



Dugesiana, Año 32, No. 1 (enero-junio, primer semestre 2025), es una publicación semestral, editada por la Universidad de Guadalajara, a través del Centro de Estudios en Zoología, por el Centro Universitario de Ciencias Biológicas y Agropecuarias. Camino Ramón Padilla Sánchez # 2100, Nextipac, Zapopan, Jalisco, Tel. 3337771150 ext. 33218, <http://dugesiana.cucba.udg.mx/index.php/DUG>, glenusmx@gmail.com. Editor responsable: José Luis Navarrete-Heredia. Reserva de Derechos al Uso Exclusivo 04-2009-062310115100-203, ISSN: 2007-9133, otorgados por el Instituto Nacional del Derecho de Autor. Responsable de la última actualización de este número: José Luis Navarrete-Heredia, Editor y Ana Laura González-Hernández, Asistente Editorial. Fecha de la última modificación 1 de enero 2025.

Las opiniones expresadas por los autores no necesariamente reflejan la postura del editor de la publicación.

Queda estrictamente prohibida la reproducción total o parcial de los contenidos e imágenes de la publicación sin previa autorización de la Universidad de Guadalajara.

A new and distinctive species of *Ceratina* Latreille (Hymenoptera: Apidae) from Veracruz, Mexico

Una nueva y particular especie de *Ceratina* Latreille (Hymenoptera: Apidae) de Veracruz, México

Gerardo Quintos-Andrade

Red de Ecología Funcional, Instituto de Ecología AC, Carretera Antigua a Coatepec 351, El Haya, 91073 Xalapa, Veracruz, México; gerardo.quintos@posgrado.ecologia.edu.mx
orcid.org/0000-0002-1783-0436

ABSTRACT

Ceratina Latreille is a cosmopolitan genus with around 380 described species, typically small in size and exhibiting primitive social structures; their habit of nesting in dry plant stems has earned them the common name of small carpenter bees. This work presents an addition to the diversity of the genus in Mexico, with the description of *Ceratina valenzuelai* sp. nov. from the cloud forest in central Veracruz State. Only males are known, which are polymorphic, with some macrocephalic individuals, a rare trait among the New World *Ceratina*. Comments on its biology and taxonomic placement within the subgenus *Ceratina* (*Calloceratina*) are also included.

Keywords. *Calloceratina*; Cloudforest; Pollination; Small carpenter bees

RESUMEN

Ceratina Latreille es un género de distribución cosmopolita con alrededor de 380 especies descritas, usualmente son de tamaño pequeño y con una forma de vida social primitiva; su comportamiento de anidar en tallos secos de plantas, les ha dado el nombre común de abejas carpinteras pequeñas. Este trabajo presenta una adición a la diversidad del género en México, con la descripción de *Ceratina valenzuelai* sp. nov. para el bosque mesófilo del centro del Estado de Veracruz. Se conocen únicamente los machos, los cuales son polimórficos con algunos individuos macrocefálicos, algo inusual en especies de *Ceratina* del Nuevo Mundo. Se incluyen comentarios sobre su biología y posición taxonómica dentro del subgénero *Ceratina* (*Calloceratina*).

Palabras clave. Abejas carpinteras pequeñas; Bosque mesófilo; *Calloceratina*; Polinización.

The bee genus *Ceratina* Latreille, 1802, is one of the most common and worldwide well known; generally referred to as small carpenter bees, this genus is characterized by a relatively small body with sparse pubescence and a smooth and shiny appearance (Michener 2007). These bees are known to nest in dry stems of herbaceous plants, where these bees can develop a primitive social lifestyle (Michener 2007; Rehan & Richards 2010; Rehan *et al.* 2010). Currently 380 species are known, grouped into 23 subgenera (Sless *et al.* 2024). This diversity is the result of few dispersal events, especially in the American continent, where the known diversity of subgenera stems from a single dispersal event from Asia, approximately 22 million years ago (Oliveira *et al.* 2020; Sless *et al.* 2024).

Among the subgenera in the Americas, *C. (Calloceratina)* is easily recognized by its integument, with bright green to blue tones, a size generally greater than 5 mm and the presence of a strong pre-occipital carina in most species (Mahlmann *et al.* 2023). The biology of this subgenus has been little studied, with only two references on their nesting behavior (Friese 1925; González *et al.* 2004). This subgenus is widely diverse in the Neotropics, with 12 described species, four recorded for Mexico and several undescribed ones (Ayala *et al.* 1996; Moure 2007; Mahlmann *et al.* 2023). This research aims to describe a new species in

the subgenus *Calloceratina* not previously identified, from central Veracruz, Mexico.

MATERIAL AND METHODS

The first examined specimens of this new species were found at Colección Entomológica del Instituto de Ecología AC (INECOL), Xalapa, Veracruz, México (IEXA) from collecting expeditions in the municipality of Huatusco and the reserve “Santuario Bosque de Niebla” in Xalapa, Veracruz. Five additional male specimens, including the designated holotype, were found in areas surrounding the reserve. The Holotype is deposited at Colección de Abejas del Colegio de la Frontera Sur, San Cristóbal de Las Casas, Chiapas (ECOAB) (Reg. SEMARNAT: DF-CC-288-15); paratypes are deposited in the IEXA collection (Reg. SEMARNAT: Ver. IN. 048.0198). Morphological terminology follows those of Michener (2007) and Mahlmann *et al.* (2023), including the abbreviations for structures: OD = diameter of the lateral ocellus, pd = separation of punctures based on its diameter, F = antennal flagellomere, S = sternite, T = tergite. Measurements and specimen descriptions were made with an Olympus SZX7 Microscope with an ocular lens with micrometer. Photographs of habitus and diagnostic structures were taken using a Nikon D3100 camera with a Vivitar 55 mm 1:2.8 auto macro lens, stacking was made

with CombineZP and the final plates edited with GIMP and ClipStudio.

SYSTEMATICS

Genus *Ceratina* Latreille, 1802

Subgenus *Calloceratina* Cockerell, 1924

Ceratina valenzuelai sp. nov.

<https://zoobank.org/0862F18B-9D0F-4EB3-BD7A-1BB6D86709F7>

(Figs. 1-2)

Diagnosis. Integumento verde metálico con reflejos azules; disco del labro con dos manchas laterales; cípeo con punturas esparcidas en el disco; grádulos en T2-5; margen apical del T7 trapezoidal con una proyección central; margen preapical del S5 con dos procesos laterales. *Ceratina valenzuelai* sp. nov. es una especie que también presenta machos polimórficos macrocefálicos con cabezas más anchas que el mesosoma; mandíbulas curvadas hacia abajo; mancha en la base del cípeo en forma de una línea horizontal y el grádulo del T5 es más débil en el centro. Los machos con cabezas no modificadas presentan la mancha del cípeo en forma triangular expandida hacia los laterales y el grádulo del T5 es más fuerte en el centro.

Diagnosis. Metallic green integument with blue reflections; labral disc with two lateral spots; clypeus with scattered punctures on the disc; graduli on T2-5; apical margin of T7 trapezoidal with a central projection; pre-apical margin of S5 with two lateral processes. *Ceratina valenzuelai* sp. nov. also exhibits polymorphic males, including macrocephalic forms with heads wider than the mesosoma, downward-curving mandibles, a horizontal line-shaped spot at the clypeal base, and a weaker gradulus in the center of T5. Males without modified heads have a triangular spot on the clypeus that expands laterally, and the T5 gradulus is more prominent in the center.

Description. Holotype male. (Fig 1). Body length: 12.1 mm. Forewing length: 9.92 mm. Head width: 3.6 mm. Ocello-ocular distance: 2.39 OD. Ocello-occipital distance: 3.41 OD. **Body coloration.** Metallic green with blue tones; labrum and clypeus base yellowish; protibia with a central yellow spot; mandibles and tarsomeres dark; wings slightly ofuscated. **Vestiture.** Whitish setae, yellowish to dark on the mid and hind tarsomeres. Longer setae present on the hypostomal area, coxae, propodeum, and sternites. **Mouthparts.** Maxillary palps five-segmented, with the first segment longest and the last three subequal. **Labrum.** Surface even, rounded at the apical margin; smooth with irregular punctures spaced 1pd apart. **Mandibles.** Curved downward, slightly narrow at the midsection; rounded apex; smooth integument with dense basal punctures. **Clypeus.** Flat in lateral view; wider than long; smooth integument with dense punctures <1pd, scattered on the disc. **Paraocular and frontal areas.** Paraocular area smooth with dense punctures <1pd; frontal area with similar puncturing as the paraocular area; the area surrounding antennal insertions is depressed, smooth, and unpunctured. **Antennae.** Flagellomeres sub-

equal; F11 longer and pointed at the tip. **Genal and hypostomal areas.** Gena narrower than the eye in lateral view; smooth with scattered punctures >2pd, clustered along the center; hypostomal area smooth with dense punctures 1pd apart; hypostomal carina lamellate. **Vertex.** Inflated above the ocelli level; smooth with scattered punctures >2pd; ocelli surrounded by dense punctures. **Pronotum.** Pronotal carina strong, extending to the procoxa; rough integument with dense punctures 0.5pd; pronotal lobe swollen and smooth with punctures spaced 1.5pd. **Scutum.** Wider than long; anterior margin straight; smooth integument with punctures >1pd, unpunctured posterior to the midline; tegulae smooth. **Scutellum.** Axillae and scutellar center slightly produced anteriorly; integument with dense punctures <1pd. **Propodeum.** Metapostnotum with regular longitudinal striations that do not extend past the center, except for a central stria spanning the basal area; reticulate integument; lateral propodeum smooth with dense punctures <1pd apart. **Legs.** Procoxa with an anterior projection; tibiae widened in the center; femora and tibiae smooth with punctures >2pd apart. **Metasoma.** Graduli on T2-5, with the final gradulus incomplete at the center; T1 narrow at the apex, smooth with a submarginal line of fine punctures <1pd apart; T2-3 smooth with punctures >1pd apart; T4-7 rugulose with fine, dense punctures; T7 trapezoidal with a central projection (Fig. 1E); sternites smooth with scattered punctures >1pd apart; pre-apical margin of S5 with two lateral processes (Fig. 1D); S6 and genital capsule as in Figure 1F-G.

Female. *Latet.*

Variation. Male polymorphism occurs gradually; the designated holotype represents the individual with the largest head size found. The remaining males exhibit variable head widths ranging from 2.7 mm to 3.4 mm, and a length ranging from 1.02 mm to 1.1 mm. The male with the smallest head also displays a metallic green coloration with yellow reflections (Fig.2).

Material Examined. (6 males): HOLOTYPE. MEXICO: Veracruz, Coatepec, Bosque Briones, 28x2023, 19.510977, -96.946382; 1450 m, ex *Dahlia coccinea*, Quintos-Andrade, G. & González, H. (ECOAB). PARATYPES. Three males with same data as holotype, collected at 20xi2024 (IEXA). ADDITIONAL SPECIMENS. Huatusco, Las Cañadas, área de restauración pasiva, Borde de Camino, 24v2018, 19.1916, -96.9774, 1,399 m, PA. González-Vanegas and G. Sánchez (IEXA) Xalapa, Quinta Briones, 14vi2016, 19.512383, -96.948752, 1400 m, P. Gonzalez and S. Ospina (IEXA). Xalapa, INECOL, Camino al Campus 1, 8vii2024, 19.5132, -96.9432, 1400 m, specimen found crushed, G. Quintos-Andrade (IEXA).

Distribution. To date, this species is known from a small area in central Veracruz, characterized by original cloud forest vegetation, in the municipalities of Coatepec, Xalapa and Huatusco. It is hypothesized that the species may also occur in other nearby areas with similar vegetation (Thiago Mahlmann, *pers. comm.*), potentially in regions surrounding the Cofre de Perote and Pico de Orizaba.

Etymology. This species is dedicated to Dr. Jorge E. Valenzuela González for his contributions to the knowledge of diverse insect groups, primarily ants and bees, and in gratitude for his support as a mentor over more than six years of collaboration.

DISCUSSION

Within the subgenus *Ceratina* (*Calloceratina*), this species is similar to those in the *Chloris* species group (Mahlmann *et al.* 2023) due to its uniform coloration over much of the body, large size and well-developed preoccipital carina. However, the members of this species group are known only from South America, so *C. valenzuelai* sp. nov. could represent the northernmost record of this group or potentially a different species group. Due to this uncertainty, the inclusion of this species within the *Chloris* group was not made in this work. This species has been collected between June and November, and the only plant it has been associated with is *Dahlia coccinea* (Asteraceae).

Ceratina valenzuelai sp. nov. exhibits an aberrant head morphology for the genus. The presence of large heads in *Ceratina* species from the Americas has only been reported in *C. capitosa* Smith of the subgenus *C. (Zadontomerus)*, which is also found in Mexico (Flórez-Gómez *et al.* 2022). However, the modified mandibles of *C. valenzuelai* have not been reported in other species. Mandibles in *Ceratina* are typically useful for females in nest construction; there are few reports of male involvement in nest building or care (see Mikát *et al.* 2021; Oppenheimer *et al.* 2021). Thus, the morphology of these structures may play a role in courtship, as observed in other bee species with large heads (Kukuk *et al.* 1988; Houston and Maynard 2012). Despite the sampling effort, no females were found. It is likely that females are similar to males in coloration and structures such as body punctation, metapostnotum ornamentation, and the graduli in T2-5, as seen in other species of the subgenus (Mahlmann *et al.* 2023).

ACKNOWLEDGEMENTS

I thank Osseily Hanna for his support in providing the photographic equipment and to Héctor González for his assistance in the field. I thank the curators Viridiana Vega-Badillo from IEXA, and Remy Vandame from ECOAB collections for their support in the specimen review. Also, thanks to Thiago Mahlmann, José Luis Navarrete Heredia and the anonymous reviewers for their valuable comments and recommendations. I am also grateful for a fellowship from the Consejo Nacional de Humanidades, Ciencias y Tecnologías (CONAHCYT).

LITERATURE CITED

Ayala, R., T. L. Griswold y D. Yanega. 1996. Apoidea (Hymenoptera). (pp. 423-464). En: Llorente J., García-Aldrete A. N., y González Soriano E. (Eds.). *Biodiversidad, taxonomía y biogeografía de artrópodos de México: Hacia una síntesis de su conocimiento I*. Uni-

versidad Nacional autónoma de México. Instituto de Biología, México, DF.

- Flórez-Gómez, N., R. Ayala, I. Hinojosa-Díaz, and J. J. Morrone. 2022. The neotropical species of small carpenter bees of the subgenus *Ceratina* (*Zadontomerus*) Ashmead, 1899 (Hymenoptera: Apidae). *Zootaxa*, 5214(2): 189-223.
- Friese, H. 1925. Neue neotropische Bienenarten, zugleich II. Nachtrag zur Bienenfauna von Costa Rica (Hymenoptera). *Stettiner entomologische Zeitung*, 36(2): 1-141.
- Gonzalez, V. H., E. Moreno, and M. H. Richards. 2004. Nesting biology of a neotropical bee, *Ceratina mexicana currani* Schwarz (Hymenoptera: Apidae: Xylocopinae). *Journal of the Kansas Entomological Society*, 77(1): 58-60.
- Houston, T. F., and G. V. Maynard. 2012. An unusual new paracolletine bee, *Leioproctus (Ottocolletes) muelleri* subgen. and sp. nov. (Hymenoptera: Colletidae): with notes on nesting biology and in-burrow nest guarding by macrocephalic males. *Australian Journal of Entomology*, 51(4): 248-257.
- Kukuk, P. F., and M. Schwarz. 1988. Macrocephalic male bees as functional reproductives and probable guards. *Pan-Pacific Entomologist*, 64: 131-137.
- Mahlmann, T., F. F. de Oliveira, and M. L. de Oliveira. 2023. Taxonomy of South American species of *Ceratina* (*Calloceratina*) Cockerell, 1924 with comments on new species-groups proposed for this subgenus (Apidae: Xylocopinae). *EntomoBrasilis*, 16(e1062): 1-14.
- Michener, C. D. 2007. *The Bees of the World*. Johns Hopkins University Press, Baltimore.
- Mikát, M., Matoušková, E., and Straka, J. 2021. Nesting of *Ceratina nigrolabiata*, a biparental bee. *Scientific Reports*, 11(5026): 1-13.
- Moure, J. S. 2007. Xylocopini Latreille, 1802. (pp. 637-674). In: Moure, J. S., D. Urban, G. A. R. Melo (Eds.) *Catalogue of Bees (Hymenoptera, Apoidea) in the Neotropical Region*. Sociedade Brasileira de Entomologia, Curitiba.
- Oliveira, F. F. de, L. R. de Sousa Silva, F. C. V. Zanella, C. T. Garcia, H. L. Pereira, C. Quaglierini, and C. M. Pigozzo. 2020. A new species of *Ceratina* (*Ceratinula*) Moure, 1941, with notes on the taxonomy and distribution of *Ceratina* (*Ceratinula*) *manni* Cockerell, 1912, and an identification key for species of this subgenus known from Brazil (Hymenoptera, Apidae, Ceratinini). *ZooKeys*, (1006): 137-165.
- Oppenheimer, R. L., and S. M. Rehan. 2021. Inclusive fitness of male and facultatively social female nesting behavior in the socially polymorphic bee, *Ceratina australensis* (Hymenoptera: Xylocopinae). *Annals of the Entomological Society of America*, 114(5): 627-636.
- Rehan, S. M., and M. H. Richards. 2010. Nesting biology and subsociality in *Ceratina calcarata* (Hymenoptera: Apidae). *The Canadian Entomologist*, 142(1): 65-74.

Rehan, S. M., T. W. Chapman, A. I. Craigie, M. H. Richards, S. J. Cooper, and M. P. Schwarz. 2010. Molecular phylogeny of the small carpenter bees (Hymenoptera: Apidae: Ceratinini) indicates early and rapid global dispersal. *Molecular Phylogenetics and Evolution*, 55(3): 1042-1054.

Sless, T. J., M. G. Branstetter, M. Mikát, K. A. Odanaka, K. B. Tobin, and S. M. Rehan. 2024. Phylogenomics and biogeography of the small carpenter bees (Apidae: Xylocopinae: *Ceratina*). *Molecular Phylogenetics and Evolution*, 198(108133): 1-9.

Recibido: 6 de agosto de 2024

Aceptado: 26 de noviembre de 2024

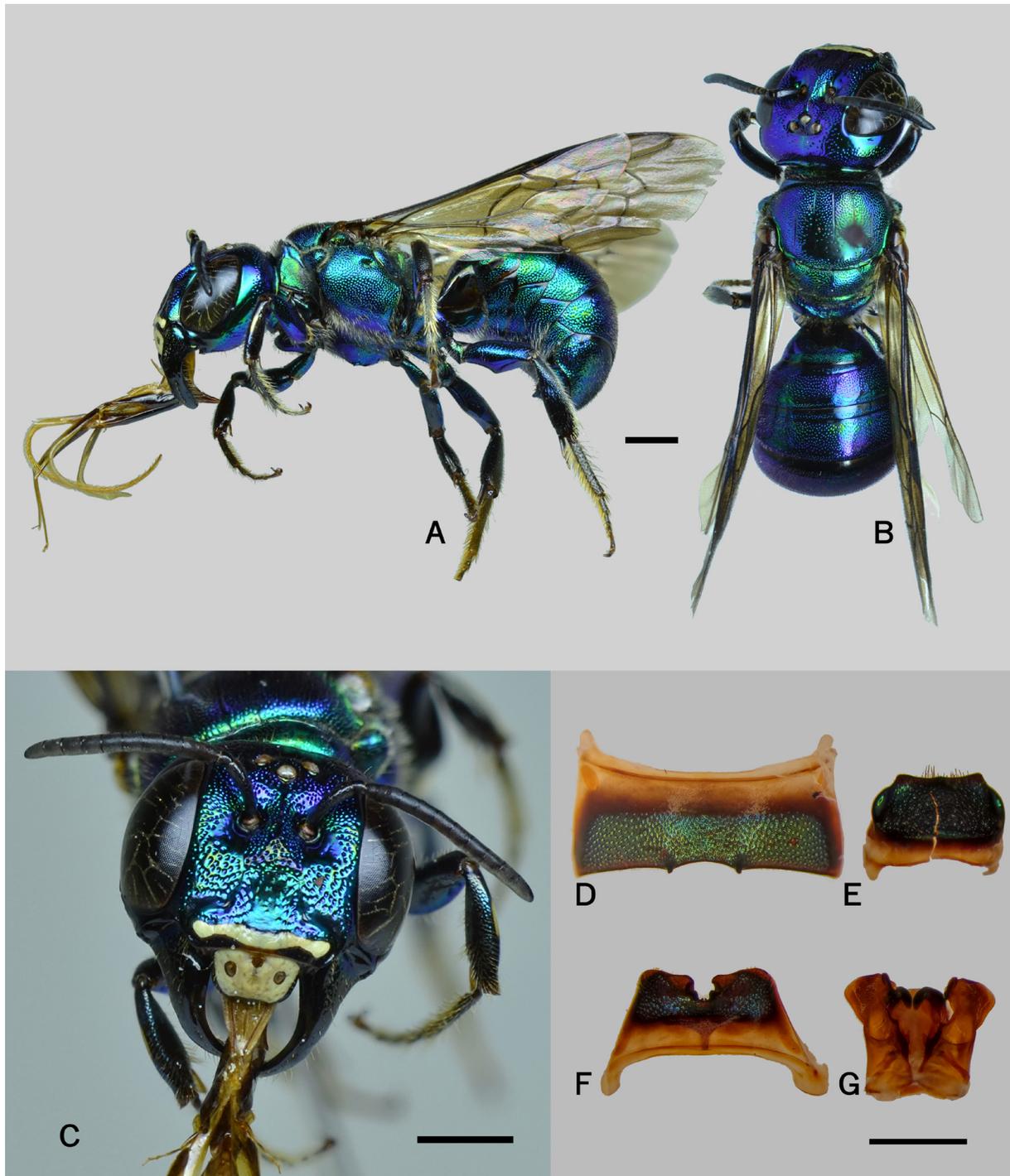


Figure 1. *Ceratina valenzuelai* sp. nov. Habitus of the male holotype in A) lateral, B) dorsal and C) frontal view; D-G) terminal structures from a paratype specimen: D) S5, E) T6, F) S6 and G) genital capsule view. Scale bar 1 mm.



Figure 2. *Ceratina valenzuelai* sp. nov. Habitus of the male paratype with the smallest head in A) lateral, B) dorsal and C) frontal view. Scale bar 1 mm.