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A new genus of Cicadellini (Hemiptera: Cicadellidae) from the Oaxacan Cloud Forest, with taxonomic notes on allied red-striped genera

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Abstract. Cicadellinae is a relatively large subfamily of leafhoppers (Hemiptera: Cicadellidae) with a cosmopolitan distribution with most genera known to occur in the Neotropics. Mexico houses nearly 16% of the total genera and most are endemic, inhabiting threatened native forests. Here, a new unusual Mexican genus, *Christopherus* gen. nov., is described to accommodate a new species of Cicadellini, *C. mictlantecuhtli* sp. nov., collected in the endangered Cloud Forest of Sierra Juárez, Oaxaca State of Mexico, based on dry-pinned museum specimen data. The new taxa can be separated from other Neotropical Cicadellini genera easily using male genitalia features: (i) pygofer without processes, (ii) segment 10th without processes, (iii) paraphysis absent, and (iv) edeagus with single basal atrial process elongate and asymmetrical. The monotypic genus *Gillonella* with its type species, *G. ampulla* Nielson & Godoy, 1995, are redescribed. A detailed extensive morphological description and discussion to distinguish the new genus from allied red-striped Neotropical genera in Mexico, Central America, and South America are given. Distributional data for new taxa within Mexican forests is also provided.

Keywords. Membracoidea, Neotropical, Mexico, Sierra Madre del Sur, new taxa.

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Introduction

Leafhoppers (Hemiptera: Cicadellidae), the largest insect family of the order Hemiptera, comprise more than 25 000 described species distributed in terrestrial ecosystems (Dietrich 2005). All leafhoppers feed directly on the vascular fluids of host plants and the subfamily Cicadellinae Latreille, 1825, widely known as 'sharpshooters', are efficient xylem-feeders with economic importance worldwide due to their ability to transmit xylem-borne plant pathogens to important common crops destined for human consumption and forage (Nielson 1968; Bartlett *et al*. 2018).

Sharpshooters currently include more than 2400 described species grouped into 330 genera as part of two diverse tribes, Cicadellini Latreille, 1825, and Proconiini Stål, 1869, mostly distributed in tropical realms (Young 1968, 1977; Dietrich 2005; Wilson & Turner 2007). The largest cosmopolitan tribe, Cicadellini, includes 2108 described species in ~271 genera, of which ~160 are found in the New World, mostly in the tropics (Young 1977; Bartlett *et al*. 2018). Mexico harbors 43 genera (~16% of total known) broadly dispersed over all bioregions including several types of tropical, temperate, or seasonal forests that may represent the centers of distribution of some genera (Dietrich 1994; Blanco-Rodríguez & Pinedo-Escatel 2022).

Cicadellinae Latreille, 1825 leafhoppers are relatively well documented throughout most of tropical America, with several recent authors having substantially increased the number of taxa known from different ecosystems (Quintas *et al*. 2020, 2022; Felix *et al*. 2022; Froza & Mejdalani 2022; Mejdalani *et al*. 2022). Brazilian researchers have been leading new species discovery and description of leafhoppers in this region in recent years (Domahovski 2021; Camisão & Dietrich 2022; Da-Silva *et al*. 2022; Domahovski & Cavichioli 2022; Gonçalves & Viegas 2022). In Mexico, few recent attempts have been made to document the sharpshooter fauna due to the smaller number of researchers devoted to the Mexican fauna (Blanco-Rodríguez *et al*. 2015, 2022; Blanco-Rodríguez & Pinedo-Escatel 2022).

Herein, based on a study of pinned museum specimens, we describe a new genus of Cicadellini apparently very narrowly distributed in the Oaxacan Cloud Forest of Mexico. The new genus exhibits similar features to some Neotropical genera, especially to the closely related Costa Rican genus *Gillonella* Nielson & Godoy, 1995, which is redescribed here to enhance differentiation. This unusual new monotypic leafhopper genus inhabits an endangered forest. Its discovery highlights the uniqueness of the biota of this region and may be useful to promote protection of the integrity of such forests, which are under constant threat from deforestation (Pinedo-Escatel *et al*. 2021a). The limited available material may further reflect declines in forest-dwelling Mexican leafhoppers documented by a previous study (Pinedo-Escatel *et al*. 2021b).

Material and methods

Terminology for head and thorax follows Dietrich (2005), wing venation is based on Young (1968), whereas Rakitov (1998) is followed for leg chaetotaxy. Male abdomens were removed and cleared following Oman's (1949) protocol except for an increase in heating time to 20 minutes and neutralizing the remaining KOH solution with acetic acid after washing with water. Abdomens and dissected genitalia are stored in glycerin in microvials pinned beneath the specimen. Pinned specimen labels are quoted verbatim. The total length was measured using an ocular micrometer mounted to the stereo microscope. Digital habitus photographs were taken using a camera mounted on a Carl Zeiss stereo microscope Stemi 2000c, images from multiple focal planes were stacked using Zerene Stacker software.

A distributional map created for the new genus is based on Mexican cartographic data with the Mexican biogeographic regionalization proposed by Morrone *et al*. (2017), all mapped points were generated and referenced using information from the specimens deposited in the institutions below. Table 1 includes

records from literature for Mexican Cicadellini, mostly retrieved from Oman (1949), Metcalf (1964), Young (1977), with additions from Nielson (1968), Dietrich (1994), McKamey (2001), and Blanco-Rodríguez & Pinedo-Escatel (2022).

All studied material is deposited at the Illinois Natural History Survey, University of Illinois at Urbana-Champaign, Champaign, USA (INHS); the California Academy of Sciences, San Francisco, USA (CAS); the Museo Nacional de Costa Rica, San José, Costa Rica (MNCR); and the Museo de Zoología de la Universidad de Costa Rica, San José, Costa Rica (MZUCR).

Results

Class Insecta Linnaeus, 1758
Order Hemiptera Linnaeus, 1758
Suborder Auchenorrhyncha Duméril, 1806
Family Cicadellidae Latreille, 1825
Subfamily Cicadellinae Latreille, 1825
Tribe Cicadellini Latreille, 1825

Genus ***Christopherus*** gen. nov.
urn:lsid:zoobank.org:act:6BF11A96-6F1D-4ABB-B039-8BE587731FB7
Figs 1–8

Type species

Christopherus mictlantecuhtli sp. nov., here designated.

Diagnosis

Slender-sized and moderately elongated leafhoppers with overall body coloration red with longitudinal black stripes running from head to tips of wings. Crown acutely projected; surface striated anteriorly. Pronotum much wider than head, lateral margins weakly carinate, posterior margin weakly concave. Forewing macropterous, without extra crossveins. Male pygofer rounded, without processes. Segment 10th without processes. Subgenital plates divergent in ventral view. Connective long, extending beyond apex of style by one third of its total length; arms narrow and slightly extended but shorter than stem. Paraphysis absent. Aedeagus with single basal atrial process elongate and asymmetrical.

Etymology

The genus is named in honor of our colleague and friend, Dr Christopher H. Dietrich (Illinois Natural History Survey, USA), for his major contribution to leafhopper systematics. Gender masculine.

Description

Head. Conical, produced anteriorly, 1.3× as wide as mid-length; interocular width of crown 1.5× median length, transocular width 2.1× median length; anterior margin acutely angulate in dorsal view, posterior concavity extended nearly to anterior eye angle; disc elevated in lateral view; with several striations extended from crown to face, cibarial muscle impressions strongly evident near anterior margin, posterior area smooth; ocelli ovate, located somewhat equidistantly between middle line and eyes, closer to posterior margin, and unusually prominent in lateral view; crown in lateral view strongly convex, declivous anteriorly; anterior margin with apex slightly upturned and laterally sinuous (Figs 1–2). Postfrontal sutures distant from ocelli but closer to eye in dorsal view. Antennal ledges, in dorsal view, slightly protuberant, striated; in lateral view below transition of crown to face slightly convex and relatively shallow (Fig. 2). Frontoclypeus with lateral sutures well developed, extending with lateral sutures well developed, extending onto crown, striations distinct over anterior surface

Table 1 (continued on next three pages). Sharpshooter genera in Mexico and known distribution. MTZ = Mexican Transition Zone; * = data records non-specific.

Taxa	Records in Mexico	Range in major Mexican regions	Known distribution
Agrosoma Medler, 1960	Veracruz; Oaxaca; Colima; San Luis Potosí; Tamaulipas; Puebla; Morelos; Nayarit; Guerrero; Ciudad de México; Estado de México	Neotropical; Nearctic; MTZ	Mexico; Guatemala; Honduras; Panama; Costa Rica; Colombia; Ecuador; Venezuela; El Salvador
Allogonia Melichar, 1926	Michoacán; Durango; Ciudad de México, Guerrero; Guanajuato	Neotropical; Nearctic; MTZ	Mexico; USA; Honduras; El Salvador; Costa Rica; Panama
Allonolla Young, 1977	Michoacán; Jalisco; Estado de México	Nearctic; MTZ	Mexico; USA
Amblyscarta Stål, 1869	Veracruz; Chiapas; Oaxaca	Neotropical	Mexico; Guatemala; French Guiana; Colombia; Bolivia; Brazil; Peru; Venezuela; Colombia; Ecuador; Panama; Argentina; Costa Rica; Guyana
Amphigonalia Young, 1977	Jalisco; Puebla; Hidalgo	Endemic to Mexico; MTZ	Mexico
Apogonalia Evans, 1947	Yucatán; Veracruz; Puebla; Nayarit; Morelos; Sinaloa; San Luis Potosí; Sonora; Michoacán; Colima; Ciudad de México; Guerrero; Chiapas; Hidalgo; Oaxaca; Nuevo León	Neotropical; Nearctic; MTZ	Mexico; Guatemala; Costa Rica; Honduras; Nicaragua; Panama; Cuba; Puerto Rico; Haiti; Dominican Republic; El Salvador; Bahamas, Jamaica
Caldwelliola Young, 1977	Veracruz	Neotropical	Mexico; El Salvador; Guatemala; Honduras; Costa Rica; Venezuela; Colombia; Brazil; Peru; Trinidad and Tobago Island
Campecha Melichar, 1925	Michoacán	Endemic to Mexico	Mexico
Chlorogonalia Young, 1977	Veracruz; Michoacán; Ciudad de México: Estado de México; Puebla; Guerrero; Chiapas; Oaxaca; Guanajuato, Morelos; San Luis Potosí	Neotropical	Mexico; Guatemala; El Salvador; Costa Roca; Venezuela; Colombia; Brazil; Panama; Peru; Ecuador
Ciminius Metcalf & Bruner, 1936	*	*	Mexico; Cuba; El Salvador; Panama; French Guiana; Venezuela; Brazil; Bolivia; Argentina; Paraguay; USA
Christopherus gen. nov.	Oaxaca	Endemic to Mexico	Mexico
Cuitlana Young, 1977	Veracruz; Colima; Morelos; Guerrero; Nayarit; Michoacán; Estado de México	Neotropical	Mexico; Guatemala
Decua Oman, 1949	*	*	Mexico; USA

Table 1 (continued). Sharpshooter genera in Mexico and known distribution. MTZ = Mexican Transition Zone; * = data records non-specific.

Taxa	Records in Mexico	Range in major Mexican regions	Known distribution
Diedrocephala Spinola, 1850	Chiapas; Quintana Roo; Yucatán	Neotropical	Mexico; Costa Rica; Panama, Honduras; Brazil; Bolivia; Argentina; Venezuela; Colombia; Peru; Paraguay; French Guiana; Guyana; Suriname
Dilobopterus Signoret, 1850	Veracruz; Quintana Roo; Chiapas; Guerrero; Hidalgo; Michoacán	Neotropical; MTZ	Mexico; Brazil; Bolivia; Peru; Colombia; French Guiana; Panama; Paraguay; Argentina; Uruguay; Ecuador; Venezuela; Guatemala; Costa Rica; Tobago
Draeculacephala Ball, 1901	Nuevo León; Tamaulipas; Zacatecas; San Luis Potosí; Guanajuato; Nayarit; Jalisco; Querétaro; Hidalgo; Puebla; Morelos; Michoacán; Guerrero; Tlaxcala; Aguascalientes; Oaxaca; Chiapas; Veracruz; Tabasco; Campeche; Quintana Roo; Yucatán	Nearctic; MTZ; Neotropical	Mexico; USA; Nicaragua; Canada; Ecuador; Costa Rica; Honduras; El Salvador; Panama; Cuba; Guatemala; Venezuela; Argentina; Belize
Erythrogonia Melichar, 1926	Veracruz; Quintana Roo; Chiapas; Guerrero; Guanajuato; Oaxaca; Jalisco; San Luis Potosí; Yucatán; Campeche; Sinaloa; Nayarit	Neotropical; Nearctic; MTZ	Mexico; Peru; Bolivia; Honduras; Guatemala; El Salvador; Costa Rica; Brazil; Venezuela; Argentina; Colombia; French Guiana; Panama; Paraguay; Trinidad and Tobago; Ecuador; Nicaragua
Fusigonalia Young, 1977	*	*	Mexico; Colombia; Panama; Trinidad and Tobago; Venezuela; Guatemala; Costa Rica; Brazil, Peru; Bolivia
Gorgonalia Young, 1977	San Luis Potosí; Puebla; Ciudad de México	Endemic to Mexico	Mexico
Graphocephala Van Duzee, 1916	Campeche; Hidalgo; Ciudad de México; San Luis Potosí; Sonora; Puebla; Veracruz; Querétaro; Tlaxcala; Guerrero; Oaxaca; Chiapas; Estado de México; Morelos; Durango; Coahuila; Sinaloa; Nayarit; Guanajuato; Nuevo León; Michoacán; Tamaulipas; Zacatecas; Tabasco; Baja California; Chihuahua	Neotropical; Nearctic; MTZ	Mexico; Guatemala; Nicaragua; El Salvador; USA; Costa Rica; Panama; Honduras; Venezuela; Canada; French Guiana

Table 1 (continued). Sharpshooter genera in Mexico and known distribution. MTZ = Mexican Transition Zone; * = data records non-specific.

Taxa	Records in Mexico	Range in major Mexican regions	Known distribution
Graphogonalia Young, 1977	Sinaloa; Jalisco; Quintana Roo; Yucatán; Campeche; Chiapas; Estado de México; Ciudad de México; Oaxaca; Nuevo León; Guerrero; Hidalgo; Nayarit; San Luis Potosí; Tlaxcala; Sinaloa	Neotropical; Nearctic; MTZ	Mexico; El Salvador; Guatemala; Honduras; Costa Rica; Panama; Venezuela; Trinidad and Tobago
Helochara Fitch, 1851	Jalisco	MTZ	Mexico; USA; Canada
Hortensia Metcalf & Bruner, 1936	Quintana Roo; Veracruz; Hidalgo; Oaxaca; Chiapas; San Luis Potosí; Sinaloa	Neotropical; Nearctic; MTZ	Mexico; Panama; French Guiana, Brazil, Guatemala, Honduras
Isogonalia Young, 1977	Veracruz; Estado de México; Morelos; Ciudad de México; Guerrero; Chiapas; Oaxaca	Neotropical; MTZ	Mexico; Honduras; Guatemala; El Salvador; Costa Rica; Panama
Janastana Young, 1977	*	*	Mexico; Costa Rica; Panama; Ecuador; Colombia
Juliaca Melichar, 1951	Tabasco	Neotropical	Mexico; Peru; Bolivia; Ecuador; Colombia; Venezuela; Paraguay; Brazil; Panama; Costa Rica;
Ladoffa Young, 1977	Chiapas; Veracruz; San Luis Potosí; Morelos; Quintana Roo; Yucatán; Puebla	Neotropical	Mexico; Guatemala; Nicaragua; Costa Rica; Panama; Honduras; Argentina; French Guiana; Ecuador; Brazil; Peru; Venezuela; Colombia
Macugonalia Young, 1977	*	*	Mexico; Colombia; Brazil; Peru; Bolivia; Ecuador; Paraguay; French Guiana; Guatemala; El Salvador; Argentina; Panama; Venezuela
Macunolla Young, 1977	Chiapas; Veracruz; San Luis Potosí; Oaxaca	MTZ; Neotropical	Mexico; Guatemala; Honduras; Colombia; Ecuador
Manzutus Oman, 1949	Durango; Hidalgo; Michoacán; Coahuila	Nearctic; Neotropical	Mexico; USA
Naltaca Young, 1977	Puebla	Endemic to Mexico	Mexico
Oragua Melichar, 1926	Chiapas; Yucatán	Neotropical	Mexico; Brazil; Bolivia; Panama; Paraguay; Argentina; French Guiana; Ecuador; Peru; Venezuela; Guatemala; Honduras; El Salvador
Paromenia Melichar, 1926	Chiapas	Neotropical	Mexico; Colombia; Peru; Brazil; Guatemala; Costa Rica; Panama; Bolivia; Venezuela; Ecuador; French Guiana
Plesiommata Provancher, 1889	Nayarit; Oaxaca; Morelos; Veracruz; Jalisco; Guanajuato; Sinaloa; Chiapas; Michoacán; Guerrero	Neotropical; Nearctic; MTZ	Mexico; Costa Rica; Colombia; Panama; Trinidad and Tobago; Venezuela; Brazil; Honduras Guatemala; Bolivia; Ecuador; Costa Rica; El Salvador; Paraguay; Argentina; Bolivia; USA

Table 1 (continued). Sharpshooter genera in Mexico and known distribution. MTZ = Mexican Transition Zone; * = data records non-specific.

Taxa	Records in Mexico	Range in major Mexican regions	Known distribution
Sibovia China, 1927	Tamaulipas; Veracruz; Chiapas; Puebla; Morelos; Michoacán; Guerrero; Yucatán; Campeche; Quintana Roo; Durango; Tabasco; Hidalgo; Jalisco	Neotropical; Nearctic; MTZ	Mexico; Bolivia; Peru; Guatemala; Ecuador; Colombia; Venezuela; Cuba; Panama; Brazil; USA, Costa Rica; Argentina
Sisimitalia Young, 1977	Oaxaca; Michoacán	Neotropical	Mexico; Costa Rica; Panama; Colombia; Honduras; Guatemala; Nicaragua
Stephanolla Young, 1977	Chiapas	Neotropical	Mexico; Guatemala; Panama; Colombia; Ecuador; Costa Rica
Tlagonalia Young, 1977	Veracruz; Chiapas	Endemic to Mexico; Neotropical	Mexico
Tylozygus Fieber, 1866	Guerrero; San Luis Potosí; Veracruz; Puebla; Oaxaca; Yucatán; Quintana Roo; Campeche; Jalisco; Nuevo León: Hidalgo; Tamaulipas	Neotropical; Nearctic; MTZ	Mexico; USA; Guatemala; Honduras; El Salvador; Costa Rica; Ecuador; Panama; Dominican Republic; Colombia; Venezuela; Peru; Cuba; Trinidad and Tobago; Jamaica; Santa Lucia
Xyphon Hamilton, 1985	Jalisco; Zacatecas; San Luis Potosí; Querétaro; Veracruz; Chihuahua; Coahuila; Sonora; Guanajuato	Neotropical; Nearctic; MTZ	Mexico, USA, Honduras; Guatemala
Plummerella DeLong, 1942	Ciudad de México; Michoacán	Endemic to Mexico	Mexico
Mareja Melichar, 1926	Veracruz; Chiapas; Jalisco; Nayarit; Michoacán; Morelos; Guerrero	Neotropical; MTZ	Mexico; Costa Rica; Panama; Colombia; Venezuela; El Salvador; Guatemala; Nicaragua
Janastana Young, 1977	*	*	Mexico; Costa Rica; Panama; Colombia; Ecuador

with inconspicuous minute rugose striations on center, weekly prominent in lateral view. Anteclypeus broad near frontoclypeus then tapering to apex, inflated medially in lateral view, apex following normal curvature and not surpassing normal curve of gena (Fig. 3). Gena short laterally, concavely incised below eyes without distinct angle. Lora 2 × as long as width; 3 × narrower than anteclypeus width.

Thorax. Pronotum wider than transocular width of head; anterior margin strongly produced, conical; lateral margins evenly divergent posterad; anterior and posterior margin without striations; lateral margins carinate, length as half eye length in lateral view; posterior margin weekly concave; disk slightly rugose with minute punctuations. Anepisternum slightly projected and convex laterally. Scutellum rugose; not protuberant, without striations; shorter than pronotum; anterior margin as wide as transocular width (Figs 1–2). Forewings macropterous extending posteriorly beyond terminalia, surface smooth, semitranslucent; appendix not extended around apex, apex rounded; veins not raised and distinct except apically; without extra crossveins; four large apical cells subequal in width with three closed anteapical

Figs 1–3. *Christopherus mictlantecuhtli* gen. et sp. nov., holotype, ♂ (INHS), overall habitus. **1**. Body, dorsal view. **2**. Body, lateral view. **3**. Face, anterior view.

cells. Hindwings translucent; scheme with vein R2+3 absent. Posterior meron not exposed when wings at rest. Front femur in anterior view with AM1 near to mid-height of apex, long; row AV with 8–11 fine similar setae size, and AV1 apical. Hind femoral setal formula 2+1+1; macrosetae of hind tibia with row AV of 13–19 long stout setae. Hind tarsomere I as long as II and III combined, with two parallel rows of small setae on plantar surface, apex not expanded, plantar setae simple, pecten with 5 platellae.

Abdomen. Apodemes inconspicuous; extra setae absent laterally or ventrally; without tubercles, punctations or microsculpture over surface.

Male genitalia. Tenth segment short, broad, not well sclerotized, mostly membranous from base to apex, with minute apical inconspicuous fine setae, without processes. Pygofer in lateral view moderately produced posteriorly, posterior margin rounded; without processes; dorsomedial margin strongly sclerotized; surface minutely punctate; macrosetae in oblique band near posterior margin with 3–4 rows of stout setae with intercalated microsetae (Fig. 4). Valve short, in ventral view subrectangular; slightly produced posteromedially. Subgenital plates slender, longer than pygofer; in ventral view triangular, broad basally narrowing to tip with strong along medial margin constriction after midlength, connected to each other basally by thin membranous area; with uniseriate longitudinal row of macrosetae and adjacent row of fine long setae and additional elongate microsetae also present near inner margin; finely punctate over entire surface (Fig. 5). Connective Y-shaped and articulated with aedeagus; in dorsal view, longer than style by one third of its total length, arms and stem narrowly elongated; with weak joint to aedeagus. Style slender, shorter than connective; base sharply acute; medial lobe short; preapical lobe weakly developed with 2 rows of 2–3 stout long setae; apophysis very short; apex curved outwards and pointed (Fig. 6). Aedeagus asymmetrical and weakly sclerotized; preatrium short; shaft tubular and short; atrium bulbous and corrugated dorsally with single basal elongate process compressed laterally with several minute dorsal striations and apex pointed; shaft without fine setae; gonoduct short and wide, gonopore small subapical (Figs 7–8).

Female genitalia. Unknown.

Biology

Unknown.

Distribution

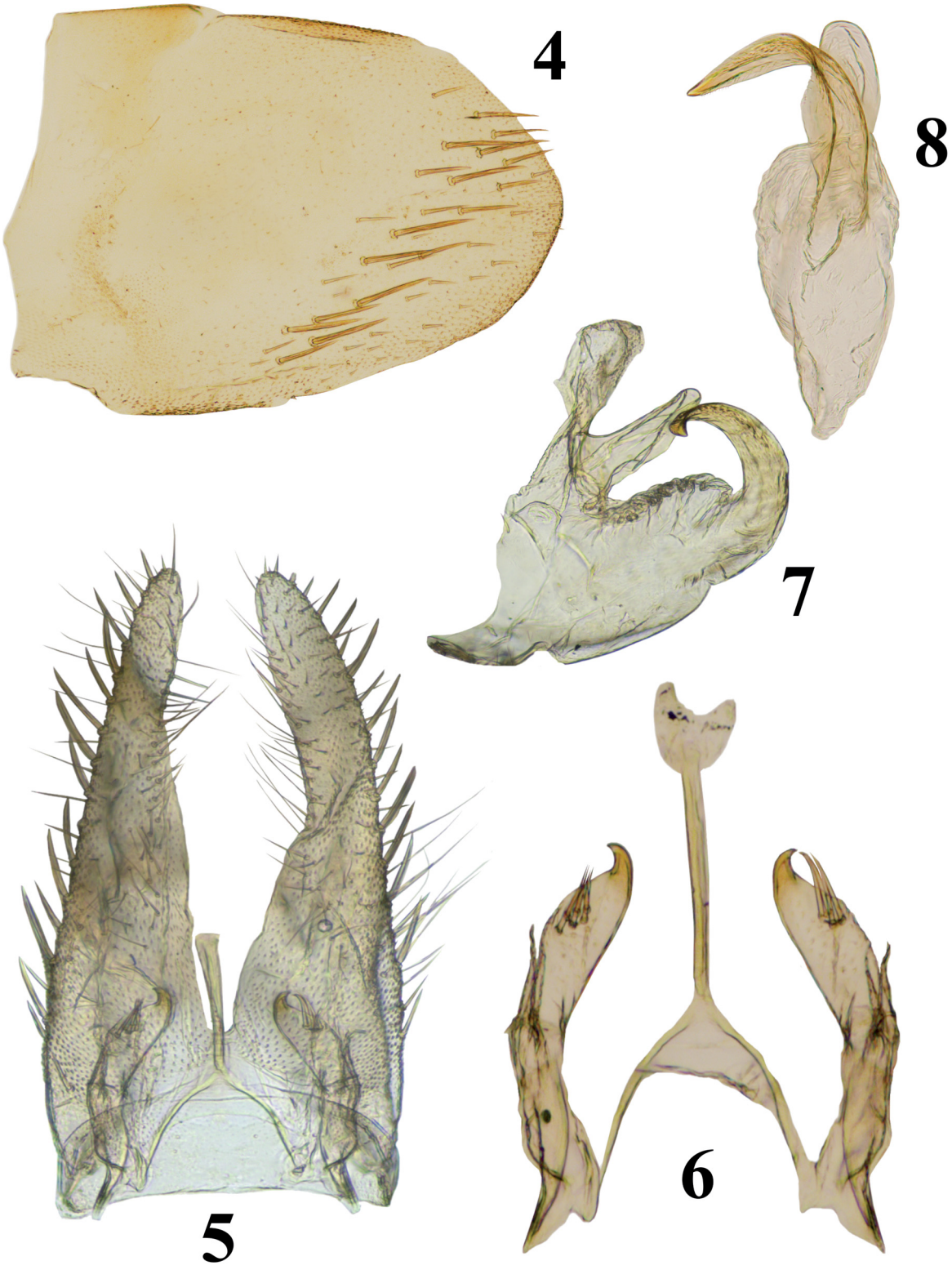
The genus contains a single species from Sierra Norte or "Sierra Juárez" (Sierra Madre del Sur Province), restricted to Oaxaca State in Mexico (Fig. 9).

Habitat

Cloud Forest (Fig. 10).

Remarks

The new genus can be distinguished from other similar tropical sharpshooter genera by the following combination of characters: (1) red longitudinal stripes on dorsum running from head to tips of wings; (2) pronotal width wider than transocular width of head; (3) pygofer without spines or processes; (4) connective elongate; (5) aedeagus with single elongate basal atrial process; (6) aedeagus asymmetrical. Some other Neotropical genera have similar external color patterns, but the male genital capsule and genitalia of the new genus is distinctive. In the discussion below, we summarize the characteristics that segregate this new taxon from other morphologically similar genera.



Figs 4–8. *Christopherus mictlantecuhtli* gen. et sp. nov., holotype, ♂ (INHS), terminalia. **4**. Pygofer, lateral view. **5**. Subgenital plates and styles, ventral view. **6**. Styles, ventral view. **7**. Aedeagus and basal atrial process, lateral view. **8**. Aedeagus and paraphysis, posterior view.

Christopherus mictlantecuhtli sp. nov.
urn:lsid:zoobank.org:act:5931072A-D84A-4872-A158-513DEA9C3850
Figs 1–10

Etymology

The epithet is dedicated to the Aztec god of death and king of Mictlan (underworld), named "Mictlantecuhtli" based on the Nahuatl language (pronunciation: Mict-lan-te-cuht-li). The most prominent deity that ruled over other gods and goddesses of the Mictlan in Aztec culture. Gender masculine.

Type material

Holotype

MEXICO – **Sierra Juárez** • ♂; "Hwy 175 33mi S. Valle Nacional, 7800 ft, 16 May 1983, C. & L. O'Brien, & G.B. Marshall"; INHS.

Description

Coloration. Body red with longitudinal black stripes. Face almost entirely black with paired vertical red markings on ecdysial line; crown with well-defined inconspicuous red marks; ocelli red; postfrontal sutures faint black. Midline faint with red and black, not carinate. Antennal ledge black with margin straight. Frontoclypeus mostly black with minute red dots; surface rugose and striated. Anteclypeus colored with black markings near apical suture and apex red. Gena mostly black with paler areas near

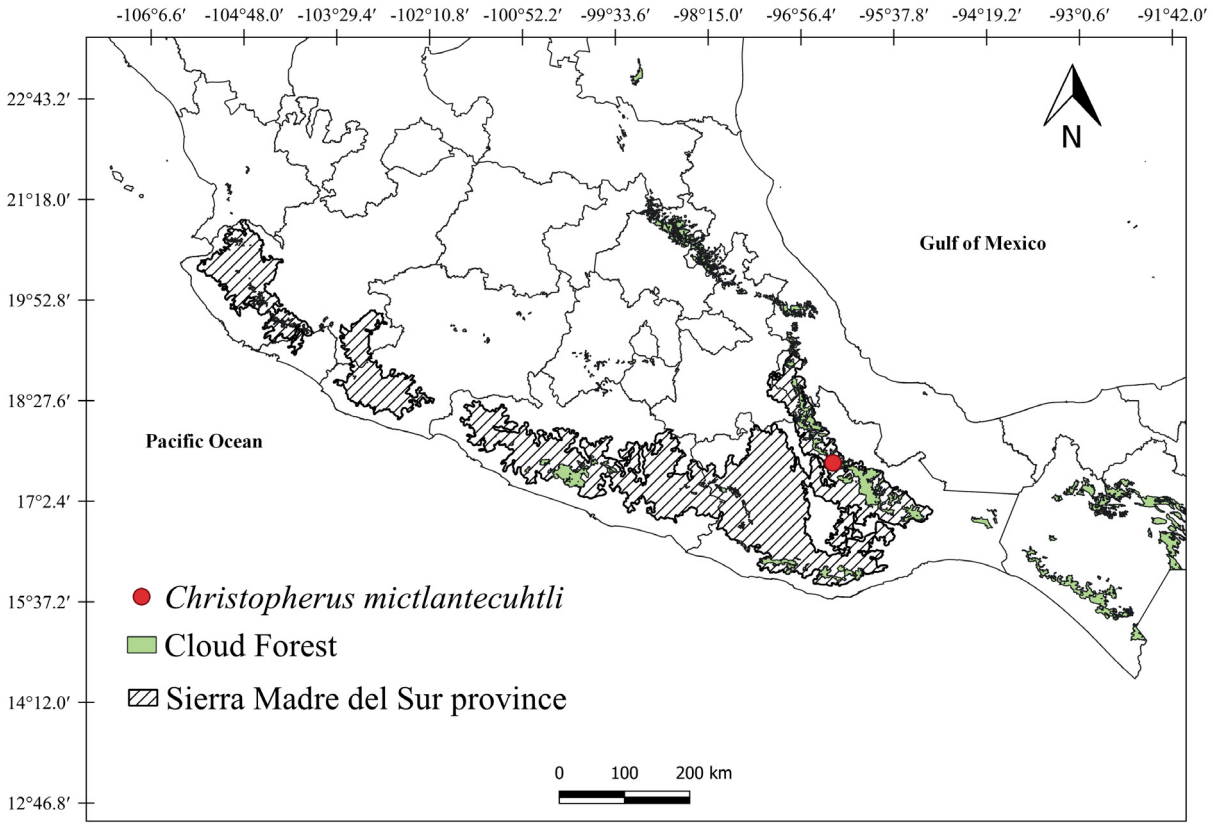


Fig. 9. Known distribution of *Christopherus mictlantecuhtli* gen. et sp. nov.

basal eye angle, laterally, and basally. Lora entirely black. Pronotum with three longitudinal red bands, two laterally and one central surrounded by black. Scutellum with red band in center and black borders. Forewings with three longitudinal red and two black stripes running along total length. Abdomen with dorsum mostly black and venter dark yellow. Legs light yellow. Male genital capsule dark yellow.

Male terminalia. Pygofer 1.5 × as long as tall; posterior margin rounded; 4 rows of 7–12 macrosetae with microsetae scattered distally. Subgenital plate triangular; broad at base tapering to tip with preapical constriction on inner margin; 10–13 uniseriate macrosetae on lateral margin with several intercalated long fine setae. Style narrow; surface smooth; base acute, medial anterior lobe absent, preapical lobe weakly developed, apophysis somewhat long and slightly curved with apex pointed outwards. Connective much longer than style; 1.3 × as long as style. Aedeagus extended nearly to apex of pygofer, broad; recurved dorsad, apex emarginate in lateral view; base bulbous and corrugated dorsally, basal atrium process strongly recurved with apex extended to left side.

Female terminalia. Unknown.

Measurements in millimeters

Total length ♂ 6.00, ♀ unknown; width 1.50. Head: width 1.33; midlength 0.46; eye width 0.30; eye length 0.19; crown mid width before eyes 0.94; crown posterior width between eyes 0.72; distance between ocelli 0.52; frontoclypeus width 0.77; frontoclypeus length 0.91; anteclypeus width 0.22; anteclypeus length 0.20; lorum width 0.11; lorum length 0.25; gena width 0.33; gena length 0.39. Pronotum: width 1.41; length 0.89. Scutellum: width 0.76; length 0.56. Forewing: length 4.70. Male capsule: pygofer height 0.45; pygofer length 0.97; valve width 0.36; valve length 0.39; subgenital plate, apex width 0.12; mid width 0.25, base width 0.27; plate length 0.80; style length 0.25; connective length 0.35; aedeagus length 0.45.

Fig. 10. Habitat of *Christopherus mictlantecuhtli* gen. et sp. nov. Ancient Cloud Forest from Sierra Juárez, Oaxaca, Mexico. Images taken by Juvenal Aragón-Parada.

Type locality

33 mi S of Valle Nacional (near Cascada de Niebla de Comaltepec).

Remarks

This new species is externally similar in appearance to *Gillonella ampulla* Nielson & Godoy, 1995 but *C. mictlantecuhtli* gen. et sp. nov. can be easily distinguishable by the (1) 10th abdominal segment without processes; (2) joint of atrium to 10th segment membranous, and (3) aedeagus with an elongated compressed basal atrial process.

Genus ***Gillonella*** Nielson & Godoy, 1995
Figs 11–23

Gillonella Nielson & Godoy, 1995: 190.

Type species

Gillonella ampulla Nielson & Godoy, 1995.

Diagnosis

Slender moderately elongated leafhoppers with red coloration and medial longitudinal black stripe running from pronotum to tips of wings. Crown broadly rounded anteriorly; surface smooth anteriorly. Pronotum slightly wider than head, lateral margins weakly carinate, and posterior margin weakly convex. Forewing macropterous, without extra crossveins. Male pygofer rounded, without processes. 10th segment with processes. Subgenital plate with outer and inner margins parallel in ventral view. Connective long, extending beyond apex of style by a bit further than one third of its total length; arms narrow and not extended. Shaft of aedeagus with small asymmetrical processes strongly adjoined to anal tube, and single minute basal atrial process.

Redescription

Head. Rounded, produced anteriorly, 2 × as wide as mid-length; interocular width of crown 1.8 × median length, transocular width 2.8 × median length; anterior margin broadly rounded in dorsal view, posterior margin weakly concave; softly elevated in lateral view; without striations, mouth muscles impression weakly evident on anterior margin; ocelli in ovate shape, located closer to middle line than eyes and posterior margin, not prominent in lateral view; crown in lateral view weakly concave, declivous anteriorly and rounded; surface of crown smooth; anterior margin with distal point and laterally rounded (Figs 11–12). Postfrontal sutures reaching ocelli in dorsal view. Antennal ledges, in dorsal view, not protuberant, not striated; in lateral view below transition of crown to face convex and relatively shallow. Frontoclypeus with lateral sutures well developed, extending onto crown, striations distinct over entire surface with inconspicuous microsculpture, weekly convex in lateral view. Anteclypeus broad near frontoclypeus then tapering to apex, convex medially in lateral view, apex following normal curvature and not exceeding normal length of gena. Gena short and narrow laterally, concavely incised below eyes without distinct angle. Lora 1.5 × as long as width; 2.5 × narrower than anteclypeus width (Fig. 13).

Thorax. Pronotal width slightly wider than transocular width of head; anterior margin produced, broadly rounded; posterior margin wider than head width; anterior and posterior margin without striations; lateral margins weakly carinate, length as two-thirds of eye-length in lateral view; posterior margin weakly convex; disk transversely rugose without minute punctuations. Anepisternum not projected. Scutellum smooth; not protuberant, without striations; shorter than pronotum; anterior margin slightly shorter than transocular width (Figs 11–13). Forewings macropterous extending posteriorly beyond terminalia, surface smooth, dull color not trespassing light; without appendix; apex rounded; veins not

raised and distinct except apically; without extra crossveins; four large apical cells subequal in width with three closed anteapical cells. Hindwings translucent; scheme with vein R2+3 absent. Posterior meron not exposed when wings at rest. Front femur with AM1 near to mid-height of apex, long; row AV with 6–10 of fine setae with similar size, and AV1 apical. Hind femoral setal formula 2+1+1; macrosetae of hind tibia with row AV of 10–15 long stout setae. Hind tarsomere I as long as II and III combined, with two parallel rows of small setae on plantar surface, apex not expanded, plantar setae simple, pecten with 4 platellae and outer microsetae.

Abdomen. Apodemes poorly developed; extra setae absent laterally or ventrally; with few punctuations over surface.

Male genitalia. Tenth segment short, slender, not well sclerotized, mostly membranous-like with exception of apex, scattered fine setae present, with asymmetrical processes. Dorsum of pygofer well sclerotized but without ornamentation or processes. Pygofer produced posteriorly, posterior margin rounded, ventral margin with distinct concavity; without processes but minute tooth present in posterior margin; dorsomedial margin sclerotized; surface densely punctate; macrosetae from mid-length to posterior margin and arranged in two 4–5 rows of stout setae with distal microsetae (Figs 14–15). Valve short, in ventral view subrectangular; divergent. Subgenital plates slightly shorter than pygofer length; in ventral view triangular, outer margin mostly straight and parallel with inner margin, connected to each other basally by thin membranous area; in lateral view, base with uniseriate row of macrosetae on laterobasal portion with few fine long setae; few punctations over entire surface. Connective Y-shaped and articulated with aedeagus; in dorsal view, longer than style by a bit further than one third of its total length, arms short and stem elongated; with moderately weak joint to aedeagus (Fig. 21). Style small and sinuate; base acute; medial lobe weakly developed; preapical lobe prominent, without setae; apophysis short and tapered to apex, weakly curved (Figs 16, 19). Aedeagus asymmetrical and well sclerotized; preatrium short; shaft short and asymmetrical without processes, semitubular, slightly compressed laterally; atrium short weakly developed and dorsal apodeme strongly connected with two long asymmetrical processes adjoined to anal tube (Figs 17, 21); with small single poorly sclerotized atrial basal process with apex pointed; without fine setae. Gonoduct sinuous, partially wide with narrow sections (Fig. 19); gonopore small, subapical on ventral surface (Figs 19–20).

Female genitalia. Pygofer elongated, pointed; sternite VI wide and elongated, posterior margin produced mediately.

Biology

Unknown.

Distribution

Gillonella contains a single species known from Costa Rica (San José, Puntarenas, Heredia, Alajuela, and Cartago provinces) (Fig. 18).

Habitat

Rain forest (Fig. 23).

Gillonella ampulla Nielson & Godoy, 1995
Figs 11–23

Gillonella ampulla Nielson & Godoy, 1995: 190.

Figs 11–13. *Gillonella ampulla* Nielson & Godoy, 1995, holotype, ♂ (CASENT 19796), habitus. **11**. Body, dorsal view. **12**. Body, lateral view. **13**. Face, anterior view.

Type material examined

Holotype

COSTA RICA – **San José** • ♂; "Zurqui de Moravia, 1600 m, 25.II.1992. Collectors M.W. Nielson & Carolina Godoy"; CASENT 19796.

Paratypes

COSTA RICA – **San José** • 1 ♀; same collection data as for holotype; CASENT 8539117. – **Puntarenas** • 4 ♀♀, 14 ♂♂; "Monteverde NP, 5.II.1993. Nielson & Mora"; CASENT 8539115, 8539116 • 3 ♀♀, 4 ♂♂; "Elena Res. Sta., 4.II.1993. Nielson & Mora"; MNCR • 1 ♀, 3 ♂♂; same collection data as for preceding; MZUCR.

Other material examined

COSTA RICA – **Heredia** • 1 ♀ (Fig. 23); "Vara Blanca, San Rafael. 1720m, 15-X-2023. Coll. Peraza, A"; MZUCR • 2 ♂♂; "Braulio Carrillo, Oct-1987"; MNCR. – **Cartago** • 3 ♂♂; "Sendero Rancho Negro, 12-Feb-1997"; MNCR. – **Puntarenas** • 1 ♂; "Sendero Rancho Negro, 12-Feb-1997"; MNCR. – **Alajuela** • 1 ♂; "Río San Florencia, Mar-1990"; MNCR.

Redescription

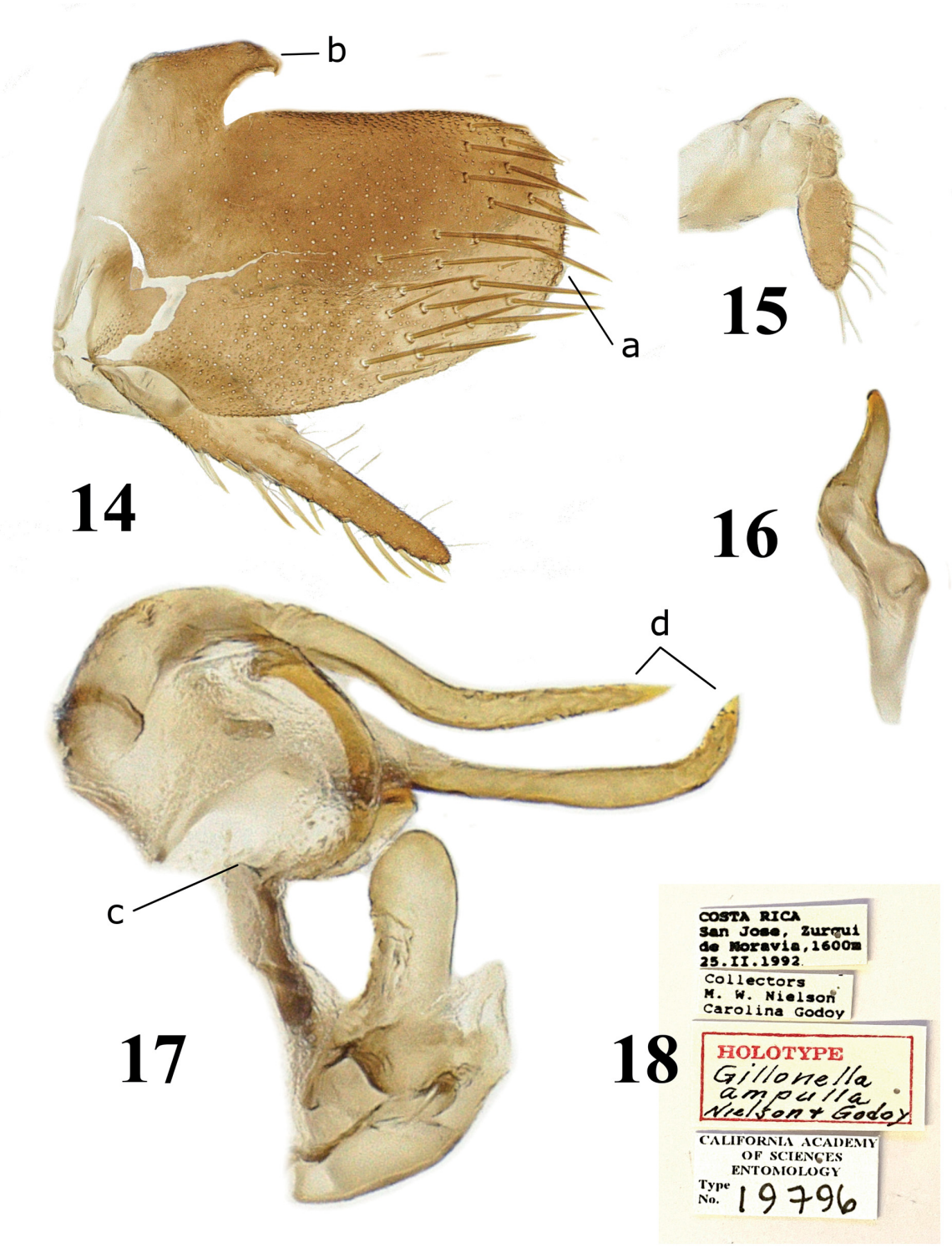
Coloration. Body red with one longitudinal black stripe arising on pronotum running along dorsum and pair of black stripes on each side of forewings. Face red with large black spot near ecdysial line; crown red with quadrate median anterior black spot, anterolateral margins weakly sinuate; ocelli black; postfrontal suture red, extended laterad of ocelli. Midline faint red, not carinate. Antennal ledge red with margin straight. Frontoclypeus red and slightly convex medially; surface weakly striated. Anteclypeus red; in lateral view straight; similar in proportions of length versus width. Gena red with lateral margin slightly acute. Lora red 2 × slender than anteclypeus mid-width. Pronotum mostly red with a black stripe on midline broadened near posterior margin. Scutellum red. Forewings black with red longitudinal stripe along claval suture continued onto inner apical cell. Abdomen mostly fuscous. Legs with femora red, tibiae and tarsi dark brown. Male genital capsule fuscous.

Male terminalia. Pygofer 1.3 × as long as tall; posterior margin subquadrate with minute pointed projection near mid-length; 4 rows of 5–7 macrosetae without microsetae. Subgenital plate triangular; broader near base and strongly tapering to tip; 8–10 uniseriate macrosetae on lateral margin with few intercalated fine setae. Style narrow; surface partially smooth; base curved inwards and acute, medial anterior lobe not developed, preapical lobe strongly developed, apophysis somewhat long and wide, apex pointed. Connective stem longer than arms, 1.4 × as long as style. Aedeagus not prominent in pygofer, shaft recurved dorsad, apex broadly rounded in lateral view; base broad with basal atrial process short, curved and pointed.

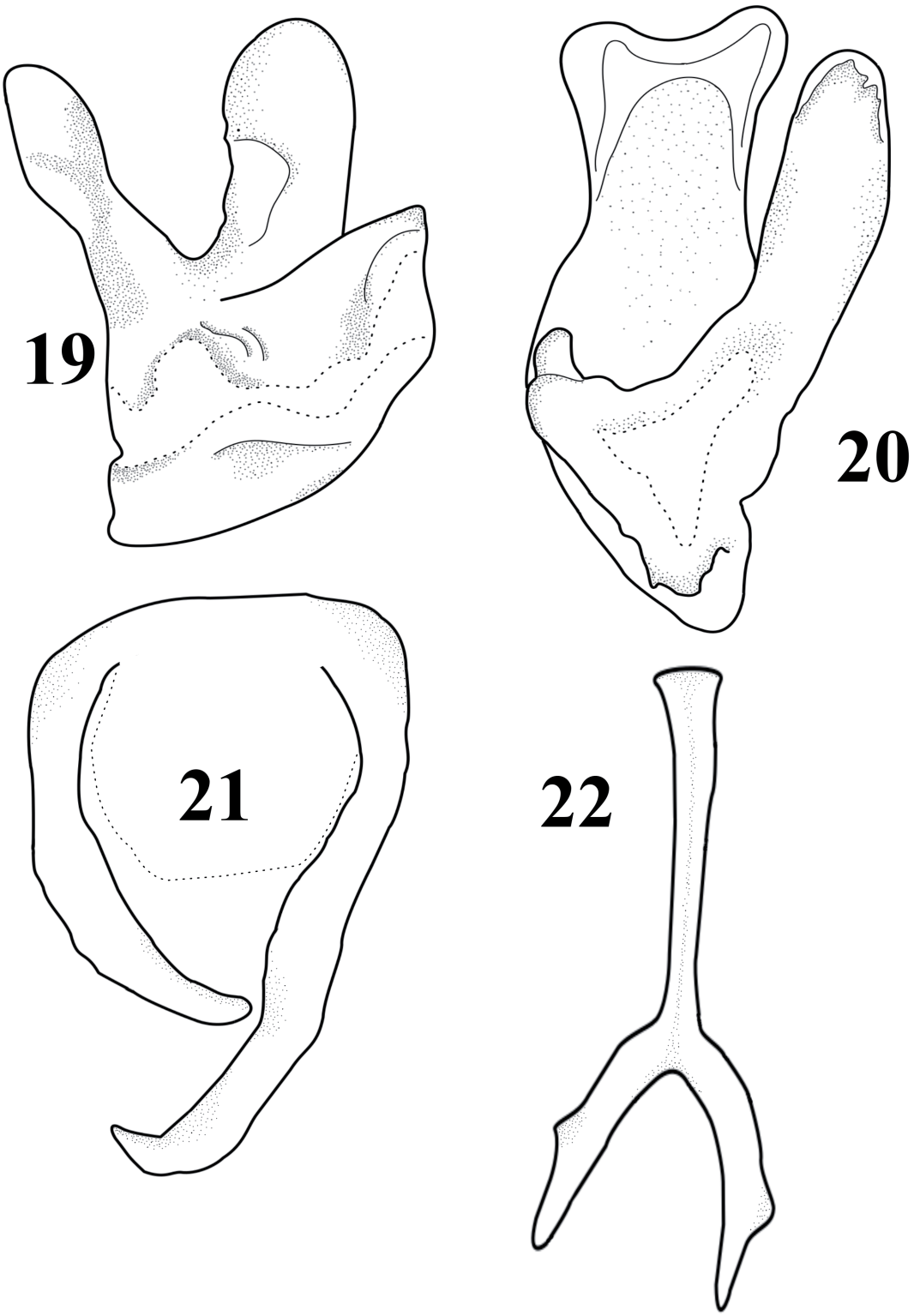
Female terminalia. Pygofer pale with some dark distal stout elongated macrosetae, posterior margin darker and weakly pointed; sternite VI mostly pale with minute dark impressions near to posterior margin produced.

Measurements in millimeters

Total length ♂ 6.48–6.60, ♀ 6.50–6.90; width 1.45–1.60. Head: width 1.27–1.35; midlength 0.43–0.55; eye width 0.34–0.40; eye length 0.23–0.27; crown mid width before eyes 0.95–1.00; crown posterior width between eyes 0.80–0.89; distance between ocelli 0.47–0.51; frontoclypeus width 0.60–0.68; frontoclypeus length 0.68–0.71; anteclypeus width 0.18–0.20; anteclypeus length 0.21–0.24; lorum width 0.12–0.13; lorum length 0.12–0.13; gena width 0.25–0.27; gena length 0.63–0.68. Pronotum: width 1.35–1.40; length 0.83–0.90. Scutellum: width 0.75–0.80; length 0.60–0.70. Forewing: length



Figs 14–18. *Gillonella ampulla* Nielson & Godoy, 1995, holotype, ♂ (CASENT 19796), terminalia. **14**. Pygofer and subgenital plate, lateral view. **15**. Anal tube, lateral view. **16**. Style, ventral view. **17**. Aedeagus, basal atrial process, and asymmetrical processes adjoined to anal tube, lateral view. **18**. Labels. a = minute tooth on posterior margin; b = dorsum of pygofer sclerotized; c = joint of aedeagus with asymmetrical processes adjoined to anal tube; d = asymmetrical processes tips.



Figs 19–22. *Gillonella ampulla* Nielson & Godoy, 1995, ♂ from Braulio Carrillo (MNCR), male terminalia. **19**. Aedeagus, lateral view. **20**. Aedeagus, posterior view. **21**. Asymmetrical processes adjoined to anal tube, dorsal view. **22**. Connective, ventral view.

4.91–5.00. Male capsule: pygofer height 0.60–0.62; pygofer length 0.70–80; valve width 0.36–0.45; valve length 0.30–0.35; subgenital plate, apex width 0.12–0.13; mid width 0.15–0.17, base width 0.19–0.20; plate length 0.50–0.52; style length 0.30–0.35; connective length 0.50–0.55; aedeagus length 0.30–0.35.

Discussion

Christopherus mictlantecuhtli gen. et sp. nov. keys out following Young's (1977) key to couplet 140 with *Nielsonia* Young, 1977. The new genus shares similarities in the external shape and color with red-

Fig. 23. *Gillonella ampulla* Nielson & Godoy, 1995 photographed in situ. Photo taken by Andrey Peraza.

Table 2. Principal morphological features between the new genus and *G. ampulla* Nielson & Godoy, 1995.

Features		***C. mictlantecuhtli***	***G. ampulla***
Crown	shape	conical	rounded
Abdomen	surface	without punctations	with punctuations
	apodemes	absent, or inconspicuous	weakly developed, not extended
Segment 10th	process	absent	with asymmetrical process
	joint to aedeagal shaft	inconspicuous, membranous	evident, sclerotized
Subgenital plate	shape	divergent	parallel
	fine setae	densely	absent
Style	preapical lobe	weakly developed	evident, strongly developed
Aedeagus	basal process shape	large, bulbous	small, formless
	basal process length	larger than aedeagus	shorter than aedeagus
	basal process apical form	apically strongly curved	partially straight

striped species belonging to other Neotropical genera such as *Soosiulus* Young, 1977, *Ramosulus* Young, 1977, *Geitogonalia* Young, 1977, *Parasubrasaca* Mejdalani & Cavichioli, 2013, *Erythrogonia* Melichar, 1926, and *Ladoffa* Young, 1977. However, from those genera the new genus can be unequivocally separated by characters of the male genital capsule. Based on male genitalia, the new genus seems most similar to *Graphocephala* Van Duzee, 1916, *Allogonia* Melichar, 1926, *Nielsonia*, *Amphigonalia* Young, 1977, or *Gillonella*, but it differs from those genera in lacking a paraphysis (*Erythrogonia*, *Graphocephala* and *Allogonia* have paraphyses), in having a very long connective (also present in *Allogonia* and *Gillonella*), lacking processes on the aedeagal shaft (present in *Amphigonalia*), having an asymmetrical aedeagus (shared with *Gillonella* and *Nielsonia*) and a basal atrial process (present in *Gillonella*). Thus, combinations of male terminalia characteristics readily separate the other mentioned genera from *C. mictlantecuhtli*. The overall red appearance and genitalia characteristics suggest that the new genus is most similar to *Gillonella*, not included in Young's (1977) key either, but the latter genus, apparently endemic to Costa Rica, has a quite different head structure and the male genitalia have asymmetrical processes associated with the 10th abdominal segment that are absent in the new genus. Other morphological differences are shown in Table 2. The dorsum of the pygofer in the original drawing by Nielson & Godoy (1995) was drawn apparently showing a dorsal spine but all studied material has no evidence of such structure, so it only represents the shape of the dorsum near the base. In addition, Nielson & Godoy (1995: fig. 2) did not properly show the asymmetrical process shape or strong adjoin to the anal tube.

Mexico is home to 43 sharpshooter genera, of which 30% are presumably endemic to the country while 44% are widely dispersed in Central America, and the remaining are dispersed more broadly in North or South America (Metcalf 1964; McKamey 2001). The geographical distribution of Cicadellini has been poorly explored within Mexico (Young 1977; McKamey 2001). Most Mexican species were described or redescribed by Young (1977), and few additional records have been published subsequently, especially for endemic or uncommon genera and species. Further collecting efforts are needed in unsampled areas. In contrast, some common species have been densely recorded in crop fields (Blanco-Rodríguez *et al*. 2015, 2022; Pinedo-Escatel & Moya-Raygoza 2015, 2018) and increasing numbers of records are being recorded by online platforms (e.g., iNaturalist).

The Sierra Juarez has been largely unsampled historically for leafhoppers. Nevertheless, very few occasional visits over time have been made (occasional stop by L. O'Brien in 1983 and ongoing fieldwork of Pinedo-Escatel in 2017 and 2019). Further study of these remote mountains and successful community forest management might yield discoveries of additional new taxa. Other leafhoppers previously collected and described from Oaxacan forests appear to be strongly endemic and limited to particular vegetation types (Pinedo-Escatel *et al*. 2016, 2021a). We believe that the new taxon described above falls into this category of narrow Mexican forest endemics.

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