

RESEARCH ARTICLE

# A new species of the leafhopper genus *Ladoffa* (Hemiptera: Auchenorrhyncha: Cicadellidae) from rainforests of eastern Mexico

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**Abstract.** While sorting the section of unidentified Auchenorrhyncha in the National Collection of Insects at the Institute of Biology, National Autonomous University of Mexico, an undescribed species of the genus *Ladoffa* Young, 1977 was found. Here it is described as *Ladoffa tsibi* Chávez-Gutiérrez & Pinedo-Escatel, sp. nov., and illustrated based on dry-mounted specimens. Most of the specimens were collected in the early 1960s to late 1980s in remnants of the highly threatened evergreen rainforest in eastern Mexico, including the Los Tuxtlas Tropical Biology Station and the vicinity of the core areas of the Los Tuxtlas Biosphere Reserve. A distributional map for the new species and a key to all species of *Ladoffa* occurring in Mexico are given. The new state records are reported for *L. cavillator* Young, 1977 (Quintana Roo), *L. dependens* Young, 1977 (Chiapas, Oaxaca and Veracruz) and *L. purpurascens* (Fowler, 1900) (Chiapas and Veracruz). In addition, *L. sannionis* Young, 1977 is recorded for the first time in Costa Rica. The use of the forewing color pattern for identification and historical records of *Ladoffa* in Mexico are discussed.

**Key words.** Hemiptera, Auchenorrhyncha, Cicadellinae, Cicadellini, sharpshooter, new species, taxonomy, Gulf of Mexico, Neotropical Region

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## Introduction

The leafhoppers of the subfamily Cicadellinae (Insecta: Hemiptera: Cicadellidae), colloquially known as sharpshooters, feed exclusively on xylem tissue and, with more than 2,650 species in 341 genera worldwide, they are the third largest subfamily within Cicadellidae (BARTLETT et al. 2018, DMITRIEV et al. 2022–onward). The largest tribe, Cicadellini, has a wide distribution across all environments with vascular plants, but the majority seems to favour mesic habitats or humid forests. The Neotropical realm has the greatest diversity in the world (YOUNG 1968, 1977; FENG et al. 2024). For Mexico, 43 genera of Cicadellini have been reported (PINEDO-ESCATTEL & BLANCO-RODRIGUEZ 2024).

The New World genus *Ladoffa* Young, 1977 was described with *Tettigonia ignota* Walker, 1851 as the type species from Central America, Colombia, and Guyana (YOUNG 1977). In the same work, four additional species of *Tettigonia* were reclassified and 18 new South American species were included in *Ladoffa*, including some with distribution in Mexico. Later, LOZADA (1991) described *L. aguilar* Lozada, 1991 from Peru. CAVICHIOLI & CHIAMOLERA (2001) added *L. isabellina* Cavichioli & Chiamolera, 2001 and *L. rubronigra* Cavichioli & Chiamolera, 2001 from Brazil and *L. trifasciata* Cavichioli & Chiamolera, 2001 from Guyana. Subsequently, LOZADA & FREYTAG (2010) described three species for Panama (*L. grandis*



Lozada & Freytag, 2010; *L. woldai* Lozada & Freytag, 2010; and *L. lamasi* Lozada & Freytag, 2010). Finally, FREYTAG & LOZADA (2013) increased the number of species by including 12 additional nominal species from Central and South America. *Ladoffa* now consists of 42 species distributed from Mexico to Argentina; so far, seven species have been reported from Mexico (YOUNG 1977).

During a comprehensive review of the unsorted specimens of the section of unidentified Auchenorrhyncha at the National Collection of Insects (Colección Nacional de Insectos, CNIN) at the Institute of Biology (Instituto de Biología) of the National Autonomous University of Mexico (Universidad Nacional Autónoma de México, UNAM), an undescribed species belonging to the genus *Ladoffa* was found. This paper aims to describe this species, compile a species list, and provide a key to differentiate all *Ladoffa* species known to occur in Mexico.

### Material and methods

The techniques for dissecting the genital structures followed the standard protocol for leafhoppers with a modification in which the male and female abdomens were removed, immersed in absolute ethanol for 24 h, then placed in a 10% hot KOH solution for 5–10 minutes, then rinsed and immersed 3–4 times each in acetic acid to neutralize, and finally soaked five times each using distilled water mixed with ethanol at 72%, 84% and 96%.

The cleared and dissected genital structures were stored in microvials with glycerin and placed under the specimens. The photographs were taken at the Laboratorio Nacional de Biodiversidad (LANABIO) using a Zeiss microscope equipped with AxioCam MRc5 camera and the software ZEN 2012 (blue edition). Color and editing were done in Adobe Photoshop® based on colors of the dry-mounted specimens. The illustrations were created with Adobe Illustrator®. Body measurements were extracted using an electronic vernier. The total length was measured from the anterior margin of the crown to the tips of the forewings at rest. The information on the labels was reproduced exactly as it was given on the labels of the specimens.

The criteria for species identification and morphological terminology were based on YOUNG (1977) and DIETRICH (2005). The coloration in the species description is based on dry-mounted specimens. A map of the distribution in Mexico was projected with QGIS® using all georeferenced *Ladoffa* records.

The specimens examined are deposited in the Colección Nacional de Insectos, Instituto de Biología, UNAM, Mexico City, Mexico (CNIN); Florida State Collection of Arthropods, Florida, USA (FSCA); Academy of Natural Sciences of Philadelphia, Pennsylvania, USA (ANSP); American Museum of Natural History, New York, USA (AMNH); Illinois Natural History Survey, Illinois, USA (INHS); Colección de Insectos del Centro de Estudios en Zoológia de la Universidad de Guadalajara, Guadalajara, Jalisco, Mexico (CZUG); and United States National Museum of Natural History, Washington, D.C., USA (USNM).

### Taxonomy

Subfamily Cicadellinae Latreille, 1825

Tribe Cicadellini Latreille, 1825

**Genus *Ladoffa* Young, 1977**

*Ladoffa* Young, 1977: 339

**Type species.** *Tettigonia ignota* Walker, 1851, by original designation.

**Remarks.** Overall morphological conceptualization follows the original description by YOUNG (1977).

**Distribution.** Mexico, Guatemala, El Salvador, Nicaragua, Costa Rica, Panama, Colombia, Ecuador, Peru, Venezuela, Brazil, Bolivia, and Argentina (YOUNG 1977, FREYTAG & LOZADA 2013).

### Review of *Ladoffa* species from Mexico

***Ladoffa cavillator* Young, 1977**

(Figs 1A, I)

*Ladoffa cavillator* Young, 1977: 366

**Material examined.** MEXICO: QUINTANA ROO: 1 ♂, Felipe Carrillo Puerto, 27-X-2018, Jimenez T. (CNIN).

**Distribution.** Quintana Roo (this paper).

**Note.** YOUNG (1977) and FREYTAG & LOZADA (2013) mentioned the distribution in Mexico without giving further details. The material studied here shows for first time the state in Mexico where this species occurs.

***Ladoffa coccinea* (Fowler, 1900)**

(Figs 1B, K)

*Tettigonia coccinea* Fowler, 1900: 263

*Tettigella coccinea* (Fowler, 1900) in METCALF (1965: 178)

*Ladoffa coccinea* (Fowler, 1900) in YOUNG (1977: 341)

**Distribution.** Veracruz (YOUNG 1977).

**Note.** FOWLER (1900) and YOUNG (1977) mentioned the distribution in Mexico without giving further details.

***Ladoffa dependens* Young, 1977**

(Figs 1C, H)

*Ladoffa dependens* Young, 1977: 361

**Material examined.** MEXICO: CHIAPAS: 1 ♂, Palenque, 31-I-1985, F. Arias (CNIN). OAXACA: 1 ♂, Tuxtepec km 58, 17-IV-1983, M. Liarcia & A. Ibarra (CNIN). VERACRUZ: 1 ♂, Los Tuxtlas, 16-I-1986, F. Arias (CNIN).

**Distribution.** Chiapas, Oaxaca, and Veracruz (this paper).

**Note.** YOUNG (1977) and FREYTAG & LOZADA (2013) mentioned the distribution in Mexico without giving further details. The material studied here shows for first time the states in Mexico where this species occurs.

***Ladoffa guttata* (Signoret, 1854)**

(Fig. 1D)

*Tettigonia guttata* Signoret, 1854: 355

*Aulacizes guttata* (Signoret, 1854) in VAN DUZEE (1894: 269)

*Cardioscarta guttata* (Signoret, 1854) in MELICHAIR (1932: 315)

*Poeciloscarta guttata* (Signoret, 1854) in METCALF (1965: 68)

*Ladoffa guttata* (Signoret, 1854) in YOUNG (1977: 341)

**Distribution.** Mexico (no specific locality/state data available).

**Note.** YOUNG (1977) and SIGNORET (1854) stated the distribution in Mexico without giving further details.



Fig. 1. External and internal characters of *Ladoffa* species found in Mexico. A, I – *L. cavillator* Young, 1977; B, K – *L. coccinea* (Fowler, 1900); C, H – *L. dependens* Young, 1977; D – *L. guttata* (Signoret, 1854); E, M – *L. lentiginosa* Young, 1977; F, L – *L. purpurascens* (Fowler, 1900); G, J – *L. sannionis* Young, 1977. A–G – habitus in dorsal view; H–I – aedeagus in lateral view; J–K – connective in ventral view; L–M – paraphysis in ventral view. Scale bar = 1.0 mm.

***Ladoffa lentiginosa* Young, 1977**

(Figs 1E, M)

*Ladoffa lentiginosa* Young, 1977: 239**Distribution.** Hidalgo, San Luis Potosí, Chiapas, Veracruz, and Oaxaca (YOUNG 1977).***Ladoffa purpurascens* (Fowler, 1900)**

(Figs 1F, L)

*Tettigonia purpurascens* Fowler, 1900: 259*Tettigella purpurascens* (Fowler, 1900) in METCALF (1965: 190).*Ladoffa purpurascens* (Fowler, 1900) in YOUNG (1977: 342).**Material examined.** MEXICO: CHIAPAS: 1 ♂, Santa Elena km 23 de Montebello, 8-IV-1979, CRB (CNIN). VERACRUZ: 1 ♂, Catemaco, Bastonal, 17-VII-1989, H. Rojas & L. Colin (CNIN).**Distribution.** Chiapas and Veracruz (this paper).**Note.** FOWLER (1900) and YOUNG (1977) stated the distribution in Mexico, without giving further details. The material studied here shows for first time the states in Mexico where this species occurs.***Ladoffa sannionis* Young, 1977**

(Figs 1G, J)

*Ladoffa sannionis* Young, 1977: 357**Material examined.** COSTA RICA: 1 ♂ 1 ♀, Parque Nacional Corcovado, Estación Sirema, 06-08-II-1981. H. Brailovsky & E. Barrera Cols. (CNIN).**Distribution.** Mexico: Chiapas, Nayarit, and Estado de México (YOUNG 1977), Costa Rica (this paper).**Note.** Records from Nayarit and Estado de México are questionable data (see below in Discussion).***Ladoffa tsibi* sp. nov.**

(Figs 2–5)

**Type locality.** Ocotal Grande in Veracruz state, Mexico.**Type material.** HOLOTYPE: MEXICO: VERACRUZ: ♂, Ocotal Grande, L. Cervantes, 8-XII-1985 (CNIN). PARATYPES: MEXICO: VERACRUZ: 14 ♂♂ 1 ♀; 1 ♂, Catemaco, Coyame, R. E. Woodruff, Black light trap, 5-III-1963 (FSCA); 3 ♂♂, Los Tuxtlas, Arroyo Claro, H. Pérez, 25-V-1977 (FSCA: 1 ♂, CNIN: 1 ♂, INHS: 1 ♂); 2 ♂♂, Los Tuxtlas Ocotal Chico, Sierra de Santa Marta, H. Pérez, 17-18-VII-1982 (CNIN: 1 ♂, CZUG: 1 ♂); 1 ♂, Catemaco, Bastonal, H. Rojas & L. Colin, 17-VII-1989 (CNIN); 2 ♂♂, H. Rojas, 16-X-1989 (CNIN: 1 ♂, INHS: 1 ♂); 3 ♂♂, L. Colín, 16-X-1989 (AMNH: 1 ♂, ANSP: 1 ♂, CNIN: 1 ♂). CHIAPAS: 2 ♂♂ 1 ♀, km 23 Montebello a Santa Elena, CRB, 8-IV-1979 (CNIN: 1 ♂ 1 ♀; USMN: 1 ♂).**Diagnosis.** Forewing disposing a set of red spots arranged as shown in Figs 4 and 5. Pygofer moderately small, square-shaped, having denticles on dorso-apical margin and truncate posterior margin, without processes. Connective T-shaped. Paraphysis globose. Aedeagus with three processes, two subapical and one basal; the paired subapical processes are directed ventrad, and the basal process has a bifid tip.**Description.** **Coloration.** Head almost entirely red in dorsal view (Figs 2B, 3A); face in anterior view pale yellow (Figs 2C, 3C); anterior margin of crown brown with a light brown spot on the posterior margin forming an inverted U above midline; eyes dorsally tinged red and from anterior view dark brown to black. Pronotum with a W-shaped red mark; anterior margin with two subparallel brown bands extending towards posterior margin; lateral margins brown. Scutellum with anterior margin brown and red posteriorly

(Figs 2B, 3A). Legs pale yellow (Fig. 2A). Abdomen with venter light cherry-colored and dorsum darker.

**Forewing color pattern.** Wing ground color black with red spots. Clavus usually with three irregular (Figs 4A, 5A–F, I–M) or with four spots (Figs 4B–C, 5G–H, N–P), the first spot is near the wing base, second is likely a circle, third irregularly shaped, fused or not, and fourth almost reaches the base of inner apical cell. Another series of three spots parallel to the claval suture, in some specimens fused to other spots, commonly the first and third spots irregularly shaped while the second is ovoid. Costal margin with two posterior medial spots joining, in some specimens isolated from other spots. One irregular spot over subapical cells extending to the costal margin. Discal zone with four hyaline zones, two triangular on costal margin and two medially semicircular.**Morphology.** Crown moderately produced, 1.2× as wide as long, anterior margin conical (Figs 2B, 3A). Interocular width in dorsal view 1.5× as wide as eye diameter. Frontoclypeus 2.0× as long as wide, not prominent in lateral view. Anteclypeus 1.2× as long as wide, apex rounded, not prominent in lateral view. Gena narrow, 2.5× as long as wide; lora 2.0× as long as wide (Figs 2C, 3C). Pronotum with anterior margin convex and posterior margin slightly concave, almost straight. Pronotum width medially equal to transocular width and 1.6× wider than length. Basal lateral margins as long as head width. Scutellum without striations on midline, wider than long (Figs 2A–B, 3A). Scheme of first and second pair of wings usual for Cicadellini. Abdominal apodemes inconspicuous.**Male terminalia.** Pygofer moderately small, square-shaped, as wide as long; posterior margin truncated, without processes, with few tiny denticles following dorsoapical margin and macrosetae arranged near posterior half (Fig. 2D). Anal tube membranous, elongated as 0.75× pygofer length, arising about midlength of pygofer. Valve triangular, 2.2× wider than long. Subgenital plates triangular with strongly elongated apex, not reaching posterior margin of pygofer; outer edge with a row of well-differentiated macrosetae, inner medial margin strongly corrugated (Fig. 2H). Styles linear, 1.5× longer than the connective; basal lobe simple and acute; medial lobe weakly developed; curved apophysis with blunt apex (Fig. 2H). Connective short, 1.5× smaller than style; T-shaped; apex slightly curved dorsally (Fig. 2I). Paraphysis elongated, almost reaching the posterior margin of pygofer, tubular, wider at base and narrowing towards apex, branching at two-thirds of total length into divergent branches with sharp posterior end that may or not curve dorsally (Fig. 2G). Aedeagus elongated, covering nearly half length of pygofer, recurved and directed posteriad, with three strongly sclerotized processes directed ventrad: a pair of processes inserted near aedeagus apex and a simple process with a bifid tip inserted near aedeagus base; flanges of stem with linear fine row of denticles reaching almost the tip, apex slightly truncated and without ornamentation; gonoduct weakly sclerotized and narrow; gonopore ovoid, placed on ventral margin (Fig. 2E–F).**Female terminalia.** Pygofer, in ventral view, elongated, 2.8× longer than wide, macrosetae distributed near ventral

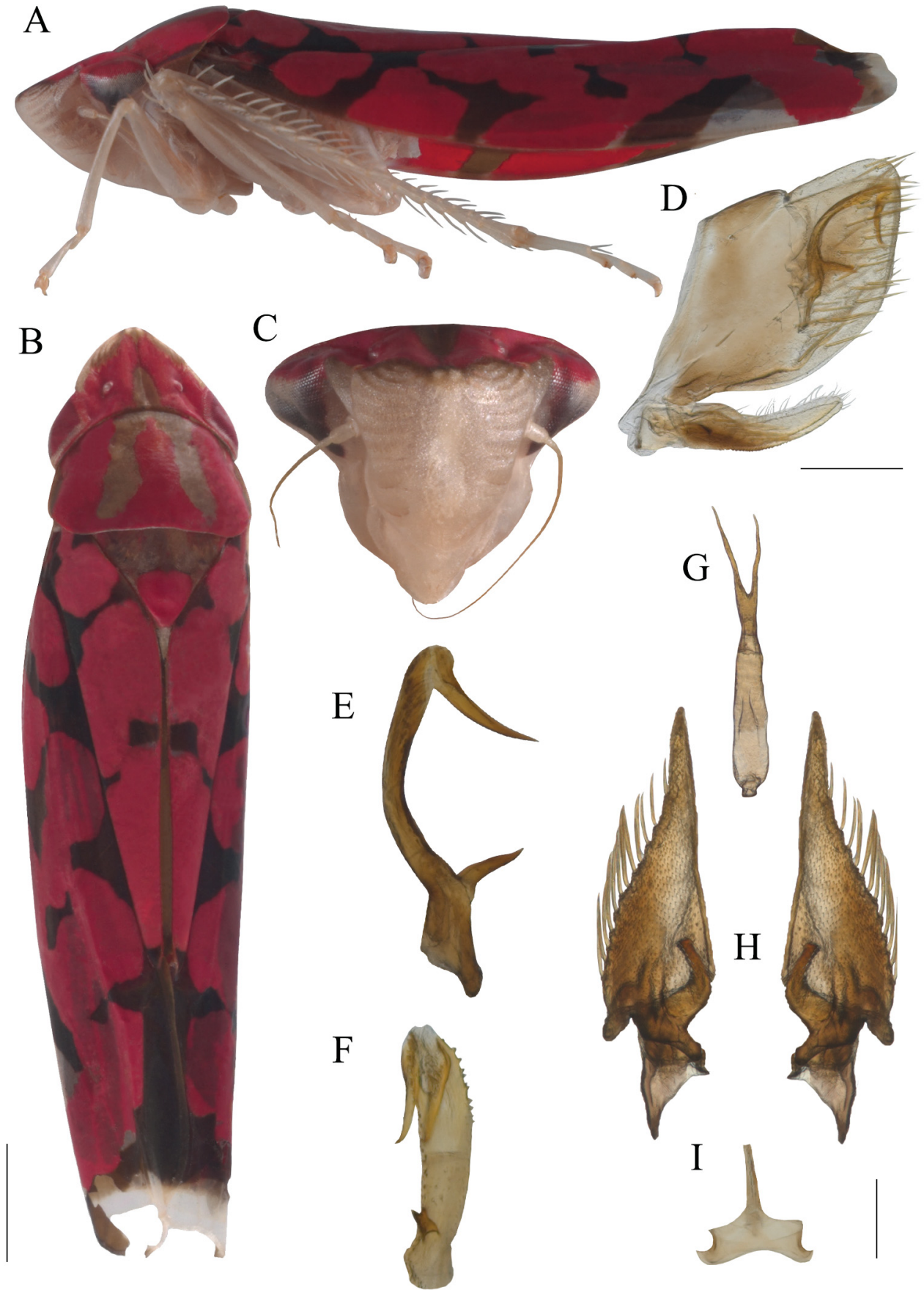


Fig. 2. Habitus and genitalia of *Ladoffa tsibi* sp. nov., holotype, male. A – body, lateral view; B – body, dorsal view; C – head, anterior view; D – pygofer, lateral view; E – aedeagus, lateral view; F – aedeagus, ventrolateral view; G – paraphysis, ventral view; H – subgenital plates and styles, ventral view; I – connective, ventral view. Scale bars: A, B = 1.0 mm; C, D = 0.5 mm; E–I = 0.2 mm.

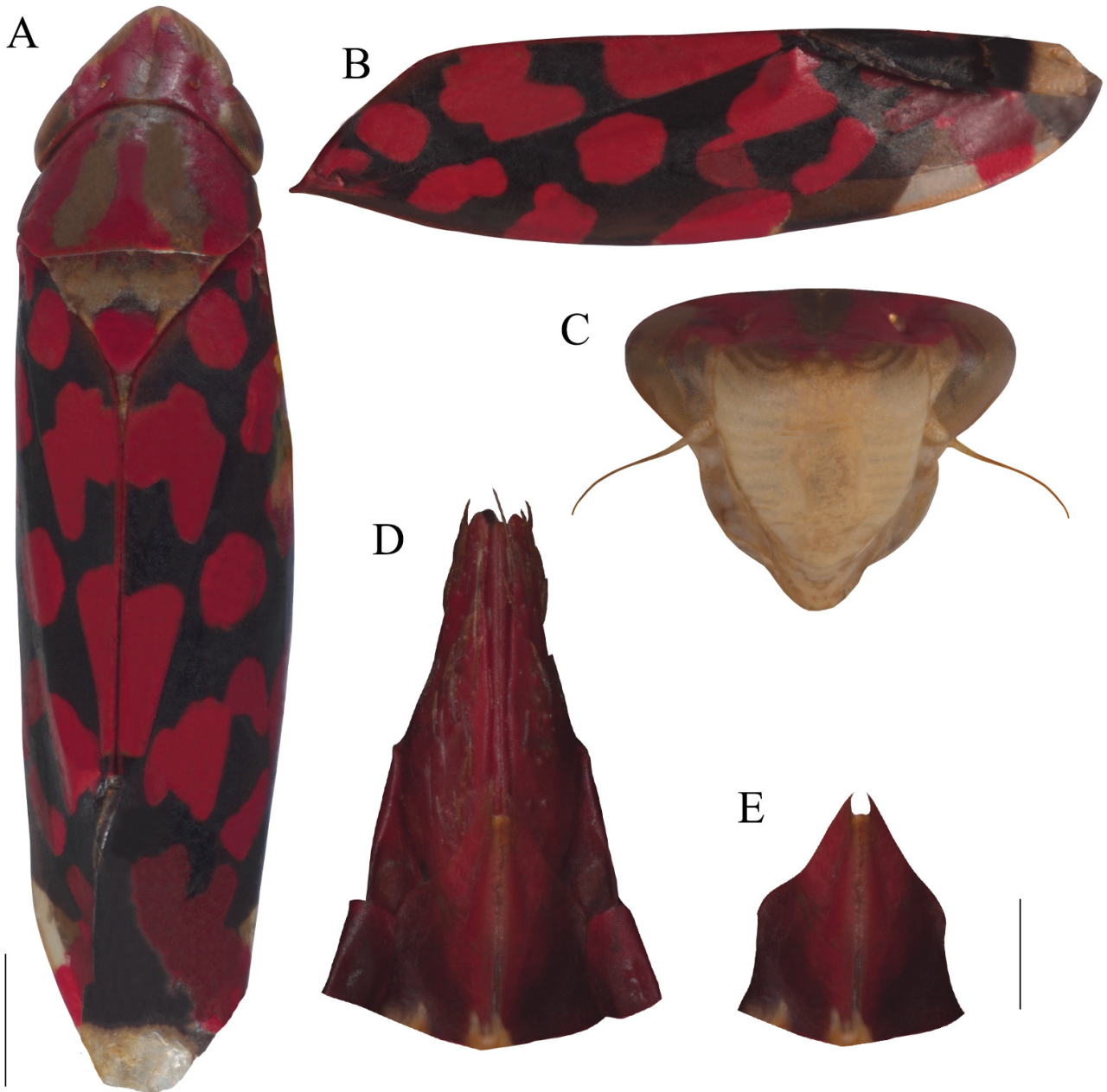


Fig. 3. Habitus of *Ladoffa tsibi* sp. nov., paratype, female. A – body, dorsal view; B – left forewing, lateral view; C – head, anterior view; D – apex of abdomen, ventral view; E – 7th sternite, ventral view. Scale bars: A, B = 1.0 mm; C–E = 0.5 mm.

margin along the entire pygofer length. Ovipositor as long as pygofer. Seventh sternite triangular, moderately produced, with a central notch; 0.8× wider than long (Fig. 3D–E).

**Measurements** (mm). *Male* (n = 15). Body length 7.81–8.40; body width 2.08–2.20. Head width 0.83–0.67; head length at midline 1.68–1.69; eye width 0.41–0.56, eye length 0.24–0.25; crown width at middle before eyes 1.15–1.21; crown posterior width between eyes 0.97–1.03; distance between ocelli 0.52–0.55; frontoclypeus width 0.80–0.81; frontoclypeus length 0.88–0.93; anteclypeus width 0.16–0.17; anteclypeus length 0.20–0.22; lorum width 0.09–0.10; lorum length 0.48–0.49; gena width 0.51–0.59; gena length 0.11–0.11. Pronotum width 1.62–1.67; pronotum length 1.15–1.17. Scutellum width 1.19–1.40; scutellum length 0.84–1.00. Forewing length 6.14–6.22.

*Male capsule*: pygofer height 1.08–1.09; pygofer length 0.92–0.96; valve width 0.65–0.68; valve length 0.19–0.21; subgenital plate: apex width 0.033–0.035; width at middle 0.079–0.092, base width 0.31–0.28; plate length 0.80–0.83; style length 0.44–0.47, connective length 0.31–0.33; paraphysis length 0.73–0.74; aedeagus length 0.83–0.90.

*Female* (n = 1). Body length 8.52; body width 2.06. Head width 0.84; head length at midline 1.23; eye width 0.48; eye length 0.25; crown width at middle before eyes 1.28; crown posterior width between eyes 1.06; distance between ocelli 0.60; frontoclypeus width 0.86; frontoclypeus length 0.93; anteclypeus width 0.18; anteclypeus length 0.23; lorum width 0.12; lorum length 0.43; gena width 0.60; gena length 0.12. Pronotum width 1.84; pronotum length 1.11. Scutellum width 1.41; scutellum length

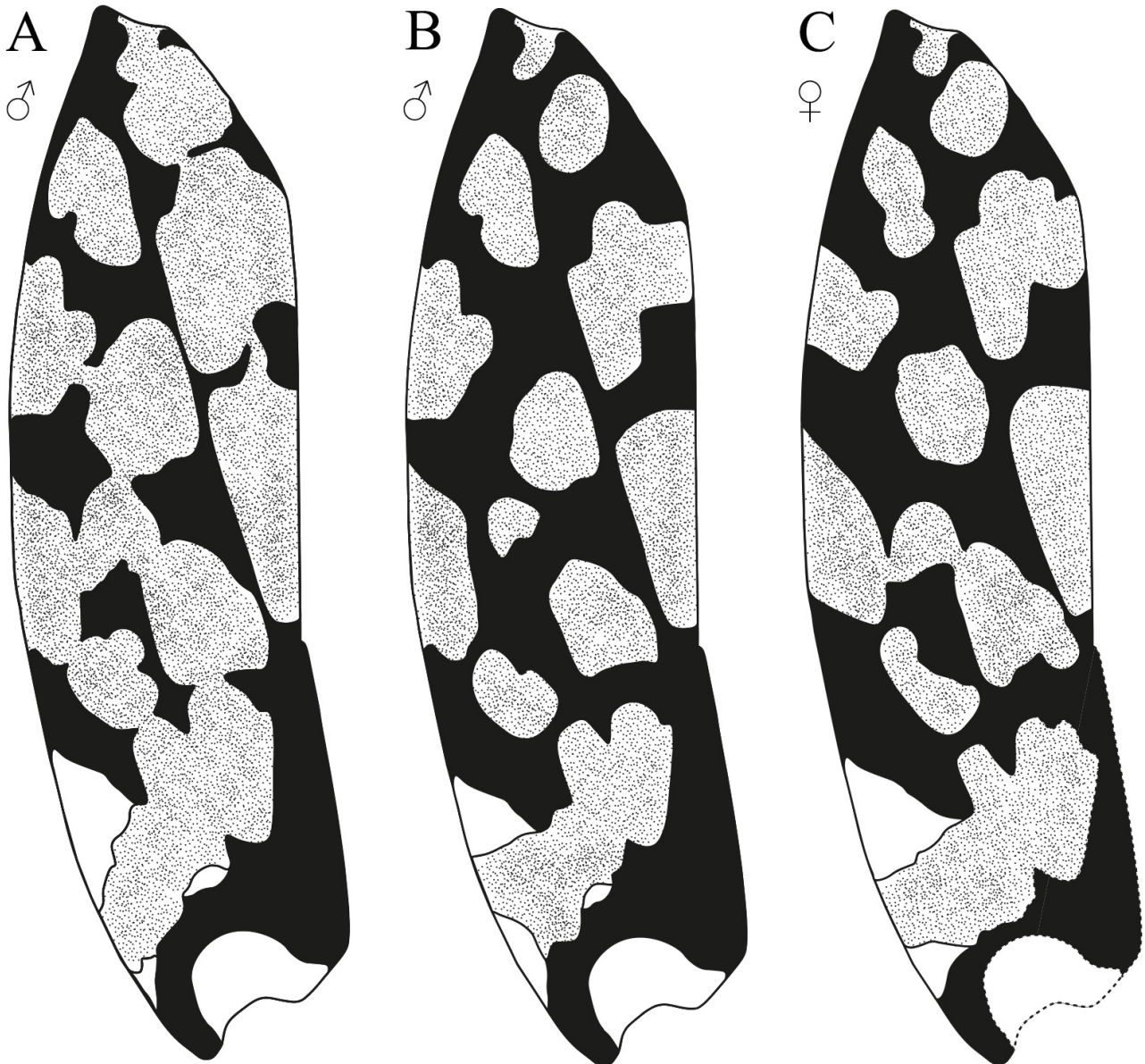


Fig. 4. General forewing color arrangement pattern of *Ladoffa tsibi* sp. nov. A, B – males, different specimens; C – female. Scale bar = 1.0 mm.

0.95. Forewing length 6.85; forewing width 1.32. Female capsule: pygofer height 0.82; pygofer length 2.42; 7th sternite length 1.18; 7th sternite width 0.85; oviduct 1.93.

**Etymology.** The species epithet, a noun in apposition, is composed of the word ‘*tsibi*’, which comes from the Otomi language and means “fire”, referring to the coloration of the organisms studied.

**Habitat.** Rainforest.

**Distribution.** Restricted to Mexico (Veracruz and Chiapas) (Fig. 6).

**Taxonomic notes.** The new species is externally very similar to *L. purpurascens* Fowler, 1900, as far as the color pattern of the forewings is concerned. Nevertheless, no other described species has a similar arrangement of genital structures, which clearly differ in the shape of the aedeagus with three processes, two subapical and one basal, the paraphysis, which is globose, and a T-shaped connective.

#### Key to males of *Ladoffa* species occurring in Mexico

- 1 Pronotum with a single black longitudinal band running from the anterior to the posterior margin (Fig. 1B); connective Y-shaped (Fig. 1K). ..... *L. coccinea* (Fowler, 1900)
  - Pronotum with a pair of black or light bands; connective spatulate (Fig. 1J) or T-shaped (Fig. 2I). ..... 2
- 2 Crown with a black band running on midline (Fig. 1D); anterior margin of crown acute; pronotum with a subpentagonal spot emerging from the posterior margin and running to the anterior margin without touching it. .... *L. guttata* (Signoret, 1854)
  - Crown without black bands; anterior margin of crown not particularly pointed; pronotum either without spot near the posterior margin or with a rounded spot. .... 3
- 3 Paraphysis articulated with aedeagus (Fig. 1M). ..... 4

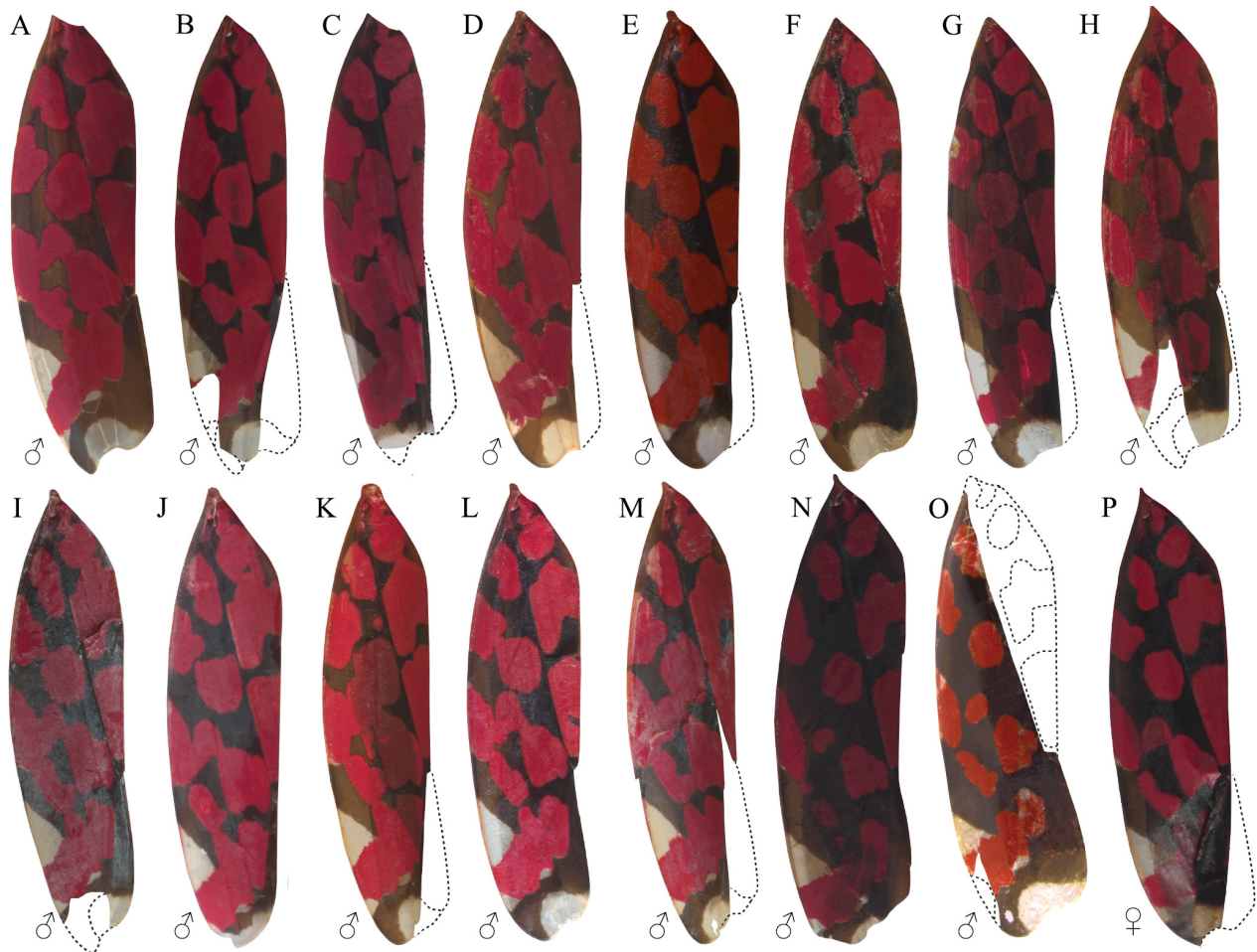


Fig. 5. Forewing color pattern of type series of *Ladoffa tsibi* sp. nov. Specimens (n = 16) from 6 localities: A – Coyame; B – Bastonal; C – Ocotal Grande; D, E – Ocotal Chico; F–H – Arroyo Claro; I–M – Veracruz; N–P – Santa Elena.

- Paraphysis not articulated with aedeagus (Figs 1L, 2G). ..... 5
- 4 Aedeagus without processes (as in Fig. 1I). ..... *L. lentiginosa* Young, 1977
- Aedeagus with one process on ventral margin (as in Fig. 1H). ..... *L. sannionis* Young, 1977
- 5 Aedeagus tubular (Figs 1H, 2E), three or more times longer than wide. .... 6
- Aedeagus globose (Fig. 1I), 1.5 times longer than wide. .... 7
- 6 Aedeagus with a pair of subapical processes and a single basal process (Fig. 2E, F). ..... *L. tsibi* sp. nov.
- Aedeagus with a single apical and a single basal process. .... *L. dependens* Young, 1977
- 7 Anterior margin of head conical (Fig. 1F); aedeagus with process. .... *L. purpurascens* (Fowler, 1900)
- Anterior margin of head rounded (Fig. 1A): aedeagus without process. .... *L. cavillator* Young, 1977

**Discussion**

The forewing color pattern of *Ladoffa* is one of the most complex in Neotropical leafhoppers. After careful examination, the species of *Ladoffa* can be identified only based

on this pattern. In some species, the pattern is consistent, while others are highly variable, such as the new taxon described here, which generally shows two schematic patterns (two in males, one in females, which is similar in some males, as shown in Fig. 4), depending on where the specimens were taken (Fig. 5), but the male terminalia are uniform in all specimens. The use of wing color patterns in further studies could facilitate the delimitation of species within *Ladoffa*.

There are now eight species of *Ladoffa* in Mexico, and the Mexican Neotropical zone shares several species with other Central American countries due to the similar habitat structure of the rainforests. Nevertheless, the number of *Ladoffa* species occurring in Mexico is low compared to Costa Rica (13 spp.) and Panama (15 spp.), which have the largest number of known species of the genus to date. In contrast, the number of species in Mexico is similar or higher than in countries such as Guatemala (7 spp.) or Belize (8 spp.), but this may be an artifact due to less intensive fieldwork in these areas, including Mexico (YOUNG 1977, FREYTAG & LOZADA 2013).

The distribution of some species (e.g., *L. coccinea*, *L. guttata*, and *L. sannionis*) has been poorly documented in Mexico and the known historical records by FOWLER

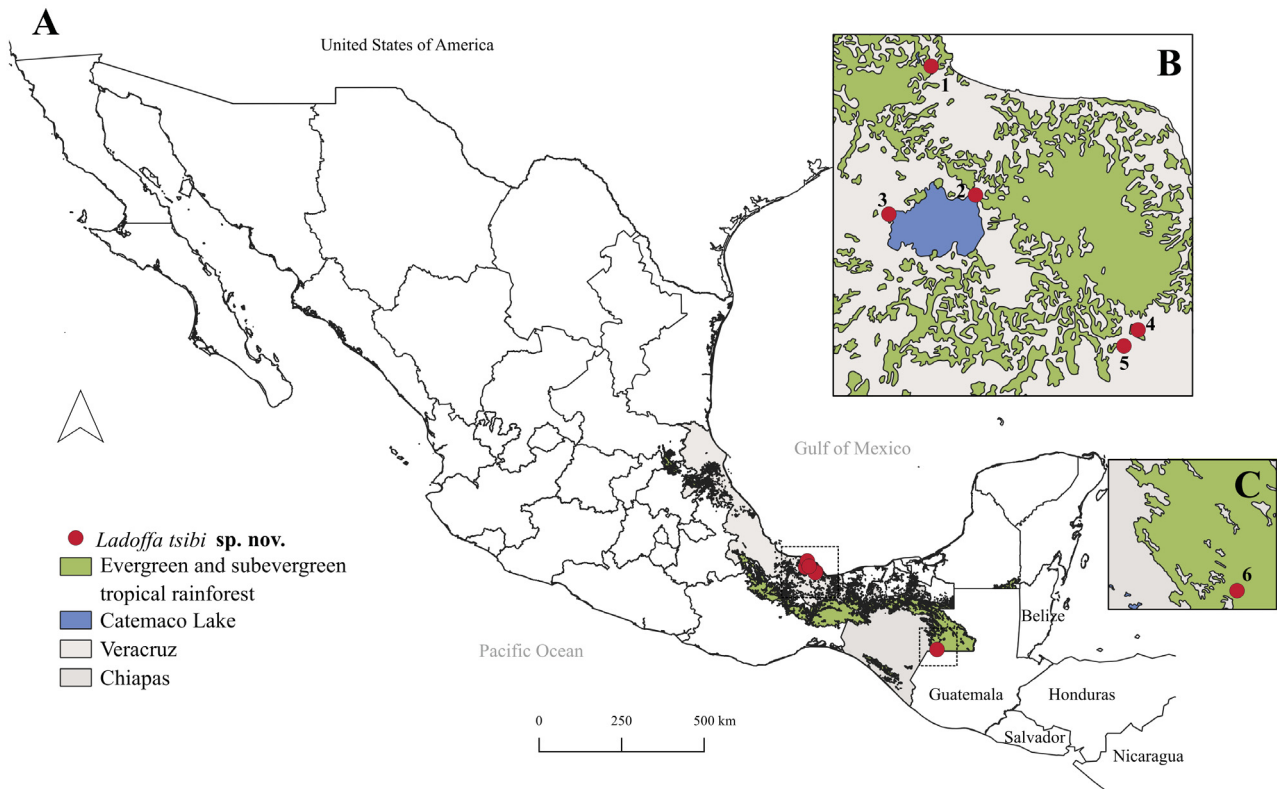


Fig. 6. Distribution of *Ladoffa tsibi* sp. nov. A – map of Mexico; B – detail of Veracruz state (localities 1–5); C – detail of Chiapas state (locality 6). Localities: 1 – Arroyo Claro, Los Tuxtlas; 2 – Coyame, Catemaco; 3 – Bastonal, Catemaco; 4 – Ocotal Grande, Los Tuxtlas; 5 – Ocotal Chico, Los Tuxtlas; 6 – Santa Elena, Montebello.

(1900) and SIGNORET (1854), as well as other more recent records such as FREYTAG & LOZADA (2013), do not include information on the exact locality (region or state) where the specimens were presumably found, but most specimens date from the 1890s or earlier, so it is understandable that limited information or additional details were not included in the original labels of these species.

In the specific case of *L. sannionis*, YOUNG (1977) stated that the specimens examined from Mexico originated from the states of Chiapas, Nayarit, and Estado de Mexico. For the latter state, he referred to the locality "Texcoco", and the single specimen was presumably deposited at UNAM. However, no such specimens were found by us in UNAM, and PINEDO-ESCATTEL & DMITRIEV (2019) and PINEDO-ESCATTEL et al. (2021) noted that most of the specimens with such information were originally mislabeled. For this reason, the record from Estado de Mexico is questionable. Another case is the locality Nayarit, because all known records for the genus historically come from the slope of the Gulf of Mexico to Central America, and the Pacific coast of Mexico does not have climatic conditions or similar vegetation, so this record is also questionable. Finally, we believe that the specimens studied by David Young belonged to the Escuela Nacional de Agricultura (now known as the Universidad Autónoma Chapingo) in the municipality of Texcoco and did not come from the UNAM collection, as stated in YOUNG (1977). These specimens may still be in the collection of North Carolina State University (NCSSU).

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