqueline Y. Miller); MEXICO: HIDALGO: 5 mi. NW Zimapan, 1980-2140 m., 23.i.1969; L. D. and J. Y. Miller (AME).

on wing, there angles posteriorly to Cu_2; the Cu_1-Cu_2 segment concave outward; Cu_2-2A segment transverse, deeply concave outward; from 2A to inner margin angled inward. On inner margin it ends at a point about 2/3 out on margin. In Cu_1-Cu_2 a Thecla spot composed of subterminal black spot, distally dusted with pale blue, capped with a thick brownish orange lunule, the latter in turn capped with a thin black bar. In the adjoining Cu_2-2A interspace a similar spot, a little larger, more heavily blue-dusted, and with the orange-brown lunule more heavily black-capped. Costally adjoining the Thecla spot (in M_3-Cu_1) sometimes a faint trace of a similar spot. Tornal lobe black, with orange basad. Costad of Thecla spot a subterminal band of red-brown to apex (end of Rs). distad of which is a thin whitish terminal line from tornus to M_2or M_1. Fringe brown, black with proximal white from Cu_2 posteriorly.

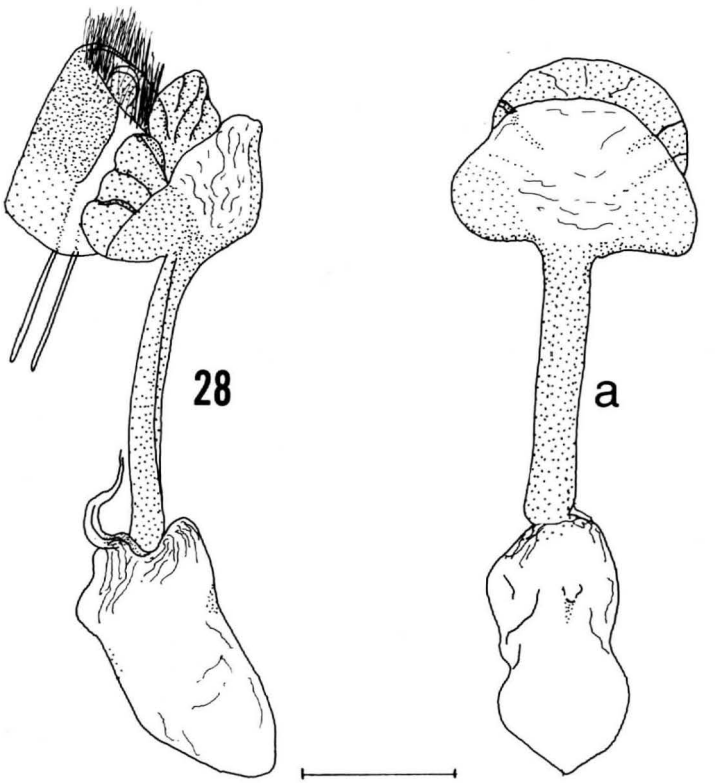


Figure 28: ♀ genitalia of *Callophrys* (*Mitoura*) *dospassosi*, new species, Paratype. 28, lateral view of genitalia; a, ventral view of genitalia with papillae annales removed; ♀ genitalia preparation M-5442 (Jacqueline Y. Miller); MEXICO: HIDALGO: 5 mi. NW Zimapan, 1980-2140 m., 24.i.1969; L. D. and J. Y. Miller (AME).

Female. Upperside as in the male except that the scent pad is wanting and the basal blue is brighter and more extensive, reaching about to the middle of each wing. On the hind wing the tail at Cu_1 is a little more pointed but scarcely longer. The fringe of both wings is white distally.

Underside as in the male. The green color may become distinctly brownish in worn specimens. Below Cu_1 of the hind wing the pm line has a thin black edge just basad of the white, absent or very faint in the male. The red-brown basal edging of the pm line on both wings is much widened in some of the specimens.

Male genitalia (Fig. **27**; compare with Fig. **29**, *spinetorum* and Fig. **21**, *siva*). Two traits appear to be particularly distinctive of this species: (1) the proportionally much longer forearm of the falx; and (2) the somewhat more produced shoulder process of the

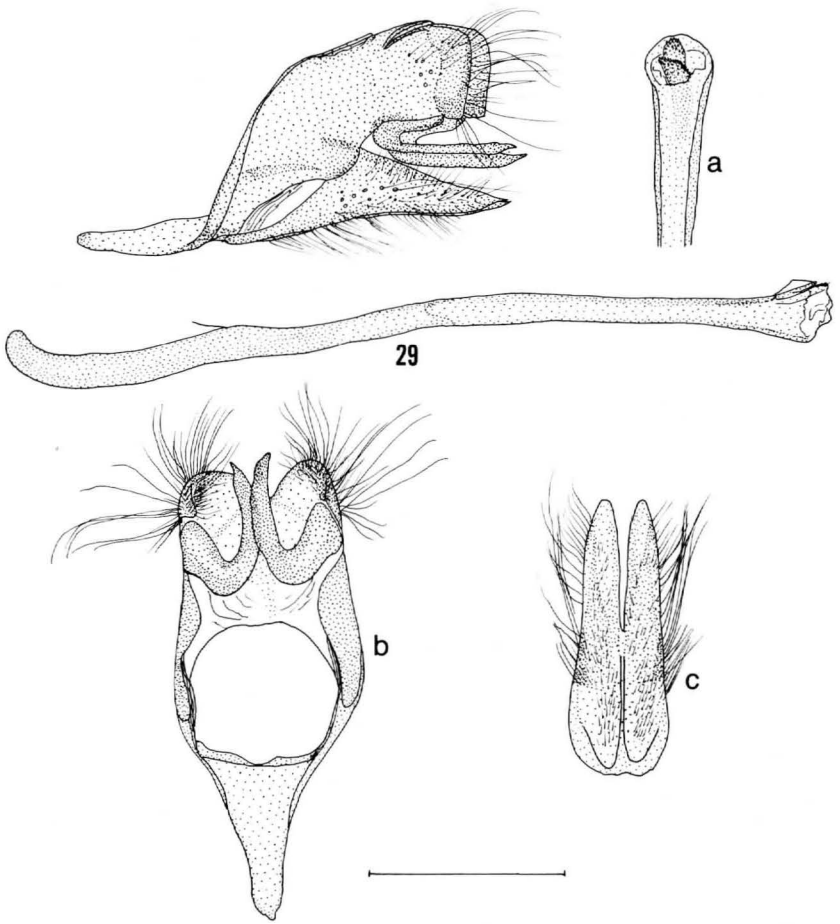


Figure 29: ♂ genitalia of *Callophrys* (*Mitoura*) *spinetorum ninus* Edwards. 29, lateral view of genitalia with penis below; a, tip of penis; b, ventral view of genitalia with valvae removed; c, ventral view of valvae; ♂ genitalia preparation M-5450 (Jacqueline Y. Miller); COLORADO: Maryvale; 13.vii. 1970; "LST" (AME).

posterior edge of the vinculum. The uncus lobes appear to be somewhat wider, and the saccus somewhat shorter and broader, than in other *Mitoura.* The penis is about 2.6 times as long as the valva (compare 2.7 times in *siva,* and 3.0 times in *spinetorum*). In *spinetorum* the valvae are rounded truncate at the tips, instead of bluntly pointed as in *dospassosi* and other *Mitoura.*

Length of fore wing: male, 10.5 - 14.0 mm., mean (of 8), 12.5 mm.; female, 12.0-14.5 mm., mean (of 13), 13.8 mm.

Holotype, male, vic. Zimapan, 2100 m., Hidalgo, Mexico, 18.i.1963 (E. C. Welling), ♂ genitalia slide no C-1166. Two male and six female paratypes, all Hidalgo, Mexico: one female as holotype except 17.i.1963; one female 5 mi N. Zimapan, 2140-2280 m., 12.i.1966 (H. K. Clench and L. D. Miller, Carnegie Museum-Catholic University of America Exp., sta. 17 b), LDM specimen no. 1966-460; one male, Jacala ca. 5000 ft., 20. iii.1968; 1 ♂, 4 ♀, El Puerto de los Frijoles, Mpio. Jacala, 20.iii.1968, the preceeding six specimens all *leg.* E. C. Welling, all quite worn.

Holotype and all preceding paratypes, C. M. Ent. type series no. [699 — ed].

The following paratypes, all in AME (Acc. 1969-4), all from Hildago, Mexico, leg. L. D. and J. Y. Miller, 1969: 1 mi. N. Trancas, 2060 m., oak-juniper scrub, 20.i. (sta. 4) 1 ♂ (LDM specimen no. 1969-219); 5 mi. NW Zimapán, 1980-2140 m., piñon-oak-juniper scrub, 19.i.(sta. 2, 1 ♀ (LDM no. 1969-139); 22.i. (Sta. 5), 1 ♂ (no. 1969-241), 1 ♂ (no.-275); 23.i (sta. 7) 1 ♂ (no.-368); 24.i (sta. 8) 2 ♂ (incl. no. - 412), 6 ♀ (incl. nos. -415, -438, -445); 25.i (sta. 9) 1 ♂ (no. -474), 1 ♀ (no. -462); 26.i (sta. 10) 1 ♂ (no. -496)' 15.ii (sta. 37) 3 ♀ (incl. nos. -1720, -1729): in all 7 ♂, 12 ♀.

One male Paratype, 50 road miles S. Tamazunchale on Hwy. 85 [probably ca. 7 mi. S. Jacala], 6600 ft., 1.ix.1971, *leg.* R. K. Robbins, in collection of R. K. Robbins.

Remarks. This new species strikingly combines attributes of the well known, exceedingly different looking *Mitoura:* its upperside is almost indistinquishably like that of *spinetorum,* while the underside is similar to that of *siva.* Detailed comparisons will be made with each of these species.

The male of *dospassosi* differs from that of *spinetorum* Hewitson (1876) on the upperside as follows: the scent pad is much paler and hence more conspicuous, and it is rounded (in *spinetorum* it is smaller, fuscous like the ground color, and pointed both distally and basally); the steel blue above is duller and more restricted to the base; the fringe is brown, not white; the faint pale terminal bar in the hind wing Cu_1-Cu_2 is absent in *spinetorum.* The latter character is true also of females, where otherwise there are no differences whatsoever. The underside of *dospassosi* differs from that of *spinetorum* most conspicuously in its green ground color (brown in *spinetorum*). In addition there is no white cell-end bar on the fore wing and the fore wing pm line is straighter, not convexly bowed as in *spinetorum,* and thinner than is usual in that species. On the hind wing the pm line is similar in general configuration but thinner, much less edged basad with black, and the segment in Cu_1-Cu_2 is straight. not concave outward as in *spinetorum.*

The differences compared with *siva* Edwards (1874) are as follows: *dospassosi* is blue and fuscous above with no trace of the bright fulvous that is conspicuous on the upperside of *siva;* the male scent pad is larger, less elongate and less pointed at either end; the tail at Cu_1 is shorter (but cf. ssp. *searsi* below). On the underside the ground color is a distinctly bluer shade of green, darker and more extensive; the orange-brown shades are darker than the bright orange of *siva;* the pm line of the fore wing is straighter (in *siva* tending to be convexly bowed to parallel termen); on the hind wing the pm line above Cu_1 is more regular and not edged basad with black as is true in *siva;* below Cu_1 the pm line is similar in configuration in both. The subterminal brown edge of the hindwing of *dospassosi* is not unlike that of *siva,* but the latter has a partial filling of hoary scaling and traces of black subterminal spots (homologous with the black cap of the orange lunule of the Thecla spot) in the two or three interspaces nearest Cu_1-Cu_2, absent in *dospassosi.*

The one specimen of *dospassosi* which Lee Miller and I obtained on our 1966 trip was taken by Miller on the yellow flowers of a composite shrub (*Senecio* ? sp., cf.

oaxacanus) that grew in numbers along the edge of a mine road north of Zimapán. The road descends a north-facing valley that is clothed in second growth oak-piñon-pine-juniper low forest and scrub. The specimen came from the upper part of the valley (Transition zone) and was there associated with *Catasticta nimbice, Eurema salome, Celastrina ladon gozora,* [*Parrhasius* — ed] *m-album* and *Erora quaderna* among others.

It is a pleasure to name this distinctive new species in honor of my good friend of many years, Dr. Cyril F. dos Passos, of Mendham, New Jersey.

Callophrys (Mitoura) dospassosi searsi, new subspecies

Figures 30, 31 (♂), 32, 33 (♀)

Differs from nominate *dospassosi* as follows: it is somewhat larger, particularly in females (see measurements below); the hind wing tails are markedly longer, that at Cu_1 about half the Cu_1-Cu_2 apical interspace width, that at Cu_2 about half again as long as the interspace width. On the underside the green is more yellowish, lacking the bluish tinge of nominate *dospassosi;* the pm line of both wings is more narrowly edged proximad with brown, barely exceeding the width of the white. On the fore wing the terminal brown edging is frequently (but not always) blackish below M_3 or Cu_1.

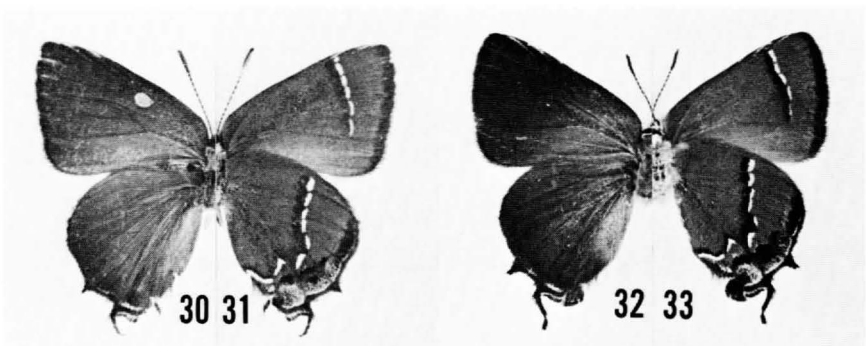
Length of fore wing: male 13.5 mm.; females, 15.0-16.5 mm., mean (of 3) 15.8 mm.: the type series only. If the single Sonora female (below) is included, the mean for females is 16.0 mm.

Holotype, male, Cuiteco 5200 ft., Chihuahua, Mexico, 29.viii. 1969, *leg.* T. A. Sears, R. C. Gardiner & C. S. Glasser. Cuiteco is on the Chihuahua al Pacifico railroad line, SW of Creel, at roughly Long. 108° 00' W, Lat. 27° 25' N.

Paratypes: 3 females, same locality and collector as Holotype, dated 20.vii, 3.ix and 14.ix.1969.

Holotype and all paratypes, C. M. Ent. type series no. [700 — ed.]

Remarks. The type locality has trees in the vicinity, determined at the University of California Herbarium at Davis as follows: *Quercus crassifolia* Humb. and Bonpl., *Q. viminea* Trel., *Q. endlichiana* Trel., *Q. epileuca* Trel., *Q. arizonica* Sarg and *Juniperus mexicana* Sprengl.



Figures 30-33: *Callophrys* (*Mitoura*) *dospassosi searsi,* new subspecies. 30-31, ♂ upper (30) and under (31) surfaces; MEXICO: CHIHUAHUA: Madera, vii.1966 (T. Escalante); Allyn Museum photos 810622-A-4/5. 32-33, ♀ upper (32) and under (33) surfaces; MEXICO: CHIHUAHUA: Madera, viii.1966 (T. Escalante); Allyn Museum photos 810622-A-6/7. Both specimens in AME.

In addition to the types I have seen a single female (fore wing length 16.5 mm.) from "Tecora" [recte Yecora], 5300-6000 ft., S. E. Sonora, 23.ix-10.x.1967, *leg.* Peter Hubbell (AMNH). The specimen resembles the type series quite well except that the green on the underside has a bluish cast.

Because of its brighter, yellower green below and longer tails this subspecies resembles *siva* on the underside more than does the nominate subspecies.

It gives me pleasure to name this new subspecies in honor of Dr. Terry A. Sears, leader of the expedition (sponsored by the American Philosophical Society, #5192 Penrose Fund) on which it was taken. I am grateful to Dr. Sears and to Dr. Shields for the generous gift of these specimens to Carnegie Museum and for information about the locality.

Callophyrys (Mitoura) spinetorum ninus Edwards

Thecla ninus Edwards 1870, Trans. American Ent. Soc. 3: 270

C. (M.) spinetorum heretofore has always been treated as a monotypic species. Examination of the material in Carnegie Museum, however, shows that, as Brown (1970) suspected, at least one other subspecies needs to be recognised, for which the name *ninus* Edwards is available.

Subspecies *ninus* ranges from the Denver area of Colorado north through western Wyoming at least as far western Montana. It differes from nominate *spinetorum* Hewitson (1867) as follows: It is somewhat smaller, the fore wing length averages about 1.4 mm. (males) to 1.7 mm. (females) less in a series of *ninus* from Rollinsville, Gilpin Co., Colorado, compared with a series of nominate *spinetorum* from Laguna Mts., San Diego Co., California, measured by Shields (1965), and a similar size difference holds in all of the material I have seen. On the hind wing underside the pm line tends to be more shallowly tortuous in the area of the "W" (exceptions occur, but they are not numerous), and above all the black core spot of the Thecla spot in Cu_1-Cu_2 is small or absent, whereas in nominate *spinetorum* it is large and black. The lectotype of *ninus* (Brown, 1970, fig. **17**), from 1 mi. E Kenosha Pass, Park Co., Colorado, shows these traits well.

The differences between *ninus* and nominate *spinetorum* are readily apparent in the colored figures given by Shields (1965: 238, bottom figure).

I have seen *ninus* from the following localities (abbreviated, since they are given more fully in Shields, 1965.) COLORADO: Denver, nr Kenosha Pass (TL *ninus*); Glacier Basin, 8700 ft., Rocky Mtn. National Park; Durango. — WYOMING: Jenny Lake, Teton Co. (series); Mammoth Hot Springs, Yellowstone National Park. — MONTANA: Granite Co., (no further data); Ennis, Madison Co.; Ouzel Falls, Gallatin Co.; Polaris (series) and Elkhorn Hot Springs, Beaverhead Co.

Nominate *spinetorum* is at hand from Oregon (Maury Mts., Crook Co.); California; western Nevada ("Gardner" [probably Gardnerville, Douglas Co.]); Arizona (Catalina Mts.); New Mexico (including the following localities, all in the northern part of the state and hence closely approaching the range of *ninus:* 4 mi. S. Questa, Taos Co.' Tesuque Pueblo and 4 mi. E Tesuque Pueblo, both Santa Fe Co.; Ft. Wingate; and a series from Jemez Springs, Sandoval Co.).

From the remainder of the species' range (Shields, 1965:241) I have no specimens and hence cannot delimit further ranges of the two subspecies. Material from British Columbia, Washington, and Utah would be particularly instructive.

Callophrys (Mitoura) millerorum, new species

Figures 34, 35 (♀), 36 (♀ genitalia)

Callophrys (Mitoura) spinetorum: Shields, 1965, J. Res. Lepid. 4: 243 (in part).

This species is closely related to *spinetorum* Hewitson, differing from it as follows: upperside of female with blue brighter and more extensive, ending well beyond middle of fore wing and covering most of hind wing (in female *spinetorum* it barely reaches the

middle fore wing and leaves a rather thick, fuscous border on the hind wing, especially costad); upperside of male virtually identical to that of male *spinetorum*, the scent pad a little paler but pointed at either end as in *spinetorum*, the blue if anything a little more restricted than in *spinetorum*. On the underside there are two conspicuous differences: First, the "W" in the postmedian line of *spinetorum* is not recognizable here as such because the posterior (Cu_2) tooth is absent completely, the line being nearly straight from Cu_2 to 2A (slightly concave outward in the female, inward in the male). Second, there is a postbasal line composed of two bars, one in Sc-Rs, the other within the cell, both fuscous, edged basally with white, the whole a little less distinct than the postmedian line. No trace of such a line exists in *spinetorum* (but see below). The ground color of the female underside is reddish-brown, a little darker than in *spinetorum;* of the male a little paler; but *spinetorum* is variable in this and *millerorum* may be too. The length of the fore wing is 15.5 mm. in both specimens, a little larger than most (but not all) *spinetorum*.

[Female genitalia (Fig. 36) as illustrated — ed.]

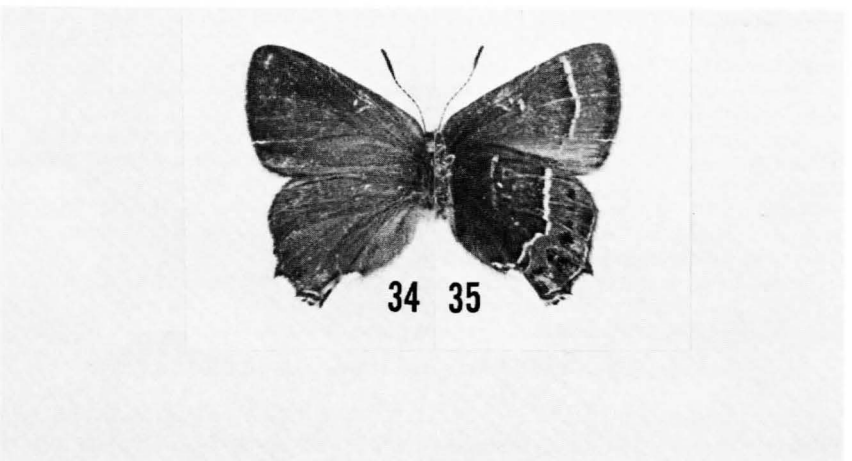
Holotype, female, vic. El Encarnacion, 2400-2450 m. Hidalgo, Mexico, 15.ii.1969 (*leg.* L.D. and J. Y. Miller, sta. 36), LDM specimen no. 1714, in AME.

Paratype, male, Palos Colorados [ca. 13 mi. W of Cd. Durango], 8000 ft., Durango, Mexico, 6.viii.1947, leg. C. D. Michener, in AMNH.

This specimen was reported in error as *spinetorum* by Shields (1965). It bears a holograph note, unsigned, "New sp. next to spinetorum, 10/vii/1948."

Remarks. It is possible that all Mexican records in Shields (1965), with the exception of the single specimen from Baja California Norte, are in fact *millerorum* instead of *spinetorum* as listed. Although undeniably similar in appearance to *spinetorum*, this new species differs in two significant traits, the different configuration of the hind wing postmedian line and the presence of a postbasal line. The latter in particular is far more likely to indicate a specific level of differentiation. A similar line occurs in both *estela* and *guatemalena*, described below.

A single remarkable female is at hand from southern New Mexico (3 mi. N Weed, ca. 6700 ft., Sacramento Mts., Otero Co., 12.vi.1977, *leg.* H. & M. Clench, sta. 412) that I cannot place with certainty. It is from a region where nominate *spinetorum* occurs, and it agrees well with *s. spinetorum* (including two from the Sacramento Mts.) in all traits



Figures 34-35: *Callophrys* (*Mitoura*) *millerorum*, new species. Holotype ♀ upper (34) and under (35) surfaces; MEXICO: HIDALGO: vic. El Encarnacion, 2400-2450 m., 15.ii.1969; (L. D. and J. Y. Miller); Allyn Museum photos 810622-A-8/9 (AME).

except that it has a postbasal line on the hind wing under side, about as well developed as in *millerorum*, but with the segment in the cell slightly displaced distad. None of the other traits is of *millerorum*. At present I believe this female to be simply an aberrant individual of *s. spinetorum*, but I have never seen another specimen of that species in which the postbasal line is present.

It gives me particular pleasure to name this new species in honor of Dr. Lee D. Miller and his wife Jacqueline Y. Miller, who collected the holotype.

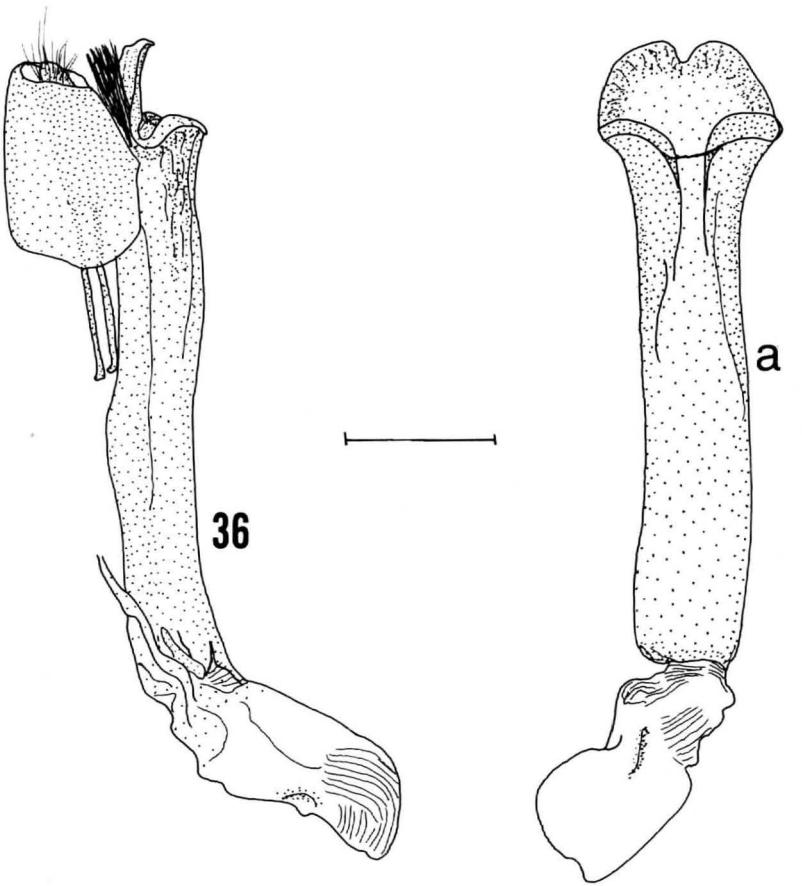


Figure 36: ♀ genitalia of *Callophrys* (*Mitoura*) *millerorum*, new species, Holotype (same specimen as Figs. 34-35). 36, lateral view of genitalia; a, ventral view of genitalia with papillae annales removed; ♀ genitalia preparation M-3451 (Jacqueline Y. Miller).

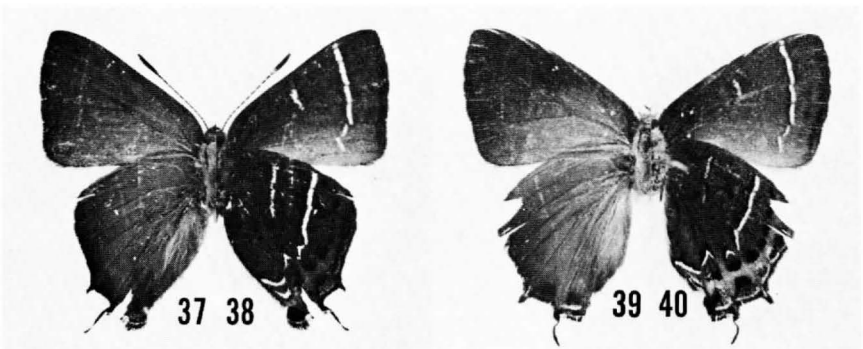
Callophrys (Mitoura) estela, new species

Figures 37, 38 (♂), 39, 40 (♀), 41 (♂ genitalia), 42 (♀ genitalia)

Male. Frons and vertex fuscous, the latter with some white scales intermixed centrally; eye mesially and laterally bordered with white; antennae black, white annulate, the club black with a dark fulvous (nearly black) tip; palpi black, the second segment with intermingled white scales laterally, almost solid white mesially.

Upperside. Both wings fuscous with extensive steel blue. On the forewing this blue extends in the cell as far as the cell-end where it stops abruptly; below cell it extends somewhat farther distad, then gradually shades to dark blue-black, then to the terminal fuscous. Scent pad dark brown, hardly visible, about twice as long (distobasally) as wide; fringe fuscous basally, pale tan distally. Hindwing with steel blue covering most of wing: costa gray-tan; outer margin narrowly dark fuscous, somewhat broader apically; inner margin gray in basal half, shading to black distally. Anal lobe black with small white spot at its basal limit; a terminal white bar, rather faint, in Cu_2-2A, none in Cu_1-Cu_2. Fringe as on fore wing except that the tan becomes white posteriorly, and in Cu_2-2A the fringe is black distally, white proximally; at 2A a tuft of pure white scales. Tail at Cu_2 about as long as the apical width of the Cu_1-Cu_2 interspace, black with a white tip; tail at Cu_1 very short, about a quarter the length of that at Cu_2, also white-tipped.

Underside: Ground color of both wings blackish-brown. Fore wing with ground color gradually shading to light gray below Cu_2; a pure white bar at cell-end; a pure white pm line; slightly curved and parallel to termen from costa to 2A, about 3-4 scale rows wide (or about 1/3 the width of M_2-M_3 interspace where it crosses); the posterior segment of this line, in Cu_2-2A, is about half as wide and displaced slightly basad, shallowly chevron-shaped and with the point basad. Hind wing with a straight postbasal thin bar of white from Sc across to posterior border of cell, ending just distad of the origin of Cu_2; pm line thicker than this bar, about as on fore wing but obscurely edged basad by darker ground color, straight from costa to M_3; M_3-Cu_1 segment slightly angled outward; Cu_1-Cu_2 segment concave outward, short and not reaching either vein; Cu_2-2A segment V-shaped (point basad), posterior arm about two or three times as long as anterior; 2A-3A segment shallowly convex outward. A subterminal row of black spots, one to an interspace, from 2A costad, costad of M_3 becoming smaller, more bar-



Figures 37-40: *Callophrys (Mitoura) estela,* new species. 37-38, Paratype ♂ upper (37) and under (38) surfaces; MEXICO: DURANGO: 1-½ mi. W of El Salto, 8200 ft., 9.x.1970 (R. Holland) Allyn Museum photos 810622-A-10/11 (CM). 39-40, ♀ upper (39) and under (40) surfaces; MEXICO: CHIHUAHUA: Madera, vi.1966 (T. Escalante); Allyn Museum photos 810622-A-12/13 (AME).

like and nearly continuous; this row of spots distally edged broadly with bright orange-red, continuous across the veins from inner margin costad (in 2A-inner margin with a narrow, black bar, then a narrow white bar, basad), thickest in Cu_1-Cu_2-2A, fading and thinning costad. This orange-red is prominently streaked inward on veins Cu_1 and Cu_2 to well basad of pm line, continuously so on vein Cu_2 but on Cu_1 interrupted by the black-brown ground color just distad of the pm line. A few scales of this orange-red color are sprinkled in the median area between cell-end and pm line. Distad of this orange-red in Cu_1-Cu_2 is a black spot and in Cu_2-2A, a large, nearly round, field of fuscous with intermingled white scales. Anal lobe black, basally with a small white patch on inner margin. Fringe of both wings as on upperside.

Female. Head and appendages as in male except that third (terminal) palpal segment is a little longer and sometimes has a few white scales, especially terminally.

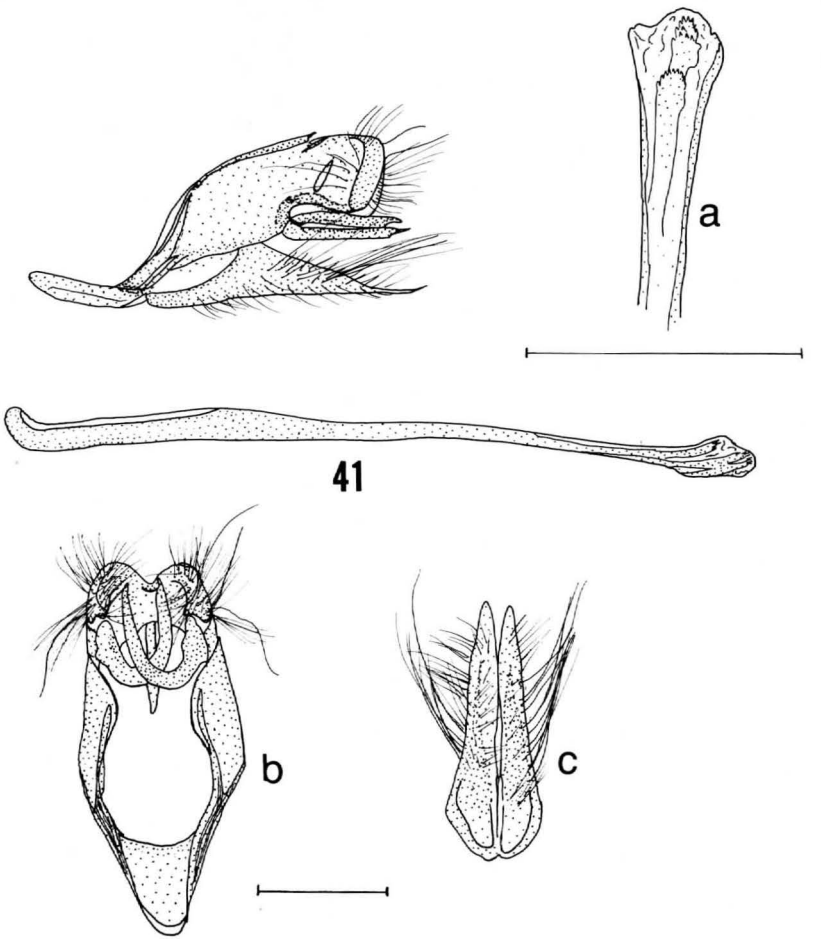


Figure 41: ♂ genitalia of *Callophrys* (*Mitoura*) *estela*, new species, Paratype (same specimen as Figs. 37-38). 41, lateral view of genitalia with penis below; a, tip of penis; b, ventral view of genitalia with valvae removed; c, ventral view of valvae; unnumbered genitalic dissection (K. Johnson).

Upperside. Almost as in male: the steel blue is about as extensive and of the same color or perhaps slightly paler; the hind wing tails about as long; the fore wing scent pad, of course, is absent.

Underside: as in male.

Length of fore wing: males, 15.0-16.5mm., mean (of 2), 15.8 mm; females, 15.5-17.5 mm., mean (of 2), 16.5 mm.

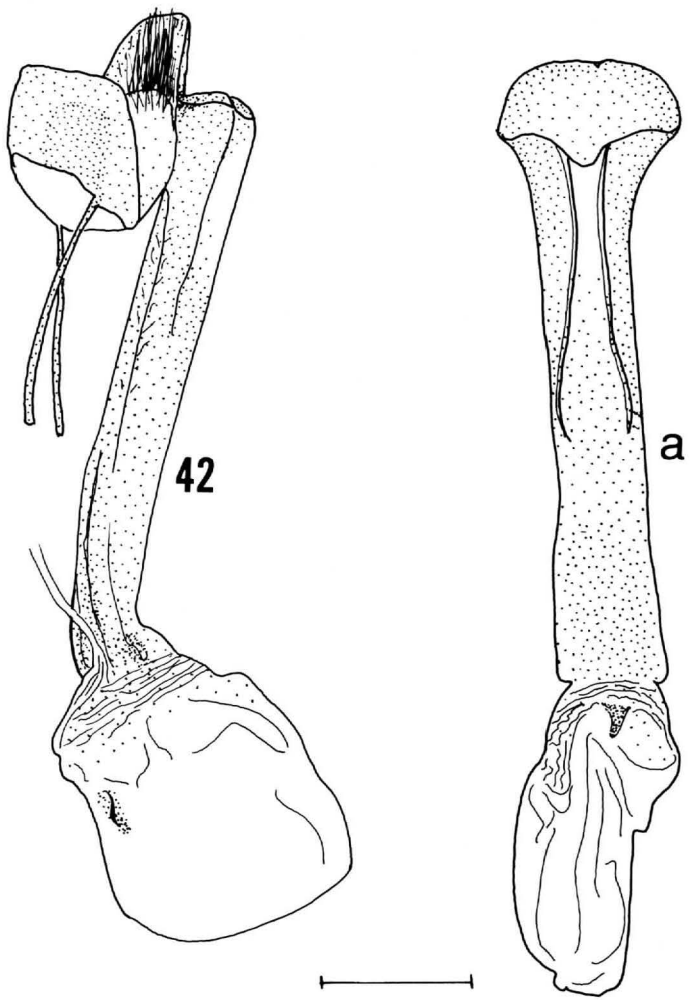


Figure 42: ♀ genitalia of *Callophrys* (*Mitoura*) *estela*, new species. 42, lateral view of genitalia; a, ventral view of genitalia with papillae annales removed; ♀ genitalia preparation M-3480 (Jacqueline Y. Miller); MEXICO: CHIHUAHUA: Madera, viii.1968; T. Escalante (AME).

Holotype, male, 1-1/2 mi. W El Salto, 8200 ft., Durango, Mexico, 9.x.1970, *leg.* Richard Holland.

Paratypes, one male and two females, same data as holotype.

Holotype and three paratypes, C. M. Ent. type series [no. 701 — ed.].

Remarks. This striking and handsome species appears to be most closely allied to *millerorum.* It differs as follows: the underside ground color is darker and lacks the ruddy tint of *millerorum.* Against this ground the white bars and lines stand out in much sharper contrast. The subterminal red-orange of the hind wing underside is hypertrophied and, most unusually, is streaked basad along the cubital veins. The average size may be a little larger but too few specimens of either species are available to be sure.

I am grateful to Dr. Richard Holland, the collector of the type series, for his gift of the specimens to the Carnegie Museum of Natural History.

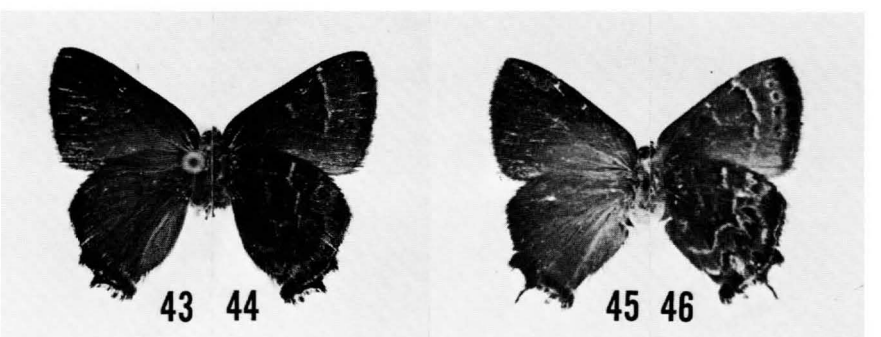
Callophrys (Mitoura) guatemalena, new species

Figures 43, 44 (♂), 45, 46 (♀), 47 (♂ genitalia), 48 (♀ genitalia)

Male. Frons and vertex fuscous; antennae black, white annulate, club black dorsally, fulvous ventrally and broadly at tip.

Upperside. Both wings black, with steel blue in the base, covering the basal half of the fore wing and most of the hind wing except for a broad fuscous border area on costa and termen, and a gray inner margin. The boundary between blue and black is indefinite. Fore wing with a small scent pad, fuscous, slightly longer (distobasally) than wide, pointed at either end. Hind wing with no tails but a tooth is present at the ends of Cu_1 and Cu_2, the latter larger. Fringe of fore wing basally fuscous, distally a little paler between the veins; of hind wing fuscous, distally whitish between the veins. Tornal lobe of hind wing prominent, rust colored.

Underside, chocolate brown. Forewing with inner margin dark gray costad into basal part of cell and to Cu_2. A pale whitish bar at cell-end. Pm line nearly straight from costa at a little beyond 2/3 to Cu_2 at about 1/2 or 2/3 from its origin, the line dingy white edged basad by black. A subterminal row of black spots, each narrowly edged basad with white and distad with pale brownish-orange, one to an interspace from near costa to Cu_2. Hind wing with a thin postbasal line from Sc across cell (at 2/3 its length from base), but apparently not beyond; this line black, edged basally with a thin line of sordid



Figures 43-46: *Callophrys (Mitoura) guatemalena,* new species. 43-44, Paratype ♂ upper (43) and under (44) surfaces; MEXICO: CHIAPAS: Ochuc, 19-23.x.1971 (R. Wind); Allyn Museum photos 810629-7/8. 45-46, Paratype ♀ upper (45) and under (46) surfaces; MEXICO: CHIAPAS: Ochuc, 12-14.x.1971 (R. Wind); Allyn Museum photos 810622-A-14/15. Both specimens in AME.

whitish and nearly straight on the Sc-Rs segment, somewhat displaced basad; a faint, thin, pale bar at cell-end; pm line thin, black, with a narrow edging of dingy white distad, from Sc (at 2/3) to inner margin (at 3/4), complexly dislocated as follows: Rs-M_1 a little basad (of costal bar in Sc-Rs); M_1-M_3 continuous and a little distad; M_3-Cu_1 distad; Cu_1-Cu_2 basad; Cu_2-2A diagnol, costal end contiguous with preceding, posterior end distad and continuous with next; 2A- inner margin convex outward, diagonally angled inward. A subterminal row of connected chevron-shaped black bars, the row nearly straight to Cu_1, then curved to end on inner margin, each bar basally edged with a thin sordid whitish line, distally by chocolate-brown which gradually shades to orange distad in Cu_1-Cu_2, and to slightly paler brown in the interspaces costad of Cu_1. A small black dot distad of the orange Cu_1-Cu_2 is the only trace of the Thecla spot core. Terminal area chocolate brown with a thin sordid white terminal line. Fringe brown with some

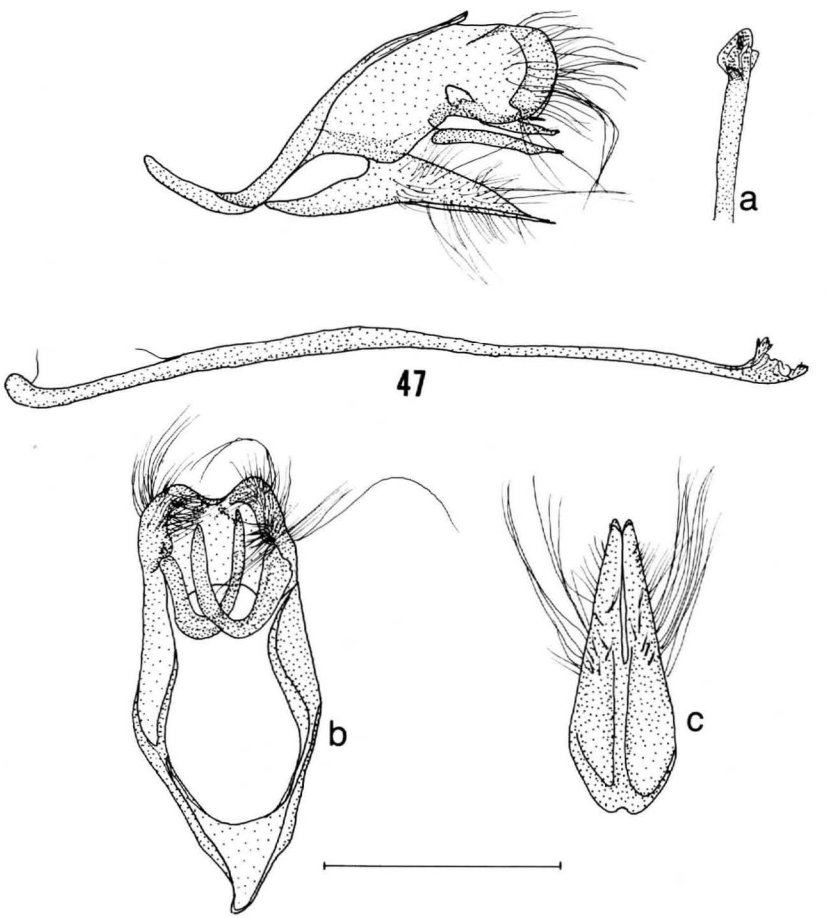


Figure 47: ♂ genitalia of *Callophrys* (*Mitoura*) *guatemalena*, new species. Paratype. 47, lateral view of genitalia with penis below; a, tip of penis; b, ventral view of genitalia with valvae removed; c, ventral view of valvae; ♂ genitalia preparation M-3482 (Jacqueline Y. Miller); MEXICO: CHIAPAS: Ochuc, 19-23.x.1971; R. Wind (AME).

whitish distad between the veins. Tornal lobe black, edged basad with a thin white line.

Female (Figs. **45-46**). Almost identical to the male in all respects except for: the absence of the fore wing scent pad; the somewhat more convex fore wing termen; and the tails on the hind wing — the tooth at Cu_1 is larger than that of the male, and at Cu_2 is a distinct tail, about as long as the apical width of the Cu_1-Cu_2 interspace. The tornal lobe of the hind wing above appears to be black instead of rust-colored.

Male genitalia (Fig. **47**) of typical *Callophrys* configuration; the broad, spatulate cornuti and absence of caps on the tips of the valvae confirm its belonging to the subgenus *Mitoura*. The broad, flat-bottomed median notch between the uncus lobes distinguishes it from any other *Mitoura* I have studied except perhaps *gryneus* and *hesseli*. The falx is of normal configuration, its forearm not elongated as in *dospassosi* (Fig. **27**). The valvae are bluntly pointed, not truncate as in *spinetorum* (Fig. **29**). The posterior shoulder process of the dorsal vinculum is almost absent (as in all other *Mitoura* but *dospassosi*). The penis is about 2.7 times as long as the valva.

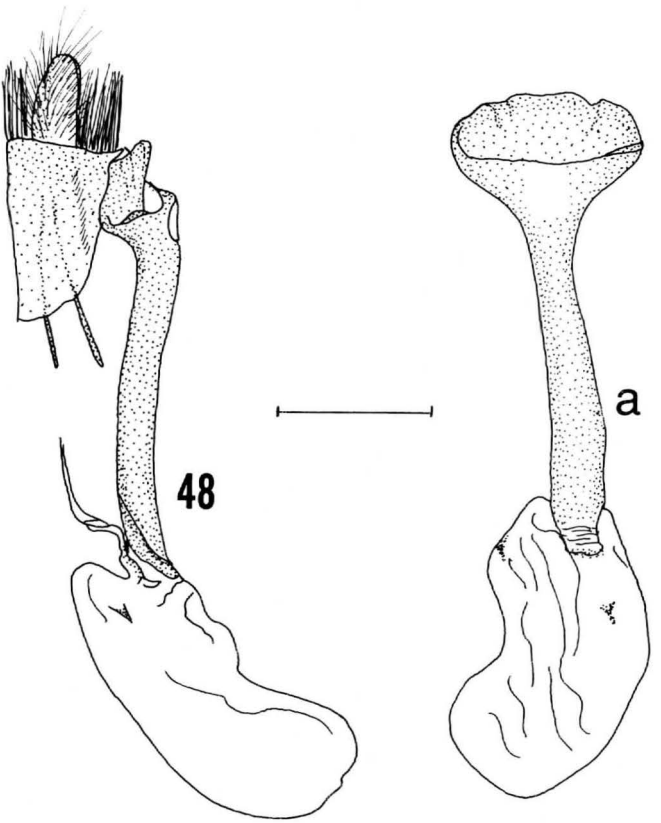


Figure 48: ♀ genitalia of *Callophrys* (*Mitoura*) *guatemalena*, new species, Paratype (same specimen as Figs. 45-46). 48, lateral view of genitalia; a, ventral view of genitalia with papillae annales removed; unnumbered genitalia preparation (K. Johnson).

[Female genitalia (Fig. 48) as illustrated — ed.]

Length of fore wing: male 13.5-14.0 mm., mean (of 4), 13.8 mm.; the one female, 13.0 mm.

Holotype, male, Baleu, 1350 m., Mpio. San Cristobal Verapaz, Alta Verapaz, Guatemala, 29.vi.1966, *leg.* E. C. Welling.

Paratypes: 1 ♂, same data as holotype, except 30.vii.1966; 2 ♂, 1 ♀ Ochuc. Chiapas, Mexico, 19-23 (♂) and 12-14.x.1971 (♀), *leg.* R. G Wind, AME Acc. 1972-3.

Holotype and one male of the Chiapas paratypes, C. M. Ent. type series no. [702 — ed.]. First paratype in AMNH. One male and one female of the last paratypes in AME.

Remarks. This strange new species has the wing shape (except for the tails) and upperside coloration of *C.(M.) spinetorum* or *dospassosi.* Its underside, with a virtually complete complement of strymonine pattern elements (cell-end bars, pm line, st spot row on both wings, postbasal hind wing bars) is remarkably similar to an *Incisalia*, particularly *niphon, eryphon* or some other Palearctic species. This resemblance is further enhanced by the reduction of the tails in the male to mere short tooth-like projections, by the strong reduction of the Thecla spot pattern specialization, and by the presence of st spot rows on both wings and their connected chevron shapes of the hind wing, producing a zig-zag line much as in those of *Incisalia* species. Because of this extensive similarity I believe *guatemalena* may well represent an ancestral form from which *Incisalia* was derived.

The Blue *Mitoura*

Before this paper, there was only one known species of *Callophrys* (Mitoura) with blue on the upperside, *spinetorum* Hewitson. There are now five of them. The following key may prove helpful in their identification. Note that *johnsoni* also belongs to this group, but because it has no blue on the upperside it is excluded from the key.

1. a. Un green; ♂ up with contrasting, pale scent pad; unfw without cell-end bar ..... *dospassosi*
   b. Un brown; ♂ upperside with dark, inconspicuous scent pad; unfw with white or pale cell-end bar 2
2. a. Unhw with post-basal white bar from near costa inward across cell 3
   b. No such bar (but see text under *millerorum*) ..... *spinetorum*
3. a. Unhw st line continuous, deeply crenulate, basally edged with white, hw tail at Cu_2 a short tooth only in ♂ ..... *guatemalena*
   b. Unhw st line broken at veins, a series of black spots, usually fainter costad, not crenulate, not basally edged with white; hw Cu_2 tail of normal length in both sexes 4
4. a. Unhw st orange dull and obscure, virtually confined to a small lunule in Cu_1-Cu_2 and not streaked on veins ..... *millerorum*
   b. Unhw st orange bright and extensive, continuous from inner margin costad (often to costa), streaked inward along veins Cu_1 and Cu_2 ..... *estela*

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