

Journal of Insect Biodiversity



ISSN: 2147-7612

RESEARCH ARTICLE

A new species of the genus *Mahanarva* Distant, 1909 (Hemiptera: Cercopoidea: Cercopidae), with a key to the species from Central America and Mexico

Ulises Castro–Valderrama¹, Daniel C. Peck², Gervasio Silva Carvalho³, Jorge Manuel Valdez–Carrasco¹, Jesús Romero–Nápoles^{1*}

¹Colegio de Postgraduados, Campus Montecillo. Km 36.5, Carretera México-Texcoco, C.P. 56230, Texcoco, Edo. de México, México; ²BioWorks, Inc., 100 Rawson Rd., Victor, NY 14564, USA; ³Pontifícia Universidade Católica do Rio Grande do Sul, Escola de Ciências, Programa de Pós-Graduação em Zoologia, Laboratório de Entomologia. Av. Ipiranga, 6681, CEP 90619-900, Porto Alegre, RS, Brazil;

*Corresponding author: romero.napoles.jesus@gmail.com

[urn:lsid:zoobank.org:pub:C3F43E62-7A5E-4E09-A34C-9940BD8AE5B0](https://zoobank.org/pub/C3F43E62-7A5E-4E09-A34C-9940BD8AE5B0)

¹[urn:lsid:zoobank.org:author:3A3F8A68-24B9-44F5-B6F8-FD5592D69496](https://zoobank.org/author/3A3F8A68-24B9-44F5-B6F8-FD5592D69496)

²[urn:lsid:zoobank.org:author:4ECCC358-0A8D-43AC-A5AA-FEFD0ADA3E43](https://zoobank.org/author/4ECCC358-0A8D-43AC-A5AA-FEFD0ADA3E43)

³[urn:lsid:zoobank.org:author:526BBD73-DF57-46F6-87F9-5121C5C584CE](https://zoobank.org/author/526BBD73-DF57-46F6-87F9-5121C5C584CE)

Abstract: The genus *Mahanarva* Distant, 1909 (Hemiptera: Cercopoidea: Cercopidae) currently includes two subgenera: *Mahanarva* Distant, 1909 with 38 species and six subspecies, and *Ipiranga* Fennah, 1968 with nine species. The *Manaharva* species are all from the Americas, and a few species are important pests in pasture grasses and sugarcane. There are no reports of any *Manaharva* species from North America, including Mexico and areas to the north. Here, a new species is described from Mexico and a key to the species of *Mahanarva* from Central America and Mexico is proposed.

Key words: *Maharnava*, *Ipiranga*, *Heliconia*, pasture grasses, sugarcane, Spittlebug.

Introduction

The genus *Mahanarva* was established by Distant (1909) with two species, *M. indicata* Distant, 1909 as the type species, and *M. uniformis*, now transferred to the genus *Deois* (Fennah 1968). Fennah (1968) created two subgenera for this genus: *Mahanarva*

Distant, 1909 and *Ipiranga* Fennah, 1968. According to Fennah (1968), Paladini & Carvalho (2007), and Paladini & Cavichioli (2014), the characters to identify the subgenus *Ipiranga* are the following: the postclypeus slightly convex, the rostrum short and not reaching the mesocoxae, and ratio of the tegmina length to width 3.3–3.7: 1.0 (the narrow tegmina). Meanwhile, the subgenus *Mahanarva* in lateral view has the postclypeus inflated, convex and angulate, similar to *Zulia* Fennah, 1949 and *Sphenorhina* Amyot & Serville, 1843 (more evident in females than males), the rostrum reaching the mesocoxae, and ratio of the tegmina length to width 3.0: 1.0 (the wide tegmina). Usually, in both subgenera the pygofer has a lateral process between the anal tube and the subgenital plates, with subgenital plates long and apex acute. The subgenus *Ipiranga* currently has nine species and *Mahanarva* 38 species and six subspecies, the latter belonging to *M. tristis* (Carvalho & Webb 2005; Paladini & Carvalho 2007, 2008; Paladini & Cavichioli 2014). In the recent phylogenetic study for the Neotropical spittlebugs based on morphological characters, the subgenera *Mahanarva* and *Ipiranga* were established as separate clades (Paladini *et al.* 2015).

There are three species reported from Central America: *Mahanarva* (*s. str.*) *costaricensis* (Distant, 1879) in Costa Rica, Panama, and Nicaragua, *M. (s. str.) stygia* (Fowler, 1897) in Costa Rica, and *M. (s. str.) insignita* (Fowler, 1897) in Costa Rica and Panama (Thompson 1997, Carvalho & Webb 2005). Thompson (1997) reported that the nymphs of *M. (s. str.) costaricensis* and *M. (s. str.) insignita* live in water accumulated in the bracts of *Heliconia*, so that their nymphs are semi-aquatic. The other *Mahanarva* species are recorded in South America and a few species are important pests in pasture grasses and sugarcane (Mendonça 2001; Mendoza 2001; Peck *et al.* 2004; Garcia 2013).

There is no published record of *Mahanarva* from north of Central America. Now, a new species from Mexico is described and a key to species from Central America and Mexico is proposed.

Material and methods

The specimens were examined from the Colección Nacional de Insectos del Instituto de Biología de la UNAM, Ciudad de México (CNIN), Estación de Biología Tropical Los Tuxtlas-UNAM (EBTLT), Colección de Insectos del Centro de Referencia-SENASICA (CECR), and the American Museum of Natural History (AMNH). The identifications were made based on available taxonomic papers related to *Mahanarva* (Fowler 1897; Distant 1909; Fennah 1968; Carvalho & Webb 2005; Costa & Sakakibara 2002; Paladini & Carvalho 2007; Paladini & Cavichioli 2014). The genitalia were detached from the abdomen and clarified in 10% KOH solution for 12–24 hours. KOH was neutralized with acetic acid and the cleared genitalia were washed with distilled water. Finally, the genitalia were stored in microvials with glycerin. The photographs of genitalia were taken with a Zeiss® SteREO Discovery, V20 and images captured with AxioCam IC-ZEN 2 lite software. Adult photographs were taken with a digital Olympus® E-620 camera attached to an Olympus SZX7 stereoscope and images captured with Olympus Studio 2.22 software. The images were stacked with Combine ZP free software and edited with GIMP 2.8.14 free software. The morphological terminology follows Fennah (1949, 1968), Hamilton (1977), and Paladini *et al.* (2015). The taxonomic key was elaborated with external morphology focused on the color pattern of the tegmina.

Results

Mahanarva (s. str.) jurael Castro–Valderrama, Carvalho & Peck sp. nov.

urn:lsid:zoobank.org:act:D2EC4DFA-121D-431B-AC45-108EEF5A342B

Male. Lateral view length 17.66 ± 0.35 mm (n=2); dorsal view width of the head 3.29 ± 0.03 mm (n=2). Dorsal view (Fig. 1A). Head triangular, merged with the pronotum, black with black setae; anterior margins, between eyes and tylus red and without setae; compound eyes rounded, red with black tints; vertex with median carina that originates in the posterior margin of the head and extends to the tylus; between eyes and carina on vertex there is a small depressed zone, long, and without setae; posterior margin of head black, except behind eyes where it is red; ocelli red, one separated from the other by the width of an ocelli; tylus quadrangular, black, with median carina. Pronotum black, anterior lateral margin red, punctate, hexagonal, without carina, with whitish and blackish setae; anterior zone with irregular depressed area, one in each side; anterior margin and lateral anterior margin straight; lateral posterior margin slightly grooved and humeral angle red; posterior margin grooved with a delicate red stripe (not perceptible to the naked eye); scutellum black. Lateral view (Fig. 1B). Postclypeus black, convex, angulate, lateral grooves marked; pronotum with no curve; tegmina long, black, with thick red lines, one on the clavus and two on the remigium; the last two, extend to three quarters of the tegmina, one parallel to claval suture and other on costal vein. Ventral view (Fig. 1C). Postclypeus inflated, from the edge of the tylus, with a reddish carina that becomes black toward the end of postclypeus; rostrum black and reaching the mesocoxae; anteclypeus black; antennae with scape and pedicel reddish-brown, setae on pedicel scarce, flagellum reddish-brown, basal body of the flagellum ovoid, smaller than the pedicel and with an arista. Thorax with hind wing transparent light brown, dark brown venation, and black setae on both faces; prosternum and mesosternum black; metasternum black with reddish; legs black, posterior tibiae with two lateral spines and an apical crown with two rows of spines, 17-18 in total, basal spine smaller than the distal spine (two times larger), basal spine with the same length as the spines in the apical crown; basitarsus with three rows of spines and some setae. Abdomen black, but the posterior edges of each sternite with some red.

Genitalia. Pygofer in lateral view, a triangular process between anal tube and subgenital plates, the base wide and the tip rounded, projecting forward to space between anal tube and the subgenital plates; dorsal margin curved, with an acute process; ventral margin straight, the tip curved upward, subgenital plates with the same width in the two basal thirds, the last third tapered (Figs. 1D-E); subgenital plates in ventral view, wide, the same width almost as its entire length, except in the tip, which is rounded; parameres short (Fig. 1F). Paramere in external view, rhomboidal shape, dorsal margin with thick setae at middle, depressed in the middle third, distal third with thin setae and an acute chitinized spine; ventral margin without setae, lateral side with a thick process, and thin and short setae (Fig. 1G). Paramere in internal view, with the lateral side smooth (Fig. 1H). Aedeagus in anterior view, violin-shaped (Fig. 1I); in lateral view arched, long, cylindrical, at the middle with two spine-like processes, long, slender and chitinized (Fig. 1J).

Female. Lateral view length 20.39 ± 0.10 mm (n=4); dorsal view width of the head 3.87 ± 0.17 mm (n=4). Similar color patterns to male, but body larger, and abdomen black, without any red tint (Figs. 2A-C).

Type material: Holotype, ♂, MEXICO, Veracruz, Los Tuxtlas, 13/V/1985, L. Cervantes (HOM-TIP-92, CNIN). Paratypes, MEXICO: 1♀, Veracruz, 14/VI/1969, C. Beutelspacher

B., on platanillo (HOM-TIP-93, CNIN); 1♂, Veracruz, 1968, J. Ramos Elorduy de Conconi (HOM-TIP-93, CNIN); 1♀, Veracruz, 14/VI/1969, C. Beutelspacher B., on Platanillo (HOM-TIP-93, CNIN); 2♀♀, Veracruz, Est. Biol. Ver., 22/VI/1964, C. Beutelspacher B. (HOM-TIP-93, CNIN); 1♀, Veracruz, Estación Biológica Los Tuxtlas, 11/VI/1986, 170 m, A. Ibarra (EBTLT); 1♀, Veracruz, Estación Biológica Los Tuxtlas, 20/VII/1986, 160 m, A. Ibarra (EBTLT); 1♂, Veracruz, Estación Biológica Los Tuxtlas, El Vigía, TM, 25/V/1986, 480 m, P. Sinaca (EBTLT); 1♀, Veracruz, Tecolapa, 27/V/1951, A. Barrera (CECR); 1♀, Veracruz, Tecolapa, 27/V/1951, I. Bassols (CECR); 5♀♀, Chiapas, Chajul, 2017, Julio Medin (AMNH).

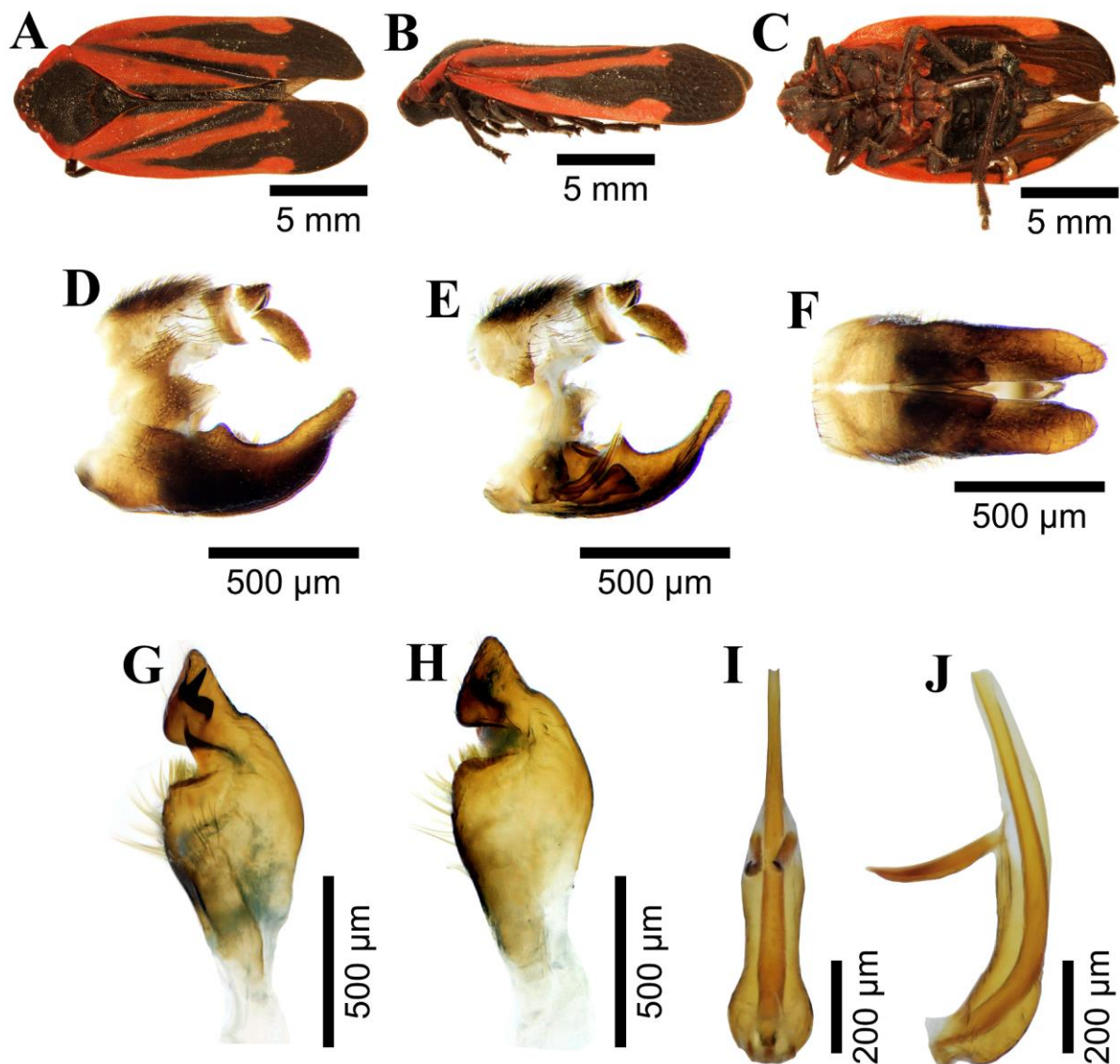


Figure 1. Adult male of *Mahanarva jurael* sp. nov. (holotype). **A**, dorsal view; **B**, lateral view; **C**, ventral view. Pygofer: **D**, lateral view of external genitalia; **E**, lateral view of internal genitalia. Subgenital plates: **F**, ventral view. Paramere: **G**, lateral external view; **H**, lateral internal view. Aedeagus: **I**, anterior view; **J**, lateral view.

Etymology: This species is named for our colleague and collector Julieta Ramos Elorduy de Conconi. The specific epithet is a noun in apposition to *Mahanarva*. It was formed for the first two letters of the first name, middle name, and last name.

Distribution: Mexico (Veracruz and Chiapas).

Remarks: This species is characterized by the thick red lines, one on the clavus and two on the remigium; the last two, extend to three quarters of the tegmina, one parallel to claval suture and other on costal vein; also the structures in male genitalia are unique.



Figure 2. Adult female of *Mahanarva jurael* sp. nov. **A**, dorsal view (the color of the right tegmen was edited); **B**, lateral view; **C**, ventral view.

Key to males of the species of *Mahanarva* Distant 1909 from Central America and Mexico

1. Tegmina background brownish or almost black *M. (s. str.) stygia* (Fowler)
- Tegmina background black, but with some spots, points or lines with different colors ... 2
2. Tegmina with two or three spots on the base and five in the rest, the spots variable in size..... *M. (s. str.) costaricensis* (Distant)
- Tegmina with lines and spots or only lines 3
3. Tegmina with a line near the claval suture and joined with two spots, another line joined with three spots on the costa, this line continues around the tegmina, and a spot on the clavus *M. (s. str.) insignita* (Fowler)
- Tegmina with thick lines, one on the clavus and two on the remigium; the last two, extend to three quarters of tegmina, one parallel to claval suture and the other on costal vein *M. (s. str.) jurael* sp. nov.

Discussion

As *Mahanarva (s. str.) jurael* sp. nov. has the narrow tegmina in which the length is longer than the width, it could be placed in the subgenus *Ipiranga*; however, we put it in the subgenus *Mahanarva* because in lateral view the postclypeus is convex, the paramere is similar to other species of the subgenus, and the rostrum reaches to the mesocoxae. We considered these three morphological characters to be more important in separating the subgenera than the proportions of the tegmina. This species probably has the same behavior as *M. (s. str.) insignita* and *M. (s. str.) costaricensis* because two females were collected on “platanillo”, the common name for *Heliconia* plants in some parts of Mexico. The species

was found only in the area Los Tuxtlas, Veracruz, and Chajul, Chiapas, but probably the five females in AMNH were collected from El Parque Nacional Montes Azules across the river in Chajul. Nevertheless, it is probable that this species occurs in the lowlands of Veracruz, Tabasco, and Chiapas State with the same vegetation as Los Tuxtlas and Parque Nacional Montes Azules. The female insects had fungi, which probably caused the colors of the tegmina to deteriorate (Fig. 2).

Acknowledgements

We thank the individuals and institutions that loaned material of *Mahanarva* species: Cristina Mayorga, Co-curator at the Colección Nacional de Insectos, Instituto de Biología, UNAM (CNIN); Martha Madora-Astudillo, Curator at the Colección Nacional de Insectos-Estación Biológica Trópica Los Tuxtlas-UNAM (EBTLT); and Héctor Enrique Vega Ortiz, Curator Colección de Insectos del Centro de Referencia-SENASICA (CECR). Dr. Vinton Thompson contributed valuable comments and suggestions. This research was funded by the Consejo Nacional de Ciencia y Tecnología (CONACYT), grant # 308701 given to the first author.

References

- Carvalho G. S. & Webb M. 2005.** *Cercopid Spittlebugs of the New World (Hemiptera: Auchenorrhyncha: Cercopidae)*. Pensoft. Sofia - Moscow. 271 pp.
- Costa A. C. F. da & Sakakibara A. M. 2002.** Reestruturação do gênero *Deois* Fennah; descrição de um novo gênero e de novas espécies (Homoptera, Cercopidae, Tomaspinae). *Revista Brasileira de Entomologia* 46(2): 195–207.
- Distant W. L. 1909.** XXII–Rhynchotal notes–XLVI, *Journal of Natural History*. Series 8: 187–213. <https://hemiptera-databases.org/coolpdf/1728.pdf>
- Fennah R. G. 1949.** New genera and species of Neotropical Cercopoidea (Homoptera). *Annals and Magazine of Natural History* 12(1): 605–620.
- Fennah R. G. 1968.** Revisionary notes on the new world genera of cercopid froghoppers (Homoptera: Cercopoidea). *Bulletin of Entomological Research* 58: 165–190.
- Fowler W. W. 1897.** Order Rhynchota. Suborder Hemiptera-Homoptera. *Biologia Centrali-Americana*, 1894–1909, 2 (1): v-xii, 1-339 + plates 1–21. <http://www.biodiversitylibrary.org/item/14633#page/198/mode/1up>
- Garcia J. F. 2013.** Manual de Identificação das Pragas da Cana. <https://pt.slideshare.net/mariakatiane/manual-de-identificao-das-pragas-da-cana>
- Hamilton K. G. A. 1977.** Review of the world species of *Prosapia* Fennah (Rhynchota: Homoptera: Cercopidae). *Canadian Entomologist* 109(4): 621–630.
- Mendonça A. F. 2001.** Manejo integrado del salivazo de la raíz de la caña de azúcar. *Mahanarva fimbriolata* en Brasil. *Memorias del I Taller Latino Americano sobre plagas de la Caña de Azúcar*. Guayaquil, nov. 28–30. Aeta-Atalac: 48–55.
- Mendoza J. R. 2001.** Bioecología del Salivazo de la caña de azúcar, *Mahanarva andigena* (Hom: Cercopidae) en el Ecuador. *Memorias del I Taller Latino Americano sobre plagas de la Caña de Azúcar*. Guayaquil, nov. 28–30. Aeta-Atalac: 40–47.
- Paladini A. & Carvalho G. S. 2007.** Descrição de tres novas espécies de *Mahanarva* (Hemiptera: Cercopidae: Ishnorhininae). *Iheringia Serie Zoologia* 97(1): 57–63.
- Paladini A. & Carvalho G. S. 2008.** Revisão taxonômica de *Kanaima* Distant (Hemiptera: Cercopidae: Ishnorhininae). *Revista Brasileira de Entomologia* 53(3): 311–325.

- Paladini A. & Cavichioli R. R. 2014.** Taxonomic notes on *Mahanarva (Ipiranga)* (Hemiptera, Cercopidae) with description of a new species. *Zootaxa* 3861(5): 479–486.
- Paladini A., Takiya D. M., Cavichioli R. R. & Carvalho G. S. 2015.** Phylogeny and biogeography of Neotropical spittlebugs (Hemiptera: Cercopidae: Ishnorhininae): revised tribal classification based on morphological data. *Systematic Entomology* 40: 82–108.
- Peck D., Rodríguez Ch. J. & Gómez L. A. 2004.** Identity and first record of the spittlebug *Mahanarva bipars* (Hemiptera: Auchenorrhyncha: Cercopidae) on sugarcane in Colombia. *Florida Entomologist* 87(1): 83–84.
- Thompson V. 1997.** Spittlebug nymphs (Homoptera: Cercopidae) in Heliconia flowers (Zingiberales: Heliconiaceae): Preadaptation and evolution of the first aquatic Homoptera. *Revista de Biología Tropical* 45(2): 905–912.

Correspondence: Jesús Romero–Nápoles, e-mail: romero.napoles.jesus@gmail.com

Received: 06.12.2017 **Accepted:** 05.02.2018 **Published:** 26.02.2018

Cite paper: Castro–Valderrama U., Peck D. C., Carvalho G. S., Valdez–Carrasco J. M. & Romero–Nápoles J. 2018. A new species of the genus *Mahanarva* Distant, 1909 (Hemiptera: Cercopoidea: Cercopidae), with a key to the species from Central America and Mexico. *Journal of Insect Biodiversity* 6(2): 1–7.

<http://dx.doi.org/10.12976/jib/2018.6.2>

<http://www.insectbiodiversity.org>