

**PRELIMINARY ANALYSIS OF THE COLOR VARIATION
IN *CYPARIUM TERMINALE* FROM MEXICO,
WITH COMMENTS ON *C. PALLIATUM*,
AND A NEW RECORD FOR *C. YAPALLI*
(COLEOPTERA: STAPHYLINIDAE, SCAPHIDIINAE)¹**

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ABSTRACT: Preliminary analysis of the color pattern of the body, antennae, head, pronotum, pronotal hypomeron, elytra, elytral epipleura, and last two visible pregenital tergites of *Cyparium terminale* Matthews is presented based on specimens from four Mexican states. Taxonomical remarks are included for *C. palliatum* Erichson based on study of the holotype. To augment the poor original description of *C. palliatum*, the holotype is compared to specimens of *C. terminale*. *Cyparium yapalli* Fierros-López is reported from the state of Guerrero for the first time and from a new locality in the state of Oaxaca.

KEY WORDS: Staphylinidae, Scaphidiinae, taxonomy, Mexico

Cyparium Erichson, 1845, the only genus of the tribe Cypariini (Leschen and Löbl, 1995; Löbl, 1997), was based on *C. palliatum* Erichson, 1845, a species reported from Mexico, but without a precise locality. The original description of this species is rather poor, and it is possible that the specimen studied is teneral, because of its pale color (Matthews, 1888; Fig. 1f). The genus includes 50 species. Five are distributed in Mexico: *C. navarretei* Fierros-López, 2002 from Veracruz; *C. palliatum* from "Mexico"; *C. sallaei* Matthews, 1888 from Oaxaca and Veracruz; *C. terminale* Matthews, 1888 from the states of Mexico, Jalisco, Michoacan, Morelos, Oaxaca and Veracruz (also recorded from Guatemala and Panama); and *C. yapalli* Fierros-López, 2002 from Oaxaca (Navarrete-Heredia et al., 2001; Fierros-López, 2002; Márquez, in press).

Since the original description of *C. palliatum* (Erichson, 1845) nothing has been documented about this species. Recently, four specimens of *Cyparium* were collected from three localities in Oaxaca and another three specimens were collected in the Sierra de Atoyac, Veracruz, Mexico. These specimens are orange, red or yellow and resemble *C. palliatum* more than any other Mexican species of *Cyparium* (Fig. 1b, f). Additionally, several typical specimens (body black with red bands on pronotum and elytra) of *C. terminale* were collected at the same sites (Fig. 1a, c). The seven paler specimens were difficult to assign either to *C. palliatum* or to *C. terminale*, due to the lack of published information about the former species, known only by the holotype, and because *C. terminale* presents wide variation in its color pattern.

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The goal of this work is to assess the variation in color pattern of *C. terminale* through the study of specimens from four Mexican states and to include taxonomical remarks for *C. palliatum* based on the study of the holotype, in order to distinguish it from *C. terminale*. *Cyparium yapalli*, until now known only from the type locality, is reported from two new localities.

METHODS

The holotype specimen of *C. palliatum* was obtained on loan from the Museum of Natural History of Berlin, Germany (MNHUB; J. Frisch). The other specimens studied were obtained on loan from the following collections (acronyms identify the collections in the text): American Museum of Natural History, New York (AMNH; L. Herman); Colección de Coleoptera, Universidad Autónoma del Estado de Hidalgo, Pachuca, Hidalgo (CC-UAEH; J. Márquez); Colección Entomológica, Instituto de Ecología, A. C., Xalapa, Veracruz (IEXA; L. Delgado); Colección de Coleoptera del Museo de Zoología, Facultad de Ciencias, UNAM, México, D. F. (MZFC-UNAM; J. J. Morrone); and Colección Nacional de Insectos, Instituto de Biología, UNAM, México, D. F. (CNIN; S. Zaragoza).

Taxonomical characteristics were taken from Matthews (1888), Fierros-López (2002) and Leschen and Löbl (1995). This study can be considered as a preliminary analysis of the variation in color pattern of *C. terminale*, due to the reduced number of specimens studied (28), and the lack of specimens of the states of Mexico and Jalisco, Mexico, and from Guatemala and Panama.

RESULTS AND DISCUSSION

Cyparium terminale Matthews, 1888

The color pattern of the species is highly variable and is documented herein so as to permit separation of the species from similar ones of the genus (Fig. 1a-e). Also, it can be a precedent of a variable species that can be studied with respect to its geographic distribution, and with respect to its association with mushrooms at different sites.

Variation of the color pattern is presented in descending frequency with respect to the dominant color pattern and is based on 28 specimens among which are 1 from Michoacan, 5 from Morelos (1 teneral), 8 from Oaxaca (4 reddish, pattern color documented herein for the first time), and 14 from Veracruz (3 of them teneral).

1. General body color

a) Body black, or black with some red areas on pronotum and/or elytra: 20 specimens: Michoacan (1); Morelos (4); Oaxaca (4); Veracruz (11); Fig. 1a, c-e.

b) Body red, or red with reduced black areas on head and/or on last two visible abdominal tergites: 4 specimens from Oaxaca indicated below as "red"; Fig. 1b.

c) Body yellow, or yellow with pale (nearly white) spots on basal and apical corners of elytra: 4 specimens indicated below as "teneral": Morelos (1); Veracruz (3).

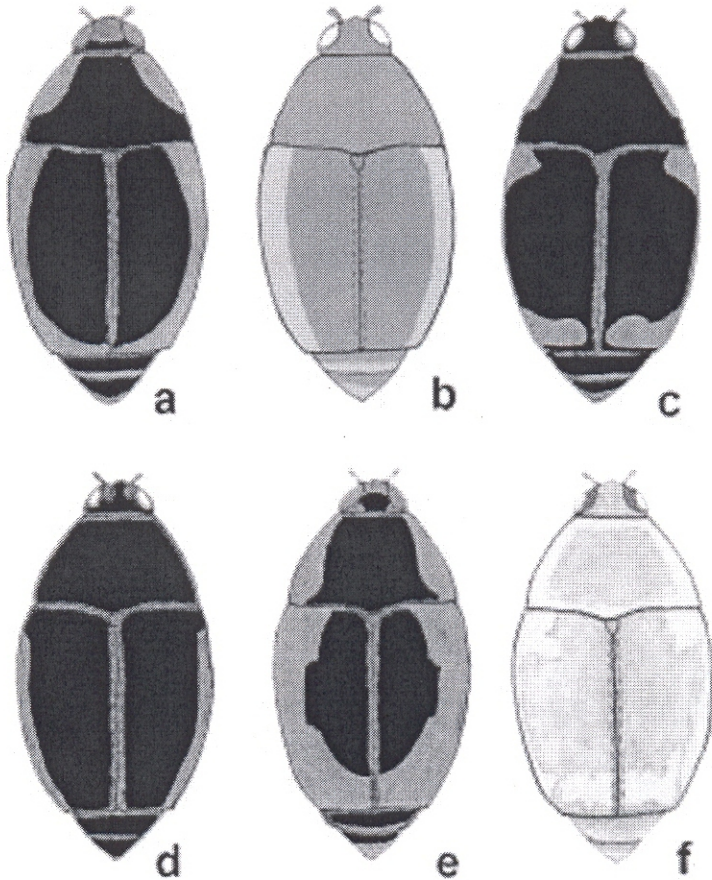


Figure 1. Schematic representations of color patterns of head, pronotum, elytra and last visible tergites of *Cyparium terminale* (a-e) and *C. palliatum* (f; holotype; antennae and legs omitted).

2. Last antennomere (one specimen from Veracruz without antennae)

a) Basal half black contrasting strongly with yellow apical half: 20 specimens: Morelos (5); Oaxaca (4); Veracruz (11, three of them teneral).

b) Basal half brown, but not contrasting strongly with reddish brown apical half: 6 specimens: Oaxaca (4, red); Veracruz (2).

c) Basal half reddish brown, not contrasting strongly with pale red apical half: Michoacan (1).

3. Head

a) Head black, with frontoclypeal region and labrum reddish brown: 9 specimens: Morelos (3); Oaxaca (3); Veracruz (3).

b) Head red, with brown to black color beginning at posterior margin adjacent

to neck, and ending behind eyes: 8 specimens: Michoacan (1); Oaxaca (4, red); Veracruz (3).

c) Head black, only with anterior half of frontoclypeal region and labrum reddish brown: 7 specimens: Morelos (1); Oaxaca (1); Veracruz (5).

d) Head uniformly yellow: 4 teneral specimens: Morelos (1); Veracruz (3).

4. Pronotum

a) Pronotum black, with red band on anterior 2/3 of lateral borders: 9 specimens: Morelos (3); Oaxaca (2); Veracruz (4); Fig. 1a.

b) Pronotum black, with red band along entire lateral borders, red band wider than band of specimens of 4a): 6 specimens: Michoacan (1); Veracruz (5); Fig. 1e.

c) Pronotum uniformly black: 5 specimens: Morelos (1); Oaxaca (2); Veracruz (2); Fig. 1d.

d) Pronotum uniformly red: 4 specimens: Oaxaca (red); Fig. 1b.

e) Pronotum red pale or yellow, with lateral borders slightly paler than remaining area: 4 specimens: Morelos (1, teneral); Veracruz (3, teneral).

5. Elytra

a) Elytra black, with red band along lateral border, widest at anterior and posterior corners (about as wide as 1/3 of width of elytra) narrower at midlength (about as wide as 1/4 of total width of elytra): 11 specimens: Morelos (3); Oaxaca (4); Veracruz (4); Fig. 1a.

b) Elytra black, with red spot at antero-lateral corner and red spot at postero-lateral corner: 7 specimens: Veracruz; Fig. 1c.

c) Elytra red, with same band as indicated above, but pale: 5 specimens: Morelos (1, teneral); Oaxaca (4, red); Fig. 1b.

d) Elytra yellow, with white spot at antero-lateral corner and white spot at postero-lateral corner: 3 specimens: Veracruz.

e) Elytra with similar color pattern as in 5a), but with red band evenly narrow, about as wide as 1/5 of width of elytra: 1 specimen: Morelos; Fig. 1d.

f) Elytra with similar color pattern as in 5a), but with red band wider, and black area of elytra forming a frontal silhouette of a human head when both elytra are contiguous: 1 specimen: Michoacan; Fig. 1e.

6. Pronotal hypomeron

a) Pronotal hypomeron dark brown to black, with red band near upper line: 19 specimens: Morelos (4); Oaxaca (4); Veracruz (11).

b) Pronotal hypomeron uniformly red (pale in teneral specimens): 9 specimens: Morelos (1, teneral); Michoacan (1); Oaxaca (4, red); Veracruz (3, teneral).

7. Color of elytral epipleura

a) Superior and inferior carinae of elytral epipleura black, contrasting strongly with red area between carinae: 17 specimens: Michoacan (1); Morelos (4); Oaxaca (3); Veracruz (9).

b) Superior and inferior carinae of elytral epipleura reddish brown to yellow (teneral specimen), contrasting with red area between carinae, but less strongly than in specimens indicated above: 9 specimens: Morelos (1, teneral); Oaxaca (5, four of them red); Veracruz (3, teneral).

c) Superior and inferior carinae of elytral epipleura black, contrasting strongly with anterior half of area between carinae, and contrasting slightly with almost black posterior half of area between carinae: 2 specimens: Veracruz.

8. Legs

a) Legs red or reddish brown, with coxae black to brown, darker than remaining segments of leg: 11 specimens: Michoacan (1); Morelos (4); Oaxaca (6, two of them red).

b) Legs yellow, or yellow with red coxae: 6 specimens: Morelos (1, teneral); Oaxaca (2, red); Veracruz (3, teneral).

c) Legs with coxae, trochanters and basal half of femora black; apical half of femora, tibiae and tarsi red: 6 specimens: Veracruz.

d) Legs black, with tibiae and tarsi red: 5 specimens: Veracruz.

9. Visible abdominal sternites

a) Abdominal sternites dark brown to black, with red or reddish brown posterior and lateral margins: 20 specimens: Michoacan (1); Morelos (4); Oaxaca (4); Veracruz (11).

b) Abdominal sternites red, with yellow posterior and lateral margins: 4 specimens: Oaxaca (red).

c) Abdominal sternites uniformly yellow: 4 teneral specimens: Morelos (1); Veracruz (3).

10. Last two visible pregenital tergites

a) Penultimate tergite black with red or reddish brown posterior border; last tergite with black basal half and red or reddish brown apical half: 12 specimens: Michoacan (1); Morelos (4); Oaxaca (3, one of them red); Veracruz (4); Fig. 1a, c, e.

b) Two last tergites uniformly black: 8 specimens: Oaxaca (2); Veracruz (6); Fig. 1d.

c) Two last tergites uniformly red or yellow: 7 specimens: Morelos (1, teneral); Oaxaca (2, red); Veracruz (4, three of them teneral).

d) Penultimate tergite red; last tergite red, with transverse black band on basal 1/4: 1 specimen: Oaxaca (red).

Cyparium terminale presents three principal color patterns that overlap. The dominant pattern is mainly black, with red spots or bands on the elytra and pronotum (Fig. 1a, c, d); the second is red, with some poorly marked pale spots or bands distributed identically to the red spots of the black form (Fig. 1b); and the third pattern is represented only by one specimen from Michoacan, which displays an equal distribution of black and red color on the elytra and, to a lesser degree, the pronotum (Fig. 1e). Teneral specimens of *C. terminale* are difficult to distinguish from the pale yellow specimen of *C. palliatum*; possible diagnostic differences are

described below under *C. palliatum*. Teneral specimens of *C. terminale* might be confused also with adults of the red pattern type, but they may be distinguished because they are pale yellow, with some whitish spots on pronotum and elytra; whereas adults red specimens lack spots and are slightly browner than teneral specimens. Specimens with red pattern color are known at present only from Oaxaca, from two localities of the Sierra Madre del Sur and one locality of the Mexican Pacific Coast Provinces (Fig. 3).

In contrast, the aedeagi of several red and black specimens do not differ (Fig. 2a-b), but the teneral specimens are all females. Additionally, all specimens have the same punctational pattern on the head, pronotum and elytra, and the antennae show the same proportion and form in each antennomere. A future revision of a long series of specimens from more localities can provide a better knowledge of the variation of this species.

Cyparium terminale is found in several Mexican states and extends to Guatemala and Panama. In Mexico, it has been documented from the following biogeographic provinces (Fig. 3): Trans-Mexican Volcanic Belt (states of Mexico, Jalisco and Michoacan), Balsas Basin (Mexico and Morelos), Sierra Madre del Sur

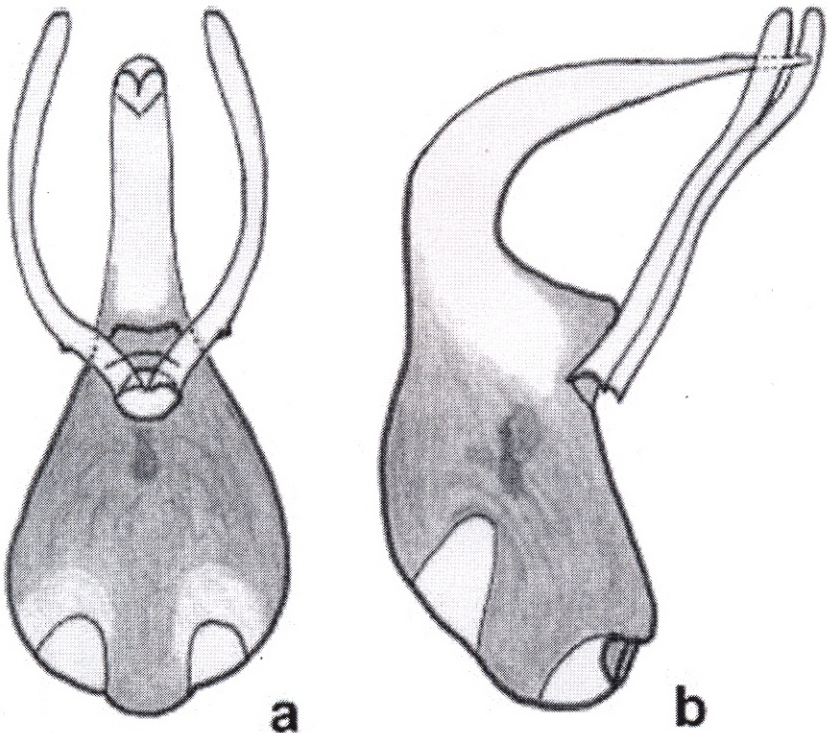


Figure 2. Aedeagus of *Cyparium terminale*: a) ventral view, b) lateral view. Scale bar 0.95 mm.

(Oaxaca), Mexican Pacific Coast (Oaxaca), and Gulf of Mexico (Veracruz). It may be predicted to occur also in Chiapas Province, since its distributional pattern is similar to other staphylinids (Márquez and Morrone, 2003; Márquez and Asiain, in press). It is also possible that *C. terminale* is present in several Central American countries such as Belize, Honduras, El Salvador, Nicaragua and Costa Rica, because the apparent disjunction in the distribution from Guatemala to Panama is not a common pattern in Neotropical staphylinids. The disjunction for *C. terminale* may be the result of a lack of sampling or the Mexican and Central American specimens may not be conspecific, as was documented for species of *Homalolinus* (Márquez, 2003).



Figure 3. Geographical distribution of *Cyparium terminale* in Mexico. Black circles: black pattern color (16 specimens), white circles: red pattern color (four specimens), and black triangle: black/red pattern color (one specimen). Teneral specimens are excluded. Question marks: state records only (Jalisco and Mexico; Navarrete-Heredia et al., 2002).

Material Studied: "México: Michoacán, Ocampo, Laguna Seca. Bosque mixto. N 19° 32'37", W 100° 22'38.9". En hongos. 22-VII-2000. S. Bautista y J. Asiain cols." (1, CC-UAEH). "México: Morelos, Tlayacapan, San José de los Laureles. Bosque mesófilo de montaña. Localidad 3. 15-08-1998. En hongos diversos. R. Toledo y J. Márquez cols." (3, MZFC). Same data as previous, except: "Necro-

trampa permanente (calamar). Localidad 1. Bosque de encino-pino, 1 a 30 de septiembre de 1996. J. Márquez col." (1, MZFC). Same data as previous, except: "1 a 30 de octubre de 1995. K. Villavicencio y J. Márquez cols." (1, MZFC). "México: Oaxaca, Santiago Yosondúa, camino a El Vergel, La Cascada. Bosque de encino. 1917 m. N 16° 50' 49.6", W 97° 34' 47.5". En trampa de intercepción de vuelo. 10 a 13-VII-2005. J. Asiain y J. Márquez cols." (5, CC-UAEH). Same data as previous, except: "En *Russula* sp. 12-VII-2005. J. Asiain y J. Márquez cols." (1, CC-UAEH). "México: Oaxaca, Santiago Jamiltepec, El Monroy. 10-14-julio-2005. Alt. 100 m. Trampa de intercepción. L. Delgado col." (1, IEXA). "México: Oaxaca, km 3 Carr. Santo Domingo Tepuxtepec-Juquila Mixes. 19-VIII-2003. Alt. 2000 m. Trampa de intercepción. Q. Santiago y L. Delgado cols." (1, IEXA). "México: Veracruz, Sierra de Atoyac, Atoyaquillo. 30-VI-2003. Alt. 650 m. En hongos. A. y L. Delgado cols." (2, IEXA). Same data as previous, except: "30-VI-2-VII-2003. En agarical" (3, IEXA). "México: Veracruz, Huatusco, km 30 Carr. Fortín-Huatusco. 12-Julio-2001. Alt. 1490 m. Bosque mesófilo. L. Delgado col." (1, IEXA). Same data as previous, except: "24-VI-2003. Alt. 1500 m. En hongos y tronco. A. y L. Delgado cols." (1, IEXA). "México: Veracruz, Fortín, Barranca de Metlac. 25-28-VI-2003. Alt. 1000 m. Trampa de intercepción. A. y L. Delgado cols." (1, IEXA). "México: Veracruz, Chocaman. 1200 msnm. 6-I-2000. H. Brailovsky, E. Barrera / Colección del Instituto de Biología, UNAM, México, D. F." (2, CNIN). "Mexico: Jalapa, W. Schaus, Coll'r. / *Cyparium terminale* Matth. Det. J. F. Cornell '67." (3, AMNH). "Mexico: Jalapa. Hoegel. / *Cyparium terminale* Matt. / Donated by F. Du C. Godman. 1907. (1, AMNH).

Cyparium palliatum Erichson, 1845

This species is known only from the female holotype. I agree with Matthews (1888) that this specimen may be teneral, which, together with the lack of additional males and females, make it difficult to interpret this species. The problem is made more difficult when teneral specimens are collected, as occurred with *C. terminale* described above. Initially and erroneously I considered that these teneral specimens to be *C. palliatum*, since it is not easy to detect conspicuous differences between the holotype of *C. palliatum* and the 28 specimens of *C. terminale* included herein.

The holotype of *C. palliatum* is more similar to the red and teneral specimens of *C. terminale* than to the others. The two species can be distinguished because the apical half of the last antennomere of *C. palliatum* is scarcely flattened and with the basal half reddish brown, not contrasting strongly with its pale red apical half. On the other hand, the apical half of the last antennomere of *C. terminale* is clearly flattened, yellow and contrasts strongly with the black basal half.

If the holotype of *C. palliatum* is really teneral, it is probable that a mature adult may have some pale spots on the elytra and on the borders of the pronotum, because the specimen studied shows several pale to near transparent areas in a vague pattern (Fig. 1f). Similar pale areas were detected in the teneral specimens and the red form of *C. terminale*. Only by collecting and studying additional material of

C. palliatum might the validity of the species be verified and the characters by which the species is distinguished be clearly known.

Type Material. Holotype female: "7689 / Mexico Deppe / Type / *palliatum* Er. / *Cyparium* Er. / Zool. Mus. Berlin / Hist-Coll (Coleoptera) Nr. 7689 *Cyparium palliatum* Erichson. Mexico, Deppe. Zool. Mus. Berlin / Holotypus *Cyparium palliatum* Erichson, 1845, labelled by MNHUB 2005."

Cyparium yapalli Fierros-López, 2002

This species has been recorded only from the type locality, "km 164, carretera Sola de Vega – Puerto Escondido," state of Oaxaca (Fierros-López, 2002). Two new localities for the species are reported here: "México: Oaxaca, Santiago Jamiltepec, El Monroy. 10-14-julio-2005. Alt. 100 m. Trampa de intercepción. L. Delgado col." (1, IEXA). "México: Guerrero, Chilpancingo, Barranca Las Juntas. 27 / 29-VIII-2003. Trampa de intercepción. Alt. 900 m. Q. Santiago y L. Delgado cols." (1, IEXA). This species now known at two localities in the Sierra Madre del Sur Province and one locality in the Mexican Pacific Coast Province (Fig. 4).



Figure 4. Geographical distribution of *Cyparium yapalli* (black circles).

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