

ADULT STAGES OF TWO SPECIES OF *TRAVERELLA* (EPHEMEROPTERA: LEPTOPHLEBIIDAE) FROM COSTA RICA

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ABSTRACT: The adult stage is described for *Traverella holzenthali* Lugo-Ortiz and McCafferty and *Traverella promifrons* Lugo-Ortiz and McCafferty. Additional characters are given for recognition of the nymphs of these species.

KEY WORDS: *Traverella*, Ephemeroptera, Leptophlebiidae, Costa Rica

During a survey of aquatic insects in northwestern Costa Rica, we collected a number of *Traverella* adults and subimagos that proved to belong to two species known only from the nymphal stage. In this paper we describe the adult male and females for *Traverella holzenthali* Lugo-Ortiz and McCafferty, the adult male of *Traverella promifrons* Lugo-Ortiz and McCafferty, and provide nymphal characters to assist in the separation of the nymph of *T. holzenthali* from other *Traverella* with short clypeal horns.

The species were collected from the Río Animas at the northern border of the Área de Conservación Guanacaste during the dry season in late January. The collecting site is a diverse mixture of habitats including bedrock, cobble, aquatic vegetation and small waterfalls. Both *Traverella* species were found in a limited area, under rocks in one short deep channel upstream from a deep, shaded pool area. The Río Animas runs from south to north into Lake Nicaragua in a transitional area between the wet Atlantic forest and the Pacific dry forest. It is a permanent stream. All specimens are deposited in the Instituto Nacional de Biodiversidad (INBio).

Traverella holzenthali Lugo-Ortiz and McCafferty

Male Imago. Length: forewing 8.6-9.4 mm; body 8.4-10.2 mm. Head: brown washed with black, antenna light brown; upper portion of eyes pinkish-brown, lower portion dark grey. Ocelli whitish, their stalks dark brown. Thorax: pronotum yellowish brown, margins and midline black, two convergent black bands on either side of midline; meso- and metanota orange-brown, yellowish white on sutural lines, mesoscutellum darker brown; pleura yellowish brown, membranes yellowish white, area between wing base and mesocoxa washed with dark grey; thoracic sternum yellowish brown. Forewing: membrane translucent brown in basal third, fading to hyaline toward apex, milky white in stigmatic area; longitudinal veins brown, cross veins translucent brown, becoming hyaline at apex of wing. Hind wing: costal projection slightly beyond mid-length; membrane and veins translucent brown in basal third, hyaline apically. Foreleg: yellowish brown, washed with darker brown,

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femur with slightly darker areas at mid-length and apically; tarsus yellowish brown, apical segment whitish, tarsal formula 0.12: 1.00 (0.9 mm): 0.51: 0.26: 0.20. Hind legs with same color and markings as forelegs. Abdomen: tergum I brownish black; terga II-V translucent milky white, posterior and lateral margins with dark brown bands, posterior bands somewhat narrower on midline; tergum VI washed with dark brown in posterior three-fourths; terga VII-X yellowish brown, washed with brown, and with dark brown posterior margins. Sterna II-VI translucent white, VII-IX yellowish brown, Genitalia (Fig. 1): forceps yellowish brown at base, purplish brown at apex of segment 1, segments 2 and 3 whitish. Styliiger plate above forceps with a rectangular extension bearing spines of variable size on the posterior corners (Figs. 1, 2), surface of rectangular extension scaly. Penes pale yellow, each lobe with a long curved ventrally directed spine (Fig. 1). Caudal filaments brown, becoming paler toward apex.

Female Imago. Length: forewing 11.6 mm., body 11.2 mm. Coloration as in male imago except head extensively washed with black on vertex; abdomen yellowish brown, terga extensively washed with brown except along basal margins

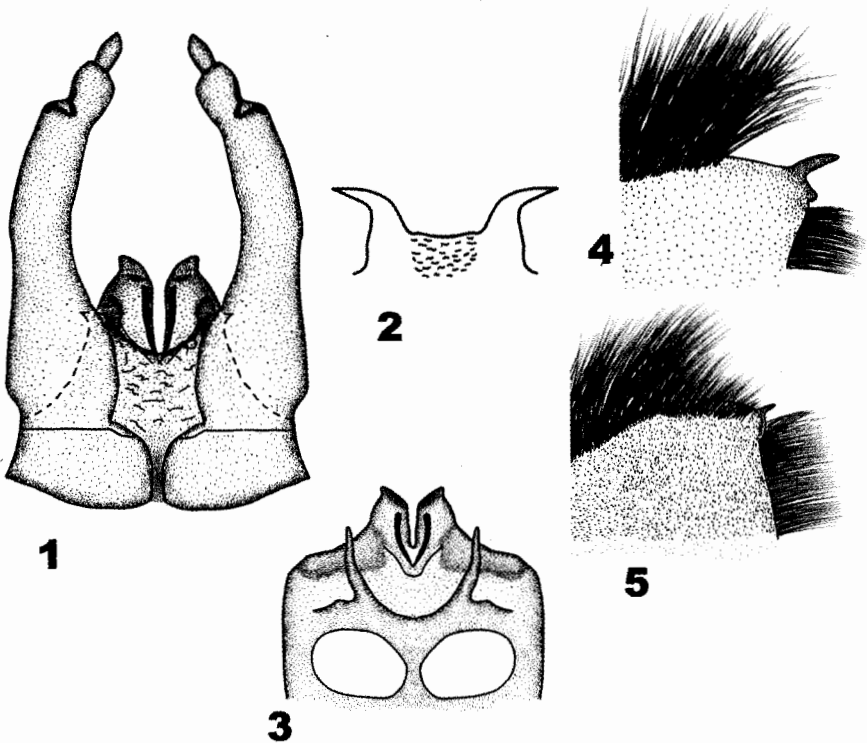


Fig. 1-2. *Traverella holzenthali*. 1, male genitalia; 2, dorsal plate of male genitalia from a different individual. 3, *T. promifrons*, male genitalia (forceps not shown). 4-5, apex of galealacinia of nymph, ventral view. 4, *T. holzenthali* (setae arising from dorsal side not shown); 5, *T. promifrons*.

and in small round spots at lateral margins. Terga VII-X dark brown, sterna yellow, darker on VII-IX; subanal plate with a broad shallow apical emargination, yellowish brown. Caudal filaments as in male imago.

Specimens Examined. 9 male imagos, 4 male subimagos, 2 female imagos, 5 female subimagos. COSTA RICA: Guanacaste Province. Río Animas at Hwy CR 4, N 11°2.957' E 85°35.208' 26-I-2005, luz, S. Ávila, R. W. Flowers; 14 nymphs, same locality and collectors, 28-I-2005.

Male imagos of *Traverella holzenthali* can be recognized by the scaly dorsal extension of the subgenital plate which bears spines of variable size on its apical angles (Figs. 1, 2). Some of the short-spined forms (Fig. 1) resemble the dorsal plate in the subgenus *Zonda* illustrated by Domínguez (1995). *Zonda* is defined by the form of the dorsal extension of the styliger plate, and by an attached base of ICu1. In *T. holzenthali* both these conditions are present in some imagos but not others. Adults and nymphs of *T. holzenthali* were associated through the two diagonal black bands on the pronotum, which are clearly visible in nymphs three-quarters grown and older. Nymphs collected in the Río Animas were compared with the holotype in the Florida A&M University collection. The nymph of *T. holzenthali* was described and illustrated by Lugo-Ortiz and McCafferty (1996). It can be distinguished from the two other known *Traverella* species in Costa Rica (*T. promifrons* Lugo-Ortiz and McCafferty, *T. longifrons* Lugo-Ortiz and McCafferty) by its very short frontoclypeal projection. However, it also has an unusual form of the anteromedian tusk of the maxilla (Fig. 4), not shown correctly in Lugo-Ortiz and McCafferty (1996), which is unlike those in any other *Traverella* we have seen, and which should serve to separate nymphs of *T. holzenthali* from other known species with small clypeal horns (*T. albertana* (McDunnough), *T. castanea* Kilgore and Allen, and *T. lewisi* Allen). Lugo-Ortiz and McCafferty (1996) also stated that *T. holzenthali* lacks anterolateral seta on the pronotum, a feature of most other *Traverella* species. All the nymphs we collected have these setae; in the holotype nymph in the Florida A&M collection, setal sockets are present although the setae themselves are missing.

***Traverella promifrons* Lugo-Ortiz and McCafferty**

Male imago. Length: forewing 10-10.2 mm, body 10.4-11 mm. Head: yellowish brown, washed with black; antenna yellowish white. Upper portion of eyes yellowish tan, lower portion grey. Ocelli yellowish white, their stalks orange brown on upper half, black on basal half. Thorax: pronotum yellowish white, washed with brown; meso- and metanota orange brown, yellowish brown on sutural lines, tip of mesoscutellum brown; pleura orange-brown with dark brown margins, membrane grey; thoracic sterna orange brown. Forewing: membrane hyaline, milky white in stigmatic area, basal area washed with brown in axial area; longitudinal veins translucent yellowish brown, cross veins hyaline. Hind wing: costal projection at 2/3 hind wing length, C and Sc yellowish brown, remaining veins yellowish brown. Foreleg: yellowish brown, washed with darker brown, femur with darker areas at mid-length and apically; tarsus yellowish brown, apical segment whitish, tarsal formula: 0.14; 1.00 (0.8 mm): 0.80: 0.41:0.18. Hind legs with same color and pattern

as forelegs. Abdomen: tergum I washed with brown, whitish at midline; terga II-VI translucent white, a broad light reddish brown band across the posterior margin of each segment; terga VIII-X yellowish tan, posterior margins darker brown; sterna II-VI translucent whitish, VII-IX yellowish brown. Genitalia (Fig.3): styliger plate and basal two-thirds of forceps yellowish brown, apex of forceps whitish; a pair of long, thin upturned spines dorsally on apex of styliger plate; penes yellowish white, each lobe with a long, ventral, curved spine. Caudal filaments brown, becoming lighter toward apex.

Specimens Examined. 2 male imagos, 1 male subimago, COSTA RICA: Guanacaste Province. Río Animas at Hwy CR 4, N 11°2.957' E 85°35.208' 26-I-2005, luz, S. Ávila, R. W. Flowers; 3 nymphs, same locality and collectors, 28-I-2005.

The nymph of this species has been described and figured by Allen (1973), and Lugo-Ortiz and McCafferty (1996). The anteromedian tusk of the maxilla (Fig. 5) is smaller and less sclerotized than that of *T. holzenthali*. The male imago can be distinguished from *T. holzenthali* by the absence of diagonal black streaks on the pronotum, and by the forewing in which the membrane is transparent except at the basal arc. Nymphs of *T. promifrons* also lack diagonal black streaks in the pronotum, a character which was used to associate them with their adult stage. In Río Animas *T. promifrons* occurs alongside *T. holzenthali*, although at least in the middle of the dry season, *T. promifrons* is much scarcer.

In addition to the species discussed above, four additional *Traverella*, *T. longifrons* Lugo-Ortiz and McCafferty, *T. nervosa* (Eaton), *T. versicolor* (Eaton) and *Traverella* sp. A of Allen (1973) are known from Central America, south of Mexico. Adults of *T. longifrons* and *Traverella* sp. A. are still undescribed while *T. nervosa* and *T. versicolor* are known only from their type series which consist entirely of females.

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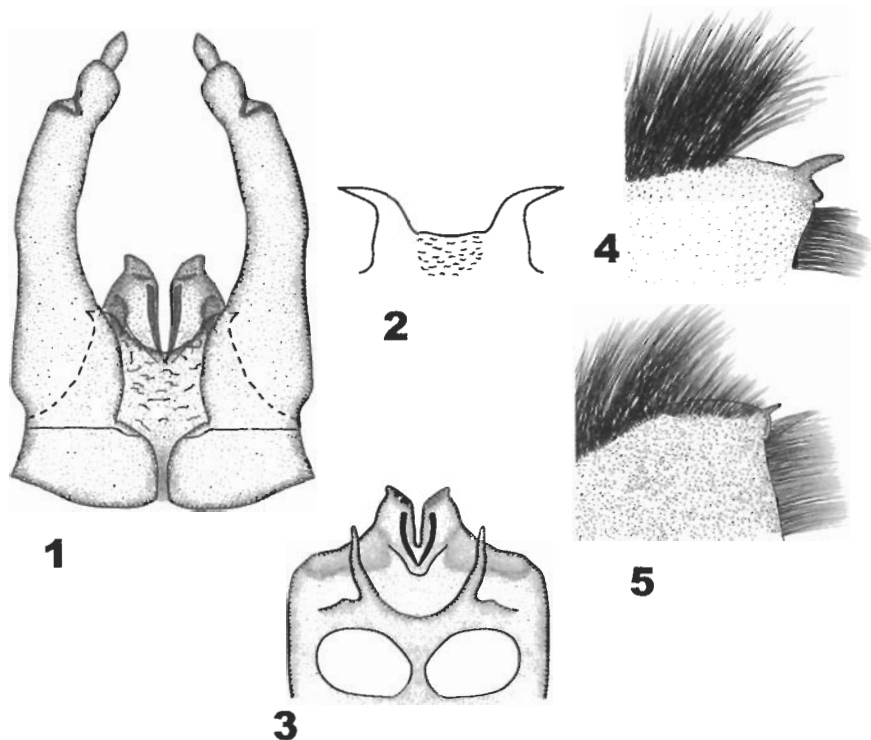


Fig. 1-2. *Traverella holzenthali*. 1, male genitalia; 2, dorsal plate of male genitalia from a different individual. 3, *T. promifrons*, male genitalia (forceps not shown). 4-5, apex of galealacinia of nymph, ventral view. 4, *T. holzenthali* (setae arising from dorsal side not shown); 5, *T. promifrons*.