



## First record of *Loisirella* Holzinger, Holzinger & Egger, 2013 and description of a new species from Brazil (Hemiptera: Fulgoromorpha: Cixiidae)

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### Abstract

A second species of the genus *Loisirella* Holzinger, Holzinger & Egger, 2013, *L. xanthosa* sp. nov., is described from Amazonas State, Brazil. The new species can be distinguished from *L. erwini* Holzinger, Holzinger & Egger, 2013, type species of the genus, by the coloration of the body and wing and male genitalia. This species represents the first record of *Loisirella* from Brazil.

**Key words:** Amazonia, new species, planthopper

### Introduction

Bennarellini Emeljanov comprises only six valid species in four genera (Holzinger *et al.*, 2013; Viegas & Ale-Rocha, 2019), being all the species from the Neotropical Region (Emeljanov 1989): *Amazobenna* Penny, 1980 with *A. reticulata* Penny, 1980 (Brazil) and *A. pennyi* Viegas & Ale-Rocha, 2019 (Brazil); *Bennarella* Muir, 1930 with *B. bicoloripennis* Muir, 1930 (Brazil and Guyana) and *B. fusca* Muir, 1930 (Brazil); *Noabennarella* Holzinger & Kunz, 2006 with *N. costaricensis* Holzinger & Kunz, 2006 (Costa Rica) and *N. paveli* Holzinger, Holzinger & Egger, 2013 (Ecuador); and the monotypic *Loisirella* Holzinger, Holzinger & Egger, 2013 with *L. erwini* Holzinger, Holzinger & Egger, 2013 (Ecuador). Until now there are no known fossils for the tribe. This tribe is a very small taxonomic unit within the Cixiidae restricted to the Neotropical Region, representing only 0.2% of the genera and 0.1% of the species in Fulgoromorpha (Bourgoin 2021).

Bennarellini have two lateral pairs of modified abdominal processes that are a putative apomorphy of this clade (Emeljanov 1989; Holzinger *et al.* 2013). The shape and the number of sensory pits of abdominal processes are not equal in all genera. *Bennarella*, *Amazobenna*, and *Noabennarella* have five shallow sensory pits, being three in the fourth sternite and two in the fifth sternite. While *Loisirella* is characterized by having two deep sensory pits, being one in the fourth sternite and the other in the fifth sternite. (Penny 1980; Holzinger *et al.* 2013) provided a key for all genera of the tribe.

There are no studies about Phylogenetic relationships among genera of Bennarellini, thus making difficult to recognize sister groups relationships. However, *Amazobenna*, *Bennarella*, and *Noabennarella* share the abdominal processes with five sensorial pits (Holzinger *et al.* 2013), indicating a possible close relationship between these genera.

Until now, *Loisirella* was a monotypic genus of Bennarellini with the type species *Loisirella erwini*. Holzinger *et al.* (2013) described the genus based on males and females from Orellana Province, Ecuador. Here we describe a second species of the genus and provide the first record of *Loisirella* for Brazil.

## Material and methods

Material studied belong to Coleção de Invertebrados do Instituto Nacional de Pesquisas da Amazônia, Amazonas (INPA). Three specimens were collected in the locality Estirão da Preta, on the banks of the Liberdade River, in the municipality of Ipixuna, southwest of the State of Amazonas, Brazil.

For analysis of genital structures, abdomen was detached from thorax, macerated into 85% hot lactic acid, studied under a Leica M165C stereomicroscope, and illustrated immersed in glycerin jelly. Afterwards, genitalia were kept in plastic microvials filled with glycerin and pinned together with the specimen. Fore wing of a specimen was detached, cleaned by a short xylol bath, and mounted between cover glasses with Euparal. After drying, sides of cover slides were glued to a small piece of cardboard and pinned with the specimen. Digital photographs were taken with a Leica MC 170 HD camera attached to a stereomicroscope and combined into expanded focus images by Leica Application Suite software.

Terminology of head characters mostly follows O'Brien & Wilson (1985), for wing venation follows Bourgoïn *et al.* (2015), and male genitalia mostly follows Bourgoïn (1988) and Bourgoïn & Huang (1990). We herein refer as “base of anal tube” the distance from base of the anal tube to the beginning of the opening of paraproct, and “anal tube extension” the portion from the beginning of the opening of paraproct to apex of the anal segment; all observed in lateral view.

Measurements taken in this study: body length (tip of head to tip of anal segment) and body length including wings (from tip of head to tip of wing). Measurements are taken in lateral view.

The distribution map was created with SimpleMappr (Shorthouse 2010), using geographical coordinates from specimen labels. Square brackets were used to complement label information of the material examined.

## Taxonomy

### Order Hemiptera Linnaeus, 1758

### Suborder Fulgoromorpha Evans, 1946

### Family Cixiidae Spinola, 1839

### Subfamily Cixiinae Spinola, 1839

### Tribe Bennarellini Emeljanov, 1989

### *Loisirella* Holzinger, Holzinger & Egger, 2013

*Loisirella* Holzinger, Holzinger & Egger, 2013: 148–152, Figs. 14–25, 29, 30. Type species: *Loisirella erwini* Holzinger, Holzinger & Egger, 2013 (original designation, key).

**Updated description.** Medium sized cixiid: body length 2.4–4.6 mm in males, 2.4–5.8 mm in females. Frons approximately 1.5 or 2.0 times as long as broad. Pronotum with lateral carinae divergent anteriorly. Lateral longitudinal carinae of mesonotum variable, distinct or indistinct. Forewings: sc-r cross-vein before or after first bifurcation of radial vein;  $MP_{3+4}$  and  $CuA_1$  veins touch each other for a short distance (about 3 times smaller than length of cross-vein icu) or long distance (subequal to length of cross-vein r-m); cross-vein icua short (about half length of cross-vein icu) or long (about twice length of cross-vein icu); apical half of the  $CuA_1$  vein arched or angled. Metatarsus with 6+5 or 7+7 apical spines. Other characters as original description.

**Remarks.** This genus may be easily distinguished from the other genera of Bennarellini by a set of characters: median carina of frons missing; transversal carina, separating the frons from the vertex, present;  $MP_{3+4}$  and  $CuA_1$  veins touch each other for a short distance; two lateral abdominal appendages, each with a single large sensory pit with large seta.

Until now, little is known about the distribution of the Bennarellini, having records of the tribe only in the Neotropical region, with the four included genera recorded in some countries: *Bennarella* in Guyana and Brazil,

*Amazobenna* in Brazil, *Noabennarella* in Costa Rica and Ecuador and *Loisirella* in Ecuador (Holzinger *et al.* 2013). In this paper, *Loisirella* has been recorded exclusively for the Brazilian part of Amazon biome. There is no information on the biology of *Loisirella*, however according to the information on labels of specimens, in the Amazon biome they can be found on shrubby plants of the lower strata and on the canopy of trees. *Loisirella* specimens analyzed in this study were collected in May, during the rainy season in the region (Marques-Filho *et al.* 1981). Besides that, based on information from labels of specimens studied and on the literature, collecting methods were light trap near ground, light trap on the canopy, and canopy fogging (Holzinger *et al.* 2013).

**Distribution.** Brazil (Amazonas) and Ecuador (Orellana).

***Loisirella xanthosa* sp. nov.**

(Figs. 1–13)

**Type material.** Holotype male (INPA). BRASIL: Amazonas, Ipixuna, Com[unidade] Lago Grande, Rio Gregório, 07°21'46.7"S–71°52'07.1"W, 12.v.2011, 19:00–22:00h, Arm[adilha] Luminosa baixa, J.A. Rafael, J.T. Câmara, R.F. Silva, A. Somavilla, C. Gonçalves, A. Agudelo, leg.

**Condition of the holotype:** In perfect condition.

**Paratypes:** BRASIL: Amazonas, Ipixuna, Rio Liberdade, Estirão da Preta, 07°21'46.7"S –71° 52'07.1"W, 13.v.2011, 04:00–06:30h, Arm[adilha] Luminosa dossel, J.A. Rafael, J.T. Câmara, R.F. Silva, A. Somavilla, C. Gonçalves, A. Agudelo, leg (1 ♀, INPA); *idem*, except 13–14.v.2011, 22:00–1:00h, Arm[adilha] Luminosa baixa (1 ♂, INPA).

**Measurements:** Body length: male 2.4–2.6 mm (4.5–4.6 mm including wings) (N=2); female 2.4 mm (4.4 mm including wings) (N=1). Forewing length: male 4.0–4.1 mm (N=10); female 4.0 mm (N=1).

**Diagnosis.** Frons predominantly brown (Fig. 3). Forewing with basal half yellowish brown and apical half dark brown with white areas (Fig. 1). Lateral longitudinal carinae of mesonotum strongly marked (Fig. 4). Pygofer with pair of spiniform projections on dorsal region of posterior margin (Figs. 7–9). Perandrium with two retrorse spines (Fig. 11, S1 and S2).

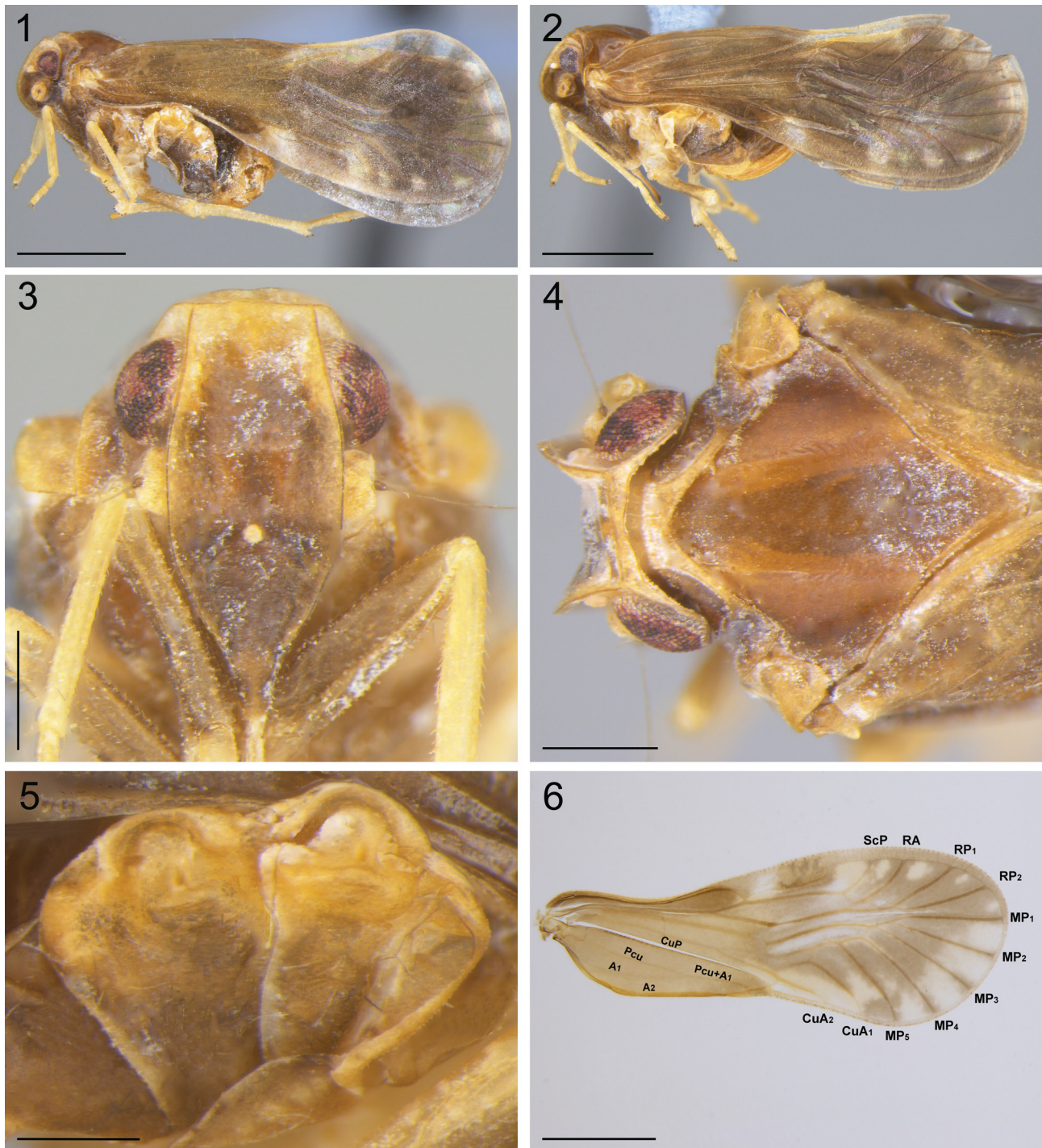
**Description.** Coloration. General body color brown with yellow regions (Figs. 1–5). Lateral carinae of the frons above lateral ocelli, vertex, rostrum, pedicellus, median region of pronotum, tegula, epimeron, and episternum yellow. Forewing with basal half light brown and apical half dark brown, with translucent regions: two white regions within the postcostal cell; white region at apex of the subcostal cell; white rounded region at apex of the C1 cell; small white region at apex of C1a cell; long white region within Radial cell; small white region at apex of C2' cell; C3 cell white; large white region at apex of C3a, C3', C3b and C3c cell; white region near apex of C4' cell; C5' cell predominantly white; white region at apex of cubital cell (Fig. 6). Pterostigma dark brown. Hind wing brown. Legs yellow, except all femora light brown. Abdomen brown, except upper half of sternites III, IV, V, anal segment, pygofer, and genital style, yellow.

**Head:** Frons approximately 1.5 times as long as broad; median carina of frons absent; lateral carinae weakly directed obliquely laterally (Fig. 3). Pedicellus as long as wide and scape inconspicuous in anterior view (Fig. 3).

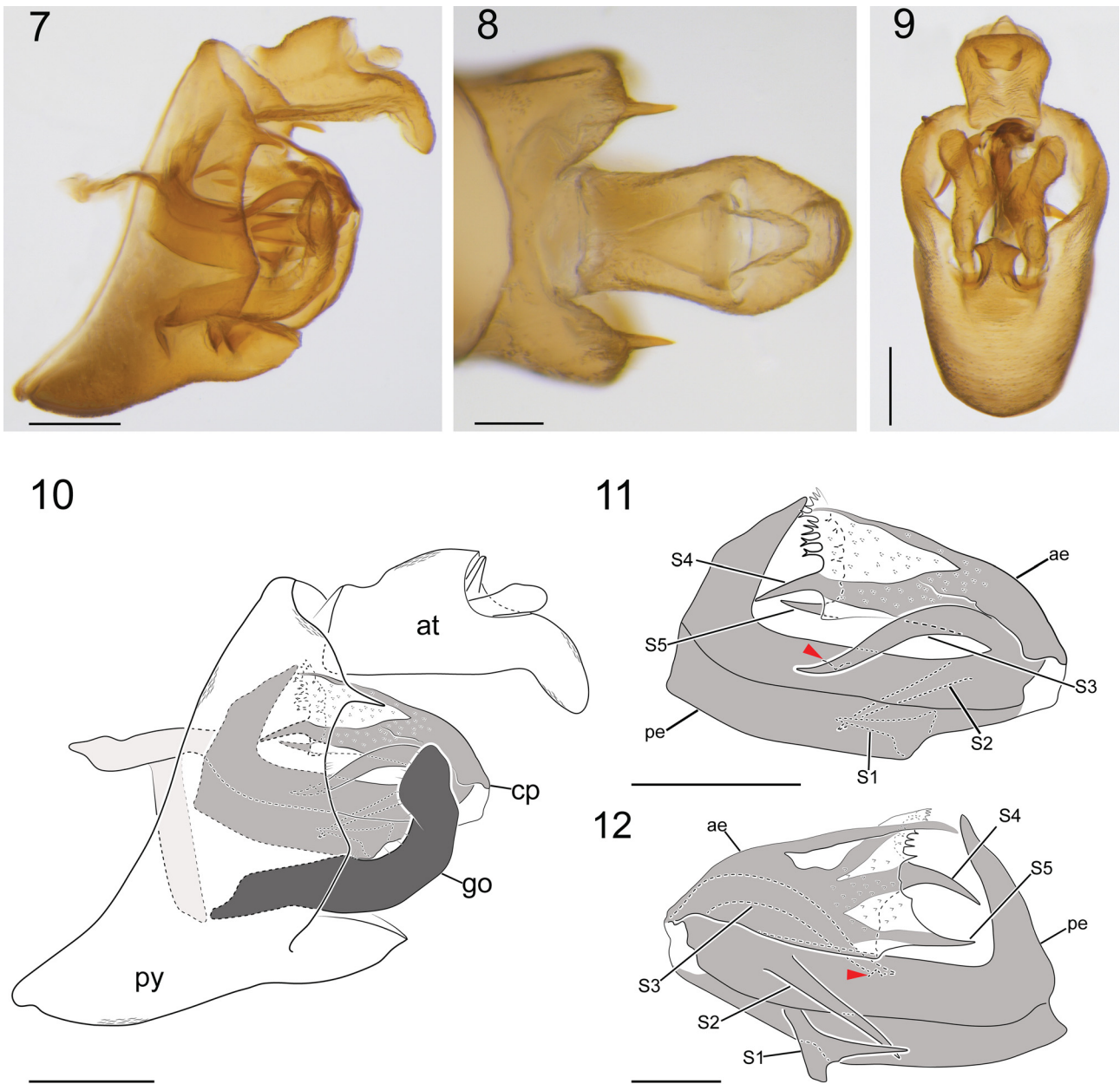
**Thorax:** Pronotum with lateral carinae divergent anteriorly in dorsal view; posterior margin concave with deep median notch. Mesonotum with lateral longitudinal carinae present, strongly marked; median longitudinal carina absent (Fig. 4). Forewing with sc-r cross-vein after first bifurcation of radial vein; MP<sub>3+4</sub> and CuA<sub>1</sub> veins touch each other for a short distance; short icua cross-vein, half length of icu cross-vein; apical half of the CuA<sub>1</sub> vein arched; Pcu+A<sub>1</sub> vein approximately half length of Pcu vein (Fig. 6). Legs with metatibia with 6 apical spines; metatarsus with 7+7 apical spines. Other structural characters as in generic description.

**Male terminalia** (Figs. 7–12): Pygofer with pair of spiniform projections on posterodorsal margins of lobes; small lateral lobe near middle region in lateral view (Figs. 7, 10); medioventral process robust, conical, in lateral view, with posterior margin triangular in ventral view (Figs. 8, 9). Gonostyli symmetrical, curved up in lateral view; inner margin sinuous, divergent and rounded apex in posterior view (Figs. 9, 10). Phallic complex robust, with almost straight perandrium bearing two retrorse spines near apex, and one small triangular lateral projection at median region (Fig. 11), spines as follows: one slender, elongated, and curved anteriorly inserted at apex (Fig. 11, S1) and another slender, elongate, almost straight, ventrally directed, inserted near base (Fig. 11, S2). Aedeagus robust with membranous projections at apex and three spines (Fig. 12), spines as follows: one long, slightly sinuate

spine inserted near base (Fig. 12, S3) and two short, slender, and almost straight apical spines (Fig. 12, S4 and S5). Anal tube robust, subpentagonal in dorsal view, dorsal margin almost straight in lateral view; ventral margin abruptly folded down ventrally at apex in lateral view; base approximately subequal to length of anal tube extension in lateral view; apex truncated in posterior view (Figs. 7–10).



**FIGURES 1–6.** *Loisirella xanthosa* sp. nov.: 1. Holotype male habitus, lateral view; 2. Female habitus, lateral view; 3. Male head, anterior view; 4. Male head and thorax, dorsal view; 5. Female abdominal process, right side lateral view; 6. Right forewing of paratype. Abbreviations: A<sub>1</sub>, first anal vein; A<sub>2</sub>, second anal vein; CuA<sub>1</sub>; CuA<sub>2</sub>; CuP, Cubitus posterior; MP<sub>1</sub>, first media posterior branch; MP<sub>2</sub>, second media posterior branch; MP<sub>3</sub>, third media posterior branch; MP<sub>4</sub>, fourth media posterior branch; MP<sub>5</sub>, fifth media posterior branch; Pcu+A<sub>1</sub>, Postcubitus+first anal vein; Pcu, Postcubitus; RA, radius anterior branch; RP<sub>1</sub>, first radius posterior branch; RP<sub>2</sub>, second radius posterior branch; ScP, Subcosta posterior. Scale bars: 1,2,6 = 1.0 mm; 3,4 = 0.3 mm; 5 = 0.2 mm.



**FIGURES 7–12.** *Loisurella xanthosa* sp. nov., male genitalia: **7.** Genital capsule, lateral view; **8.** Anal tube and pygofer, dorsal view; **9.** Anal tube, pygofer and gonostyli, posterior view; **10.** Anal tube, pygofer, gonostylus, and phallic complex, lateral view; **11–12.** Phallic complex. **11.** right lateral view; **12.** left lateral view, lateral view. Abbreviations: ae: aedeagus; at, anal tube; cp, phallic complex; go, gonostylus; pe, periandrium; py, pygofer; S, spines. Scale bars: 7,9,10 = 0.2 mm; 8, 11, 12 = 0.1 mm.

**Etymology.** From the Greek *xanthos*, yellow. The species name is allusive to the yellow coloration of tibiae.

**Distribution.** Brazil (Amazonas) (Fig. 13).

**Taxonomic notes.** *Loisurella xanthosa* sp. nov. can be promptly distinguished from *Loisurella erwini* by the general color of wings and body and mesonotum with lateral longitudinal carinae strongly marked. Furthermore, the genitalia are quite distinct, the new species having pygofer with a spiniform projection on posterodorsal margin of each lobe and phallic complex with periandrium bearing two spines near apex and one small triangular lateral projection at median region and aedeagus with three spines.

## Discussion

Previous to this study, the type species *Loisirella erwini* was the only known species included into the genus. Through our analysis it was verified that *L. xanthosa* **sp. nov.** fits very well to the generic description and allowed us to verify that diagnostic characters used by Holzinger *et al.* (2013) to describe the genus are valid to identify all representatives.

Based on the material studied so far, all species of genus are known and recorded to the Amazon biome. Lack of collecting efforts and specialists studying this group in the region certainly contribute to this scarce knowledge.

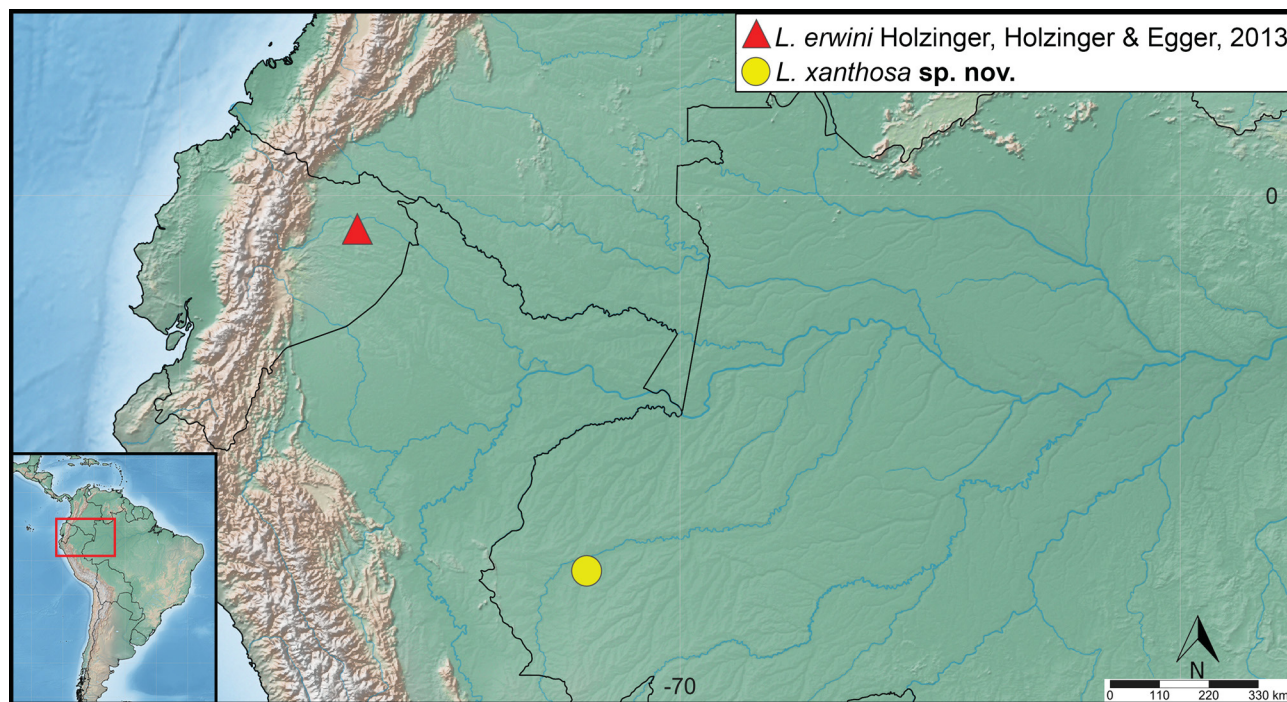


FIGURE 13. Geographical distribution of *Loisirella* species.

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