



Two new Species of *Tricorythodes* Ulmer (Ephemeroptera: Leptoxyphidae) from Colombia

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Abstract

At present 17 species of *Tricorythodes* Ulmer are known from South America. Two new species are described here from Colombia: *T. uniandinus* sp. nov. from nymphs and imagines of both sexes, and *T. capuccinorum* sp. nov. from males and females imagines. A brief diagnosis and illustrations to distinguish both species from the other of the genus are given.

Key words: Leptoxyphidae, Neotropic, mayfly, Taxonomy, Colombia

Introduction

The genus *Tricorythodes* Ulmer (1920) includes 17 species occurring in South America: *T. arequita* Traver, *T. bullus* Allen, *T. hiemalis* Molineri, *T. mirca* Molineri, *T. ocellus* Allen & Roback, *T. popayanicus* Domínguez, *T. quizeri* Molineri, *T. santarita* Traver, *T. yura* Molineri, *T. trifasciatus* Molineri & Zúñiga, *T. zunigae* Molineri. These eleven species are known from all the stages. *Tricorythodes barbatus* Allen, *T. cristatus* Allen, *T. curiosus* (Lugo-Ortiz & McCafferty), *T. nicholsae* (Wang et al.), and *T. molinerii* Dias & Salles are known from nymphs. Only *T. lichyi* Traver is known from imagines (Molineri (2002; 2005), Dias and Salles (2005), Molineri and Zúñiga (2006)).

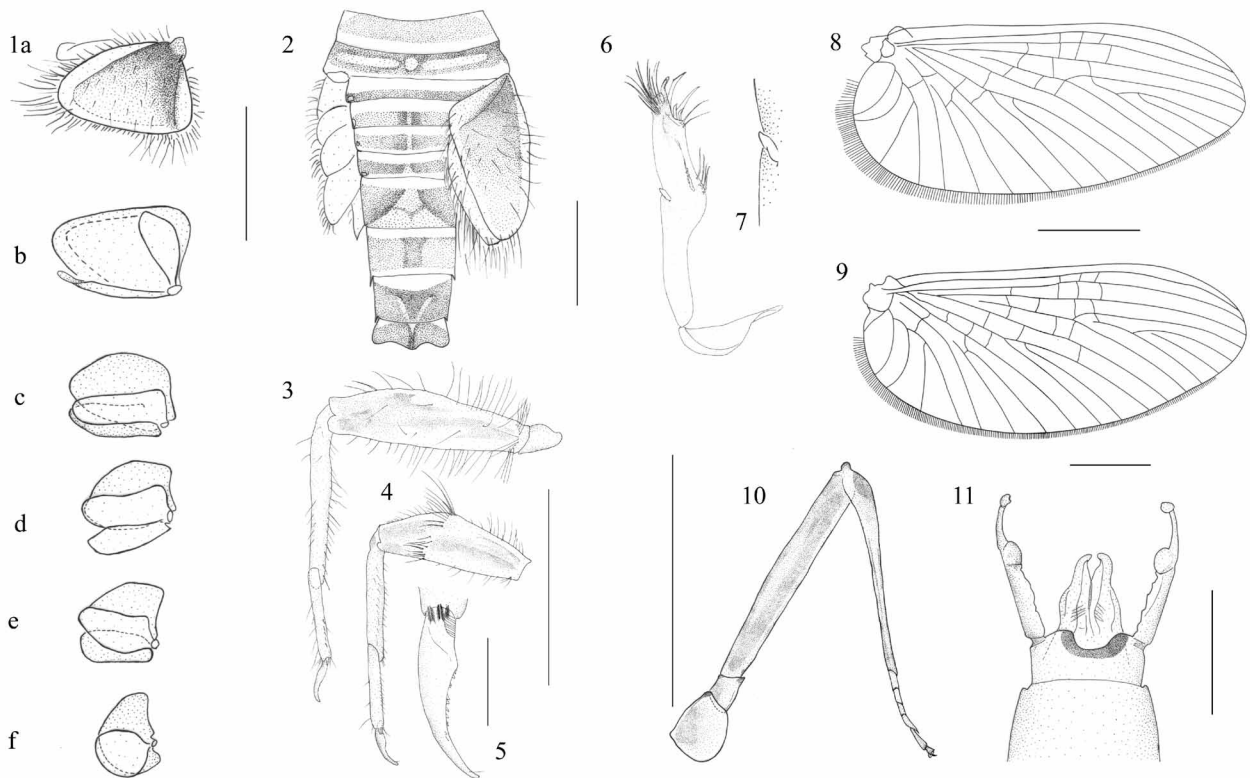
In the present paper two new species from Colombia are described: *T. uniandinus* sp. nov. from all the stages and *T. capuccinorum* sp. nov. from imagines of both sexes.

Results

Tricorythodes uniandinus sp. nov. (Figs. 1–11)

Holotype. Male imago. Length: body, 3.3 mm; fore wings, 3.7 mm. Head: yellowish brown shaded dorsally with gray as in nymph, ventrally paler. Antennae: scape whitish, pedicel and flagellum yellowish. Thorax. Pronotum extensively shaded with black except on a pair of submedian marks (as in nymphs); propleurae and prosternum whitish translucent slightly shaded with yellowish gray. Mesonotum yellowish brown shaded with black, shading stronger on margins, carinae and mesoscutellum; membranous filaments of mesoscutellum short and grayish; mesopleurae and mesosternum whitish yellow shaded with gray on sternum. Metathorax yellowish shaded with gray. Legs: femora yellowish white completely shaded with gray, shading stronger on three longitudinal bands; fore femora with a whitish oblique band at 1/3 from base; tibiae and tarsi of all legs translucent white. Wings: membrane hyaline shaded with gray in sectors C, Sc and R₁, longitudinal veins

grayish, cross veins paler (Fig. 8). Abdomen whitish shaded with gray, terga I–II shaded completely, remaining terga shaded more markedly toward hind margin; intersegmental membranes whitish translucent; terga III–VII with a paler median band; tergum X with median line blackish; sterna slightly shaded with gray. Genitalia: styliger plate yellowish white shaded with gray; forceps whitish translucent; penes whitish, dorsoventrally flattened, in dorsal view widening at submedian zone and becoming thinner toward apex (Fig. 11). Caudal filaments whitish translucent shaded with gray at basal half.



FIGURES 1–11: *Tricorythodes uniandinus* sp. nov. Nymph: 1.a-f. Gills; a. left gill II, d.v. (dorsal view); b. left gill II, v.v. (ventral view); c-f. left gills III–VI, v.v.; 2. Abdomen, d.v. (left gills dissected), color pattern; 3. right hind leg, d.v.; 4. right fore leg, d.v.; 5. right fore tarsal claw, d.v.; 6. left maxilla, v.v.; 7. maxillary palp, detail; Adult: 8. male fore wing; 9. female fore wing; 10. female hind leg; 11. male genitalia, v.v. Scale bars: 1, 2, 3, 4, 8, 9 and 10 = 1.0 mm; 5 and 11 = 0.1 mm.

Female imago. Length: body, 4.1 mm; fore wings, 4.9 mm. General aspect as in male, coloration darker and shading stronger than male. Membranous filaments of mesoscutellum blackish and longer than in male, extending above first abdominal segment. Legs as in male except tibiae yellowish shaded with gray (Fig. 10). Wings as in figure 9. Abdomen. Sternum IX posteriorly projected, with convex and entire hind margin. Cerci whitish shaded with gray almost completely; terminal filament shaded at basal half. Eggs yellowish.

Mature nymph. Length: body, 5.0 mm; cerci, 3.0 mm; terminal filament, 3.8 mm. General coloration yellowish gray. Head: yellowish shaded with gray among ocelli; antennae yellowish, twice as long as head length; mouthparts yellowish shaded with gray on submentum and external margins of mandibles; maxillary palpi apparently 2-segmented, with weak median constriction (Figs. 6, 7). Thorax: Pronotum extensively shaded with black, except on a pair of oblong submedian marks. Mesonotum light brown shaded with black, shading more marked on costal margins of wingbuds, rest of wingbuds whitish. Thoracic sterna yellowish shaded with gray. Legs: femora yellowish shaded with gray, tibiae and tarsi yellowish; transversal row of spines on dorsum of fore femora located at 2/3 from base (Fig. 4); tarsal claws with 8–11 marginal denticles and with a pair of small submarginal denticles near apex (Fig. 5). Abdomen yellowish white tinged with

black, dorsal pattern as in figure 2. Gill formulae (number of lamellae per gill): 3/3/3/3/2; opercular gills triangular as in figure 1.a, uniformly tinged with black; remaining gills translucent (Figs. 1.c–f). Posterolateral spines present on segments VII–IX, largest on VII; lateral flanges present on segments II–VII. Caudal filaments brownish with whorls of long setae at each intersegmental joining.

Life cycle associations

Nymphs and adults from the same localities and dates are tentatively associated by shared color pattern (mainly on mesonotum and abdomen). Male and female imagines are associated because they share general color, size and activity period.

Type locality

Río Dulce is a river with rithronic characteristics. The sampling site is situated at 790 m.a.s.l. The river receives the sewage of riverine population which results in a lowering of dissolved oxygen during the dry season. This is in part compensated by water turbulence maintaining a level of about 70% of saturation. During the rainy season the volume of water increases considerably and the dissolved oxygen level rises to 100% of saturation.

Quebrada Grande is a small stream with stony substrate and emergent rocks. The sampling site is situated at 1400 m.a.s.l. This stream presents also organic pollution.

This stream showed a high species richness in Ephemeroptera, these mayflies found in Quebrada Grande are: two species of *Baetodes*; *Americabaetis* sp.; two unknown genus of Baetidae; *Farrodes* sp.; *Atopophlebia* sp.; three species of *Thraulodes*; *Haplohyphes* sp. and three species of *Leptohyphes* (D. Emmerich, unpublished results).

Biology

The nymphs were totally covered by sandy sediment which is very difficult to wipe away. Imagines were collected by light trapping at predawn. A few imagines were observed flying upstream at dawn, parallel to the bank line at about 2 m over the surface of the water.

Etymology

Named in honor of Los Andes University (its abbreviation is "Uniandes"). From the Latin word *andinus* (*adj.*, *m*) = *native of Los Andes*.

Material

Holotype male imago, COLOMBIA, Cundinamarca, Villeta (va a Sasaima), Río Dulce, D. Emmerich and E. Realpe, light trap at pre-dawn, 27-VI-2002. Allotype female imago, same data as holotype. Paratypes: 6 nymphs, same data as holotype; 87 male imagines, 1 male subimago, 59 female imagines, same data as holotype.

Two male imagines, Colombia, Cundinamarca, San Antonio de Tequendama, Finca Tranquilandia, Quebrada Grande, D. Emmerich, G. Rueda and E. Realpe, light trap at predawn, 1 male date: 29-IX 1999, the other: 17-XII-1999.

Holotype, allotype, twenty male imagines, twenty female imagines and 3 nymphs deposited in Museo de Historia Natural de la Universidad de los Andes, Bogotá, Colombia (ANDES) with this reference for the types: Andes 000001, remaining material in IFML (Instituto-Fundación Miguel Lillo, Tucumán, Argentina).

Diagnosis

Tricorythodes uniandinus sp. nov. can be distinguished from the other species of the genus by the following combination of characters. In the imago: 1) pronotum with a pair of whitish submedian oblong marks; 2)

abdomen shaded almost uniformly with blackish; 3) legs shaded almost completely with gray on femora as in Fig. 10; 4) penes widening submedially, becoming thinner toward apex. In the nymph: 1) maxillary palpi reduced, apparently 2-segmented (Fig. 7); 2) transversal row of spines on dorsum of fore femora located at 2/3 from base (Fig. 4); 3) opercular gills triangular (Fig. 1.a) remaining gills as in Figs. 1.c-f; 4) abdomen shaded as in Fig. 2; 5) posterolateral spines present on segments VII-IX; 6) tarsal claws with 8-11 marginal denticles and a pair of submarginal denticles near the apex (Fig. 5).

The penes of *Tricorythodes uniandinus* are similar to those described for *T. fictus*, but in the last species the penes are slender, and the coloration in legs and abdomen is different.

To assess the phylogenetic position of *Tricorythodes uniandinus*, its characters were coded and included in the matrix published by Molineri (2002). As a result it appeared as the sister group of ((*T. bullus*, *T. cristatus*) (*T. zunigae* (*T. curiosus* (*T. nicholsae*, *T. santarita*))))). The synapomorphy shared by them is the presence of posterolateral spines on segments VII-IX.

***Tricorythodes capuccinorum* sp. nov.**

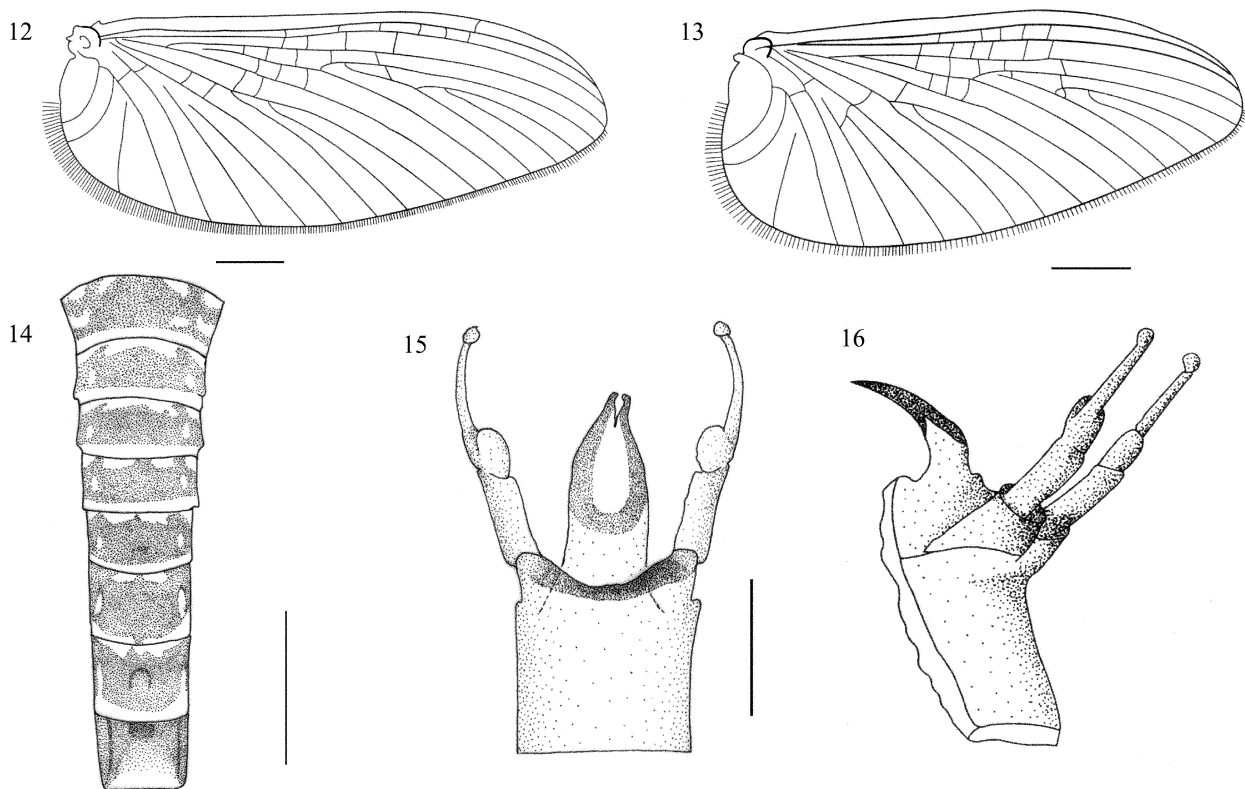
Male imago. Length: body, 5.1 mm; fore wings, 7.3 mm. General coloration chestnut. Head blackish brown; antennae: scape and base of pedicel brownish, rest of pedicel yellowish, flagellum hyaline except base yellowish. Head shaded with black among ocelli and between antennae. Lateral ocelli big, 3/4 of diameter of an eye. Thorax: pronotum brownish shaded with black. Meso- and metanotum chestnut, shaded with black on mesonotum, mainly in a mediolongitudinal band; mesopleurae light brown; meso- and metasternum chestnut. Membranous filaments of mesoscutellum relatively long and slender. Metanotum with darker hind margin. Legs: femora, tibiae and tarsi yellowish brown with paler longitudinal bands; coxae and trochanters chestnut tinged with black. Wings hyaline shaded with grayish brown in sectors C and Sc, longitudinal veins brownish lightening toward apex, cross veins paler except on C and Sc sectors (Fig. 13). Abdomen: terga grayish tinged with yellowish brown, sterna yellowish brown, sterna II-VIII with a pair of paler submedian marks near fore margin, and with another pair located laterally and posteriorly (Fig. 14). Pleural membranes hyalines except on segments VII-IX whitish. Genitalia: styliger plate with lateral margins blackish and with a median brownish mark on fore margin; styliger plate and forceps segment 1 light brown, forceps segments 2-3 lighter; distal half of penes orangeish brown except median cleft (Fig. 15); in lateral view penes are strongly dorsally curved (Fig. 16). Caudal filaments whitish translucent shaded with gray except at joins.

Female imago. Length: body, 5.3 mm; fore wings, 8.0–8.8 mm. General aspect more robust and darker than male. Head as male except scape whitish, pedicel brownish, flagellum hyaline except base brownish. Thorax as in male except membranous filaments of mesoscutellum relatively longer extending above second abdominal segment. Wings as in figure 12. Abdomen translucent shaded with gray more marked at median zones of terga, segments IV–VIII with ventrolateral blackish projections. Sternum IX posteriorly projected once the length of terga X, with convex and entire hind margin. Cerci short and thin, terminal filament longer. Egg mass yellowish; it is obvious the contrast between egg mass colour with dark coloration of the female body.

Nymph: unknown.

Biology

Adults were collected with light traps at predawn. These imagines were the only mayflies collected at this time. Nuptial flight was not observed. Subimagines were collected with light traps at dusk.



FIGURES 12–16: *Tricorythodes capuccinorum* sp. nov. Adult: 12. female fore wing; 13. male fore wing; 14. male abdomen, segments II–IX, v.v., color pattern; 15. male genitalia, v.v.; 16. male genitalia, lateral view. Scale bars: 12–14 = 1.0 mm; 15 and 16 = 0.1 mm

Type locality

The Teusacá River has stony substratum with emergent rocks. Riffles are predominant over small shallow pools. The site (El Hato) is at approximately 3000 m. a. s. l. The measuring of dissolved oxygen performed in different occasions during the year range between 7.6–7.8 mg/L (99.2–101.8 % of saturation).

Etymology

This species is dedicated to the Order of Franciscan Capuchin Brothers.

Material

Holotype male imago: COLOMBIA, Cundinamarca, La Calera, "El Hato", Río Teusacá, D. Emmerich and E. Realpe, light trap at pre-dawn 19-VI-2002; Allotype female imago, same data of location, date: 5/III/2000 at dawn. Paratypes: 1 male imago same data as holotype except date of collection is 5-XII-1999; 3 female imagines same data as allotype; 2 male subimagines same data of location, date I-IX-1999 at dusk, 2 male subimagines same data, 5-XII-1999 at dusk.

Holotype and allotype deposited in Museo de Historia Natural de la Universidad de los Andes, Bogotá, Colombia (ANDES) with this reference for the types: Andes 000002, remaining material in IFML (Instituto-Fundación Miguel Lillo, Tucumán, Argentina).

Discussion

Imagines of *Tricorythodes capuccinorum* sp. nov. can be distinguished from the other species of the genus by the following combination of characters: 1) large size; 2) abdominal sterna patterned as in Fig. 14; 3) penes tinged apically orange brown, and curved dorsally, becoming thinner on apical third (Figs. 15–16).

Acknowledgments

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