

STUDIES IN NEOTROPICAL LEPTOCERIDAE (TRICHOPTERA)

II. *Amphoropsyche*, a new genus and species of Leptocerinae from northern South America

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Abstract. *Amphoropsyche*, n. gen. (Trichoptera: Leptoceridae: Leptocerinae), from northern South America is described and illustrated. Nine new species are placed in the new genus: *A. ayura*, *A. cauca*, *A. choco*, *A. flinti*, *A. quebrada*, and *A. stellata* from Colombia; *A. napo* from Ecuador; and *A. aragua* and *A. refugia* from Venezuela. *Brachysetodes insularis* is transferred to the new genus. *Amphoropsyche* is diagnosed by the presence of a large internal gland in the preanal appendages and by a tuft of closely appressed setae on the inferior appendages of the male genitalia. Its phylogenetic position is near the base of the Leptocerinae.

Flint (1968) described and hesitantly placed the adults and immatures of a species of leptocerine caddisfly from the Lesser Antillean island of Dominica in the Chilean genus *Brachysetodes* Schmid. Recently, 9 new species of the same morphotype as the Dominican species have been discovered from Colombia, Ecuador, and Venezuela. A comparative character analysis of these species and *Brachysetodes* sensu stricto has revealed that the 2 groups are not congeneric as suspected by Flint (1968). I am removing Flint's species from *Brachysetodes* and placing it and 9 new species in a new genus, *Amphoropsyche*.

The new genus seems to be restricted in distribution to Dominica, the Cordillera de la Costa of Venezuela, and the Cordilleras Occidental, Central, and Oriental of Colombia and Ecuador. Adults appear to be day-flying and are associated with small streams in wet montane forests. Based on the frequency of collection of new species, it appears that the genus has undergone a great deal of speciation and many more new species are yet to be discovered.

Terminology for wing venation and genitalia follows Schmid (1980) (except that the term "phallicata" is preferred here over the variously applied word "aedeagus"). A, B, and C in Fig. 3-16 are lateral, dorsal, and ventral views, respectively, of the terminal abdominal segments. In males, C is a ventral view of the left inferior appendage only. D is a lateral view of the male phallic apparatus. Types will be deposited in the U.S. National Museum (Natural History) (USNM), the Instituto de Zoología Agrícola, Universidad Central de Venezuela, Maracay (UCV), and the Clemson University Entomological Collection (CLEMS), as indicated below.

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Amphoropsyche Holzenthal, new genus

Type-species: *Brachysetodes insularis* Flint, 1968.

Diagnosis. Tibial spur formula 1-2-2. Midcranial sulcus absent. Mesopleural katapisternum truncate dorsally. Forewing (Fig. 1A, 2A) with forks I and V present; fork I sessile. *M* 2-branched in ♂, 3-branched in ♀ (i.e., fork III present); main bifurcation sessile to subsessile on *r-m* crossvein. Discal cell ½ length of thyridial cell. Hind wing narrow, forks I and V present; a false vein present before fork V (Fig. 1B, 2B).

Color. Forewing dark brown with scattered golden hairs. Hind wing brown. Body and appendages brown.

♂ *genitalia.* Ninth sternal and phallic sclerotized strips present. Preanal appendages large, subspherical, and fused along their midlengths; each bearing a large internal cavity or gland (subsequently referred to as the "amphora"), which opens to the exterior by a ventral pore. Segment X usually composed of a single mesal process and a pair of lateral processes. Inferior appendages usually with a long thin 2nd article and always with 1st article ending in a bulbous lobe, bearing a subterminal tuft of closely appressed setae. Phallic apparatus with phallicata entirely membranous and difficult to distinguish from endothelial membranes; parameres and phallosomal sclerite usually present.

♀ *genitalia.* Difficult to diagnose due to lack of commonality among associated species. In *A. insularis* (Flint), and *A. refugia*, n. sp., appendages of segment X well developed, broad and flat; valves small, underdeveloped. Appendages of segment X large and triangular in *A. ayura*, n. sp., short and blunt in *A. quebrada*, n. sp. Valves well developed in both species. Vaginal apparatus complex in all species; usually with a narrow posterior neck.

Etymology. The genus name is from the Greek *amphoreus* (a tall jar or urn used to hold water, wines, oils, or other precious substances); it refers to the glands of the preanal appendages characteristic of this genus. Gender feminine.

The phylogenetic position of *Amphoropsyche* seems to be between the athripsodine and nectopsychine nodes of Morse's (1981) phylogeny. The new genus shares 2 characters with Morse's nectopsychine-node ancestor: larval gills unbranched and 1-2-2 tibial spur formula. Because of the primitive 3-branched condition of the female median stem, I am obliged to place *Amphoropsyche* as the sister group to the Nectopsychini-through-Mystacidini branch of Morse (1981).

It is interesting to note that in several specimens the subterminal tufts of setae on the male inferior appendages are inserted and lodged in the ventral pores of the preanal appendages. It is highly likely that these setae act in dispersing a chemical substance (sex pheromone ?) contained in the amphorae. This character complex is unique to this genus and resembles a similar complex seen only in the African leptoecrine genus *Axiocerina* Ross (Morse 1984).

Amphoropsyche insularis (Flint), new combination

Fig. 1-4

Brachysetodes insularis Flint, 1968: 69, Fig. 189-92, 202-08, ♂, ♀, larva, pupa, biology.

In many respects this species resembles *A. refugia*, n. sp., and *A. aragua*, n. sp. The lateral spinelike projections of the phallobase are similar to those of *A. refugia*, n. sp.,

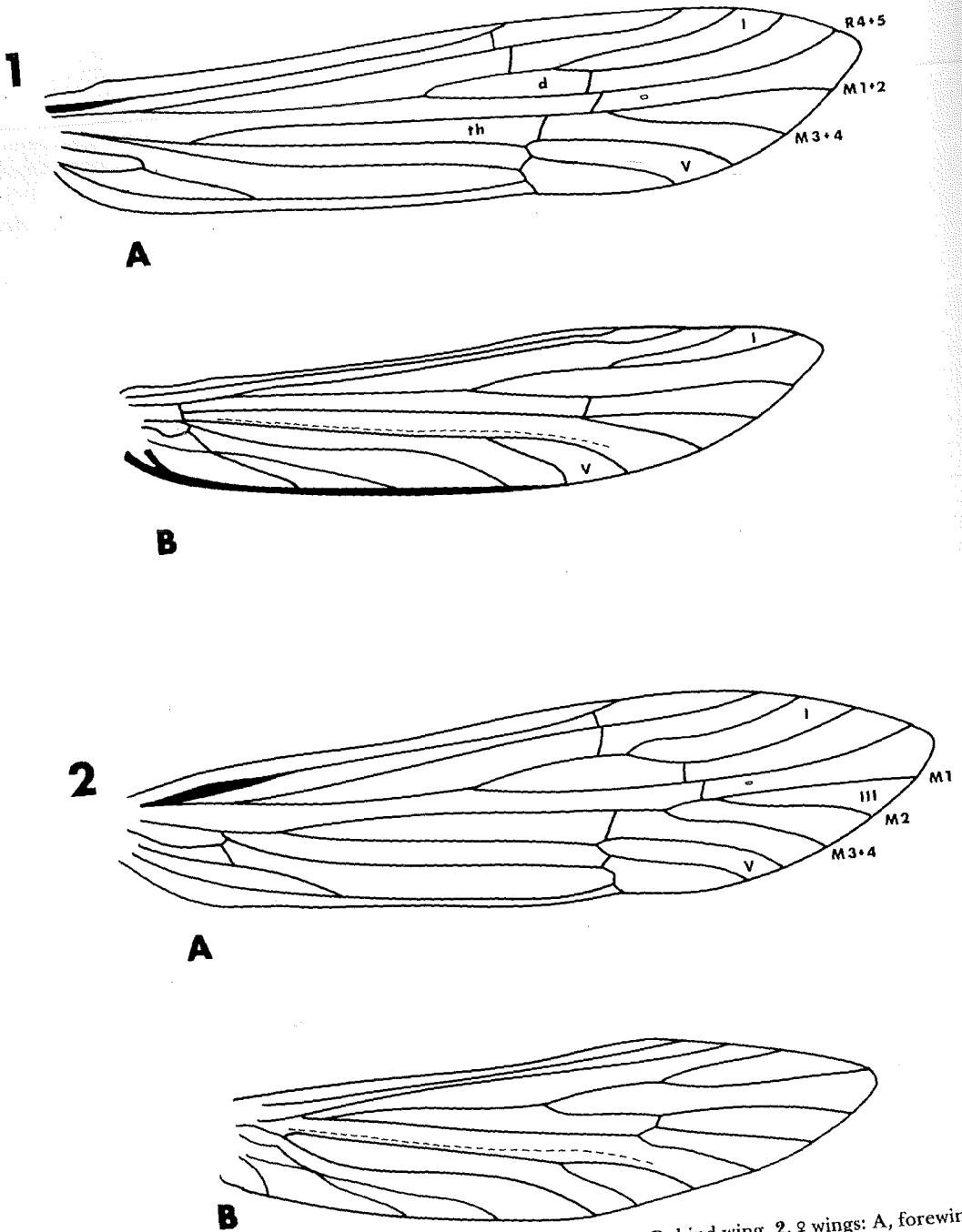


FIG. 1-2. *Amphoropsycha insularis*. 1, δ wings: A, forewing; B, hind wing. 2, η wings: A, forewing; B, hind wing.

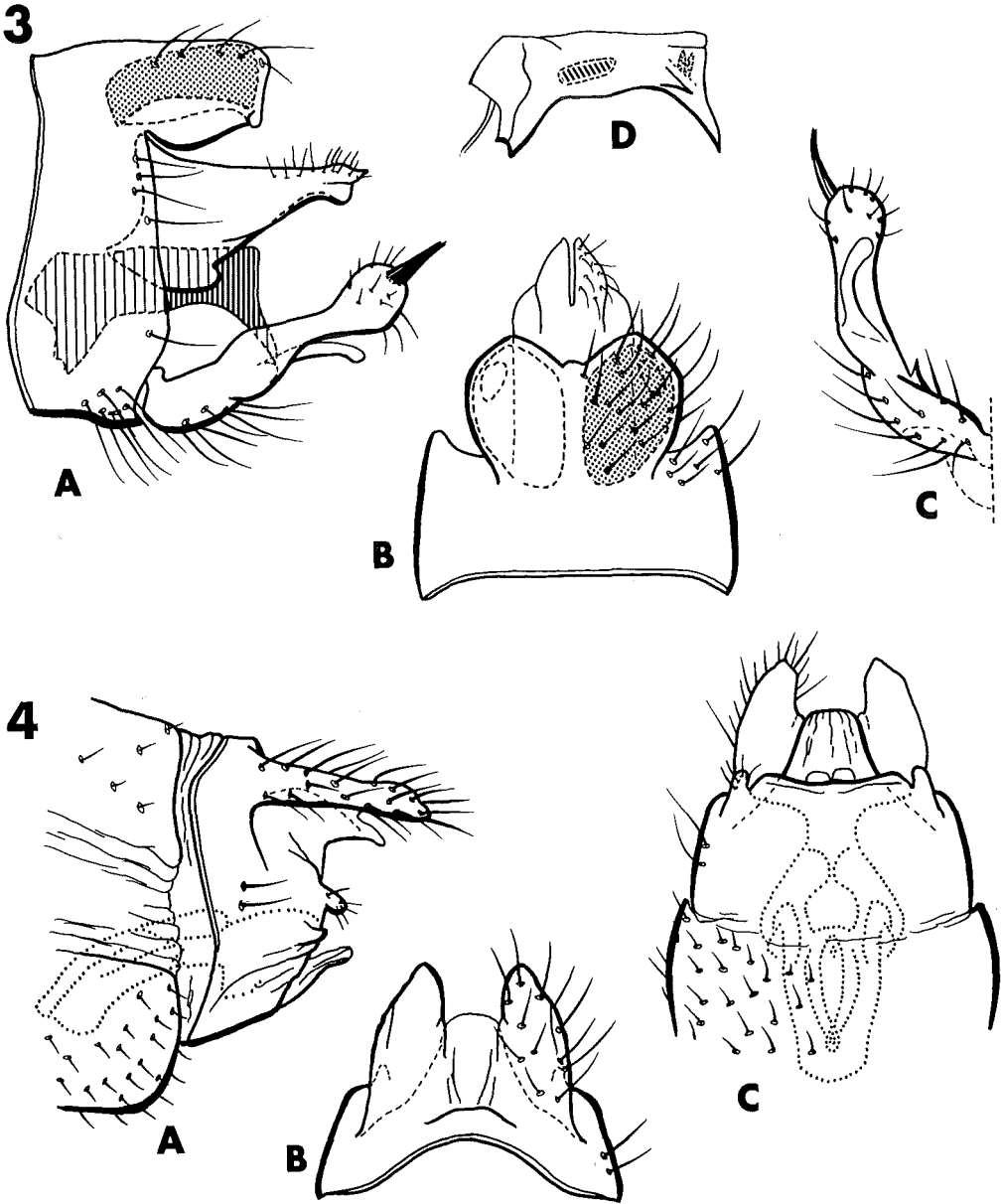


FIG. 3-4. *Amphoropsycha insularis*: 3, ♂ genitalia; 4, ♀ genitalia.

but the phallic apparatus of *A. insularis* bears a pair of small parameres absent in the former species. Segment X is similar in appearance to that of *A. aragua*, n. sp. There is no trace of the heavy dorsolateral projections of the preanal appendages in this species so characteristic of *A. refugia*, n. sp., and *A. aragua*, n. sp., although the preanal appendages are completely fused along their midlengths as they are in those 2 species. Female genitalia with appendages of segment X well developed; broad and flat. Valves reduced to small nubs. The coloration of *A. insularis* differs from the plain dark brown of other members of the genus. In *A. insularis* the forewings are golden with interspersed transverse rows of brown spots. The adults, immatures, and biology of this species were described by Flint (1968).

***Amphoropsyche napo* Holzenthal, new species**

Fig. 5

This species is characterized by the short, broad basomesal lobe of the inferior appendage, 2 pairs of parameres, and the anterior extension of abdominal sternum IX, a character it shares with *A. flinti*, n. sp.

♂. Length of forewing 6 mm. Color and structure typical for genus. Genitalia as in Fig. 5A–D. Segment IX annular; ventral part broad, extended anteriorly. Segment X composed of a single mesal process and a pair of lateral processes. Mesal process thin, slightly sinuate in lateral view, tip pointed in dorsal view; lateral process U-shaped, tip bifid and bearing a pair of small spines. Preanal appendages large, subspherical, and fused along their midlengths; each bearing a ventrolateral flange. Amphora present. First article of inferior appendages with a short broad basomesal lobe; ending in a bulbous lobe bearing a tuft of setae. Second article of inferior appendages long, thin, curved. Phallic apparatus with phallobase well developed; phallicata membranous; 2 pairs of parameres present; phallosomal sclerite present.

♀. Unknown.

Holotype ♂, ECUADOR: Napo, Sebundoy, 0°30'N, 77°30'W, 2600 m, 11–15.IX.1977 (L.E. Peña G.) (USNM).

Etymology. This species is named for the Río Napo.

***Amphoropsyche flinti* Holzenthal, new species**

Fig. 6

This species most closely resembles *A. napo*, n. sp, in the structure of abdominal segments IX and X. It can be distinguished from *A. napo* by the spinelike projection on the phallobase and by the broad flaplike nature of the 2nd article of the inferior appendages.

♂. Length of forewing 6 mm. Color and structure typical for genus. Genitalia as in Fig. 6A–D. Segment IX annular; ventral part extended anteriorly. Segment X composed of a single mesal process and a pair of lateral processes. Mesal process shaped like a plow in lateral view, tip blunt in dorsal view; lateral process C-shaped, tip bearing several stout setae. Preanal appendages large, fused only along basal 1/3 of their midlengths. Amphora filling most of preanal appendage. First article of inferior appendages with a long, slender, mesally directed fingerlike process bearing a small subterminal spine; a small setose thumblike projection on dorsal midlength; terminal 1/2 with a bulbous lobe bearing a tuft of setae. Second article of inferior

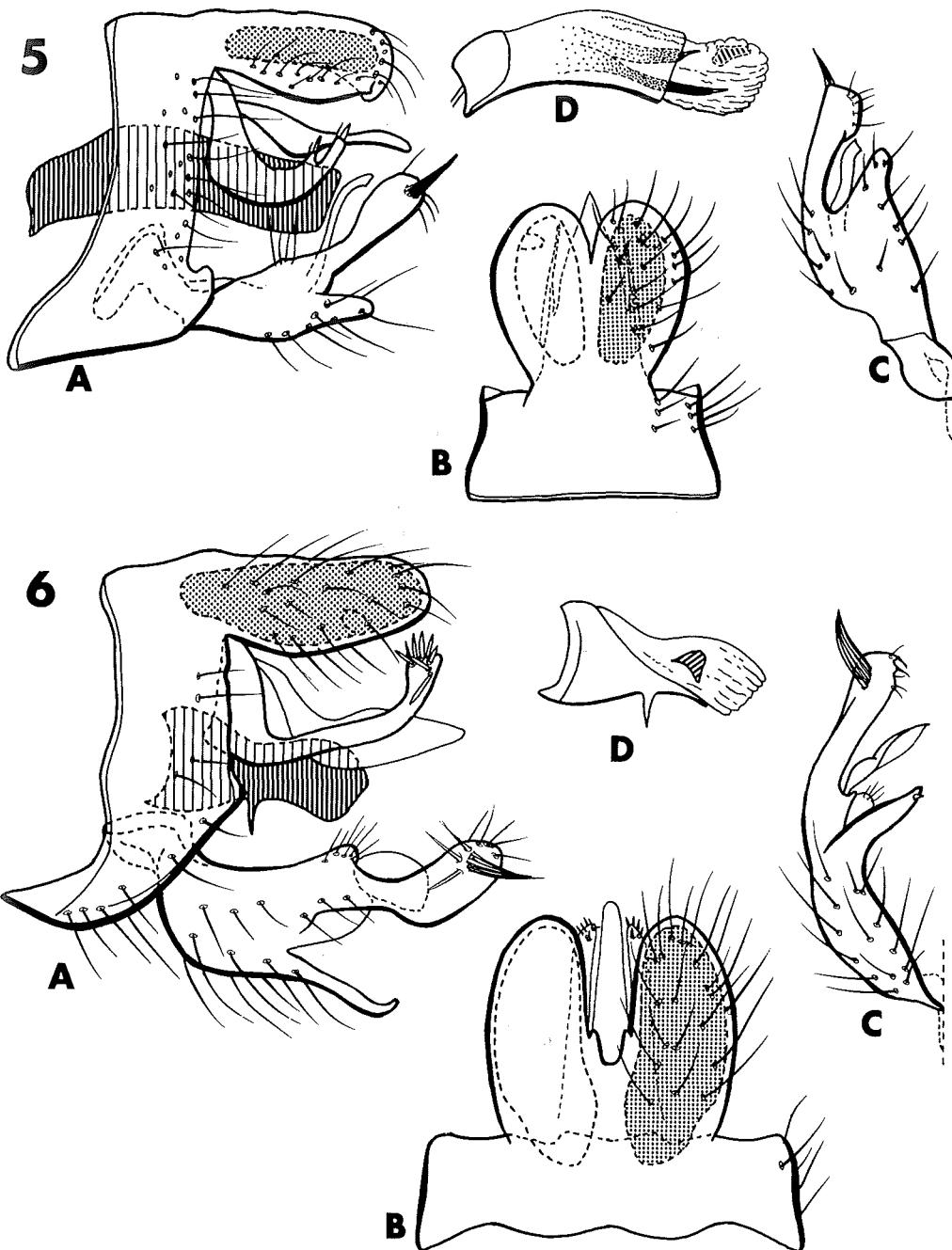


FIG. 5-6. ♂ genitalia: 5, *Amphoropsycha napo*; 6, *A. flinti*.

appendages short, broad, and semicircular in lateral view. Phallic apparatus with phallobase well developed, bearing a ventral spinelike process; phallicata and parameres absent; phallostremal sclerite present.

♀. Unknown.

Holotype ♂, COLOMBIA: Antioquia, 27 km W of Medellín, road to San Jeronimo, 23.II.1984 (C.M. & O.S. Flint, Jr) (USNM).

Etymology. It is with great pleasure that I name this species in honor of Dr Oliver S. Flint, Jr, Smithsonian Institution.

***Amphoropsyche stellata* Holzenthal, new species**

Fig. 7

This species seems to be close to *A. napa* and *A. flinti*. All 3 species share similar morphologies of abdominal segments IX and X. *Amphoropsyche stellata* differs from the other 2 species by the shape of the inferior appendages and by the presence of broad flat parameres.

♂. Length of forewing 6 mm. Color atypical for genus. Forewing dark brown to black with ca. 10 distinct patches of white hairs. Frons, vertex, and antennal scape clothed with long golden hairs. Body dark brown. Genitalia as in Fig. 7A–D. Segment IX annular; sternum IX slightly extended anteriorly. Segment X composed of a single mesal process and a pair of lateral processes. Mesal process long, acuminate in lateral view; lateral process tapered to a terminal point at a right angle to longitudinal axis of lateral process. Preanal appendages short, oval, fused along basal $\frac{2}{3}$ of their midlengths. Amphora filling most of preanal appendage. First article of inferior appendages stout, with a small pointed basomesal projection and a dorsal humplike projection; apical $\frac{1}{2}$ truncate in ventral view, ending in a bulbous lobe bearing a recessed tuft of setae. Second article of inferior appendages long and slender. Phallic apparatus with phallobase well developed; phallicata membranous; a pair of broad, flat, lightly sclerotized parameres present; phallostremal sclerite present, lightly sclerotized.

♀. Unknown.

Holotype ♂, COLOMBIA: Risaralda, Termales de Santa Rosa de Cabal, 29.II.1984 (C.M. & O.S. Flint, Jr) (USNM).

Etymology. The name is from the Latin *stellatus*, meaning “starred” or “starry,” and refers to the bright white patches of hairs on the dark forewing of this species.

***Amphoropsyche refugia* Holzenthal, new species**

Fig. 8–9

This species and the following (*A. aragua*, n. sp.) differ from all others in the possession of a dark, heavily sclerotized, ventrally directed process arising from the dorsomesal portion of the fused preanal appendages. The 2 species sharing this character can be most easily separated from each other by the morphology of segment X and the phallic apparatus.

♂. Length of forewing 5 mm. Color and structure typical for genus. Genitalia as in Fig. 8A–D. Segment IX annular. Segment X a single hoodlike structure with lateral portion deeply excised. Dorsal portion (above excision) triangular in lateral view, apex bearing a few small setae; ventral portion (below excision) slender, curved, tapered to a terminal point. Preanal

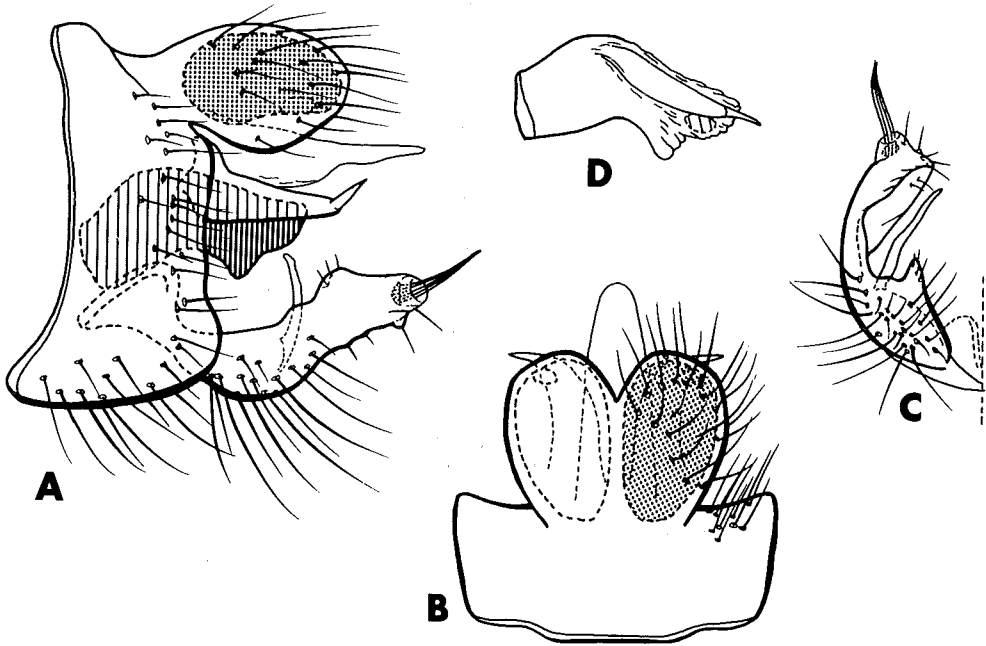


FIG. 7. *Amphoropsyche stellata*, ♂ genitalia.

appendages oval, completely fused along their midlengths, bearing a pair of dark heavily sclerotized, ventrally directed, dorsomesal processes. Amphora spherical. First article of inferior appendages straight, more or less parallel-sided; bearing a flat, thumblike, basomesal process, ending in a bulbous lobe bearing a tuft of setae. Second article of inferior appendages long and thin. Phallic apparatus with phallobase well developed, bearing a pair of basolateral bifid extensions, ventral subterminal portion serrate. Phallicata and parameres absent; phalotremal sclerite present.

♀. Length of forewing 5 mm. Color and structure similar to ♂. Genitalia as in Fig. 9A–C. Segment X thin; lightly sclerotized; slightly emarginate in dorsal view. Appendages of segment X large, flat; triangular in dorsal view; downturned. Valves small; U-shaped, spatulate. Vaginal apparatus complex; with a narrow posterior neck.

Holotype ♂, VENEZUELA: Distrito Federal, Estacion Experimental Bajo Seco, ca. 15 km NE of Colonia Tovar, 2000 m, 23–25.I.1983 (O.S. Flint, Jr) (USNM). Paratypes, 1♂, 1♀, same data as holotype (USNM).

Etymology. The name is from the Latin *refugium*; it refers to the Rancho Grande area near the type-locality, a proposed Pleistocene refuge.

Amphoropsyche aragua Holzenthal, new species

Fig. 10

This species is most closely related to *A. refugia* and, as stated above, can be distinguished from that species by the characteristics of abdominal segment X and the phallic apparatus. In *A. aragua* segment X is a broad saddle-shaped structure while

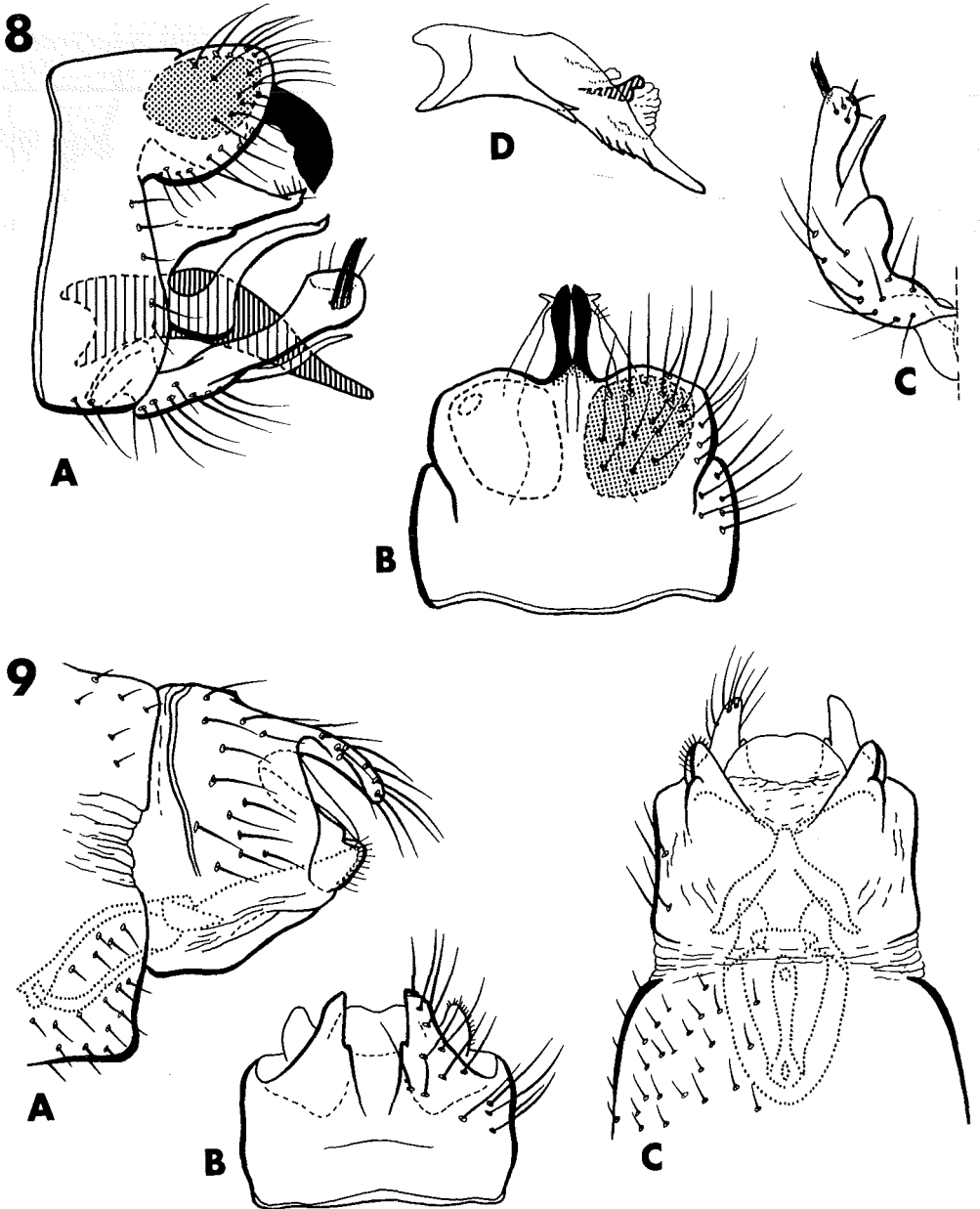


FIG. 8-9. *Amphoropsyche refugia*: 8, ♂ genitalia; 9, ♀ genitalia.

in *A. refugia* it bears a deep lateral excision. *Amphoropsyche aragua* bears 2 pairs of endothelial processes while *A. refugia* lacks endothelial processes.

♂. Length of forewing 6.5 mm. Color and structure typical for genus. Genitalia as in Fig. 10A-D. Abdominal segment IX annular. Segment X a broad saddle-shaped structure, roughly

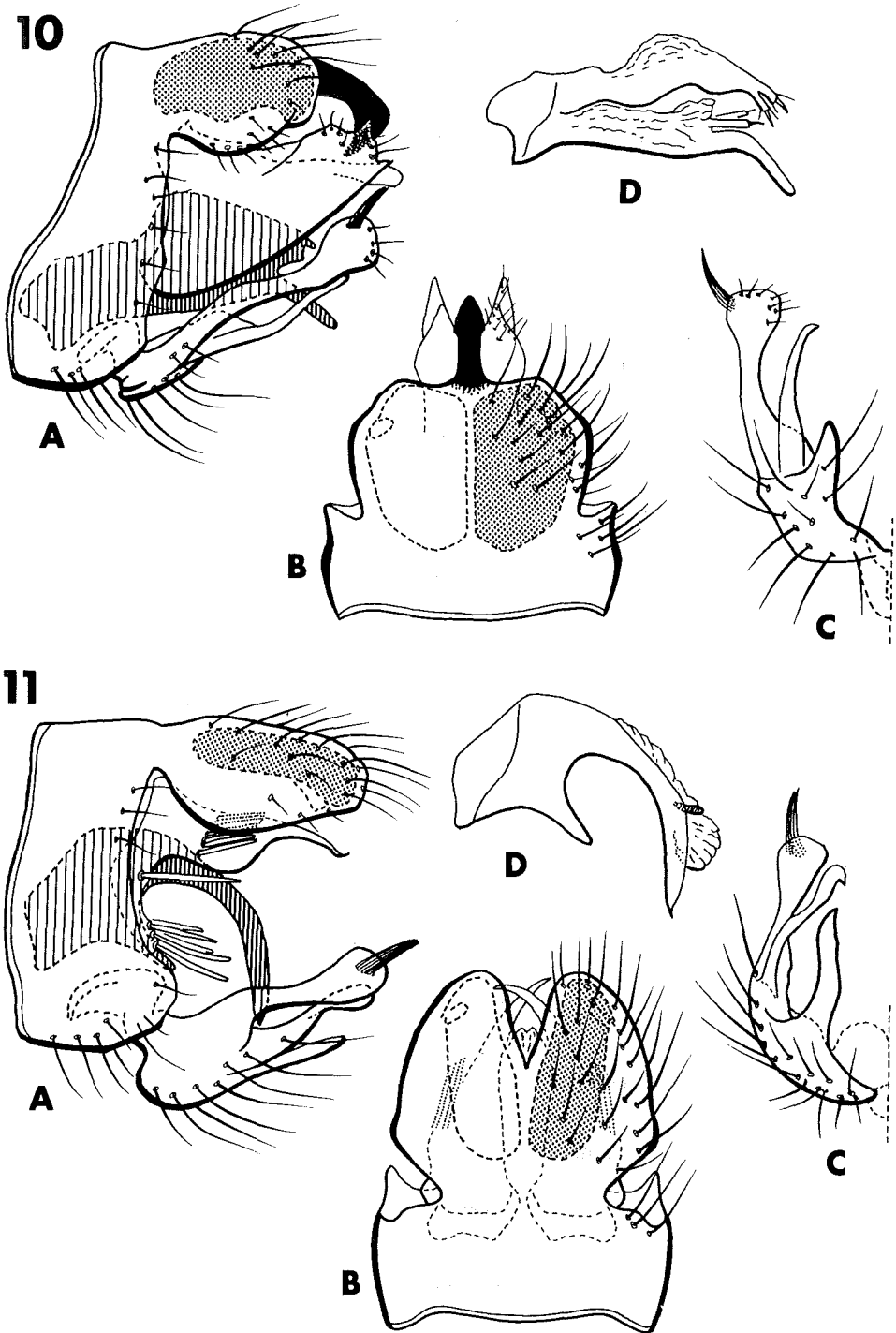


FIG. 10-11. ♂ genitalia: 10, *Amphoropsycha aragua*; 11, *A. choco*.

triangular in lateral view; apical $\frac{1}{3}$ divided into 2 processes: mesal process a small fingerlike lobe, lateral process developed as a wide lobe bearing several setae. Preanal appendages oval, completely fused along their midlengths, bearing a single dark, heavily sclerotized, ventrally directed, dorsomesal process. Amphora roughly oval. First article of inferior appendages long, slender, gently curved; bearing a basomesal process, ending in a large bulbous lobe bearing a tuft of setae. Second article of inferior appendages long and thin. Phallic apparatus with phallobase well developed, bearing 2 pairs of semimembranous endothelial processes: a basodorsal pair, each terminating in a bifid spinose tip and a small apicodorsal pair, each bearing a small terminal spine. Phallicata and phallostremal sclerite absent.

♀. Unknown.

Holotype ♂, VENEZUELA: Aragua, road between Maracay and Choroni, 1280 m, 9.X.1980 (F. Fernandez & A. Chacón) (ucv). Paratypes, same data as holotype: 2♂ (CLEMS), 2♂ (USNM), 1♂ (ucv).

Etymology. This species is named for Aragua State.

Amphoropsyche choco Holzenthal, new species

Fig. 11

This species stands apart from other members of the genus. The tripartite inferior appendages and the absence of parameres are reminiscent of *A. refugia* and *A. aragua*. The unusual structure of segment X, with its long stout setae, and the basomesal process of the phallobase separate this species from all others.

♂. Length of forewing 5 mm. Color and structure typical for genus. Genitalia as in Fig. 11A–D. Segment IX annular. Segment X composed of a completely membranous mesal process and a pair of lateral processes. Lateral process with distinct dorsal and basoventral portions. Dorsal portion with basal $\frac{1}{2}$ broad, bearing a parallel row of 5 long stout setae; apical $\frac{1}{2}$ acuminate, directed mesally. Basoventral portion long, tapered, curved posteriorly; bearing a single long stout seta at midlength, 5 long stout setae at apex. Preanal appendages large, extending beyond lateral processes of segment X; roughly oval in shape, fused along basal $\frac{2}{3}$ of their midlengths. Amphora small, filling only $\frac{1}{2}$ volume of preanal appendage. First article of inferior appendages broad basally, bearing a prominent long, thin, pointed basoventral projection; dorsoapical portion long, slender, ending in a bulbous lobe bearing a tuft of setae. Second article of inferior appendages long and slender, apex hooked in ventral view. Phallic apparatus with phallobase well developed, curved, apex bifid in dorsal or ventral view, tips acuminate, bearing a prominent baso-meso-ventral projection. Phallicata and parameres absent; phallostremal sclerite present, small.

♀. Unknown.

Holotype ♂, COLOMBIA: Chocó, km 130, 86 km E of Quibdó, 17.II.1983 (O.S. Flint, Jr) (USNM).

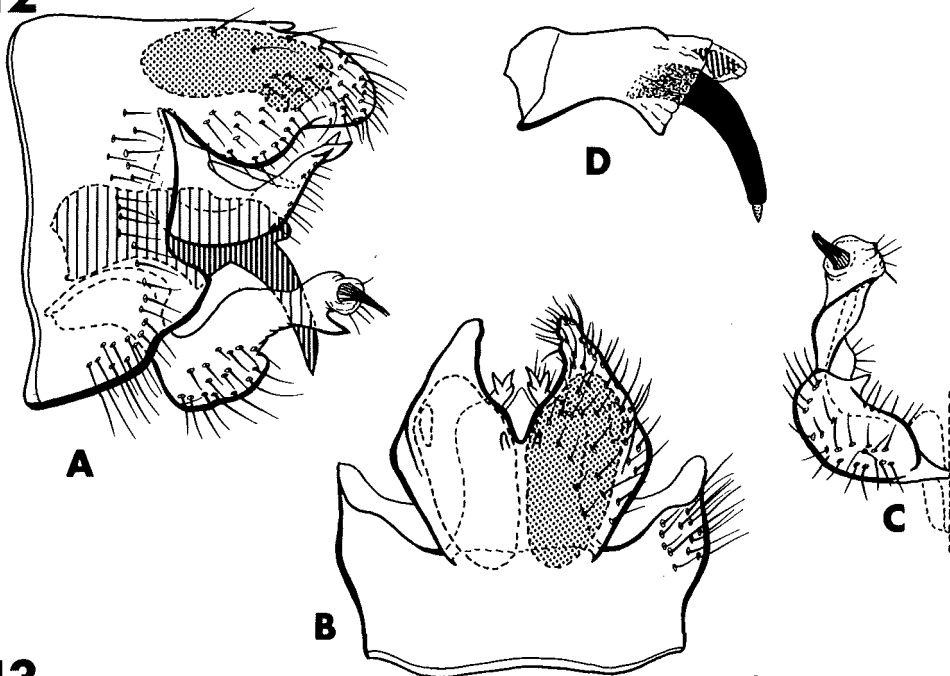
Etymology. This species is named for the Chocó refuge.

Amphoropsyche ayura Holzenthal, new species

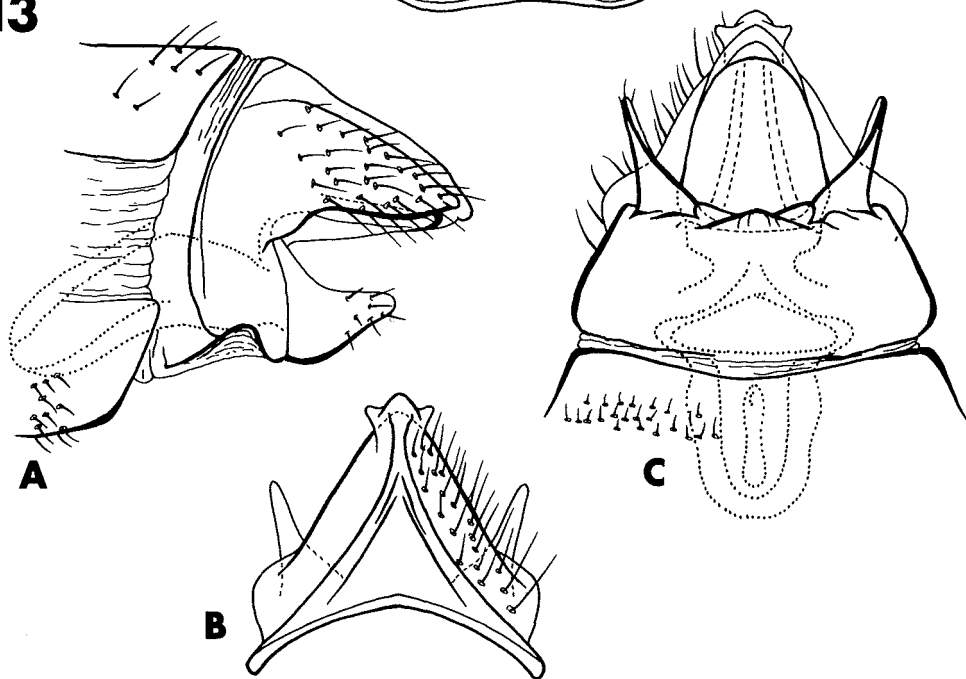
Fig. 12–13

Amphoropsyche ayura and the next 2 species, *A. quebrada*, n. sp., and *A. cauca*, n. sp., form a related group defined by the shape of abdominal segment X, the loss or reduction of the 2nd article of the inferior appendage, and the presence of a pair of prominent parameres on the male genitalia. *Amphoropsyche ayura* can be separated

12



13

FIG. 12-13. *Amphoropsyche ayura*: 12, ♂ genitalia; 13, ♀ genitalia.

from its relatives by the trifid apex of the lateral process of segment X, the thick heavy parameres, and the unusual shape of the inferior appendage.

♂. Length of forewing 6 mm. Color and structure typical for genus. Genitalia as in Fig. 12A–D. Segment IX annular. Segment X composed of a single mesal process and a pair of lateral processes. Mesal process a small, thin, lightly sclerotized shelf; lateral process U-shaped, broad basally, tapering to an upturned apex bearing 3 spinelike points. Preanal appendages large, extending beyond lateral processes of segment X, fused along $\frac{1}{2}$ of their midlengths; more or less oval in shape, but in dorsal view apical portion terete and heavily setose; ventrolateral edge produced into a rounded flange. Amphora filling most of preanal appendage. First article of inferior appendages broad basally; short and stout; a ventral subapical spinelike projection present; apex bulbous, almost entirely membranous, and bearing a tuft of setae. Second article of inferior appendages apparently lost or fused to, and indistinguishable from, 1st article. Phallic apparatus with phallobase well developed; phallicata membranous; a pair of large, heavy, curved parameres present, each bearing a terminal spine; phallosclerite present.

♀. Length of forewing 5 mm. Color and structure similar to ♂. Genitalia as in Fig. 13A–C. Segment X large and prominent; cone-shaped, ending in 3 membranous lobes. Appendages of segment X large and triangular; closely appressed or fused to segment X; heavily setose. Valves situated ventrolaterally; roughly triangular; apex rounded, slightly upturned. Vaginal apparatus complex; with a narrow posterior neck.

Holotype ♂, COLOMBIA: Antioquia, Quebrada la Ayura, above Envigado, S of Medellín, 2000 m, 21.VII.1983 (U. Matthias) (USNM). *Paratype*, 1♀, same data as holotype except 28.V.1983 (USNM).

Etymology. This species is named for the type-locality.

***Amphoropsyche quebrada* Holzenthal, new species**

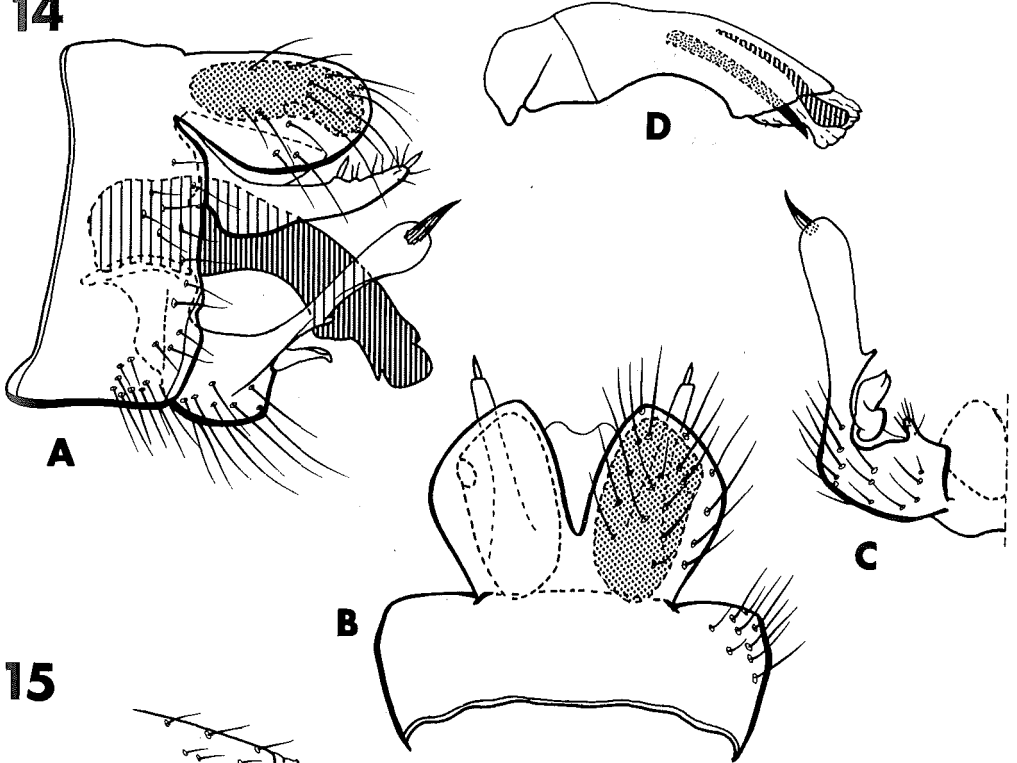
Fig. 14–15

The presence of a short, stout, S-shaped 2nd article of the inferior appendage, the structure of segment X, and the long, thin, anteriorly directed extension of the phallosclerite render this species distinct from its relatives *A. ayura* and *A. cauca*, n. sp.

♂. Length of forewing 5 mm. Color and structure typical for genus. Genitalia as in Fig. 14A–D. Segment IX annular. Segment X composed of a single mesal process and a pair of lateral processes. Mesal process a lightly sclerotized, brim-shaped structure; lateral process boomerang-shaped, bearing a terminal and subterminal spine. Preanal appendages large, but not extending beyond apex of lateral process of segment X; fused only along basal $\frac{1}{3}$ of their midlengths; oval in shape. Amphora present. First article of inferior appendages broad basally; L-shaped in ventral view; small, setose, lobelike projection present basomesally and a small pointed projection at mesal midlength; apical portion long, slender, ending in a bulbous lobe bearing a tuft of setae. Second article of inferior appendage short, stout; S-shaped in ventral view. Phallic apparatus with phallobase well developed; phallicata absent; a pair of long thin parameres present; phallosclerite with a long, thin, anteriorly directed extension.

♀. Length of forewing 5 mm. Color and structure similar to ♂. Genitalia as in Fig. 15A–C. Abdominal tergum IX with posterolateral extensions. Segment X membranous; excised mesally. Appendages of segment X large, broad, blunt; heavily setose. Valves situated ventrolaterally; U-shaped; ventral portion thickened. Vaginal apparatus complex; with a broad posterior neck.

14



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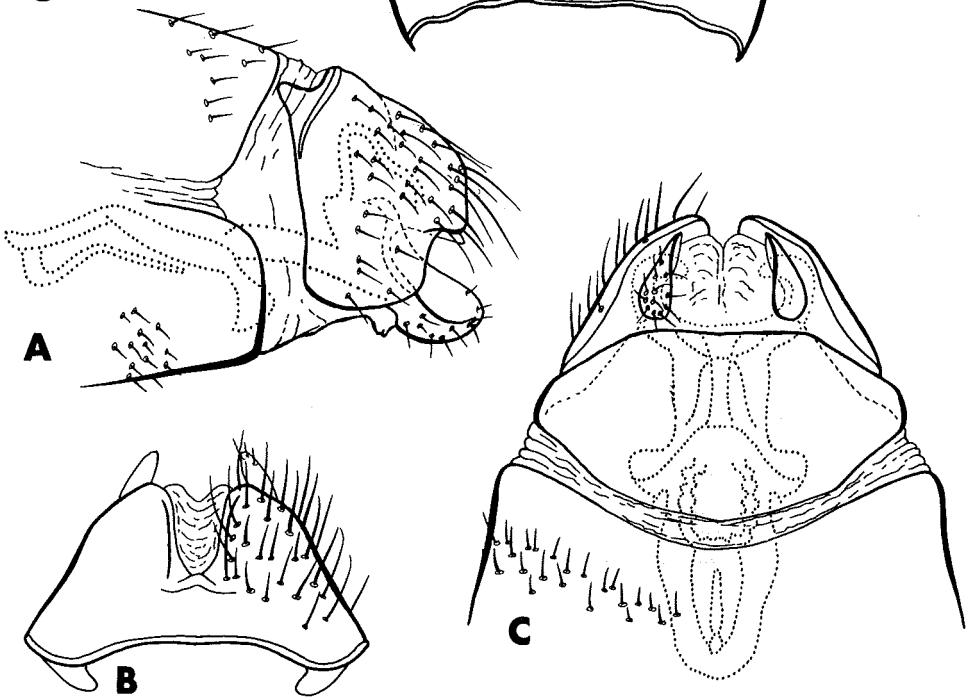


FIG. 14-15. *Amphoropsyche quebrada*: 14, ♂ genitalia; 15, ♀ genitalia.

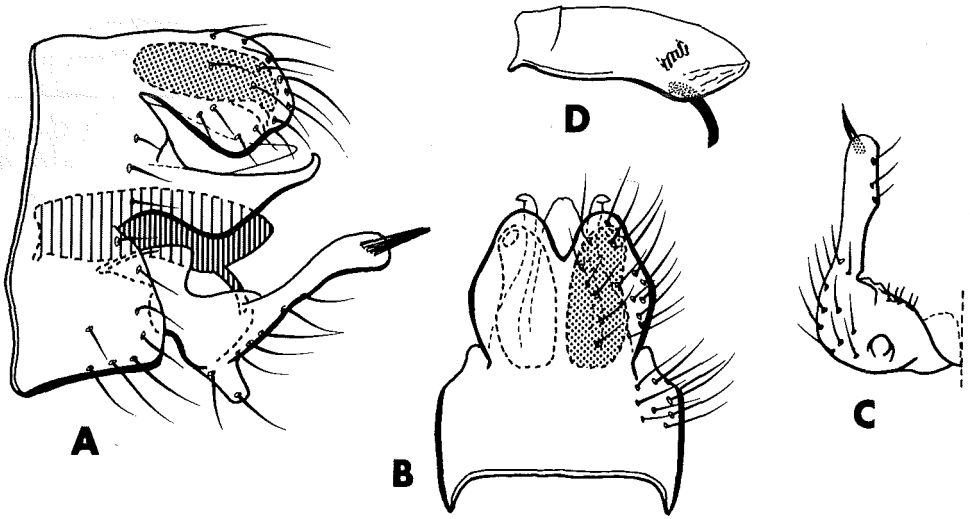


FIG. 16. *Amphoropsyche cauca*, ♂ genitalia.

Holotype ♂, COLOMBIA: Antioquia, Quebrada del Cebolla, W of La Fe, 25 km E of Medellín, 2500 m, 18.VI.1983 (U. Matthias) (USNM). *Paratypes*: 1♀, same data as holotype except 4.VIII.1983 (USNM); 1♀, same except 13.X.1983 (USNM).

Etymology. The name is Spanish for "gully" or "small stream"; it refers to the type-locality as well as the habitat preferred by members of the genus.

***Amphoropsyche cauca* Holzenthal, new species**

Fig. 16

The short parameres, absence of a 2nd article, and the presence of a basoventral lobe on the 1st article of the inferior appendage distinguish this species from *A. ayura* and *A. quebrada*.

♂. Length of forewing 7 mm. Color and structure typical for genus. Genitalia as in Fig. 16A–D. Segment IX annular. Segment X composed of a single mesal process and a pair of lateral processes. Mesal process lightly sclerotized, beak-shaped; lateral process with dorsal edge straight, ventral edge rounded, apex pointed, upturned. Preanal appendages large, but not extending beyond apex of lateral processes; fused along their midlengths; each with a ventrolateral flange. Amphora present. First article of inferior appendages broad basally; L-shaped in ventral view, with a basoventral projection; apical portion long, slender, ending in a bulbous lobe bearing a tuft of setae. Second article of inferior appendages apparently absent. Phallic apparatus with phallobase well developed; phallicata membranous; a pair of short, thin parameres present; phallostremal sclerite present.

♀. Unknown.

Holotype ♂, COLOMBIA: Antioquia, 12 km N of Fredonia, 2000 m, 22.II.1983 (O.S. Flint, Jr) (USNM).

Etymology. This species is named for the Río Cauca.

Acknowledgments. This research would have been impossible without the continued support of Dr Oliver S. Flint, Jr, Smithsonian Institution. I am grateful to him for his generous loan of material and for his interest in my research. I am also thankful to my colleagues Dr John Morse and Mr Steve Hamilton, Clemson University, for advice and encouragement. This is Technical Contribution No. 2324 of the South Carolina Agricultural Experiment Station.

LITERATURE CITED

- Flint, O.S., Jr.** 1968. Bredin-Archbold-Smithsonian biological survey of Dominica. 9. The Trichoptera (caddisflies) of the Lesser Antilles. *Proc. U.S. Natl. Mus.* **125**: 1-86.
- Morse, J.C.** 1981. A phylogeny and classification of the family-group taxa of Leptoceridae (Trichoptera), p. 257-64. In: Moretti, G.P., ed., *Proc. 3rd Int. Symp. Trichoptera*. W. Junk Publ, The Hague, Ser. Entomologica 20.
1984. Evolution and historical biogeography of *Leptocerina* and *Axiocerina* (Leptoceridae, Leptocerinae, Athripsodini), p. 261-66. In: Morse, J.C., ed., *Proc. 4th Int. Symp. Trichoptera*. W. Junk Publ, The Hague, Ser. Entomologica 30.
- Schmid, F.** 1980. *Les Insectes et Arachnides du Canada, Partie 7: Genera des Trichoptères du Canada et des États adjacents*. Agriculture Canada. Ottawa. 296 p.