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New species of *Chimarrhodella* from Venezuela and Ecuador (Trichoptera: Philopotamidae)

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Abstract

Two new species of *Chimarrhodella* (Trichoptera: Philopotamidae) are described and placed within the current phylogenetic framework for the genus. New species described (with their corresponding distribution) are *Chimarrhodella paria* (Venezuela) and *C. ornata* (Ecuador).

Key words: Trichoptera, Philopotamidae, Chimarrinae, *Chimarrhodella*, caddisfly, new species, Neotropics

Introduction

Chimarrhodella is a small caddisfly genus endemic to South America and the southern part of Central America. It is significant in being the sister taxon to the very large and nearly cosmopolitan genus *Chimarra*. The genus was revised by Blahnik and Holzenthal (1992), who recognized nine species in the genus (four newly described) and proposed a hypothesis for relationships among the species. Additionally, the monophyly and close phylogenetic relationship of *Chimarrhodella* and *Chimarra* was established. Relative monophyly of the two genera has also been confirmed by recent DNA sequence data (Kjer et al. 2001, 2002). The only other genus included in the subfamily Chimarrinae is the monotypic and poorly known genus *Edidiehlia*, described from Sumatra by Malicky (1993). Precise phylogenetic placement of *Edidiehlia* remains uncertain. Like *Chimarra* it has foretibial spurs reduced to one, but seems to have the anal veins of the hind wing more complete, and hence more primitive, than either *Chimarra* or *Chimarrhodella*.

Recently accessioned material has revealed two additional species of *Chimarrhodella*, described in this paper. Terminology used in the paper follows that in general use for Trichoptera and as used by Blahnik and Holzenthal (1992) for other *Chimarrhodella* species, except that the term endothecal spine is used instead of paramere and the more general

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term of phallic apparatus is substituted for phallus. Phylogenetic placement of the species was determined by adding the taxa to the data matrix presented by Blahnik and Holzenthal (1992) and adding one additional character. Type material is deposited in the United States National Museum of Natural History, Washington DC (NMNH), the University of Minnesota Insect Collection, St. Paul, Minnesota (UMSP), and the Instituto de Zoología Agrícola, Maracay, Venezuela (IZAM), as indicated in the species descriptions.

Species Descriptions

Chimarrhodella ornata, new species

(Fig. 1A–D)

This is a very distinctive species of *Chimarrhodella*, unlikely to be confused with any other described species. The color, golden-yellow overall with wing margins and apices fuscous, is particularly distinctive. The color pattern shares a general similarity to that of some lycid beetles and it is conceivable that it could be aposematic. The male genitalia are also unusual in several respects: the preanal appendages are short and knoblike, as in many *Chimarra*, rather than elongate as in other *Chimarrhodella*; the posterolateral projections of segment IX are very elongate and apically acute; the inferior appendage is also very elongate (longer than any described species of *Chimarrhodella*) and possesses a unique rounded apicomesal projection; and the phallic apparatus lacks the hoodlike apicodorsal projection found in other *Chimarrhodella* species and also lacks endothecal spines. Other species lacking endothecal spines include *C. nigra*, *C. tobagoensis*, and *C. paria* n. sp., but these species are quite different in other respects.

Adult. Forewing length: male 11.0 mm. Overall color, including body, wings, and appendages (except antennae) yellowish, setae of head and thorax distinctly golden-orange; antennae and associated setae black (broken off distally); setae of palps and foretibiae pale brownish to fuscous; apex and margins of wings, except anal margin of hind wing, fuscous. Head elongate, flattened; ocelli small; maxillary palps with segments 1 and 2 short, subequal, segment 2 with apicomesal setae, segment 3 inserted preapically, about as long as first 2 segments combined, segment 4 short, segment 5 long, about as long as segments 3 and 4 combined. Tibial formula 2:4:4. Venation typical for genus.

Male. Segment IX with anterior margin moderately, sinuously expanded ventrally; posterior margin with very distinctly projecting, acute, setose dorsolateral expansions; posterior margin below dorsolateral expansions with paired, mesally directed, sclerotized hooklike processes subtending phallic apparatus; ventral process absent. Tergum X partially divided apicomesally into short, subtruncate lateral lobes, each with preapical sclerotized spinelike process on outer margin and apical sensilla. Preanal appendages short, knoblike, inserted above dorsolateral expansions of segment IX. Inferior appendage very elongate, linear; apex incurved and acute; mesal surface flattened, with convexly rounded

preapical projection. Phallic apparatus: phallobase relatively short with sclerotized apicoventral projection; endotheca short, without spines and without sacklike dorsal extension; internally without pleated membranous region, phallotremal sclerite prominent, with tubular base and projecting sclerotized apex.

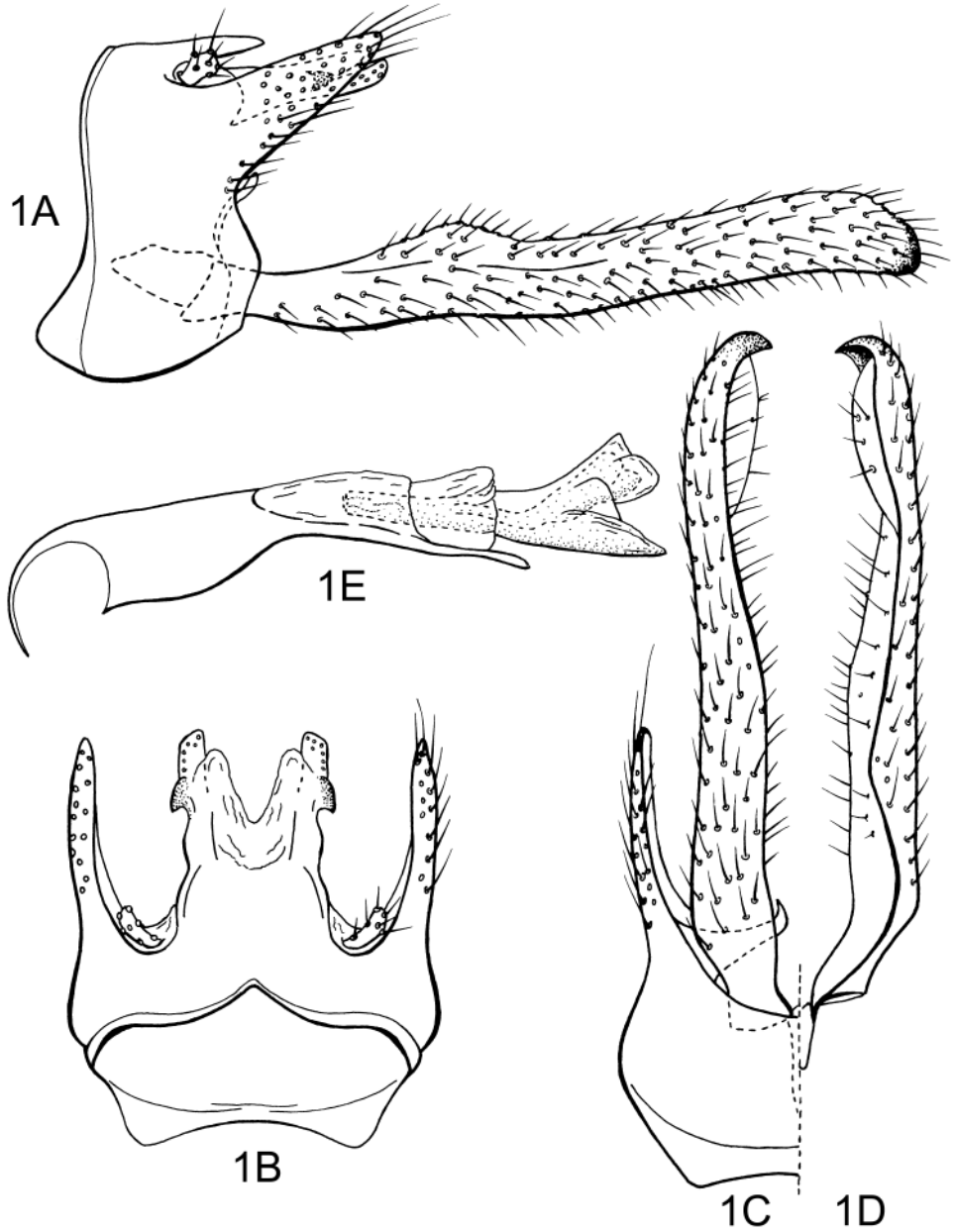

FIGURE 1. *Chimarrhodella ornata*, new species. Male genitalia: 1A—lateral view; 1B—dorsal view, segments IX and X; 1C—inferior appendage, ventral view; 1D—inferior appendage, dorsal view; 1E—phallic apparatus, lateral view.

Female. Unknown.

Holotype male (UMSP000092631)**: ECUADOR: Tungurahua:** Río Verde, 1600 m, 26.xii.1992—V.O. Becker (NMNH).

Etymology. This species is named *ornata* for its colorful yellow and fuscous wings.

***Chimarrhodella paria*, new species**
(Fig. 2A–D)

This species is a very close sister species to *Chimarrhodella nigra* Flint. The male shares with that species an elongate narrow tergum X with an upturned dorsomesal spinelike process, and like both *C. nigra* and *C. tobagoensis* (and also *C. ornata*, n. sp.) lacks phallic spines. It can be distinguished from *C. nigra* by the position of the spine on tergum X, which emerges from the middle of the segment, rather than the base, and by the shape of the hooklike posterodorsal processes of tergum IX, which are basally enlarged and narrow apically. Additionally, it differs from *C. nigra* in coloration. *Chimarrhodella nigra* is uniformly black in color, whereas *C. paria*, while being generally black or blackish overall, has the antennae and legs paler. No structural differences were observed to separate females of *C. paria* from either *C. nigra* or *C. tobagoensis*, and consequently the female of *C. paria* was not figured. The female of *C. tobagoensis* was figured by Blahnik and Holzenthal, 1992, figs. 16A, B. All of these species, however, are separable by their coloration, black overall in *C. nigra*, black with paler antennae and legs in *C. paria*, and pale stramineous overall in *C. tobagoensis*. Specimens of *Chimarrhodella tobagoensis* also differ in being considerably smaller in size.

Adult. Forewing length: male 5.2-6.8 mm, female 6.0-7.2 mm. General color, dark brown, head blackish; frontal setal wart, palps and femora yellowish, associated setae yellowish-brown or golden; crossveins of forewing chord white; head elongate, flattened, ocelli distinct.

Male. Segment IX very short ventrally; anterolateral margin slightly concave; posterior margin with subacute, setose dorsolateral expansions, extending nearly linearly to ventral margin; Posterodorsal margin with paired, hooklike processes, each with basal part enlarged and apex much narrowed; ventral process absent. Tergum X narrow, elongate, divided apically, lateral margins sensillate; tergum mesally with upturned spinelike process emerging near middle of segment. Preanal appendages narrow, elongate, subequal in length to tergum X. Inferior appendage elongate, linear; as viewed ventrally, narrowed and slightly mesally curved in distal half. Phallic apparatus: phallobase tubular with basodorsal expansion, apicoventral margin acute and downcurved; endotheca without spines, membranous hoodlike apicodorsal expansion present; internally with short pleated membrane basally and moderately distinct apicoventral phallotremal sclerite.

Female. Genitalia diagnostically indistinguishable from *C. tobagoensis* (Blahnik and Holzenthal, 1992, figs. 16A, B).

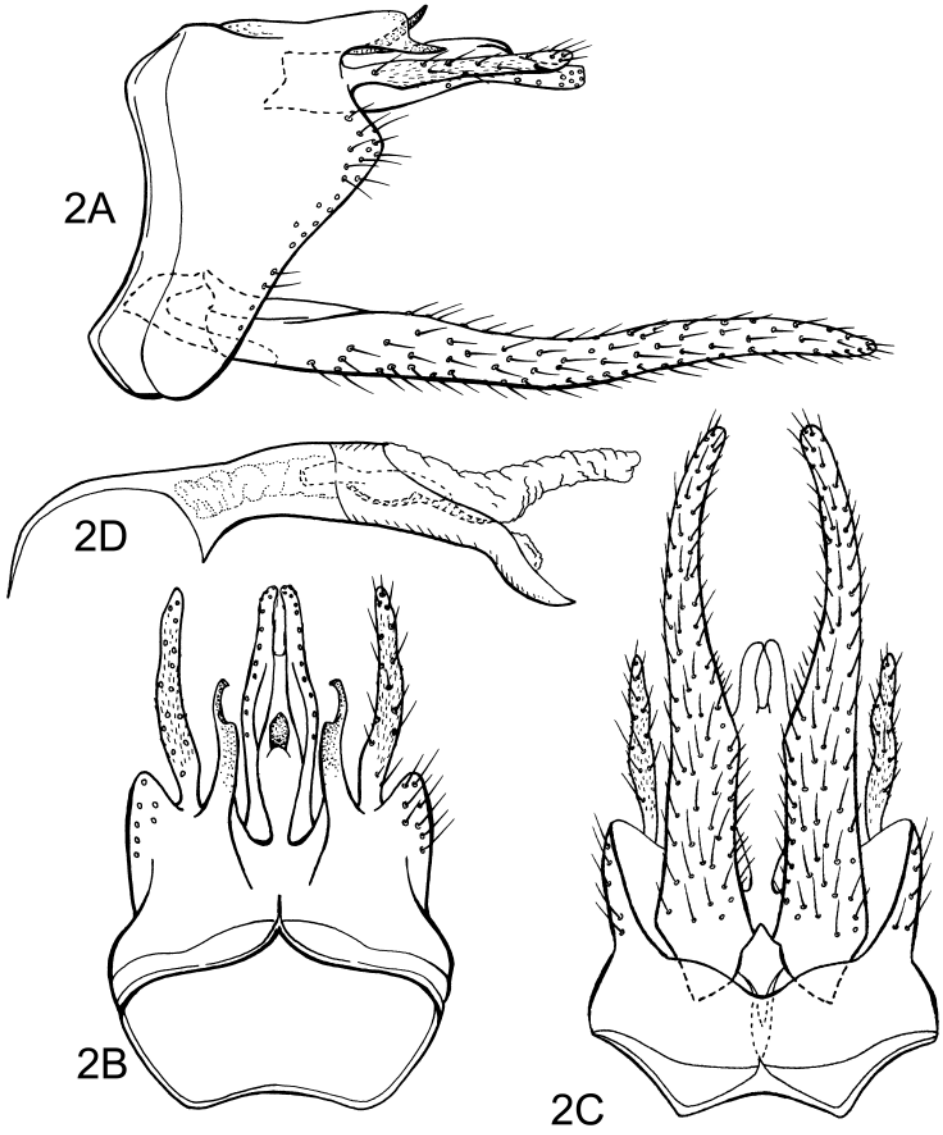

FIGURE 2. *Chimarrhodella paria*, new species. Male genitalia: 2A—lateral view; 2B—dorsal view, segments IX and X; 2C—ventral view; 2D—phallic apparatus, lateral view.

Holotype male (UMSP000048319)**: VENEZUELA: Sucre:** Peninsula de Paria, Santa Isabel, Río Santa Isabel, 10°44.294'N, 62°38.954'W, el 20 m, 4.iv.1995, Holzenthal, Flint, Cressa (UMSP).

Paratypes: VENEZUELA: Sucre: same data as holotype—3 males, 5 females (UMSP); Peninsula de Paria, Puerto Viejo, "Río el Pozo", 10°43.073'N, 62°28.569'W, el 20 m, 3.iv.1995, Holzenthal, Flint, Cressa— 2 males, 5 females (UMSP); Peninsula de

Paria, Puerto Viejo, Río Puerto Viejo, 10°43.137'N, 62°28.743'W, el 15 m, 2.iv.1995, Holzenthal, Flint, Cressa—12 males, 2 females (UMSP, NMNH, IZAM).

Etymology. This species is named *paria* for the Peninsula de Paria in Venezuela where the type series was collected.

Phylogenetic placement of the species

The phylogenetic treatment of the genus *Chimarrhodella* by Blahnik and Holzenthal (1992) divided the genus into two species groups, the *peruviana* Group, with elongate female genitalia and males possessing short curved spines on the posterior margin of tergum IX, and the *galeata* Group, with short female genitalia and males with spinelike lateral processes of tergum X. Characters of the two new species were added to the character matrix and rerun on PAUP* (Swofford 1999). The purpose of this analysis was not to reconsider the original phylogenetic hypothesis, but simply to accommodate the new species within an exiting phylogenetic structure. One additional character was added to the end of the data matrix, as discussed below, and is unique to *C. paria* and *C. nigra*. Character scoring for the new taxa is as follows:

C_paria	`00111011000000l0??01111`
C_ornata	`001111?010010?10??0??00`

The phylogenetic placement of *Chimarrhodella paria* is easily established by its very close structural similarity to *C. nigra*. Character scoring for the two species is identical. The dorsomesal spinelike process of tergum X is the most convincing synapomorphy, unique to these two species, and when scored as an additional character, places the two species as sister taxa.

The placement of *C. ornata* is somewhat more problematic. An unordered and equally weighted PAUP analysis places *C. ornata* as a basal or near basal taxon within the *galeata* Group (equivocal with respect to *C. costaricensis*). However, an alternate phylogenetic placement, either as a basal taxon within the genus as a whole or as a basal taxon in the *peruviana* Group, seems nearly equally probable, even if not quite as parsimonious. The mélange of putatively primitive and derived characters it displays, including the short preanal appendages, absence of a hoodlike endothecal process, and very elongate inferior appendages, makes it an interesting and enigmatic species. The discovery of females may shed additional light on its placement, since female genitalia is characteristically different in the two major lineages of *Chimarrhodella*. Until then, it is probably better to consider the phylogenetic position of *C. ornata* as unresolved (forming a trichotomy with the two major lineages of *Chimarrhodella*).

Acknowledgments

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