

ARTICLE



Jatoba gen. nov. (Hemiptera: Fulgoromorpha: Nogodinidae), a new genus of planthoppers from Dominican amber

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ABSTRACT

A new monotypic genus of nogodinid planthoppers (Hemiptera: Fulgoromorpha: Nogodinidae) is described from Dominican amber. The adult female of *Jatoba losbrachi* gen. et sp. nov. can be distinguished from other genera of extant and extinct planthoppers by a combination of the following features: the absence of a medial carina on the mesonotum, the presence of transverse carina on the frons, the presence of transverse veinlets on the basal half of the tegmen, a multifurcate and curved longitudinal vein CuA at the apex of the clavus and eggs bearing an operculum. Of special interest is an immature egg in the process of being extruded from the tip of the abdomen and an already deposited egg adjacent to the body terminus.

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Fossil; fulgorids; Hispaniola; morphology; taxonomy

Introduction

Dominican amber is an important source of fossil planthoppers, with 7 families, 11 genera and 12 species having been recorded from these deposits (Table 1). The currently described taxon belongs to family Nogodinidae, subfamily Colpopterinae Gnezdilov, 2003, tribe Colpopterini Gnezdilov, 2003. The other fossil members of this family belong to the subfamily Nogodininae Melichar, 1898 and include *Tonacatecutlius gibsoni* (Stroiński and Szewo 2000) from Mexican amber and *Tainosia quisqueyae* (Szewo and Stroiński 2001) from Dominican amber.

The subfamily Colpopterinae consists of two tribes; the Niadrimini with *Niadrima yulei* described from late Eocene imprints from the Isle of Wight (Szewo et al. 2019) and the Colpopterini (Gnezdilov 2003). The tribe Colpopterini was established in the family Issidae by Gnezdilov (2003) but later transferred to the family Nogodinidae (Gnezdilov 2012), which currently includes seven genera with 39 species. Included genera are *Bumerangum* (monotypic; Gnezdilov 2012), *Caudibeccus* (5 species; Gnezdilov and O'Brien 2008), *Colpoptera* (29 species; Burmeister 1835), *Dozierana* (monotypic; Gnezdilov 2018), *Jamaha* (2 species; Gnezdilov and O'Brien 2008), *Neocolpoptera* (5 species; Dozier 1931) and *Ugoa* (monotypic; Fennah 1945). Except for the monotypic genus *Bumerangum* from South Africa, the remaining species are from the Greater and Lesser Antilles, Mexico and northern South America. Three genera with five species are currently known from Hispaniola, namely *Colpoptera clerodendri*, *C. insularis*, *C. nana*, and *Dozierana gibbicollis* (Dozier 1931) and *Jamaha elevans* (Walker 1858).

Materials and methods

The fossil was collected in Santiago from 'Los Brachos' mine (La Cumbre), in the Cordillera Septentrional of the Dominican Republic. Dating of Dominican amber is generally believed to be 20–15 mya based on foraminifera (Iturralde-Vinent and MacPhee 1996); however, a date of 45–30 mya was previously proposed based

on coccoliths (Cêpek in Schlee 1990). Dominican amber is secondarily deposited in sedimentary rocks, which makes a definite age determination difficult (Poinar and Mastalerz 2000). A range of ages for Dominican amber is possible since the amber is associated with turbiditic sandstones of the Upper Eocene to Lower Miocene Mamey Group (Draper et al. 1994). Dominican amber was produced by the leguminous tree, *Hymenaea protera* Poinar (1991), and a re-construction of the Dominican amber forest based on amber fossils indicated that the environment was similar to that of a present-day tropical moist forest (Poinar and Poinar 1999).

Observations and photographs were made with a Nikon SMZ-10 R stereoscopic microscope and Nikon Optiphot compound microscope with magnifications up to 800 X. Helicon Focus Pro X64 was used to stack photos for better depth of field.

The nomenclature of the forewing (tegmen) follows the interpretation proposed by Bourgoin et al. (2015) and Stroiński (2020).

Results

The specimen is complete (Figure 1). Other inclusions in the amber are several small, fragile gall gnats (Diptera: Cecidomyiidae).

Class: Insecta Linnaeus, 1758

Order: Hemiptera Linnaeus, 1758

Suborder: Fulgoromorpha Evans, 1946

Superfamily: Fulgoroidea Latreille, 1810

Family: Nogodinidae Melichar, 1898

Subfamily: Colpopterinae Gnezdilov, 2003

Tribe: Colpopterini Gnezdilov, 2003

Type genus: *Jatoba* gen. nov.

LSID: urn:lsid:zoobank.org:act:254EB53E-3B96-4BA6-B1A8-42D1AFA733D1

Diagnosis: *Jatoba* gen. nov. is based on characters presented by Gnezdilov (2012) and is similar to the extant genera *Caudibeccus* (Gnezdilov and O'Brien 2008) and *Ugoa* (Fennah 1945) based on the common stem of longitudinal veins ScP+R. It differs from *Ugoa* by the presence of a lateral spine on the metatibiae. *Jatoba* gen. nov. is distinguished from other genera by special characters

Table 1. Planthoppers described from Dominican amber.

Species and Family	Reference
<i>Antecedusa dominicana</i> (Derbidae)	Emeljanov (2008)
<i>Cedusa credula</i> (Derbidae)	Emeljanov and Shcherbakov (2000)
<i>Dysimia imprudens</i> (Derbidae)	Emeljanov and Shcherbakov (2000)
<i>Jatoba losbrachi</i> (Nogodinidae)	Present paper
<i>Oecliidius browni</i> (Kinnaridae)	Bourgoin and Lefčbvre (2002)
<i>Oecliidius salaco</i> (Kinnaridae)	Emeljanov and Shcherbakov (2000)
<i>Oligocixia electrina</i> (Cixiidae)	Gebicki and Wegierek (1993)
<i>Quilessa stolidia</i> (Kinnaridae)	Emeljanov and Shcherbakov (2000)
<i>Oliarus kulickae</i> (Cixiidae)	Szwedo (2000)
<i>Quizqueiplana alexbrowni</i> (Caliscelidae)	Bourgoin et al. (2016)
<i>Seeteascanopia arcabucana</i> (Tropiduchidae)	Bourgoin et al. (2019)
<i>Tainosia quisqueyae</i> (Nogodinidae)	Szwedo and Stroiński (2001)
<i>Thionia douglundbergi</i> (Issidae)	Stroiński and Szwedo (2008)

such as: the absence of medial carina on the mesonotum; the presence of transverse carina on the frons; the presence of transverse veinlets on the basal half of the tegmen, multifurcate and curved longitudinal vein CuA at the tip of clavus and egg with an operculum.

Etymology: The generic name is based on the common local name (jatoba) for the *Hymenaea* tree. Gender feminine.

Type species: *Jatoba losbrachi* gen. et sp. nov.

Included species: Only one species in the genus.

Diagnosis: as for genus (by monotypy)

LSID: urn:lsid:zoobank.org:act:763B6E18-4BD7-40AB-AB40-A85B144838FB

Etymology: The specific epithet refers to the name of the mine, 'Los Brachos', from which the specimen was excavated.

Type material: Holotype, ♀, deposited in the Poinar amber collection (accession # D-HO-64) maintained at Oregon State University, USA.

Type locality: The fossil was collected in Santiago from 'Los Brachos' mine (La Cumbre), in the Cordillera Septentrional of the Dominican Republic (Hispaniola Island).

Description

Jatoba losbrachi gen. et sp. nov. (Figures 1–7)

Head

Compound eyes (in dorsal view) about as wide as mesonotum at the level of lateral angles (Figure 1B). Vertex (Figures 1B and Figure 2A) transverse, distinctly wider than long at midline, sub-rectangular, with all margins well carinated and elevated, anterior margin angulate with 'broken point' medially; posterior margin arcuate with major curvature; lateral carinae straight and parallel; a disc of vertex flat, median carina absent. Frons (Figure 2B) with all margins well carinated; upper margin shorter than the width at midline, the widest portion of frons a bit wider than long at midline; lateral margins covering the base of the pedicel, not incised near the level of ocelli; lateral carinae diverging to below level of antennae with maximum expanded (widest point) about the level of



Figure 1. *Jatoba losbrachi* gen. et sp. nov. in Dominican amber. (A) Habitus, lateral view; scale bar = 2.0 mm; (B) Dorsal view; scale bar = 1.8 mm. E = egg adjacent to the tip of the abdomen.

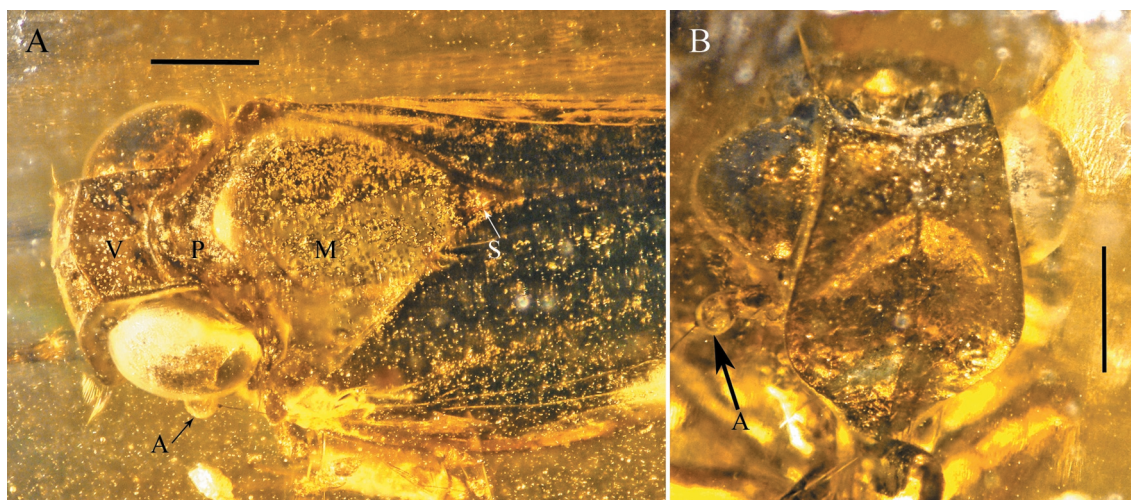


Figure 2. *Jatoba losbrachi* gen. et sp. nov. in Dominican amber. (A) Anterior part of body, dorso-lateral view; A = antenna; V = vertex, P = pronotum; M = mesonotum, S = scutellum; (B) Head, frontal view; A = antenna. (A and B) scale bar = 0.5 mm.

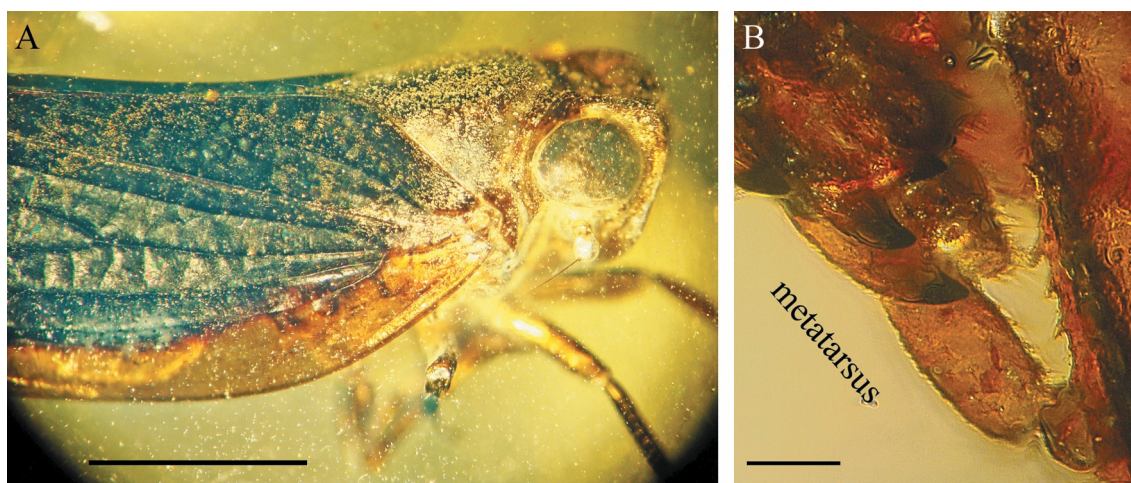


Figure 3. *Jatoba losbrachi* gen. et sp. nov. in Dominican amber. (A) Anterior part of body and half base of tegmen, lateral view; scale bar = 2 mm; (B) Metatarsus, ventro-lateral view; scale bar = 36 µm.

frontoclypeal suture and distinctly rounded at frontoclypeal suture. Frontal disc with single median carina and arcuate (half-moon) shape transverse carina near middle portion; median part of disc slightly depressed.

Compound eyes (Figure 1A, Figure 2, Figure 3A) large with very small callus at posterior margin. Ocelli present, antennal pedicel enlarged, bulbous. Clypeus (Figure 2B) distinctly narrower than frons, without any carinae. Rostrum reaching slightly past mid-coxae, with apical segment shorter than subapical one.

Thorax

Pronotum (Figure 1, Figure 2A, Figure 3A) narrow, distinctly shorter than vertex at midline; anterior margin of pronotum extended; with medial partly flattened margin reaching to the middle of the compound eyes (in dorsal view); posterior margin distinctly convex; a median portion of posterior margin extending to the level of posterior margin of compound eyes (in dorsal view); a disc of pronotum without median carina and distinctly depressed medially. Mesonotum (Figure 1, Figure 2A, Figure 3A) elongated, trapezoid in shape, distinctly longer at midline than the combined length of vertex and pronotum; medial carinae absent; lateral

carinae present, connected at the base, arcuate to the level of lateral angles of mesonotum; lateral carinae reaching to posterior margin; Lateral angles of mesonotum placed before mid-length of mesonotum; scutellum triangular, sharp.

Tegmina (Figure 1A, Figure 2A, Figure 4, Figure 5, Figure 6) membranous, elongate (distinctly longer than wide), slightly tapering apicad, flattened with distinct venation and transverse veinlets. Costal margin weakly arcuate, apical and claval angles broadly rounded, posterior margin arcuate; tornus present (postclaval margin). Costal area very narrow and distinctly narrower than the costal cell, without transverse veinlets, ending before the tip of clavus. Postcostal cell distinctly wider than costal area (distinctly basally), with transverse veinlets. Basal cell (elongate-oval), distinctly longer than wide; longitudinal veins ScP+RA, MP and CuA leaving basal cell separated; all first forks of longitudinal veins ScP+RA and MP placed distinctly before half of the tegmen; first fork of CuA placed after the tip of clavus, distinctly curved and multifurcate; veins ScRA and RP arising as a very short common stem from the basal cell (vein forked just after leaving basal cell); all terminals of Sc+RA ending in costal margin; longitudinal veins ScP+RA ending with 7 terminals; vein RP ending with 8 terminals; vein MP ending with 12 terminals and CuA with 5 terminals. Terminals

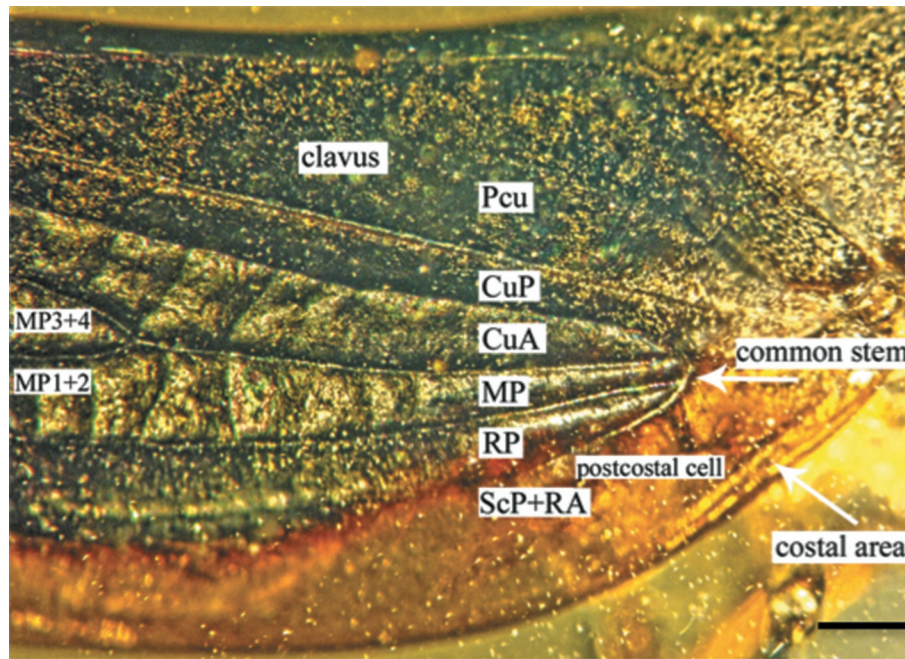


Figure 4. *Jatoba losbrachi* gen. et sp. nov. in Dominican amber. (A) Tegmen, basal half. Scale bar = 0.5 mm.

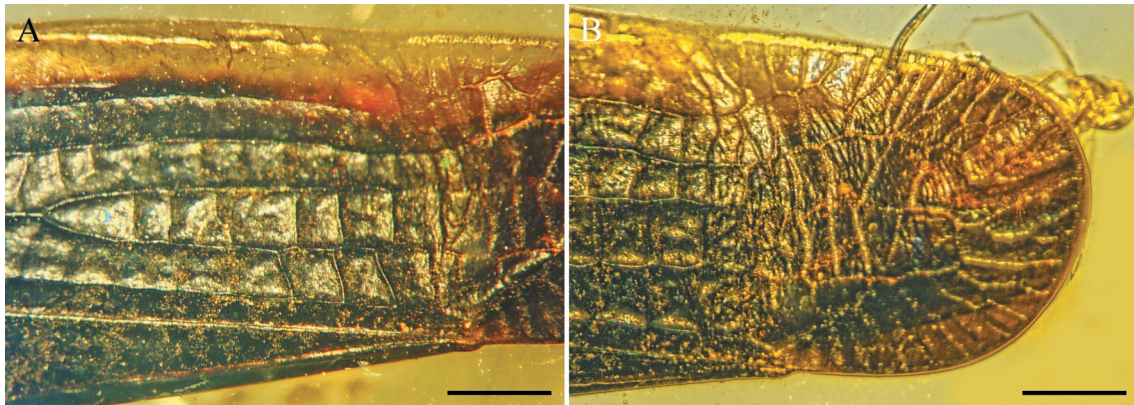


Figure 5. *Jatoba losbrachi* gen. et sp. nov. in Dominican amber. (A) Tegmen, median part; (B) Tegmen, apical part. (A and B) scale bar = 0.5 mm.

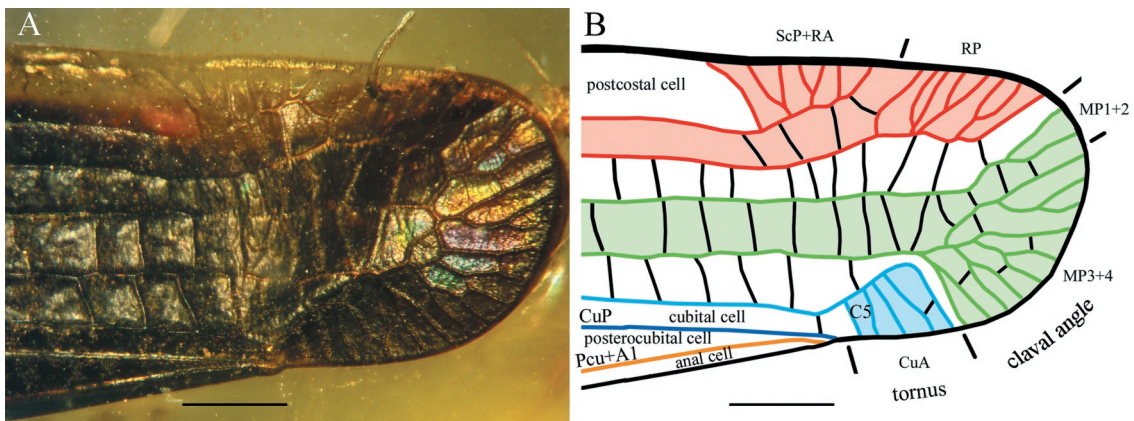


Figure 6. *Jatoba losbrachi* gen. et sp. nov. in Dominican amber. (A) Tegmen, apical part; (B) Tegmen, pattern of venation. (A and B) scale bar = 0.5 mm.

of RP ending in the costal margin and costal angle; all terminals of MP ending between costal and claval angles; CuA ending in tornus, cell C5 open; longitudinal veins to the level of the end of clavus sharp and elevated; at the posterior part of tegmen (after the tip of

clavus) veins more diffuse and flattened than in basal part and with small tubercles. Tegmen with numerous transverse veinlets (starting from the base of tegmen), nodal line and apical line of transverse veinlets absent. Cubital cell with transverse veinlets. Clavus

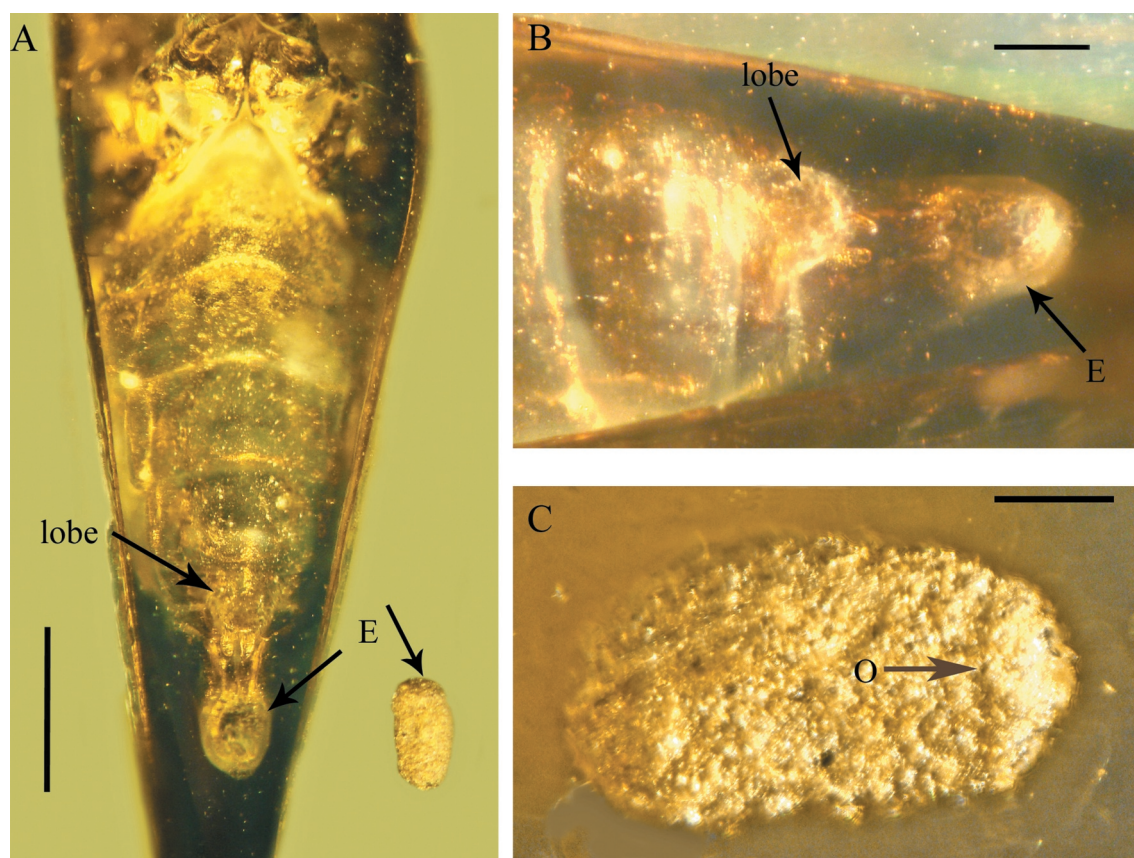


Figure 7. *Jatoba losbrachi* gen. et sp. nov. in Dominican amber. (A) Abdomen, ventral view; scale bar = 64 μ m; E = eggs; (B) Abdomen, apical part: E = egg; scale bar = 40 μ m; (C) Egg, arrow shows line of operculum (O); scale bar = 23 μ m.

closed; CuP ending at the margin; claval veins fused distinctly before midlength of CuP vein; PCu+A1 ending before the apex of clavus; posterocubital cell (basal and posterior part) and postcubital cell with transverse veinlets. Tegmen black, with pronotum, head, legs and lower border of tegmen light brown.

Pro- and mesofemur shorter than pro- and mesotibia; protibiae with small spines on lower margin (Figure 1A). Metatibia longer than metafemur with single lateral spine placed slightly after middle (Figure 1A). An apical row of five teeth on metatibia. Basitarsomere (Figure 3) of metatarsus a bit shorter than the cumulative length of second and apical tarsomeres, with a row of 8 (2 + 6) apical teeth and well-developed lateral and distinctly smaller internal spines. Mesotarsomere with well-developed lateral teeth and median lobe bearing long setae, with posterior margin of lobe not extending to the level of lateral teeth.

Female terminalia (Figure 7)

Pregenital sternite with huge lobe and wide rounded tip at the median part of the posterior margin. Egg (Figure 7) widely ovoid, opaque, surface coarsely pebbled, with an operculum.

Male: unknown

Distribution

Hispaniola: Dominican Republic.

Measurements

Length of body, 10.0 mm; width at head, 2.0 mm; width antennal pedicel, 190 μ m; length antennal seta, 630 μ m; L tegmen, 8.4 mm;

greatest width tegmen, 2.4 mm; L pronotum, 200 μ m; L scutellum, 1.5 mm; L abdomen, 2.9 mm; L hind tibia, 2.0 mm; length egg, 100 μ m. Vertex about 1.7 times wider than long in the midline with posterior margin distinctly elevated. Frons about 0.8 times shorter at the upper margin than the height at midline and in widest place about 1.11 wider than long at the midline.

Discussion

The Fulgoromorpha (planthoppers) is a large group of phytophagous insects with a worldwide distribution. Currently, about 14,000 species have been described in 30 families, including fossils specimens (Bourgoin 2020). Our knowledge of Dominican amber planthoppers is greatly underestimated since many representatives remain undescribed (Szwedo, pers. comm.).

Our knowledge on the morphology of planthopper eggs and ovipositional behaviour of planthoppers is very poor and varies in different groups of Fulgoromorpha (Cobben 1965; Gjonov et al. 2019). Some groups insert their eggs in plant tissues while others place their eggs on the soil substrate or glue the eggs on plants. Some planthoppers cover their eggs with wax (O'Brien 2002; Dietrich 2009). Knowledge about the ultrastructure of the eggshells, respiratory systems, micropylar caps, opercula and anchoring mechanisms is very fragmented and known only for some species (Gjonov et al. 2019). Interestingly, the egg of *Jatoba losbrachi* (Figure 1B and Figure 7) has an operculum (Figure 7C), which up to this point was only known in members of the family Tropiduchidae. The faint line at one end of the egg in the present specimen probably represents the future opening for the nymph when it is ready to hatch. The pebbled surface of the egg (Figure

7C) may be wax deposits since many female planthoppers are known to coat their eggs with wax (Dietrich 2009). Such a surface structure suggests that the egg would have been deposited on a similar-appearing surface, e.g. among soil grains, under bark, or on the pebbly bark or leaf surface of an angiosperm.

Disclosure statement

No potential conflict of interest was reported by the authors.

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