

A new genus, *Loisirella*, and two new species of Bennarellini from Ecuador (Hemiptera: Auchenorrhyncha: Fulgoromorpha: Cixiidae)

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HOLZINGER W. E., HOLZINGER I. & EGGER J. 2013: A new genus, *Loisirella*, and two new species of Bennarellini from Ecuador (Hemiptera: Auchenorrhyncha: Fulgoromorpha: Cixiidae). In: KMENT P., MALENOVSKÝ I. & KOLIBÁČ J. (eds.): Studies in Hemiptera in honour of Pavel Lauterer and Jaroslav L. Stehlík. *Acta Musei Moraviae, Scientiae biologicae* (Brno) **98(2)**: 143–153. – A new genus, *Loisirella* gen.nov., and two new species, *Loisirella erwini* sp.nov. and *Noabennarella paveli* sp.nov., of the Neotropical clade Bennarellini are described from the Yasuni National Park in eastern Ecuador. *Loisirella* is the only Bennarellini genus with only two instead of five large sensory pits on its lateral abdominal appendages. A key to the genera and species of Bennarellini is provided.

Keywords. Planthoppers, taxonomy, new genus, new species, Neotropical Region, Amazonian rainforest, terra firme forest, Yasuni National Park

Introduction

The tribe Bennarellini Emeljanov, 1989 is a small Neotropical clade within the planthopper family Cixiidae (EMELJANOV 1989). Only three genera and four species have been described: *Bennarella* Muir, 1930 with *B. bicoloripennis* Muir, 1930 (known from Brazil and Guyana) and *B. fusca* Muir, 1930 (Brazil), and the two monotypic genera *Amazobenna* Penny, 1980 with *A. reticulata* Penny, 1980 (Brazil) and *Noabennarella* Holzinger et Kunz, 2006 with *N. costaricensis* Holzinger et Kunz, 2006 (Costa Rica) (MUIR 1930, PENNY 1980, HOLZINGER & KUNZ 2006). Two more taxa from Peru are mentioned in literature, but not formally described: an “undescribed genus” with very peculiar sensory pits is mentioned by HOCH (1987), and an undescribed *Noabennarella* species is figured by HOLZINGER & KUNZ (2006). Bennarellini are easily recognisable by the presence of unique abdominal appendages that are an autapomorphy of this clade (EMELJANOV 1989, HOLZINGER & KUNZ 2006).

In the Cixiidae samples Terry Erwin and his colleagues collected in the Yasuni National Park in Ecuador, we recognised two more yet undescribed taxa from Bennarellini. Here we provide descriptions of these species, one of them also representing a new genus.

Material and methods

The specimens were collected in the Yasuni National Park in eastern Ecuador (e.g. BASS *et al.* 2010). Both sampling sites are located in a terra firme Amazonian lowland forest: The first site is the Onkone Gare Station transect (ONK) in the Reserva Etnica

Waorani (00°39'10"S, 76°26'00"W, 250 m) near the Piraña field station, the second one is in a distance of about 35 km from the first site close to the Tiputini Biodiversity station (TIP, 00°39'25"S, 76°27'10"W, 230 m). The insects were collected in 1994–1999 by the method of “canopy fogging” in a sophisticated sampling design that is described by LUCKY *et al.* (2002) and ERWIN *et al.* (2005). The Fulgoromorpha specimens were sorted out and preliminarily identified by Charles Bartlett and Lawrence Barringer (BARRINGER 2011).

The holotypes designated here and most other specimens studied are stored in trust for the country of Ecuador at the National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA (USNM). Five specimens of each species are kept in the collection of the Ökoteam-Institute for Animal Ecology and Landscape planning, Graz, Austria (OEKO), and two paratypes of *Noabennarella paveli* sp.nov. in the Moravian Museum, Brno, Czech Republic (MMBC).

Taxonomy

Noabennarella paveli sp.nov.

(Figs 1–13)

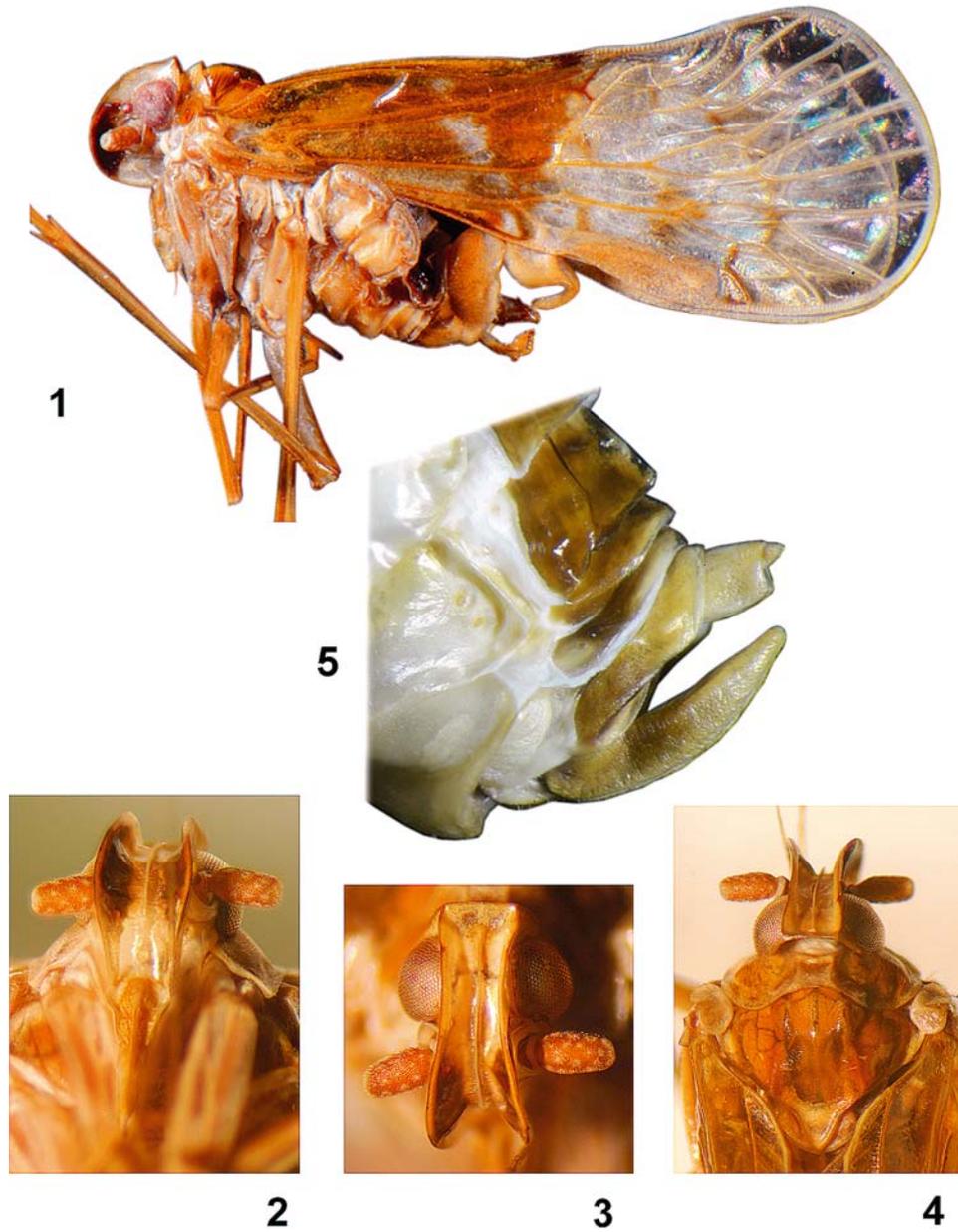
Type material. Holotype: ♂, “681 Ecuador Orellana TransectEnt.1km 220m S. Onkonegare Camp Reserva Etnica Waorani / 00°39'10"S 076°26'00"W 20.vi.94 T.Erwin et al fogging terra firme forest / Morphospecies Cixiidae 4 L. Barringer UDEL m.s.thesis / 2062”; stored in trust for the country of Ecuador at the National Museum of Natural History, Smithsonian Institution (USNM).

Paratypes: Same locality as holotype (ONK): 1 ♂ 1 ♀, 4.ii.1996 (USNM); 1 ♂, 29.vi.1994 (OEKO); 2 ♂♂, 4.x.1994; 2 ♂♂ 1 ♀, 6.x.1994 (OEKO, USNM); 3 ♂♂ 1 ♀, 9.x.1994; 1 ♂ 1 ♀, 10.x.1994; 1 ♂ 1 ♀, 9.ii.1995; 9 ♂♂ 2 ♀♀, 1.vii.1995 (USNM, OEKO); 1 ♂, 3.vii.1995; 2 ♂♂, 6.vii.1995; 1 ♀, 4.x.1995 (OEKO); 2 ♂♂, 6.x.1995; 1 ♀, 4.ii.1996; 1 ♂, 13.ii.1996; 3 ♂♂, 23.vi.1996 (USNM, MMBC). Locality “TIP”: 2 ♂♂, 1.vii.1998; 1 ♂ 1 ♀, 4.vii.1998 (USNM, MMBC); 2 ♂♂, 22.x.1998; 2 ♂♂ 1 ♀, 7.ii.1999 (USNM).

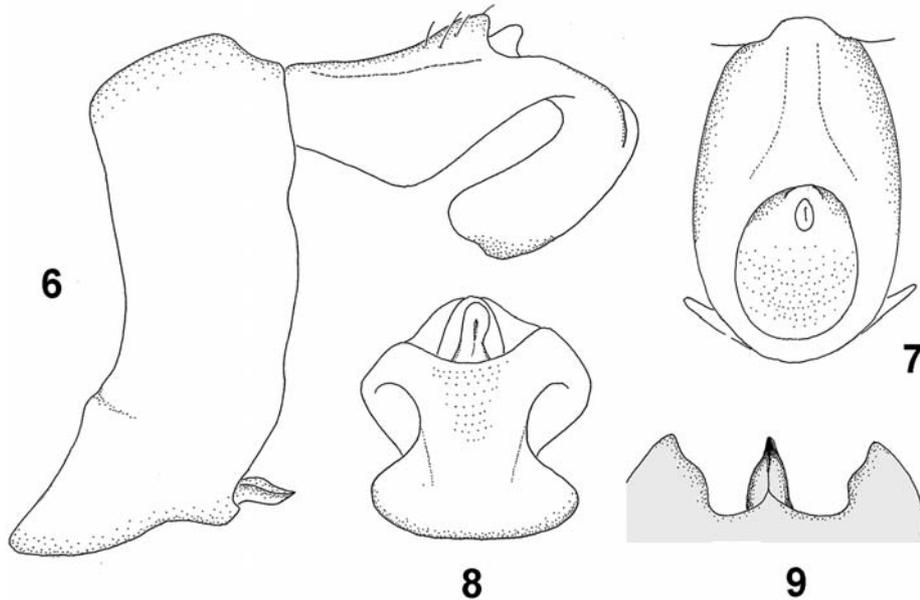
Description. Size. Medium-sized Cixiidae, body length in males 4.0–4.6 mm (6.5–7.5 mm including wings), in females 4.3–4.8 mm (7.4–7.8 mm including wings).

Coloration. Head, body and legs straw-coloured, dorsally yellowish-brownish. Lateral keels of frons with large black spots (Figs 1, 2), reaching from lateral ocellus to epistomal suture. Fore wings (Figs 1, 10) in the basal half with a brownish tinge and brownish-yellow veins. Pterostigma whitish. Apical half of fore wings transparent with yellowish-whitish veins. Spots with a distinct brownish tinge present along a half-circular line from the distal end of the pterostigma along the small crossveins to the distal end of the clavus. Apical cells in some specimens distally with a brownish tinge, too. Hind wings colourless, transparent.

Male genitalia. Shaft of aedeagus close to its base with two slightly curved, basally triangular spines, and three spines at the apex of the shaft: one long, almost straight, movable spine on the left side, and two tiny spines at the apex. Flagellum widening apically and bearing one straight spine on its inner left side (Figs 12, 13). Genital styles spoon-shaped, with a distinct inner lobe and a larger lateral lobe, the latter being produced into a long tip (Fig. 11). Anal segment very characteristic because of its long ventral process (Figs 6–8).



Figs 1–5. *Noabennarella paveli* sp.nov. 1 – habitus of holotype, lateral view; 2 – head, ventral view; 3 – head, frontal view; 4 – head and prothorax, dorsal view; 5 – apex of female abdomen, lateral view.

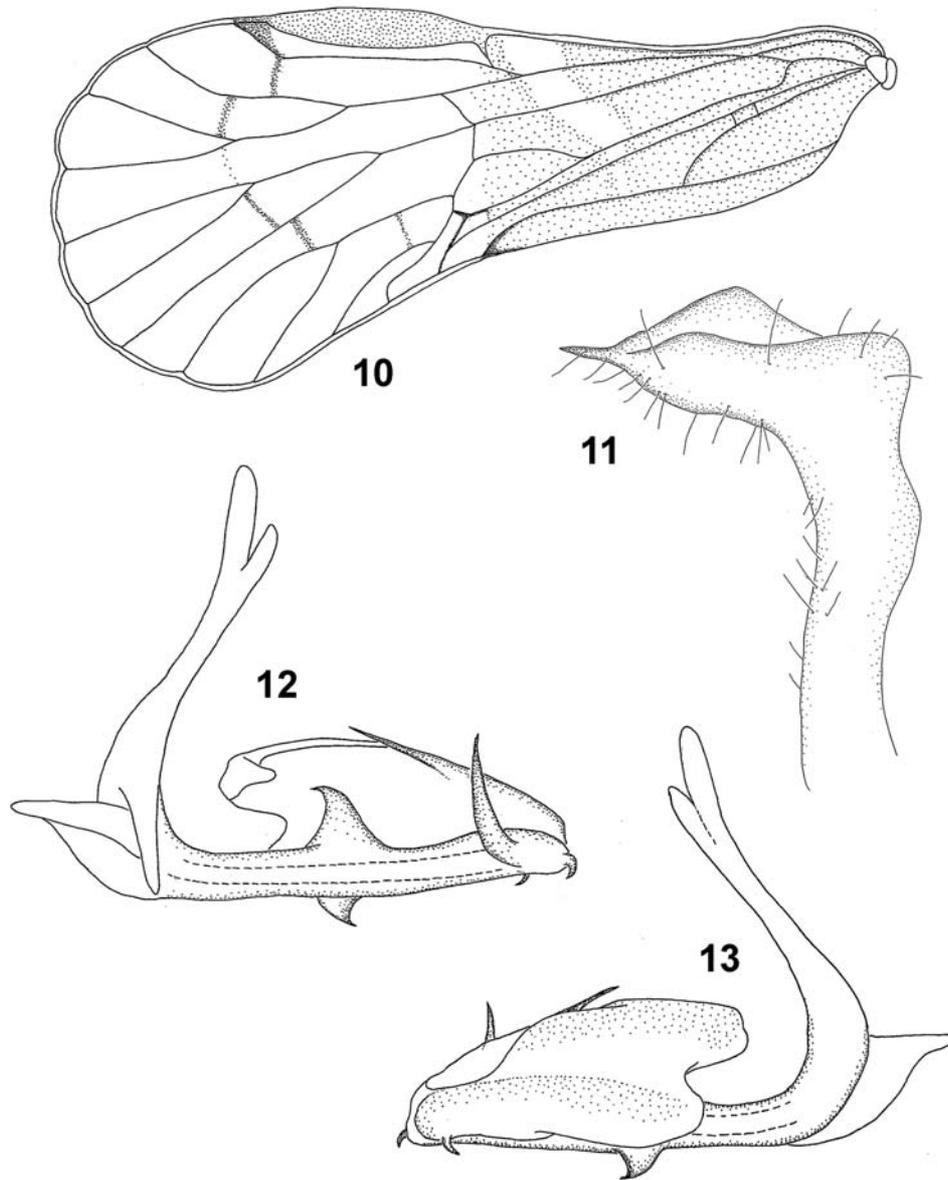


Figs 6–9. *Noabennarella paveli* sp.nov. 6 – male genital and anal segments (aedeagus and styli omitted), left lateral view; 7 – male anal segment, dorsal view; 8 – same, caudal view; 9 – ventro-median process of male genital segment, ventral view.

Female genitalia. Ovipositor (Fig. 5) and female genitalia very similar to those of the (still undescribed) *Noabennarella* species figured by HOLZINGER & KUNZ (2006: 60).

Differential diagnosis. Morphology of *N. paveli* sp.nov. fits very well to the generic description of *Noabennarella* (HOLZINGER & KUNZ 2006), thus we consider it congeneric with the type species, *N. costaricensis* Holzinger et Kunz, 2006, and do not repeat the general description of the genus here. The new species is larger than *N. costaricensis* and differs also in coloration and characters of the male genitalia: In *N. paveli*, the black spots on the lateral keels of the frons are much larger than in *N. costaricensis*, reaching from the epistomal suture to the lateral ocelli (Fig. 1), the spines of the aedeagus are short and triangular in *N. paveli* (Figs 12, 13), but long and slender in *N. costaricensis*, and the anal segment of males of *N. paveli* has a large, distally widening ventral process (Figs 6–8), whereas this process is small and tongue-shaped in *N. costaricensis*.

Etymology. The species is named in honour of our teacher and friend RNDr. Pavel Lauterer, a very well known Auchenorrhyncha and Psylloidea specialist.



Figs 10–13. *Noabennarella paveli* sp.nov. 10 – fore wing; 11 – male genital style, inner maximum view; 12 – aedeagus, left lateral view; 13 – same, right lateral view.

***Loisirella* gen.nov.**

Type species. *Loisirella erwini* sp.nov.

Description. Small cixiids (body length 2.5–3.5 mm, including wings less than 6 mm) with laterally compressed body and wings in resting position steeply inclined.

Frons almost twice as long as broad, concave, separated from (very small) vertex by a distinct and straight carina. Lateral carinae of frons strongly produced, median carina missing. Median and lateral ocelli distinct. Scapus short, ring-like, pedicellus almost spherical.

Pronotum short, lateral carinae distinct. Mesonotum with indistinct median and lateral keels. Fore wings long (almost 3 times as long as wide), apically widening (Fig. 23), R and MA trifurcate, MP bifurcate. Metatibiae without macrosetae, apically with six spines. Metatarsus with 6+5 apical spines, without platellae.

Abdominal segments 4 and 5 bearing lateral processes with two large sensory pits (Fig. 29).

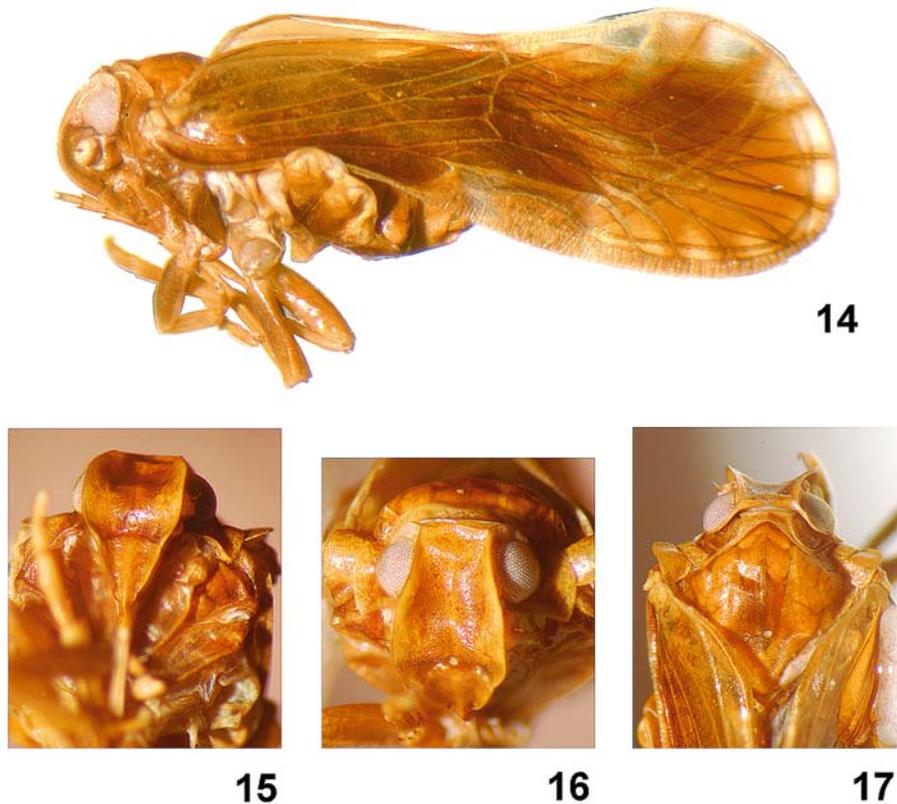
Male genital and anal segments almost symmetrical, aedeagus with shaft and flagellum well-developed. Apex of female abdomen of the “plesiomorphic type” within Cixiidae (see HOLZINGER *et al.* 2002), like in other Bennarellini: truncate, without wax plate, ovipositor evenly curved, adjacent to abdomen (Fig 30).

Differential diagnosis. *Loisirella* gen.nov. is the only Bennarellini genus with abdominal appendages bearing only two large sensory pits. One sensory pit is present at the tip of the appendage of the fourth, the other one on the appendage of the fifth abdominal segment. The abdominal appendages of all other Bennarellini bear five sensory pits: the appendage of the fourth segment has three and the process of the fifth segment two apical sensory pits. The size of these pits in *Noabennarella* and *Bennarella* is about half of the size of *Loisirella*'s pits.

Etymology. The genus is dedicated to “Mother Fulgoromorpha” Dr. Lois B. O’Brien. The name itself is an arbitrary combination of letters. Gender feminine.

Note. The placement of *Loisirella* gen.nov. into the tribe Bennarellini is based on the fact, that its abdominal appendages are formed by the fourth and fifth abdominal segment and bear sensory pits with large setae. Thus we think that these appendages are homologous to the appendages of the hitherto known Bennarellini species and we consider *Loisirella* to be part of a monophyletic Bennarellini clade (possibly derived from a Oecleini-like Cixiidae taxon), characterised by these abdominal processes as autapomorphy.

Species of another Cixiidae tribe, the palaeotropical Bennini Metcalf, 1938, (recently revised by HOCH 2013) also have lateral abdominal processes, but these are derived from the third and fourth abdominal segments and the shape of these appendages (see HOCH 2013: 18 ff. and HOLZINGER *et al.* 2002: 123, Fig 10E) is completely different to those of *Loisirella*. The only other taxon with lateral abdominal appendages within Fulgoromorpha is the family Achilixiidae, with again morphologically very different appendages (see WILSON 1989: 490 and HOLZINGER & KUNZ 2006: 56). Furthermore, based on characters of male and female genitalia, head, wing venation etc., *Loisirella* is not an Achilixiidae but a true Cixiidae *s. str.*



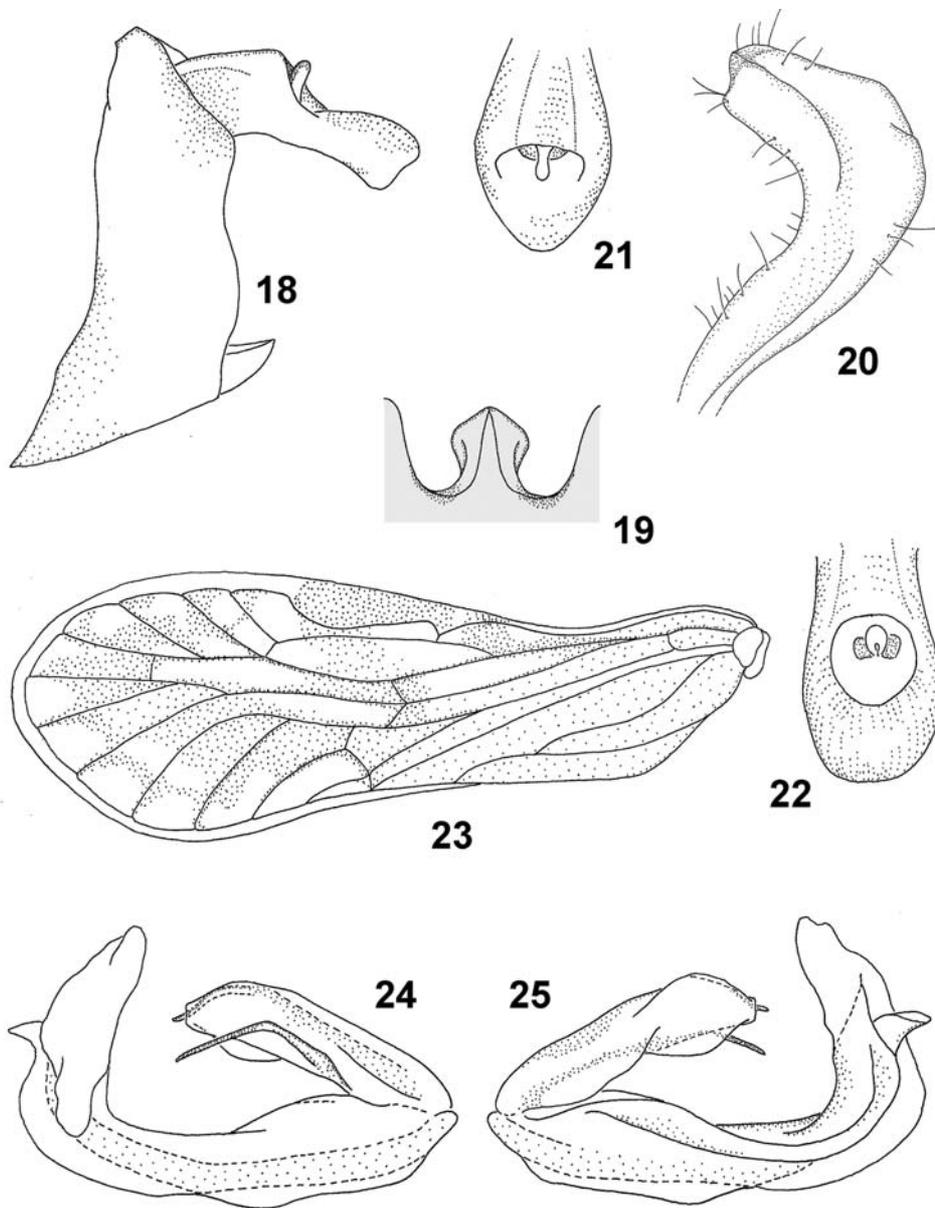
Figs 14–17. *Loisirella erwini* sp.nov. 14 – habitus of holotype, lateral view; 15 – head, ventral view; 16 – head, frontal view; 17 – head and prothorax, dorsal view.

If we consider *Loisirella* as a member of Bennarellini, the question arises, if the configuration of two large sensory pits in *Loisirella* (instead of 3+2 in all other Bennarellini) represents a plesiomorphic state within Bennarellini or is a secondary reduction (by either loss or fusion of some pits). More detailed studies on the morphology of these appendages are needed to solve this question.

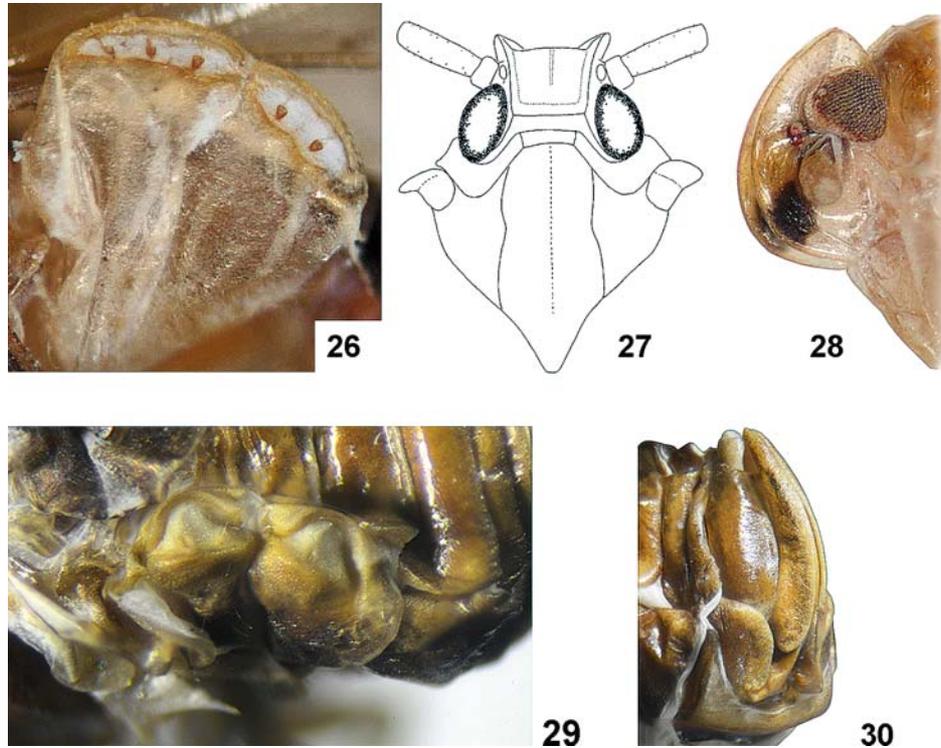
***Loisirella erwini* sp.nov.**

(Figs 14–25, 29, 30)

Type material. Holotype: ♂, “1572 Ecuador Orellana ErwinTransect Onkonegare Camp Reserva Etnica Waorani / 00°39'25.7"S 076°27'10.8"W 22.vi.96 T.Erwin et al fogging terra firme forest /Morphospecies Cixiidae 16 L. Barringer UDEL m.s.thesis / 2130”; stored in trust for the country of Ecuador at the National Museum of Natural History, Smithsonian Institution (USNM).



Figs 18–25. *Loisirella erwini* sp.nov. 18 – male genital and anal segments (aedeagus and styli omitted), left lateral view; 19 – ventro-median process of male genital segment, ventral view; 20 – male genital style, inner maximum view; 21 – male anal segment, dorsal view; 22 – same, dorso-caudal view; 23 – fore wing; 24 – aedeagus, left lateral view; 25 – same, right lateral view.



Figs 26–30. 26 – *Noabennarella* sp., abdominal appendage, ventro-lateral view. 27 – *Bennarella bicoloripennis* Muir, head and thorax in dorsal view; 28 – *Noabennarella costaricensis* Holzinger et Kunz, head in lateral view (from HOLZINGER & KUNZ 2006, slightly modified); 29 – *Loisirella erwini* sp.nov., lateral abdominal appendage; 30 – *Loisirella erwini* sp.nov., apex of female abdomen, laterocaudal view.

Paratypes: Same locality as holotype (ONK): 2 ♀♀, 22.vi.1996; 1 ♂ 2 ♀♀, 29.vi.1994; 1 ♂, 6.x.1994; 2 ♀♀, 9.x.1994; 2 ♂♂, 8.ii.1995; 1 ♀, 12.ii.1995; 1 ♂ 1 ♀, 6.vii.1995; 1 ♂, 6.x.1995; 2 ♂♂ 1 ♀, 8.x.1995 (all USNM); 3 ♂♂ 2 ♀♀, 7.ii.1996; 4 ♂♂ 3 ♀♀, 10.ii.1996; 4 ♂♂ 2 ♀♀, 2.x.1996 (USNM, OEKO). Locality “TIP”: 1 ♂, 5.ii.1999 (OEKO); 1 ♂, 6.ii.1999 (USNM).

Description. Size. Small Cixiidae, body length in males 2.5–3.2 mm (4.8–5.7 mm including wings), in females 2.9–3.3 mm (5.0–5.8 mm including wings).

Coloration. Head, body and legs yellowish-brownish, without distinct colour pattern. Fore wings with a brownish tinge and yellowish-brownish veins. Apical part of fore wings slightly darker in central part, only inner parts of apical cells almost colourless.

Morphology of head, thorax and abdomen as in generic description (Figs 14–17).

Male genitalia. Aedeagus with shaft slightly bent, without prominent keels and without spines. Flagellum with two slender spines: a long one emerging at the base of the

flagellum, and a short one emerging subapically (Figs 24, 25). Genital styles apically widened, bent inwards (Fig. 20). Anal segment more or less symmetrical, ventrally prolonged, tongue-like (Figs 21, 22).

Etymology. The species is named in honour of Dr. Terry L. Erwin, famous rainforest ecologist and Carabidae specialist, who was the head of the team that collected this remarkable species.

Key to genera and species of *Bennarellini*

- 1 Lateral abdominal appendages apically with two large sensory pits (Figs 14, 29). ***Loisirella erwini* sp.nov.**
- Lateral abdominal appendages apically with five large sensory pits (grouped 3+2; Figs 1, 26). 2
- 2 Median keel on frons distinct, elevated. Lateral keels of frons strongly elevated apically, semicircular in lateral view (Figs 2–4). 3. (***Noabennarella***)
- Median keel on frons absent or vanishing. Lateral keels of frons less produced, directed obliquely laterad (Fig. 27). 4
- 3 Black spots on lateral keels of frons small, not reaching lateral ocelli (Fig. 28). Spines on the shaft of the aedeagus very long and slender. Male anal segment with a small tongue-shaped ventral process. ***Noabennarella costaricensis* Holzinger et Kunz**
- Black spots on lateral keels of frons large, reaching from epistomal suture to lateral ocelli (Fig. 1). Spines on the shaft of the aedeagus short, basally triangular (Figs 12, 13). Male anal segment with a large, distally widening ventral process (Figs 5–7). ***Noabennarella paveli* sp.nov.**
- 4 Vertex small, but present, separated from frons by a transverse carina. Cubital veins of fore wing entering anal margin at acute angle. First cell of cubitus nearly triangular, only twice as long as wide. 5. (***Bennarella***)
- Vertex not recognisable, as there is no subapical transverse carina on dorsal border of frons. Cubital veins entering anal margin at almost right angle. First cell of cubitus approximately ten times as long as wide. ***Amazobenna reticulata* Penny**
- 5 Fore wing fuscous basally, translucent apically. ***Bennarella bicoloripennis* Muir**
- Fore wing uniformly dark fuscous. ***Bennarella fusca* Muir**

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Zusammenfassung

Eine neue Gattung und zwei neue Arten des neotropischen Tribus Bennarellini werden beschrieben: *Loisirella* gen.nov. mit *Loisirella erwini* sp.nov. sowie *Noabennarella paveli* sp.nov. Zudem wird ein Bestimmungsschlüssel zu den Gattungen und Arten der Bennarellini präsentiert. *Loisirella* ist die einzige Gattung der Bennarellini mit nur zwei an Stelle von fünf großen Sinnesgruben an den Enden der Lateralanhänge des Abdomens. Die Tiere stammen aus dem Yasuni Nationalpark im Osten von Ecuador und wurden im Rahmen eines umfassenden „Canopy fogging“-Forschungsprojekts gesammelt.

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