

## Two new species of *Costatrichia* (Trichoptera: Hydroptilidae: Leucotrichiinae)

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**ABSTRACT.** *Costatrichia* Mosely, 1937 is a Neotropical genus included in the subfamily Leucotrichiinae. Previously, this genus included 14 described species, two from Brazil and eight from Costa Rica. Based on recent specimens collected with light traps in the Brazilian Amazon and Costa Rica, we describe two new species: *Costatrichia ipixuna* sp. nov. from the state of Amazonas, Brazil (*C. lodora* group) and *C. falsa* sp. nov. from Puntarenas, Costa Rica (*C. simplex* group). *Costatrichia ipixuna* sp. nov. is most similar to *C. noite* Angrisano, 1995, but can be distinguished by the shallower U-shaped incision on posterior margin of sternum VIII, by the absence of the lateral projection of the same segment bearing very long setae, and by the phallus with a pair of spine-like sclerotized processes apically. *Costatrichia falsa* sp. nov. is most similar to *C. zopilote* Harris & Holzenthal, 1999, but differs from it by the median pair of spines of segment VIII, directed mesad and curved posteriorly crossing over each other; by the irregular posterior margin of segment VIII, in ventral view; by the segment X without short lateral paired spines; and by the flange-like apical processes on phallus. In addition, we provide the first record of *C. noite* Angrisano, 1995 from Brazil (state of Amazonas).

**KEY WORDS.** Amazon Forest; Costa Rica; *Costatrichia ipixuna* sp. nov.; *Costatrichia falsa* sp. nov.; microcaddisflies.

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Leucotrichiinae was erected by FLINT (1970) to include a distinctive group of exclusively New World microcaddisflies. MARSHALL (1979) proposed a robust classification in her revision of the Hydroptilidae genera and treated the leucotrichiines as a tribe of Hydroptilinae. The group was treated again as a subfamily, when MALICKY (2001) ranked the Ptilocolepidae, a Hydroptilidae subfamily in MARSHALL'S (1979) classification, as a caddisfly family.

In a complicated taxonomic history, several genera were described in Leucotrichiinae; of those, some were later removed and then subsequently reassigned to it (FLINT 1970, HOLZENTHAL & HARRIS 1992, HARRIS & HOLZENTHAL 1993, 1994, BOWLES *et al.* 1999). Presently, the group comprises 189 species in 17 genera, most of which are poorly defined (FLINT 1992, MARSHALL 1979) and some probably represent synonyms. Therefore, a rigorous phylogenetic study is needed to reassess the status of each genus of Leucotrichiinae.

*Costatrichia* Mosely includes 14 species recorded from Mexico, Central, and South America. The genus was revised by HOLZENTHAL & HARRIS (1999), who described most of the known species. It is divided into three species groups based on the presence of antennal and wing modifications in males and on the male genital structures (FLINT 1970, HOLZENTHAL & HARRIS 1999). Recently, species of the genus were recorded from Bra-

zil, with one species occurring in the northern and another in the southeastern regions (SANTOS & NESSIMIAN 2010). Since then, specimens collected in Brazil and Costa Rica revealed two additional new species, and also the first record of *Costatrichia noite* Angrisano, 1995 from Brazil.

### MATERIAL AND METHODS

Specimens were collected with light traps and preserved in 95% ethanol. To observe and draw the genital structures, the abdomen was removed and cleared in a solution of heated 10% KOH. Pencil sketches were made under a compound microscope, equipped with a camera lucida, and then used as templates to trace vector graphics in an Adobe Illustrator (v. 13.0.0, Adobe Systems Inc.) document. The structural terminology follows MARSHALL (1979) and HOLZENTHAL & HARRIS (1999). The descriptions provided for the new species were made with the DELTA software (DALLWITZ *et al.* 1999). The material examined is deposited in Coleção Entomológica Prof. José Alfredo Pinheiro Dutra, Departamento de Zoologia, Universidade Federal do Rio de Janeiro (DZRJ, Rio de Janeiro), Coleção de Invertebrados, Instituto Nacional de Pesquisas da Amazônia (INPA, Manaus), and Instituto Nacional de Biodiversidad (INBio, Santo Domingo de Heredia).

## TAXONOMY

*Costatrichia ipixuna* sp. nov.

Figs 1-9

Description. Male. Length 3.0-4.0 mm (n = 2). General color, in alcohol, dark brown, with green spots on forewings. Head with brush of scale setae on frontal area; 3 ocelli. Antennae (Fig. 1) 20-articulated; dark brown, 16th, 17th, and 18th articles lighter brown; scape and pedicel simple; flagellomeres I-IV short, very broad, and very compressed. Maxillary palpi 5-articulated. Labial palpi 3-articulated. Forewings with a short reflexed costal cell covered with dark brown setae; veins reaching wing margins. Hind wings with fringe of long dark brown setae on anal margin; veins reaching wing margin. Segment VII (Fig. 2) with long ventromesal process. Genitalia. Segment VIII (Figs 2 and 4) shorter dorsally than ventrally; posterior margin, in ventral view, with mesal U-shaped incision, and very long, slender, paired processes, in lateral view, directed about 45° upward. Segment IX (Fig. 3) mostly within segment VIII, opened ventrally. Inferior appendages (Figs 2 and 4) fused mesally, in ventral view, broad basally, with a V-shaped incision on apical margin. Subgenital plate (Figs 2 and 4) long, exceeding length of inferior appendages, narrowing to rounded apex; in lateral view, slightly downturned. Tergum X (Figs 3 and 4) membranous and rounded. Phallus (Figs 5 and 6) tubular basally, bearing midlength complex, with dorsal window and long basal loop; apex with paired, lateral sclerotized spine-like processes.

Female. Length 3.1-3.8 mm (n = 4). Color as in male. Antennae 19-articulated, simple. Ocelli 3. Reflexed costal cell on forewing absent. Segment VI with short ventromesal process. Segment VII long. Genitalia. Segment VIII (Fig. 7) with sternite subquadrate, with ring of long and stout setae on posterior margin; lateral apodemes extending through segment VII. Segment IX (Fig. 7) mostly membranous, in ventral view, divided into rounded paired lobes; lateral apodemes extending to mid of segment VII. Segment X (Fig. 7) with sternite rounded apically, with pair of lateral papillae. Bursa copulatrix (Figs 8 and 9) with long membranous lobe, connected to vaginal sclerite; vaginal sclerite lyre-like, with short spines on internal margin, a transverse sclerite dorsally, and setal brush anteriorly.

Material examined. Holotype male. BRAZIL, Amazonas: Ipixuna (Rio Liberdade, Comunidade São Vicente, 07°21'47"S 71°52'07"W, 175 m, light trap), 11-14.V.2011, D.M. Takiya, J.A. Rafael *leg.* (INPA). Paratypes. BRAZIL, Amazonas: Barcelos (Rio Paduari, 00°06'45"S 63°58'15"W, 03.VI.2010, light trap), 1 male, 3 females, D.M. Takiya *leg.* (DZJR).

Etymology. The species is named after the locality where the holotype was collected. Ipixuna means "black water" in the Tupi-guarani language.

Remarks. This new species belongs to the *C. lodora* Mosely group, due to the modification on the basal articles of the antennae (Fig. 1) and the presence of reflexed costal cell on the

forewings. *Costatrichia ipixuna* sp. nov. is most similar to *C. noite*, because both species have a pair of very long, slender processes on the posterior margin of sternum VIII and fused inferior appendages forming a ventral plate, broad basally and incised apically (Fig. 2). However, the new species has a shallower U-shaped incision on posterior margin of sternum VIII and lacks the lateral projection of the same segment with very long, stout setae, which is present in *C. noite*. Additionally, the new species differs in the phallus, which bears a pair of spine-like sclerotized processes apically (Fig. 6).

Ecological notes. Sampling in both localities from where type specimens were collected were at borders of *terra firme* Amazonian forests with white sheet and mixed mercury vapor lamps.

*Costatrichia falsa* sp. nov.

Figs 10-14

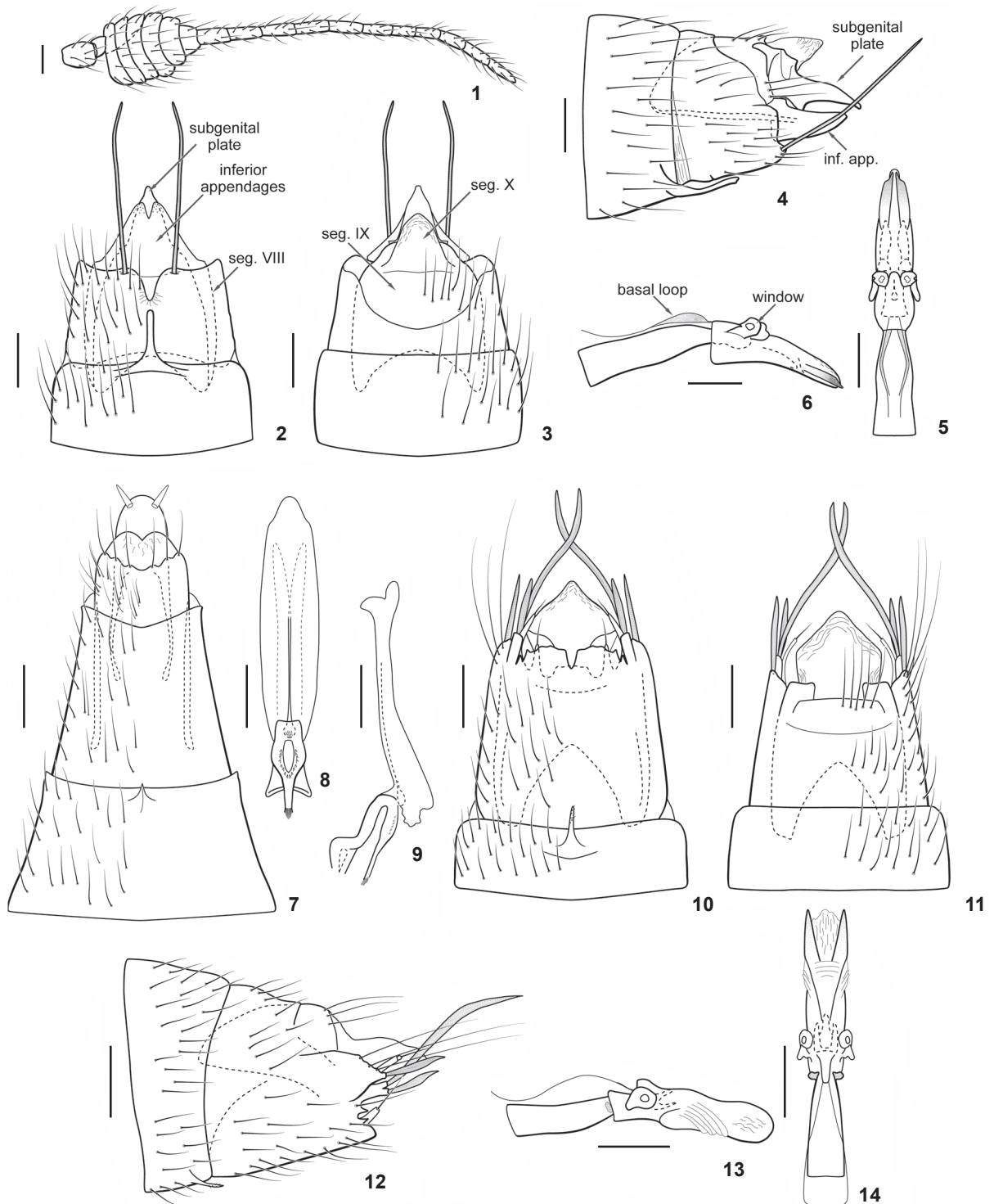
Description. Male. Length 2.0-2.2 mm (n = 5). General color, in alcohol, dark brown, with green spots on forewings. Head with three ocelli. Antennae dark brown, 18-articulated, simple; pedicel long. Maxillary palpi 5-articulated. Labial palpi 3-articulated. Forewings without reflexed costal cell; veins reaching wing margins. Hind wings with fringe of long dark brown setae on anal margin; veins reaching wing margin. Segment VII (Fig. 10) with short ventromesal process. Genitalia. Segment VIII (Figs 10 and 12) shorter dorsally than ventrally; posterior margin, in ventral view, with mesal U-shaped incision; lateral lobes with 3 long, thick, paired spines, median pair very long, crossing over each other. Segment IX (Fig. 10) mostly within segment VIII, opened ventrally. Inferior appendages (Figs 10 and 12) short, fused mesally; with two paired, finger-like processes, each bearing apical seta. Subgenital plate absent. Tergum X (Fig. 11) membranous and pentagonal, in dorsal view. Phallus (Figs 13 and 14) tubular basally, bearing midlength complex, with dorsal window and long, thin basal loop; apex with paired, sclerotized flange-like lateral processes.

Female unknown.

Material examined. Holotype male. COSTA RICA, Puntarenas: La Gamba (Esquinas Lodge, river at waterfall trail, 08°41'05"N 83°12'17"W, 70 m, light trap), 21-22.II.2011, D.M. Takiya *leg.* (INBio). Paratypes. Same data as holotype, 4 males (DZJR).

Etymology. The name of this species refers to its uncertain position in the genus *Costatrichia*, from the Spanish "falsa".

Remarks. *Costatrichia falsa* sp. nov. is similar in the structure of male genitalia to *C. zopilote* Harris & Holzenthal, tentatively placed in the *C. simplex* Flint group. HARRIS & HOLZENTHAL (1999) mentioned the uncertain position of *C. zopilote* in this genus because it has features found in another leucotrichiine genus, *Acostatrichia* Mosely. While a complete reassessment of the genera included in the subfamily is not available, these two species are maintained in *Costatrichia*, despite the fact that their affinities with the other described species are obscure. This new species, as *C. zopilote*, has thick and very long spines arising from lateral lobes of segment VIII (Fig. 12) and inferior append-



Figures 1-14. (1-9) *Costatrichia ipixuna* sp. nov. (1-6) Male: (1) antenna, lateral view; (2-6) genitalia: (2) ventral view; (3) dorsal view; (4) lateral view; (5) phallus, dorsal view; (6) phallus, lateral view. (7-9) Female: (7) terminal segments of abdomen, ventral view; (8) bursa copulatrix, ventral view; (9) bursa copulatrix, lateral view. (10-14) *Costatrichia falsa* sp. nov., male genitalia: (10) ventral view; (11) dorsal view; (12) lateral view; (13) phallus, dorsal view; (14) phallus, lateral view. Scale bar = 0.1 mm.

ages fused basally with paired finger-like processes (Fig. 10). However, the new species differs from *C. zopilote* in the following features: 1) median pair of spines of segment VIII, which are directed mesad and curved posteriorly crossing over each other (Fig. 10); 2) irregular posterior margin of segment VIII, in ventral view (Fig. 10); 3) segment X without short lateral paired spines; and 4) flange-like apical processes on phallus.

Ecological notes. Sampling of type specimens were conducted with two UV tubes over a 90% ethanol-filled plastic tray at the river bed. This river was found within the lodge preserved area of tropical lowland forest.

### *Costatrichia nocte* Angrisano, 1995

Remarks. ANGRISANO (1995) described this species from one specimen from Uruguay. HOLZENTHAL & HARRIS (1999) recorded *C. nocte* from Peru and provided additional illustrations of the male genitalia. This species is herein recorded from Brazil, state of Amazonas, confirming its wider distribution in South America.

Distribution. Brazil (new record), Peru (HOLZENTHAL & HARRIS 1999), and Uruguay (ANGRISANO 1995).

Material examined. BRAZIL: Amazonas: Ipixuna (Rio Liberdade, Comunidade Santa Catarina, 07°19'46"S 71°50'46"W, 169 m, 10.V.2011, light trap), 1 male, D.M. Takiya *leg.* (DZRJ). BRAZIL: Amazonas: Ipixuna (Rio Gregório, Comunidade Lago Grande no Seringal do Recreio, 07°10'06"S 70°49'06"W, 145 m, 17-23.V.2011, light trap), 1 male, D.M. Takiya *leg.* (DZRJ).

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