

## New species and new records of *Copris* (Coleoptera: Scarabaeidae: Scarabaeinae) from Mexico and the United States

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### Abstract

One new species of *Copris* Geoffroy from Sonora and Chihuahua is described and illustrated: *Copris warneri* **sp. nov.** The new species is closely related to *C. arizonensis* Schaeffer. Drawings of the male and female and a distribution map are included. New distributional records for *C. arizonensis* Schaeffer and *C. martinezi* Matthews and Halffter are provided.

**Key words:** Coleoptera, Scarabaeidae, *Copris*, new species, new records, Mexico, USA, Arizona, Chihuahua, Sonora

### Resumen

Se describe e ilustra a una nueva especie del género *Copris* Geoffroy proveniente de los estados de Sonora y Chihuahua: *Copris warneri* **sp. nov.** La nueva especie se encuentra emparentada con *C. arizonensis* Schaeffer. Se incluyen ilustraciones del macho y de la hembra, así como un mapa de distribución. Se registran nuevas localidades para *C. arizonensis* Schaeffer y *C. martinezi* Matthews y Halffter.

### Introduction

In this paper we describe and illustrate *Copris warneri* **sp. nov.**, a species of *Copris* inhabiting oak and pine-oak forests in the Mexican states of Chihuahua and Sonora, between 1500 and 1800 m in elevation. In addition, we provide new distributional records for *C. arizonensis* Schaeffer and *C. martinezi* Matthews and Halffter.

With the description of this new species we bring the total number of New World *Copris* species to 32; the U.S. and Canada report nine species, 21 more are distributed in Mexico, whereas 11 species are known from Central America and one from South

America (Matthews 1961, Matthews and Halffter 1968, Warner 1990, Ratcliffe 1998, Delgado and Kohlmann 2001, Solís and Kohlmann 2003, Kohlmann *et al.* 2003).

The holotype and allotype of *C. warneri* are deposited in the Canadian Museum of Nature in Ottawa; paratypes are deposited in the Smithsonian Institution, Washington, D. C. and in the private collections of R. Cunningham, Chino, California; S. McCleve, Douglas, Arizona; Miguel Angel Morón, Jalapa, Veracruz; B. Streit, Tucson, Arizona; and W. B. Warner, Chandler, Arizona.

***Copris warneri* McCleve and Kohlmann, sp. nov. (Figs. 1–5)**

**Diagnosis.** This species is characterized as follows: male clypeal teeth small, remote; clypeal emargination shallow, smoothly and broadly arcuate, without median notch; median pronotal prominences closely approximate (in dorsal view), exterior margins divergent, emargination between prominences deep so as to embrace head horn, each prominence narrow, each at tip subequal to width of head horn apex; median dorsal sulcus shallow, with small umbilical punctures not extending onto bifurcate process; lateral pronotal prominences reduced, not usually projecting anteriorly past anterior pronotal angles in dorsal view, in profile with upper margin directed on a line toward base of head horn; 8<sup>th</sup> elytral stria complete; 9<sup>th</sup> elytral stria complete except for basal part opposite mesoepisternum; anterior tibial spur slender, turned sharply inward and downward, apex acute.

**Description. Holotype. Male (Figs. 1, 3, 4):** Total length: 19.3 mm. Elytral width: 10.3 mm. Clypeus with two small remote teeth; emargination shallow, smoothly and broadly arcuate, with no median notch (Fig. 3). Posterior angles of genae acute. Upper surface of head weakly umbilico-punctate, more prominent on genae, less so anteriorly, sparser and less distinct medially basal to emargination. Minute punctures evident at 25X magnification around base of horn, eyes, base of head. Occipital margin in three overlapping segments. Head horn long, apex extending above apices of medial pronotal prominences in lateral profile, smoothly curved backward. Demarcation between gula and submentum broadly V-shaped. Antennae dark brown.

Pronotal anterolateral angles obtuse, lateral margin angled out near origin of lateral carina. Lateral carina more or less prominent. Anterior margin behind genae almost straight, not concave. Dorsal median longitudinal sulcus shallow, incomplete; punctures small to moderate, vaguely umbilicate. Entire surface of pronotum punctate except for elevated portions of median prominences. Dorsal surface of basal half of median prominences (except for dorsal sulcus) with evenly distributed, minute punctures; minute punctures continuing onto base of lateral prominences, becoming gradually coarser and more umbilicate toward pronotal basal margin. Posterior angles with broad area of coarse umbilical punctures, punctures smaller below lateral carina, large to moderate in lateral fossa. Entire anterior face of median prominences with widely spaced small circular,

umbilicate punctures; punctures near base of median prominences narrow, elongate. Concavity between median and lateral prominences with small, widely and regularly spaced, round, umbilicate punctures. Median prominences approximate, slender; outside margins divergent; apex of each slightly wider than base, slightly wider than apex of head horn; emargination between apices deeply U-shaped, about as deep as 4 diameters of head horn apex (Fig. 4). In lateral profile each prominence has a blunt apex and a bulge on the underside, apex wider than stem. Lateral prominences small; in dorsal view angled outward toward, but not reaching, apical pronotal angles (Fig. 1); in lateral profile upper margin of lateral prominences angled slightly downward, upper margin directed toward base of head horn. Anterior face of lateral prominences more or less perpendicular to lateral margin, apex right-angled, furthest point of lateral prominences not extending over anterior margin of pronotum (Fig. 4). Anterior prosternal margin with small, triangular tooth; sternellum with about 4 irregular transverse rows of crisp, well-defined, moderate-to-large, umbilicate punctures; punctures with fine, pale setae shorter than puncture width. Median lobe of metasternum densely umbilico-punctate anteriorly and laterally; median impressed line complete.

Elytra with 8<sup>th</sup> stria complete; 9<sup>th</sup> stria complete except for basal segment opposite mesoepisternum (Fig. 3); 10<sup>th</sup> stria complete. Striae closely, moderately punctate; punctures slightly transverse, separated by their approximate width. Interstriae slightly convex, minutely punctate.

Pygidium with margin complete; punctures umbilical, small to moderate; punctures bearing short, minute, pale setae. Genital capsule without apical hook.

Ventral surface of profemora with large, setose, umbilicate punctures on posterior longitudinal half with dark setae; punctures becoming much smaller toward anterior half, then minute and apparently simple near anterior margin and bearing minute, pale setae. Protibial spurs sharply bent at almost a right angle directed inward and downward apically, apex sharp. Middle coxae with outer face densely punctate with a single row of large, umbilicate punctures or a rugose area near outer margin; then an impunctate area; then 2–3 rows of smaller, umbilicate punctures on inner half. Ventral surface of middle and posterior femora with large, umbilicate punctures distally becoming minute, simple proximally.

**Allotype. Female (Fig. 2):** Length: 16.8 mm. Elytral width: 9.2 mm. Differs from holotype as follows: head horn short, broad, slightly expanded apically, about 1.2 mm tall, 1.4 mm wide at narrowest width near base, 1.6 mm wide at apex; apex excavated, anterior and posterior margins of apex evenly elliptical in dorsal view; lateral corners of horn apex not recurved backwards. Clypeal teeth slightly closer together, more prominent, with a broad angulation between them. Foretibial spurs not as sharply bent as in male, bent portion slightly shorter. Pronotal punctation stronger, more regular with entire pronotal surface punctate. Median pronotal prominences united, anteriorly with weak carina, carina slightly emarginate medially in dorsal view (Fig. 2).

**Variation.** Total length 16.2–19.3 mm. Elytral width 9.0–10.3 mm. The holotype is very fresh and unworn, but some paratypes show signs of wearing. Some paratype males, compared to the holotype, show both smaller size and weaker development of the head and pronotal armament more or less in a continuum to the smallest and least developed male. These lesser males also have a smaller anterior tibial spur. One male (from Río Piedras Verdes) has the pronotum with larger punctures. Little variation was observed in females, including horn development and the nearly complete 9<sup>th</sup> elytral stria. One female has a head horn more expanded apically, much more like the horn in female *C. arizonensis*. Pronotal angles can be obtuse or sometimes are made salient by a feeble inward curve (this was previously a diagnostic character for the *C. arizonensis* complex but is now known to be variable).

**Material examined** (12 males 7 females). **Holotype**, male: **MEXICO. Sonora:** 14.4 miles NW Yécora on Santa Rosa road, 5512 feet elevation, 8 VII 1993, UV, S. McCleve, G.E. & K.E. Ball. **Allotype**, female: **MEXICO. Chihuahua:** 4 miles N Las Chinacas, (0.8 miles S La Lovera), 4910 feet elevation, 9–10 VII 1989, UV, S. McCleve. **Paratypes** (11 males, 6 females): **MEXICO. Chihuahua:** 6 miles S Yécora (SON), 5740 feet elevation, 2–3 VII 1990, UV, S. McCleve, 1 male; 3 miles S Ignacio Zaragoza, Río Piedras Verdes, 5900 feet elevation, 11–12 VII 1988, UV, P. Jump, 1 male; same as allotype, 1 female; 86 km NE Nácori Chico (Sonora), Rancho Arroyo El Cocono, 1660 m elevation, 7 VIII 1982, ex fungi trap, S. McCleve, G. E. & K. E. Ball, 1 female; between Yepáchic & Temosáchic, large canyon bottom, 31 VIII 1984, UV, D. Mullins, 1 female. **Sonora:** Highway 16, 19 km W Yécora, Cañón del Aguajito, 5 VIII 2005, 28° 22' 22" N, 109° 02' 52" W, ex human dung trap, B.D. Streit & R.D. Cunningham, 1 male; Hwy 16, 1.8 mi W Yécora, 4 VIII 2005, ex human dung trap, B. Steit & R.D. Cunningham, 1 male; Hwy 161.8 road miles NW Yécora, 28° 21' 34" N, 108° 57' 06" W, 5338 feet elevation, 6 VIII 2003, B. D. Streit & R. A. Cunningham, taken in pitfall trap baited with human dung, 1 male; Highway 16, 1.3 road miles E Yécora, 28° 22' 27"N, 108° 54' 27" W, 5153 feet elevation, 5 VIII 2003, B. D. Streit & R. A. Cunningham, taken in pitfall trap baited with human dung, 1 female; Highway 16, 5.0 road miles E Yécora, 28° 23' 23" N, 108° 52' 25" W, 5647 feet elevation, 6 VIII 2003, B. D. Streit & R. A. Cunningham, taken in pitfall trap baited with human dung, 1 female; Highway 16, 5289 feet elevation, 1.65 miles W Yécora, 7–10 August 2004, 28° 21' 37" N, 109° 56' 59" W, R. Cunningham & B. Streit lgt, taken in human dung trap, 2 males; Highway 16, 5530 feet elevation, 5.0 miles W Yécora, 7–10 August 2004, 22° 21' 54" N, 108° 59' 30" W, R. Cunningham & B. Streit lg, taken in human dung trap, 1 male; Highway 16, 5386 feet elevation, 1.9 miles W Yécora, 7–10 August 2004, 28° 21' 29" N, 108° 57' 12"W, R. Cunningham & B. Streit lgt, taken in human dung trap, 2 males; Highway 16, 5331 feet elevation, 1.8 miles W Yécora, 6 August 2003, 28° 21' 34"N, 108° 57' 12" W, R. Cunningham & B. Streit lg, taken in human dung trap, 1 female; Highway 16, 7029 feet elevation, 9.1 miles E + 1.8 miles SW Yécora, 8 August 2004, 28° 22' 13" N, 109° 01' 53" W, R. Cunningham & B. Streit, lgt, Near Radio Tower, BL + MV, 1 male.

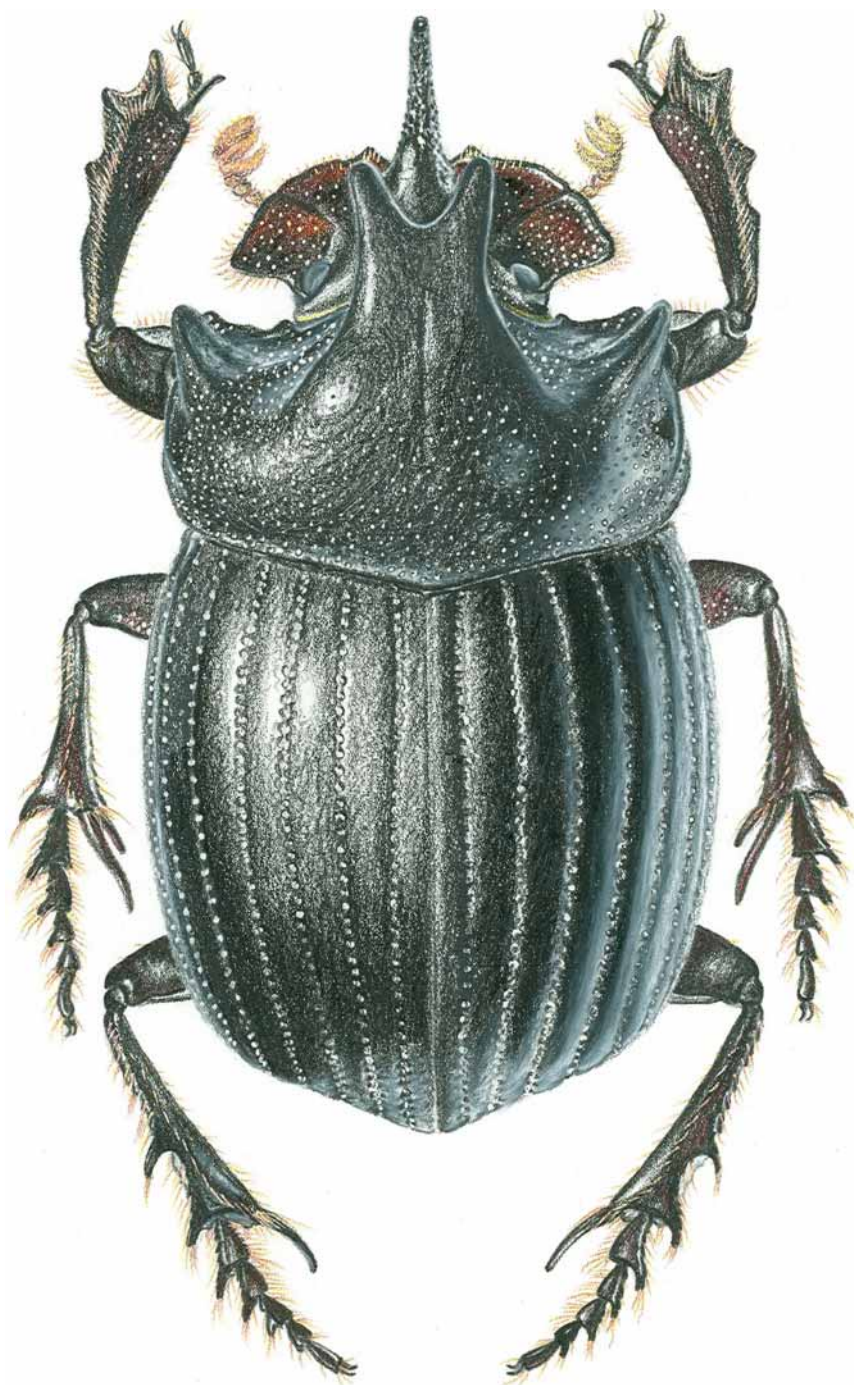
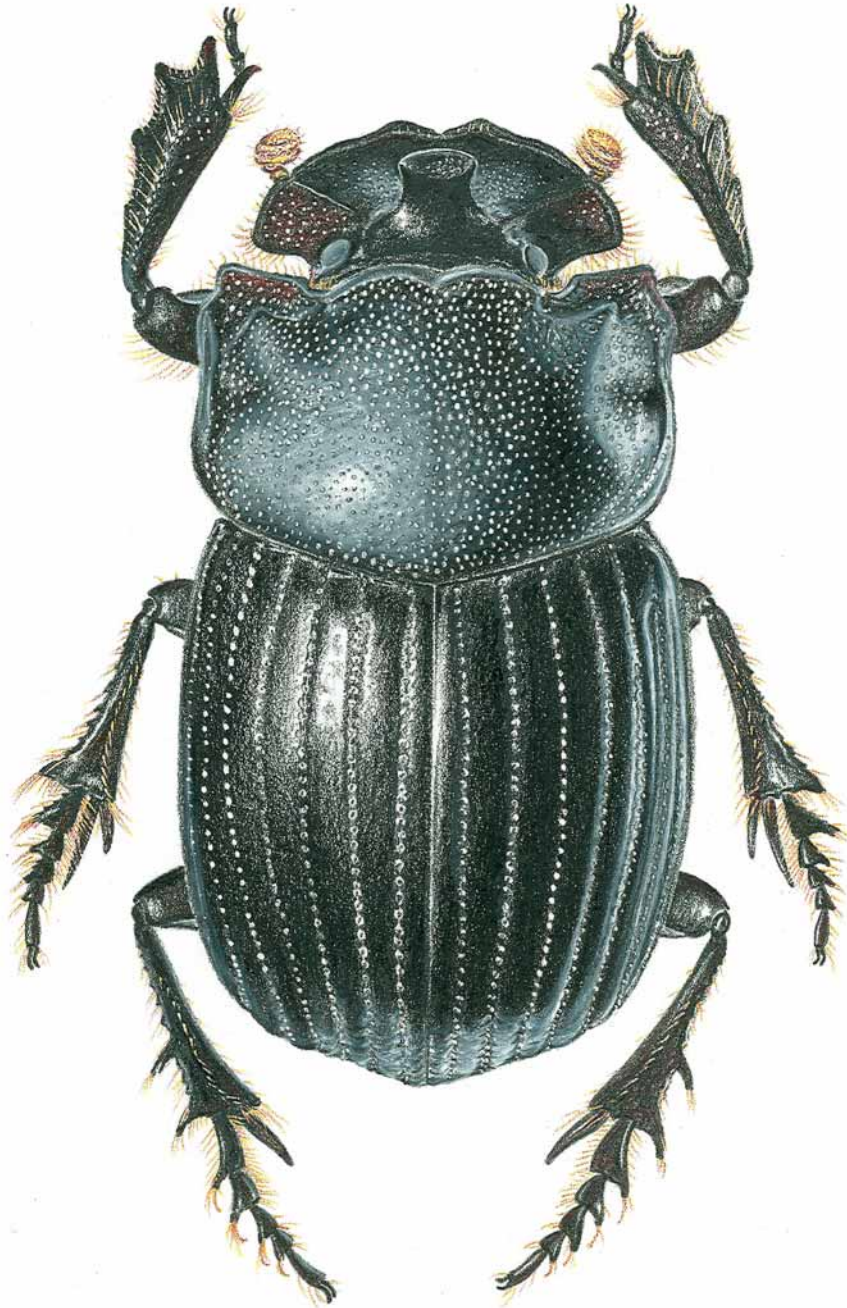


FIGURE 1. Dorsal view of a male *Copris warneri*.

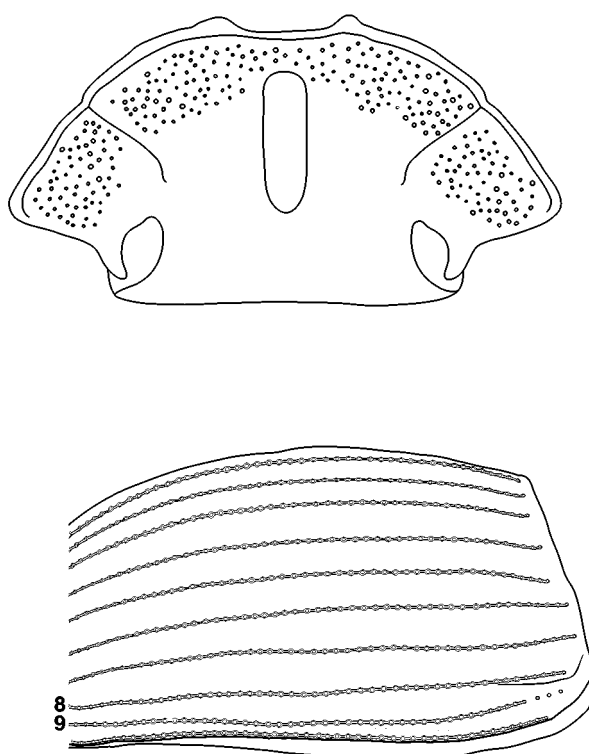
**Remarks.** This species belongs to the *C. arizonensis* complex, as defined by Matthews (1961) and Matthews and Halffter (1968). Males of *C. warneri* run to couplet

13 in Matthews' 1961 first key, and fit the characters given there for *C. arizonensis*. In Matthews' second key males and females run to couplet 17 and fit the characters given there for *C. arizonensis*. Indeed, *C. warneri* seems to be closely related to *C. arizonensis*.



**FIGURE 2.** Dorsal view of a female of *Copris warneri*.

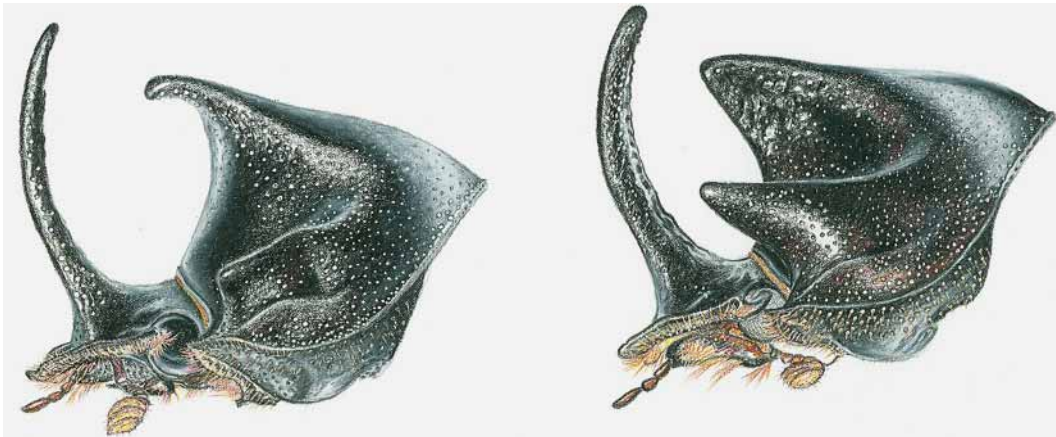
We have seen *Copris* specimens from a *Neotoma* nest from a locality near the city of Durango that are deposited at the Canadian Museum of Nature. These specimens seem to represent a new species that is similar to *C. warneri*. Unfortunately, only one male specimen is known (a minor male) and more are needed to determine how this population should be classified.



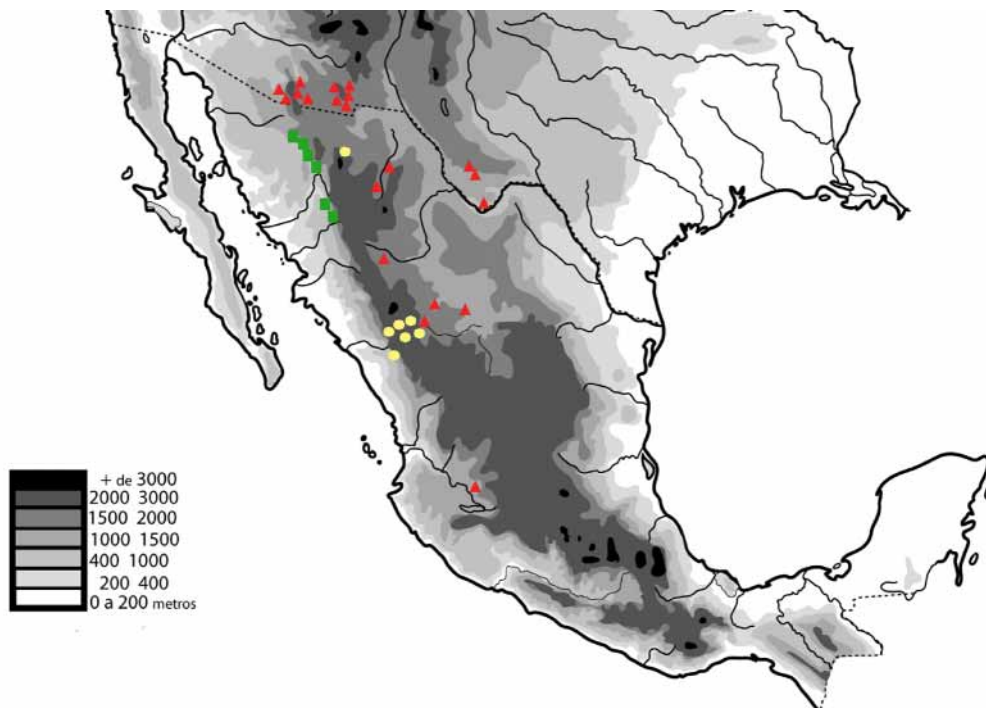
**FIGURE 3.** Dorsal view of a male *Copris warneri* head (top) and the lateral view of the anterior part of a male elytron (bottom).

**Distribution.** All specimens of *C. warneri* are from the northern Sierra Madre Occidental (Fig. 5). The holotype was collected in Sonora, in the east-central part of that state near the Chihuahuan border. The Chihuahua specimens are concentrated near the Sonora border, with the allotype and one other female being taken barely inside Chihuahua in the southwest part of that state. *Copris warneri* has not been recorded as sympatric with either *C. arizonensis* (Fig. 5) or *C. martinezi* (Fig. 5), two species that are chorologically nearest to the new one. The known range of *C. warneri* occurs to the southwest of the known range of *C. arizonensis*, which has a wider distribution from southeastern Arizona and adjacent New Mexico on the northwest to Guadalajara, Jalisco on the southwest and from west Texas on the northeast to near Durango, Durango on the southeast. Matthews (1961) and Matthews and Halffter (1968) list no Sonoran specimens for *C. arizonensis*, nor do we below. There would seem to be a large area of Sonora below the range of

*warneri* that apparently lacks any species of large *Copris*. Also, *C. warneri* and *C. martinezi* have separate known ranges, with *C. martinezi* occurring east of *C. warneri*. *Copris martinezi* occurs at or above 2500 m in elevation, which is higher than either *C. arizonensis* or *C. warneri* (Matthews and Halfpter 1968). The elevational range for *C. warneri* is from 1500 m to 2142 m, while *C. arizonensis* has been recorded from 1300 m to 2234 m.



**Figure 4.** Lateral views of the head and pronotum of *Copris warneri* (left) and of *Copris arizonensis* (right).



**FIGURE 5.** Distribution of *Copris* cited in the work in southern USA and northern Mexico. Green squares = *Copris warneri*, red triangles = *Copris arizonensis*, yellow circles = *Copris martinezi*.



**Ecology.** Warner (1990) reported that *C. arizonensis* (the species most similar to *C. warneri*) inhabits packrat (*Neotoma*) nests and has not been reported from dung traps. Eleven specimens of *C. warneri* were taken in low numbers (often singly) at pitfall dung traps baited with human dung. An additional seven *C. warneri* specimens were collected at ultraviolet (UV) or mercury vapor (MV) lights. However, usually only one specimen of *C. warneri* was collected at each locality using lights, while multiple (up to 11 specimens) *C. arizonensis* specimens have been collected in at light on several occasions. One female *C. warneri* was taken in a pitfall trap baited with a fresh piece of a local mushroom set the day before, but there was no evident feeding damage to the mushroom. All nineteen *C. warneri* specimens were collected in oak or oak-pine woodlands.

**Etymology.** This species is a patronym for our esteemed colleague, William B. Warner, of Chandler, AZ in recognition of: 1) his many contributions to the advancement of our science; 2) his relentless pursuit of scarab beetles, including particularly rare and secretive species; and 3) his good-natured generosity towards his colleagues.

**Modification of Matthews (1961) New World *Copris* key based on major males**

- 13 a- Median pronotal prominences massive and closely adjacent, forming a single bifurcate process; anterior face of the median pronotal prominences slightly concave with the apices of the prominences directed obliquely upward; lateral pronotal prominences appearing long and pointing slightly upward in lateral view (Fig. 4); anterolateral angles of pronotum obtusely angulate, lateral margin not sinuate; 9<sup>th</sup> elytral stria not complete, beginning about a third of the way from the base of the elytra; metafemur short and thick. Southern Arizona, New Mexico, Western Texas, Chihuahua, Durango, and Jalisco ..... *C. arizonensis* Schaeffer
- 13 b- Median pronotal prominences slender, forming an open bifurcate process (Fig 1); anterior face of the median pronotal prominences strongly concave with the apices of the prominences directed forward or slightly downward; lateral pronotal prominences appearing short and pointing slightly downward in lateral view (Fig. 4); anterolateral angles of pronotum obtusely angulate (sometimes forming a tooth); lateral margin slightly sinuate; 9<sup>th</sup> elytral stria almost complete, beginning at a point opposite the posterior angle of the mesoepisternum (Fig. 3); metafemur long and slender. Sonora and Chihuahua ..... *C. warneri* McCleve and Kohlmann, **n. sp.**

**Modification of Matthews (1961) New World *Copris* key based on males and females**

- 17 a- 9<sup>th</sup> elytral stria not complete, beginning at a point about a third of the way from the base of the elytra; female head horn usually long and greatly expanded apically

forming a fork, the excavated apex of the head horn appears as a crescent when viewed dorsally. Southern Arizona, New Mexico, Western Texas, Chihuahua, Durango, and Jalisco ..... *C. arizonensis* Schaeffer  
 17 b- 9<sup>th</sup> elytral stria almost complete, beginning at a point opposite the posterior angle of the mesoepisternum (Fig. 3); female head horn short and barely expanded apically, the excavated apex of the head horn usually appears as an ellipse when viewed dorsally. Sonora and Chihuahua ..... *C. warneri* McCleve and Kohlmann, **n. sp.**

### New Distributional Records

#### *Copris arizonensis* Schaeffer (Fig. 5)

**USA. ARIZONA: COCHISE CO.: Chiricahua Mts.:** Southwest Research Station, 5 miles SW Portal, 18 VI 1961, 1; *same*, 23 VII 1963, 2; *same*, 24 VII 1960, 1; *same*, 4 VIII 1961, 1; *same*, 7 VIII 1967, 1; *same*, 25 VIII 1963, 2; 1.2 miles W Southwest Research Station, 30 VII 1987, 1; 1.9 miles NW Southwest Research Station, 25 VII 1989, 1; Cave Creek Ranch 1 mile S Portal, 1–3 VIII 1972, 1; *same*, 16–18 VIII 1971, 1; *same*, 29–31 VIII 1969, 1; Portal, 20–22 VII 1971, 1; 3 miles W Portal, Stewart Camp, 20–25 VII 1971, UV, 1; *same*, 24 VIII 1973, 1; Portal Ranger Station, 4 VII 1977, UV, 1; West Turkey Creek, 16 VII 1976, UV, 1; Stanford Canyon, 5240 feet, 6 VIII 2002, UV, 1; **Peloncillo Mts.**, Cottonwood Canyon, 17 VII 1973, UV, 1; Guadalupe Canyon, 1300 m, 15 VII 1978, UV, 1; **Huachuca Mts.**, Copper Canyon, 5 VII 1977, UV, 1; *same*, 16 VII 1977, UV, 1; *same*, 16 VII 1979, 1882 m, UV, 1; *same*, 24 VII 1978, 1882 m, **fungi trap**, S. McCleve collector, 1; *same*, 24 VII 1978, 1882 m, UV, 4; *same*, 17 VIII 1978, 2; **Dragoon Mts.**, Cochise Stronghold East, 4940 feet, 6–7 VII 1992, 11; Sorin Gulch, 1926 m, 23–24 VII 1979, UV, 2; **GRAHAM CO.: Galiuro Mts.**, High Creek, 1660 m, 20 VII 1978, UV, 3; Ash Canyon, 4970 feet, 26 VII 1990, UV, 1; **SANTA CRUZ CO.: Atascosa Mts.**, Sycamore Canyon, 12 VII 1977, UV, 2; **Pajarito Mts.**, Peña Blanca Canyon, 1158 m, 30 VII 1979, UV, 1; *same*, 1191 m, 30 VII 1981, UV, 1; **Patagonia Mts.**, Finley & Adams Canyon, 1615 m, 1 VII 1980, UV, 6; Harshaw Creek, 1577 m, 1 VIII 1979, UV, 1; **Santa Rita Mts.**, Gardner Canyon, 1508 m, 16 VII 1980, UV, 1; **NEW MEXICO: HIDALGO CO.: Peloncillo Mts.**, Clanton Draw, 1645 m, 7 VII 1985, UV, 1; *same*, 7 VII 1991, UV, 6; **Animas Mts.**, Godfrey Place, 1706 m, 8 VII 1981, UV, 3; Indian Creek, 1737 m, 5–6 VIII 1979, UV, 1. **MEXICO: CHIHUAHUA:** Highway 16, 2.5 miles E Perderales, 1 mile S, 7330 feet, 18 VII 1984, UV, 1; Highway 45, 23 miles SW Ciudad Jiménez, 5050 feet, 17 VII 1984, UV, 1; 25 miles W Hidalgo Del Parral, 6800 feet, 15 VII, 1964, Black and white lights, 1; **DURANGO:** Highway 45, 5 miles N Rodeo, 4 miles W, 4650 feet, 15 VII 1984, UV, 1; Gómez Palacio, 8 VII 1970, 1.

Collection methods for the above specimens: UV light=59 specimens; fungi trap=1 specimen; dung trap=0 specimens; no data=16 specimens.

### *Copris martinezi* Matthews & Halffter (Fig. 5)

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**MEXICO: DURANGO:** 10 miles W El Salto, 8800 feet, 1 VIII 1964, 1; *same*, 2 VIII 1964, 1; 3 miles W El Salto, 9000 feet, 22 VII 1964, J. A. Chemsack, 2; 25 miles W Durango, 8100 feet, 20 VIII 1964, 1; 30 miles W Durango, 8400 feet, 3–7 VIII 1972, J. Powell and D. Veira, under pine bark, 1 female; 30 miles W Durango, 8400 feet, 4–8 VIII 1972. 1. **SINALOA:** 26.5 miles SW Durango, 21 VII 1982, F. Andrews, Blacklight, **NEW STATE RECORD**, 1 (CSCA).

Collection methods for the above specimens: blacklight=1 specimen; under pine bark=1 specimen; dung trap=0 specimens; no data=6 specimens.

### Acknowledgments

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