

A journal of world insect systematics

INSECTA MUNDI

0803

Description of a new species of *Chrysina* Kirby
(Coleoptera: Scarabaeidae: Rutelinae)
from the Sierra Azul, Oaxaca, Mexico,
a new synonymy, and notes on *Chrysina* species
found in the Sierra Azul

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Date of issue: October 16, 2020

Center for Systematic Entomology, Inc., Gainesville, FL

Monzón-Sierra J, Blackaller-Bages JF, Hawks DC. 2020. Description of a new species of *Chrysina* Kirby (Coleoptera: Scarabaeidae: Rutelinae) from the Sierra Azul, Oaxaca, Mexico, a new synonymy, and notes on *Chrysina* species found in the Sierra Azul. *Insecta Mundi* 0803: 1–7.

Published on October 16, 2020 by
Center for Systematic Entomology, Inc.
P.O. Box 141874
Gainesville, FL 32614-1874 USA
<http://centerforsystematicentomology.org/>

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Abstract. A new species of *Chrysina* Kirby, *C. clavellina* Monzón, Blackaller, and Hawks (Coleoptera: Scarabaeidae: Rutelinae: Rutelini) is described from Santiago Clavellinas in the Sierra Azul in Oaxaca, Mexico. *Chrysina cosijoezai* (Ramírez-Ponce and Curoe) is placed as a junior synonym of *C. lacordairei* (Boucard), and notes on the *Chrysina* fauna of this mountain range are included.

Key words. Rutelini, Oaxaca, Mexico, new species, new synonym

Resumen. Se describe una nueva especie de *Chrysina* Kirby, *C. clavellina* Monzón, Blackaller, y Hawks (Coleoptera: Scarabaeidae: Rutelinae) de Santiago Clavellinas en la Sierra Azul en Oaxaca, México. *Chrysina cosijoezai* (Ramírez-Ponce y Curoe) se sitúa como un sinónimo de *C. lacordairei* (Boucard) y se incluyen notas sobre *Chrysina* en estas sierra.

Palabras clave. Rutelini, Oaxaca, México, nueva especie, nuevo sinónimo

ZooBank registration. urn:lsid:zoobank.org:pub:C0DA9E19-0E95-4EBC-8B59-F9DC6FD8DC1C

Introduction

Several recent publications on the genus *Chrysina* Kirby (Coleoptera: Scarabaeidae: Rutelinae) have resulted in many new species descriptions. There is a total of about 130 species currently recognized, including the new species described herein (Hawks 2017; Monzón 2017; Mora-Aguilar et al. 2018). Nevertheless, some of the recent work requires corrections because methods for diagnosing new species have been flawed. This is the case with *C. cosijoezai* (Ramírez-Ponce and Curoe 2017) which was described based on a “male” specimen that actually is a female of *C. lacordairei* (Boucard), and that was mistakenly associated with the male genital capsule corresponding to a specimen of *C. adalaida* (Hope) (further details follow).

Oaxaca, with its 93,747 square kilometers, is the fifth largest Mexican state in area. Its geography is extremely complex, and it includes the areas in which the Sierra Madre Oriental, Sierra Madre del Sur and Sierra Atravesada

meet. These special geographic conditions contribute to extraordinary species diversity in *Chrysina*. Currently, we know of 27 described and two undescribed species that occur in the state. We also expect to find several more undescribed species as more exploration and research in remote areas is conducted. Oaxaca could, in fact, be the most species-rich geographic region for *Chrysina* among those of comparable size.

Together with the discovery of the new species in the highest elevations of the Sierra Azul (+2700 m), specimens of four additional species were obtained at two main collecting locations in 2018 and 2019, giving a general idea of the *Chrysina* fauna of this region. These data include significant information, confirming, and/or extending the known distribution of these species. The present work contributes to our knowledge of *Chrysina* in the Sierra Azul and the state of Oaxaca. Also, it highlights the importance of additional studies to determine if other new species of *Chrysina* are found in other areas. Further research priorities should emphasize the isolated highlands of southern Mexico in which high levels of speciation and endemism are evident in many groups of animals and plants. Interestingly, during our initial, brief research in the Sierra Azul in only two areas, the discovery of five species of *Chrysina* represents a relatively high level of diversity for the genus as compared to most similar areas in Mexico. Perhaps continued exploration and sampling in the Sierra Azul will result in the discovery of additional species of *Chrysina*.

Materials and Methods

This publication follows Hawks (2001) for *Chrysina* taxonomy and nomenclature, including his informal species groups. Photographs for this publication were taken with a Nikon D7100 digital camera and Nikon macro AF-S 105 lens. Two Nikon SB-R200 Speedlights with SW-12 diffusers provided the lighting. The holotype male and paratype female of the new species are deposited in the National Insect Collection of Mexico, National Autonomous University of Mexico, Mexico City, Mexico (CNIN)

Taxonomy

Genus *Chrysina* Kirby

Chrysina Kirby 1828 (1827): 522. Type species: *Chrysina peruviana* Kirby, by monotypy.

Plusiotis Burmeister 1844: 417. Type species: *Pelidnota victorina* Hope 1840: 11, by subsequent designation (Ohaus 1934: 16).

Pelidnotopsis Ohaus 1915: 257. Type species: *Pelidnota plusiotina* Ohaus 1912: 304, by monotypy.

Plusiotina Casey 1915: 84. Type species: *Plusiotina aeruginis* Casey 1915: 85.

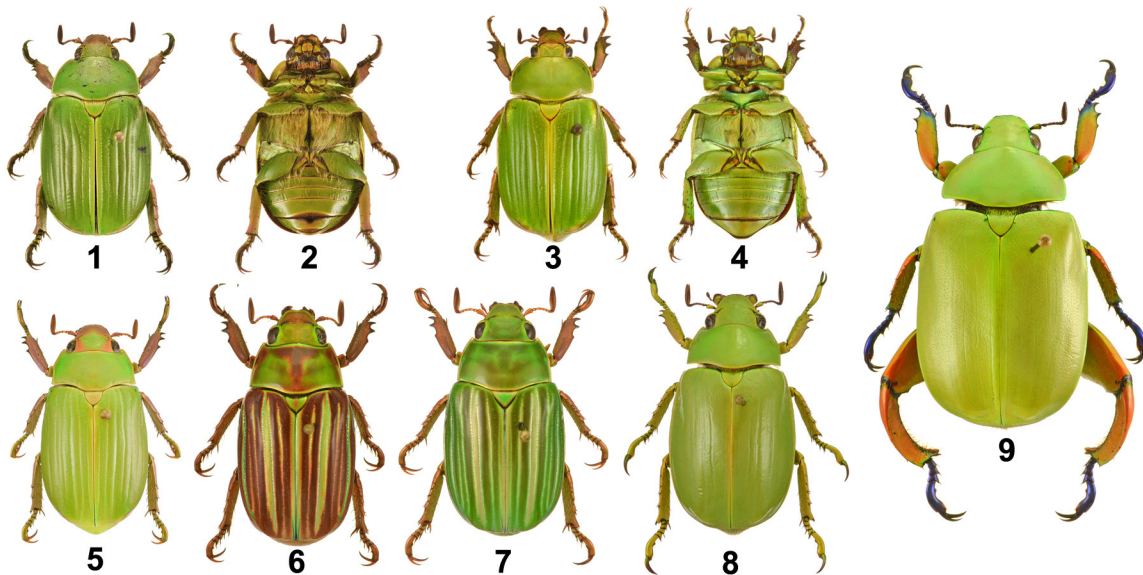
Chrysina clavellina Monzón, Blackaller, and Hawks, new species

(Figures 1–4, 10–15, 20)

Type material. Holotype male (deposited at CNIN) labeled: a) “MEXICO, Oaxaca, Zimatlán / de Álvarez, Santiago Clavellinas / cerca de cabañas, 2745 m alt. / 16.947776 -96.930873 / 9 viii 2018 J. Blackaller, D. Hawks / & J. Monzón coll.”; b) on red paper, “HOLOTYPE / *Chrysina clavellina* / Monzón, Blackaller & Hawks, 2018”. Paratype female (deposited at CNIN) labeled: a) Same data as holotype except “Santa Inés del / Monte, cerca basurero, 2647 m / alt. 16.945440 -96.878508 / 8 viii 2018 J. Monzón, D. Hawks / & J. Blackaller coll.”; b) on yellow paper, “PARATYPE / *Chrysina clavellina* / Monzón, Blackaller & Hawks, 2018”.

Description, holotype male. Length 26.0 mm; width at elytral humeri 12.0 mm; maximum width (middle of elytra) 14.0 mm. Color of dorsum shiny yellowish green; anterior half of clypeus pinkish brown, ocular canthus golden brown with a few green reflections, antennal segments brown including scape; pronotal margins with lateral and posterior margins greenish gold; scutellum green with lateral margins reddish gold; elytra with external margins yellowish green, humerus and apical umbone greenish gold; pygidium green with lateral margins golden green. Color of venter yellowish green with golden and reddish reflections. Legs with tibiae reddish brown, coxa, trochanter and ventral surface metallic greenish gold; mesometasternal process dark gold.

Head. Form subquadrate in dorsal view. Clypeus (Fig. 10) free margins semicircular in dorsal view, slightly reflexed and moderately convex in lateral view; surface coarsely rugopunctate. Frontal disc punctures sparse;



Figures 1–9. Dorsal and ventral habitus of adult *Chrysina* specimens (1×). 1–2) *C. clavellina* Holotype male. 3–4) *C. clavellina* female. 5) *C. lacordairei*. 6) *C. adelaida* red morph. 7) *C. adelaida* green morph. 8) *C. expansa*. 9) *C. adolphi*.

interocular distance 2.0 times wider than antennal club length. Mentum (Fig. 11) subquadrate; anterior depression wide and irregular; posterior depression narrow; surface setigerously punctate, punctures large and sparse; setae long, pale and very sparse.

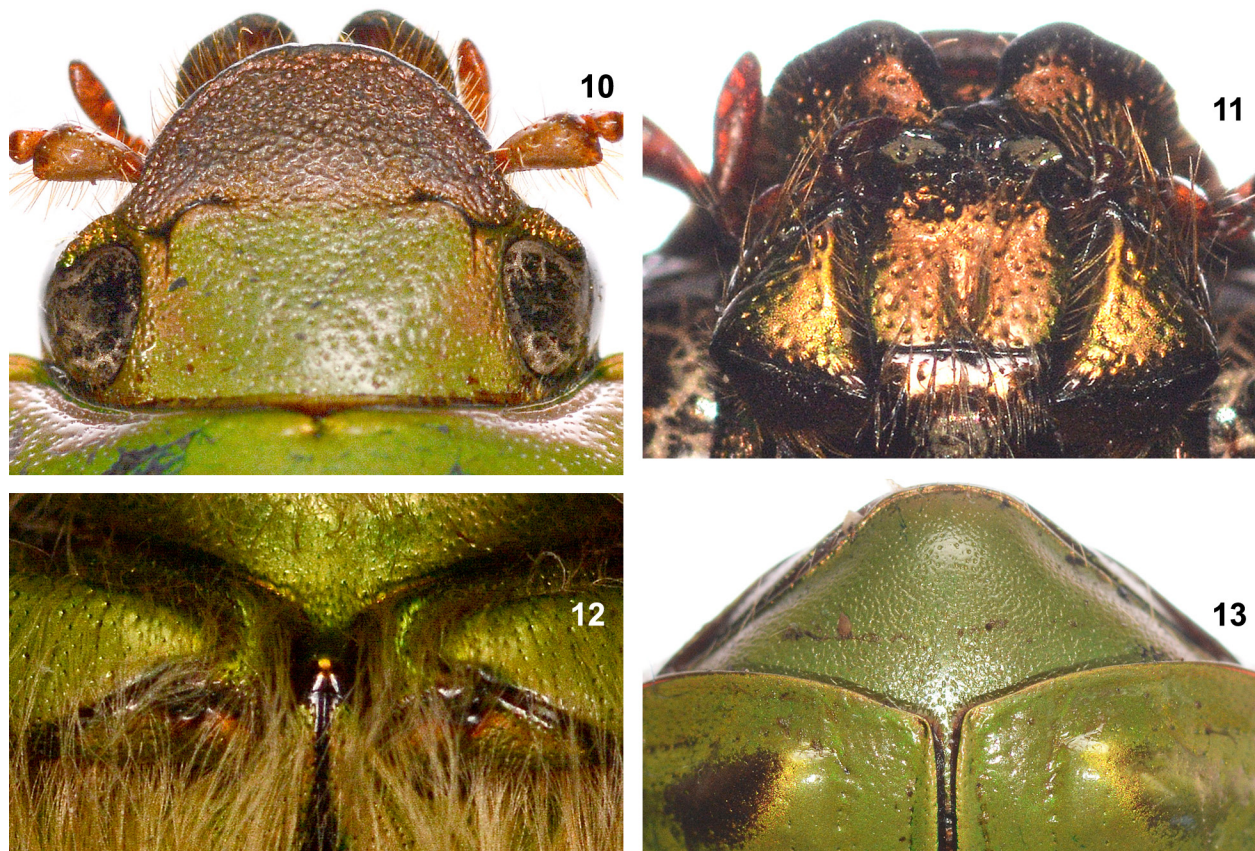
Thorax. Pronotum at base 2.8 times as wide as interocular distance; sculpture similar to frons, punctures fine and scattered, becoming denser laterally; lateral margin completely beaded except effaced on anterior margin between inner border of eyes. Elytron with 9 distinct, punctate striae; punctures in striae moderate in size, deep; intervals moderately convex. Elytron 17.5 mm long and 2.9 times as long as pronotum; lateral margin with bead complete. Venter with mesometasternal process reduced, apex rounded (Fig. 12); metasternum and femora densely setigerously punctate, setae dense, long and pale. Legs with protibiae clearly tridentate; dorsal and ventral surface of protibiae rugopunctate.

Abdomen. Pygidium punctate; apical margin with scattered pale setae; surface convex and slightly prominent towards the apex (Fig. 13). Genitalia with parameres asymmetrical, apically constricted, fused except for very narrowly rounded bidentate apex; parameres convex, right with wide shoulder close to apex; length of genital capsule 8.5 mm (Fig. 14, 15).

Female paratype. Length 27.0 mm; width at elytral humeri 12.5 mm; maximum width (middle of elytra) 14.0 mm. The female similar to the male (Fig. 3–4) except: color of clypeus more iridescent; antennal club shorter; tarsi less robust, especially protarsi; fifth and apical sternite without depression. Genital plates sub-symmetrical; slightly produced with truncate apex with lateral projecting angles; setae long, pale and scattered (Fig. 20).

Etymology. The specific epithet for this new species is a noun, based on the second name of the type locality of the holotype, Santiago Clavellinas. The term in Spanish is used to refer to several species of flowers. The English translation is carnation. The people from this region have been very friendly, open, and interested in knowing more about their insect fauna. We appreciate their valuable support of our efforts to survey this very interesting and isolated region of Oaxaca.

Diagnosis. *Chrysina clavellina* is a green species in the Adelaida Group (*sensu* Hawks 2001). Of the 20 described species in this group, only *C. clavellina*, *C. arellanoi* Monzón, *C. hawksi* Monzón and *C. pehlkei* (Ohaus) have the pronotal, elytral and scutellar coloration primarily solid green, and each elytron with a metallic golden humerus



Figures 10–13. *Chrysina clavellina* holotype male structures. **10)** Clypeus. **11)** Mentum. **12)** Mesometasternal process. **13)** Pygidium.

and apical callus. Only *C. clavellina* and *C. arellanoi* occur north of the Isthmus of Tehuantepec and can be readily distinguished from one another (and the remaining species) by both their male and female genitalia (Fig. 14–17, 20, 21). Additionally, the meso- and metatibiae in *C. clavellina* are measurably more robust in both sexes. *Chrysina arellanoi* is known only from high elevations (2,450 to 2,650 meters above sea level) from the vicinity of San José del Pacífico, approximately 110 air kilometers to the southeast in the Sierra Madre del Sur, Oaxaca (Monzón 2012; Hector Arellano, pers. comm.).

Distribution. *Chrysina clavellina* currently is known only from two specimens collected at high elevations (2,647 and 2,745 meters above sea level) in the pine-oak habitat of La Cumbre, Santiago Clavellinas and Santa Inés del Monte in the Sierra Azul in Oaxaca, Mexico.

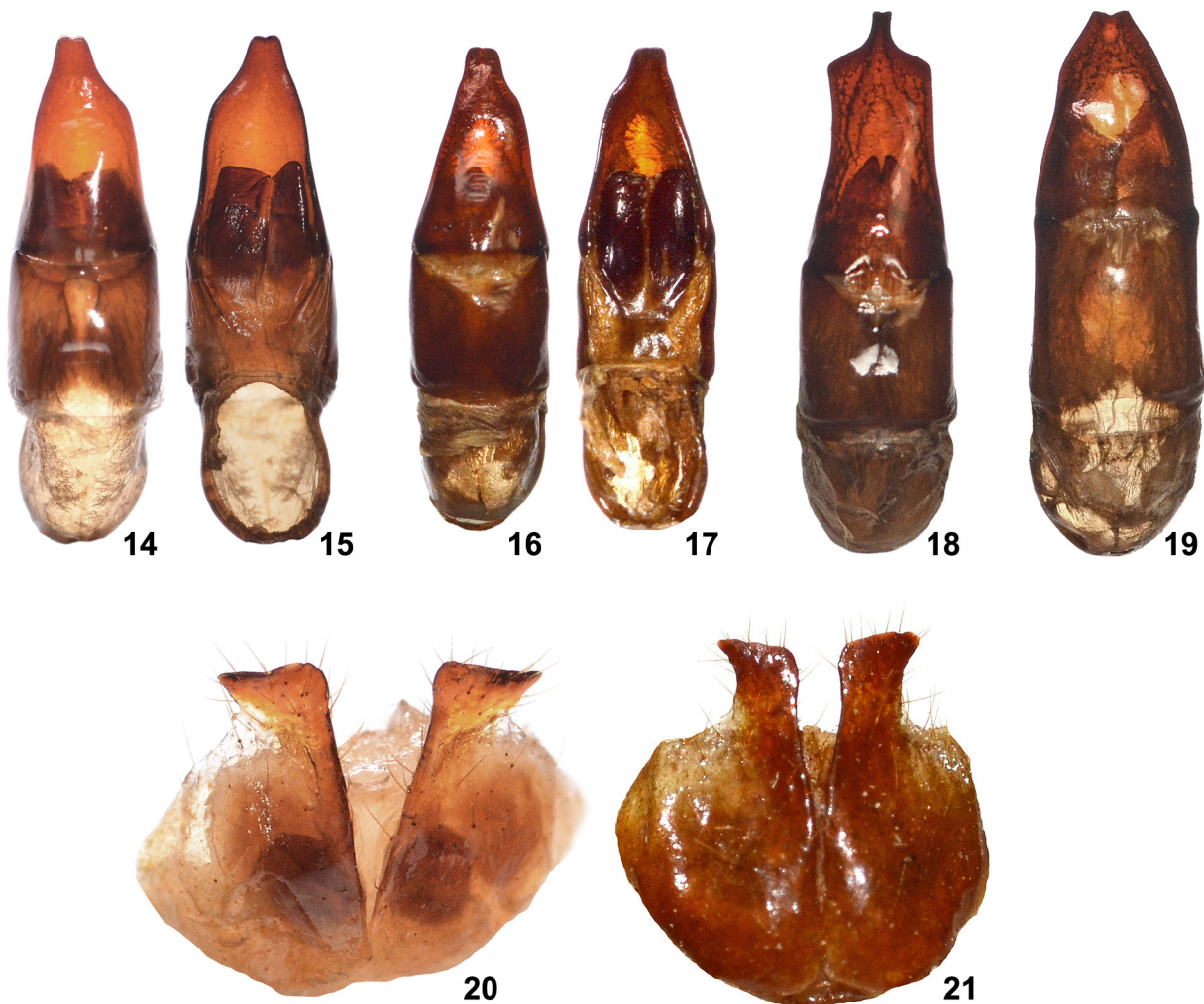
Natural history of *Chrysina* known to occur in the Sierra Azul

Chrysina lacordairei (Boucard, 1875)

(Figures 5, 18, 22, 23)

Plusiotis cosijoezai Ramírez-Ponce and Curoe, 2017. **New synonymy.**

This is a common species that has been collected in various localities in the states of Guerrero and Oaxaca in Mexico. It has been found in oak and pine-oak forests at elevations between 1100 and 2350 meters above sea level. In the Sierra Azul we found this species in August 2018 in Santa Inés del Monte at 2300 m (1 male and 1 female), and in Santiago Clavellinas in August–September 2018 and July 2019 between 2100 and 2300 m (6



Figures 14–21. *Chrysina* spp. genital structures. 14–19) Male genital capsule dorsal (d) and ventral (v), 8× original size. 14) *C. clavellina* (d). 15) *C. clavellina* (v). 16) *C. arellanoi* (d). 17) *C. arellanoi* (v). 18) *C. lacordairei* (d). 19) *C. adelaida*. 20–21) Female inferior genital plates. 20) *C. clavellina*. 21) *C. arellanoi*.

males and 4 females). *Plusiotis cosijoezai* was described in 2017 from a series consisting of one “male” holotype and seven female paratypes. We herein synonymize this species with *C. lacordairei* because the holotype “male” designated to typify the species actually is a typical female of *C. lacordairei*. The “male” holotype photographed for the original description (their Figure 1 a–b) obviously is a female based upon the external characters typical of all females of the Adelaida Group (*sensu* Hawks 2001). The consistent differences on the ventral surfaces of the male and female abdomen in *C. lacordairei* are easily observed in Fig. 22 (male) and Fig. 23 (female). The male genital capsule associated with the holotype specimen of *C. cosijoezai* represents an additional error since it corresponds to the genital capsule of *C. adelaida*. The erroneous male genitalia of *C. cosijoezai* in the original description corresponds well to that of a *C. adelaida* male collected in the Sierra Azul in August 2018 (Fig. 19). *Chrysina lacordairei* adults are known to feed on the leaves of oak trees (*Quercus* species) at other localities in Oaxaca and Guerrero (e.g., Boucard 1875).



Figures 22–23. Male and female abdominal sternites of *C. lacordairei*.
22) Male. 23) Female.

***Chrysina adelaida* (Hope, 1840)**

(Figures 6, 7, 19)

This is a common and widespread species, found throughout most of Mexico. We are aware of specimens of *C. adelaida* from every state of Mexico north of the Isthmus of Tehuantepec except Baja California and Baja California Sur. It has been found in pine-oak forests at elevations between 1300 and 3000 meters above sea level. Numerous specimens have been found in the Sierra Azul in Santa Inés del Monte at 2300 m, and in the vicinity of Santiago Clavellinas (2100–2300 and 2745 m) in pine-oak forests (5 males and 4 females) during August–September 2018 and July 2019. There are several common color morphs of *C. adelaida* from reddish striped (Fig. 6) to mostly green (Fig. 7). Adults of *C. adelaida* are known to feed on the needles of pine trees (*Pinus* species).

***Chrysina adolphi* Chevrolat, 1859**

(Figure 9)

This is a common species of *Chrysina* that is known from the Sierra Madre del Sur in the Mexican states of Guerrero and Oaxaca. It has been found in humid oak and pine-oak forests at elevations between 750 and 2300 meters above sea level. Specimens were found in the Sierra Azul in Santiago Clavellinas at elevations between 2100 and 2300 m in pine-oak forests (Ten males and 14 females) during August–September 2018 and July 2019. Adults have been observed to feed on the leaves of oak trees (*Quercus* species) in Oaxaca and Guerrero (e.g., Boucard 1875).

***Chrysina expansa* (Ohaus, 1913)**

(Figure 8)

This is a little-known species of *Chrysina* that has been collected only at a few localities in the state of Oaxaca. It has been found in forests dominated by oak trees (*Quercus* species) at elevations between 2000 and 2300 meters above sea level. Specimens were found in the vicinity of Santiago Clavellinas at elevations between 2100 and 2300 m in pine-oak forests (Five males and five females) during August–September 2018 and July 2019. Our recent discovery of this species in the Sierra Azul represents an interesting new locality record. Ongoing research by Blackaller and Hawks will provide additional information on *C. expansa* and other closely related species in the Peruviana Group (*sensu* Hawks 2001).

Acknowledgments

We would like to thank the people and the authorities of the area where the type specimens of *C. clavellina* were collected, and especially Rodrigo Rodríguez Herrera, President of the Comisionado de Bienes Comunales de Santiago Clavellinas, and the Surveillance Council of Santiago Clavellinas, Zimatlán de Álvarez, Oaxaca. We

also are grateful to the authorities of Santa Inés del Monte, Zaachila, Oaxaca, who gave us permission to survey their high elevation forest for one night. We also would like to thank our great friend Luis Zacarías López for his assistance with the collection of the type specimens of the new species, and his other productive efforts to study the *Chrysina* fauna of the Sierra Azul. We are grateful to Greg Ballmer, Adriean Mayor, and Doug Yanega for their thoughtful and valuable reviews of the near-final draft of this paper.

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Received August 19, 2020; accepted September 14, 2020.

Review editor M.J. Paulsen.

