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**Taxonomy and phylogeny of New World *Polyplectropus* Ulmer, 1905
(Trichoptera: Psychomyioidea: Polycentropodidae)
with the description of 39 new species**

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ABSTRACT

The taxonomy of the New World species of *Polyplectropus* (Ulmer, 1905a) is revised to include detailed male and female diagnoses, descriptions, illustrations, distribution records, and keys to males of all species and species groups. A phylogenetic analysis based on 59 morphological characters, 89 of 92 (97%) New World *Polyplectropus* species, and 2 outgroup taxa was inferred using parsimony and Bayesian methods, which resulted in minor topological differences. Conflicting estimates of relationship among and within most species groups led to a less resolved Bayesian tree (vs. parsimony tree) due to high variation in rates of change among characters and an overall low number of characters. A new classification for New World *Polyplectropus* is proposed with revised characterization of 10 recognized species groups, 6 newly established. Four species remain unassigned to species group. A key to genera of New World Polycentropodidae, including a redescription of *Polyplectropus* is provided. The homology of the male genitalia of *Polyplectropus* is discussed. Ninety-two species are treated. The following 39 new species are described: *Polyplectropus adamsae* (Peru), *P. alatespinus* (Brazil), *P. amazonicus* (Brazil), *P. andinensis* (Argentina, Bolivia), *P. blahniki* (Venezuela), *P. bolivianus* (Bolivia), *P. brasiliensis* (Brazil), *P. brborichorum* (Ecuador), *P. cressae* (Venezuela), *P. colombianus* (Colombia), *P. corniculatus* (Peru), *P. cuzcoensis* (Peru), *P. ecuadoriensis* (Ecuador), *P. flintorum* (Venezuela), *P. gaesum* (Brazil), *P. guyanae* (Guyana, Venezuela), *P. hollyae* (Brazil), *P. hystricosus* (Brazil), *P. insularis* (Panama), *P. juliae* (Brazil), *P. kanukarum* (Guyana), *P. maculatus* (Venezuela), *P. manuensis* (Peru), *P. matatlanticus* (Brazil), *P. minensium* (Brazil), *P. novafriburgensis* (Brazil), *P. peruvianus* (Peru), *P. petrae* (Brazil), *P. pratherae* (Brazil), *P. puyoensis* (Ecuador), *P. robertsonae* (Bolivia), *P. rodmani* (Brazil), *P. rondoniensis* (Brazil), *P. tragularius* (Brazil), *P. tripunctatum* (Peru), *P. venezolanus* (Venezuela), *P. woldai* (Panama), *P. zamoranoensis* (Honduras), and *P. zuliae* (Venezuela). *Polyplectropus buchwaldi* (Ulmer, 1911) is designated as a *nomen dubium*.

Key words: phylogeny, taxonomy, Neotropics, Nearctic, Bayesian methods, parsimony, classification, cladistics, morphology, Trichoptera, Polycentropodidae, *Polyplectropus*, new species

INTRODUCTION

The polycentropodid caddisfly genus *Polyplectropus* Ulmer contains 219 species found primarily in the tropical and subtropical regions of the world, with 125 species recorded from the Oriental biogeographic region, 53 from the Neotropical region (6 species extending their ranges into the Nearctic region), 37 from the

Australasian region, 2 from the East Palearctic region (Russian Far East and Japan), and 2 from the Afrotropical region (Democratic Republic of Congo) (Morse 2009; Johanson & Ward 2009; Zhong *et al.* 2010; Oláh & Johanson 2010). In this paper we add 39 new species from the Neotropical region, bringing the total number of known species to 258. Adult *Polyplectropus* are small to medium-sized (2.5–7.8 mm), usually dark-brown to pale yellowish-brown, robust caddisflies sometimes having light grayish markings on the forewings. The antennae are stout, approximately 3/4 the length of the forewing. The predaceous larvae build fixed retreats and prefer small, fast-flowing streams (Flint 1964; Wiggins 1996). *Polyplectropus* species are seldom collected in large numbers and most are known from only a few individuals.

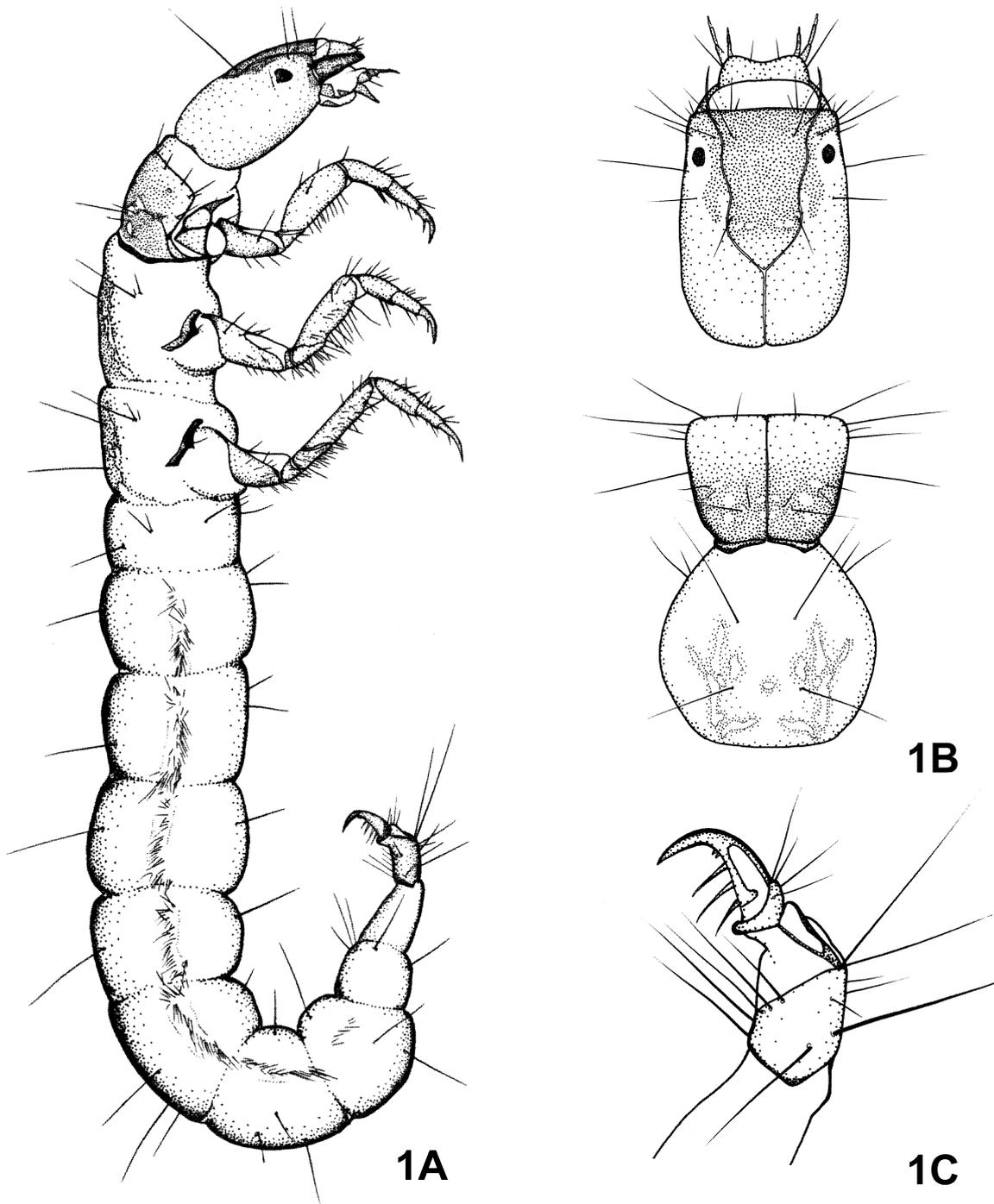


FIGURE 1. Larva of a New World *Polyplectropus* sp.: A—right lateral view; B—dorsal view; C—right anal claw, enlarged, lateral view.

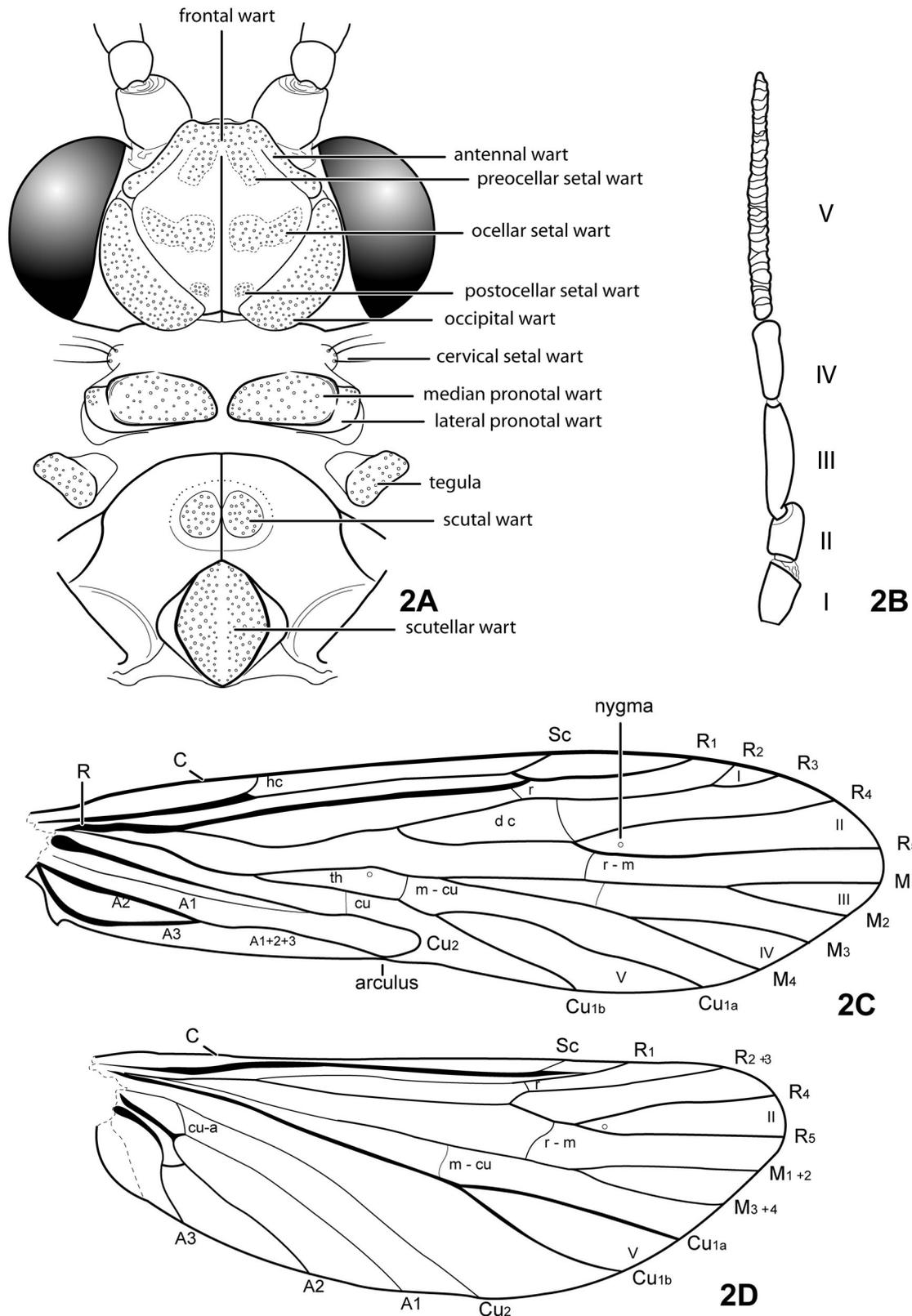


FIGURE 2. Adult of *Polyplectropus deltoides* (Yamamoto, 1967): A—head, pro- and mesothorax, dorsal view; B—right maxillary palp, dorsal view; C—right forewing, dorsal view; D—right hind wing, dorsal view.

This study treats *Polyplectropus* from the New World, which includes the type of the genus, *Polyplectropus flavicornis* Ulmer. Results from a phylogenetic analysis addressing relationships among Polycentropodidae subfamilies and genera neither supports nor rejects the monophyly of *Polyplectropus*

(Chamorro-Lacayo 2009). However, the monophyly of New World *Polyplectropus* is well supported (Chamorro-Lacayo 2009).

New World *Polyplectropus* possess a synapomorphic, apically bent Cu₂ vein in the forewing (Fig. 2C) (Chamorro-Lacayo 2009). Furthermore, a less inclusive, yet strongly supported core group of New World *Polyplectropus* (i.e., excluding *P. beccus* Hamilton and Holzenthal, 2005 and *Polyplectropus nayaritensis* Bueno-Soria, 1990) have a lightly pigmented anal vein 1 (A₁) of the forewing, which is positioned anteriorly, terminating in the Cu₂ vein (Fig. 2C); both characters are synapomorphies of this core group (Chamorro-Lacayo 2009).

A taxonomic revision of New World *Polyplectropus* is necessary for several reasons. First, no comprehensive study of New World *Polyplectropus* has ever been undertaken. A comprehensive revision of the New World fauna would provide a sound basis for comparing Old and New World taxa to address generic monophyly. Even though Old and New World *Polyplectropus* have similar apical fork arrangements of the fore- and hind wings, the male genitalia and the larvae are quite different, generating doubts about the monophyly of the genus (Flint 1968; Flint *et al.* 1999; Li & Morse 1997; Chamorro-Lacayo 2009). Second, early descriptions of species in the genus lack detail on some characters now known to be important and are inadequately illustrated, making determination of some species in the genus difficult. Third, the species groups recognized by Bueno-Soria (1990) and Yamamoto (1967) were based on regional treatments of the New World fauna and thus are not fully comprehensive. Finally, a large number of new species known from the region further increases the need for a revision of the genus. Standardization of terminology based on homology of the male genitalia, detailed illustrations, descriptions and keys for old and new species are provided. Furthermore, this taxonomic revision includes a phylogenetic analysis of 89 New World *Polyplectropus* species to test the monophyly and infer relationships of currently recognized species groups and corroborate the placement of newly described species.

Current patterns of species distribution

New World *Polyplectropus* reaches its greatest species diversity in the tropical region (Fig. 3). If the northern boundary of the Neotropical region is defined along the southwestern Mexican states of Nayarit, Jalisco, Michoacán, and Guerrero, south to northern Oaxaca, and east to western Veracruz based on the zoogeographic regions of Wallace (1876; Lincoln *et al.* 1998), then 6 of the 53 species thus far described have ranges extending into the Nearctic region. Two species occur in the Lesser Antilles and the northern islands of South America, *Polyplectropus bredini* Flint, 1968 (Dominica, Grenada, Guadeloupe, Martinique, and Saint Lucia) and *Polyplectropus pugiunculatus* Botosaneanu, 1993 (Trinidad & Tobago). The genus is absent from the Greater Antilles, however. The southern distribution of the genus borders the northern limit of the Chilean subregion of South America. Here, the northern boundary of the Chilean subregion is defined as proceeding from southern Ecuador along the eastern edge of the Andes, south to northern Argentina and eastward to include the southernmost states of Brazil and Uruguay (~ 32°S) (Wallace 1876; Lincoln *et al.* 1998). *Polyplectropus ulmeriana* Flint from Misiones, Argentina, is the southernmost record of the genus.

Life history and larval morphology

Larvae of a few species of *Polyplectropus* have been described and little is known about larval or adult biology. Flint (1968) described the larva of *P. bredini* Flint and an unknown larva designated as “Genus C” (1964) (Fig. 1), which he originally predicted to be *Cernotina*. *Polyplectropus bredini* and “Genus C” larvae were found to be almost identical, prompting Flint (1968) to synonymize “Genus C” with *Polyplectropus*.

Wiggins (1996) considered “Genus C” to be the larva of *P. charlesi* (Ross), in part because it was collected at the *P. charlesi* type locality.

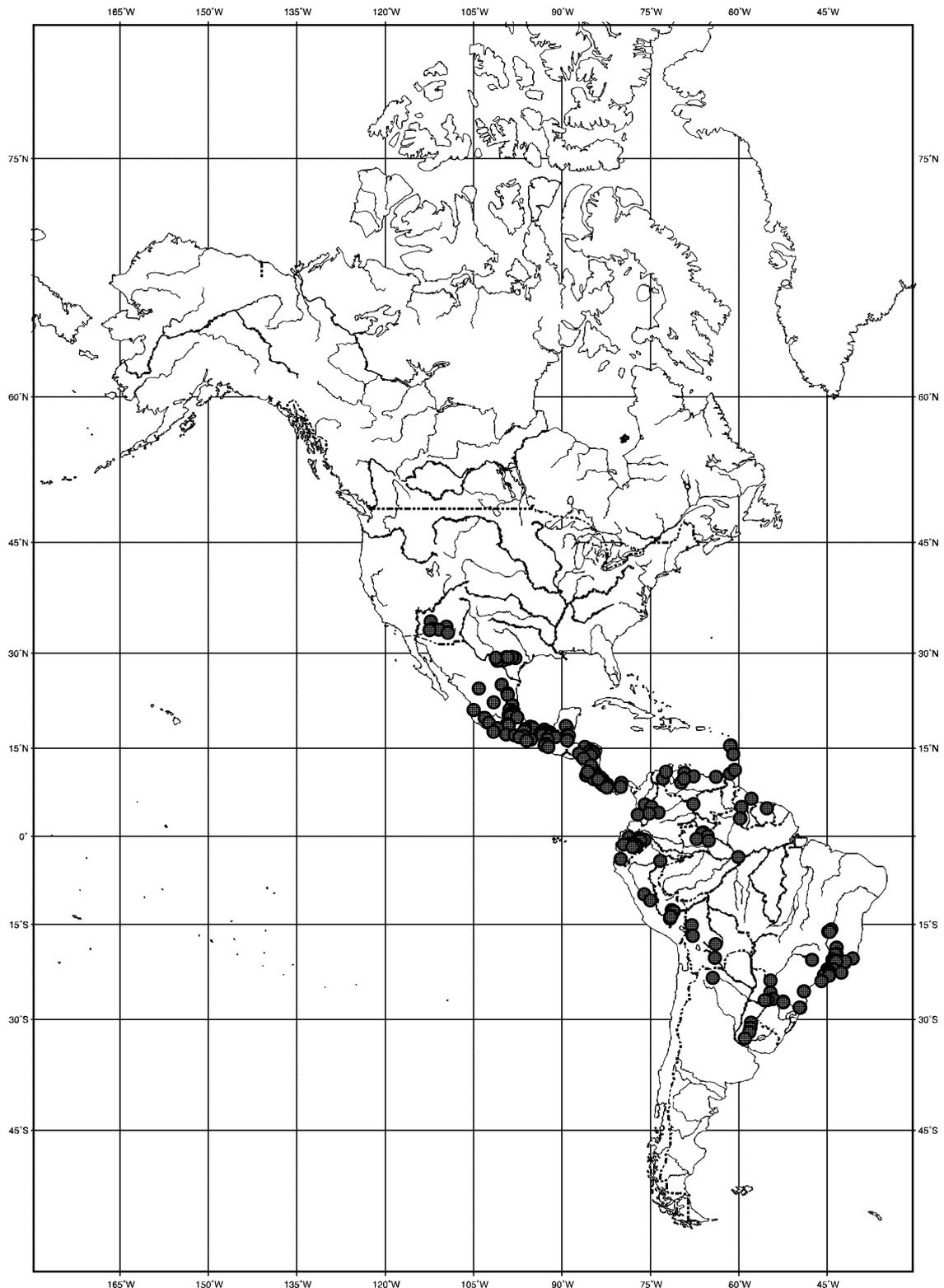


FIGURE 3. Distribution map of New World *Polyplectropus* species.

New World *Polyplectropus* larvae resemble *Nyctiophylax* Brauer larvae in morphology, habit, and retreat construction (Flint 1964; Wiggins 1996). *Polyplectropus* larvae (Fig. 1) can be distinguished from *Nyctiophylax* and other polycentropodid larvae by the mandibles having a dorsal row of teeth overhanging the

ventral row, by the presence of a row of large, dark setae on the posterior face of the fore- and mesotibiae and tarsi, by the presence of long teeth on the ventral concave margin of the anal claw, by the lack of a dorsal accessory tooth on the anal claw, and by a darkly pigmented central area on the dorsum of the head (Flint 1964, 1968; Wiggins 1996). However, this set of distinguishing characteristics does not hold true for Old World *Polyplectropus*. For example, New Zealand and Chinese *Polyplectropus* lack the distinctive long teeth on the ventral concave margin of the anal claw, as well as dark setae on the posterior face of the fore- and mesotibiae and tarsi (Li & Morse 1997; unpublished data).

Polyplectropus larval retreats consist of a silken tube open at both ends, with silk strands attached to the bottom and extending beyond the roof of the tube (Flint 1968; Wiggins 1996). The silk strands serve to detect vibrations produced by potential unsuspecting prey (Wiggins 1996). Retreats are usually found in small crevices on or under rocks or other large substrate (Flint 1968; Wiggins 1996). Data suggest *Polyplectropus* larvae prefer small, clear, fast-flowing streams where they are usually found at the beginning or end of pools (Flint 1968). At pupation the retreat is reinforced with silk. One end of the retreat is completely sealed off, while the other end only has a small cylindrical aperture, similar to the retreat-making and pupation behavior observed in *Nyctiophylax* (Flint 1964; Wiggins 1996). The pupa has not been described.

Taxonomic history of New World *Polyplectropus*

Polyplectropus was established by monotypy by Ulmer, 1905a for a Brazilian species, *Polyplectropus flavicornis* Ulmer, based on the absence of fork 1 in the hind wing. All *Polyplectropus* have forewings bearing 5 apical forks and hind wings bearing forks 2 and 5; most polycentropodids lack hind wing forks 3 and 4 (Figs. 2C, D). Ulmer subsequently added a second species to the genus, *Polyplectropus annulicornis* Ulmer, 1905b from Brazil. Flint (1967) synonymized the monotypic genus *Cordillopsyche* Banks, 1913 with *Polyplectropus* on the basis of wing venation and female genitalia. Soon after, Flint (1968) synonymized *Ecnomodellina* Ulmer, 1962 (= *Ecnomodes* Ulmer, 1911) with *Polyplectropus* based on the original description of *Ecnomodes*. In 1968, Flint transferred *P. buchwaldi* (Ulmer, 1911) from *Ecnomodellina* to *Polyplectropus* as well as 10 species then placed in *Polycentropus* Curtis, 1835: *P. charlesi* (Ross, 1941); *P. santiago* (Ross, 1947); *P. thilus* (Denning, 1962); *P. alleni* (Yamamoto, 1967); *P. deltoides* (Yamamoto, 1967); *P. elongatus* (Yamamoto, 1966); *P. laminatus* (Yamamoto, 1966); *P. recurvatus* (Yamamoto, 1966); and *P. robacki* (Yamamoto, 1966). In the same paper, he described a new species, *Polyplectropus bredini* Flint, 1968. In the following 2 decades, Flint described 10 additional species of *Polyplectropus* from the Neotropical region as a result of survey work in the Amazon basin in Brazil (Flint 1971), northern Argentina (Flint 1972), Surinam (Flint 1974), Río Limón basin in Venezuela (Flint 1981), and austral South America (Flint 1983): *P. banksianus* Flint, 1971; *P. brachyscolus* Flint, 1971; *P. inarmatus* Flint, 1971; *P. spiculifer* Flint, 1971; *P. hamulus* Flint, 1972; *P. narifer* Flint, 1974; *P. trilobatus* Flint, 1981; *P. dubitatus* Flint, 1983; *P. fuscatus* Flint, 1983; and *P. ulmeriana* Flint, 1983. Bueno-Soria (1990) revised the Mexican and Central American species of *Polyplectropus*, treating a total of 22 species, 16 described as new. Botosaneanu (1993) described *P. pugiunculatus* from Trinidad and Tobago and Angrisano (1994) described *P. paysandu* from Uruguay. A total of 42 species of *Polyplectropus* were described from the New World by 2000. Chamorro-Lacayo (2003) and Chamorro-Lacayo & Holzenthal (2004) described 9 species from Nicaragua and Costa Rica. *Polyplectropus profaupar* Holzenthal & Almeida, 2003 and *P. beccus* Hamilton & Holzenthal, 2005 were the most recent additions to the genus in the New World.

Currently recognized species groups of New World *Polyplectropus*

Of the 53 previously described species in New World *Polyplectropus*, 33 were placed in 5 species groups. Yamamoto (1967) was the first to assign *Polyplectropus* species (some at the time placed in *Polycentropus*)

into groups. He assigned *Polyplectropus alleni* (Yamamoto) and *P. santiago* (Ross) to the *P. santiago* group and *P. deltoides* (Yamamoto) and *P. thilus* (Denning) to the *P. thilus* group. Bueno-Soria (1990) revised a total of 22 *Polyplectropus* species from the Mexican and Central American fauna and established the *P. alienus*, *P. charlesi*, and *P. panamensis* groups. The species groups established by Bueno-Soria (1990) were based on characters of the male genitalia, particularly on the shape of segment X (tergum X), the presence or absence of paired “dorsal spines” or dorsal processes of the preanal appendages, on the general appearance of the paired inferior appendages, and on the presence of short or long endotheal spines of the phallus. Nineteen species from South America have never been assigned to any group, nor has the monophyly of these groups been tested. Even though species groups are not formally recognized names by the International Commission on Zoological Nomenclature (ICZN), they have traditionally been used throughout Trichoptera taxonomy (Harris & Holzenthal 1993; Blahnik 1998; Flint 1998; Flint *et al.* 1987; Hamilton 1986, 1987; Holzenthal 1995; Neboiss 1989), as well as in other orders (Adler *et al.* 2004; Konstantinov & Lingafelter 2002; White 1968), to facilitate information retrieval by assigning closely related taxa to smaller, more manageable groups.

Checklist of New World *Polyplectropus* species

***Polyplectropus alienus* species group (2 species)**

Polyplectropus alienus Bueno-Soria, 1990

Polyplectropus inarmatus Flint, 1971

***Polyplectropus annulicornis* species group (11)**

Polyplectropus alatespinus, **new species**

Polyplectropus amazonicus, **new species**

Polyplectropus annulicornis Ulmer, 1905b

Polyplectropus gaesum, **new species**

Polyplectropus hystricosus, **new species**

Polyplectropus matatlanticus, **new species**

Polyplectropus novafriburgensis, **new species**

Polyplectropus paysandu Angrisano, 1994

Polyplectropus pratherae, **new species**

Polyplectropus profaupar Holzenthal & Almeida, 2003

Polyplectropus rodmani, **new species**

***Polyplectropus bredini* species group (19)**

Polyplectropus adamsae, **new species**

Polyplectropus brasiliensis, **new species**

Polyplectropus bredini Flint, 1968

Polyplectropus clauseni Chamorro-Lacayo & Holzenthal, 2004

Polyplectropus colombianus, **new species**

Polyplectropus corniculatus, **new species**

Polyplectropus flintorum, **new species**

Polyplectropus hymenochilus Chamorro-Lacayo & Holzenthal, 2004

Polyplectropus kingsolveri Bueno-Soria, 1990

Polyplectropus maesi Chamorro-Lacayo, 2003

Polyplectropus mathisi Bueno-Soria, 1990

Polyplectropus mignonae Bueno-Soria, 1990

Polyplectropus misolja Bueno-Soria, 1990

Polyplectropus nicaraguensis Chamorro-Lacayo, 2003

Polyplectropus panamensis Bueno-Soria, 1990

- Polyplectropus perpendicularis* Chamorro-Lacayo & Holzenthal, 2004
Polyplectropus petrae, **new species**
Polyplectropus trilobatus Flint, 1981
Polyplectropus woldai, **new species**
- Polyplectropus charlesi* species group (3)**
Polyplectropus charlesi (Ross, 1941)
Polyplectropus exilis Chamorro-Lacayo & Holzenthal, 2004
Polyplectropus kylistos Chamorro-Lacayo & Holzenthal, 2004
- Polyplectropus fuscatus* species group (3)**
Polyplectropus fuscatus Flint, 1983
Polyplectropus rondoniensis, **new species**
Polyplectropus tragularius, **new species**
- Polyplectropus guyanae* species group (2)**
Polyplectropus guyanae, **new species**
Polyplectropus peruvianus, **new species**
- Polyplectropus manuensis* species group (3)**
Polyplectropus manuensis, **new species**
Polyplectropus robertsonae, **new species**
Polyplectropus tripunctatum, **new species**
- Polyplectropus narifer* species group (5)**
Polyplectropus hollyae, **new species**
Polyplectropus juliae, **new species**
Polyplectropus minensium, **new species**
Polyplectropus narifer Flint, 1974
Polyplectropus ulmeriana Flint, 1983
- Polyplectropus santiago* species group (25)**
Polyplectropus alleni (Yamamoto, 1967)
Polyplectropus andinensis, **new species**
Polyplectropus banksianus Flint, 1971
Polyplectropus bolivianus, **new species**
Polyplectropus brachyscolus Flint, 1971
Polyplectropus bravoae Bueno-Soria, 1990
Polyplectropus brborichorum, **new species**
Polyplectropus buchwaldi (Ulmer, 1911), ***nomen dubium***
Polyplectropus costalis (Banks, 1913)
Polyplectropus dubitatus Flint, 1983
Polyplectropus ecuadoriensis, **new species**
Polyplectropus elongatus (Yamamoto, 1966)
Polyplectropus flavicornis Ulmer, 1905a
Polyplectropus hamatus Bueno-Soria, 1990
Polyplectropus hamulus Flint, 1972
Polyplectropus herrerae Bueno-Soria & Hamilton, 1990
Polyplectropus laminatus (Yamamoto, 1966)
Polyplectropus maculatus, **new species**
Polyplectropus oaxaquensis Bueno-Soria, 1990
Polyplectropus robacki (Yamamoto, 1966)
Polyplectropus santiago (Ross, 1947)
Polyplectropus spiculifer Flint, 1971

Polyplectropus squalus Bueno-Soria, 1990
Polyplectropus zamoranoensis, **new species**
Polyplectropus zaragozai Bueno-Soria, 1990

***Polyplectropus thilus* species group (15)**

Polyplectropus blahniki, **new species**
Polyplectropus carolae Bueno-Soria, 1990
Polyplectropus cressae, **new species**
Polyplectropus cuzcoensis, **new species**
Polyplectropus deltoides (Yamamoto, 1967)
Polyplectropus denticulus Bueno-Soria, 1990
Polyplectropus insularis, **new species**
Polyplectropus paradelpheae Chamorro-Lacayo & Holzenthal, 2004
Polyplectropus pugiunculatus Botosaneanu, 1993
Polyplectropus puyoensis, **new species**
Polyplectropus recurvatus (Yamamoto, 1966)
Polyplectropus thilus (Denning, 1962)
Polyplectropus venezolanus, **new species**
Polyplectropus yolandae Chamorro-Lacayo & Holzenthal, 2004
Polyplectropus zuliae, **new species**

Unassigned *Polyplectropus* spp. (4)

Polyplectropus beccus Hamilton & Holzenthal, 2005
Polyplectropus beutelspacheri Bueno-Soria, 1990
Polyplectropus kanukarum, **new species**
Polyplectropus nayaritensis Bueno-Soria, 1990

MATERIALS AND METHODS

Species discrimination. Species are discriminated for this study based primarily on characters of the male genitalia. Species are recognized based on the possession of a combination of constant (non-variable) morphological character states. Characters states that vary along a continuum are inadequate for species discrimination unless some distinguishing discrete trait is also present. For certain species groups, variation within species is slight, even among geographically distant populations. In other instances, differences between species are apparent only in the shape, number, and/or arrangement of the endotheal phallic spines.

Morphological terminology. Terminology for head and thoracic setal warts follows Ivanov (1990) (Fig. 2A). Terminology for the male and female genitalia is adapted from the works of Nielsen (1957, 1980, respectively), Schmid (1970), Roy *et al.* (1980), and Hamilton (1986). Terminology for wing venation follows the Comstock-Needham system as interpreted by Mosely & Kimmins (1953). Paired structures are referred to in the singular form in descriptions and keys for simplicity (i.e., dorsolateral, mesolateral, ventrolateral processes of the preanal appendages, dorsal and ventral branches of the inferior appendages, papillate lobes, dorsolateral arms of dorsal phallic sclerite).

Specimen preparation. To observe male and female genitalic structures obscured by muscles and other soft tissues, abdomens were cleared using standard methods as outlined by Ross (1944) and expanded and explained in detail by Holzenthal & Andersen (2004). Protocols for clearing genitalic structures were slightly modified during the course of this research, having started with KOH and subsequently changing to hot 85% lactic acid. Using lactic acid for clearing genitalia was preferred because it was less time consuming and

because in most cases the phallic endothelial membrane was successfully everted when using this method. The lactic acid method for clearing caddisfly genitalia was outlined in detail by Prather (2003), Holzenthal & Andersen (2004), and Blahnik *et al.* (2007). However, instead of placing test tubes in a beaker bath of glycerin over a hot plate (Holzenthal & Andersen 2004), they were heated using a dry-bath incubator (Fisher Scientific Int., Inc.) at 110–125 C for 20–30 minutes depending on the size of the specimen (Blahnik *et al.* 2007). Several specimens, particularly females, were stained with Chlorazole Black E (Fisher Scientific Int., Inc.) to observe interconnectedness of membranes and lightly sclerotized structures. Several drops of Chlorazole Black E (saturated aqueous solution) were added to a watch glass containing glycerin where the stain was allowed to penetrate the tissues for 30 minutes–1 hour, depending on the size of the specimen. Wing preparation for observing venation followed standard protocols as outlined by Prather (2003).

Illustrations. Adult genitalic structures were traced using a camera lucida (drawing tube) mounted on an Olympus BH-2 compound microscope at 250–500 X magnification, depending on the size of the specimen. Illustrations of the adult head and thorax were traced with a camera lucida mounted on an Olympus SZH stereomicroscope. Wing preparations were photographed with a digital camera (Olympus model C3030) mounted on an Olympus SZX 12 stereomicroscope. Final illustrations were rendered digitally using the software Adobe Illustrator® (v 11, Adobe Systems, Inc.) by electronically tracing templates of the scanned pencil sketches as outlined by Holzenthal & Andersen (2004) and Holzenthal (2008).

Illustrations of the genitalia are of the holotype, unless otherwise noted. Different views of the genitalia of a particular species are drawn to scale and are from the same specimen, unless otherwise noted. Illustrations of other specimens are included to show variation within a species or alternate conditions of a particular structure (i.e., of an everted or retracted endotheca) where appropriate. Illustrations of species unavailable for study (e.g., *P. narifer* Flint) were rendered from literature sources.

Plates of illustrations for each species follow a standardized figure numbering format to facilitate comparison between species. For male genitalia, a number of illustrations are provided for several standard views: A—left lateral view of abdominal segments IX, X, intermediate, preanal and inferior appendages and insets of complex structures; B—dorsal view of segment X, intermediate appendage, and dorsolateral and mesolateral processes of preanal appendage; C—caudal view of all appendages and segment X (crosshatching indicates the phallocrypt); D—ventral view of segment IX and inferior appendage; E—left lateral view of the phallus; F—dorsal view of the phallus (not always drawn); G—H additional views or details of structures as needed. For female genitalia up to 3 views are provided: A—left lateral view of abdominal segments VIII, IX, X; B—ventral view of abdominal segments IX and X; C—detailed views of internal structures or abdominal segment V.

Species descriptions. Species descriptions were generated using the DDescription Language for TAXonomy (DELTA) system (Dallwitz *et al.* 1999 onwards) to ensure consistently formatted, comparative descriptions. Procedures and directives follow those outlined in detail by Holzenthal & Andersen (2004). The color of several species is described based on pinned specimens, which retain setae unlike material preserved in alcohol. Size reflects measurements of the forewing for a range of specimens and is given to the nearest 0.5 mm. Under the material examined list, square brackets ([]) are used when including data not specified in the original label, such as the complete spelling of an abbreviated word or georeference data points. Square brackets are also used to specify holotype or paratype information.

Distribution maps. Distribution maps representing locality records of material examined were generated with the software iMap 3.5 (Bioevolution 2006) to better visualize ranges of species. Coordinates for localities without georeference data were obtained using the Global Gazetteer, v. 2.1 (Falling Rain Genomics 2006) and entered into the University of Minnesota Insect Collection (UMSP) Biota® database (v. 2.0, Sinauer

Associates, Inc.) (Colwell 2003) (see below). Latitude and longitude associated data for each species were automatically exported from Biota as a single tab-delimited Excel file and seamlessly imported into iMap. High resolution vector maps (Premier International CD-ROM, Map Resources) were imported into iMap, calibrated, and data points were subsequently plotted.

Material examined and specimen management. More than 900 specimens were examined for this study. A Code-49, 4 mil polyester, 14 x 8 mm barcode label (Intermec Technologies) containing a unique alphanumeric barcode identification number was attached to each pinned specimen, or lot of alcohol specimens, examined. The taxonomic, collection, and locality data associated with each barcoded specimen or lot were stored in Biota® (v. 2.0, Sinauer Associates, Inc.) (Colwell 2003). Biota facilitated the retrieval of material-examined lists and decimal-degree georeference coordinates. Specimen barcode numbers for the holotype of the new species herein described are included in the material examined lists.

A detailed list of all material examined is maintained at UMSP and can be accessed from <http://www.entomology.umn.edu/museum/databases/BIOTAdatabase.html>. Types of the species described herein and other material examined are deposited, as indicated in the species descriptions, in the following institutions. Institutional codens follow Flint *et al.* (1999) and Evenhuis (2008).

CAS	California Academy of Sciences, San Francisco, California, USA
FHCU	Facultades de Humanidades y Ciencias, (Departamento de Artrópodos, Universidad de la República, Montevideo, Uruguay
IBUNAM	Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico
IML	Instituto Miguel Lillo, Universidad Nacional de Tucumán, Tucumán, Argentina
INBIO	Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica
INHS	Illinois Natural History Survey, Champaign, Illinois, USA
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA
DRC	specimens from Steve Moulton, deposited in Dave Ruiters Collection, Centennial, Colorado, USA
MZUSP	Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil
NMNH	National Museum of Natural History, Washington, DC, USA
NMW	Naturhistorisches Museum, Vienna, Austria
PAN	Polish Academy of Sciences, Warsaw, Poland
RNH	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands
UASC	Museo de Historia Natural “Noel Kempff Mercado”, Santa Cruz de la Sierra, Bolivia
UMSP	University of Minnesota Insect Collection, Saint Paul, Minnesota, USA
ZMUA	Zoölogische Museum, Universiteit van Amsterdam, Amsterdam, Netherlands
ZSZMH	Zoologische Staatsinstitut und Zoologisches Museum, Hamburg, Germany

Cladistic analysis

Ingroup. The ingroup consisted of 89 of the 92 currently recognized species of New World *Polyplectropus*. *Polyplectropus costalis* (Banks, 1913), *Polyplectropus buchwaldi* (Ulmer), and *Polyplectropus rondoniensis*, new species were not included. *Polyplectropus rondoniensis* was excluded from the analysis because it was discovered after the analysis was finished. *Polyplectropus costalis*, known from a single female specimen and *P. buchwaldi*, were excluded because more than half of the characters were coded as missing data. The original description of *P. buchwaldi* is incomplete and only includes illustrations of the wings. Furthermore, both known specimens are reported to be in poor condition and are missing the diagnostically important abdomen (Ulmer 1911; Flint 1968). While evidence suggests taxa with high levels of missing data are still phylogenetically informative (Kearney 2002; Kearney & Clark 2003; Novacek 1992; Poe & Wiens 2000;

Wiens 2004, 2006), this dataset already presented computational difficulties due to the small number of characters (59) relative to the large number of terminal taxa (91 species). Inclusion of these 2 highly incomplete taxa in the analysis would have likely contributed to an increased number of equally most-parsimonious reconstructions. Furthermore, exclusion of these taxa is justified on the grounds they would not influence the topology by altering relationships because the presence of missing data renders these species as “potential taxonomic equivalents” with taxa having more complete coding (i.e., several species in the *P. santiago* group) (Wilkinson 1995). The placement of these taxa within the species-level phylogeny of New World *Polyplectropus* is addressed in the discussion and reflected in the revision.

Outgroup. *Plectrocnemia conspersa* (Curtis, 1834) and *Polycentropus chilensis* Yamamoto, 1966 were chosen to root the tree to determine character polarity (Maddison *et al.* 1984). These species possess male genitalia with affinities to the ingroup.

Approach to coding inapplicable data. Coding for characters becomes difficult when structures deemed to be homologous are absent in some taxa (i.e., inapplicable data). To account for inapplicable data in this study, a character was coded to address the presence or absence of a feature and a second (or more) character(s) was coded to treat the variation of the condition; inapplicable observations were coded as missing data “-” (dash-coding or reductive-coding) (Hawkins *et al.* 1997; Strong & Lipscomb 1999). This method was preferred for most characters for 3 primary reasons: 1) characters were based on hypotheses of homology, because there was a clear correspondence of structures across taxa and no ambiguity they represented the same entities, 2) by coding the inapplicable condition as missing values (with a dash) and not as a separate character state (absence-coding), the absence condition, if optimized as informative when recovering relationships, will not inflate (duplicate) support for taxa lacking the feature, and 3) coding all observations into a single multi-state character (composite coding, Maddison 1993) became unwieldy, particularly when features were complex (i.e., needing to code for pubescence, size, shape, color, etc., in 1 character). Under a dash coding approach, both the “?” (question mark) for missing data and “-” (dash) for inapplicable data are optimized as 1 of the existing states (Strong & Lipscomb 1999); nevertheless, in the data matrix inapplicable character states are coded with a dash “-” and missing data with a “?” to conserve character state information. In instances when primary homology assessments were problematic, a composite approach (single, multi-state character) was employed (e.g., characters 23 and 46) (Maddison 1993; Marshall 2003). By following this approach all observations were presented in a single character and information on observed similarity was retained (Schuh 2000), thus minimizing the possibility of erroneous homologies concealing reconstructions by true homologies (Kitching *et al.* 1998). The order of the character states does not imply hypotheses of character state transformation (apomorphy or plesiomorphy) if the non-additive (unordered) option is chosen for the analysis.

Character treatment. The character matrix is presented in Appendix 1. Characters were included in the phylogenetic analysis if 1) discontinuous variation was clear or could be delimited based on a point of reference (e.g., characters 10, 25, and 29) and 2) characters and their states could be easily and clearly observed. When continuous variation could not be discretely delimited, characters were excluded (e.g., shape of the posterior border of sternum IX). Additionally, several characters of the female genitalia and several characters of the phallus were not included since interpretation of membranous internal structures proved difficult. All 59 characters (36 binary characters and 23 multi-state characters for a total of 166 character states) included in this analysis were interpreted from structures of the male genitalia (46), female genitalia (1), and fore- and hind wings (12 characters). Two characters were parsimony uninformative. Female characters are poorly represented in this analysis due to male and female associations being highly speculative at times, particularly when more than 1 male was collected with the same female from the same locality. Additionally, very few male and female pairs were collected from the same locality and more than 50% of the

species were known from less than a handful of male specimens. Characters were treated as unordered (i.e., additive) (Fitch 1971) and equally weighted (Wilkinson 1992).

Data analysis. Two approaches to phylogeny reconstruction were used to analyze the data, the principle of parsimony and Bayesian phylogenetic inference so as to analyze the data under different evolutionary assumptions and methods and to determine clade credibility values. The character matrix was constructed and characters mapped with MacClade 4.08 (Maddison & Maddison 2000) to observe character state transformation on a given tree.

Parsimony analysis. The dataset was analyzed with PAUP* v. 4.0 (Swofford 2003). Initially a heuristic search was implemented with stepwise taxon addition and 100 random addition sequence replicates, 5 trees held at each step and Tree-Bisection-Reconnection (TBR) branch-swapping algorithm. Due to the large number of taxa (91) relative to the number of characters (59) (“lop-sided” dataset), the memory (900,000 KB on a Macintosh iMac PowerPC G5, processor speed 1.8 GHz and 1.25 GB DDR SDRAM memory) was quickly exhausted saving hundreds of thousands of equally parsimonious trees while still undergoing branch swapping during the first random addition sequence replicate. Because large datasets can have many local optima of shorter trees (tree islands), a second search strategy was performed. The initial search included 500 random addition sequence replicates, 5 trees held at each step and specified no branch-swapping algorithm. This search more efficiently explored tree space by trying several random combinations of taxa. In order to search for optimal trees, a second round of searching was done with the saved pool of trees as the starting point for branch-swapping with TBR algorithm (Sharon Jansa pers. comm.). The “Maxtrees” parameter was set to 50,000 trees and a strict consensus was performed.

Finally, the Parsimony Ratchet (Nixon 1999) was implemented to better search tree space. The parsimony ratchet was implemented in PAUP* using a command file generated with PAUPRat (Sikes & Lewis 2001a). The search consisted of 20 independent ratchet searches each comprised of 200 short, dependent, heuristic searches or iterations. Previous exploratory searches suggested that perturbing 5–10% of the characters was the most effective procedure, as measured by the number of ratchet runs actually finding the shortest tree. For this analysis 5% of the characters were perturbed. The entire search proceeded sequentially and uninterrupted through 20 ratchet runs, each of 200 iterations. Upon completion of the ratchet searches, the resulting trees from each ratchet search (200 iterations) were filtered using the “keep best” function in PAUP*. Only the shortest trees were included in the consensus (Nixon 1999). Duplicate trees were excluded and a strict consensus was performed. A strict consensus tree (Fig. 18) of the combined results of all independent ratchet searches was calculated (Sikes & Lewis 2001b).

Uninformative characters were excluded when calculating tree statistics (Bryant 1995; Yeates 1992). Bootstrapping (Felsenstein 1985), decay or Bremer support indices (Bremer 1988, 1994), and posterior probabilities obtained from Bayesian likelihood analysis (discussed below) were interpreted to represent nodal support for the preferred topology based on the given dataset. A bootstrap analysis was carried out with 100 pseudoreplicates, each with 10 random-taxon-addition replicates and “Maxtrees” set at 10,000. Decay indices were calculated using TreeRot v.3 (Sorenson & Franzosa 2007) by implementing 20 replicate heuristic searches and random taxon additions for each constraint tree with “Maxtrees” set at 100,000.

Bayesian Inference. The dataset was analyzed with MrBayes 3.1.2 (Huelsenbeck & Ronquist 2001; Ronquist & Huelsenbeck 2003; Ronquist *et al.* 2007). The Bayesian analysis consisted of the same dataset analyzed under parsimony. Once executed in MrBayes, morphological datasets (i.e., standard) are by default assigned the Markov k (Mk) model (Lewis 2001) and the coding parameter for how data are sampled corrected as “variable” since only non-constant characters were included (Ronquist *et al.* 2007). The Mk model specifies equal rates of character state change.

The analysis involved the inclusion and exclusion of a gamma parameter (Mk and Mk + gamma) to account for different rates of change among characters (e.g., genitalic characters vs. larval characters or wing characters). The fit of these models was tested using Bayes factor, $B_{10} = (\text{harmonic mean Ln likelihood Mk} - \text{harmonic mean Ln likelihood Mk} + \text{gamma}) \times 2$ (Kass & Raftery 1995) to determine if including a gamma parameter was appropriate given the data (Nylander *et al.* 2004; Wiens *et al.* 2005). A value greater than 10 signifies strong support for one model over another (Kass & Raftery 1995; Wiens *et al.* 2005). The harmonic mean was calculated in MrBayes under the *sump* command, post *burn-in* (Ronquist *et al.* 2007). The results strongly favored the Mk model invoking a gamma parameter (*lset rates = gamma*) $(-1762.87 - (-1663.10) \times 2 = 199.5)$. The dataset was executed 3 times under the preferred model to minimize starting tree bias (Andrew Simons pers. comm.; Wiens *et al.* 2005). The number of generations required to reach stationarity differed among the 3 analyses of the same dataset; however, the resulting consensus trees were the same.

The results presented and discussed reflect the analysis with the highest likelihood score (as expressed by the harmonic mean) implemented under an Mk + gamma model. Based on earlier test runs, chain mixing was poor; therefore, the default incremental temperature parameter was reduced from 0.2 to 0.075 (*mcmc* temp) (Ronquist *et al.* 2007). Otherwise, default settings were left unchanged. Two parallel Markov Chain Monte Carlo (MCMC) runs, each with 1 cold chain and 3 heated chains, were performed for 8,000,000 generations with chains sampled every 1000th generation.

RESULTS

Homology of the male genitalia of New World *Polyplectropus*

Male genitalia of this genus are highly complex and diverse. Consequently, different terminology has been used by different authors for the same structures of the male genitalia of *Polyplectropus* or the same name has been used for different, non-homologous structures. Therefore, several studies were reviewed and findings compared and reconciled with observations on the family to standardize the terminology based on homology. These studies include works by Nielsen (1957), Snodgrass (1935), Schmid (1970, 1980, 1998), Hamilton (1986), Ross (1944), and Roy *et al.* (1980). Nielsen performed a detailed comparative morphological study of the male (1957) and female (1980) genitalia across all European Trichoptera families, including the polycentropodid genera *Polycentropus* and *Holocentropus* McLachlan, 1878. Roy *et al.* (1980) treated male and female genitalia of several species of *Plectrocnemia* Stephens, 1836 from the French Pyrenees. The revision by Hamilton (1986) of *Polycentropus sensu stricto* from the New World complemented these European studies. Together these works provide a foundation toward understanding the complex genitalic morphology of *Polyplectropus*. In the discussion below, bold text indicates terms used in this study.

Segment VIII

Segment VIII is unmodified and resembles preceding abdominal segments; it has been unequivocally recognized by all authors and is not rendered in any of the illustrations herein, except for *P. corniculatus*, which bears a pair of digitate processes on the posterior edge of tergum VIII.

Segment IX

Segment IX may be synscleritous, as in the genus *Neureclipsis* McLachlan, 1864 or it may be present as a large, sclerotized, entire sternite (***sternum IX***) open dorsally and bearing setae on its posterior half, as in *Polyplectropus* (Figs. 4B, C, D, E, F, 5, 6, 30). In its natural position, the anterior half of sternum IX is partially obscured by segment VIII when the abdomen has not been cleared. Certain polycentropodids, such

as Neotropical *Nyctiophylax* Brauer, 1865, species in the *Polycentropus obtusus* group, and *Plectrocnemia* retain lateral, sclerotized remnants of tergum IX. Roy *et al.* (1980) referred to these remnants of tergum IX in *Plectrocnemia* as the *latero-dorsal sclerites* and described them as “elongate sclerites with poorly defined margins” (Fig. 4A). In all *Polyplectropus*, *Polycentropus* and other related genera, tergum IX (Figs. 4, 5, 6, 30) is membranous and intimately fused dorsally with segment X (Nielsen 1957).

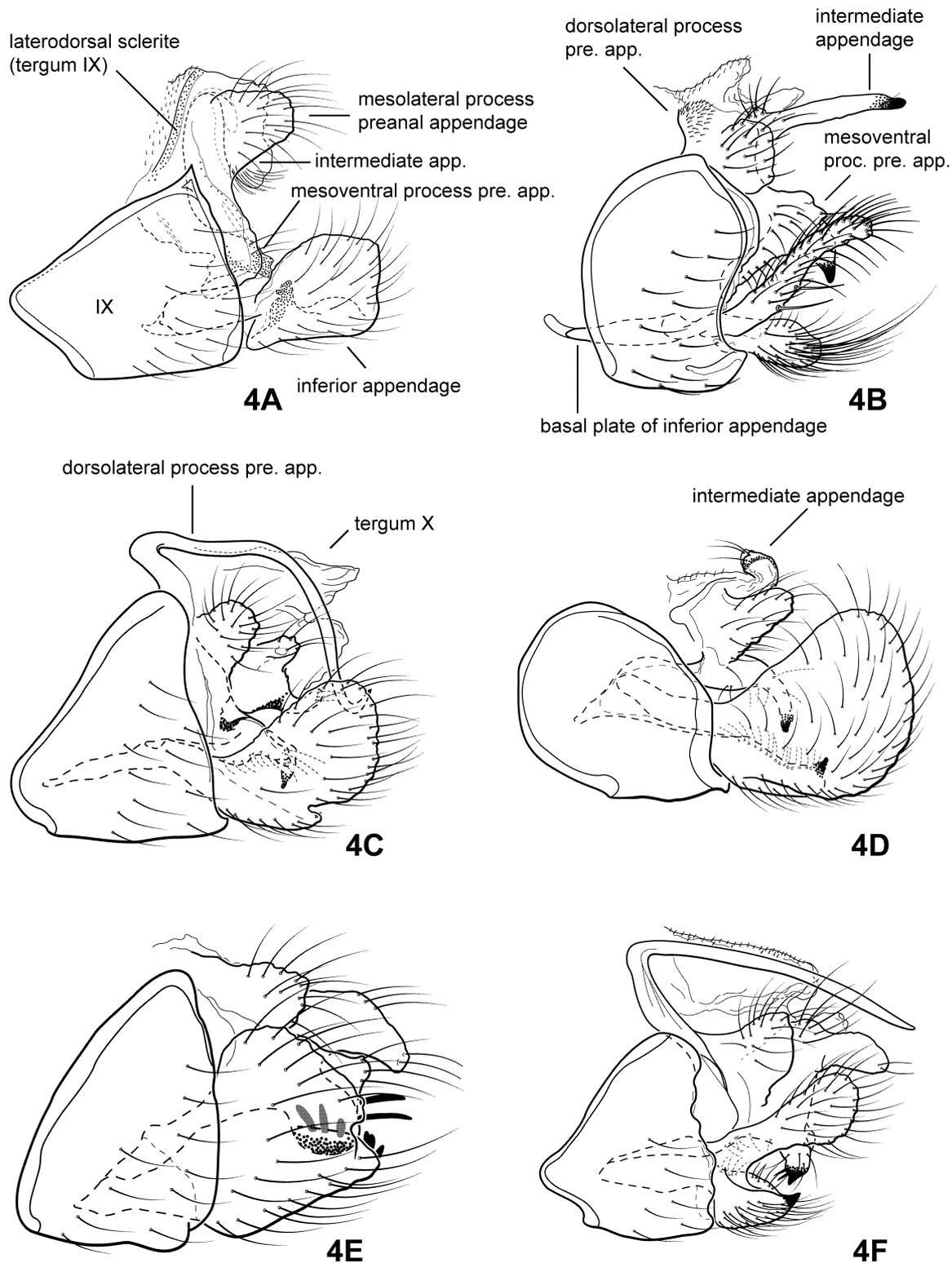


FIGURE 4. Male genitalia of New World *Polycentropus* spp., left lateral views: A—*Polycentropus chilensis*; B—*P. elongatus*; C—*P. insularis*; D—*P. paysandu*; E—*P. petrae*; F—*P. kanukarum*. Pre. app. = preanal appendage; proc. = process.

Segment X

Highly complex structures have originated from segment X in the male genitalia (Nielsen 1957; Roy *et al.* 1980; Snodgrass 1935). In polycentropodids in general, 3 major structures are derived from segment X; 1) the membranous *median lobe* (Nielsen 1957; Roy *et al.* 1980), herein also collectively called *segment X*, 2) the paired *preanal appendages* (Schmid 1970), and 3) the paired *intermediate appendages* (Nielsen 1970) (Fig. 30).

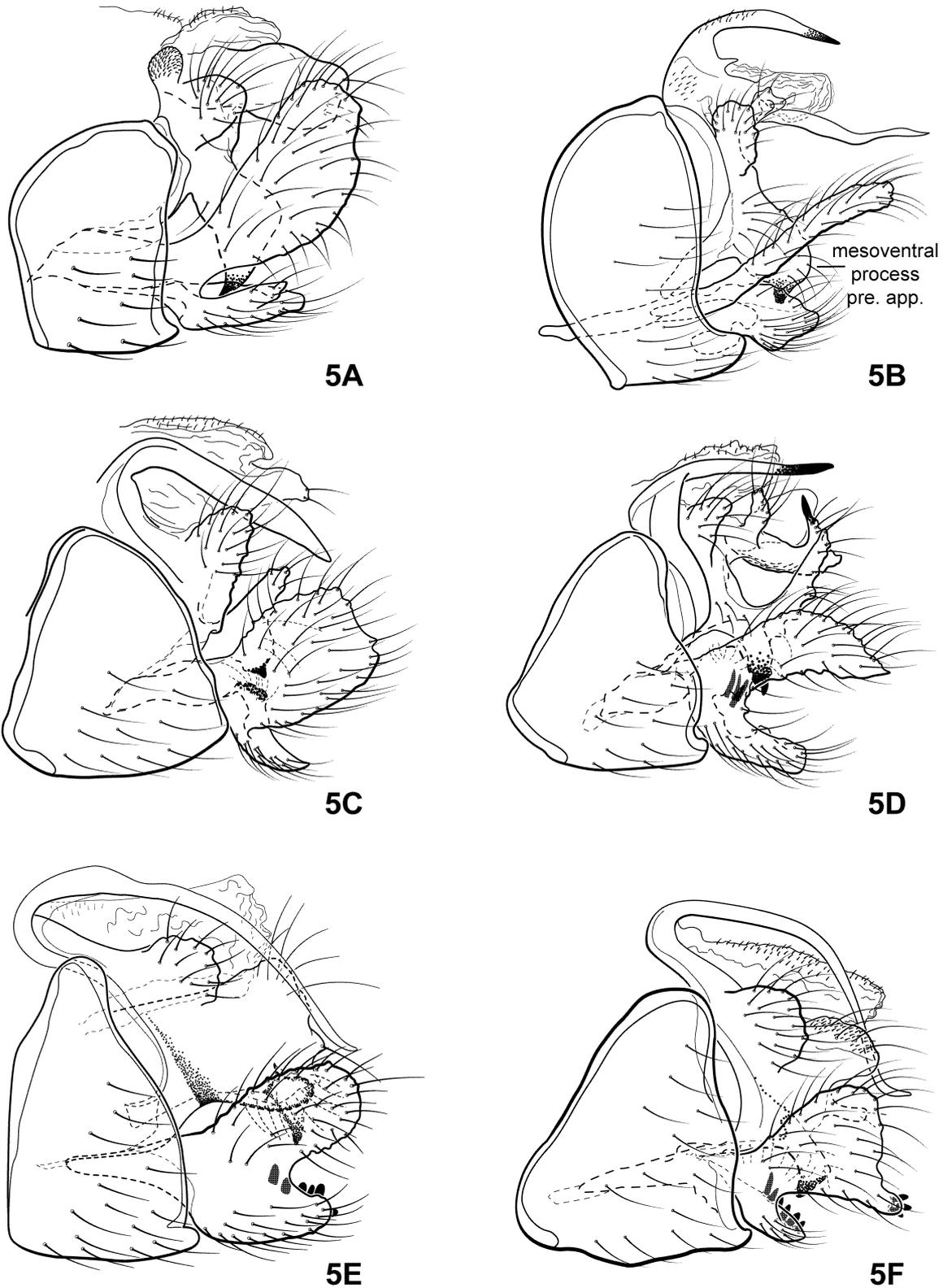


FIGURE 5. Male genitalia of New World *Polyplectropus* spp., left lateral views: A—*P. inarmatus*; B—*P. spiculifer*; C—*P. matatlanticus*; D—*P. minensium*; E—*P. trilobatus*; F—*P. blahniki*.

1. Median lobe of segment X

Segment X is indistinguishably fused dorsally and laterally with tergum IX to form the large, membranous median lobe (Fig. 4B), which extends to form the *proctiger tube* (bearing the anus) (Nielsen 1957). Nielsen (1957) and Roy *et al.* (1980) recognized a differentiation of the median lobe into the short **upper lip**, and the sometimes protruding, apically emarginate (Fig. 7B) or entire **lower lip** (Fig. 7F). The lower lip is not readily visible in all species.

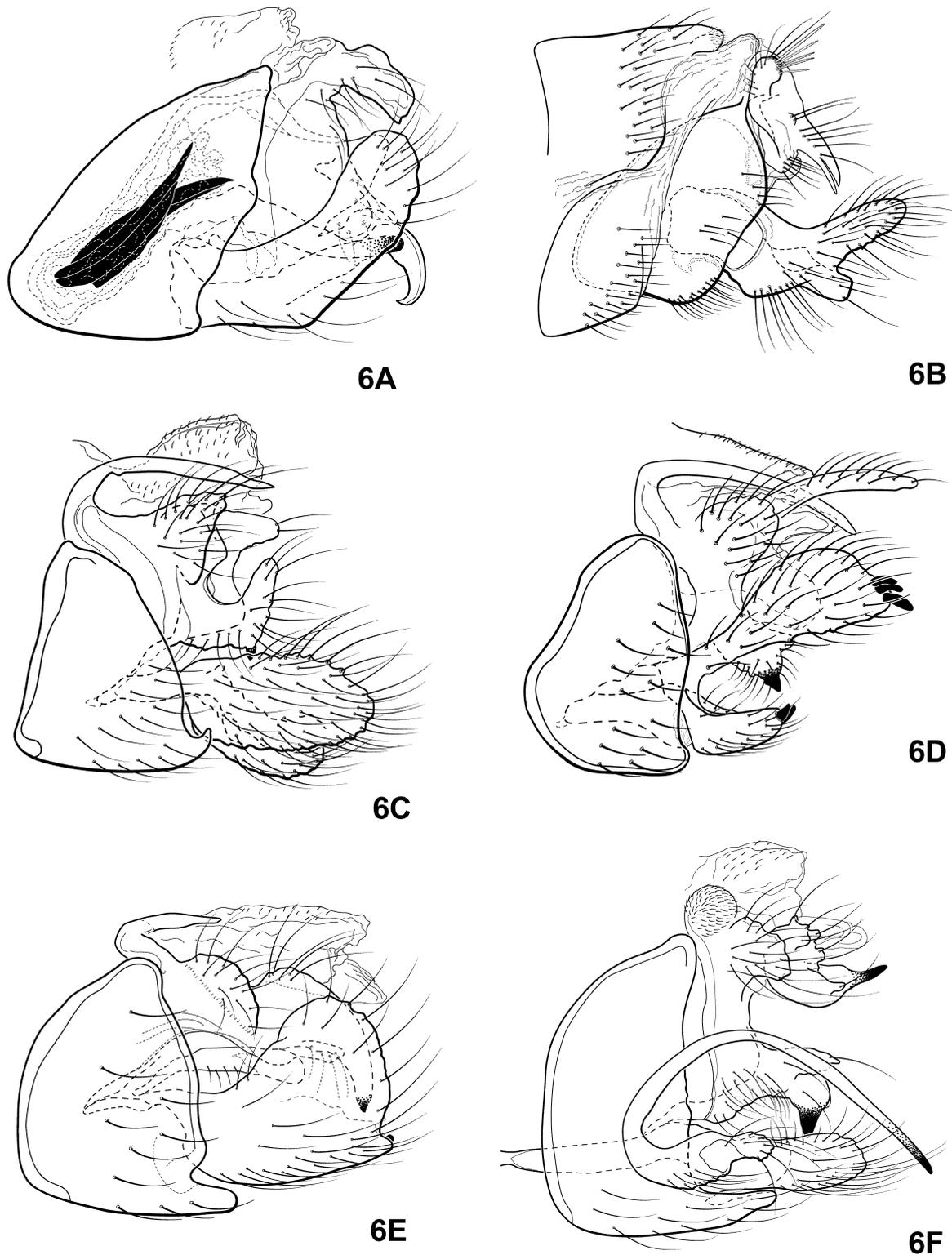


FIGURE 6. Male genitalia of New World *Polyplectropus* spp., left lateral views: A—*P. nayaritensis*; B—*P. beccus*; C—*P. alatespinus*; D—*P. misolja*; E—*P. woldai*; F—*P. bolivianus*.

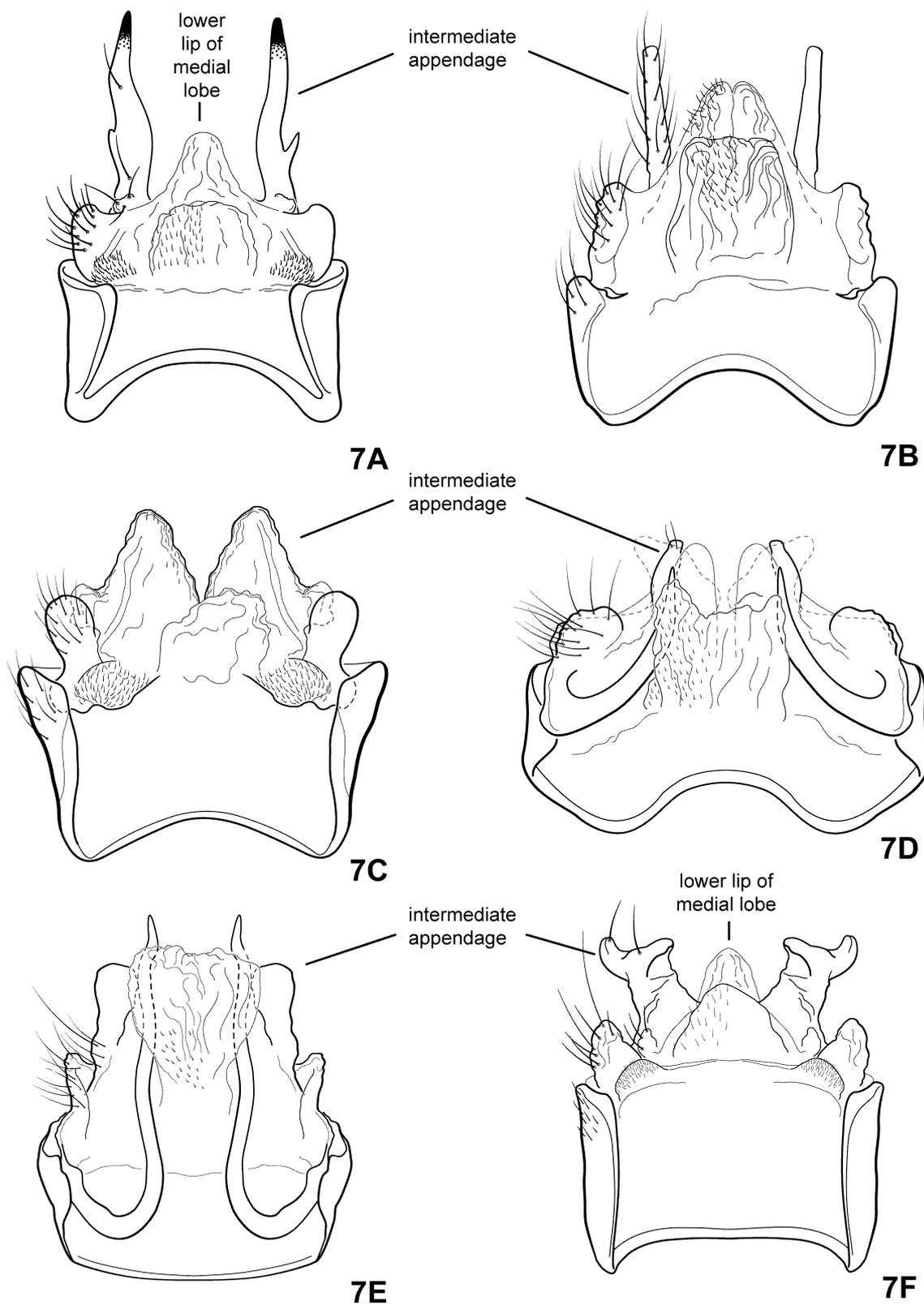


FIGURE 7. Male genitalia of New World *Polyplectropus* spp., dorsal views: A—*P. alleni*; B—*P. bredini*; C—*P. alienus*; D—*P. annulicornis*; E—*P. clauseni*; F—*P. laminatus*.

2. Intermediate appendages

The different morphological manifestations of the *intermediate appendages* are very useful for segregating species into groups in New World *Polyplectropus* (Fig. 30). In polycentropodids, the presence of

the intermediate appendages may be difficult to discern for taxa having these structures fused along their meso-dorsal margins to the median lobe (e. g., Malicky 1991, for *Kambaitipsyche* Malicky), when the intermediate appendages are particularly complex, or when they are lightly pigmented and membranous (e. g., Bueno-Soria 1991, for *P. alienus*). The intermediate appendages, possibly as a result of fusion with the lower lip of segment X, are quite complex and may bear several secondary lobes (e. g., *P. ulmeriana*, *P. juliae*, *P. minensium*, Figs. 68, 69, 71). Furthermore, the intermediate appendages are morphologically quite diverse, ranging in shape and pigmentation from entirely sclerotized and narrow (Fig. 4B) (*P. santiago* group) to completely membranous and broad (Figs. 4A, 5A, 7C) (e. g., *P. alienus* group). Often the intermediate appendages are confused and considered homologous to what Hamilton (1986) and Chamorro-Lacayo (2003) called the *dor-solateral processes of the preanal appendages* (e. g., Bueno-Soria 1990, for species in the

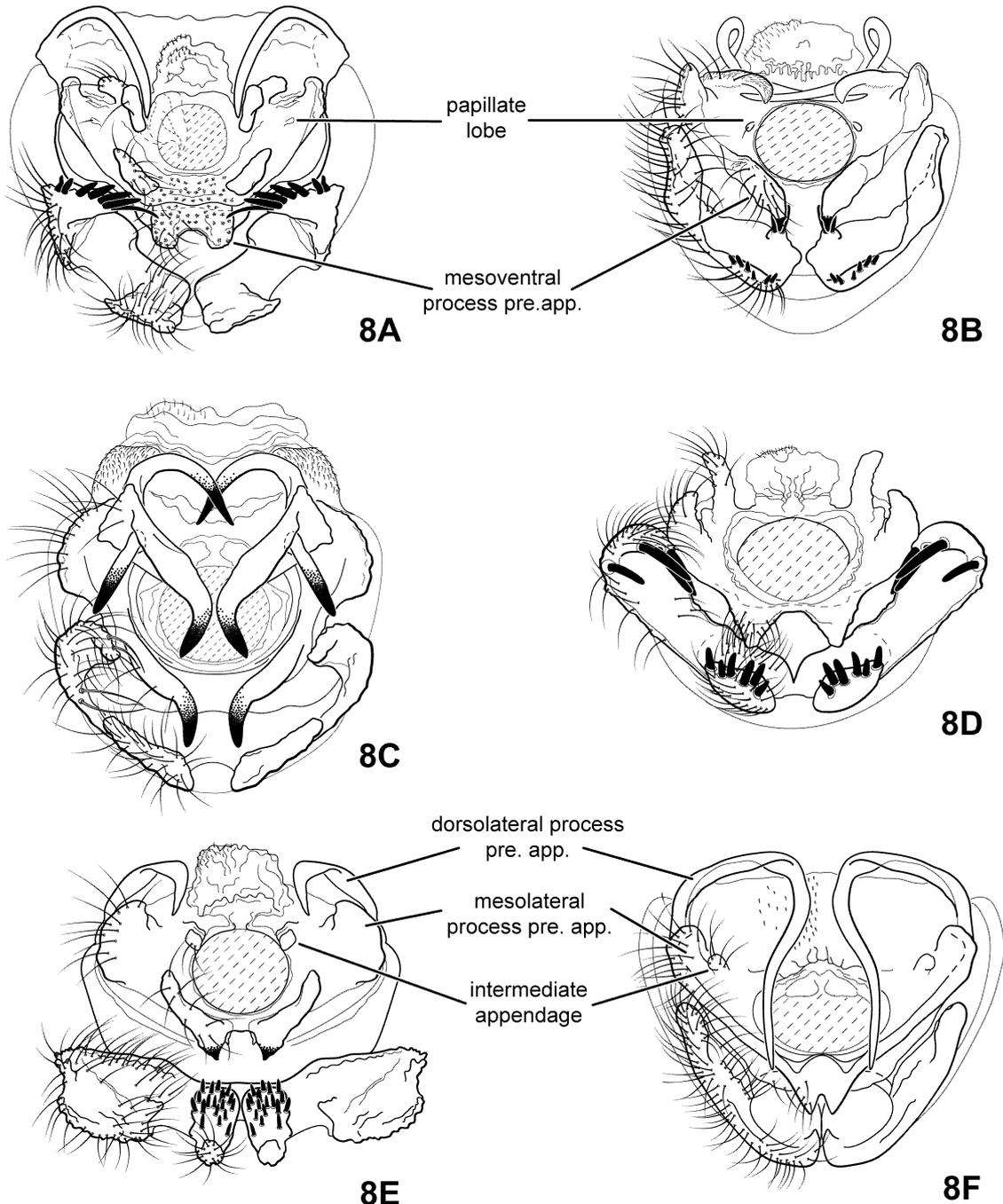


FIGURE 8. Male genitalia of New World *Polyplectropus* spp., caudal views: A—*P. colombianus*; B—*P. puyoensis*; C—*P. flavicornis*; D—*P. bredini*; E—*P. alatespinus*; F—*P. manuensis*.

P. santiago group; Schmid 1970; Nielsen 1957). The position of the intermediate appendages is ventrolateral to the median lobe of segment X and mesal to the *mesolateral processes of the preanal appendages* (Figs. 8E, F, 30A, C). In addition, the intermediate appendages always bear setae, either throughout their surfaces, basally, apically, or both (Figs. 4, 30A, C). In close proximity and mesoventral to the base of each intermediate appendage may lie a lightly sclerotized papillate lobe bearing a pair of small, apical setae (Figs. 8A, B).

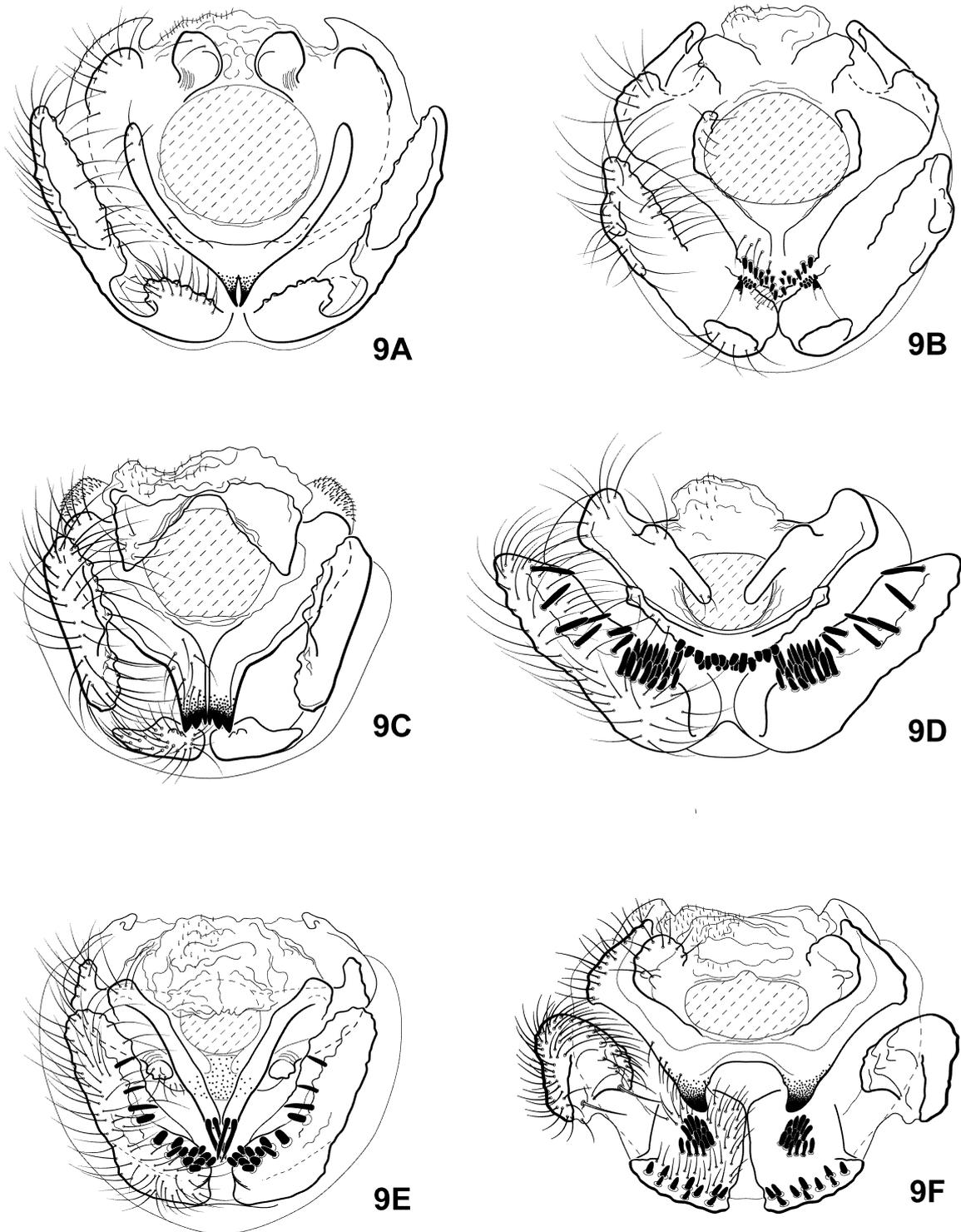


FIGURE 9. Male genitalia of New World *Polyplectropus* spp., caudal views: A—*P. guyanae*; B—*P. hollyae*; C—*P. inarmatus*; D—*P. petrae*; E—*P. woldai*; F—*P. beutelspacheri*.

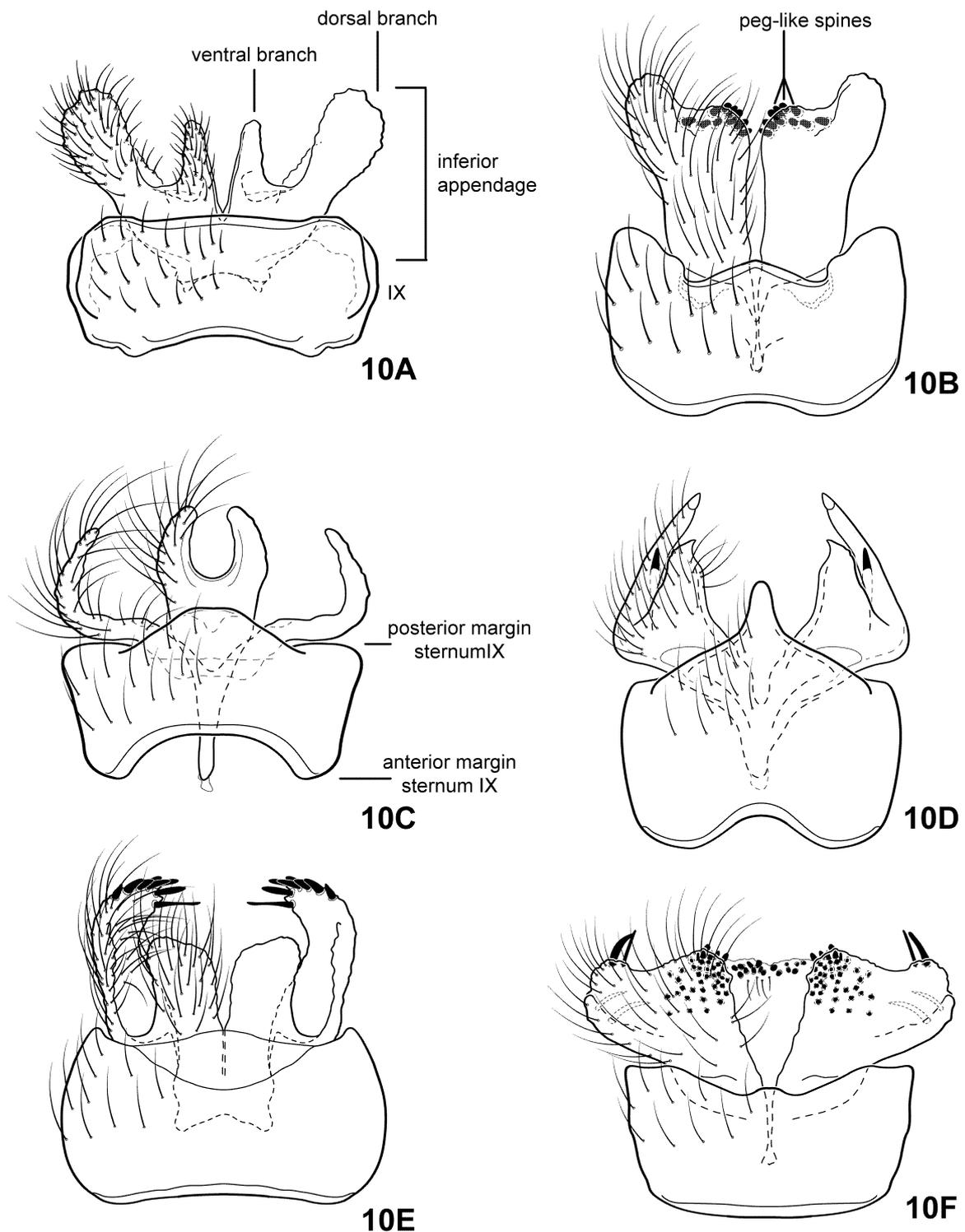


FIGURE 10. Male genitalia of New World *Polyplectropus* spp., ventral views: A—*P. annulicornis*; B—*P. woldai*; C—*P. ecuadoriensis*; D—*P. kylistos*; E—*P. colombianus*; F—*P. petrae*.

3. Preanal appendages

The *preanal appendages* were hypothesized by Snodgrass (1935) to be homologous with the socii in Lepidoptera. Snodgrass (1935) considered the socii to be possibly the pygopods, i.e., the appendages of segment X (Torre-Bueno 1989). In New World *Polyplectropus*, each preanal appendage is divided into 2 or 3 discernable processes, depending on the species group: *mesolateral process*, *mesoventral process*, and *dorsolateral process* (Figs. 8E, F, 30A, C).

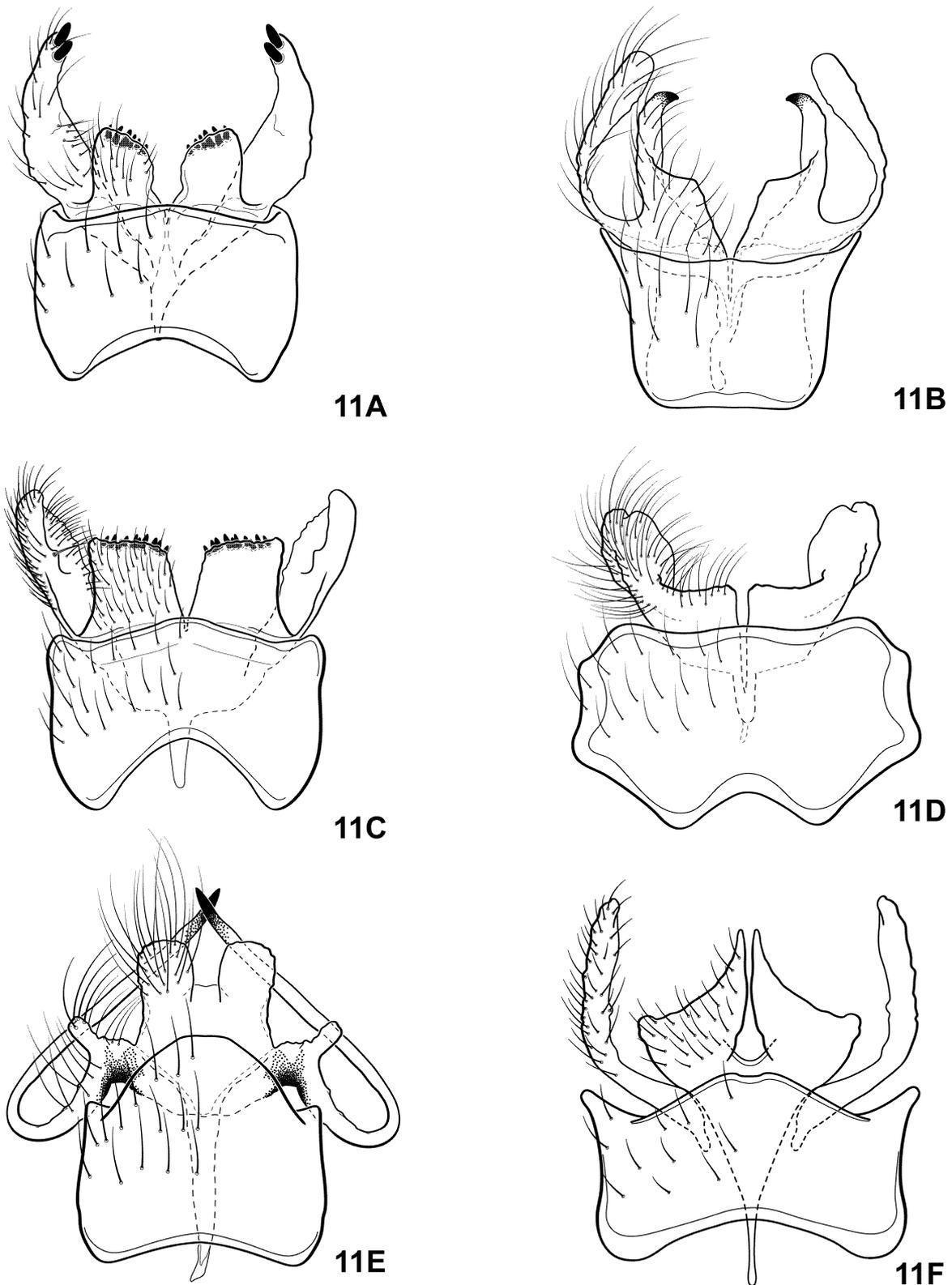


FIGURE 11. Male genitalia of New World *Polyplectropus* spp., ventral views: A—*P. mignonae*; B—*P. nayaritensis*; C—*P. beutelspacheri*; D—*P. manuensis*; E—*P. robacki*; F—*P. brachyscolus*.

The *mesolateral processes of the preanal appendages* are located laterally and dorsal to the pleural plane (some authors use the terms *lobes* or *branches* instead of *processes* and *superior appendages* [e.g., Roy *et al.* 1980; Nielsen 1957] instead of *preanal appendages*) (Figs. 4, 30A, C). In New World *Polyplectropus* the

mesolateral processes are broadly semi-circular to quadrate and setose. The mesolateral processes extend mesoventrally to form *the bodies of the preanal appendages*. The paired bodies or plates of the preanal appendages meet medially below the phallocrypt at a point specified by Roy *et al.* (1980) as the *median margin of the preanal appendage*.

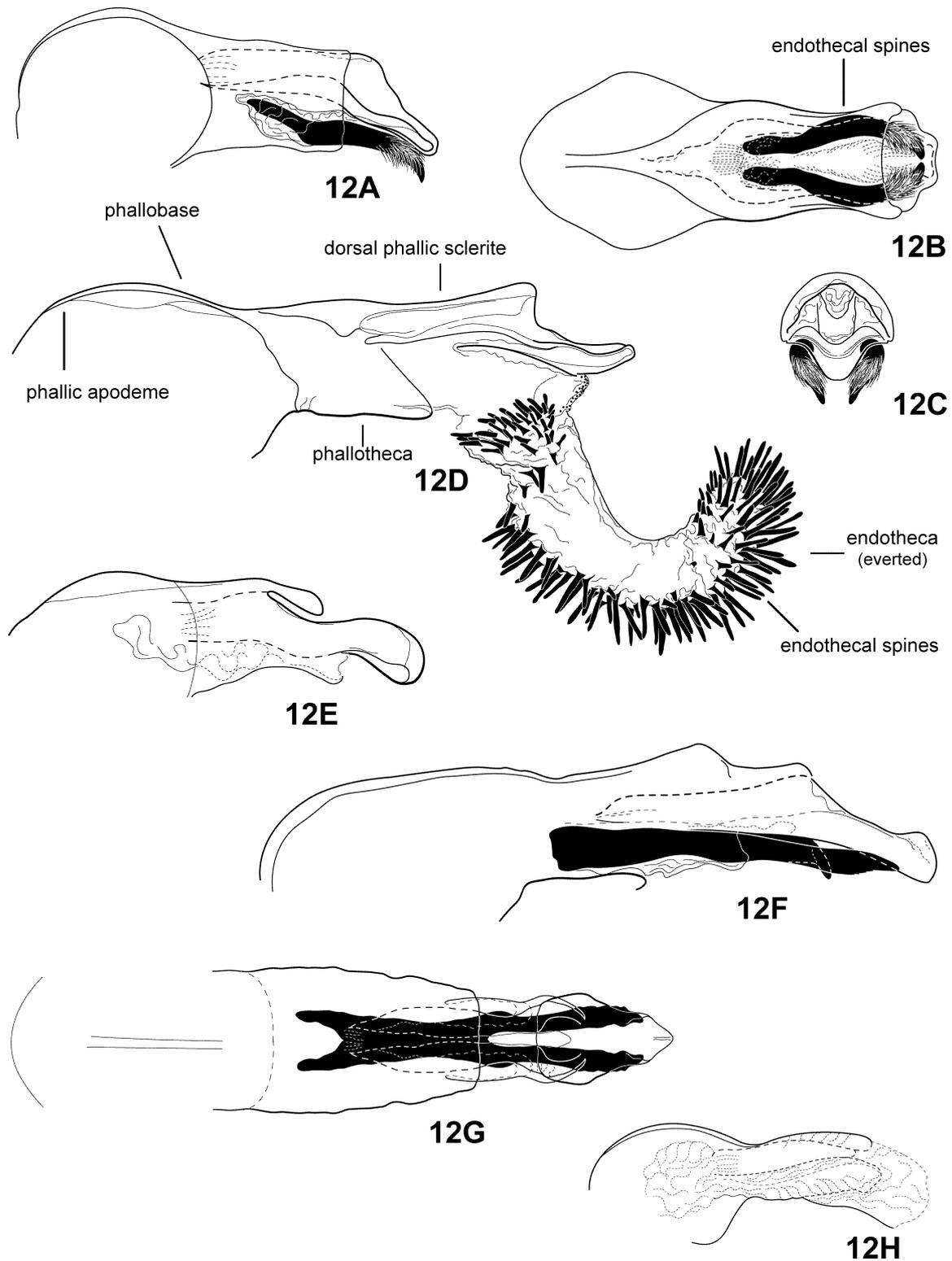


FIGURE 12. Phalli of New World *Polyplectropus* spp.: A–C—*P. annulicornis*: A—left lateral view; B—dorsal view; C—caudal view; D—*P. hystricosus*, left lateral view; E—*P. bredini*, left lateral view; F–G—*P. inarmatus*: F—left lateral view, G—dorsal view; H—*P. maesi*, left lateral view.

From the bodies of the preanal appendages emerge the *mesoventral processes of the preanal appendages* (Figs. 8A, B, 30A, C), which are highly sclerotized and variously shaped, although usually curved. The mesoventral processes may be incompletely (Fig. 30C) or entirely (Fig. 9D) fused to each other. Dorsally each mesoventral process may have a relatively elongate, *digitate lobe* (Figs 30A, C; 9A). In *Plectrocnemia*, Roy *et al.* (1980) identified paired structures that lie between the mesolateral and mesoventral processes, termed the *median processes of the preanal appendages*. In New World *Polyplectropus*, the median processes appear to be lost or reduced and appear as raised patches of setae located between the mesolateral and mesoventral processes, barely visible in certain taxa.

Not all species in New World *Polyplectropus* have *dorsolateral processes of the preanal appendages* (Figs. 4D, E, 6A). The dorsolateral processes arise dorsally from the mesolateral processes of the preanal appendages. The dorsolateral processes can be 1) fully developed (Figs. 4C, F, 5C, E, F, 6D, 30A), 2) short, cylindrical with (Fig. 5B) or without microsetae (Fig. 114A), or 3) reduced to bulbous patches of microsetae (Fig. 5A). Two species possess short, cylindrical, sclerotized dorsolateral processes bearing dense basal patches of microsetae (i.e., *P. spiculifer* and *P. juliae*), thus possessing the intermediate form between these 2 conditions (Figs. 93A, 68A). Some species only have a small sclerite instead of a bulbous or rod-like structure and are considered to be lacking dorsolateral processes (i.e., *P. charlesi*, Fig. 56A). Hamilton (1986) correctly indicated that the dorsolateral processes are derived from the preanal appendages and the intermediate appendages are located mesal to the preanal appendages. Thus, the 3 main diagnosable structures of the preanal appendages exhibiting interspecific variation in New World *Polyplectropus* are the dorsolateral, mesolateral, and mesoventral processes.

Inferior appendages

The *inferior appendages* are 1-segmented, each with a distinct *dorsal branch* and a smaller *ventral branch* (Figs. 10A, 30A, C). Highly sclerotized, peg-like setae may be present basally (Figs. 9B, 10B), apically (Figs. 8A, B, D, 10B, 11A, C), or throughout the dorsal surfaces (Figs. 8E, 9D, E) of either the dorsal or ventral branches. Proximally, the pair of inferior appendages fuse to form the *anterior basal plate* (Nielsen 1957). This structure has proven to be a useful character for sorting lineages within New World *Polyplectropus* since it is present in some species as a long (Figs. 4B, 11E, 72A, C, D) or short plate (Figs. 10A, 30A) and it may be distally entire (Fig. 72D) or bilobed (Figs. 10A, E).

Phallus

The *phallus* is located below segment X and above the mesoventral processes of the preanal appendages. The anterior wall of the *phallocrypt*, or opening from where the phallus arises, is fused to the anterior end of the phallus, thus forming the *phallic apodeme* (Fig. 30E) (Nielsen 1957). This lightly sclerotized, thin base of the phallus is broad and extends anterad while curving ventrad. Primitively, the phallus is separated into the proximal *phallobase* and the distal *aedeagus* or *phallicata* (Figs. 12, 13, 14, 30E) (Nielsen 1957; Tuxen 1970). In polycentropodids, the *phallotheca*, or external side of the phallobase (Tuxen 1970), is sclerotized and the phallicata is reduced (Nielsen 1957). No demarcation is apparent between the proximal phallic apodeme and the distal phallobase. The membranous inner envelope of the phallobase bearing the phallicata is the *endotheca* (Fig. 12D) (Tuxen 1970). The endotheca bears the phallic spines. Roy *et al.* (1980) recognized an *upper* and a *lower process of the phallicata*. The upper process bears the guitar-shaped (in dorsal view) *dorsal phallic sclerite* (Figs. 12D, 30E) through which passes the *ejaculatory duct* (Fig. 30E). The dorsal phallic sclerite laterally bears the paired *dorsolateral arms*, which may be apparent as lateral extensions (Fig. 54E, F, 109E, F) or produced posterad beyond the apex of the dorsal phallic sclerite (Figs. 88E, F) (Roy *et al.* 1980). The apical *phallotremal sclerite* is continuous with the dorsolateral arms, but it is not as readily discernable in New World *Polyplectropus* as it is in *Plectrocnemia* (Roy *et al.* 1980). The lower process is not apparent as a discrete structure in *Polyplectropus*. Roy *et al.* (1980) were able to distinguish a

ventral sclerite in *Plectrocnemia*, below the dorsal phallic sclerite; however, a ventral sclerite is not evident in *Polyplectropus*.

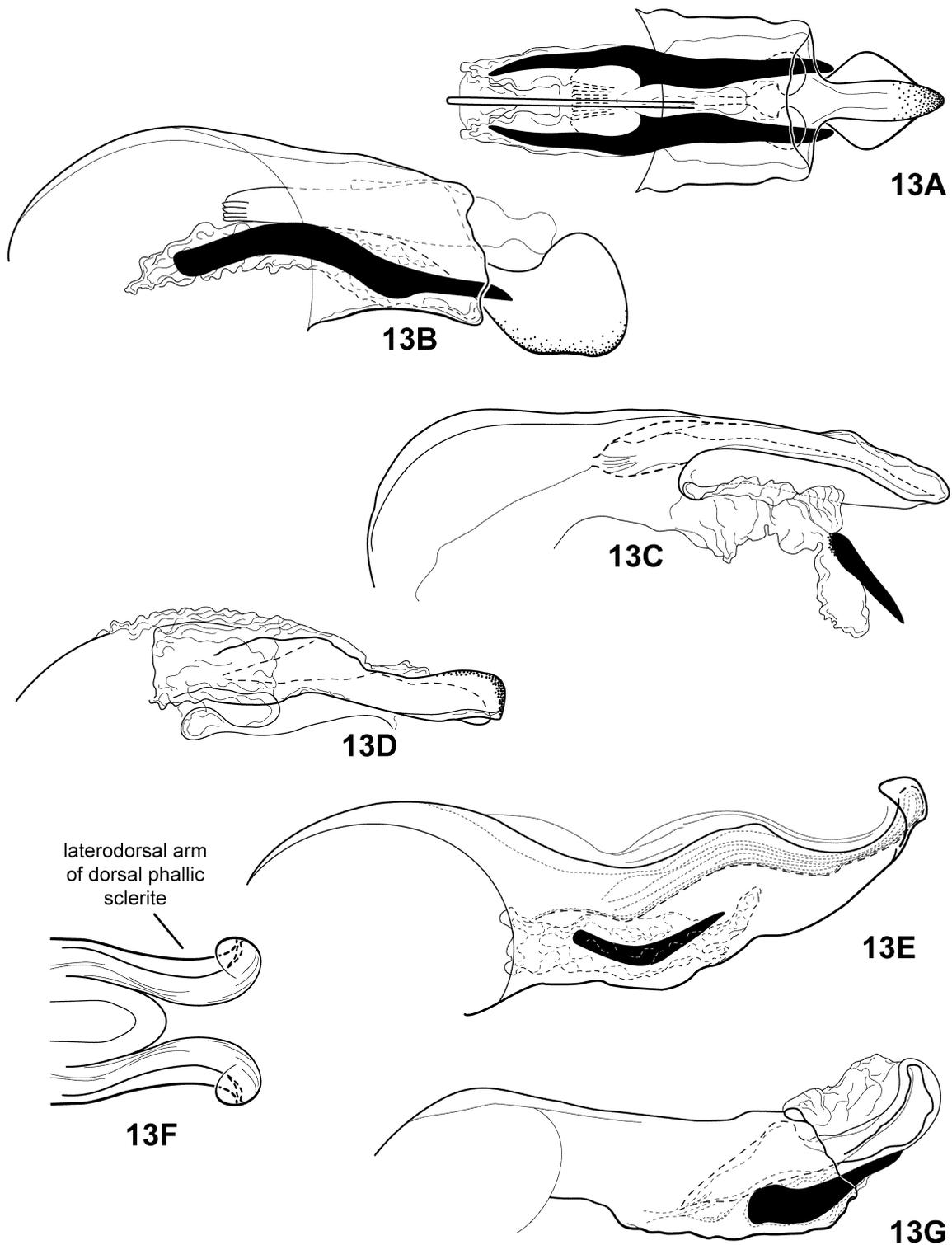


FIGURE 13. Phalli of New World *Polyplectropus* spp.: A–B—*P. alienus*: A—dorsal view, B—left lateral view; C—*P. hollyae*, left lateral view; D—*P. clauseni*, left lateral view; E–F—*P. laminatus* E—left lateral view, F—dorsal view; G—*P. charlesi*, left lateral view.

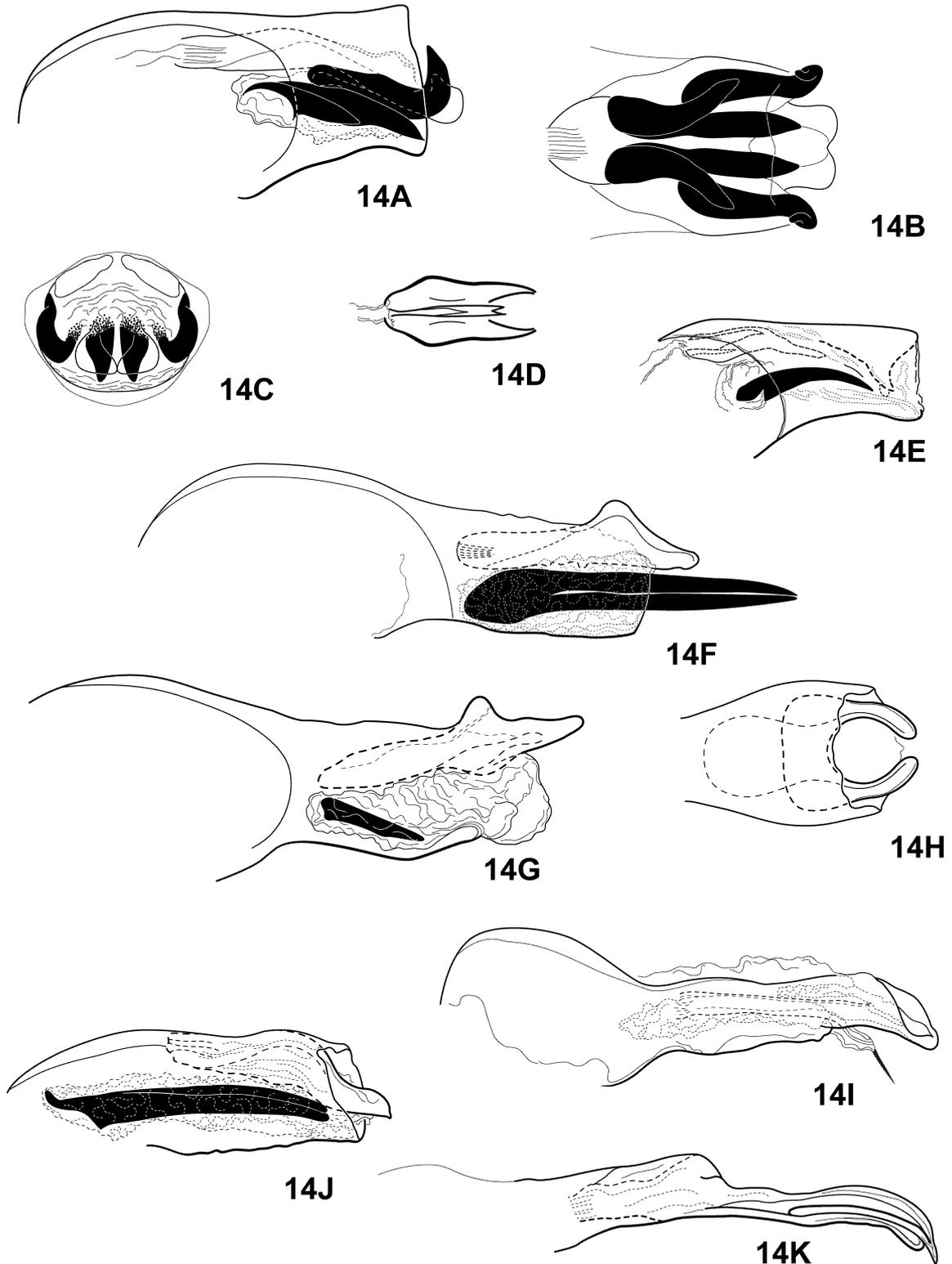


FIGURE 14. Phalli of New World *Polyplectropus* spp.: A–C—*P. zaragozai*, A—left lateral view, B—dorsal view, C—caudal view; D–E—*P. beccus*: D—dorsal phallic sclerite, dorsal view, E—left lateral view; F—*P. oaxaquensis*, left lateral view; G–H—*P. hamatus*: G—left lateral view, H—dorsal view; I—*P. elongatus*, left lateral view; J—*P. colombianus*, left lateral view; K—*P. petrae*, left lateral view.

Characters and states for cladistic analysis

Male genitalia

1. *Tergum IX*. 0: Present as irregularly shaped dorsolateral sclerite (Fig. 4A); 1: Intimately fused with tergum X (Figs. 4B, 7A-F).

Both outgroup species, *Plectrocnemia conspersa* and *Polycentropus chilensis* retain lateral sclerotized remnants of tergum IX.

2. *Height of sternum IX*. 0: Height less than 1/2 of entire male genital complex (Fig. 4A); 1: Height 3/4ths of entire male genital complex (Figs. 4B-C, E-F, 5, 6); 2: Height equal to height of entire male genital complex (Fig. 4D).

Three states possessing discontinuous variability were recognized for the relative height of sternum IX with respect to the entire height of the genital complex (i.e., dorsally from segment X ventrally to the inferior appendages). All New World *Polyplectropus* species, with the exception of *P. paysandu* (state 2), possess state 1. The unique specimen of *P. paysandu* possesses a distinct sternum IX, being as tall as the entire genital complex and rounded. Additional specimens of *P. paysandu* may reveal this autapomorphic condition to be an artifact due to methods of preservation or of clearing. Nevertheless, it was coded as a separate state to bring attention to this condition in case similar species and specimens are discovered.

3. *Posteroventral margin of segment IX* (as seen in ventral view). 0: Entire with median flange (not deeply concave submedially) (Figs. 10A, 11A-D); 1: Sinuate (Fig. 10B); 2: Broadly convex (Figs. 10C, 11E-F); 3: With pronounced acute median projection (Fig. 10D); 4: Medially membranous (Fig. 10E); 5: Concave with median flange (Fig. 10F).

Most New World *Polyplectropus* species possess an entire posteroventral margin with a median flange (state 0); however, in several cases discrete discontinuities are apparent. *Polyplectropus colombianus*, new species, possesses a medially membranous margin, an autapomorphic condition unique in the genus.

4. *Prominence of lower lip of tergum X*. 0: Not extending beyond median lobe of tergum X; 1: Extending beyond median lobe of tergum X (Figs. 4B, 5B, 6F).

Tergum IX is indistinguishably fused dorsally and laterally with segment X to form the large, membranous median lobe (Nielsen 1957). Nielsen (1957) and Roy *et al.* (1980) recognized a differentiation of the tube of the median lobe into the short upper lip, and a sometimes protruding lower lip.

5. *Apex of lower lip of tergum X*. 0: Bilobed (Fig. 7B); 1: Entire (Figs. 7A, F).

The lower lip may not be readily discernible in some species, but when it is discernable, the apex is either entire or deeply bilobed.

6. *Pubescence on intermediate appendages*. 0: Setose throughout (Fig. 7B); 1: Few (2-3) setae restricted apically (Fig. 7D); 2: Setose medially; 3: Few basal and apical setae (Figs. 7A, F).

This character codes for the different placement of setae along the length of the intermediate appendages.

7. *Microsetae of intermediate appendages*. 0: Without microsetae; 1: With microsetae (Figs. 5D, F).

Microsetae differ from the more visible, larger setae only by their size.

8. *Location of microsetae on intermediate appendages*. 0: Microsetae throughout (Figs. 5F, 8B); 1: Microsetae ventrally (Fig. 5D).

9. *Direction of apex of each intermediate appendage*. 0: Posterad (Fig. 5A); 1: Dorsad (Fig. 5D); 2: Posteromesad (Figs. 8B, 9D); 3: Posterolaterad (Fig. 9B); 4: Posteroventrad (Fig. 6E).

This character pertains to the direction of the apices of the intermediate appendages. In instances when the intermediate appendages are small and bulbous (Fig. 8F) the direction was scored as 0 (posterad).

10. *Relative distance between intermediate appendages*. 0: Distance between appendages equal to or less than basal width of an appendage (Figs. 9A, B, C); 1: Distance between appendage more than twice the basal width of an appendage (Figs. 8A–F, 9D–F).

The separation between appendages is largely discontinuous and is best observed in caudal view.

11. *Shape of intermediate appendages*. 0: Oblong to digitate (Figs. 4A, D–F, 6C, 7B); 1: Lanceolate (Figs. 4B, 5B, 7A); 2: Basally broad, narrowing apically or beak-shaped (Figs. 6B, 7C); 3: Rectangular (Fig. 6F); 4: Bulbous (Fig. 8F); 5: Quadrate and fused to mesoventral processes; 6: Each with 2 or more digitate or oblong lobes (Fig. 9F); 7: Each with sclerotized and digitate lobes (Fig. 5D); 8: Each tripartite, with robust, sclerotized lobes (Fig. 8C).

The intermediate appendages have several distinct forms. Most *Polyplectropus* species have simple intermediate appendages, each consisting of a single lobe of varying shapes and sizes. However, other species have a primary, major lobe with secondary, minor lobes projecting from it (Fig. 5D). In some cases the intermediate appendages consist of several lobes of equal sizes and shapes (Fig. 8C).

12. *Sclerotization of intermediate appendages (primary lobe)*. 0: Membranous (Figs. 4A, F); 1: Membranous basally and sclerotized apically (Fig. 5D); 2: Sclerotized throughout (Figs. 4B, 5B, 7A).

The intermediate appendages of most New World *Polyplectropus* are either entirely membranous or entirely sclerotized. However, several species have membranous appendages becoming sclerotized apically. In the case of *P. minensium* and *P. narifer*, only the larger, more prominent lobe (primary lobe) is considered; therefore these species are scored as having basally membranous and apically sclerotized intermediate appendages, even though the secondary lobes are completely membranous.

13. *Length of intermediate appendages*. 0: Small, almost indistinguishable (Fig. 8F); 1: Large, always distinguishable.

Species of the *P. manuensis* group have very small, round intermediate appendages, which may be easily overlooked. Most other species have considerably larger and distinct intermediate appendages.

14. *Papillate lobes*. 0: Absent; 1: Present (Figs. 8A, B).

Several species, particularly those in the *P. thilus* group, possess a small, paired papillate lobe ventromesad to each intermediate appendage and apically bearing a couple of small setae. These papillate lobes usually flank the phallocrypt laterally, with the exception of *P. colombianus*, where each is located closer to the meso-ventral processes of the preanal appendages (Fig. 8A). In several species, namely those having a membrane originating from the intermediate appendages and surrounding the phallocrypt, the papillate lobes are hardly visible or are only discernable by slight projections and by the presence of remnant setae. Those species for which remnants are still visible were scored as having papillate lobes (e.g., *P. thilus* and *P. trilobatus*). Furthermore, papillate lobes in *P. woldai* are positioned ventrally and are apically enlarged (Figs. 6E, 9E). The intermediate appendages of this species each has a ventral secondary lobe not previously observed in any other *Polyplectropus* species. *Polyplectropus woldai* was scored as possessing papillate lobes.

15. *Dorsolateral processes of the preanal appendages*. 0: Absent (Figs. 4A, D–E, 6A–B); 1: Present (Figs. 4B–C, F, 5A–F, 6C–F).

The dorsolateral processes of the preanal appendages originate from the dorsum of the mesolateral processes of the preanal appendages.

16. *Shape of dorsolateral processes of the preanal appendages*. 0: Bulbous, bearing dorsal microsetae (Figs. 4B, 5A–B, 6F); 1: Strongly sclerotized curved cylinder (Figs. 4C, F, 5B–F, 6C–E).

The paired dorsolateral processes may be present as elongate, cylindrical, sclerotized rods [in some species they may not be as long (Fig. 6E)] forming a kind of phallic guide, or as bulbous structures bearing dorsal microsetae. Two species possess short, cylindrical, sclerotized dorsolateral processes bearing dense basal patches of microsetae [*P. spiculifer* (Fig. 5B) and *P. juliae*]. This condition is interpreted as the intermediate form between these 2 states.

17. *Direction of bases of the dorsolateral processes of the preanal appendages*. 0: Curved posterad (Figs. 6C–D); 1: Curved anterad, recurved posterad (Fig. 4C).

18. *Fusion of mesoventral processes of preanal appendages*. 0: Processes separated (Fig. 9F); 1: Processes basally fused, apically divergent (Figs. 8A, F, 9A); 2: Processes entirely fused (Figs. 9B, D) 3: Processes broadly separated (Fig. 9E).

In *Polyplectropus*, the bodies, or plates of the preanal appendages meet below the phallocrypt. From the bodies of the preanal appendages and below the phallocrypt extend the mesoventral processes of the preanal appendages. In several species (e.g., *P. beccus* and *P. woldai*) the mesoventral processes are oblong, linear, poorly developed, and appear to be located laterally. In these instances the species were scored under state 3.

19. *Curvature of mesoventral processes of preanal appendages*. 0: Strongly to weakly curved (Fig. 5A); 1: Not curved, almost horizontal (180–225°) (Figs. 6D, F).

The mesoventral processes in several species are strongly curved, with apices directed anterad (towards the head of the insect). Most species have curved processes with the apices directed ventrad, while others have processes directed posterad and without curvature. Proper care was taken to examine specimens having a retracted phallus. When the phallus is extended, or protracted, the mesoventral processes usually bend posteroventrad with the apices directed anterad, thus confounding interpretation of the extent of the curvature.

20. *Shape of mesoventral processes of the preanal appendages*. 0: Digitate (Figs. 4B–D, 5A–B, F); 1: Rectangular (Figs. 5C, 6D); 2: Bulbous (Fig. 4E); 3: Lanceolate (*P. manuensis* group).

This character takes into account the overall shape of the mesoventral process as best observed in lateral view.

21. *Peg-like setae on mesoventral processes of the preanal appendages*. 0: Less than 4 (Figs. 9A, 4F); 1: More than 6 (Figs. 9B, D).

The mesoventral processes ventrally have a varying number of peg-like setae. Several taxa having mesoventral processes with sclerotized apices are considered to each possess an apical peg-like seta and were coded as having state 0.

22. *Dorsal digitate lobes of mesoventral processes of preanal appendages*. 0: Absent (Figs. 4A–D, 6E, 8B–D); 1: Present basally (Figs. 8A, 9B); 2: Present apically (Figs. 4E, 5C, D, 6C, F, 8E, 9A).

Several taxa (*P. annulicornis* group, *P. guyanae* group, *P. narifer* group) possess a relatively elongate, digitate lobe on the dorsum of each mesoventral process of the preanal appendage. All observed variations of structures arising dorsally from the mesoventral processes are here coded into a single character, as either state 1 or 2.

23. *Anterior basal plate of inferior appendage*. 0: Proximally broad and with distally short apodeme (Figs. 4A, 6A, B); 1: Proximally narrow and with distally elongate apodeme (Figs. 5A–F).

The anterior basal plate is the distal point for muscle attachment (apodeme) of the inferior appendages. State 1 is characteristic of all New World *Polyplectropus*, with the exception of *P. colombianus*, *P. nayaritensis*, and *P. beccus*.

24. *Apex of the anterior basal plate of the paired inferior appendages (best observed in ventral view)*. 0: Entire (Figs. 11A–F); 1: Bilobed (Figs. 10A, E).

The bilobed condition is characteristic of the *P. annulicornis* group. *Polyplectropus colombianus* and *P. ulmeriana* were found also to have a bilobed apex, however.

25. *Relative length of anterior basal plate of inferior appendages*. 0: Elongate (extending well beyond anterior margin of sternum IX) (Figs. 4B, 5B, 10C, 11E–F); 1: Short (not extending beyond anterior margin of sternum IX) (Figs. 4C–F, 5A, C–F, 10A–B).

An elongate anterior basal plate is characteristic of species in the *P. santiago* group, having the apodeme extending well beyond the anterior margin of sternum IX. Species with a basal plate reaching the margin or extending only slightly beyond it were scored as having state 1.

26. *Direction of dorsal branches of inferior appendages*. 0: Posterodorsad (45° angle) to posterad (0°); 1: Dorsad (nearly 90°) (Fig. 4E).

The angle of direction is determined by visualizing the posterior margin of sternum IX as the *y*-axis and the base of the inferior appendages as the *x*-axis.

27. *Peg-like setae of dorsal branches of inferior appendages*. 0: Absent (Fig. 4A); 1: Present (Figs. 4E, 5F, 8A).

Small, sclerotized peg-like setae are sometimes present on the dorsal branches of the inferior appendages. Location of these peg-like setae could not be discretely coded, therefore only presence or absence was considered.

28. *Apex of dorsal branches of inferior appendages*. 0: Rounded (Fig. 4F); 1: Truncate (Fig. 4A); 2: Emarginate; 3: Acutely pointed (Figs. 5D, 6F); 4: Narrowed (Fig. 5B).

An acutely pointed apex may abruptly or gradually culminate in a distinct point (Figs. 5D, 6F), whereas a narrowed apex gradually tapers to a rounded end (Fig. 5B).

29. *Basal width of the dorsal branches of inferior appendages*. 0: Base wider than apex (Fig. 6F); 1: Base as wide as apex (Fig. 5C); 2: Base narrower than apex (Fig. 5A).

Width measurements were taken at the widest point of the dorsal branch.

30. *Length of dorsal branches of inferior appendages*. 0: Length at least 5x width (medium length) (Fig. 5B); 1: Length approximately 3x or less width (short) (Figs. 5A, C, F); 2: Length more than 5x width (long) (Fig. 6F).

31. *Shape of ventral branches of inferior appendages (ventral view mostly)*. 0: Rectangular to deltoid (Fig. 11C); 1: Narrowly oblong (digitate) (Figs. 10A, C); 2: Deltoid (Fig. 11F); 3: Intimately fused with dorsal branch, forming a single large structure (Figs. 10B, F, 11D); 4: Quadrate to deltoid; 5: Narrowly deltoid (Fig. 10D); 6: Inversely deltoid (obdeltoid, broader apically, narrowed basally); 7: Basally quadrate, abruptly narrowing apically into digitate structure (Fig. 11B).

The space between the dorsal and ventral branches in several species (e.g., *P. woldai*, *P. clauseni*) is very shallow, presenting difficulties when interpreting the shape of the ventral branches. Species having ventral branches indistinguishable from the dorsal branches (Figs. 10B, F, 11D) were scored as having state 3.

32. *Gap between ventral branches of inferior appendages*. 0: Narrowly angled (Figs. 10A, B, E, F, 11A–D); 1: Broadly parallel (Figs. 10C, 11E); 2: Broadly angled (equal to width of branch) (Fig. 10D).

The space between the ventral branches is best observed in ventral view.

33. *Distance from apex of ventral branches of inferior appendages to point of fusion between them*. 0: 1/3rd length of inferior appendage (Figs. 10C, 11E, F); 1: 1/5th length of inferior appendage (Figs. 10A, 11A); 2: 2/3rds length of inferior appendage; 3: More than 2/3rds length of inferior appendage (Figs. 10B, D, 11D).

Measurements are of the point of fusion between the ventral branches relative to the entire length of an inferior appendage including the basal plate; best observed in ventral view.

34. *Peg-like setae on ventral branches of inferior appendages*. 0: Absent (Figs. 8A, 9A); 1: Present (Figs. 8E, 9D).

35. *Location of peg-like setae on ventral branches of inferior appendages*. 0: Restricted basally (Fig. 9B); 1: Medially or distributed unevenly on anterior surface (Fig. 8E); 2: Restricted apically (Fig. 8D).

36. *Apical arrangement of peg-like setae on ventral branches of inferior appendages*. 0: Scattered, not in transverse row; 1: In transverse row (Figs. 11A, C).

37. *Phallic spines*. 0: Absent (Fig. 13D); 1: Present (Figs. 12D, 14C).

The endothelial membrane of the phallus sometimes bears spines of several sizes and shapes. The endothelial membrane is located below the dorsal phallic sclerite and is eversible (Fig. 12D).

38. *Size of spines in endothelial membrane*. 0: Spines less than half the size of the dorsal phallic sclerite (Figs. 13E, 14G); 1: More than half or as long as the dorsal phallic sclerite (Figs. 12A, 14A, 13G); 2: Longer than the dorsal phallic sclerite (Figs. 12G, 13B, 14F).

39. *Type of phallic spines*. 0: Rod-like spines (Figs. 13E, 14A); 1: Peg-like spines (Fig. 12D).

40. *Pigmentation of phallic spines in endothelial membrane*. 0: Darkly pigmented (Fig. 14F); 1: Lightly pigmented (Fig. 14I).

41. *Number of spines in endothelial membrane*. 0: 1 apically bifurcating spine (Fig. 12G); 1: 2 spines (Figs. 12A, 14G, J); 3: More than 3 spines (Fig. 14C).

42. *Apical setae on endothelial phallic spines*. 0: Present (Figs. 12A–C); 1: Absent (Figs. 14A–C).

Some species in the *P. annulicornis* group have several setae at the apex of the phallic spines.

43. *Apex of phallic sclerite*. 0: Not produced subapicodorsally (Fig. 13D); 1: Produced subapicodorsally (Fig. 14G).

The dorsal phallic sclerite may be preapically enlarged, giving the apex of the phallus a kind of “alligator-head” shape, a characteristic shared by several species in the *P. santiago* group.

44. *Direction of dorsolateral arms of dorsal phallic sclerite*. 0: Dorsad; 1: Posterodorsad; 2: Ventrad; 3: Anterodorsad; 4: Posterad.

The dorsal phallic sclerite laterally bears the dorsolateral arms. Those species for which the dorsolateral arms are not distinguishable (essentially fused to the apex of the phallic sclerite) are scored according to the direction of the apex of the entire phallic sclerite.

45. *Apex of dorsal phallic sclerite*. 0: Tapering subapically alongside dorsal phallic sclerite; 1: Tapering apically alongside dorsal phallic sclerite (forming a leveled apex) (Fig. 12B); 2: Produced beyond apex of dorsal phallic sclerite and both arms free (Figs. 13F, 14H); 3: Produced beyond apex with both processes fused apically (Figs. 13A, B).

This character represents observations and perceived discontinuities of the fusion or separation of the apex of the dorsolateral arms and the dorsal phallic sclerite.

46. *Apex of dorsal phallic sclerite (lateral view)*. 0: Not enlarged dorsally; 1: Enlarged dorsally.

The apex of the dorsal phallic sclerite is enlarged in some species (e.g., *P. narifer* group). The dorsal phallic sclerite of *P. alienus* does not have an enlarged apex. We interpret the enlarged structure of the phallus in *P. alienus* to be the fused dorsolateral arms of the dorsal phallic sclerite (Figs. 13A, B).

Female genitalia

Characters of the female were scored only for those species for which male/female associations were unambiguous; that is, when male and female pairs were collected from the same locality.

47. *Sclerotized, paired internal "rods"*. 0: Absent; 1: Present.

The females of several species in the *P. santiago* group possess diagnostically important, highly sclerotized paired, internal rods (Fig. 97C). Based on the material examined, these rods varied morphologically from narrow and elongate to broad and elongate. However, only presence/absence was considered due to the limited number of male/female associations.

Wings

Several features of wing venation were included in this analysis. These include several conventional characters traditionally used in designation and recognition of taxa, such as the presence or absence of wing forks and of certain crossveins. Additional characters were identified, such as the relative placement of wing forks relative to a given crossvein (e.g., rooted, sessile, or petiolate), the relative position of crossveins, the position and pigmentation of certain wing veins in relation to adjacent veins, and union of wing veins to the wing margin. Rooted (Vshivkova 2006) refers to a given wing fork originating towards the base of the wing relative to the nearest crossvein. Sessile describes a fork originating at the point of contact with a given crossvein, and petiolate refers to a given wing fork originating towards the apex of the wing relative to a given crossvein and having a kind of basal "stem" (Figs. 2C, D).

48. *Fork 3 forewing*. 0: Sessile (Fig. 15F); 1: Petiolate (Fig. 15B).

49. *Fork 4 forewing*. 0: Rooted (Fig. 16C); 1: Sessile (Fig. 15H); 2: Petiolate (Fig. 16A).

50. *Location of cu-a crossvein forewing*. 0: Proximad or mesad on A_1 (Fig. 16F); 1: Distad on A_1 (Figs. 3C, 16C).

51. *Forewing A_1 position*. 0: Towards A_{2+3} (Figs. 15F, 16F, H); 1: Towards Cu_2 (Figs. 17B, 15D, H, 16B).

52. *Forewing A_1 pigmentation*. 0: Lightly pigmented (hyaline) (Figs. 17B, 15A); 1: Pigmented (Figs. 15F, 16H).

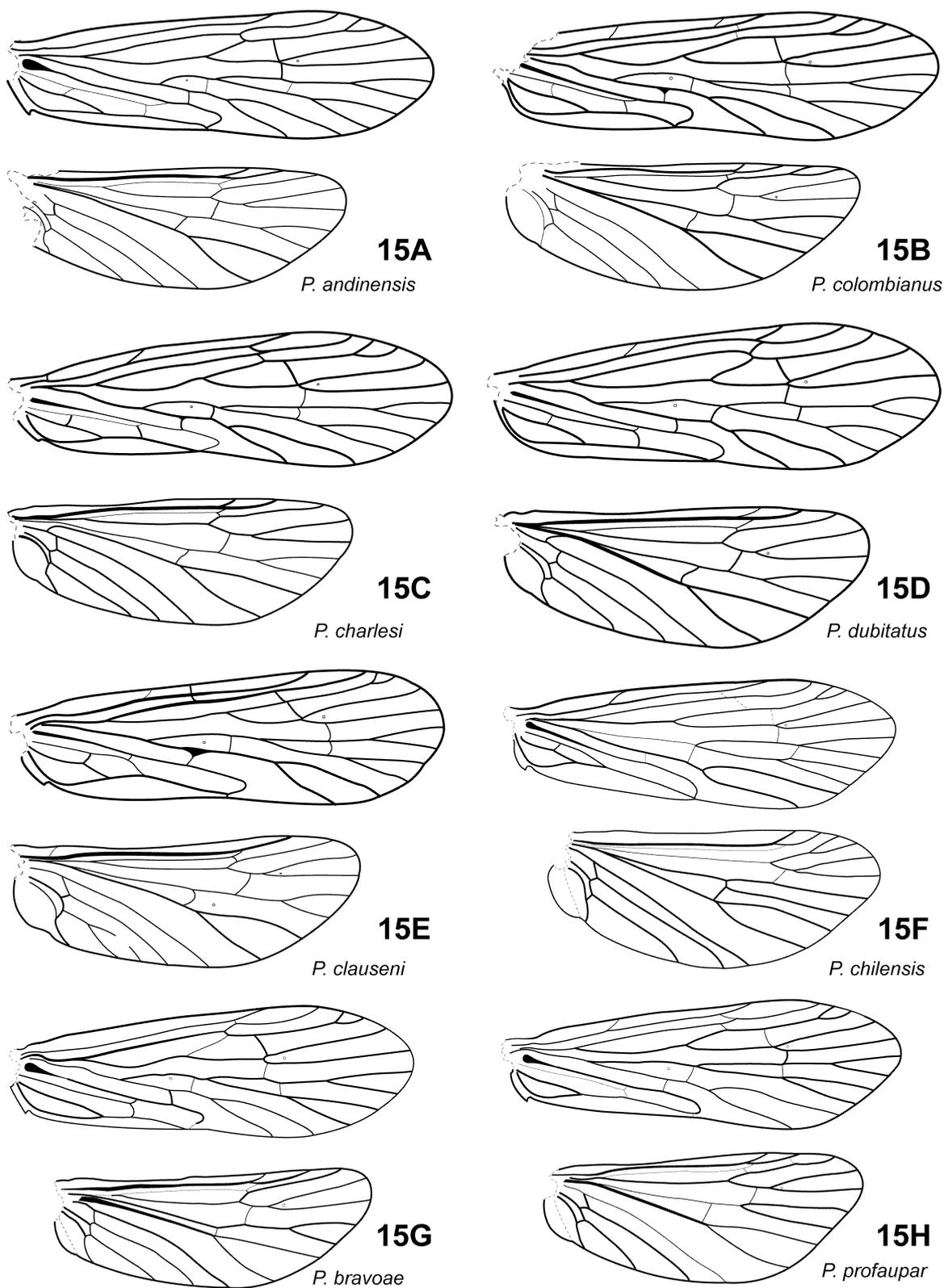


FIGURE 15. Right fore- and hind wings of New World *Polyplectropus* spp., dorsal views: A—*P. andinensis*; B—*P. colombianus*; C—*P. charlesi*; D—*P. dubitatus*; E—*P. clauseni*; F—*Polycentropus chilensis*; G—*P. bravoae*; H—*P. profaumar*.

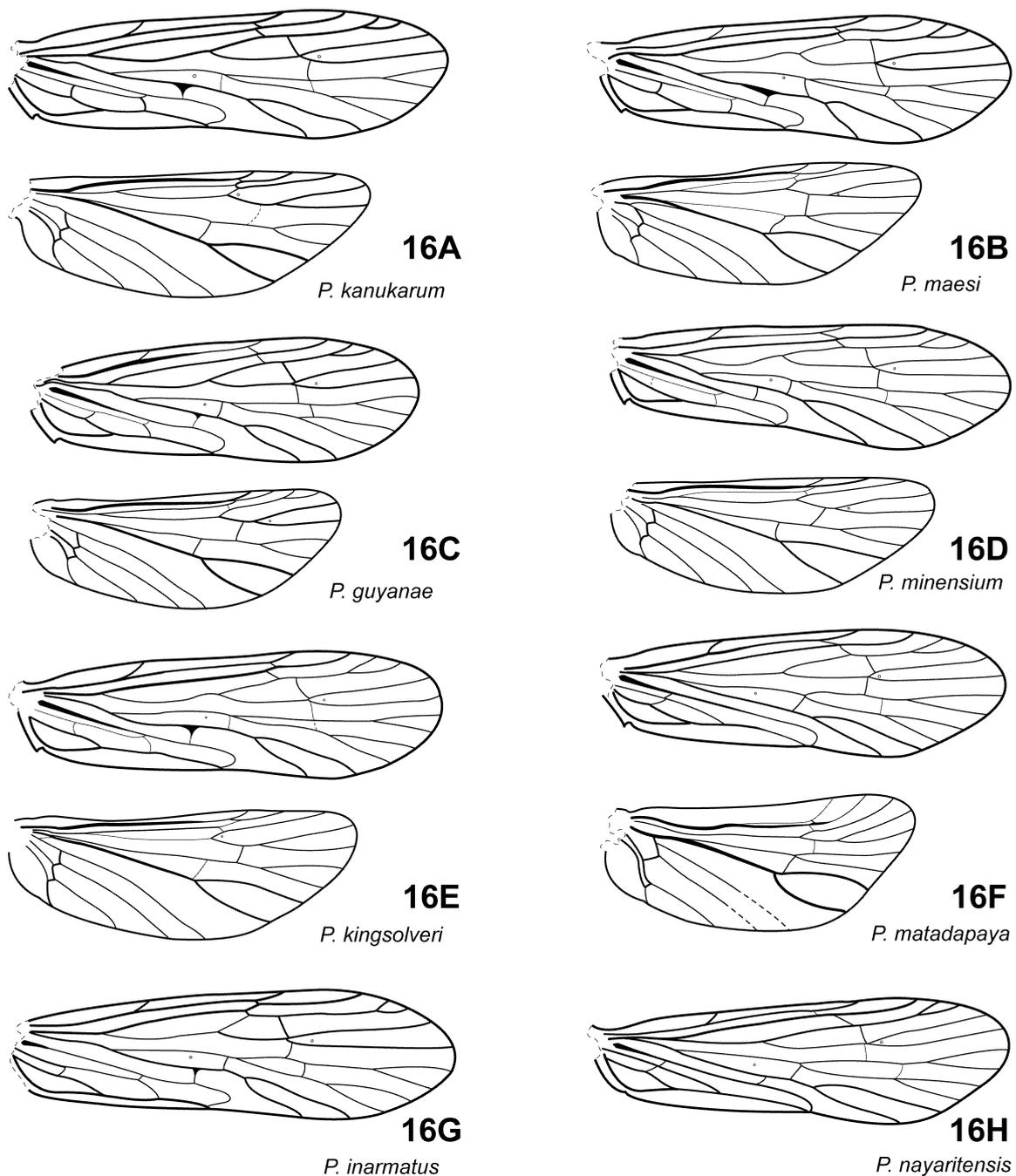


FIGURE 16. Right fore- and hind wings of New World *Polyplectropus* spp., dorsal views. A—*P. kanukarum*; B—*P. maesi*; C—*P. guyanae*; D—*P. minensium*; E—*P. kingsolveri*; F—*P. matadapaya*; forewing G—*P. inarmatus*; H—*P. nayaritensis*.

53. *Cubitus 2* (Cu_2) union to margin at arculus. 0: Not bowed (Fig. 15F); 1: Bowed (Figs. 17B, 16A).

54. *Radial-median* (*r-m*) and *median* (*m*) crossveins in forewing. 0: Not directly below each other (vertically) (Figs. 1B, 16C); 1: Directly below each other (vertically) (Fig. 15B).

55. *Fork 1* hind wing. 0: Present (Fig. 15F); 1: Absent (Figs. 15A, H, 16F).

56. Fork 2 hind wing (with respect to *r-m* crossvein). 0: Sessile; 1: Petiolate (Fig. 17C).

57. Median fork hind wing. 0: Rooted to *r-m* (Figs. 15F, H); 1: Sessile to *r-m*; 2: Petiolate to *r-m* (Fig. 17C).

58. Discoidal cell hind wing. 0: Present; 1: Absent (Fig. 17C).

59. Fork 5 hind wing (relative to *m-cu* crossvein). 0: Sessile (Fig. 16D); 1: Petiolate (Fig. 17C); 2: Rooted (Fig. 16B).

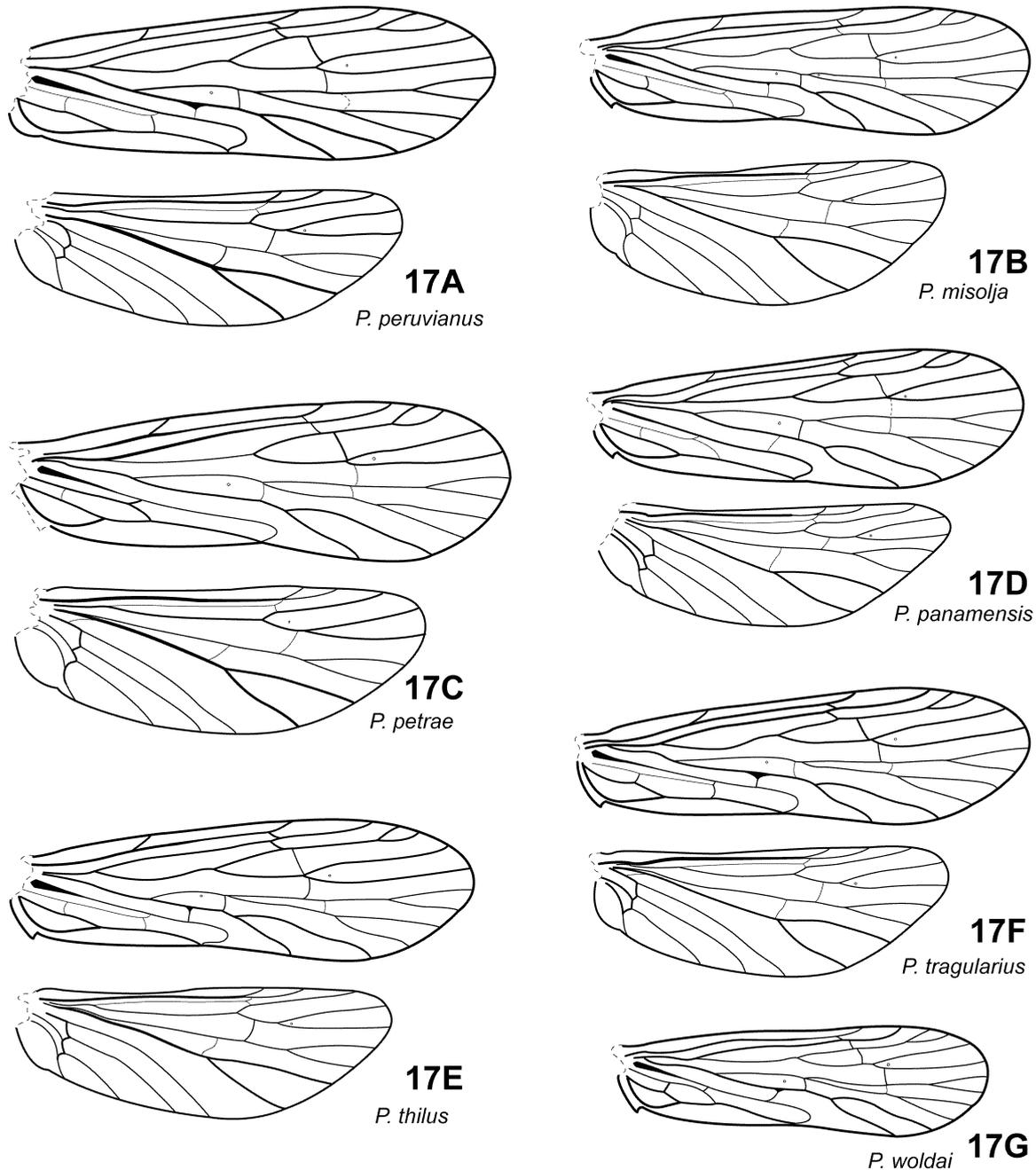


FIGURE 17. Right forewing and hind wings of New World *Polyplectropus* spp., dorsal views. A—*P. peruvianus*; B—*P. misolja*; C—*P. petrae*; D—*P. panamensis*; E—*P. thilus*; F—*P. tragularius*; forewing, G—*P. woldai*.

Results of Phylogenetic analyses

Twenty independent parsimony ratchet iterations of the data under PAUP* resulted in a total of 106 trees (595 total, several redundant) of length 351 (retention index [RI] = 0.777; rescaled consistency index [RC] = 0.239). All major clades (10 species groups) were consistently recovered in the strict consensus of the combined results of all independent ratchet runs (Fig. 18). The heuristic search under non-ratchet runs (500 random addition sequence replicates followed by branch swapping and retaining 25,000 trees) found thousands of trees of the same length as the parsimony ratchet (L=351). However, the strict consensus of the 25,000 equally parsimonious trees was more resolved than the strict consensus of all topologies found under the ratchet searches. The differences in topology between the strict consensus trees indicated the first search was unable to find all local optima of shortest trees (tree islands).

The Bayesian analyses were stopped when the convergence diagnostic indicated the analysis had reached stationarity (i.e., average standard deviation of split frequencies was below 0.01, potential scale reduction factor [PSRF] value was 1.00, and plot of the generations against the log probability of the data presented only “white noise” with no increasing or decreasing trends [Ronquist *et al.* 2007]). Fifty percent of the samples were discarded as *burn-in*, under the *sumt* command (Ronquist *et al.* 2007). The majority-rule (50%) consensus phylogram of 8,002 (4001 from each run, 2 runs total) trees is shown in Fig. 19.

DISCUSSION

Consensus trees of both Bayesian and parsimony analyses returned similar results overall (Figs. 18, 19). Both methods retained exactly the same 12 clades with differing levels of support as indicated by bootstrap (B), Bremer or decay index (DI), and posterior probability values (PP). Well-supported clades had bootstrap, decay index, and posterior probability values greater than 70, 2, and 95, respectively. Eight of those well-supported clades constitute the following species groups: *P. alienus* group (B 97, DI 2, PP 88), *P. annulicornis* group (B 54, DI 2, PP 92), *P. bredini* group (B n/a, DI 1, PP 58), *P. charlesi* group (B 92, DI 2, PP 98), *P. fuscatus* group (B 72, DI 2, PP 75), *P. guyanae* group (B 86, DI 2, PP 96), *P. manuensis* group (B 100, DI 3, PP 100), and *P. santiago* group (B 97, DI 6, PP 100). Both *P. nayaritensis* and *P. beccus* were always retained as a grade at the base of the *Polyplectropus* clade (Figs. 18, 19).

Two clades recovered in the parsimony analysis were not entirely supported based on Bayesian methods. These are the *P. narifer* and the *P. thilus* groups. The Bayesian tree does not support a monophyletic *P. thilus* group as retained in the parsimony analysis (Fig. 18), instead the *P. thilus* group is rendered paraphyletic with respect to the *P. charlesi* group (Fig. 19). The placement of *P. hollyae*, *P. beutelspacheri* and *P. kanukarum* was at odds under parsimony and Bayesian analyses (Figs. 18, 19).

This analysis strongly supports a monophyletic New World *Polyplectropus*. A core *Polyplectropus* clade (*Polyplectropus sensu stricto*: excluding *P. nayaritensis* and *P. beccus*) was also well supported, particularly based on Bayesian posterior probability values. The monophyly of the *P. santiago* group, the *P. alienus* group, and to a lesser extent, the *P. thilus* group is supported and the monophyly of the *P. charlesi* and *P. panamensis* groups, as currently defined, is rejected.

Placement of new species within the genus

Ten species groups are recognized in this study and most of the 39 new species were placed in previously recognized, albeit redefined, groups. Two species are now included in the *P. alienus* group; *P. alienus* and *P. inarmatus*. The *P. thilus* group now contains 15 species, 7 of them new. Several species previously placed in the *P. thilus* group are now included in the *P. bredini* group. The monophyly of the 15 species included in the *P. thilus* group was supported in the parsimony analysis and, even though the Bayesian analysis recovered all

15 species in a monophyletic group (with unresolved placement for 5 species), the well supported *P. charlesi* group was also placed in this unresolved clade (Fig. 19). Since the Bayesian tree does not contradict results from the parsimony analysis, which finds the *P. charlesi* and *P. thilus* groups as mutually exclusive and distinct groups, these groups are therefore treated as separate entities. Only 3 species now remain in the *P. charlesi* group; most former members of the group are transferred to the *P. bredini* group. The *P. santiago* group is very distinctive and species-rich with 25 species in total, of which 6 are new. The *P. panamensis* group, as defined by Bueno-Soria (1990), consisted of 2 species, *P. panamensis* and *P. nayaritensis*. *Polyplectropus nayaritensis* was recovered at the base of the clade containing all New World *Polyplectropus* and is not assigned to a group. *Polyplectropus panamensis* is transferred to the newly established *P. bredini* group. For this group of 19 species (7 new species), the epithet *bredini* is preferred over *panamensis* because the concept of the group and the majority of the species in it are best exemplified by *P. bredini*, which is also the oldest name in the species group.

Two species groups were established based solely on new taxa, the *P. manuensis* and *P. guyanae* groups. The *P. annulicornis* group is designated to include 3 previously known and 8 new species. The *P. narifer* group includes 2 described and 3 new species. *Polyplectropus hollyae* was placed at the base of the *P. narifer* clade in the parsimony analysis and is included in this group since the Bayesian analysis did not show evidence to the contrary. The possession by *P. hollyae* of several homoplasious male genitalic features (i.e., simplified phallus and intermediate appendages), while at the same time lacking several features present in other species of the *P. narifer* group (e.g., multilobate intermediate appendages), may not provide adequate phylogenetic signal under Bayesian methods to place this species unequivocally in the *P. narifer* group. Nonetheless, this species clearly belongs in the *P. narifer* group based on the presence of key features of the male genitalia, as well as on the combination of character states also found in other species of the *P. narifer* group. The *P. fuscatus* group is created to include 1 described species and 2 new ones. In addition to *P. nayaritensis*, 3 species, *P. beutelspacheri*, *P. kanukarum*, and *P. beccus*, did not group with any other species in the genus and are not assigned to a group.

Comparison between methods of analysis

The 2 approaches implemented to analyze the data, Bayesian and parsimony, resulted in minor topological differences. Bayesian methods resulted in a less resolved topology due to conflicting estimates of relationship among most species groups (except for *P. annulicornis* group) and among several species in the *P. narifer* and *P. thilus* groups. Nevertheless, results did not contradict the parsimony tree. Both methods performed well when analyzing a dataset with twice as many taxa as characters. In a complementary study (Chamorro-Lacayo 2009), a combination of high variation in rates of change among characters (as measured by the alpha parameter), an overall low number of characters, and a high proportion of missing data negatively affected estimates of phylogeny, particularly under Bayesian methods, by greatly reducing resolution. The current dataset does not include many missing data entries; however, the total number of characters is very low compared to the number of taxa included. By including a gamma parameter in the Bayesian model, the shape of the gamma distribution can be determined by the alpha (α) parameter (Ronquist *et al.* 2007). The alpha parameter for this dataset was below 1 ($\alpha=0.59$), indicating high variation in rates of evolution among characters. The gamma distribution for a small alpha value is L-shaped with a few characters evolving rapidly while most characters are evolving very slowly (Swofford *et al.* 1996; Ronquist *et al.* 2007). Decreased resolution in the Bayesian tree may result from an inability of the method to cope with low overall numbers of characters, a few of which are evolving too quickly to be accurate, while most are evolving too slowly to be informative (Wiens & Moen 2008).

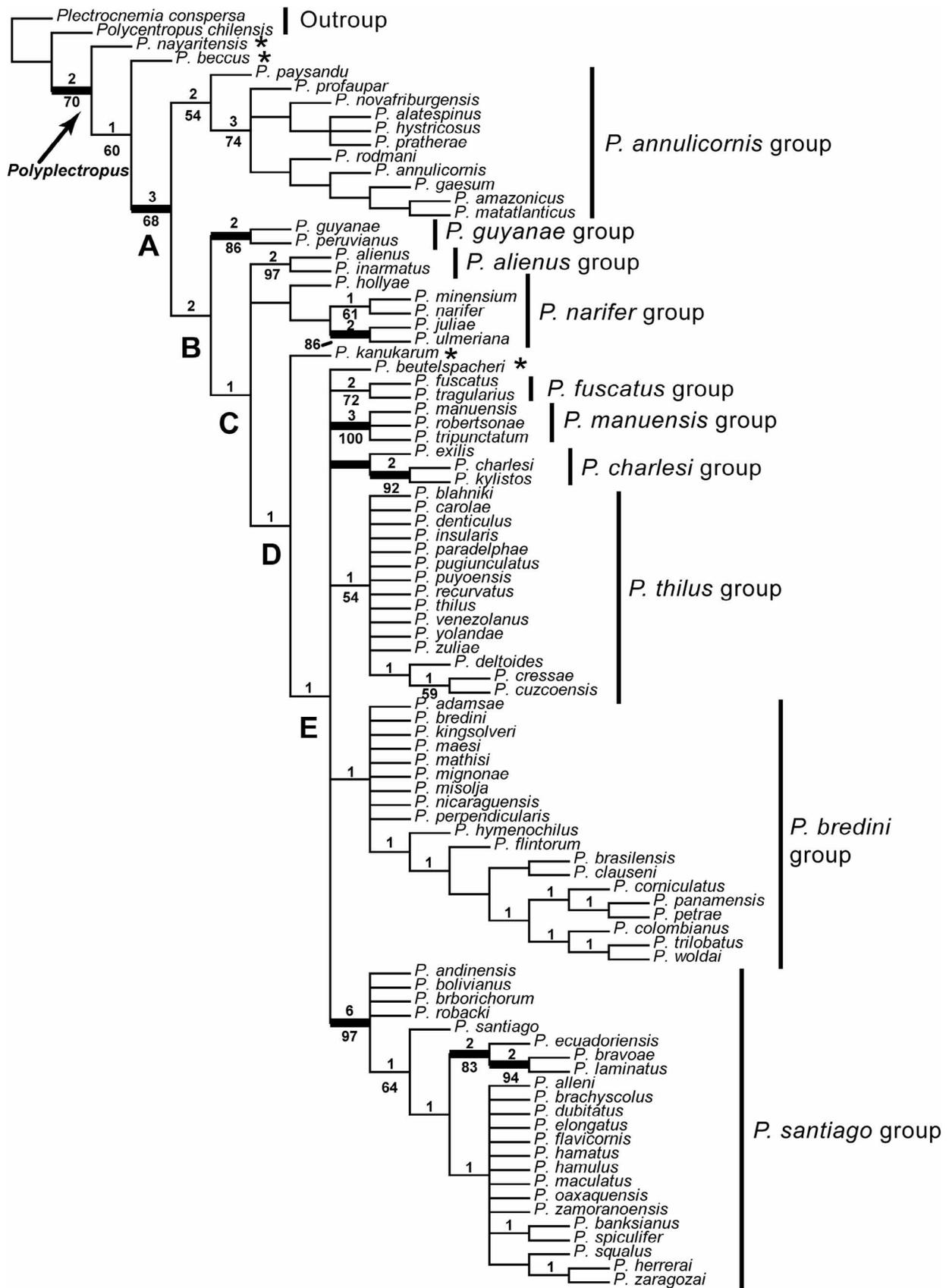


FIGURE 18. Phylogeny of New World *Polyplectropus* species (strict consensus) based on parsimony analysis of 59 morphological characters across 91 taxa. Thickened branches represent clades having 95 or greater posterior probabilities. Bremer values are indicated above and bootstrap values are indicated below the internodes. Taxa with asterisks (*) are unassigned to species group.

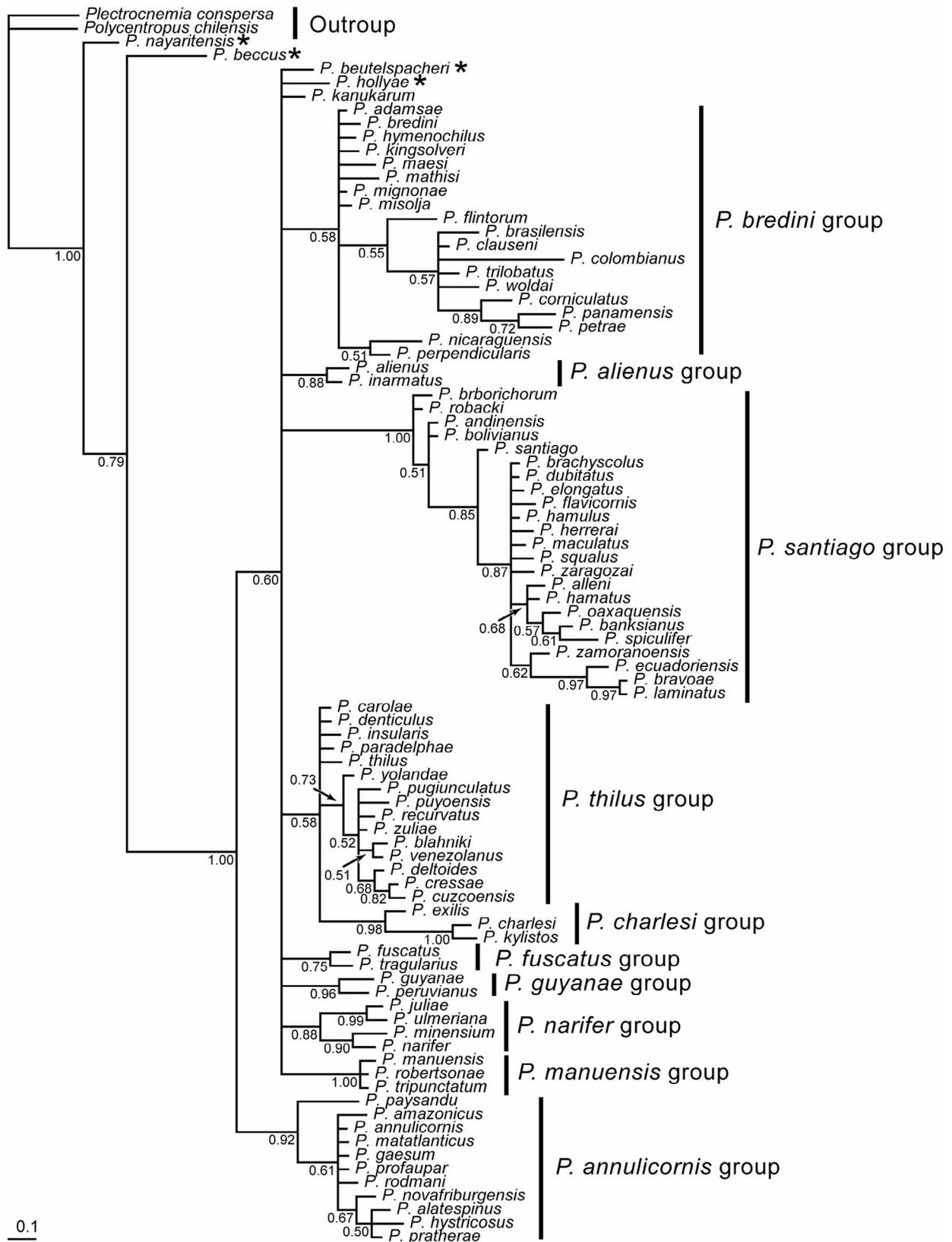


FIGURE 19. Phylogeny of New World *Polyplectropus* species (50% majority-rule consensus phylogram) based on Bayesian analysis of morphological data (91 taxa, 59 characters) under an Mk + gamma model (harmonic mean lnL = -1,663.10). Numbers below internodes indicate posterior probabilities. Taxa with asterisks (*) are unassigned to species group.

SYSTEMATICS

Key to Genera of New World Polycentropodidae

1. Spur formula 2,4,4 *Cernotina* Ross.
- Spur formula 3,4,4 2
- 2(1) Fork 3 of forewing present *Neureclipsis* McLachlan.
- Fork 3 of forewing absent (Fig. 2C) 3
- 3(2) Fork 1 of forewing absent 4
- Fork 1 of forewing present (Fig. 2C) 5
- 4(3) Median cell of forewing open *Cyrnellus* Banks.
- Median cell of forewing closed. *Nyctiophylax* Brauer.
- 5(3) Hind wing discoidal cell closed 6
- Hind wing discoidal cell open 7
- 6(5) Fork 1 of hind wing absent *Holocentropus* McLachlan.
- Fork 1 of hind wing present *Plectrocnemia* Stephens.
- 7(5) Fork 1 of hind wing usually absent, R_{2+3} unbranched (Fig. 2D); median fork of hind wing petiolate (with respect to *m-cu* crossvein); forewing Cu_2 vein distally bent beyond arculus, recurving proximad and joining anal veins 2+3 (A_{2+3}) at arculus; forewing anal vein 1 (A_1) lightly pigmented, positioned anteriorly, approaching Cu_2 vein and distally meeting *cu-a*₁ and *a*_{1-a}₂ crossveins (last 2 characteristics not present in *P. nayaritensis* or *P. beccus*)
..... *Polyplectropus* Ulmer.
- Fork 1 of hind wing present, R_{2+3} branched; median fork of hind wing rooted (with respect to *m-cu* crossvein); forewing Cu_2 vein not recurved but bent gradually towards arculus (15F); forewing A_1 as strongly pigmented as other longitudinal veins and fused with A_{2+3} *Polycentropus* Curtis.

Genus *Polyplectropus* Ulmer

Polyplectropus Ulmer, 1905a: 103 [Type species: *Polyplectropus flavicornis* Ulmer, 1905a, monotypic].—Flint, 1964: 476 [larva described as Genus C].—Flint, 1968: 23 [larva].—Flint, 1968: 20 [systematics of the genus].—Bueno-Soria, 1990: 357 [revision of Mexican and Central American species].

Ecnomodes Ulmer, 1911:17 [Type species: *Ecnomodes buchwaldi* Ulmer, 1911, monotypic, preoccupied by Turner, 1903 in Lepidoptera].—Flint 1968: 21 [synonym].

Cordillopsyche Banks, 1913: 238 [Type species: *Cordillopsyche costalis* Banks, 1913, monotypic].—Flint, 1967: 6 [synonym].

Ecnomodellina Ulmer, 1962: 5 [Type species: *Ecnomodes buchwaldi* Ulmer, 1911, replacement name for *Ecnomodes*].—Flint, 1968: 21 [synonym].

Eodipseudopsis Marlier, 1959: 117 [Type species: *Eodipseudopsis tomensis* Marlier, 1959, monotypic]. —Oláh & Johanson, 2010: 22 [synonym].

Adult. Length of forewing 2.5–7.8 mm. Antennae stout, approximately 2/3rds length of forewing; scape no more than 1/3rd length of head. Maxillary palps 5-segmented in both sexes; 1st and 2nd segments as long as wide; 2nd with apical, mesal setose cushion; 3rd inserted preapically into 2nd and length equal to 1st and 2nd together; 4th 1.5 x length of 1st; 5th annulated, twice length of 3rd (Fig. 2B). Labial palps 3-segmented; 1st and 2nd equal in length; 3rd 1.5 x longer than 2nd. Head with frontal, antennal, and occipital setal warts well developed; preocellar, ocellar, and postocellar setal warts less defined, but clearly present (Fig. 2A); occipital warts 2/3rds length of head; ocellar warts rectangular, not fused. Prothorax with elevated rectangular median pronotal setal warts; lateral pronotal setal warts less pronounced or elevated; cervical setal warts bulbous (Fig.

2A). Paired tegula heart-shaped with lateral lobe slightly more pronounced than mesal lobe (Fig. 2A). Mesoscutum with distinct oval scutal setal warts located parallel to mid-line and not at angle. Mesoscutellum with single median oblong scutellar setal wart, with mid-line devoid of setae (Fig. 2A). Tibial spur formula 3,4,4; foretibiae flattened, particularly in females. Color of body ranging from yellow to dark brown; setae on body brown with grey clusters on apex of head to entirely brown with golden reflections; setae on tegula long, golden brown and grey to dark brown; forewings ranging from yellowish-brown to dark brown or almost black, lighter wings may have brown to golden brown mottling. Forewing venation (Figs. 2C, D): forks 1–5 present, rarely fork 1 absent; fork 1 petiolate, fork 2 sessile, fork 3 petiolate [with respect to median (*m*) crossvein], fork 4 petiolate, fork 5 petiolate [with respect to median-cubital (*m-cu*) crossvein]; discoidal, medial, and thyridial cells closed; Cu₂ vein apically bent beyond arculus, recurving proximally and joining combined anal veins 2+3 (A₂₊₃) at arculus; anal vein 1 (A₁) lightly pigmented, positioned anterad towards Cu₂ vein and distally meeting *cu-a*₁ and *a*₁-*a*₂ crossveins. Abdominal segment V with short, occasionally elongate, external, paired, laterally digitate processes with associated internal bulbous glands.

Male genitalia. Sternum IX in lateral view rounded to deltoid, posterior margin shape ranging from more or less entire to possessing acute median projection. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X either produced and apically bilobed or entire or not readily apparent. Intermediate appendage of varying lengths, shapes, and pubescence, yet always distinct and not fused mesally to tergum X. Preanal appendage bipartite or tripartite; if tripartite dorsolateral process originating from dorsum of mesolateral process and either bulbous with dorsal microsetae or produced into sclerotized, sometimes short or elongate recurved, lanceolate process; mesolateral process setose, usually oblong to quadrate; mesoventral process setose, apex usually produced ventrad, dorsally produced into short or long digitate lobe, apically processes separated or completely fused, with or without peg-like setae. Inferior appendage bipartite with anterior basal plate either extending anterad beyond sternum IX (when observed in lateral view) or contained entirely within sternum IX, anteriorly bilobed or entire; dorsal branch usually highly setose and variously shaped, peg-like setae present or absent; ventral branch setose and variously shaped, but never larger than dorsal branch. Phallus long or short; dorsal phallic sclerite distinct, apex variously shaped; endothelial membrane with or without embedded spines of varying numbers, lengths, shapes, and robustness.

Female genitalia. Ventral plates of segment VIII setose and variously shaped; external part of gonopod of segment VIII in ventral view with posterior margin ranging from truncate to medially produced; internal part of gonopod VIII sclerotized, variously shaped and textured; several species with highly sclerotized paired structure, here termed internal rods, associated with internal part of gonopod VIII and genital chamber. Tergum IX devoid of setae, lightly sclerotized. Segment X setose, apically bearing pair of pigmented cerci surrounded by 2 pairs of membranous, digitate processes. Genital chamber opening to processus spermathecae through sclerotized circular opening of ductus spermathecae (Nielsen 1980).

Key to species groups of New World *Polyplectropus*

1. Dorsolateral process of preanal appendage bulbous and bearing dorsal microsetae (Fig. 4B) 2
- Dorsolateral process absent (Fig. 4D) or present as a distinct sclerotized lanceolate rod (Fig. 4F), without dorsal microsetae 3

- 2(1) Anterior basal plate of inferior appendage elongate, extending beyond anterior margin of sternum IX (Figs. 4B) *P. santiago* group, p. 146
- Anterior basal plate of inferior appendage short, not extending beyond anterior margin of sternum IX (Fig. 5A) *P. alienus* group, p. 47

- 3(1) Dorsal digitate lobe on mesoventral process of preanal appendage absent (Fig. 8B) 4

-	Dorsal digitate lobe on mesoventral process of preanal appendage present (Figs. 6C, 22A)	12
4(3)	Paired papillate lobe present or slight remnant indicated by presence of small setae (Figs. 8A, B)	5
-	Paired papillate lobe absent (Figs. 8C–F)	7
5(4)	Dorsolateral process of preanal appendage absent (small remnants visible at times) (Figs. 56–58)	<i>P. charlesi</i> group, p. 113
-	Dorsolateral process of preanal appendage present (may be short or elongate) (Figs. 5C–F)	6
6(5)	Intermediate appendage oblong, apex directed posterad, bearing few apical and basal setae (Fig. 37A); dorsolateral arm of dorsal phallic sclerites fused apically (Fig. 37F)	<i>P. bredini</i> group (in part), p. 76
-	Intermediate appendage digitate, apex directed mesad, and bearing large and small setae throughout dorsal surface (Fig. 5F); dorsolateral arm of dorsal phallic sclerite laterally fused subapically (Fig. 5F)	<i>P. thilus</i> group, p. 193
7(4)	Primary lobe of intermediate appendage prominent, usually digitate (Fig. 9A)	8
-	Primary lobe of intermediate appendage very small and rounded (Fig. 9C)	<i>P. manuensis</i> group, p. 130
8(7)	Intermediate appendage narrowly oblong with setae throughout entire surface, without secondary ventral lobe (Fig. 37); posterior margin of ventral branch truncate to slightly angled and may bear a row of peg-like setae (Fig. 37C); lower lip of tergum X prominent, produced beyond apex of median lobe of tergum X (Fig. 37A)	<i>P. bredini</i> group (in part), p. 76
-	Intermediate appendage simple or complex (i.e., with secondary lobes) with setae apically, medially, scattered dorsally, or basally and apically; posterior margin of ventral branch variously shaped with or without peg-like setae, if present apically not in a row (Figs. (39A, D; 43D), or also present medially (Fig. 118C); lower lip of tergum X not very prominent, usually not produced beyond apex of tergum X	9
9(8)	Intermediate appendage apically incised, with setae medially (Fig. 117A); mesoventral process of preanal appendage apparently absent, slight lateral lobe remains (Fig. 117C); anterior basal plate broad, not tapering distally (Fig. 117)	<i>P. beccus</i> Hamilton & Holzenthal, p. 224
-	Intermediate appendage oblong, bearing few apical and basal setae (Fig. 9D); mesoventral process of preanal appendage present, sometimes both processes fused mesally (Fig. 51C); anterior basal plate tapering or not distally (Figs. 41A, 51A)	10
10(9)	Dorsolateral process of preanal appendage present (Fig. 5E) or, if absent, inferior appendage with dorsal and ventral branches shallowly fused (Fig. 4E)	<i>P. bredini</i> group (in part), p. 76
-	Dorsolateral process of preanal appendage absent (Figs. 118, 120); inferior appendages with dorsal and ventral branches not shallowly fused (Fig. 118)	11
11(10)	Intermediate appendage with secondary ventral lobes (Fig. 118A); primary lobe of intermediate appendage with several apical setae (Fig. 118); peg-like setae present medially and apically on ventral branch of inferior appendage (Fig. 118); ventral branch of inferior appendage quadrate (in ventral view) (Fig. 118D)	<i>P. beutelspacheri</i> Bueno-Soria, p. 226
-	Intermediate appendage without secondary ventral lobes (Fig. 120A); setae on ventral branch of inferior appendage absent (Fig. 120D); ventral branch of inferior appendage produced posterolaterally into acute point, base of ventral branch quadrate (Fig. 120D)	<i>P. nayaritensis</i> Bueno-Soria, p. 230
12(3)	Dorsal digitate lobe on mesoventral process of preanal appendage originating apically (Figs. 5D, 6C)	13
-	Dorsal digitate lobe on mesoventral process of preanal appendage originating basally (Figs. 8A, 41)	16
13(12)	Ventral branch of inferior appendage broadly oblong or quadrate (Fig. 11C)	14
-	Ventral branch of inferior appendage digitate (Fig. 10A)	<i>P. annulicornis</i> group, p. 50
14(13)	Peg-like spines present in endothelial phallic membrane (Figs. 62E, F, H); dorsolateral process of preanal appendage absent (Figs. 62A, C)	<i>P. guyanae</i> group, p. 127
-	Endothelial phallic membrane with or without spines, if present not peg-like (Fig. 67E); dorsolateral process of	

preanal appendage present (Fig. 41A) or absent (Fig. 59A)	15
15(14) Lanceolate spines present in endothecal phallic membrane (Figs. 60E, F); intermediate appendage complex (with more than 1 lobe) (Figs. 59–61A)	<i>P. fuscatus</i> group (in part), p. 120
- Spines absent in endothecal phallic membrane (Figs. 53E, F); inferior appendage with dorsal and ventral branches shallowly fused (Figs. 4E, 53)	<i>P. bredini</i> group (<i>P. petrae</i>), p. 106
16(12) Dorsal branch of inferior appendage without peg-like setae (Fig. 11E); apex of mesoventral process of preanal appendage sclerotized, laterally without small papillate lobe (Figs. 59–61C,)	17
- . Dorsal branch of inferior appendage with peg-like setae (Figs. 41A, C, D); apex of mesoventral process of preanal appendage not sclerotized, laterally with small papillate lobe (Fig. 41C)	<i>P. bredini</i> group (<i>P. colombianus</i>), p. 85
17(16) Ventral branch of inferior appendage shorter than dorsal branch (never the same size) (Figs. 67–71)	<i>P. narifer</i> group, p. 136
- Ventral branch of inferior appendage equal in size or longer than dorsal branch (Figs. 59–61)	<i>P. fuscatus</i> group (in part), p. 120

Species descriptions

Polyplectropus alienus species group

This group was established by Bueno-Soria (1990) to include only the nominal species based on the shape of the inferior appendage having the dorsal and ventral branches greatly separated. The character identified by Bueno-Soria to recognize species in this group can be applied to almost all other groups with the exception of the *P. manuensis* group and certain species in the *P. bredini* group. New features characterizing the *P. alienus* group are presented and a second species is included, *P. inarmatus* Flint. *Polyplectropus alienus* had until now only been recorded from Mexico. However, this species has been found to also occur in Bolivia. *Polyplectropus inarmatus* is distributed throughout northern South America.

The *P. alienus* group is characterized by the combined possession of the following characteristics:

1. Intermediate appendage large, broadly deltoid, and membranous [Bueno-Soria (1990: 373) confused the intermediate appendage with the median lobe of segment X] (Figs. 20A–C, 21A–C);
2. Dorsolateral process of preanal appendage bulbous, bearing dorsal microsetae (Figs. 20A–C, 21A–C);
3. Mesoventral process of preanal appendage hook-like, apex down-turned and strongly curved (Figs. 20A, 21A);
4. Dorsal branch of inferior appendage with posteroventral margin slightly produced (Figs. 20A, 21A);
5. Phallic spines elongate and robust (Figs. 20E, F, 21E, F);
6. Dorsolateral arms apically fused and produced beyond apex of dorsal phallic sclerite (synapomorphy)(Figs. 20E, F).

Polyplectropus alienus Bueno-Soria

Figs. 20, 125, 133

Polyplectropus alienus Bueno-Soria, 1990: 373. [Type locality: Mexico, Chiapas, Ocosingo, Finca El Real, Río Santa Cruz; INHS; male].

Polyplectropus alienus is most similar to *P. inarmatus* Flint based on the membranous and broadly deltoid intermediate appendage, the shape of the dorsal branch of the inferior appendage, the shape of the mesoventral process of the preanal appendage, and the presence of elongate, robust sclerotized phallic spines.

Polyplectropus alienus is distinguished from *P. inarmatus* by the more dorsally expanded apex (fused dorsolateral arms) of the dorsal phallic sclerite, by the elongate and deltoid ventral branch of the inferior appendage (quadrate in *P. inarmatus*), and by the basally free endotheal spines (basally fused in *P. inarmatus*).

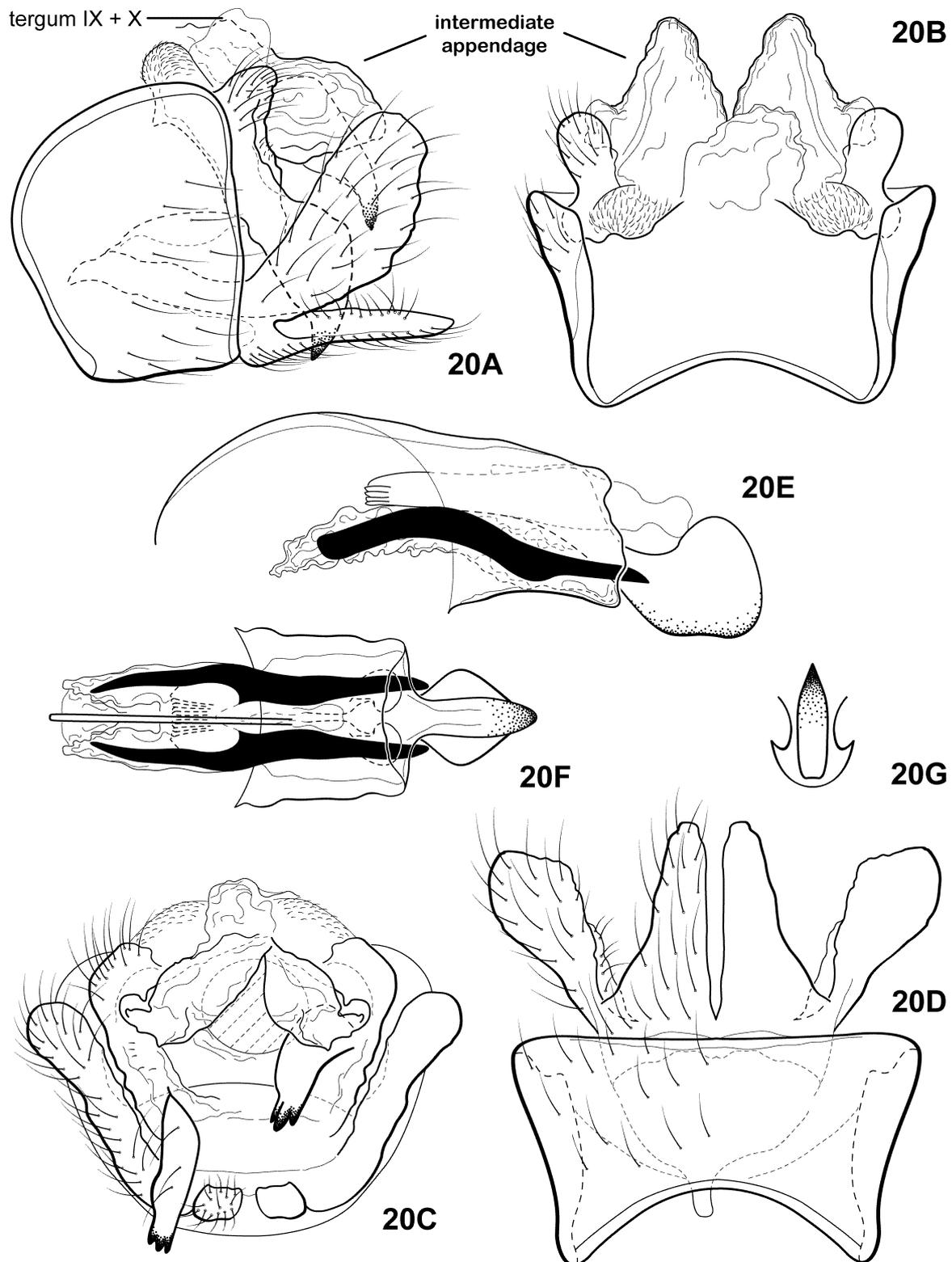


FIGURE 20. Male genitalia of *Polyplectropus alienus* Bueno, 1990 (mesoventral process of left preanal appendage broken) (holotype): A—left lateral view ; B—dorsal view; C—caudal view; D—ventral view; E—G—phallus: E—left lateral view; F—dorsal view; G—apex, caudal view.

Adult. Length of forewing 4–4.2 mm, n = 3. Color of head, thorax, and legs yellowish-brown. Specimen preserved in alcohol.

Male genitalia. Sternum IX in lateral view rounded to subquadrate, anterior margin supramedi ally convex, posterior margin entire; in ventral view rectangular, anterior margin concave, posterior margin entire. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, broad, membranous, with short setae medially and apically; in dorsal view deltoid, basally produced laterad, broadly rounded apically; in caudal view oblong, directed posterolaterad, meeting basomesally. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view orbicular, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process trilobed. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, with posteroventral margin slightly produced; in ventral view broad, lateral margin apically produced, sinuate, posterior margin truncate, mesal margin slightly undulate, slightly convex, becoming concave, expanding posterad into ventral branch; ventral branch setose, elongate, in lateral view lanceolate, narrowing posteriorly; in ventral view deltoid, mesal margin straight, posterior margin subacute, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex narrowed, dorsolateral arms of dorsal phallic sclerite fused apically, enlarged, subquadrate; apex of dorsal phallic sclerite in dorsal view acute (Fig. 20F), subapically expanded laterad; endothelial membrane with 2 stout, elongate, sclerotized spines.

Female genitalia. Ventral plates of segment VIII setose, in ventral view narrowly oblong being almost 4 times longer than wide; in lateral view oblong; external part of gonopod of segment VIII in ventral view with posterior margin obtuse, in lateral view oblong; internal part of gonopod sclerotized, in ventral view oblong, not meeting mesally. Tergum IX devoid of setae, lightly sclerotized. Segment X setose, apically bearing a pair of sclerotized cerci surrounded by 2 pairs of membranous digitate processes. Genital chamber opening to processus spermathecae through sclerotized circular opening of ductus spermathecae.

BOLIVIA: Santa Cruz: P[arque] N[acional] & A[rea] N[atural] [de] M[anejo] I[ntegrado] Amboró, Guarda Parque Mataracú, Q[uebrada] Verde Uno, 17°33'14"S, 63°52'09"W, 374 m, 19–23.xi.2004, Robertson, Garcia, Vidaurre—1 male (UMSP); **MEXICO: Chiapas:** Ocosingo, Finca El Real, Río Santa Cruz, [16°24'00"N, 92°24'00"W], 1.vii.1950, C&M Goodnight, & L Stannard ["INHS Trichop. 24589] ["HOLOTIPO", white label]—1 male [holotype] (INHS), 1 female [paratype] (INHS).

Distribution. Bolivia and Mexico. The specimens examined from these 2 distant localities are identical.

***Polyplectropus inarmatus* Flint**

Figs. 16G, 21, 133

Polyplectropus inarmatus Flint, 1971: 26. [Type locality: Brazil [Edo. Amazonas], Río Marauíá, Endstation vor langer Cachoeira; NMNH; male].

Polyplectropus inarmatus is similar to *P. alienus* Bueno-Soria based on the membranous and broadly deltoid intermediate appendage, the shape of the dorsal branch of the inferior appendage, the shape of the mesoventral process of the preanal appendage, and the presence of 2 elongate, robust sclerotized phallic spines. *Polyplectropus inarmatus* is distinguished from *P. alienus* by the dorsally narrower apex of the dorsal phallic sclerite, by the quadrate ventral branch of the inferior appendage (deltoid in *P. alienus*), and by the basally fused endothelial phallic spines (basally free in *P. alienus*).

Adult. Length of forewing 3.5–4.5 mm, n = 8. Color of head, thorax, and legs yellowish-brown.

Male genitalia. Sternum IX in lateral view rounded to subquadrate, anterior margin supramedi ally convex, posterior margin sinuate; in ventral view rectangular, anterior margin entire, posterior margin sinuate. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, broad and membranous, with long apical setae; in dorsal view deltoid, broadly rounded apically; in caudal view broadly deltoid, directed posterolaterad, basally meeting mesally. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view ovate, in lateral view broadly convex; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin sinuate, posterior margin convex; in caudal view not fused basomesally, processes slightly separated, ventral margin of process trilobed. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, with posteroventral margin slightly produced ventrad; in ventral view narrow, lateral margin apically produced, entire, posterior margin undulate, mesal margin slightly undulate, apically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, elongate, in lateral view lanceolate, medially produced laterad; in ventral view subquadrate, posterior margin concave, mesal margin straight, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex pandurate and dorsally sclerotized; apex of dorsal phallic sclerite in dorsal view acute; dorsolateral arm of dorsal phallic sclerite apically fused; in dorsal view tapering subapically; endothelial membrane with 1 stout, elongate, basally and medially bifurcating sclerotized spine.

Material examined. **BRAZIL: Amazonas:** Río Marauia, Endstation vor langer Cachoeira, Fluss tritt hier aus dem Gebirge starkem Gefalle, [00°08'00"S, 67°05'00"W], 24.i.1963, E.J. Fittkau—1 male [holotype] (NMNH); Rio Irapiro, Pont Inhira, eine Tagesreise oberhalb Mündung, stark fließendes Wasser, Wasseranstieg etwa 50 cm. in 3 Stufen, [00°24'00"S, 65°02'00"W], 13.i.1963, E.J. Fittkau—1 male (NMNH); **ECUADOR: Pastaza:** 1°19'00"S, 77°28'00"W, 1200 m, 22.v.1976, J Cohen—2 males; Tzapino, 32 km NE Tigueno, 1°11'05"S, 77°14'00"W, 400 m, 25.v.1976, J Cohen—6 males, 4 females (NMNH); **Sucumbios:** Cuyabeno (20 km W), 00°16'00"S, 75°53'00"W, 24.iv.1976, J Cohen—1 male (NMNH); Limoncocha (70 mi. SE), 00°24'00"S, 76°37'00"W, 28.v.1976, J Cohen—1 male (NMNH); **PERU: Pasco:** Puerto Bermudez, Río Pichis, [10°17'47"S, 74°56'11"W], 15.vii.1920 [No data about collector]—1 male (NMNH).

Distribution. Brazil, Ecuador, Perú and Surinam (Flint 1974).

Key to males of *P. alienus* species group

1. Ventral branch of inferior appendage apically acute; apex of phallus greatly enlarged; endothelial phallic spines basally free (Fig. 20) *P. alienus* Bueno-Soria.
- Ventral branch of inferior appendage apically broad, quadrate; apex of phallus not greatly enlarged; endothelial phallic spines basally fused (Fig. 21) *P. inarmatus* Flint.

Polyplectropus annulicornis species group, newly recognized

The *P. annulicornis* species group is established for 11 species, 8 here described as new, sharing the characteristics outlined below. The species-level phylogeny suggested a sister relationship between *P. paysandu* Angrisano and the clade containing the remaining 10 species of the group (*P. annulicornis* group *sensu stricto*). *Polyplectropus paysandu* from Uruguay is included in the *P. annulicornis* group even though it possesses several unique, autapomorphic characteristics not shared with other species. Future collecting in southern South America may reveal additional species possessing characters currently only found in *P. paysandu*, which may warrant the creation of another species group. However, in this study the definition of the *P. annulicornis* group is broadened to include *P. paysandu* instead of establishing a monobasic *P.*

paysandu species group. The *P. annulicornis* group is characterized by the combined possession of the following traits:

1. Presence of an elongate, cylindrical dorsolateral process of the preanal appendage (absent in *P. paysandu*) (Figs. 32A–C);

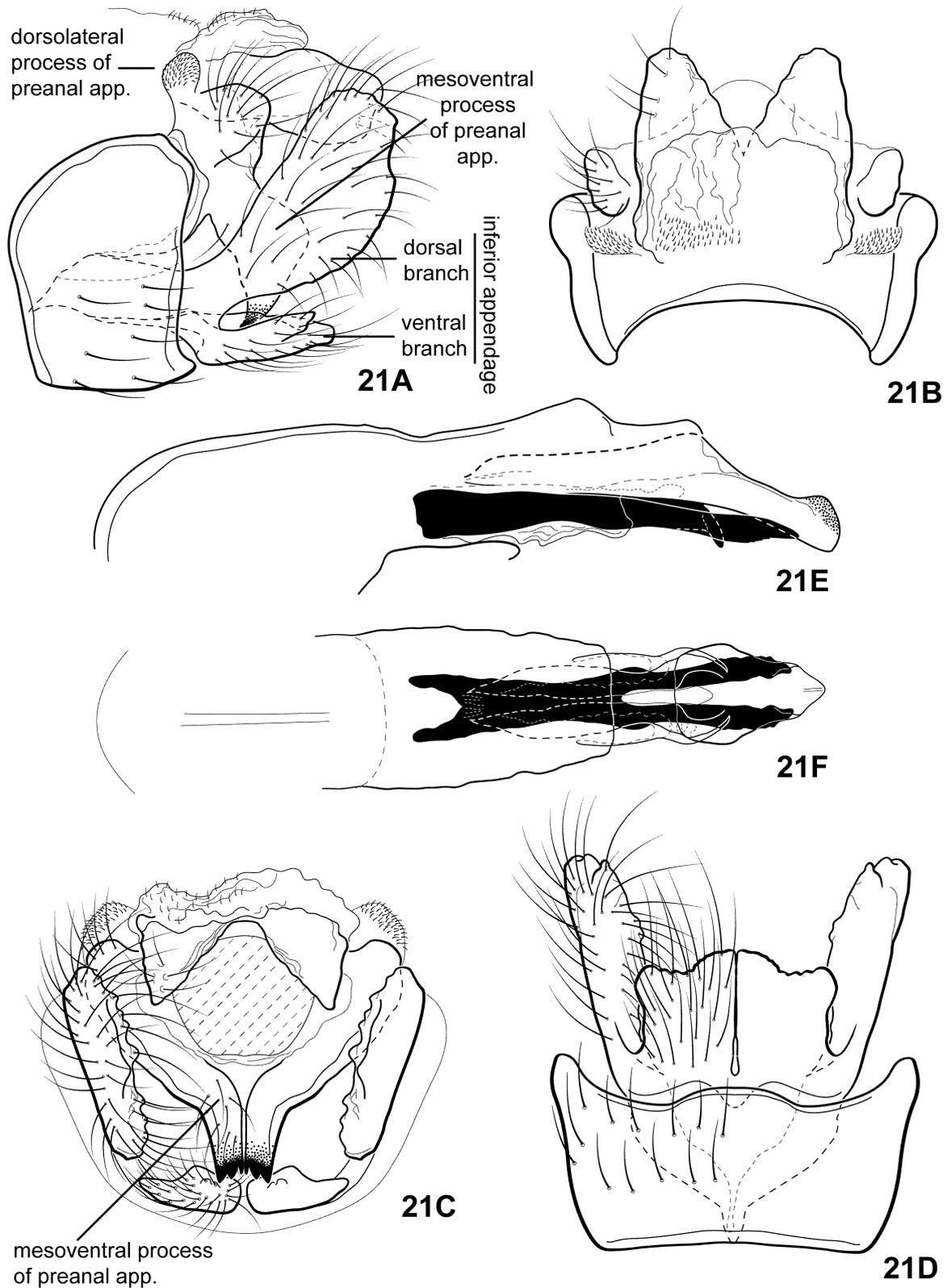


FIGURE 21. Male genitalia of *Polyplectropus inarmatus* Flint, 1971 (paratype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view; F—phallus, dorsal view.

2. Mesoventral process of preanal appendage with digitate dorsal projection (absent in *P. paysandu*) (Figs. 32A–C);
3. Intermediate appendage digitate bearing apical setae (upturned and apically sclerotized in *P. paysandu*) (Figs. 32A–C);
4. Inferior appendage with pandurate or oblong dorsal branches, generally directed posterad or posterodorsad and digitate ventral branch; dorsal branch at least 2x as long as the ventral branch, usually no more than 3x longer;
5. Anterior base of inferior appendage anteriorly bilobed;
6. Phallic endothelial membrane with embedded sclerotized spines.

Several species in the group are dark-brown, appearing almost black. Dark-brown species may have slight grey markings on the forewings. Other species are brown and have greyish mottling on the wings. Additional species have both color patterns (i.e., *P. matatlanticus*).

Most species in the group are quite similar to one another in the shapes of the preanal and intermediate appendages and to a lesser extent in the shape of the inferior appendage. The ventral branch of the inferior appendage varies among species in the group, particularly in the presence or absence of dorsal projections and in the shape of the apex. Additionally, the dorsal lobe of the mesoventral process of the preanal appendage varies between species in length and at times it is a diagnostically important character. However, in *P. hystricosus* this character varies within the species. For most species, differences among the species are characterized by the shape of the endothelial spines, visible only when the genitalia have been cleared.

***Polyplectropus alatespinus*, new species**

Figs. 22, 130

Polyplectropus alatespinus is most similar to *P. novafriburgensis*, new species, in the overall shape of the preanal, intermediate, and inferior appendages. *Polyplectropus alatespinus* can be distinguished from *P. novafriburgensis* by the spines in the endothelial membrane, these being projected anterolaterad in *P. alatespinus* when the endothelial membrane is everted and not V-shaped as in *P. novafriburgensis*; by the presence of peg-like setae on the dorsal surface of the ventral branch of the inferior appendage, and by its ventral branch being more elongate and sinuate.

Adult. Length of forewing 5.2–6.2 mm, n = 27. Color of head, thorax, and legs dark-brown; setae on body dark-brown with golden reflections; setae on wings dark-brown with golden reflections, entire specimen appearing black from a distance.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire and straight, posterior margin submedially concave; in ventral view rectangular, anterior margin concave, becoming straight, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, digitate, with pair of long apical setae; in dorsal view digitate; in caudal view digitate, directed posterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering into acute apex; mesolateral process setose; in dorsal view obovate, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, dorsally produced into digitate lobe, with ventrad-directed sclerotized apex, ventral margin sinuate, posterior margin truncate; in caudal view processes separated with dorsal digitate lobe, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view, and anteriorly bilobed; dorsal branch setose, in lateral view oblong, directed posterad; in ventral view broad, lateral margin subapically produced, undulate, posterior margin cuspidate, mesal margin slightly undulate, angled, expanding posterad into ventral branch; ventral branch

setose, elongate, bearing robust, sclerotized spines basally, in lateral view digitate, narrowing posterodorsad; in ventral view digitate, posteromesal margin sinuate, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view rounded; endotheal membrane with 2 stout, medium-sized, sclerotized spines, apically bent dorsad, spines projecting anterola-terad if endotheal membrane protracted (everted).

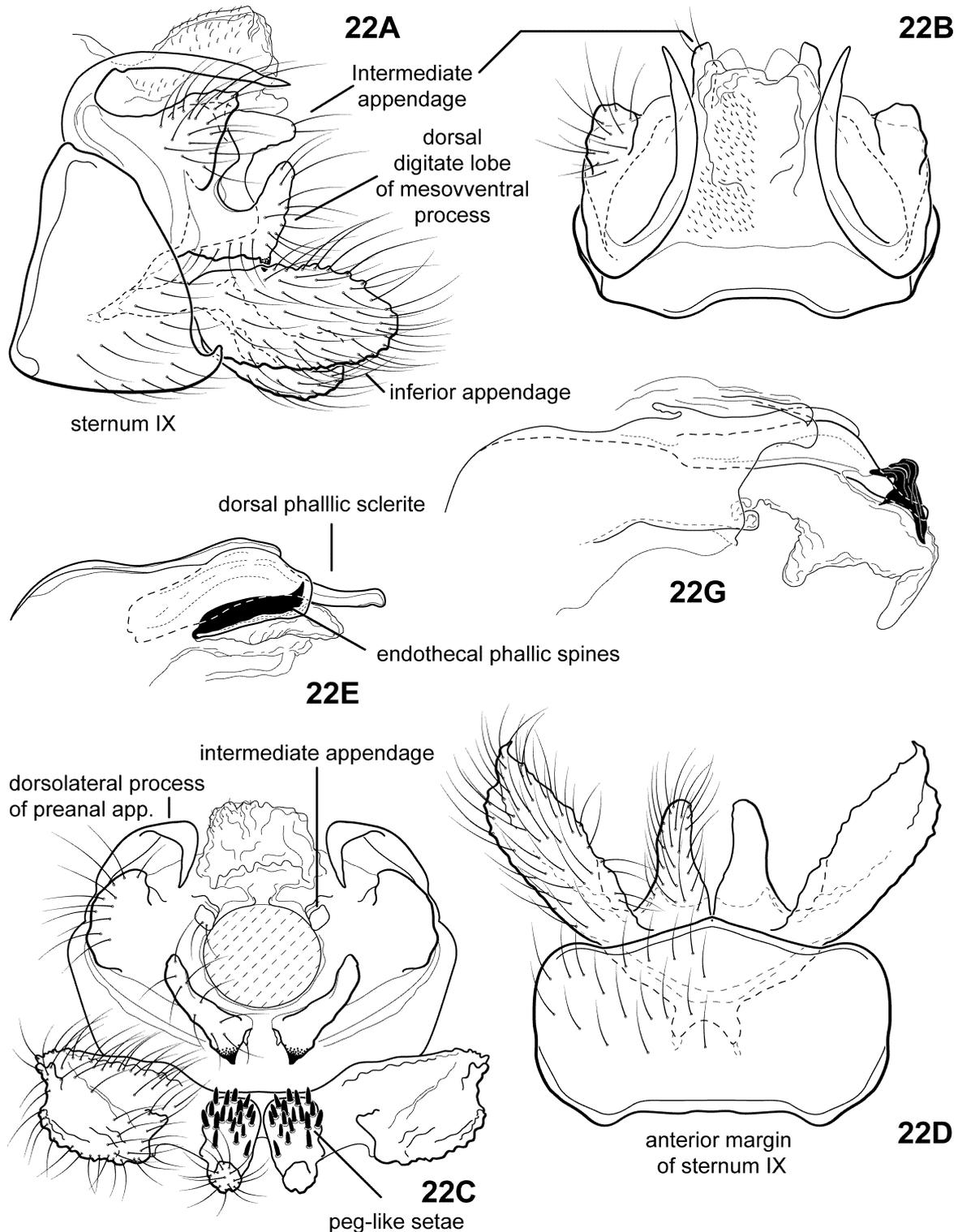


FIGURE 22. Male genitalia of *Polyplectropus alatespinus*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view, with endotheca retracted (inverted); G—phallus, left lateral view, with endotheca protracted (everted).

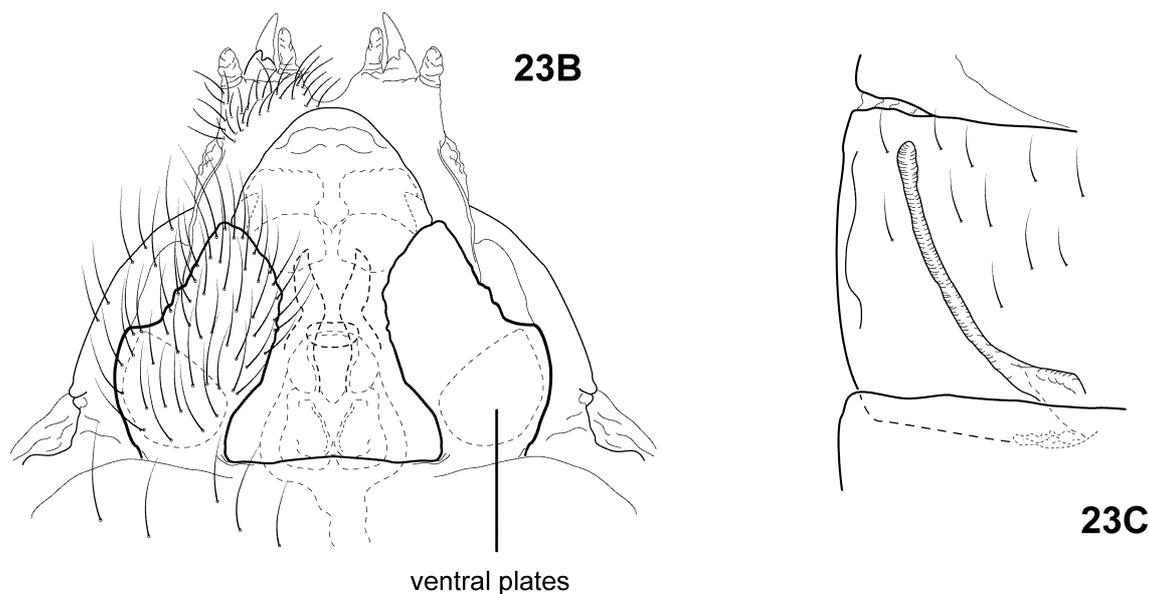


FIGURE 23. Female genitalia of *Polyplectropus alatespinus*, new species (paratype): B—ventral view; C—right half of sternite V, ventral view.

Female genitalia. Ventral plates of segment VIII setose, in ventral view oblong, lateral margin narrowing medially; in lateral view oblong; external part of gonopod of segment VIII in ventral view with posterior margin rounded, in lateral view clavate, curved dorsad; internal part of gonopod sclerotized, in ventral view subquadrate, not meeting mesally. Tergum IX devoid of setae, lightly sclerotized. Segment X setose, apically bearing pair of sclerotized cerci surrounded by 2 pairs of membranous digitate processes. Genital chamber opening to processus spermathecae through sclerotized circular opening of ductus spermathecae.

Holotype male: BRAZIL: Minas Gerais: Parque Estadual do Ibitipoca, Corrego dos Macacos, 21°42'33"S, 44°53'36"W, 1360 m, 19–20.xi.2001, Holzenthal, Blahnik, Neto & Paprocki—(UMSP000081869) (MZUSP).

Paratypes: BRAZIL: Minas Gerais: Parque Estadual do Ibitipoca, Corrego dos Macacos, 21°42'33"S, 44°53'36"W, 1360 m, 19–20.xi.2001, Holzenthal, Blahnik, Neto & Paprocki—2 males, 2 females (UMSP); **Rio de Janeiro:** Parque Nacional do Itatiaia, Rio Campo Belo, 22°27'02"S, 44°36'49"W, 1300 m, 23.xi.2001, Holzenthal, Blahnik, Neto & Paprocki—3 males, 3 females (NMNH); 7.iii.2002, Holzenthal, Blahnik, Paprocki & Prather—9 males; Rio Campo Belo, trail to Veu da Noiva, 22°25'42"S, 44°37'10"W, 1310 m, 24.xi.2001, Holzenthal, Blahnik, Neto & Paprocki—1 male, 3 females (MZUSP); 5.iii.2002, Holzenthal, Blahnik, Paprocki & Prather—1 male, 1 female (MZUSP); **São Paulo:** Parque Estadual de Campos do Jordão, Rio Galharada, 22°41'40"S, 45°27'47"W, 1530 m, 4–5.iii.1996, Holzenthal & Guahyba—1 male (UMSP).

Distribution. Brazil.

Etymology. The specific epithet “*alatespinus*” is derived from the Latin words for winged “*alater*” and spine “*spina*” (Brown 1985) in reference to the shape of the phallic spines, which resemble a pair of wings when the endotheca everts.

***Polyplectropus amazonicus*, new species**

Figs. 24, 130

Polyplectropus amazonicus, new species, is very distinct from other species in the group. It is most similar to *P. rodmani*, new species in the elongate dorsal lobe of the mesoventral process of the preanal appendage and

in the presence of a sclerotized dorsal projection on the ventral branch of the inferior appendage. *Polyplectropus amazonicus* may be superficially mistaken with *P. profaupar* Holzenthal & Almeida in the presence of a row of small lateral spines on the dorsolateral process of the preanal appendage; however *P. amazonicus* differs from *P. profaupar* in several aspects of the shape of the dorsal and ventral branches of the inferior appendage and the mesoventral process of the preanal appendage. Even so, *P. amazonicus* is readily distinguished from *P. rodmani*, *P. profaupar* and all other species by the acutely tapering, dorsally produced dorsolateral arm of the dorsal phallic sclerite (Figs. 24E, F).

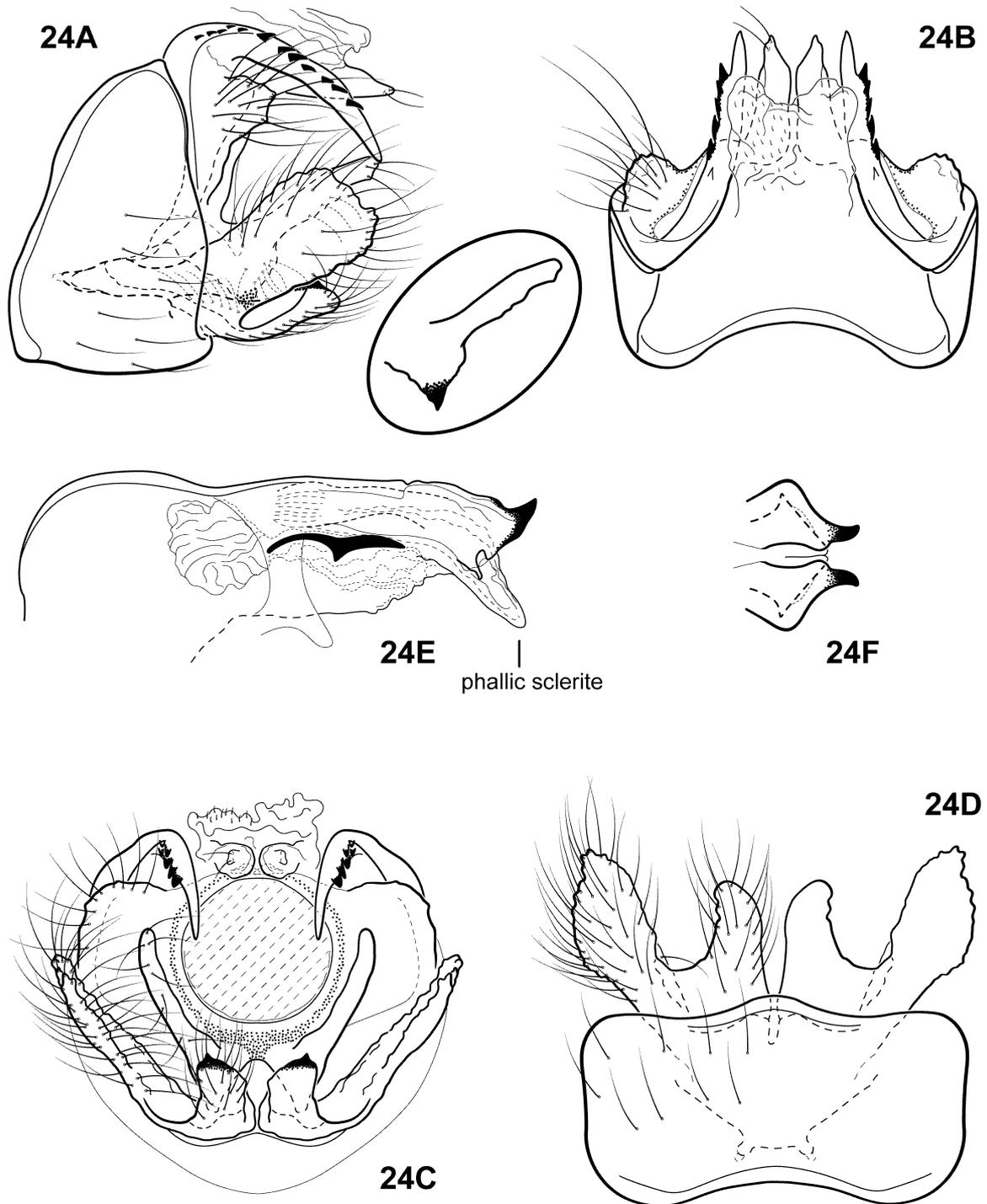


FIGURE 24. Male genitalia of *Polyplectropus amazonicus*, new species (holotype): A—left lateral view and inset of mesoventral process of left preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E—F—phallus: E—left lateral view; F—apex, dorsal view.

Adult. Length of forewing 5 mm, n = 1. Color of head, thorax, and legs dark-brown; setae on body dark-brown with golden reflections; tegulae with dark-brown setae; setae on wings dark-brown with golden reflections, entire specimen appearing black from a distance.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin medially produced; in ventral view rectangular, anterior margin concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, digitate, with a pair of long apical setae; in dorsal view digitate; in caudal view rounded, directed posterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering mesally into acute apex, laterally with row of short, sclerotized spines; mesolateral process setose; in dorsal view obovate, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, dorsally produced into elongate, digitate lobe, ventral margin slightly concave, posterior margin sinuate; in caudal view processes separated, with dorsal digitate lobe, ventral margin of process subacute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view, anteriorly bilobed; dorsal branch setose, in lateral view pandurate, posteroventrally produced; in ventral view broad, lateral margin subapically produced, undulate, posterior margin undulate and subacute, mesal margin slightly undulate, angled, expanding posterad into ventral branch; ventral branch setose, elongate, in lateral view digitate, rounded posterad and subapically produced dorsad into highly sclerotized point; in ventral view digitate, posteromesal margin rounded, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong and directed ventrad; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view produced dorsad, tapering posterodorsad into acute, sclerotized point; in dorsal view subapically enlarged, apex tapering into laterally directed point and extending beyond apex of phallic sclerite; endothecal membrane with 2, small, sclerotized spines.

Holotype male: VENEZUELA: Amazonas: Cerro de la Neblina, Camp III, 00°56'10"N, 66°03'53"W, 1820 m, 15–17.ii.1984, D. Davis—(UMSP000107519) (NMNH).

Distribution. Venezuela.

Etymology. This species is named for the province in Venezuela where the type was collected.

***Polyplectropus annulicornis* Ulmer**

Figs. 25, 141

Polyplectropus annulicornis Ulmer, 1905b: 91. [Type locality: Brazil, Rio Gr. do Sul; NMW; female].—Flint, 1966a: 4 [lectotype female].

This species resembles *P. rodmani*, new species, in having 2 elongate, endothecal spines in the phallus and in the overall shape of the male genitalia. However, *P. annulicornis* can be distinguished from *P. rodmani* by the posterior projection of the ventral branch of the inferior appendage, being more or less flat in *P. rodmani*, thus the dorsal, sclerotized projection originates more mediad on the dorsal surface of the ventral branch in *P. annulicornis* and more proximal in *P. rodmani*. The laterally directed intermediate appendage, the more elongate ventral branch of the inferior appendage, and a shorter dorsal lobe of the mesoventral process of the preanal appendage are also useful characters to distinguish *P. annulicornis* from this species.

Adult. Length of forewing 5.3–6 mm, n = 8. Color of head, thorax, and legs brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings brown with scattered patches of golden setae.

Male genitalia. Sternum IX in lateral view broadly deltoid, anterior margin submedially produced, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae.

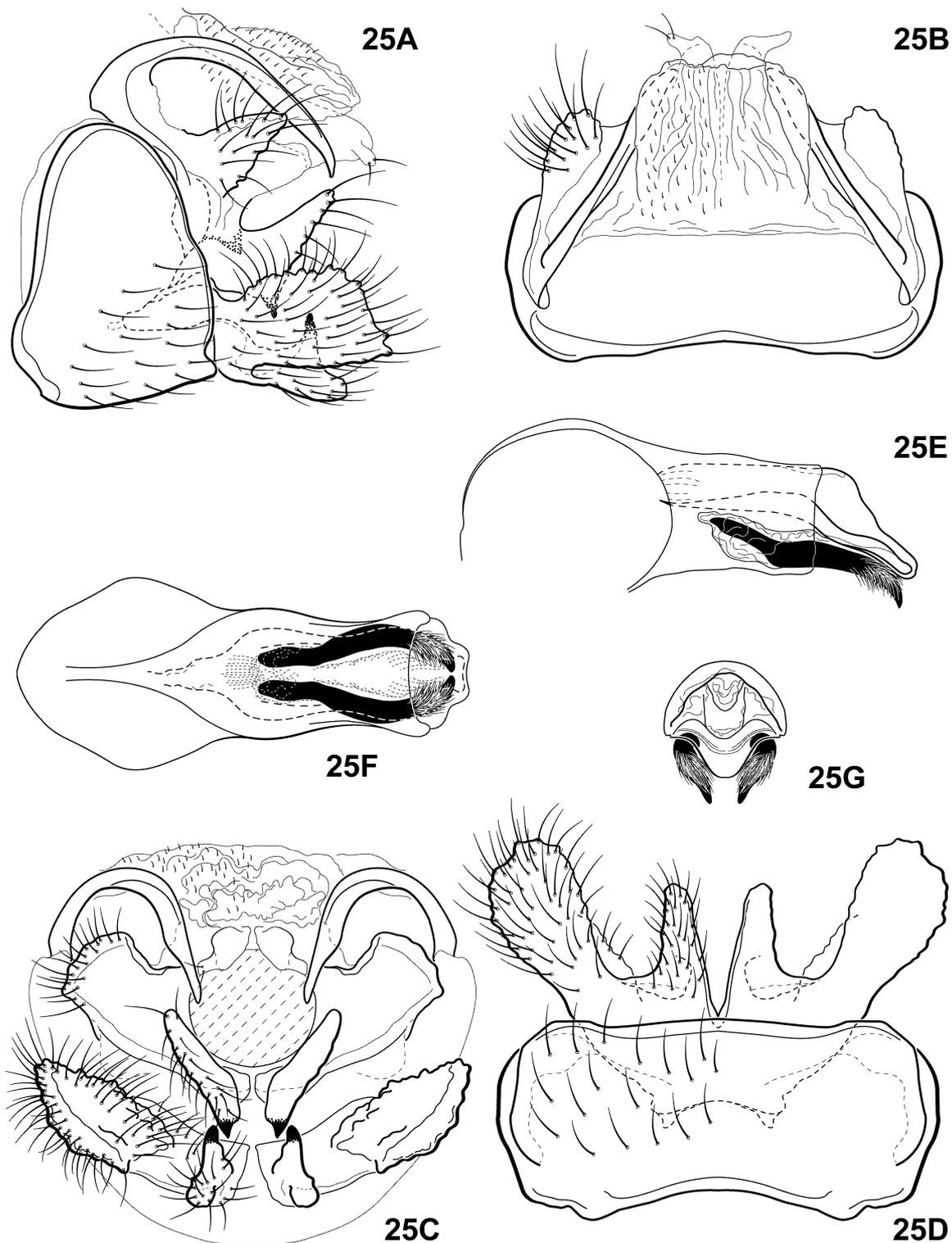


FIGURE 25. Male genitalia of *Polyplectropus annulicornis* Ulmer, 1905 (Brazil) A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–G—phallus: E—left lateral view; F—dorsal view; G—caudal view.

Intermediate appendage as long as inferior appendage, digitate, with apical setae; in dorsal view digitate, apex narrowing laterad; in caudal view digitate, curved, directed ventrolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering mesally into acute apex, slightly expanded subapically; mesolateral process setose; in dorsal view oblong, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, dorsally produced into digitate lobe with ventrad-directed sclerotized apex, ventral margin concave, posterior margin slightly angled; in caudal

view processes separated, with dorsal digitate lobe, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view, anteriorly bilobed; dorsal branch setose, in lateral view quadrate, posterior margin truncate and subapically slightly produced posterad; in ventral view broad, lateral margin subapically produced, undulate, posterior margin undulate and rounded, mesal margin slightly undulate, apically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, elongate, bearing acute, medial projection, in lateral view digitate, rounded posterad; in ventral view oblong, mesal margin slightly angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view emarginate; endothecal membrane with 2 stout, medium-sized, sclerotized spines, apex directed ventromesad, bearing apical setae.

Female genitalia. Similar to female of *P. alatespinus*.

Material Examined. **BRAZIL: Paraná:** trib[utary] to Rio Mãe Catira, 10.5 km N Porto de Cima, 25°21'47"S, 48°52'35"W, 200 m, 10.xii.1997, Holzenthal & Huisman—1 male (UMSP); Rio Mãe Catira, 10 km N Porto de Cima, 25°21'49"S, 48°52'28"W, 200 m, 8–9.xii.1997, Holzenthal & Huisman—1 male (UMSP); **Santa Catarina,** Nova Teutônia, 20.viii.1939, F. Plaumann—1 male (MCZ); same, 17.ix.1939, F. Plaumann—1 female (MCZ); same, 4.x.1939, F. Plaumann—1 female (MCZ); Nova Teutônia, 27°11'00"S, 52°23'00"W, 300–500 m, viii.1963, F. Plaumann—2 males (NMNH); same, ix.1963, F. Plaumann—1 male (NMNH).

Distribution. Brazil.

Remarks. According to Flint (1966) the syntypic series consisted of females. He designated a female lectotype and compared it to a series of males and female also previously collected by Plaumann. Flint illustrated the male genitalia from this series. We believe the males and females collected by Plaumann in 1939 and carefully compared by Flint with the lectotype, are the ones we examined and illustrated.

***Polyplectropus gaesum*, new species**

Figs. 26, 140

Polyplectropus gaesum is similar to *P. annulicornis* Ulmer and *P. rodmani*, new species in the presence of elongate endothecal phallic spines, however it differs from both species in that the spines are longer and the apices are directed dorsad instead of ventrad. It also differs from those species in the rounded, less acute apex of the mesoventral process of the preanal appendage, and in the shape of the ventral branch of the inferior appendage. In *P. gaesum* the basodorsal surface of the ventral branch is robustly produced dorsad. Also, the apex of the ventral branch is distinctively longer, narrower, and laterally more excavate medially than in *P. rodmani* and *P. annulicornis*. Additionally, the dorsolateral process of the preanal appendage of *P. gaesum* has a serrate lateral margin.

Adult. Length of forewing 4.5–5 mm, n = 4. Color of head, thorax, and legs yellowish-brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view broadly deltoid, anterior margin submedially produced, posterior margin supramedi ally produced; in ventral view rectangular, anterior margin concave, becoming straight, posterior margin entire and straight. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, digitate, with a pair of long apical setae; in dorsal view digitate; in caudal view digitate, directed ventrolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering into acute apex, lateral margin serrate; mesolateral process setose; in dorsal view obovate, in lateral view deltoid; mesoventral

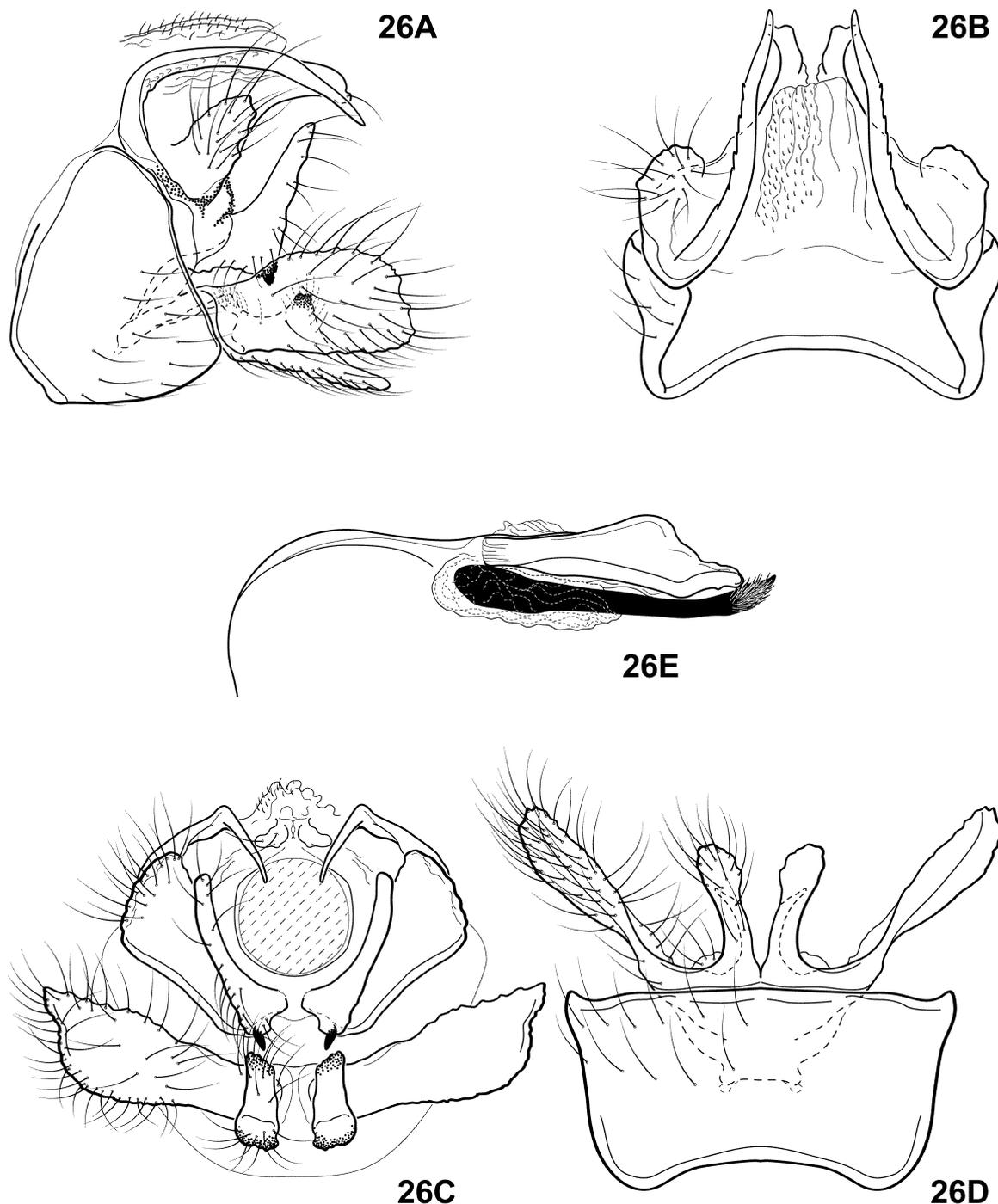


FIGURE 26. Male genitalia of *Polyplectropus gaesum*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

process setose; in lateral view hook-like, dorsally produced into digitate lobe, with ventrad-directed sclerotized apex, ventral margin slightly concave, posterior margin entire; in caudal view processes separated with dorsal digitate lobe, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view, anteriorly bilobed; dorsal branch setose, in lateral view oblong, apex truncate; in ventral view narrow, broadening apically, lateral margin convex, posterior margin rounded, mesal margin slightly undulate, angled, expanding posterad into ventral branch; ventral branch setose, elongate, with robust, medial dorsal projection, in lateral view digitate, rounded posterad; in ventral view digitate, posteromesal margin sinuate, gradually converging mesally.

Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view rounded; endothecal membrane with 2 stout, elongate, sclerotized spines, apically bent dorsad, bearing apical setae.

Female genitalia. Similar to female of *P. alatespinus*.

Holotype male: BRAZIL: Minas Gerais: Serra do Cipo, trib[utary] to Rio Capivara, 19°14'24"S, 43°34'56"W, 1000 m, 18.ii.1998, Holzenthal & Paprocki—(UMSP000032940) (MZUSP).

Paratypes: BRAZIL: Minas Gerais: Serra do Cipo, trib[utary] to Rio Capivara, 19°14'24"S, 43°34'56"W, 1000 m, 18.ii.1998, Holzenthal & Paprocki—3 females.

Distribution. Southeastern Brazil.

Etymology. The specific epithet is derived from the Latin word “gaesum” meaning “a heavy iron javelin” (Brown 1985) in reference to the stout, elongate endothecal phallic spines. Used as a noun in apposition.

***Polyplectropus hystricosus*, new species**

Figs. 27, 28, 140

This species can be distinguished from all other species in the group by the presence of many short, sclerotized, peg-like spines in the phallic endothecal membrane. When the endothecal membrane everts, it is oblong and bent anteriorly bearing peg-like spines basolaterally and along the ventral and apical margins. An elongate, basally fused spine may be present basodorsally. When the endothecal membrane is not everted *P. hystricosus* most resembles *P. alatespinus*, new species, but differs from this species in the elongate dorsal lobe of the mesoventral process of the preanal appendage (almost 2x longer than in *P. alatespinus*). However, sometimes the dorsal lobe may not be as long in *P. hystricosus* (Figs. 28A, C).

Adult. Length of forewing 5–5.5 mm, n = 7. Color of head, thorax, and legs dark-brown; setae on body dark-brown with golden reflections; tegulae with dark-brown setae; setae on wings dark-brown with golden reflections, entire specimen appearing black from a distance.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin submedially concave; in ventral view rectangular, anterior margin concave becoming straight, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view bilobed; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, digitate, with a pair of long apical setae; in dorsal view digitate; in caudal view digitate, directed posteromesad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering into acute apex; mesolateral process setose; in dorsal view obovate, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, dorsally produced into elongate, digitate lobe (variable form has shorter dorsal digitate lobe), with ventrad-directed sclerotized apex, ventral margin concave, posterior margin sinuate; in caudal view processes separated with dorsal digitate lobe, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view and anteriorly bilobed; dorsal branch setose, in lateral view oblong; in ventral view narrow, lateral margin convex, undulate, posterior margin subacute, mesal margin slightly undulate, angled, expanding posterad into ventral branch; ventral branch setose, elongate, bearing robust, sclerotized spines basally, in lateral view digitate, rounded posterad; in ventral view digitate, posteromesal margin angled, gradually converging mesally. Phallus elongate; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view rounded; endothecal membrane bearing many short, sclerotized, peg-like spines, when endothecal membrane everts, spines arranged basolaterally and along ventral and apical margins of upturned, oblong membrane (Figs. 28E, 27E); may also bear a dorsal, elongate, basally fused spine (Figs. 27E, F).

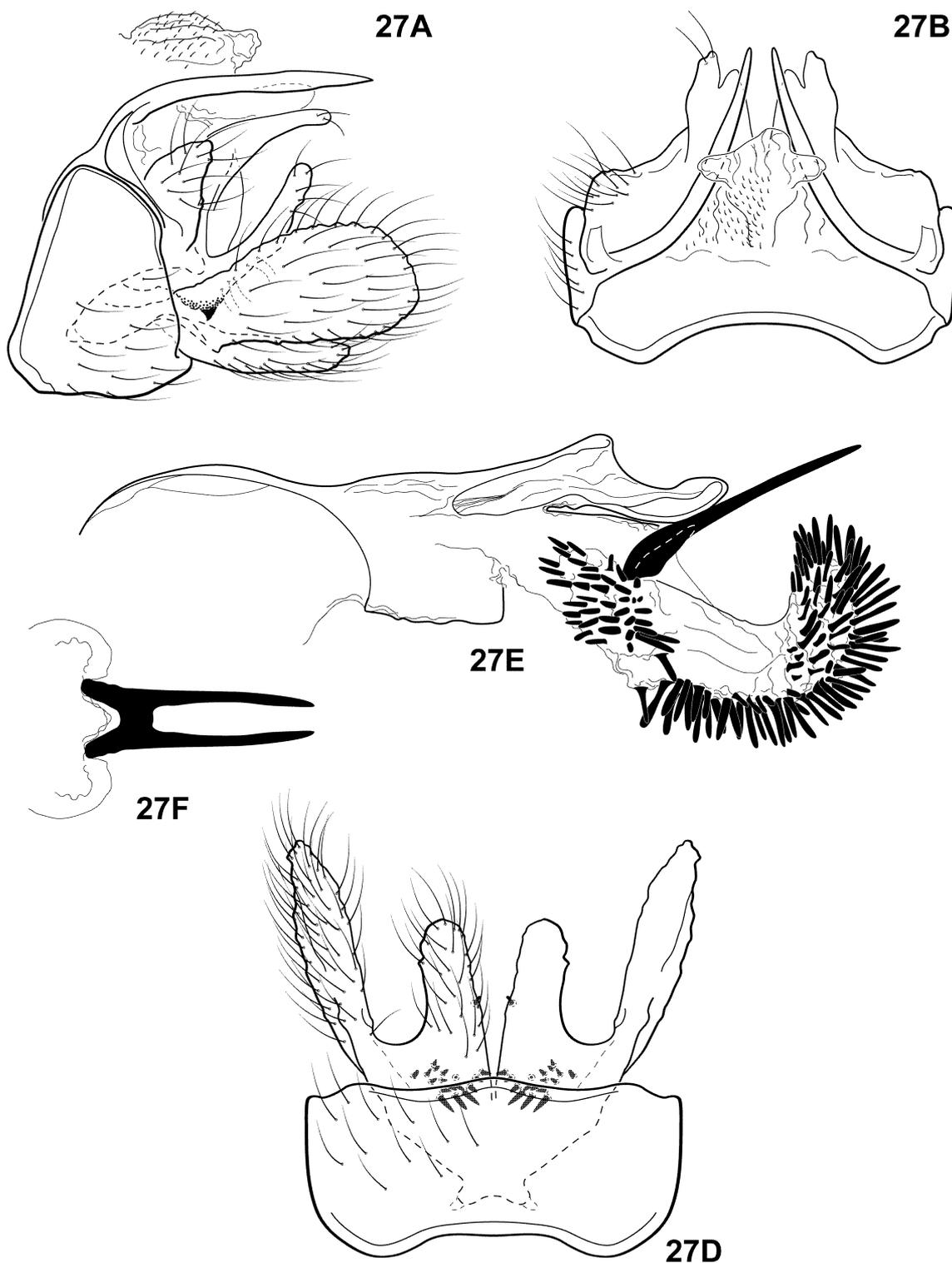


FIGURE 27. Male genitalia of *Polyplectropus hystricosus*, new species (holotype): A—left lateral view; B—dorsal view; D—ventral view; E—phallus, left lateral view; F—phallic spine, dorsal view.

Holotype male: BRAZIL: Minas Gerais: Parque Nacional do Caparaó, Rio Caparaó, Vale Verde, 20°25'02"S, 41°50'46"W, 1350 m, 12–13.iii.2002, Holzenthal, Blahnik, Paprocki & Prather—(UMSP000200972) (MZUSP).

Paratypes: BRAZIL: Minas Gerais: Estação Ecológica de Tripuí, Córrego Botafogo, 20°22'54"S, 43°33'37"W, 1100 m, 1.ii.1998, Holzenthal & Paprocki—1 male (UMSP); same, 16.xii.1998, Paprocki &

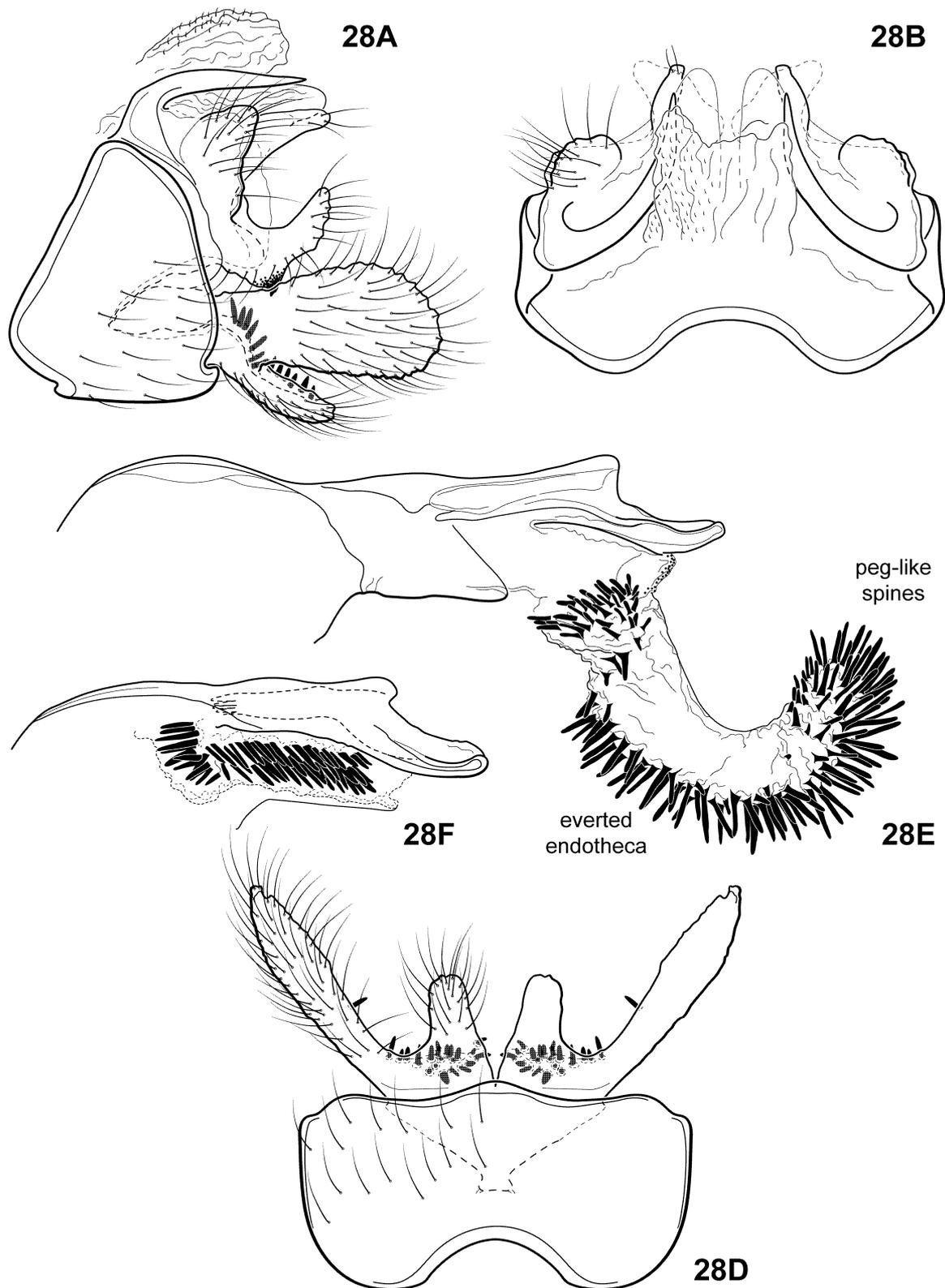


FIGURE 28. Male genitalia of *Polyplectropus hystricosus*, new species (variable form): A—left lateral view; B—dorsal view; D—phallus, left lateral view, with endophallus protracted (everted); F—phallus, left lateral view, with endophallus retracted (inverted).

Amarante—1 male [endotheca not everted and drawn] (UMSP); same, 25.xi.2001, Holzenthal, Blahnik, Neto & Paprocki—1 male [variable form with endotheca everted] (UMSP); Ibitipoca, Sitio of Anestis Papadopolous, 21°43'14"S, 43°54'33"W, 1200 m, 23.x.2000, H. Paprocki—1 male (MZUSP); Cachoeira do

Abacaxi, Vale do Tropeiro, 20°12'16"S, 43°38'10"W, 1120 m, 30.ix.2000, Paprocki, Braga & Salgado—1 male (NMNH); Parque Nacional do Caparaó, Rio Caparaó, Vale Verde, 20°25'02"S, 41°50'46"W, 1350 m, 12–13.iii.2002, Holzenthal, Blahnik, Paprocki & Prather—1 male (NMNH).

Distribution. Southeastern Brazil.

Etymology. The species name comes from the Latin word “hystricosus” meaning “spiny” in reference to the spines in the endothecal membrane, evident when the membrane is everted.

Remarks. One specimen within this series lacked an elongate dorsal endothecal phallic spine, visible when the endotheca everts (Figs. 27E). In some specimens, the endothecal membrane of the phallus failed to evert, presenting difficulties when determining whether the dorsal, elongate spine was there or not. When the endotheca fails to evert, the spine becomes confused with the underlying peg-like spines (Fig. 28F). Several specimens also had shorter dorsal digitate lobes of the mesoventral process of the preanal appendage and shorter ventral branch of the inferior appendage, sometimes half as long as in other specimens (Fig. 28). Additional material may reveal these differences to be continuous across specimens from different localities.

***Polyplectropus matatlanticus*, new species**

Figs. 29, 30, 140

Polyplectropus matatlanticus resembles *P. profaupar* Holzenthal & Almeida in the shapes of the inferior and preanal appendages. *Polyplectropus matatlanticus* can be distinguished from *P. profaupar* by the presence of 2 stout, but short endothecal phallic spines projecting laterally when the endotheca is everted. In *P. profaupar* the spines are almost 4 x longer and are apically spiny instead of setose. The 2 species can also be distinguished by the absence of a lateral row of spinules on the dorsolateral process of the preanal appendage in *P. matatlanticus* and by differences in the shapes of the mesoventral process of the preanal appendage and intermediate appendage. In *P. matatlanticus* the dorsal projection on the dorsal surface of the ventral branch of the inferior appendage is usually acutely pointed, but was instead flattened in 1 individual (Fig. 30A).

Adult. Length of forewing 4.5–5.5 mm, n = 49. Color of head and thorax brown or dark-brown, legs brown; setae on body brown with clusters of grey setae on apex of head, or dark-brown with golden reflections; tegulae with long, golden brown and grey setae, or with only dark-brown setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along wing margin and on most of wing surface, or dark-brown with golden reflections with grey patch of setae where veins meet at arculus (visible medially on FW when viewing specimen in dorsal view and visible as a white line perpendicular to body).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate; in ventral view rectangular, anterior margin highly concave, posterior margin convex. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, digitate, with a pair of long apical setae; in dorsal view digitate; in caudal view digitate, curved, directed laterodorsad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering mesally into acute apex, subapically expanded; mesolateral process setose; in dorsal view orbicular, in lateral view deltoid (sometimes with slight basoventral projection); mesoventral process setose; in lateral view hook-like, dorsally produced into digitate lobe, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin concave; in caudal view processes separated with dorsal digitate lobe, ventral margin of process acute or undulate. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view and anteriorly bilobed; dorsal branch setose, in lateral view subquadrate, apex truncate; in ventral view broad, lateral margin subapically produced, undulate, posterior margin rounded to subacute, mesal margin undulate, angled, expanding posterad into ventral branch; ventral branch setose, short, bearing acute, medial projection

or with basal flattened projection (Fig. 30A), in lateral view digitate, narrowing posterad and apically acute; in ventral view digitate, posteromesal margin sinuate, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view subacute; endotheal membrane with 2 stout, small, sclerotized spines, when endotheal membrane is everted spines project laterally, perpendicular to phallic sclerite (Fig. 29F).

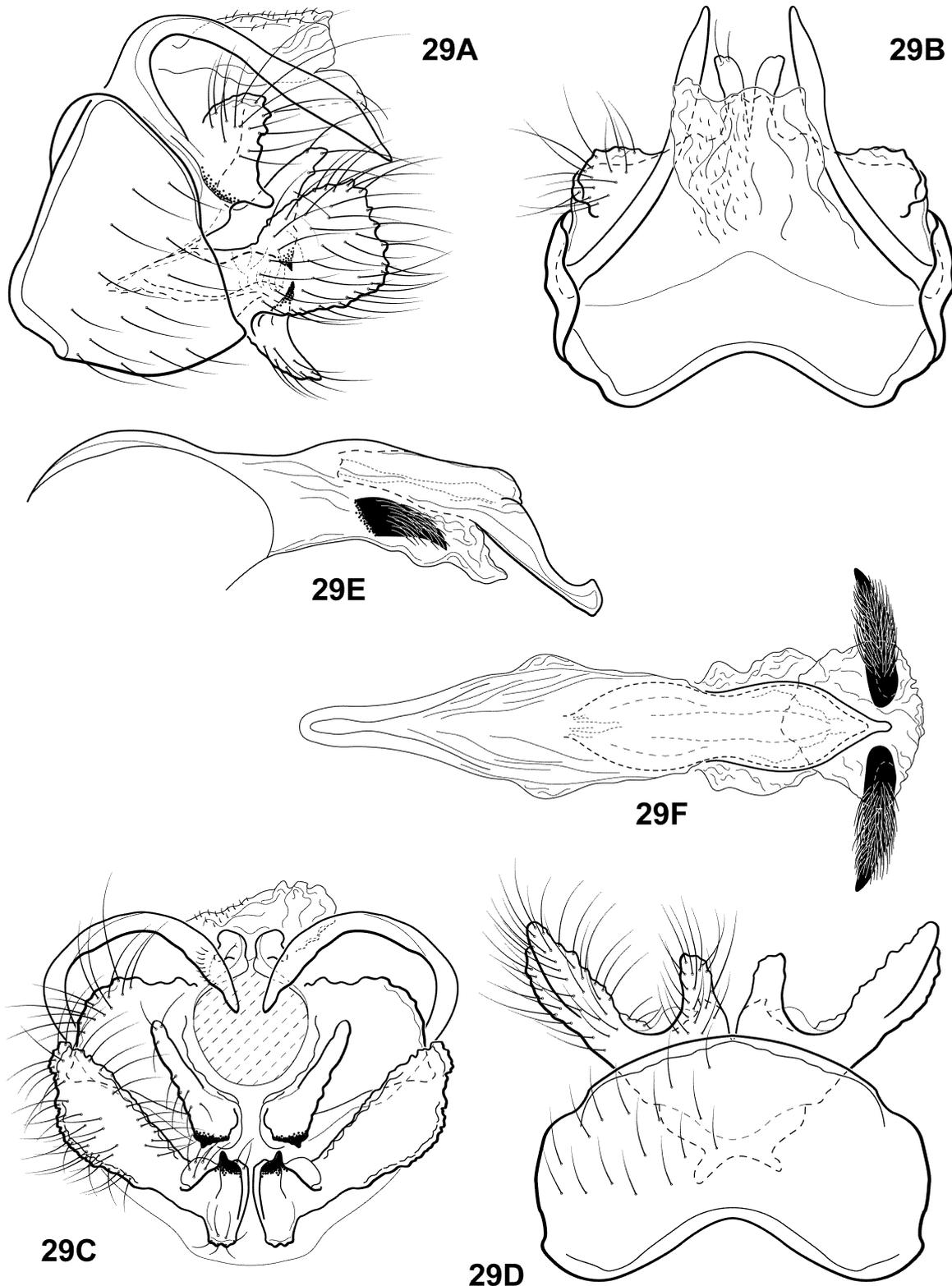


FIGURE 29. Male genitalia of *Polypsectopus matatlanticus*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Female genitalia. Similar to female of *P. alatespinus*.

Holotype male: **São Paulo:** Parque Estadual de Campos do Jordão, Rio Galharada, 22°41'40"S, 45°27'47"W, 1530 m, 4–5.iii.1996, Holzenthal & Guahyba—(UMSP000032907) (MZUSP).

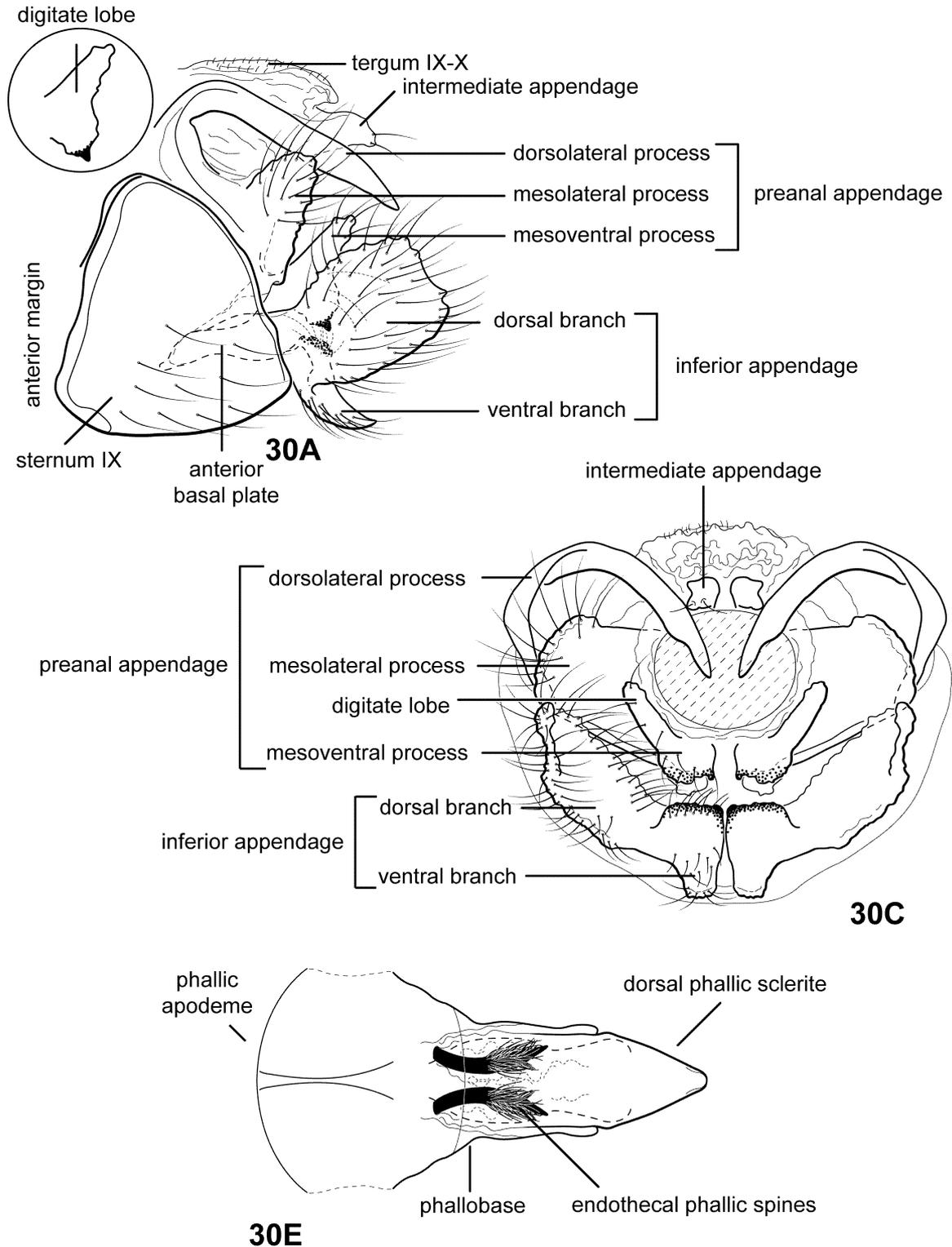


FIGURE 30. Male genitalia of *Polyplectropus mataatlanticus*, new species (variable form): A—left lateral view, with inset of mesoventral process of left preanal appendage; C—caudal view; E—phallus, dorsal view.

Paratypes: BRAZIL: Minas Gerais: Corrego das Aguas Pretas & trib[utaries], ca. 15 km S Aiuruoca, 22°03'42"S, 44°38'14"W, 1386 m, 21.xi.2001, Holzenthal, Blahnik, Neto & Paprocki—2 males, 1 female (MZUSP); **São Paulo:** Parque Estadual de Campos do Jordão, Cachoeira Galharada, 22°41'44"S, 45°27'43"W, 1620 m, 7.iii.1996, Holzenthal, Rochetti & Oliveira—5 females (MZUSP); same, Rio Galharada, 22°41'40"S, 45°27'47"W, 1530 m, 4–5.iii.1996, Holzenthal & Guahyba—1 male, 6 females (UMSP); Rio Casquilho, 3.4 km NE Parque Estadual Campos do Jordão, 22°40'17"S, 45°27'52"W, 1550 m, 23.i.1998, Holzenthal, Froehlich & Paprocki—1 male, 3 females [variable form] (UMSP); Cachoeira do Paredão, Lajeado, Serra da Bocaina, 22°43'32"S, 44°37'16"W, 1550 m, 1–2.iii.2002, Holzenthal, Blahnik Paprocki & Prather—3 males, 2 females (NMNH); Parque Nacional da Serra da Bocaina, Cachoeira Santo Izidro, 22°44'50"S, 44°36'53"W, 1480 m, 2.iii.2002, Blahnik & Paprocki—2 males (NMNH); Cachoeira dos Posses, 22°46'26"S, 44°36'15"W, 1250 m, 3.iii.2002, Holzenthal, Blahnik Paprocki & Prather—1 male, 21 females (MZUSP).

Distribution. Brazil.

Etymology. The species name is the union of the Portuguese words “Mata Atlântica” meaning “Atlantic Forest”, a biologically diverse and highly threatened region of Southeastern Brazil where the specimens were collected.

Remarks. The 2 types of coloration found in the species group, dark-brown to almost black and brown with greyish mottling, was observed for this species. The holotype and the paratype from the same locality and collected on the same date are dark-brown, as well as the variable male and 3 females from the same locality, Campos de Jordão State Park, but collected from Rio Casquilho. However, all the other paratypes have a lighter shade of brown and greyish mottling on the wing. The male genitalia of this species, except for the variable male previously mentioned, does not vary. Differences between these 2 forms lie in the presence or absence of an acute projection on the dorsal surface of the ventral branch of the inferior appendage, as well as slight continuous variations in the shape of the mesoventral process of the preanal appendage.

***Polyplectropus novafriburgensis*, new species**

Figs. 31, 130

Polyplectropus novafriburgensis is most similar to *P. alatespinus*, new species, in the overall shape of the preanal, intermediate, and inferior appendages. *P. novafriburgensis* can be distinguished from this species by the spines in the endothelial membrane forming a V-shape when the membrane is everted and not projected anterolaterad as in *P. alatespinus*, by the absence of peg-like setae on the dorsal surface of the ventral branch of the inferior appendage, and by the shorter and more linear ventral branch.

Adult. Length of forewing 5.3–5.7 mm, n = 4. Color of head, thorax, and legs dark-brown; setae on body dark-brown with golden reflections; tegulae with dark-brown setae; setae on wings dark-brown with golden reflections, entire specimen appearing black from a distance.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, digitate, with a pair of long apical setae; in dorsal view digitate; in caudal view digitate, directed posterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering into acute apex; mesolateral process setose; in dorsal view orbicular, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, dorsally produced into digitate lobe, with ventrad-directed sclerotized apex, ventral margin slightly concave, posterior margin truncate; in caudal view processes separated with dorsal digitate lobe, ventral margin of process undulate and with slight median sclerotized point. Inferior appendage bipartite

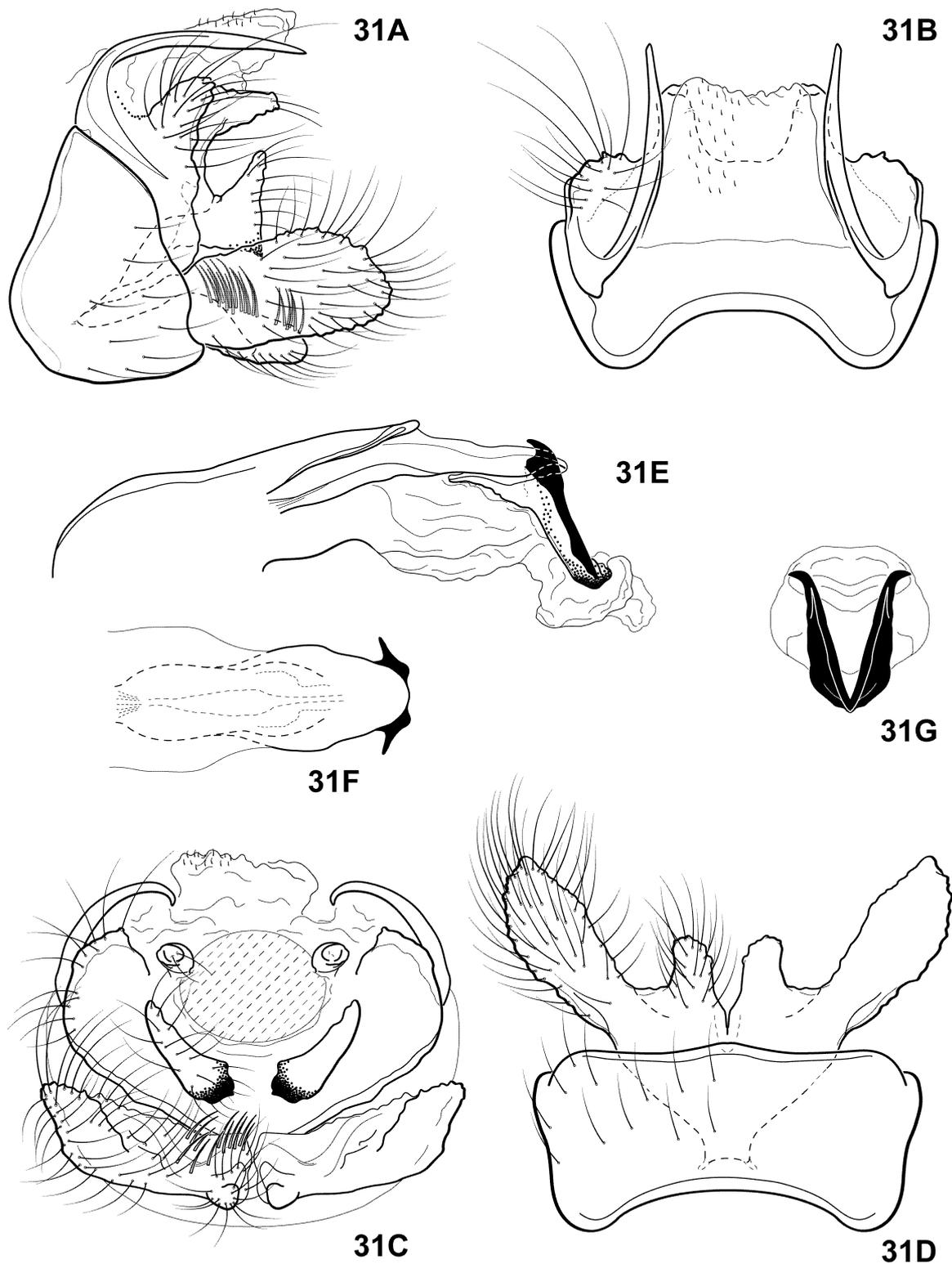


FIGURE 31. Male genitalia of *Polyplectropus novafriburgensis*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–G—phallus: E—left lateral view; F—dorsal view; G—caudal view.

with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view, anteriorly bilobed; dorsal branch setose, in lateral view oblong; in ventral view broad, lateral margin subapically produced, undulate, posterior margin subacute, expanding posterad into ventral branch; ventral branch setose, elongate, bearing stout setae along entire dorsal surface, in lateral view digitate, rounded posterad; in ventral

view digitate, posteromesal margin sinuate, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view rounded; endothecal membrane with 2 basally fused, stout, medium-sized, sclerotized spines, apically acute and bent laterad, when endothecal membrane is everted in caudal view spines are V-shaped.

Holotype male: BRAZIL: Rio de Janeiro: Nova Friburgo, mun[icipal] water supply, 950 m, 20.iv.1977, C & O Flint—(UMSP000107517) (MZUSP).

Paratypes: BRAZIL: Rio de Janeiro: Nova Friburgo, mun[icipal] water supply, 950 m, 20.iv.1977, C & O Flint—1 male (UMSP); same, 24.iv.1977, C & O Flint—2 males (NMNH, MZUSP).

Distribution. Brazil.

Etymology. Named for the type locality, the town of Nova Friburgo.

***Polyplectropus paysandu* Angrisano**

Figs. 32, 141

Polyplectropus paysandu Angrisano, 1994: 134. [Type locality: Uruguay, Depto. Paysandú, Sta. Rita; FHCU; male; wings].

This species is easily distinguished from other species in the *P. annulicornis* group by the absence of a dorsolateral process of the preanal appendage and of a dorsal digitate lobate projection on the mesoventral process of the preanal appendage. It also has broadly separated mesoventral processes, an upturned, apically sclerotized intermediate appendage, and a rounded shorter sternum IX. *Polyplectropus paysandu* shares with other species in the *P. annulicornis* group the anteriorly bilobed basal plate of the inferior appendage.

Adult. Length of forewing 4.5 mm, n = 1. Color of head brown, thorax brown, legs brown (specimen preserved in alcohol).

Male genitalia. Sternum IX in lateral view rounded, anterior margin highly convex, posterior margin convex; in ventral view rectangular, anterior margin highly concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, digitate, with a pair of long apical setae; in dorsal view apex slightly sclerotized and bent anterodosally; in caudal view digitate, broadening apically, directed mesally. Preanal appendage bipartite; mesolateral process setose; in dorsal view oblong, in lateral view oblong; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin rounded; in caudal view processes separated, ventral margin of process acute with sclerotized point. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view and anteriorly bilobed; dorsal branch setose, in lateral view broadly pandurate, with posterior margin slightly convex and directed posterad; in ventral view broad, lateral margin apically produced, entire, posterior margin angled, mesal margin entire, subapically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, elongate, bearing apical sclerotized spine, in lateral view digitate, narrowing posterad; in ventral view deltoid, posteromesal margin convex, mesal margin slightly angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex pandurate; endothecal membrane with 2 stout, sclerotized spines.

Material examined. **URUGUAY: Paysandú:** Sta. Rita, orilla Rio Uruguay, [32°07'00"S, 58°09'00"W], 1.xii.1959, C S Carbonell—1 male [holotype] (FHCU).

Distribution. Uruguay.

Remarks. Only a single male specimen is known for this species. The male genitalia of the specimen appeared to be slightly damaged, particularly the dorsal region of the genitalia, thus obscuring structures present there.

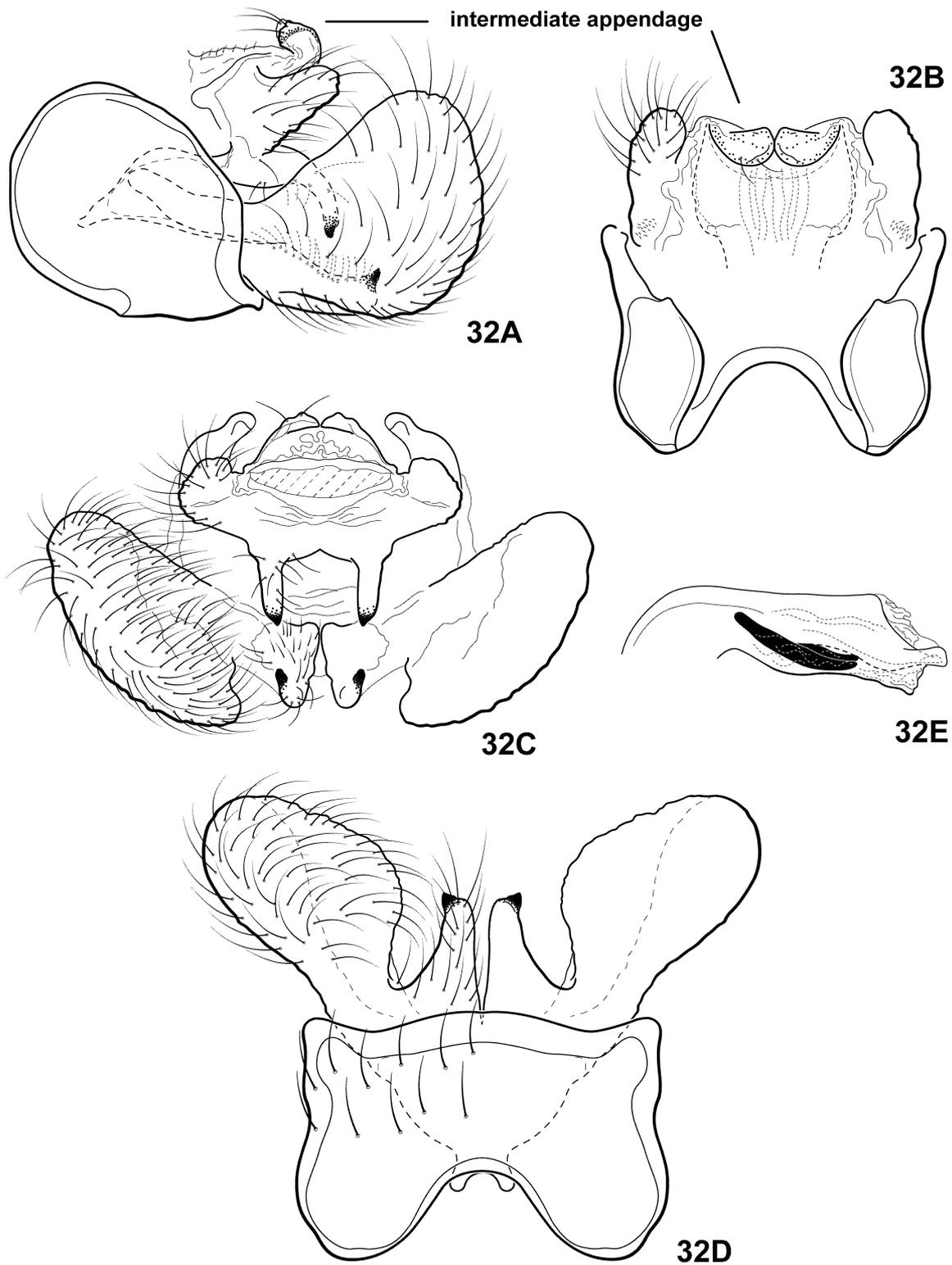


FIGURE 32. Male genitalia of *Polyplectropus paysandu* Angrisano, 1994 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

***Polyplectropus pratherae*, new species**

Figs. 33, 130

Polyplectropus pratherae resembles *P. alatespinus*, new species, in the shapes of the intermediate, preanal, and inferior appendages. *Polyplectropus pratherae* can be distinguished from this species by the presence of

2 basally fused, elongate, sinuate spines with rounded apices in the endothecal membrane of the phallus and by the more rounded ventral margin of the mesoventral process of the preanal appendage.

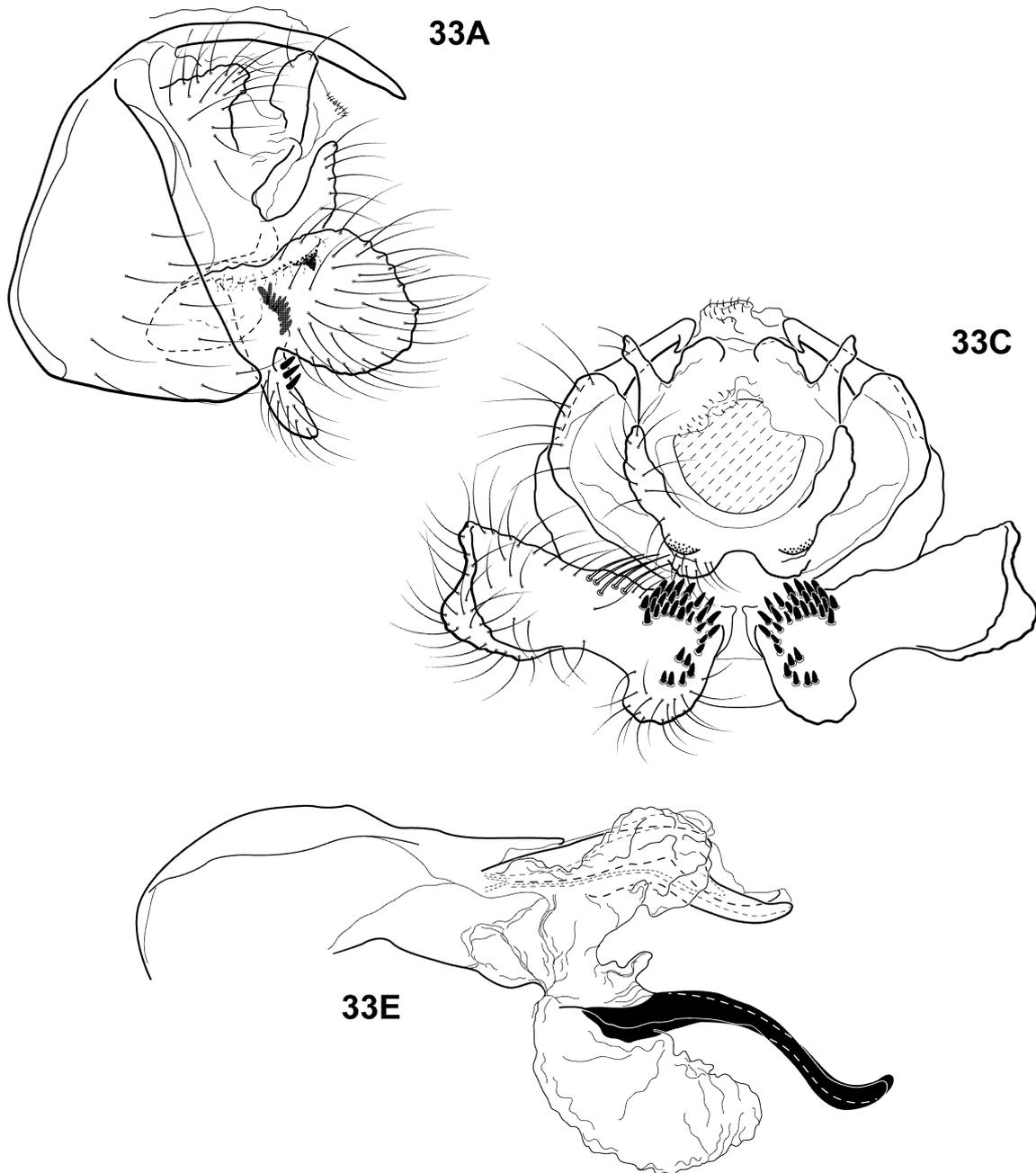


FIGURE 33. Male genitalia of *Polyplectropus pratherae*, new species (holotype): A—left lateral view, with inferior appendage foreshortened; C—caudal view; E—phallus, left lateral view.

Adult. Length of forewing 6–6.5 mm, n = 2. Color of head, thorax, and legs dark-brown; setae on body dark-brown with golden reflections; tegulae with dark-brown setae; setae on wings dark-brown with golden reflections, entire specimen appearing black from a distance.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin entire; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, digitate, with a pair of long apical setae; in dorsal view digitate; in caudal view digitate, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of

mesolateral process, recurved posterad, tapering into acute apex; mesolateral process setose; in dorsal view obovate, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, dorsally produced into digitate lobe with ventrad-directed sclerotized apex, ventral margin sinuate, posterior margin sinuate; in caudal view processes separated bearing dorsal digitate lobe, ventral margin of process rounded. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view and anteriorly bilobed; dorsal branch setose, in lateral view oblong; in ventral view broad, lateral margin subapically produced, sinuate, posterior margin rounded, mesal margin slightly undulate, slightly convex, becoming concave, expanding posterad into ventral branch; bearing robust, sclerotized spines along entire dorsal surface and with basal dorsal projection, in lateral view digitate, narrowing posterad; in ventral view digitate, mesal margin slightly angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view truncate; endothelial membrane with 2 basally fused, elongate, sinuate spines with rounded apices.

Holotype male: BRAZIL: Minas Gerais: Parque Nacional do Caparaó, Rio Caparaó, Vale Verde, 20°25'02"S, 41°50'46"W, 1350 m, 12–13.iii.2002, Holzenthal, Blahnik, Paprocki & Prather—(UMSP000087901) (MZUSP).

Paratypes: BRAZIL: Minas Gerais: Parque Nacional do Caparaó, Rio Caparaó, Vale Verde, 20°25'02"S, 41°50'46"W, 1350 m, 12–13.iii.2002, Holzenthal, Blahnik, Paprocki & Prather—1 male (UMSP).

Distribution. Southeastern Brazil.

Etymology. It is with great pleasure that we name this species in honor of Dr. Aysha L. Prather, trichopterologist, friend, and one of the collectors of this species.

***Polyplectropus profaupar* Holzenthal & Almeida**

Figs. 34, 141

Polyplectropus profaupar Holzenthal & Almeida, 2003: 26. [Type locality: Brazil, Santa Catarina, Urubici Morro da Igreja, Cachoeira Veu da Noiva; MZUSP; male.]

This species is most similar to *P. matatlanticus*, new species, in the shapes of the inferior and preanal appendages. *Polyplectropus profaupar* can be distinguished from *P. matatlanticus* by the presence of 2 stout, apically spiny, and elongate endothelial phallic spines that do not project laterad when the endotheca is everted (small and apically setose in *P. matatlanticus*), by the presence of a lateral row of spinules on the dorsolateral process of the preanal appendage, and by differences in the shapes of the mesoventral process of the preanal appendage and intermediate appendage. *Polyplectropus amazonicus* also bears a row of spinules on the dorsolateral process of the preanal appendage, however this species has a very distinct, apically broadened dorsal phallic sclerite.

Adult. Length of forewing 5.5–7 mm, n = 11. Color of head and thorax yellowish-brown, legs yellow; setae on body brown with clusters of grey setae on apex of head; setae on wings brown with scattered patches of golden setae.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin sinuate; in ventral view rectangular, anterior margin concave, posterior margin convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view bilobed; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, digitate, with a pair of long apical setae; in dorsal view digitate, apex narrowing laterad; in caudal view digitate, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering mesally into acute apex, medially with row of short lateral spinules; mesolateral process setose; in dorsal view obovate, in lateral view deltoid;

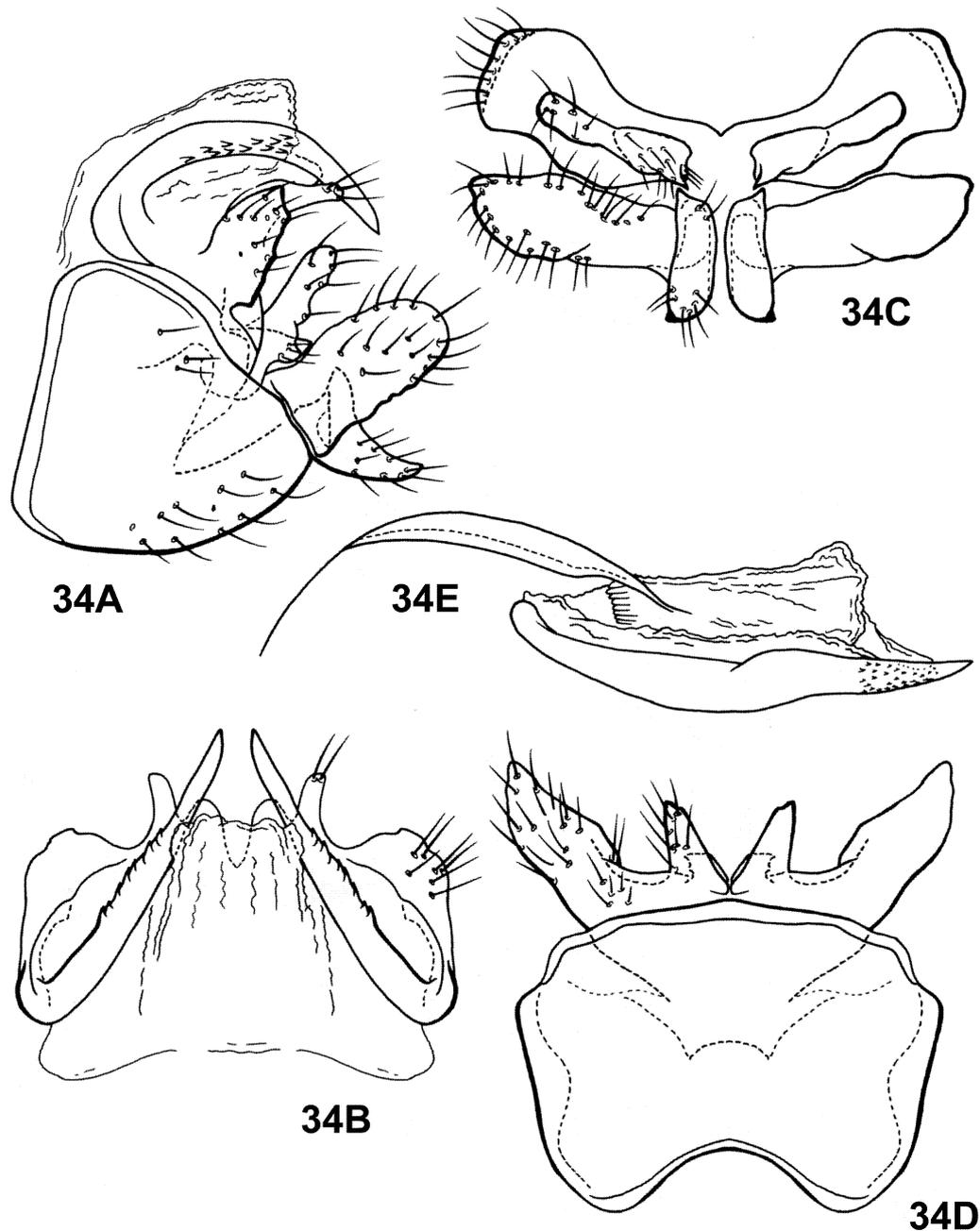


FIGURE 34. Male genitalia of *Polyplectropus profaupar* Holzenthal & Almeida, 2003 (Illustration from original description) (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

mesoventral process setose; in lateral view hook-like, dorsally produced into digitate lobe, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin slightly angled; in caudal view processes separated with dorsal digitate lobe, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view and anteriorly bilobed; dorsal branch setose, in lateral view oblong; in ventral view broad, lateral margin subapically produced, entire, posterior margin subacute, mesal margin entire, subapically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, short, bearing acute, basal projection, in lateral view digitate, narrowing posterad; in ventral view digitate, posteromesal margin angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic

sclerite in dorsal view emarginate; endothecal membrane with 2 stout, elongate, sclerotized spines, bearing small, subapical and apical spinules.

Female genitalia. Similar to females of *P. alatespinus*.

Material Examined. **Paratypes: BRAZIL: Santa Catarina:** Urubici: Morro da Igreja, Cachoeira Veu da Noiva, 28°04'36"S, 49°31'05"W, 1300 m, 5.iii.1998, Holzenthal, Froehlich & Paprocki—2 males, 9 females (UMSP).

Distribution. Brazil.

Remarks. A female paratype with the same label data as above was removed from the paratype series and identified as a female of the hydropsychid genus *Smicridea*.

***Polyplectropus rodmani*, new species**

Figs. 35, 140

Polyplectropus rodmani is a typical member of the *P. annulicornis* group resembling *P. annulicornis* Ulmer in the presence of 2 elongate, endothecal spines in the phallus. However, *P. rodmani* can be distinguished from *P. annulicornis* by the posterior truncation of the ventral branch of the inferior appendage (more elongate in *P. annulicornis*). Additionally, the sclerotized projection on the dorsal surface of the ventral branch originates proximally in *P. rodmani* and mediad in *P. annulicornis*. Additional distinguishing features present in *P. rodmani* are the posteriorly directed intermediate appendage, the shorter ventral branch of the inferior appendage, and the more elongate dorsal lobe of the mesoventral process of the preanal appendage.

Adult. Length of forewing 5–5.3 mm, n = 9. Color of head, thorax, and legs yellowish-brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate; in ventral view rectangular, anterior margin concave, becoming straight, posterior margin convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage as long as inferior appendage, digitate, with a pair of long apical setae; in dorsal view digitate; in caudal view narrowly digitate, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering into acute apex; mesolateral process setose; in dorsal view orbicular, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, dorsally produced into elongate, digitate lobe, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin concave; in caudal view processes separated bearing dorsal digitate lobe, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view and anteriorly bilobed; dorsal branch setose, in lateral view oblong; in ventral view broad, lateral margin convex, undulate, posterior margin subacute, mesal margin undulate, angled, expanding posterad into ventral branch; ventral branch setose, short, bearing dorsal, apical sclerotized spine, in lateral view digitate, truncate posterad; in ventral view deltoid, posteromesal margin angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view rounded; endothecal membrane with 2 stout, sclerotized spines, sinuate, bearing apical setae.

Female genitalia. Similar to female of *P. alatespinus*.

Holotype male: BRAZIL: São Paulo: Estação Biológica Boraceia, Rio Coruja, 23°40'06"S, 45°53'57"W, 850 m, 18.iv.1998, Holzenthal, Melo & Froehlich—(UMSP000032933) (MZUSP).

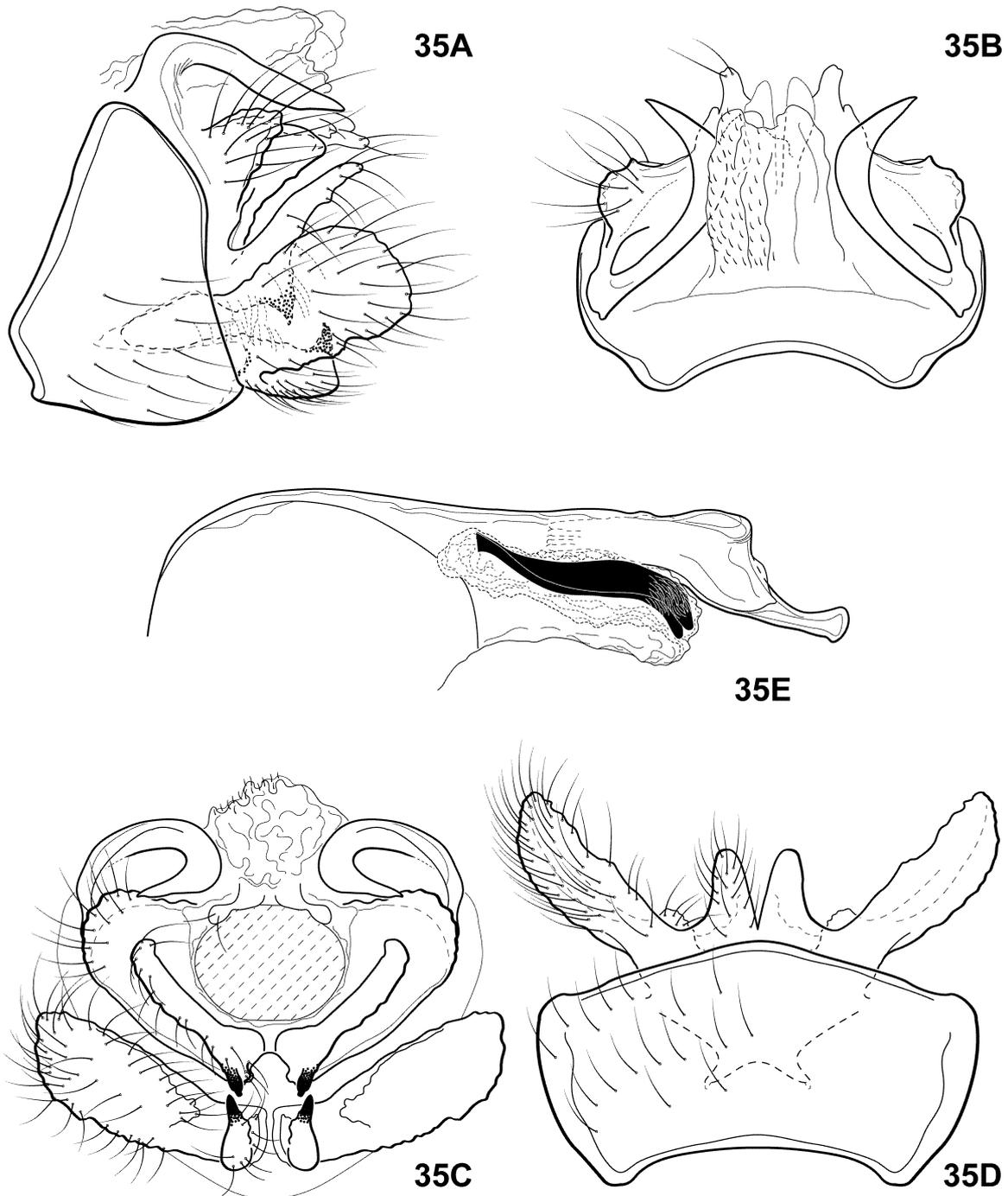


FIGURE 35. Male genitalia of *Polyplectropus rodmani*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

Paratypes: BRAZIL: São Paulo: Estação Biológica Boraceia, Rio Guaratuba, 23°40'02"S, 45°53'46"W, 775 m, 17.iv.1998, Holzenthal, Melo & Froehlich—1 male, 2 females (MZUSP); Rio Coruja, 23°40'06"S, 45°53'57"W, 850 m, 18.iv.1998, Holzenthal, Melo & Froehlich (UMSP, NMNH)—4 males, 1 female.

Distribution. Brazil.

Etymology. Named in honor of Dr. James Rodman, for recognizing and understanding the obstacles presently facing taxonomy and for taking numerous effective initiatives to address them.

Key to males of *P. annulicornis* species group

- 1 Dorsal digitate lobe of mesoventral process of preanal appendage present; Dorsolateral process of preanal appendage present (Fig. 22) 2
- Dorsal digitate lobe of mesoventral process of preanal appendage absent; Dorsolateral process of preanal appendage absent (Fig. 32) *P. paysandu* Angrisano, p. 68
- 2(1) Ventral branch of inferior appendage with dorsal projection, acutely pointed or not; dorsal peg-like setae absent] (Fig. 29) 3
- Ventral branch of inferior appendage without dorsal projection; dorsal peg-like setae present or absent (Figs. 22, 31) 8
- 3(2) Endothecal phallic spines shorter than phallic sclerite (Figs. 24, 29)..... 4
- Endothecal phallic spines as long or longer than phallic sclerite (Fig. 34) 5
- 4(3) Ventral branch of inferior appendage apically acute and with dorsal projection produced basally; endothecal spines projecting laterad if endothecal membrane everted; dorsolateral arm of phallic sclerite rounded (Figs. 29, 30) *P. matatlanticus*, n. sp., p. 63
- Ventral branch of inferior appendage apically rounded and dorsal projection produced subapically; endothecal spines half as long as dorsal phallic sclerite; dorsolateral arm of phallic sclerite produced dorsad into acute point (Fig. 24) *P. amazonicus*, n. sp., p. 54
- 5(3) Ventral branch of inferior appendage apically rounded or truncate; phallic spine apically bearing setae; dorsolateral process of preanal appendage with or without lateral row of small spines (Figs. 25, 26, 35) 6
- Ventral branch of inferior appendage apically acute; phallic spine apically bearing small spines; dorsolateral process of preanal appendage with lateral row of small spines (Fig. 34) *P. profaupar* Holzenthal & Almeida, p. 71
- 6(5) Ventral branch of inferior appendage about half as long as dorsal branch of inferior appendage; apex of endothecal phallic membrane directed ventrad; dorsolateral process of preanal appendage without lateral row of small spinules (Figs. 25, 35) 7
- Ventral branch of inferior appendage almost as long as dorsal branch of inferior appendage; apex of endotheca phallic membrane directed dorsad; dorsolateral process of preanal appendage with lateral row of small spinules (Fig. 26) *P. gaesum*, n. sp., p. 58
- 7(6) Ventral branch of inferior appendage with apical projection and apex appearing truncate; mesoventral process of preanal appendage (including dorsal lobe) almost twice as long as ventral branch of inferior appendage (Fig. 35) *P. rodmani*, n. sp., p. 73
- Ventral branch of inferior appendage with dorsomedial projection and apex of ventral branch rounded and produced posterad; mesoventral process of preanal appendage almost equal in length (including dorsal lobe) to ventral branch of inferior appendage (Fig. 25) *P. annulicornis* Ulmer, p. 50
- 8(2) Ventral branch of inferior appendage with dorsal peg-like setae; endothecal phallic spines elongate and basally fused, apices acute and directed posterad; phallic spines lanceolate-shaped when endotheca everts (Figs. 27, 28) 9
- Ventral branch of inferior appendage without dorsal peg-like setae, instead with elongate, stout setae; endothecal phallic spines basally fused and apices acute and directed laterad, phallic spines having V-shape when endotheca everts (Fig. 31) *P. novafriburgensis*, n. sp., p. 66
- 9(8) Endothecal phallic membrane with pair of long or short spines (Figs. 22, 33), never with many peg-like spines ... 10
- Endothecal phallic membrane with many peg-like spines, pair of elongate rod-like, basally fused spines present or absent (Figs. 27, 28) *P. hystricosus*, n. sp., p. 60

- 10(9) Endothecal phallic membrane with spines basally fused, elongate, sinuate, apically rounded; spines directed posterad when membrane everted (Fig. 33) *P. pratherae*, n. sp., p. 69
- Endothecal phallic membrane with spines basally not fused, short not sinuate, and apically acute; spines directed anterolaterad when membrane everts (Fig. 22) *P. alatespinus*, n. sp., p. 52

***Polyplectropus bredini* species group, newly recognized**

The *P. bredini* group contains 19 species, including several species previously in the *P. charlesi* group (*P. misolja*, *P. kingsolveri*, *P. mignonae*, *P. mathisi*, *P. hymenochilus*, *P. perpendicularis*, and *P. nicaraguensis*) and *P. thilus* group (*P. clauseni* and *P. maesi*). In addition, *P. panamensis* is now included in the *P. bredini* group and the *P. panamensis* group of Bueno has been dissolved. Seven new species now belong in the *P. bredini* group. The monophyly of the *P. bredini* group was weakly supported and most likely represents a number of species groups.

All species in the group lack embedded spines in the endothecal membrane, with the possible exception of *P. hymenochilus* and *P. colombianus*. *Polyplectropus hymenochilus* appears to have several short, lightly sclerotized spines in the endothecal membrane, but this was difficult to confirm because the endothecal membrane failed to evert for the specimens examined. *Polyplectropus colombianus* appears to have a single, lightly sclerotized spine. Additionally, *P. misolja* has 3 short spines embedded in a dorsal membrane of the phallic sclerite, but not in the endothecal membrane; these spines also failed to evert. Nevertheless, the absence of spines is not a feature unique to this group.

Homoplasious characters supporting the monophyly of the *P. bredini* group include intermediate appendage basally broad and narrowing apically, dorsolateral process of preanal appendage absent, mesoventral process angled (45 degrees) to straight (180 degrees) and rectangular in shape (as seen in lateral view), peg-like setae present on the dorsal branch of the inferior appendage, peg-like setae on ventral branch present and located apically, dorsolateral arms of dorsal phallic sclerite tapering apically alongside dorsal phallic sclerite (forming a leveled apex), and fork 5 of hind wing sessile. However, this combination of characters does not adequately characterize this heterogeneous group of species. Therefore, 2 subsets of species within the *P. bredini* group are recognized.

The *P. trilobatus* subset includes *P. brasiliensis*, *P. clauseni*, *P. colombianus*, *P. corniculatus*, *P. flintorum*, *P. panamensis*, *P. petrae*, *P. trilobatus*, and *P. woldai* characterized by the combined possession of the following traits:

1. Oblong shape of intermediate appendage bearing few setae basally and apically;
2. Presence of more than 4 peg-like setae on mesoventral process of preanal appendage (except *P. colombianus*, *P. trilobatus*, or *P. woldai*);
3. Presence of a dorsolateral process of the preanal appendage (except *P. panamensis* and *P. petrae*).

Within this subset of species, *P. brasiliensis*, *P. clauseni*, *P. trilobatus*, and *P. woldai* have a submedially and highly incised (sinuate) posterior margin of sternum IX (Fig. 36) whereas *P. petrae* and *P. corniculatus* have a deeply concave posterior margin with a slight median flange (Fig. 42). *P. colombianus* has a unique posterior margin of sternum IX, being medially membranous (Fig. 41) and *P. flintorum* and *P. panamensis* have a slightly sinuate margin with a median flange (Fig. 43) (the primitive condition also present in the rest of the species in the group).

The second subset of species (*P. bredini* subset) in the *P. bredini* group includes *P. adamsae*, *P. bredini*, *P. hymenochilus*, *P. kingsolveri*, *P. maesi*, *P. mignonae*, *P. misolja*, *P. nicaraguensis*, and *P. perpendicularis* and is characterized by the combined possession of the following traits:

1. Narrowly digitate, elongate (as long as or longer than inferior appendage) intermediate appendage with setae throughout (Fig. 37);

2. Apex of phallic sclerite oblong (when observed in lateral view), in caudal view apex of phallus concave forming a trough (Fig. 49);
3. Mesoventral processes almost quadrate (visible in lateral view) (*P. nicaraguensis* is an exception since the mesoventral process is bulbous; additionally this process is less quadrate in *P. hymenochilus* and *P. kingsolveri*) (Fig. 37);
4. Ventral branch of inferior appendage subquadrate with posterior margin slightly angled (visible in ventral view) and apically bearing a transverse row of peg-like setae (Fig. 37);
5. Ventral branch of inferior appendage in lateral view with rounded apex narrowing dorsad (Fig. 37);
6. Prominent lower lip of segment X (Fig. 37);
7. Phallic spines absent.

The shape of the intermediate appendage, the mesoventral process of the preanal appendages, the ventral branch of the inferior appendage and the dorsal phallic sclerite of the phallus change little among species in the *P. bredini* subset. *Polyplectropus hymenochilus*, *P. kingsolveri*, *P. maesi*, and *P. misolja* have an elongate dorsolateral process of the preanal appendage, absent in all other members of the subset.

***Polyplectropus adamsae*, new species**

Figs. 48F–H, 133

This species is most similar to *P. mignonae* Bueno-Soria in the shape of the phallus and the intermediate and preanal appendages. While similar overall, the dorsal branches of the inferior appendages of the 2 species differ. *Polyplectropus adamsae* has a narrower dorsal branch with apical and preapical spines, whereas *P. mignonae* has a basally broader dorsal branch and the spines are located apically.

Adult. Length of forewing 4.2–5 mm, n = 41. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings darker brown along costal margin, rest of wing lighter shade of brown with scattered patches of grey setae.

Male genitalia. Sternum IX in lateral view broadly deltoid, anterior margin convex, posterior margin sinuate and medially produced; in ventral view rectangular, anterior margin concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous bearing microsetae, digitate and slightly ridged; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage as long as inferior appendage, narrowly digitate with long setae throughout; in dorsal view digitate, linear; in caudal view digitate, elongate, apically curved, directed posterolaterad. Preanal appendage bipartite; mesolateral process setose; in dorsal view oblong, in lateral view oblong; mesoventral process setose; in lateral view quadrate with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin truncate; in caudal view processes separated, ventral margin of process rounded. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view obclavate, curved and narrowing apically, with subapical and apical spines; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, short, bearing a row of 4–7 robust, sclerotized spines along posterior margin; in lateral view clavate, rounded posterad; in ventral view subquadrate, posteromesal margin convex, mesal margin slightly concave, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view cylindrical, apex pandurate to oblong; endothelial membrane without embedded spines.

Female genitalia. Very similar to the female of *P. bredini*.

Holotype male: PERU: Madre de Dios: Manú [Biosphere Reserve], Pakitza Bio[logical] Sta[tion], Quebrada Trompetero, 11°56'39"S, 71°16'59"W, 350 m, trail 2, marker 156.vii.1993, Blahnik & Pescador—(UMSP000107422) (NMNH).

Paratypes: PERU: Madre de Dios: Manu [Biosphere Reserve], Pakitza Bio[logical] Sta[tion], Quebrada Trompetero, 11°56'39"S, 71°16'59"W, 350 m, trail 2, marker 15, 3.vii.1993, Blahnik & Pescador—2 females (UMSP); 6.vii.1993, Blahnik & Pescador—3 females (NMNH); Quebrada Paujil-Picoflor, 11°56'39"S, 71°16'59"W, 350 m, 5.vii.1993, Blahnik & Pescador—1 male, 2 females (NMNH); trail 1, marker 13, 4–6.vii.1993, Blahnik & Pescador—1 female (UMSP); 11°56'00"S, 71°18'00"W, 350 m, 30.ix.1987, M. Pogue—1 female (NMNH); same, 250 m, Aquajal, 12.ix.1988, M. Pogue—1 female (NMNH); trail 1, 1st stream, 11.ix.1988, Flint & Adams—5 males, 8 females (NMNH); trail 2, 1st stream, 14–23.ix.1988, Flint & Adams—1 female (NMNH); 17–20.ix.1988, Flint & Adams—3 females (NMNH); trail 2, marker 12, 16–22.ix.1989, Adams *et al.*—1 male (NMNH); trail 2, marker 18, 12–23.ix.1989, Adams *et al.*—2 males, 1 female (NMNH); Manú, Pakitza, Trail 1, 1st stream, 12°07'00"S, 70°58'00"W, 250 m, 20.ix.1988, M. Pogue—5 males, 1 female; Manú Biosphere Reserve, 10 km S. of Pakitza, 12°07'00"S, 70°58'00"W, 250 m, 13–14.ix.1988, Flint & Friedburg—1 female (NMNH); Río Manú, Pakitza, 12°07'00"S, 70°58'00"W, 250 m, 9–21.ix.1988, Flint & Adams—1 female (NMNH).

Distribution. Peru.

Etyymology. This species is named in memory of the late Nancy Adams, research specialist at the NMNH, Smithsonian Institution and one of the collectors of this species.

***Polyplectropus brasiliensis*, new species**

Figs. 36, 132

Polyplectropus brasiliensis resembles *P. clauseni* Chamorro-Lacayo & Holzenthal in the overall shape of the inferior appendage, in the presence of a dorsolateral process of the preanal appendage, and in the overall shape of the phallus. *Polyplectropus brasiliensis* differs in having a digitate intermediate appendage and closely adpressed mesoventral processes of the preanal appendage, which bear apical peg-like setae.

Adult. Length of forewing 5.5 mm, n = 5. Color of head, thorax, and legs yellowish-brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings darker brown patches of setae basally along costal margin, rest of wing lighter shade of brown with scattered patches of grey setae.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin sinuate, posterior margin medially produced and becoming concave ventrally; in ventral view rectangular, anterior margin entire, posterior margin with median flange and submedially deeply concave. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage longer than inferior appendage, cylindrical, with a pair of long apical setae; in dorsal view digitate, apex narrowing mesad; in caudal view digitate, with rounded apex, directed posterodorsad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view oblong; mesoventral process setose; in lateral view hook-like, directed ventrad, ventral margin concave, posterior margin entire; in caudal view fused basomesally, may appear as if processes are completely fused to form a continuous structure, apex of processes slightly separated, ventral margin of process subacute, with ventral margin bearing many sclerotized, peg-like setae. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view oblong, apically convex; in ventral view broad, lateral margin convex, undulate, posterior margin rounded, shallowly fused to ventral branch; ventral branch setose, elongate and broad, bearing robust, sclerotized spines apically; in lateral view oblong and almost forming a continuous structure with dorsal branch, truncate posterad; in ventral view deltoid to subquadrate, mesal margin slightly angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex pandurate; apex of dorsal phallic sclerite in dorsal view

rounded; lateral projection of phallobase in lateral view digitate; endothelial membrane without embedded spines, membranous basal sheath surrounding phallus.

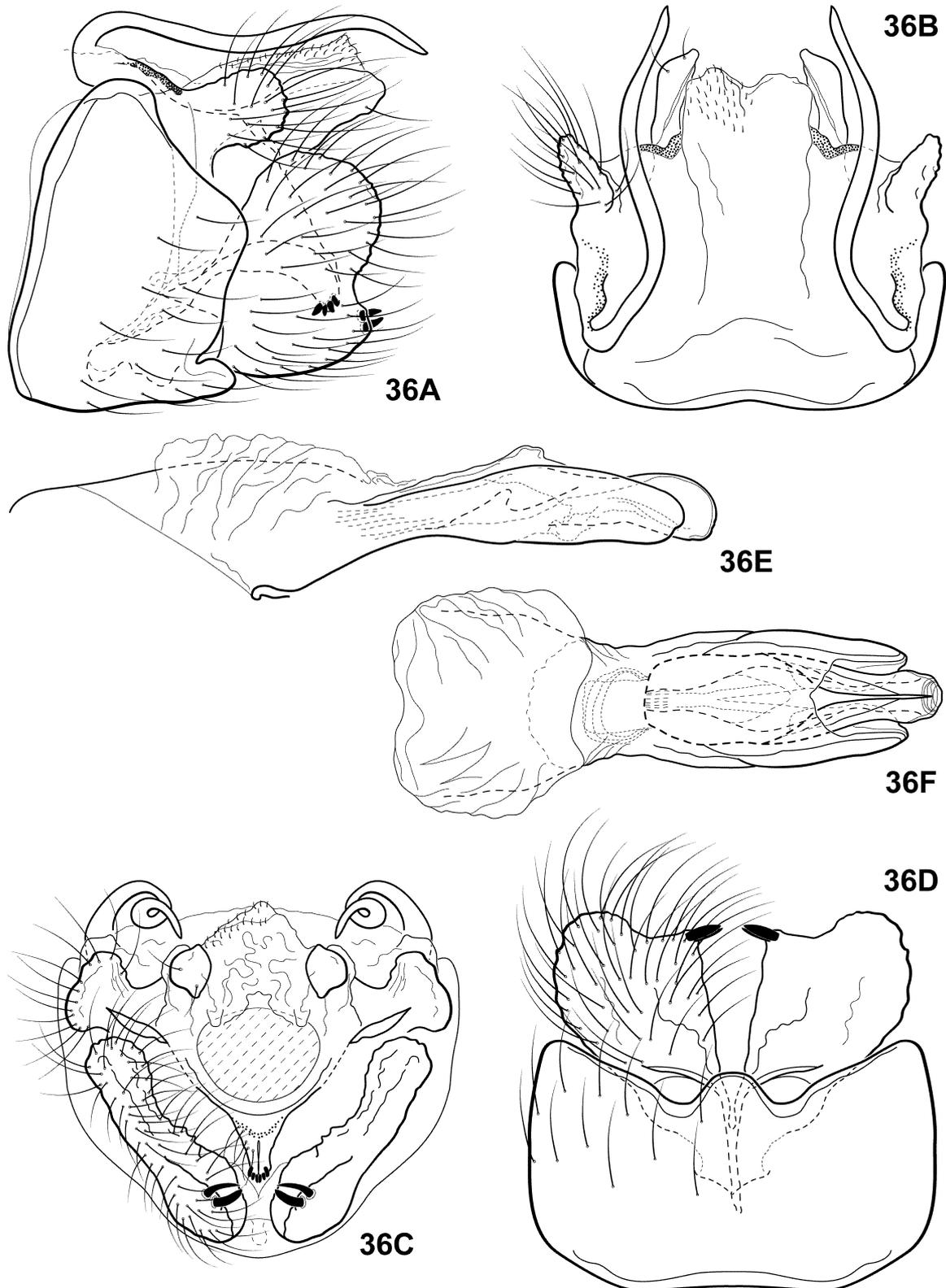


FIGURE 36. Male genitalia of *Polyplectropus brasiliensis*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Holotype male: BRAZIL: Rio de Janeiro: Nova Friburgo, municipal water supply, 950 m, 24.iv.1977, C & O Flint—(UMSP000107490) (MZUSP).

Paratypes: BRAZIL: Rio de Janeiro: Nova Friburgo, 950 m, 20.iv.1977, C & O Flint—1 male (NMNH); municipal water supply, 22°16'00"S, 42°31'59"W, 950 m, 24.iv.1977, C & O Flint—1 male (NMNH); **São Paulo:** Estação Biológica de Boracéia, Rio Claro @ Poço Verde, 23°38'51"S, 45°52'30"W, 840 m, 18.ix.2002, Blahnik, Prather, Melo, Froehlich, Silva—1 male (UMSP); Estação Biológica Boracéia, Riacho Rabelo, 23°39'11"S, 45°53'23"W, 850 m, 19.ix.2002, Blahnik & Prather—1 male (MZUSP).

Distribution. Brazil.

Eymology. Named for the country where the types were collected, Brazil.

***Polyplectropus bredini* Flint**

Figs. 37, 38A, B, 126

Polyplectropus bredini Flint 1968: 21 [Type locality: Dominica, Pont Casse, 1.3 miles east: NMNH; male.]

Polyplectropus bredini is most similar to *P. mignonae* Bueno-Soria in the shapes of the phallus and of the intermediate and preanal appendages. These 2 species can be distinguished by differences in the dorsal branch of the inferior appendage. *Polyplectropus bredini* has elongate apical spines and the dorsal branch is almost twice as broad apically and basally. In addition, the mesoventral process of the preanal appendage is basally broader in *P. bredini* than in *P. mignonae* and the ventral branch of the inferior appendage is produced more laterad in *P. bredini*.

Adult. Length of forewing 4–4.6 mm, n = 4. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings darker brown along costal margin, rest of wing lighter shade of brown with scattered patches of grey setae.

Male genitalia. Sternum IX in lateral view rounded, anterior margin convex, posterior margin sinuate and supramedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous bearing microsetae, digitate and slightly ridged; in dorsal view emarginate; in caudal view membrane surrounding phallocrypt. Intermediate appendage longer than inferior appendage, narrowly digitate with long setae throughout; in dorsal view digitate, linear; in caudal view digitate, directed posterodorsad. Preanal appendage bipartite; mesolateral process setose; in dorsal view oblong, in lateral view oblong; mesoventral process setose; in lateral view quadrate with ventrad-directed sclerotized apex, posterior margin truncate; in caudal view processes separated, ventral margin of process subacute, basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view oblong, with posteroventral margin highly undulate, bearing 3–6 long, stout, apical sclerotized spines; in ventral view broad, lateral margin convex, undulate, posterior margin undulate, mesal margin sinuate, straight, becoming concave, expanding posterad into ventral branch, dorsal branch of specimens from Dominica have 4 apical, elongate spines, while specimens from St. Lucia have only 3; ventral branch setose, broad, bearing a row of 4–7 robust, sclerotized spines along posterior margin; in lateral view clavate, posteromesal margin convex, mesal margin straight, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex pandurate to oblong; apex of dorsal phallic sclerite in dorsal view emarginate; endothecal membrane without embedded spines.

Female genitalia. Ventral plates of segment VIII setose, in ventral view oblong, in lateral view oblong, broadly fused to sternite VIII; external part of gonopod of segment VIII in ventral view with posterior margin truncate, in lateral view scirrhus, curved ventrad; internal part of gonopod sclerotized, in ventral view with mesal margin acutely angled posterad, not meeting mesally. Tergum IX devoid of setae, expanded laterad.

Segment X setose, apically bearing a pair of sclerotized cerci surrounded by 2 pairs of membranous digitate processes. Genital chamber opening to processus spermathecae through sclerotized circular opening of ductus spermathecae.

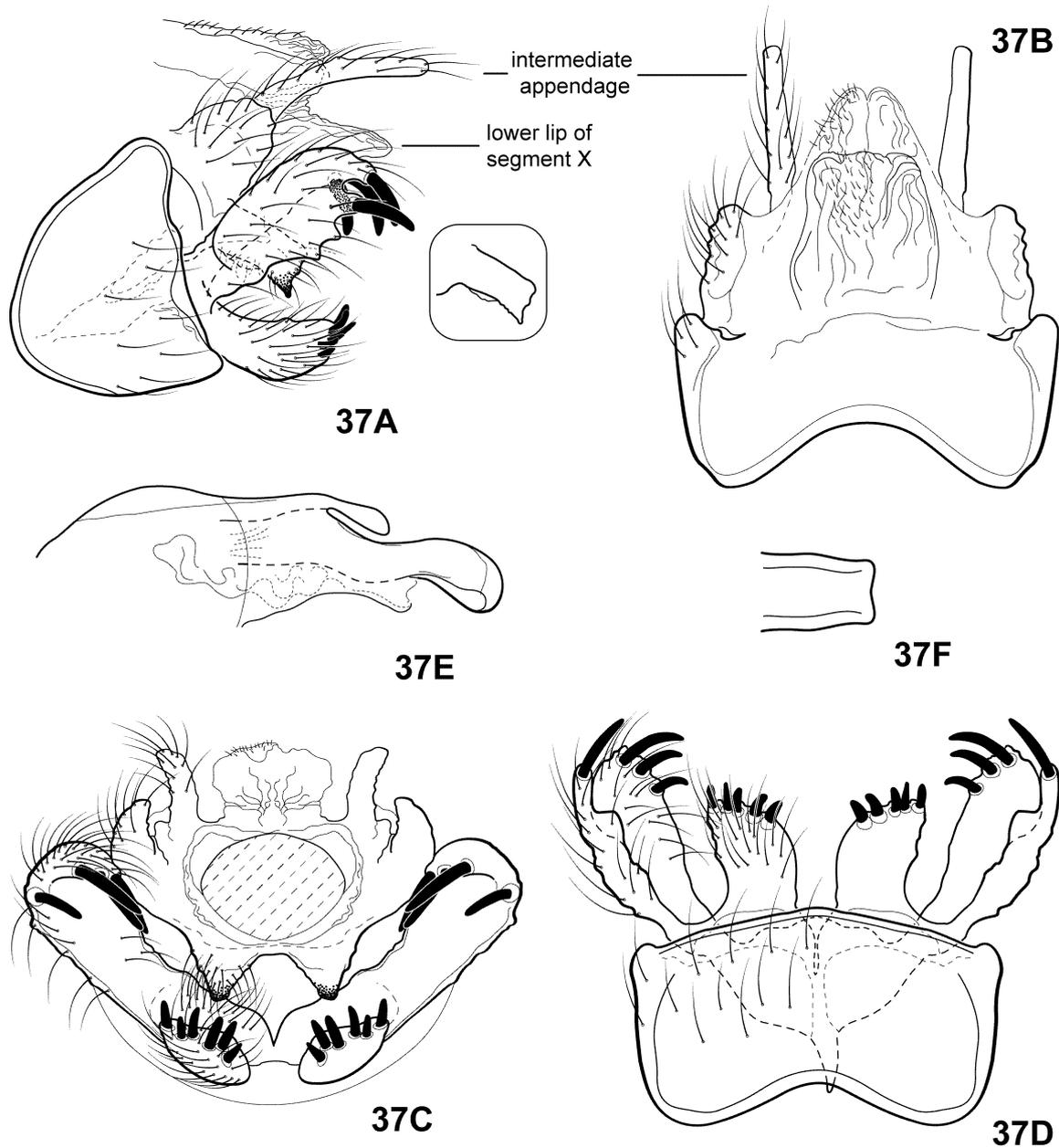
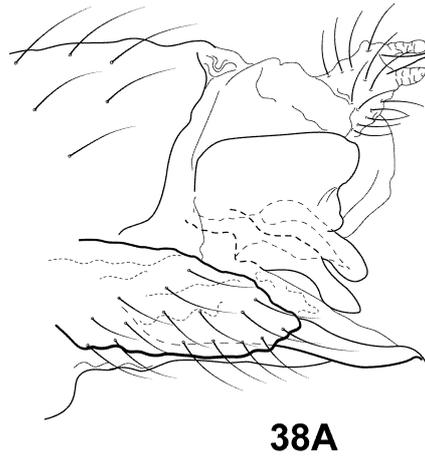


FIGURE 37. Male genitalia of *Polyplectropus bredini* Flint, 1968 (paratype): A—left lateral view, with inset of ventrolateral process of left preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—apex, dorsal view.

Material Examined. DOMINICA: Fond Figures River, Bredin-Archbold-Smithsonian Bio[logical] Survey Dominica, 13.iii.1965, W. W. Wirth—1 male [paratype] (NMNH); 1.3 mi E. of Pont Casse, 12.v.1964, O. S. Flint—1 male [paratype] (NMNH); Syndicate Est., 5.iii.1964, D. F. Bray—1 female [allotype] (NMNH); **SAINT LUCIA:** R. Galet, S. of Denneny, 1.viii.1963, Flint & Cadet—1 male (NMNH).

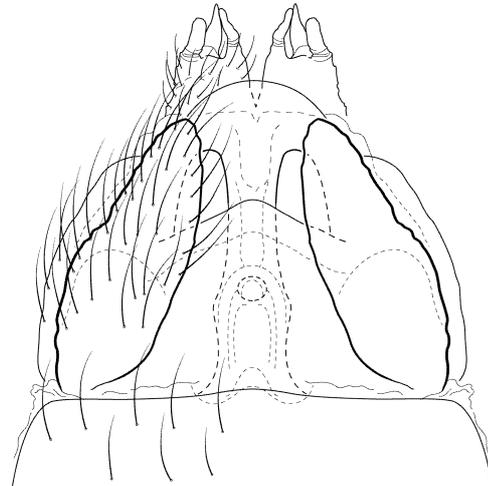
Distribution. Dominica, Grenada, Guadeloupe, Martinique, and Saint Lucia (Botosaneanu, 1988; Flint, 1968).



38A



38B



38C

FIGURE 38. Female genitalia of New World *Polyplectropus* spp.: A–B—*Polyplectropus bredini* Flint, 1968 (allotype): A—left lateral view; B—ventral view; C—*Polyplectropus clauseni* Chamorro–Lacayo & Holzenthal, 2004, ventral view.

***Polyplectropus clauseni* Chamorro-Lacayo & Holzenthal**

Figs. 15E, 38C, 39, 40, 127

Polyplectropus clauseni, Chamorro-Lacayo & Holzenthal, 2004: 202. [Type locality: COSTA RICA: Alajuela: Cerro Campana, Rio Bochinche, tributary, 6 km (air) NW Dos Rios; UMSP; male.]

This species is most similar to *P. brasiliensis*, new species in the overall shape of the inferior appendage, in the presence of a dorsolateral process of the preanal appendage, and in the overall shape of the phallus. *Polyplectropus clauseni* can be distinguished from *P. brasiliensis* and all other species in the group by the broad and largely membranous intermediate appendage, by the subquadrated dorsolaterally produced mesoventral processes of the preanal appendage bearing apical peg-like setae, and by the presence of a prominent papillate lobe.

Adult. Length of forewing 5.1 mm, n = 4. Color of head, thorax, and legs yellowish-brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

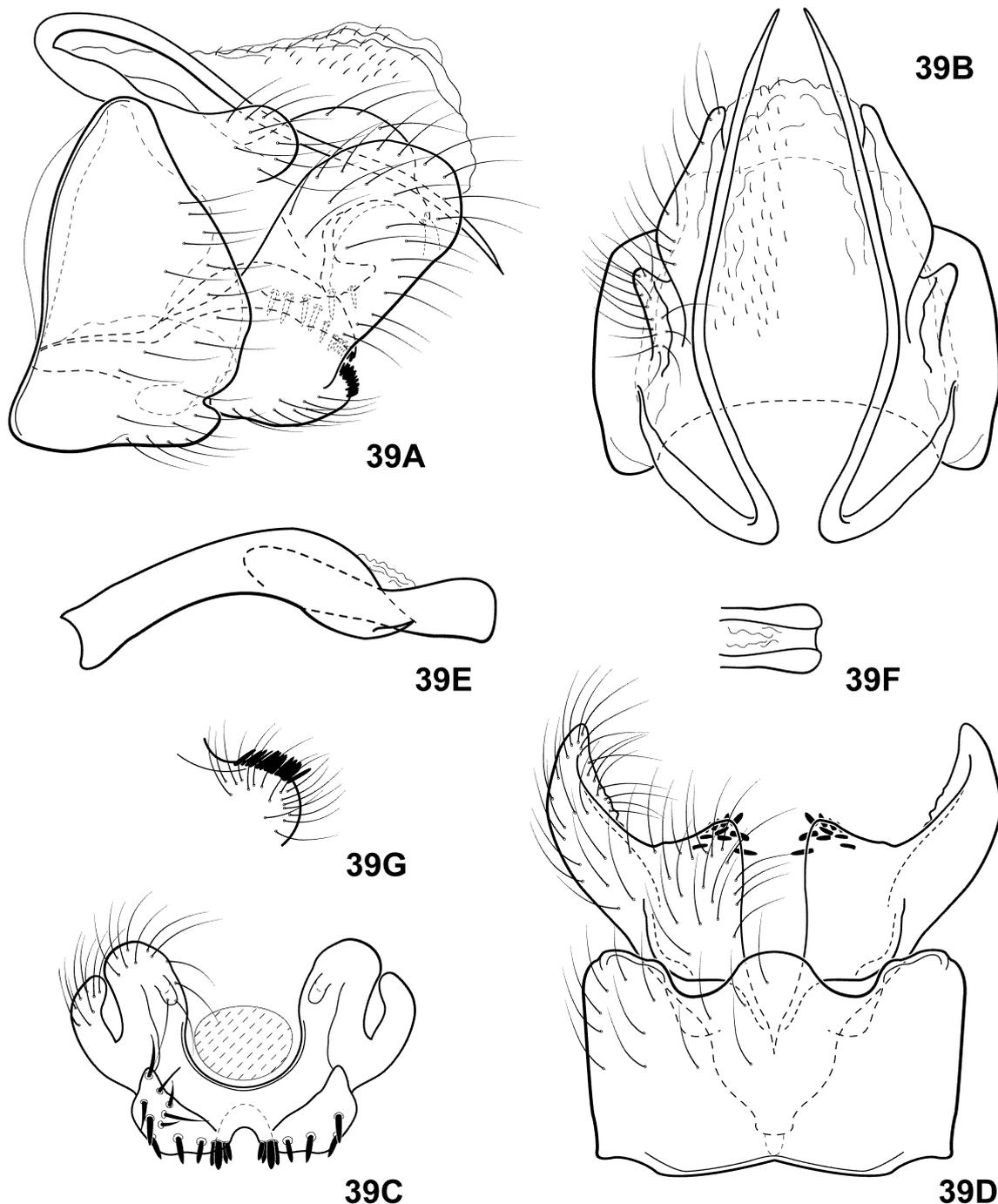


FIGURE 39. Male genitalia of *Polyplectropus clauseni* Chamorro–Lacayo & Holzenthal, 2004 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view; F—phallus apex, dorsal view; G—left inferior appendage, caudal view.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin sinuate and supramedially convex, posterior margin submedially produced and becoming concave ventrally; in ventral view rectangular, anterior margin entire to sinuate, posterior margin with median flange and submedially deeply concave. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, broad, membranous and with ventral digitate projection and long setae basally and apically; in dorsal view digitate to clavate, elongate; in caudal view clavate, produced posteroventrad and entire appendage produced posterad and ventromesally; median papillate lobe flanking phallocrypt laterally, bearing small apical setae

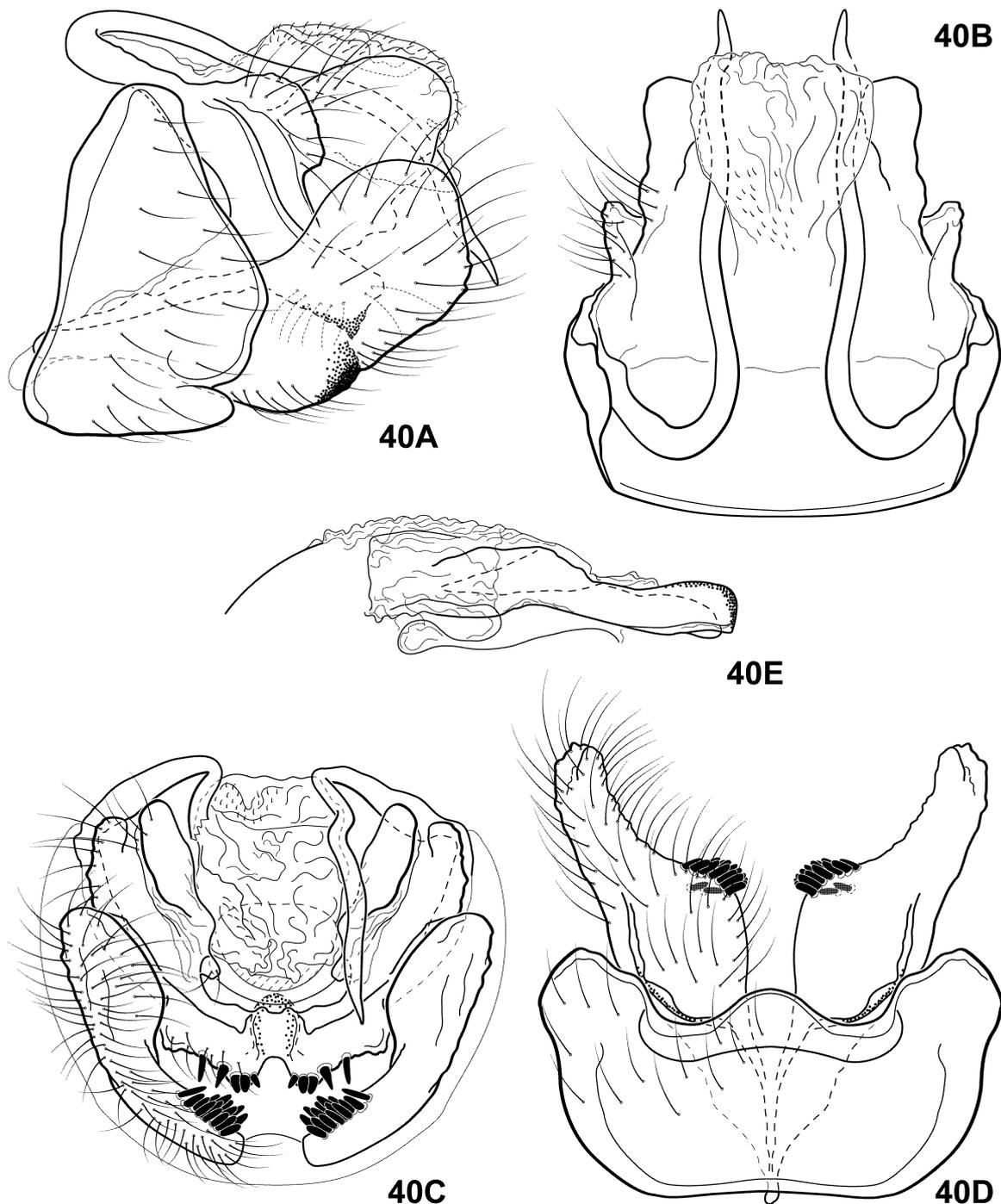


FIGURE 40. Male genitalia of *Polyplectropus clauseni* Chamorro–Lacayo & Holzenthal, 2004 (Panama): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

intermediate appendage apparently fused to mesoventral process of preanal appendage. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view sickle-shaped, in lateral view orbicular; mesoventral process setose; in lateral view hook-like or subquadrate, mesoventral process dorsally fused to intermediate appendage with dorsolateral expanded lobe with narrowed apex, process with ventrad-directed sclerotized apex, anteroventral margin angled to concave, posterior margin angled to concave; in caudal view fused basomesally, processes separated apically, ventral margin of process undulate, with many sclerotized, peg-like setae. Inferior appendage bipartite with anterior

basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view oblong, directed posterodorsad; in ventral view broad, lateral margin convex, entire, posterior margin acute, mesal margin entire, concave, shallowly fused to ventral branch; ventral branch setose, short and broad, bearing robust, sclerotized spines apically; in lateral view oblong and almost forming a continuous structure with dorsal branch, rounded posterad; in ventral view deltoid, mesal margin slightly concave, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex oblong; lateral projection of phallobase in lateral view cylindrical, with truncate apex; endothecal membrane without embedded spines, membranous basodorsally.

Female genitalia. Ventral plates of segment VIII setose, in ventral view narrowly oblong, narrowly fused to sternite VIII; external part of gonopod of segment VIII in ventral view with posterior margin rounded. Tergum IX devoid of setae, lightly sclerotized. Segment X setose, apically bearing a pair of sclerotized cerci surrounded by 2 pairs of membranous digitate processes. Genital chamber opening to processus spermathecae through sclerotized circular opening of ductus spermathecae.

Material Examined. **COSTA RICA: Alajuela:** Cerro Campana, Rio Bochinche, tributary, 6 km (air) NW Dos Rios, 10°54'00"N, 85°24'00"W, 640 m, 22–23.vii.1987, Holzenthal, Morse & Clausen—1 male (UMSP) [holotype]; **Guanacaste:** Río Los Ahogados, 11.3 km ENE Quebrada Grande, 10°51'54"N, 85°25'23"W, 470 m, 7.iii.1986, Holzenthal & Fasth—1 male (NMNH) [paratype]; Parque Nacional Rincón de la Vieja, Quebrada Agua Apinolada, 10°47'42"N, 85°17'31"W, 795 m, 25.vi.1986, Holzenthal, Heyn & Armitage—1 male (UMSP) [paratype]; **PANAMA: Panama:** Barro Colorado Island, Snyder-Molino Trail, marker 3, 3–9.viii.1988, H. Wolda—1 male (NMNH); 25–31.i.1989, H. Wolda—1 female (NMNH); 13–19.ii.1991, H. Wolda—1 male (NMNH).

Distribution. Costa Rica and Panama.

Polyplectropus colombianus, new species

Figs. 15B, 41, 134

Polyplectropus colombianus is a very distinct species and superficially resembles *P. corniculatus*, new species in the presence of an elongate dorsolateral process of the preanal appendage and in the overall shape of the inferior appendage. However, *P. colombianus* is easily distinguished from any other species by the presence of a prominent and apically emarginate basal dorsal digitate lobe on the mesoventral process of the preanal appendage, by the rounded apex of the incompletely fused mesoventral process of the preanal appendage, by the enlarged and modified apex of the phallus, and by the medially membranous posterior margin of sternum IX. Additionally, this species has small clusters of microsetae on the surface of the mesoventral process of the preanal appendage, a feature unique to this species.

Adult. Length of forewing 5.8 mm, n = 1. Color of head, thorax, and legs brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings darker brown patches of setae basally along costal margin, rest of wing lighter shade of brown with scattered patches of grey setae.

Male genitalia. Sternum IX in lateral view broadly deltoid, anterior margin convex, posterior margin sinuate and ventrally membranous; in ventral view rectangular, anterior margin entire, posterior margin with slight median flange and mesally membranous. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, oblong with setose, basal digitate lobe, primary lobe with long basal setae and few scattered apically; in dorsal view digitate, basally produced laterad, with small, lateral papillate lobe; in caudal view digitate, basolateral lobe becoming oblong and flanking phallocrypt laterally, directed posterad; lateral papillate lobe very small, midway between phallocrypt and mesolateral process of preanal appendage, bearing small apical setae. Preanal appendage tripartite;

dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view ovate, in lateral view

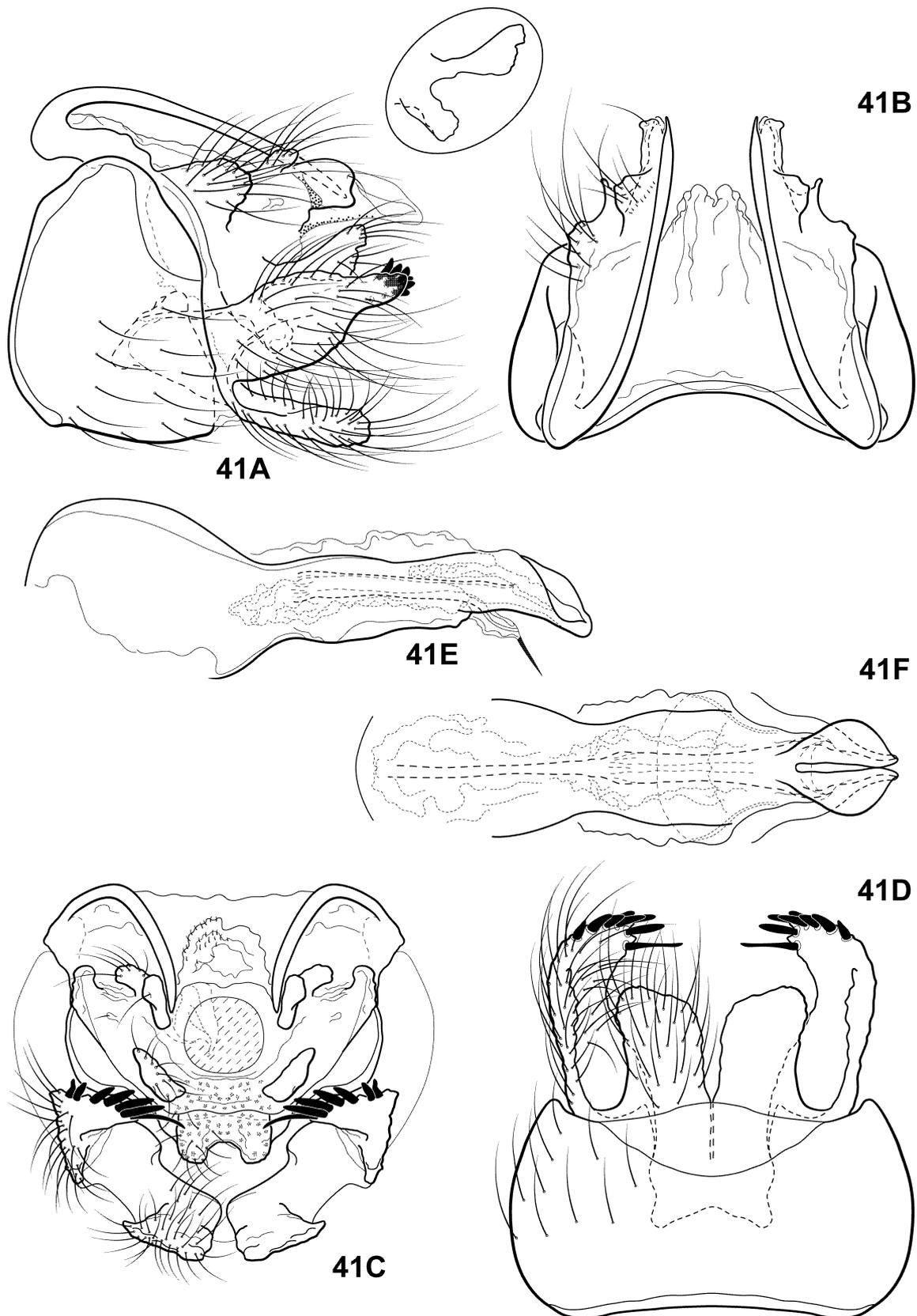


FIGURE 41. Male genitalia of *Polypsectropus colombianus*, new species (holotype): A—left lateral view and inset of mesoventral process of left preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

mesoventral process setose, in lateral view digitate, basodorsally produced into apically emarginate, clavate lobe, anteroventral margin concave, posterior margin deeply concave; in caudal view fused basomesally, surface with small scattered sculptured clumps of minute setae, processes apically separated, ventral margin of process rounded with basal dorsal digitate lobe clavate, apically emarginate and lacking clumps described above. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view, anteriorly bilobed; dorsal branch setose, in lateral view obclavate, abruptly narrowing apically, bearing several apical, sclerotized spines; in ventral view broad, lateral margin sinuate, posterior margin truncate, mesal margin slightly undulate, concave, expanding posterad into ventral branch; ventral branch setose, elongate, in lateral view clavate, rounded posterad; in ventral view subquadrate, mesal margin slightly angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex oblong and directed ventrad; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view broad, produced dorsad; in dorsal view subapically broad, apex cuspidate; endothecal membrane with lightly sclerotized spines.

Holotype male. COLOMBIA: Meta: Quebrada Blanca, 3 km W. Restrepo, [4°15'00"N, 73°34'00"W], 11.ii.1983, O S Flint—(UMSP000107489) (NMNH).

Distribution. Colombia.

Etymology. This species is named for the Republic of Colombia, where the holotype was collected.

***Polyplectropus corniculatus*, new species**

Figs. 42, 132

This species is unique among other species in the genus in having a pair of dorsal lanceolate projections on the posterior margin of tergum VIII. Other distinguishing features include a slightly sculptured apex of the intermediate appendage and a downturned apex of the phallus. *Polyplectropus corniculatus* superficially resembles *P. colombianus*, new species. Both species have an elongate dorsolateral process of the preanal appendage and oblong and elongate intermediate appendage bearing few apical setae. *Polyplectropus corniculatus* also resembles *P. petrae* in the highly concave posterior margin of sternum IX.

Adult. Length of forewing 4–5 mm, n = 9. Color of head, thorax, and legs brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings brown with scattered patches of golden setae.

Male genitalia. Posterodorsal margin of tergite VIII modified, bearing paired, dorsal lanceolate projections, directed posterad. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin medially produced; in ventral view rectangular, anterior margin entire, posterior margin concave and with median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage longer than inferior appendage, oblong, with long basal setae and few scattered subapically; in dorsal view clavate, subapically broad, apically with scale-like surface; in caudal view digitate, dorsolateral lobe produced medially into digitate, curved digitate lobe, directed posteromesad, apparently fused basoventrally to mesoventral process of preanal appendage. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posterad, tapering mesally into acute apex, subapically expanded; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view rounded, mesoventral process fused to intermediate appendage, directed ventrad, ventral margin concave, posterior margin convex; in caudal view fused basomesally, apex of processes separated, ventral margin of process angled, bearing sclerotized spines. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, bearing several apical, sclerotized spines; in ventral view narrow, broadening apically, lateral margin apically produced, posterior margin angled, mesal margin undulate,

angled, expanding posterad into ventral branch; ventral branch setose, elongate, bearing robust, sclerotized spines along entire dorsal surface; in lateral view lanceolate, medially produced laterad; in ventral view deltoid to quadrate, mesal margin slightly concave, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex oblong and directed ventrad; endothecal membrane without embedded spines.

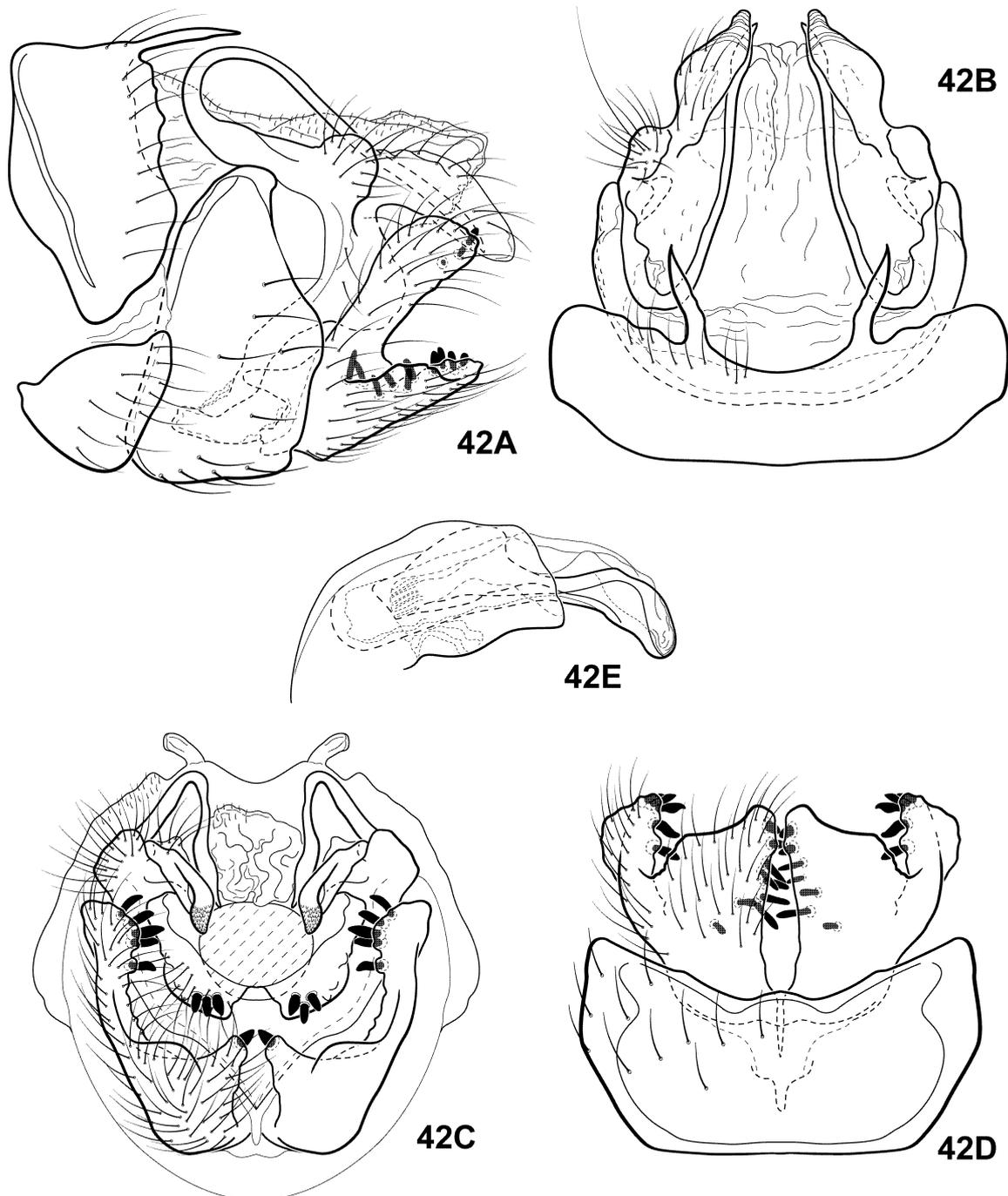


FIGURE 42. Male genitalia of *Polyplectropus corniculatus*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

Holotype male. PERU: Madre de Dios: Manú [Biosphere Reserve], Pakitza Bio[logical] Sta[tion], Quebrada Paujil-Picoflor, 11°56'39"S, 71°16'59"W, 350 m, 5.vii.1993, Blahnik & Pescador—(UMSP000107443) (NMNH).

Paratypes. PERU: Madre de Dios: Manú [Biosphere Reserve], Pakitza Bio[logical] Sta[tion], Quebrada Paujil-Picoflor, 11°56'39"S, 71°16'59"W, 350 m, 5.vii.1993, Blahnik & Pescador—1 male, 7 females (UMSP, NMNH).

Distribution. Peru.

Etymology. “Corniculatus” is the Latin word for “horned”, in reference to the narrow, paired processes arising from the posterior edge of tergum VIII.

***Polyplectropus flintorum*, new species**

Figs. 43, 134

Polyplectropus flintorum is readily distinguished from other species in the group by the presence of several peg-like setae on the ventral surface of the mesoventral process of the preanal appendage, by the sclerotized apex of the intermediate appendage, and by the shape of the phallus, being elongate, oblong, and apically emarginate (when observed from dorsal view). This species resembles *P. kanukarum*, new species and *P. corniculatus*, new species in the shape of the oblong intermediate appendage, which also bears few apical setae and in the presence of the dorsolateral process of the preanal appendage. Additionally, *P. flintorum* and *P. kanukarum* have superficially similar ventral branch of the inferior appendage.

Adult. Length of forewing 4.2–4.5 mm, n = 10. Color of head and thorax dark-brown, legs brown (specimen preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin submedially produced; in ventral view rectangular, anterior margin entire, posterior margin entire. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, cylindrical and basally produced dorsad, with long basal setae and a couple apically; in dorsal view digitate; in caudal view digitate, curved, narrowing and becoming sclerous apically, directed mesoventrad, with ventral microsetae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, basally broad, in lateral view deltoid; mesoventral process setose, in lateral view quadrate, anteroventral margin angled, posterior margin truncate; in caudal view processes separated, ventral margin of process with several stout, sclerotized peg-like setae. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view digitate, curved, abruptly narrowing apically, bearing 2–3 sclerotized spines; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin slightly undulate, concave, expanding posterad into ventral branch; ventral branch setose, short and basally broad, bearing several robust, sclerotized spines apically; in lateral view ovate, narrowing posterodorsad; in ventral view deltoid, mesal margin slightly angled, posterior margin rounded gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view emarginate; endothecal membrane without embedded spines.

Holotype male. VENEZUELA: Territorio Federal Amazonas [Estado Amazonas]: Camp II, Cerro de la Neblina, 00°50'00"N, 065°59'00"W, 2100 m, 29.i.1985, W E Steiner (UMSP000107523) (NMNH).

Paratypes: VENEZUELA: Territorio Federal Amazonas [Estado Amazonas]: Cerro de la Neblina, Camp XI, 00°52'00"N, 65°58'00"W, 1450 m, 25–28.ii.1985, P Spangler, P Spangler & R Faitoute—1 female (NMNH); Cerro de la Neblina, Camp VII, 00°51'00"N, 65°58'00"W, 1850 m, 30 Jan–10.ii.1985, P Spangler & R. Faitoute—1 male (UMSP); Camp II, Cerro de la Neblina, 00°50'00"N, 065°59'00"W, 2100 m, 29.i.1985, W E Steiner—1 male (UMSP); Cerro de la Neblina, Camp I, 00°52'08"N, 66°05'22"W, 1850 m, 6–8.ii.1984, D Davis—5 males, 1 female (NMNH).

Distribution. Venezuela.

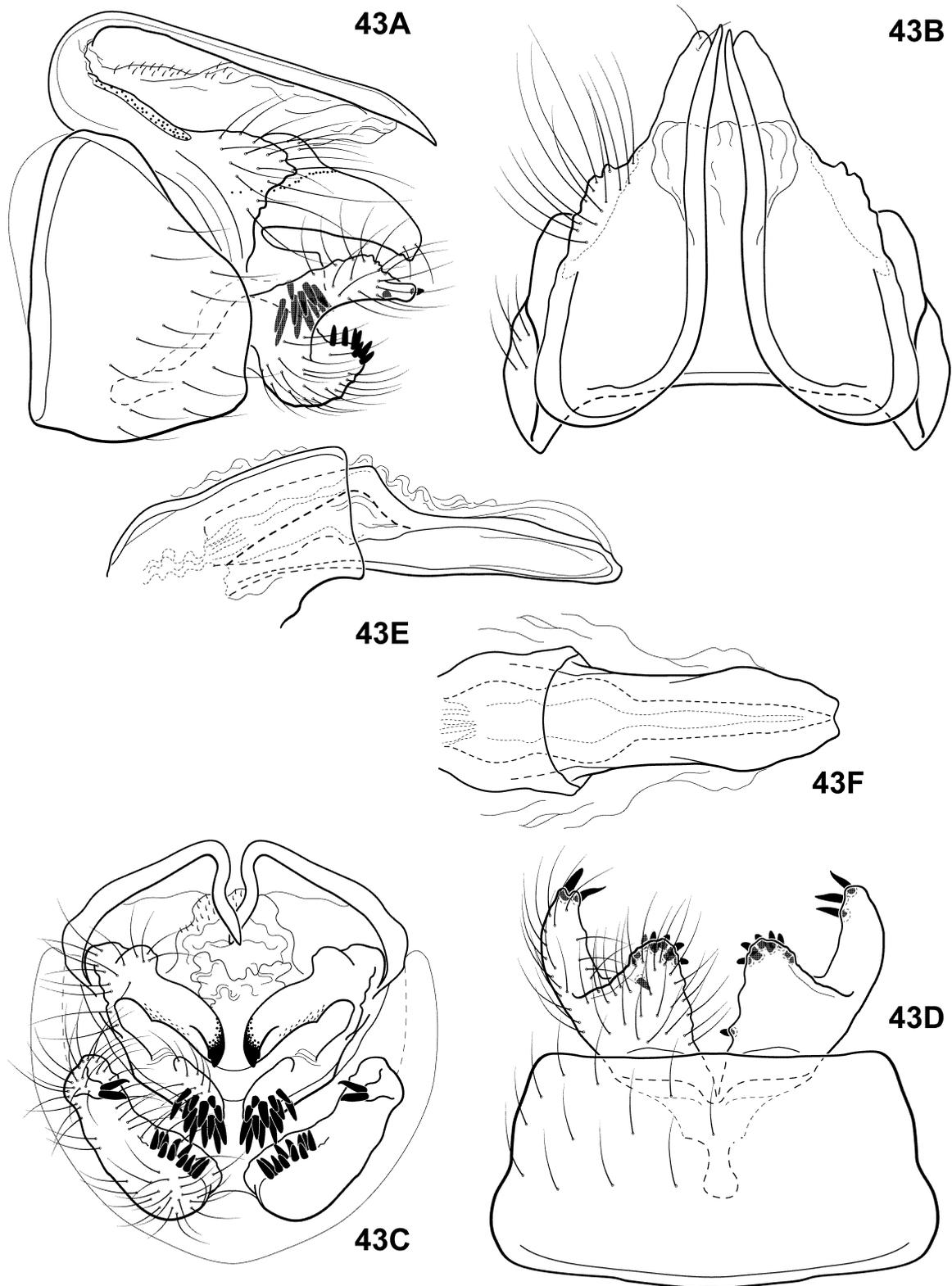


FIGURE 43. Male genitalia of *Polyplectropus flintorum*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Etymology. It gives us great pleasure to name this species in honor of Dr. Oliver S. Flint Jr. and Mrs. Carol Flint for their contribution to Trichopterozoology, as well as for their generosity, hospitality, and amity during the senior author's many visits to Washington, DC.

Polyplectropus hymenochilus Chamorro-Lacayo & Holzenthal

Figs. 44, 128

Polyplectropus hymenochilus Chamorro-Lacayo & Holzenthal, 2004: 206. [Type locality: Costa Rica, Guanacaste, Parque Nacional Guanacaste, Quebrada Alcornoque, El Hacha; UMSP; male.]

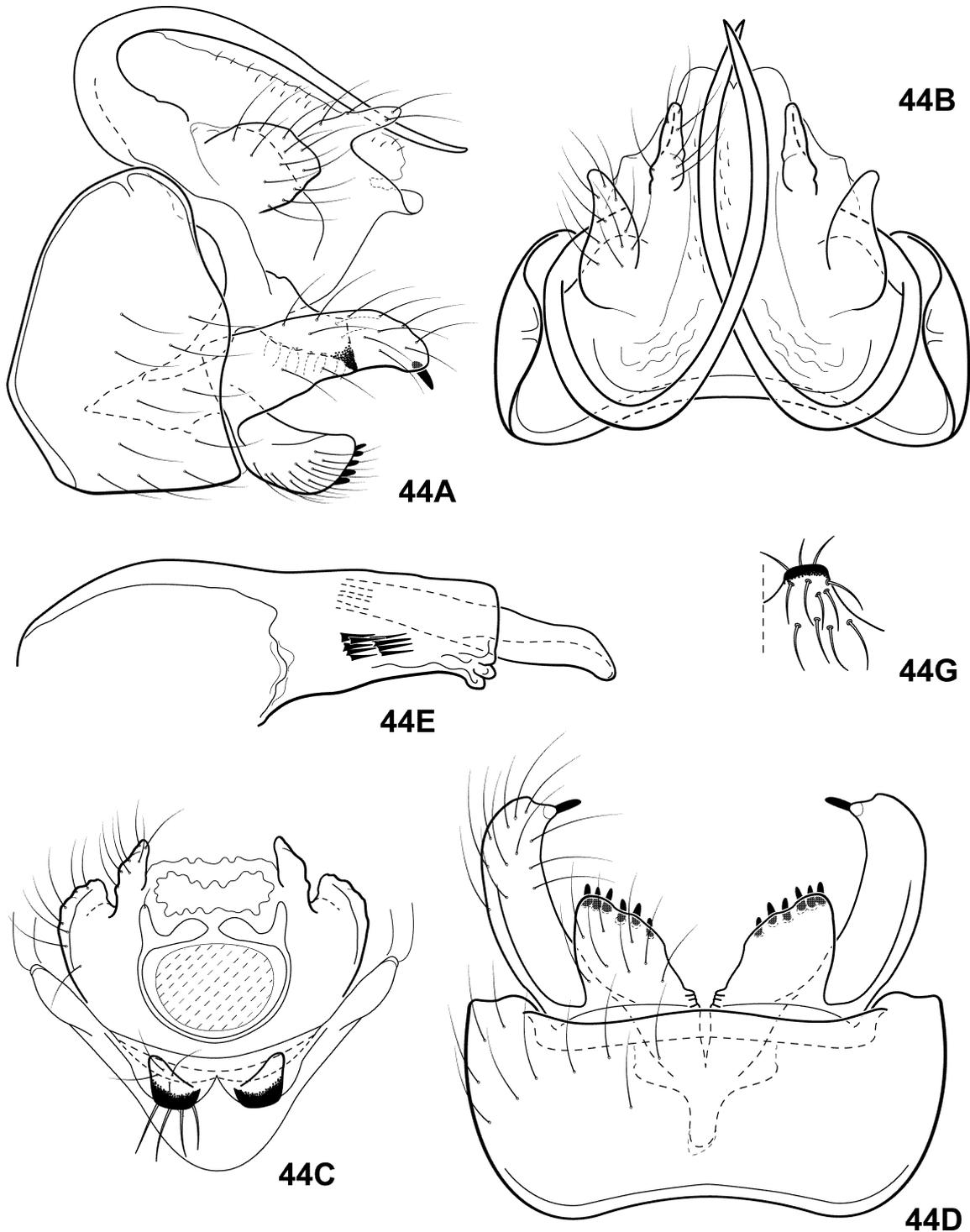


FIGURE 44. Male genitalia of *Polyplectropus hymenochilus* Chamorro-Lacayo & Holzenthal, 2004 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view; G—ventromesal process of left preanal appendage, ventral view.

This species is most similar to *P. mignoniae* Bueno-Soria based on the overall shape of the inferior appendage, especially the ventral branch, the intermediate appendage, and the mesoventral process of the preanal

appendage. *Polyplectropus hymenochilus* can be distinguished from *P. mignonae* by the presence of an elongate dorsolateral process of the preanal appendage, by the presence of a membranous lip ventral to the intermediate appendage and dorsal of the phallus, and by what appears to be the presence of several short spines embedded in the endothelial membrane of the phallus.

Adult. Length of forewing 4.5–4.7 mm, n = 4. Color of head yellowish-brown, thorax brown, legs yellowish-brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings darker brown along costal margin, rest of wing a lighter shade of brown with scattered patches of grey setae.

Male genitalia. Sternum IX in lateral view broadly deltoid, anterior margin submedially produced, posterior margin sinuate; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, narrowly digitate with long setae throughout; in dorsal view digitate; in caudal view digitate, membranous base enclosing phallocrypt (funnel-like). Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view digitate, apex tapering laterad, in lateral view orbicular; mesoventral process setose; in lateral view subquadrate, tapering ventrally into sclerotized apex, ventral margin sinuate, posterior margin truncate; in caudal view processes separated, ventral margin of process truncate, with basolateral margin produced laterad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view digitate, subapically curved ventrad, bearing sclerotized apical spine; in ventral view narrow, lateral margin convex, entire, posterior margin truncate, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, short, bearing row of robust, sclerotized spines along posterior margin, in lateral view clavate, truncate posterad; in ventral view subquadrate, posterior margin angled and mesal margin angled and basally folding (comb-like), gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex obliquely angled and directed ventrad; endothelial membrane with several (about 20) thin, sclerotized spines.

Material Examined. **COSTA RICA: Guanacaste:** Parque Nacional Guanacaste, Quebrada Alcornoque, El Hacha, 11°00'32"N, 85°34'37"W, 250 m, 26.vii.1987, Holzenthal, Morse & Clausen—3 males [holotype] (UMSP) [paratypes] (INBIO) (NMNH); Quebrada Pedregal, El Hacha, 10°58'59"N, 85°32'20"W, 300 m, 27.vii.1987, Holzenthal, Morse & Clausen—1 male [paratype] (UMSP).

Distribution. Costa Rica.

***Polyplectropus kingsolveri* Bueno-Soria**

Figs. 16E, 45, 128

Polyplectropus kingsolveri Bueno-Soria, 1990: 375. [Type locality: Mexico: Chiapas: Palenque; IBUNAM; male.]

Polyplectropus kingsolveri is most similar to *P. maesi* Chamorro-Lacayo in the presence and shape of the dorsolateral process of the preanal appendage and in the overall shape of the intermediate appendage. Both species differ in the shape of the mesoventral process of the preanal appendage and in the shapes of the dorsal and ventral branches of the inferior appendage. *P. kingsolveri* has a quadrate (best viewed ventrally) ventral branch of the inferior appendage and the apex of the dorsal branch of the inferior appendage is oblong and not emarginate as in *P. maesi*. Furthermore, *P. kingsolveri* lacks peg-like setae on the ventral branch of the inferior appendage (present in *P. maesi*).

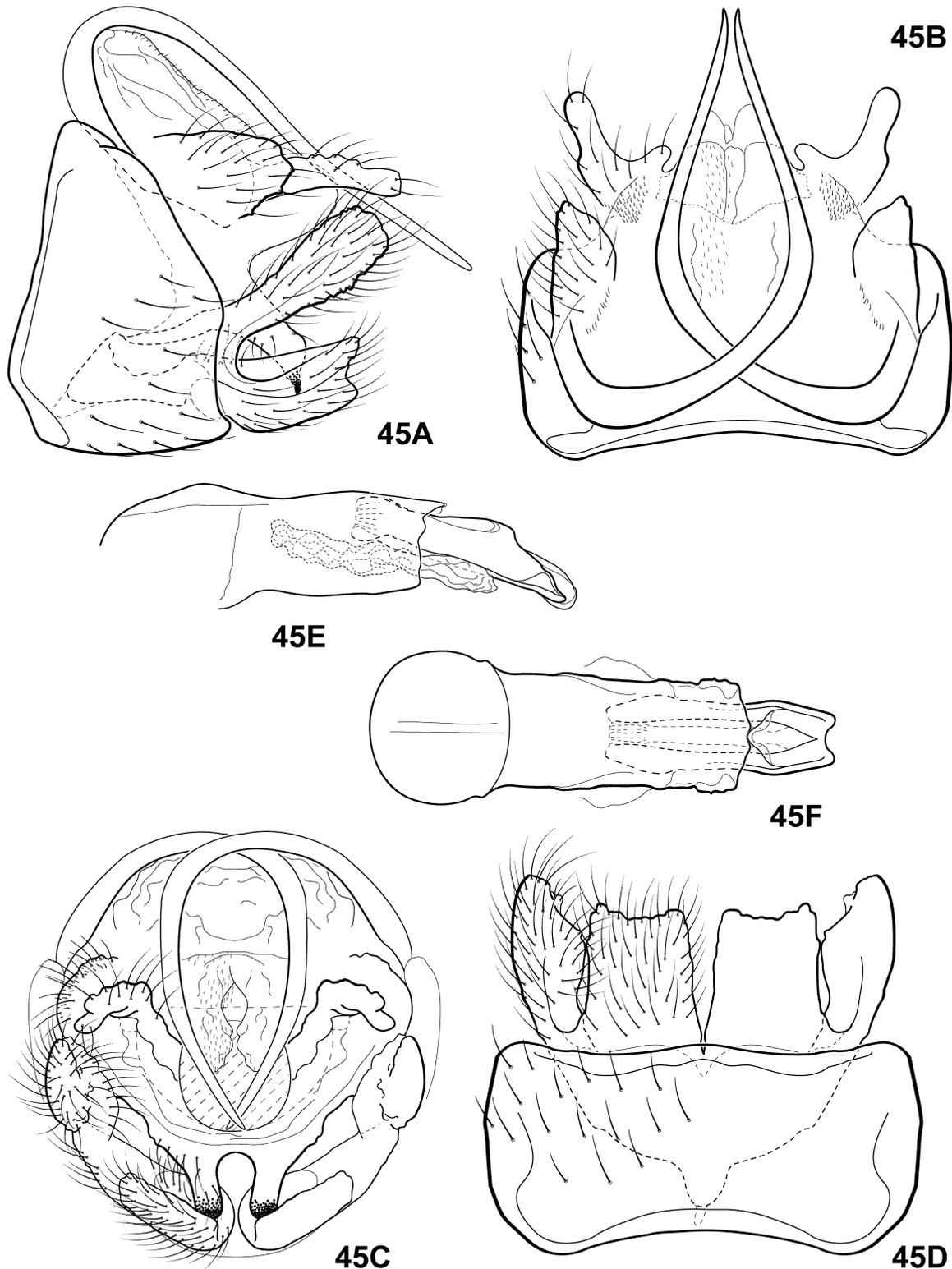


FIGURE 45. Male genitalia of *Polyplectropus kingsolveri* Bueno, 1990 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Adult. Length of forewing 4.9 mm, n = 9. Color of head, thorax, and legs yellowish-brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate and medially produced; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage as long as inferior appendage, narrowly digitate with long setae throughout; in dorsal view oblong, produced basomesally; in caudal view digitate, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view oblong; mesoventral process setose, in lateral view digitate to quadrate, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin rounded; in caudal view processes separated, ventral margin of process rounded, basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate; in ventral view broad, lateral margin convex, entire, posterior margin rounded, mesal margin slightly undulate, subapically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, elongate and broad; in lateral view quadrate, emarginate posterad, posterior margin concave, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex oblong; apex of dorsal phallic sclerite in dorsal view emarginate; endothelial membrane without embedded spines.

Female genitalia. Similar to female of *P. bredini*.

Material Examined. **BELIZE: Toledo:** Columbia For[est] Sta[tion], 2.viii.1970, Y. Sedman—1 male (NMNH); **MEXICO: Chiapas:** Palenque, 19.v.1984, Garcia, Barrera, Ibarra—8 males, 2 females [holotype & paratypes] (IBUNAM).

Distribution. Belize, Guatemala, and Mexico (Bueno-Soria 1990; Flint *et al.* 1999).

Remarks. This species presents slight variations in the thickness of the dorsal branch of the inferior appendage; specimen from Belize has a slightly narrower branch.

***Polyplectropus maesi* Chamorro-Lacayo**

Figs. 16B, 46, 128

Polyplectropus maesi Chamorro-Lacayo, 2003: 493. [Type locality: Nicaragua, Zelaya, Río Las Latas; UMSP; male.]

This species very closely resembles *P. kingsolveri* Bueno-Soria. Both species have a very elongate dorsolateral process of the preanal appendage and evident dorsal and ventral branches of the intermediate appendage. However, *P. maesi* possesses an apical row of peg-like setae on the ventral branch of the inferior appendage (absent in *P. kingsolveri*). Furthermore, the shape of the ventral branch is rather deltoid. The apex of the dorsal branch in *P. maesi* is emarginate and not rounded as in *P. kingsolveri*. This species can also be distinguished by the posteriorly produced mesoventral process of the preanal appendage (best viewed laterally).

Adult. Length of forewing 5–5.5 mm, n = 25. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin sinuate and submedially produced, posterior margin sinuate and medially produced; in ventral view rectangular, anterior margin highly concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, narrowly digitate, setose; in dorsal view digitate, linear; in caudal view digitate, curved, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in

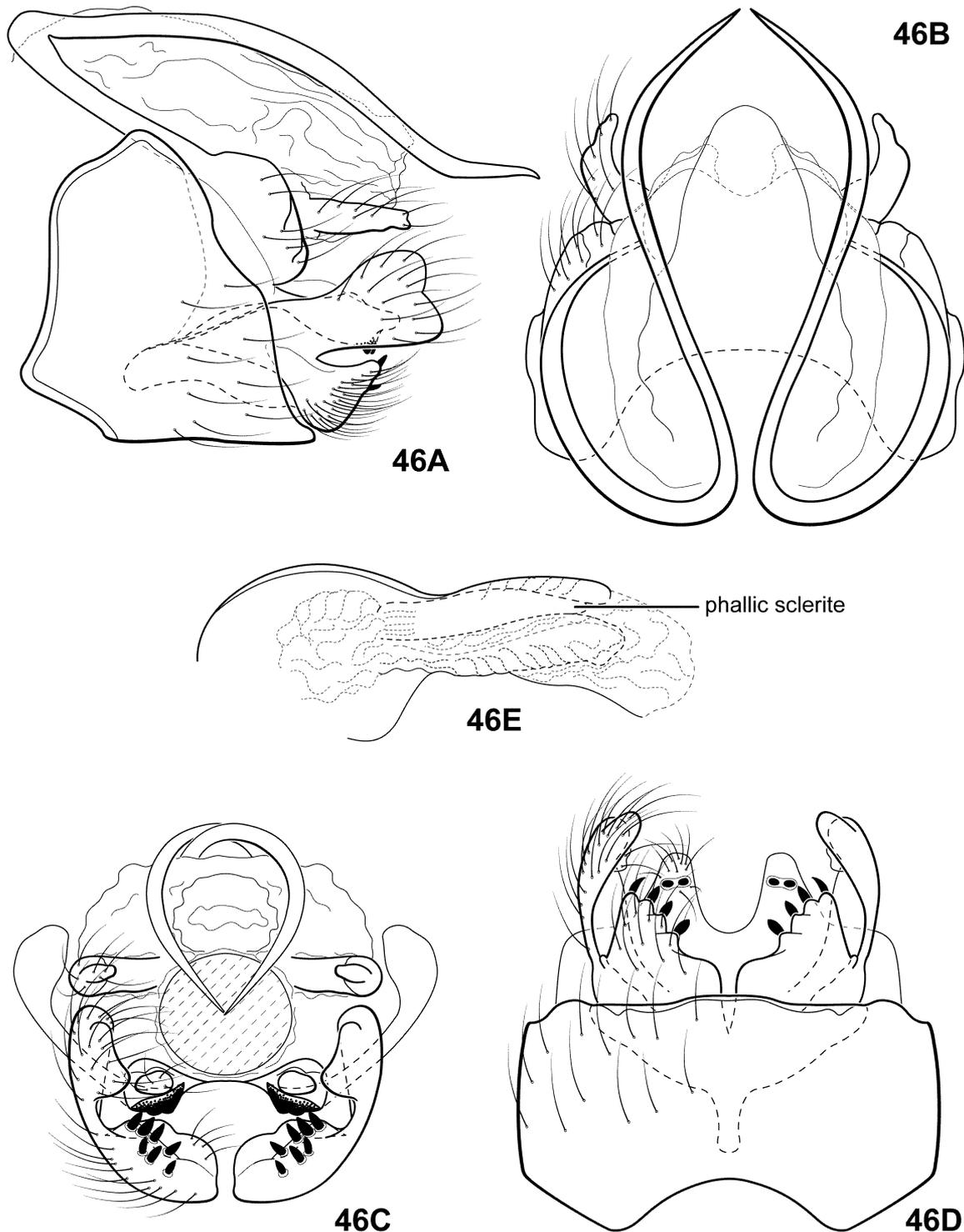


FIGURE 46. Male genitalia of *Polyplectropus maesi* Chamorro–Lacayo, 2003 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

lateral view subquadrate; mesoventral process setose; in lateral view clavate, narrowing apically, with ventrad-directed sclerotized apex, anteroventral margin sinuate, posterior margin rounded; in caudal view processes separated, ventral margin of process undulate, with sclerotized point. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, apex emarginate; in ventral view narrow, lateral margin convex, entire, posterior margin emarginate, mesal margin entire, convex, expanding posterad into ventral branch; ventral

branch setose, short, bearing row of robust, sclerotized spines along apex; in lateral view clavate, narrowing posterodorsad; in ventral view deltoid, posteromesal margin highly undulate, claw-like, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view cylindrical, apex oblong, narrow; endothecal membrane without embedded spines. When endothecal membrane becomes everted ventrolaterally it has 2 short, digitate lobes and an elongate, broader median lobe with bilobed apex. Ventrolateral lobes almost 1/3rd length and width of median lobe.

Material Examined. **NICARAGUA: Región Autónoma Atlántico Norte [Zelaya]:** Río Las Latas, 14°04'00"N, 88°33'00"W, 220 m, 2.vi.1998, Maes & Hernandez—1 male [holotype] (UMSP); **PANAMA: Panama:** Barro Colorado Island, Snyder-Molino Trail, marker 3, 4–10.iii.1987, H. Wolda—1 male (NMNH); 13.i.1988–16.ii.1988, H. Wolda—3 male, 1 female (NMNH); 1–21.vi.1988, H. Wolda—1 male (NMNH); 10.viii.–18.x.1988, H. Wolda—2 males (NMNH); 15–28.ii.1989, H. Wolda—2 male (NMNH); 17.i.–6.iii.1990, H. Wolda—4 males (NMNH); 25.iv.–29.v.1990, H. Wolda—3 males, 1 female (NMNH); 12.ix.–1.xii.1990, H. Wolda—2 males (NMNH); 30.i.–5.ii.1991, H. Wolda—1 male, 1 female (NMNH); 1–21.vi.1988, H. Wolda—1 male, 1 female (NMNH).

Distribution. Nicaragua and Panama.

***Polyplectropus mathisi* Bueno-Soria**

Figs. 47, 124

Polyplectropus mathisi Bueno-Soria, 1990: 377. [Type locality: Panama, Chiriquí, Fortuna Dam Site nr. Hornitos; NMNH; male.]

Polyplectropus mathisi is most similar to *P. mignonae* Bueno-Soria in the shapes of the intermediate appendage, the mesoventral process of the preanal appendage, and the phallus. However, *P. mathisi* is quite distinct due to the elongate, narrow and sinuate dorsal branch of the inferior appendage, the digitate mesolateral process of the preanal appendage, and the absence of an apical row of peg-like setae on the ventral branch of the inferior appendage.

Adult. Length of forewing 5.2 mm, n = 1. Color of head, thorax, and legs yellow (specimen preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin suprasedially convex; in ventral view rectangular, anterior margin concave, posterior margin convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in caudal view produced dorsad of phallocrypt. Intermediate appendage as long as inferior appendage, narrowly digitate with long setae throughout; in dorsal view digitate, linear; in caudal view digitate, directed posterad. Preanal appendage bipartite; mesolateral process setose; in dorsal view digitate, in lateral view digitate; mesoventral process setose; in lateral view quadrate with ventrad-directed sclerotized apex, anteroventral margin straight, posterior margin truncate; in caudal view processes separated, ventral margin of process subacute, basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view elongate and narrow, medially curved dorsad, bearing setae on rounded apex; in ventral view narrow, lateral margin convex, entire, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, short, in lateral view clavate, apically produced dorsad; in ventral view subquadrate, posteromesal margin angled, mesal margin straight, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex pandurate to oblong; endothecal membrane without embedded spines.

Material Examined. **PANAMA: Chiriquí:** Fortuna Dam Site nr. Hornitos, 8°55'00"N, 82°16'00"W, 1050 m, 10–16.viii.1977, H. Wolda—1 male [holotype] (NMNH).

Distribution. Panama.

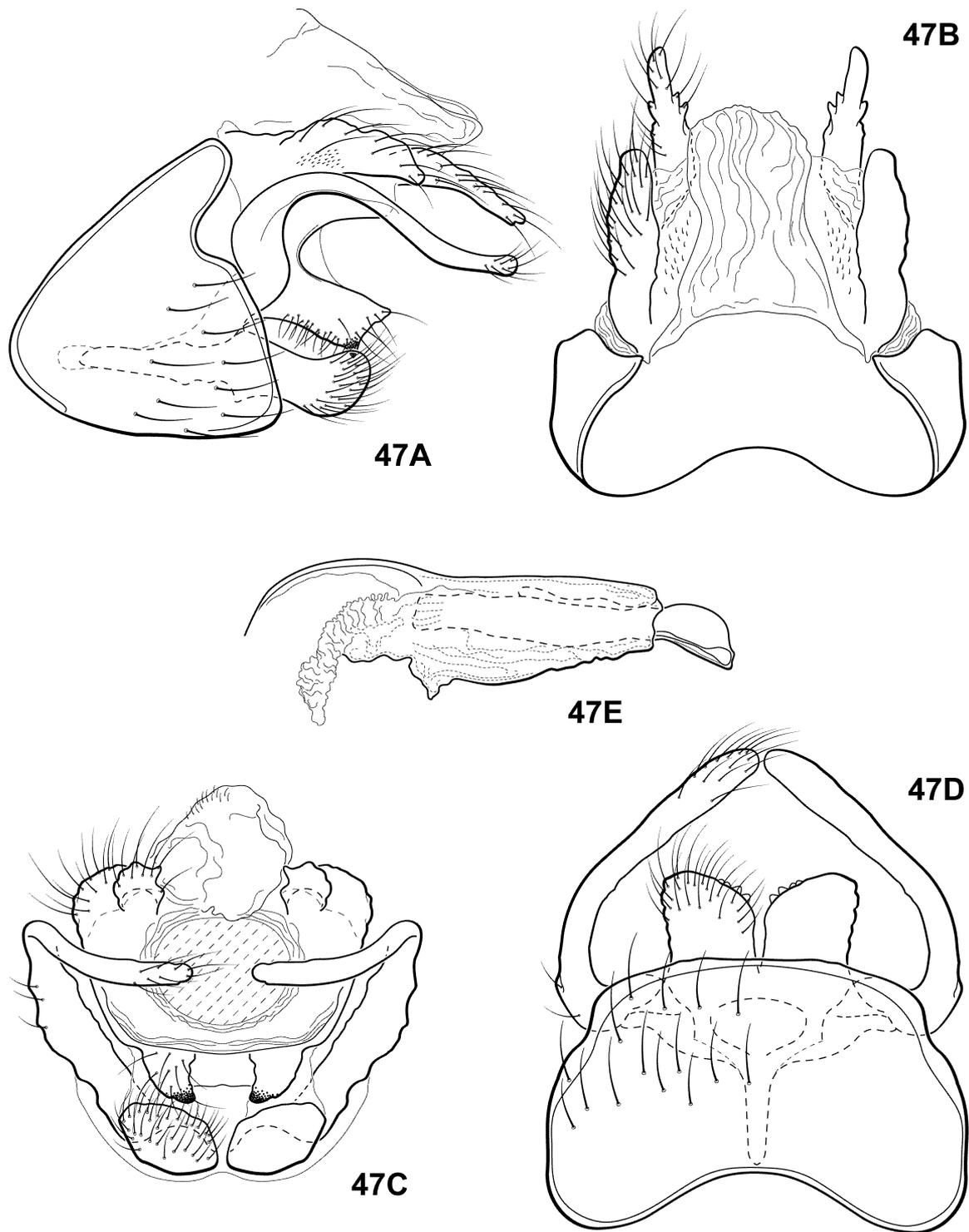


FIGURE 47. Male genitalia of *Polyplectropus mathisi* Bueno, 1990 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

***Polyplectropus mignonae* Bueno-Soria**

Figs. 48, 124

Polyplectropus mignonae Bueno-Soria, 1990: 376. [Type locality: Nicaragua, Puente Quinama, E. Villa Somoza; NMNH; male.]

This species resembles *P. adamsae*, new species in the shape of the phallus and of the intermediate and preanal appendages. The 2 species have similar inferior appendages but *P. mignonae* has a basally broader dorsal branch with apical spines, whereas *P. adamsae* has a narrower dorsal branch with apical and preapical spines.

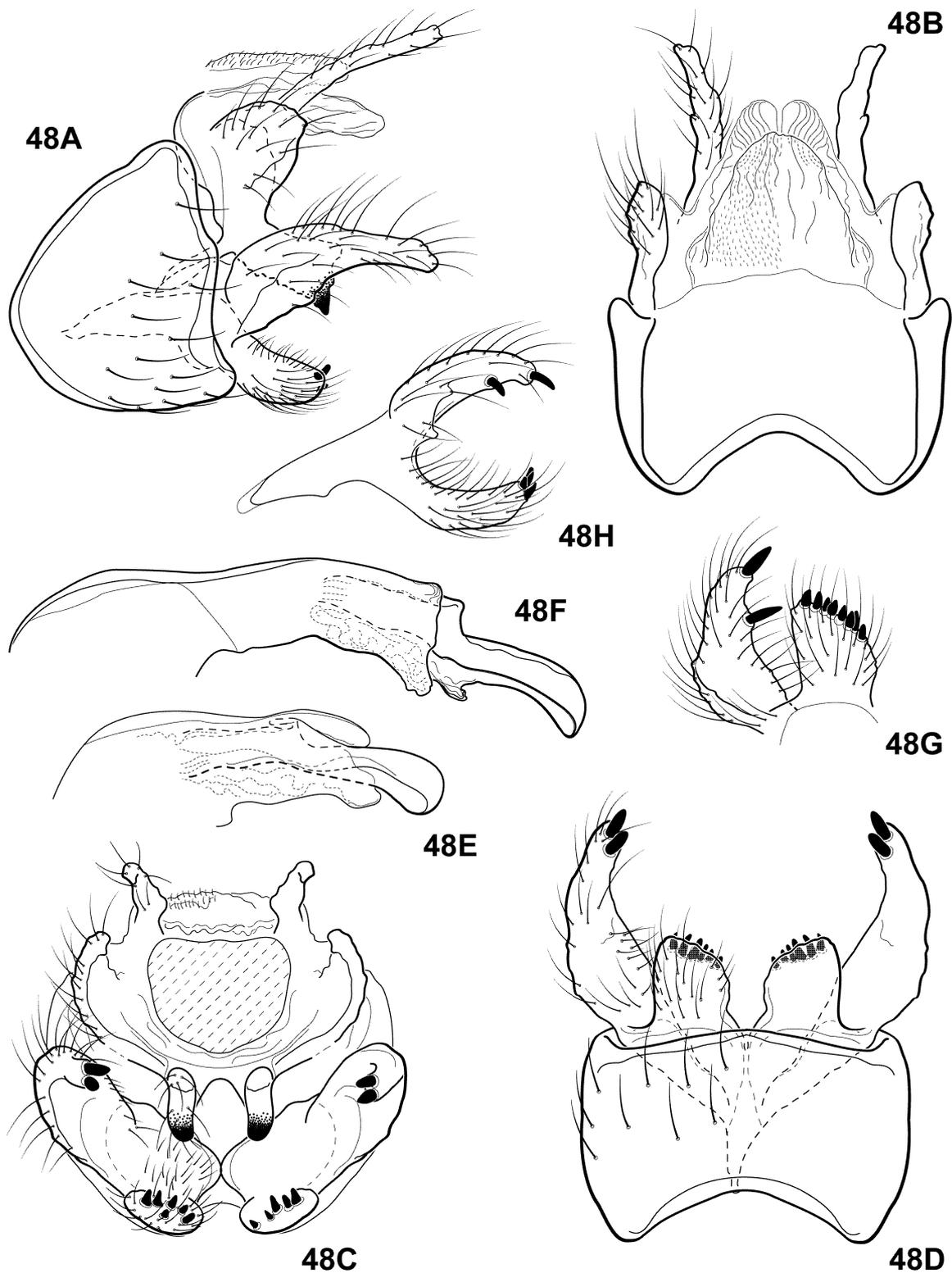


FIGURE 48. Male genitalia of New World *Polyplectropus* spp.: A–E—*Polyplectropus mignonae* Bueno, 1990 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, retracted (inverted), left lateral view. F–H—*Polyplectropus adamsae*, new species (holotype): F—phallus, protracted (everted), left lateral view; G–H—left inferior appendage: G—ventral view; H—left lateral view.

Adult. Length of forewing 4.2–5 mm, n = 4. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings darker brown along costal margin, rest of wing lighter shade of brown with scattered patches of grey setae.

Male genitalia. Sternum IX in lateral view broadly deltoid, anterior margin convex, posterior margin sinuate and medially produced; in ventral view rectangular, anterior margin concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous bearing microsetae, digitate and slightly ridged; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage as long as inferior appendage, narrowly digitate with long setae throughout; in dorsal view digitate, linear; in caudal view digitate, elongate, apically curved, directed posterolaterad. Preanal appendage bipartite; mesolateral process setose; in dorsal view oblong, in lateral view oblong; mesoventral process setose; in lateral view quadrate with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin truncate; in caudal view processes separated, ventral margin of process rounded. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view obclavate, basally broad and narrowing apically with 2 apical spines; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin entire, concave, expanding posterad into ventral branch, basal width of dorsal branch differs from holotype being narrower and more ventrally curved in some specimens; ventral branch setose, short, bearing a row of 4–7 robust, sclerotized spines along posterior margin; in lateral view clavate, rounded posterad; in ventral view subquadrate, posteromesal margin convex, mesal margin slightly concave, gradually converging mesally. Phallus elongate; dorsal phallic sclerite in lateral view cylindrical, apex pandurate to oblong; endothelial membrane without embedded spines.

Female genitalia. Similar to the female of *P. bredini*.

Material Examined. **COSTA RICA: Guanacaste:** Parque Nacional Guanacaste, Quebrada Pedregal, El Hacha, 10°58'59"N, 85°32'20"W, 300 m, 27.vii.1987, Holzenthal, Morse & Clausen—1 male (UMSP); **Puntarenas:** Arenal, Queb[rada] Tronadorcita, 24.vii.1967, O. S. Flint—1 male [paratype] (NMNH); **NICARAGUA: Chontales:** Puente Quinama, E. Villa Somoza, 29.vii.1967, O. S. Flint—2 males [holotype & paratype] (NMNH).

Distribution. Costa Rica and Nicaragua.

***Polyplectropus misolja* Bueno-Soria**

Figs. 17B, 49, 124

Polyplectropus misolja Bueno-Soria, 1990: 374. [Type locality: Mexico, Chiapas, Cascada Misolja, 20 km S Palenque: NMNH; male.]

Polyplectropus misolja is most similar to *P. bredini* in the shape of the intermediate appendage, the mesolateral and mesoventral processes of the preanal appendage and in the overall shape of the phallus and ventral branch of the inferior appendage. However, *P. misolja* can be distinguished from *P. bredini* by the presence of a dorsolateral process of the preanal appendage and by the presence of small spines above the dorsal phallic sclerite, a character absent in all other species in the genus. In addition, the dorsal branch of the inferior appendage is narrow basally in *P. misolja* and the apical spines are shorter than in *P. bredini*. Furthermore, *P. misolja* has a membranous shelf originating from the intermediate appendage surrounding the phallocrypt.

Adult. Length of forewing 4.5–5 mm, n = 5. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings darker brown along costal margin, remainder of wing lighter shade of brown with scattered patches of grey setae.

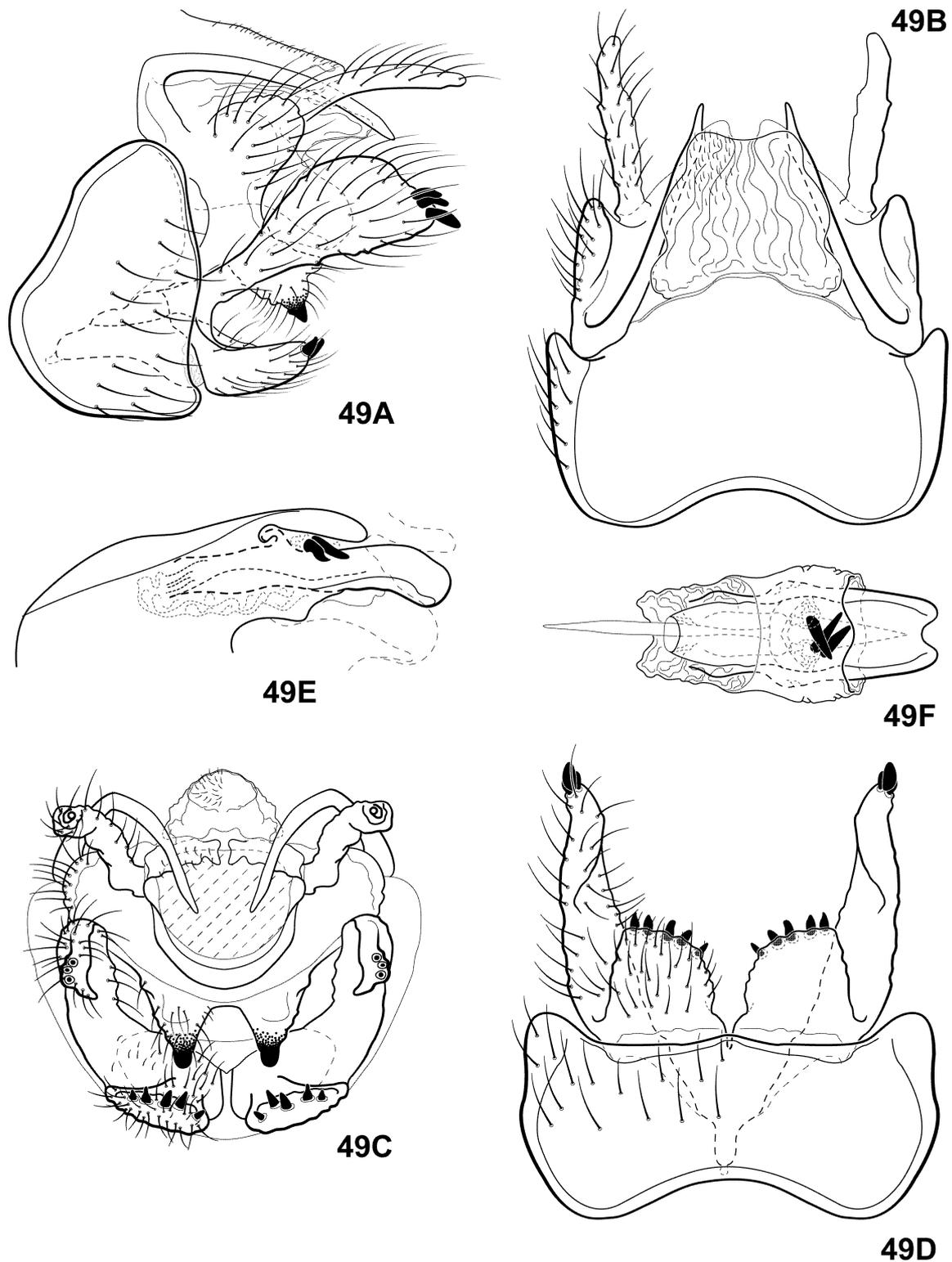


FIGURE 49. Male genitalia of *Polyplectropus misolja* Bueno, 1990 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate; in ventral view rectangular, anterior margin concave, posterior margin with median flange.

Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, digitate; in dorsal view digitate; in caudal view membrane surrounding phallocrypt. Intermediate appendage as long as inferior appendage, narrowly digitate with long setae throughout; in dorsal view digitate, linear; in caudal view digitate, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose, in lateral view quadrate with ventrad-directed sclerotized apex, ventral margin concave, posterior margin truncate; in caudal view processes separated, ventral margin of process rounded, basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, subapically produced dorsad, apically bearing 3–4 sclerotized spines; in ventral view narrow, lateral margin straight, posterior margin subacute, mesal margin entire, expanding posterad into ventral branch; ventral branch setose, short, bearing a row of 4–7 robust, sclerotized spines along posterior margin; in lateral view clavate, rounded posterad; in ventral view subquadrate, posteromesal margin rounded, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex pandurate to oblong; apex of dorsal phallic sclerite in dorsal view emarginate; endothelial membrane without embedded spines, but with 3 short, sclerotized spines dorsad of phallic sclerite, apparently on a dorsal membrane.

Material Examined. **MEXICO: Campeche:** Calakmul, Ejdo. N[ue]vo. Becan, El Chorro, 18°35'25"N, 89°15'29"W, 130 m, 30.iv.1997, Contreras, Gonzalez, Ibarra, Martinez—2 males (IBUNAM); **Chiapas:** Cascada Misolja, 20 km S Palenque, 17–18.v.1981 C & O Flint—2 males [holotype] (NMNH); **UNITED STATES: Texas:** Real County, Frío River, Leakey, 9.vi.1994, R. Garano—1 male (DRC).

Distribution. Mexico and USA (Texas).

Polyplectropus nicaraguensis Chamorro-Lacayo

Figs. 50, 124

Polyplectropus nicaraguensis Chamorro-Lacayo, 2003: 493. [Type locality: Nicaragua, Zelaya, Río Las Latas; UMSP; male.]

This species most closely compares with *P. mignoniae* Bueno-Soria. Both species lack a dorsolateral process of the preanal appendage and have similar inferior and intermediate appendages. *Polyplectropus nicaraguensis* differs from *P. mignoniae* in the rounded shape of the mesoventral process of the preanal appendage and in the absence of peg-like setae of the ventral branch of the inferior appendage.

Adult. Length of forewing 4.5–5 mm, n = 2. Color of head, thorax, and legs yellowish-brown (specimen preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin sinuate and ventrally produced; in ventral view rectangular, anterior margin entire, posterior margin with median projection. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, digitate, with long setae throughout; in dorsal view digitate; in caudal view digitate, directed posterolaterad. Preanal appendage bipartite; mesolateral process setose; in dorsal view deltoid, in lateral view deltoid; mesoventral process setose, in lateral view rounded, directed posterad, posterior margin rounded; in caudal view processes separated, ventral margin of process rounded and basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view digitate, subapically produced dorsad and apex truncate, bearing 1–2 sclerotized spines; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin entire, concave, expanding posterad into ventral branch;

ventral branch setose, short and basally broad; in lateral view digitate, truncate posterad, mesal margin slightly angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex oblong; endotheal membrane without embedded spines.

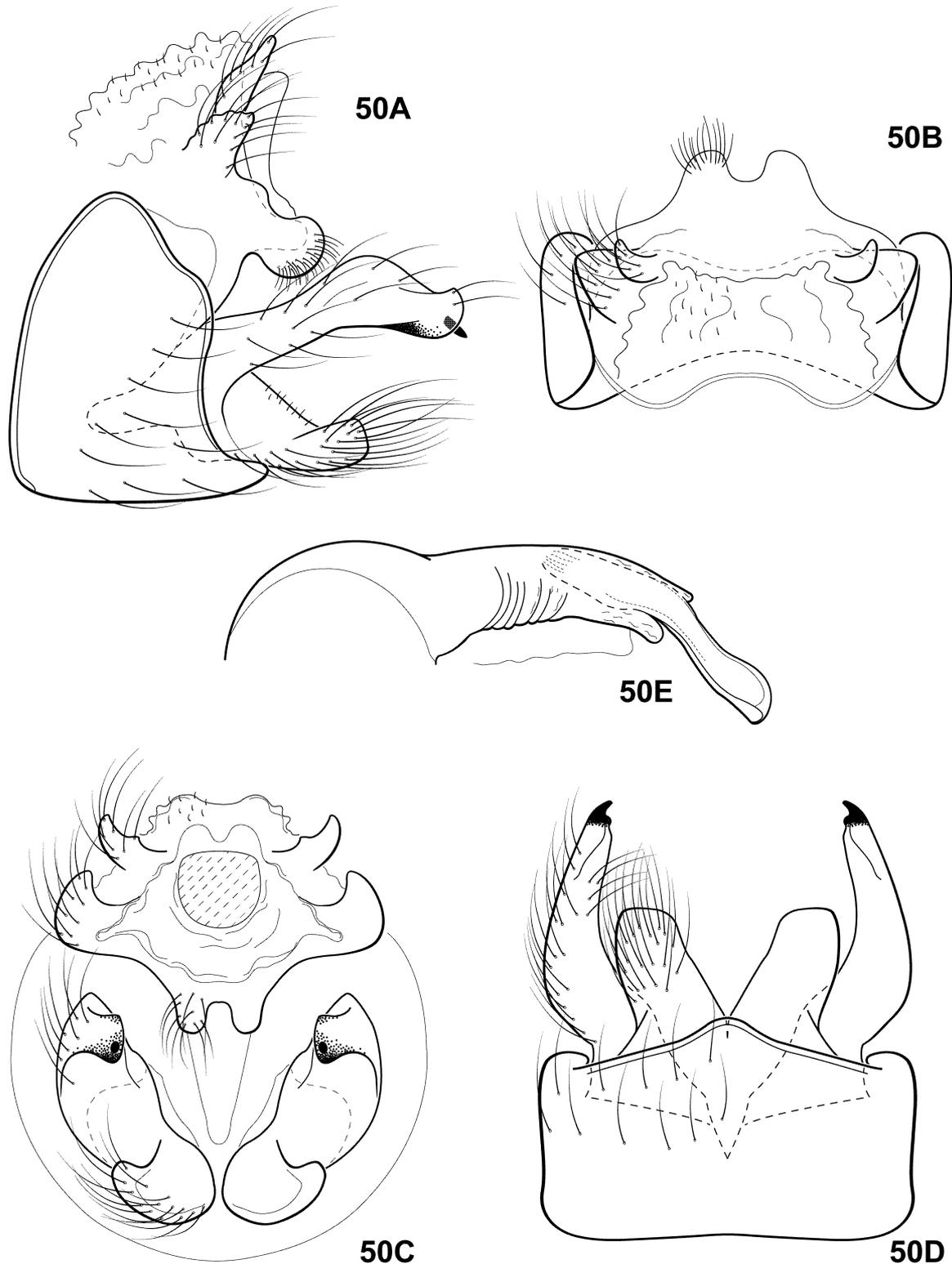


FIGURE 50. Male genitalia of *Polyplectropus nicaraguensis* Chamorro–Lacayo, 2003 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

Material Examined. **NICARAGUA: Región Autónoma Atlántico Norte [Zelaya]:** Río Las Latas, 14°04'00"N, 88°33'00"W, 220 m, 2.vi.1998, Maes & Hernandez—2 males [holotype] (UMSP) [paratype] (NMNH).

Distribution. Nicaragua.

***Polyplectropus panamensis* Bueno-Soria**

Figs. 17D, 51, 126

Polyplectropus panamensis Bueno-Soria, 1990: 363. [Type locality: Panama, Barro Colorado Island, Zona del Canal; NMNH; male].

This species is superficially similar to *P. petrae*, new species. Both species have “mitten-shaped” inferior appendages (i.e., shallowly fused dorsal and ventral branches of the inferior appendage) and lack a dorsolateral process of the preanal appendage. Furthermore, both species have completely fused mesoventral processes of the preanal appendage bearing numerous peg-like setae as well as oblong intermediate appendages with basal and apical setae. However, *Polyplectropus panamensis* can be distinguished from *P. petrae* by the absence of peg-like setae on the inferior appendage, by the narrow dorsal branch of the inferior appendage, and by the absence of a dorsal digitate lobe of the mesoventral process of the preanal appendage.

Adult. Length of forewing 2.5–4.8 mm, n = 7. Color of head, thorax, and legs brown; setae on wings brown with few scattered grey markings.

Male genitalia. Sternum IX in lateral view broadly deltoid, anterior margin sinuate, posterior margin medially produced; in ventral view rectangular, anterior margin entire, posterior margin with median flange and sinuate. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, oblong, with long basal setae and few scattered apically; in dorsal view basally broad, with 2 setose, digitate unequal lateral and apical lobes; in caudal view digitate, curved, setose lobe produced ventrolaterad and mesoventrally fused to lower lip of segment X. Preanal appendage bipartite; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view oblong, directed ventrad, ventral margin concave, posterior margin rounded; in caudal view apically fused to form a single continuous structure, ventral margin of process rounded, with ventral margin bearing many sclerotized, peg-like setae. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view oblong; in ventral view broad, lateral margin angled, undulate, posterior margin rounded, mesal margin undulate, shallowly fused to ventral branch; ventral branch setose, broad; in lateral view quadrate and forming a continuous structure with dorsal branch, truncate posterad; in ventral view subquadrate, posteromesal margin rounded, gradually converging mesally. Phallus short; apex of dorsal phallic sclerite in dorsal view truncate; dorsolateral arm of dorsal phallic sclerite in lateral view digitate; in dorsal view slightly broadening apically, not extending beyond apex of phallic sclerite, apex rounded; endothecal membrane without embedded spines.

Material examined. **COSTA RICA: Alajuela:** Cerro Campana, Río Bochinche trib[utary] 6 km (air) NW Dos Rios, 10°56'42"N, 85°24'47"E, 600 m, 22–23.vii.1987, Holzenthal Morse & Clausen—1 male, 1 female (NMNH); Reserva Forestal San Ramón, Río San Lorencito & trib[utaries], 10°12'58"N, 84°36'25"W, 980 m, 2–4.vii.1986, Holzenthal Heyn & Armitage—2 males [paratypes] (UMSP); **Guanacaste:** Parque Nacional Guanacaste, ca. 0.7 km N Est[ación] Maritza, 10°57'36"N, 85°30'00"E, 550 m, 31.viii.1990, Huisman & Quesada—1 male (UMSP); **Heredia:** Parque Nacional Braulio Carrillo, Río Peje, Est[ación] Magsasay, 10°24'07"N, 84°03'00"W, 130 m, 25–26.viii.1990, Holzenthal Blahnik & Huisman—1 male (UMSP); **PANAMA: Panama:** Barro Colorado Island, C[anal] Z[one], [9°09'49"N, 79°50'16"W], .vii.1967, W W Wirth—1 male [holotype] (NMNH).

Distribution. Costa Rica and Panama.

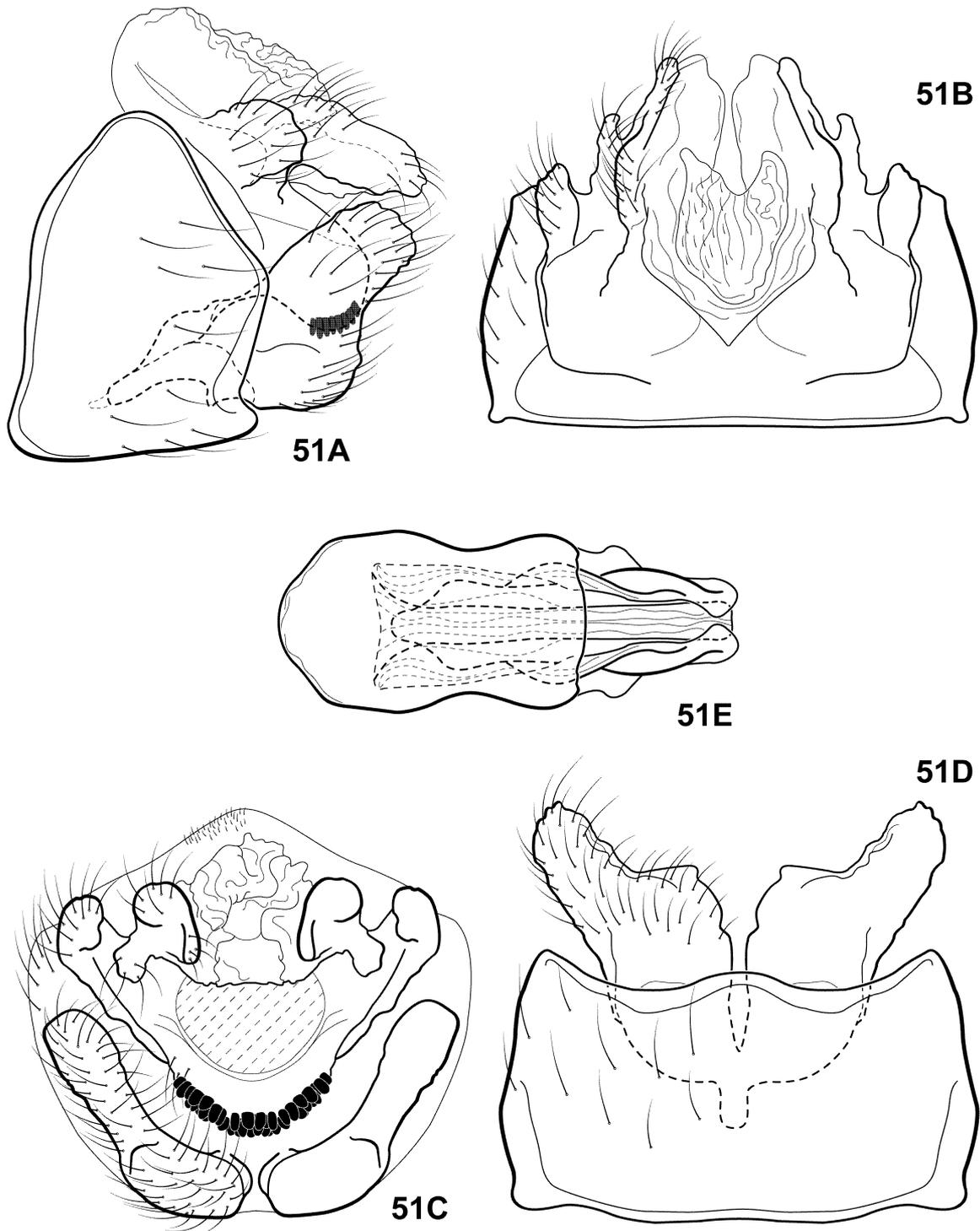


FIGURE 51. Male genitalia of *Polyplectropus panamensis* Bueno, 1990 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

***Polyplectropus perpendicularis* Chamorro-Lacayo & Holzenthal**

Figs. 52, 128

Polyplectropus perpendicularis Chamorro-Lacayo & Holzenthal, 2004: 210. [Type locality: Costa Rica, Puntarenas, Río Bellavista trib., Las Alturas; UMSP; male.]

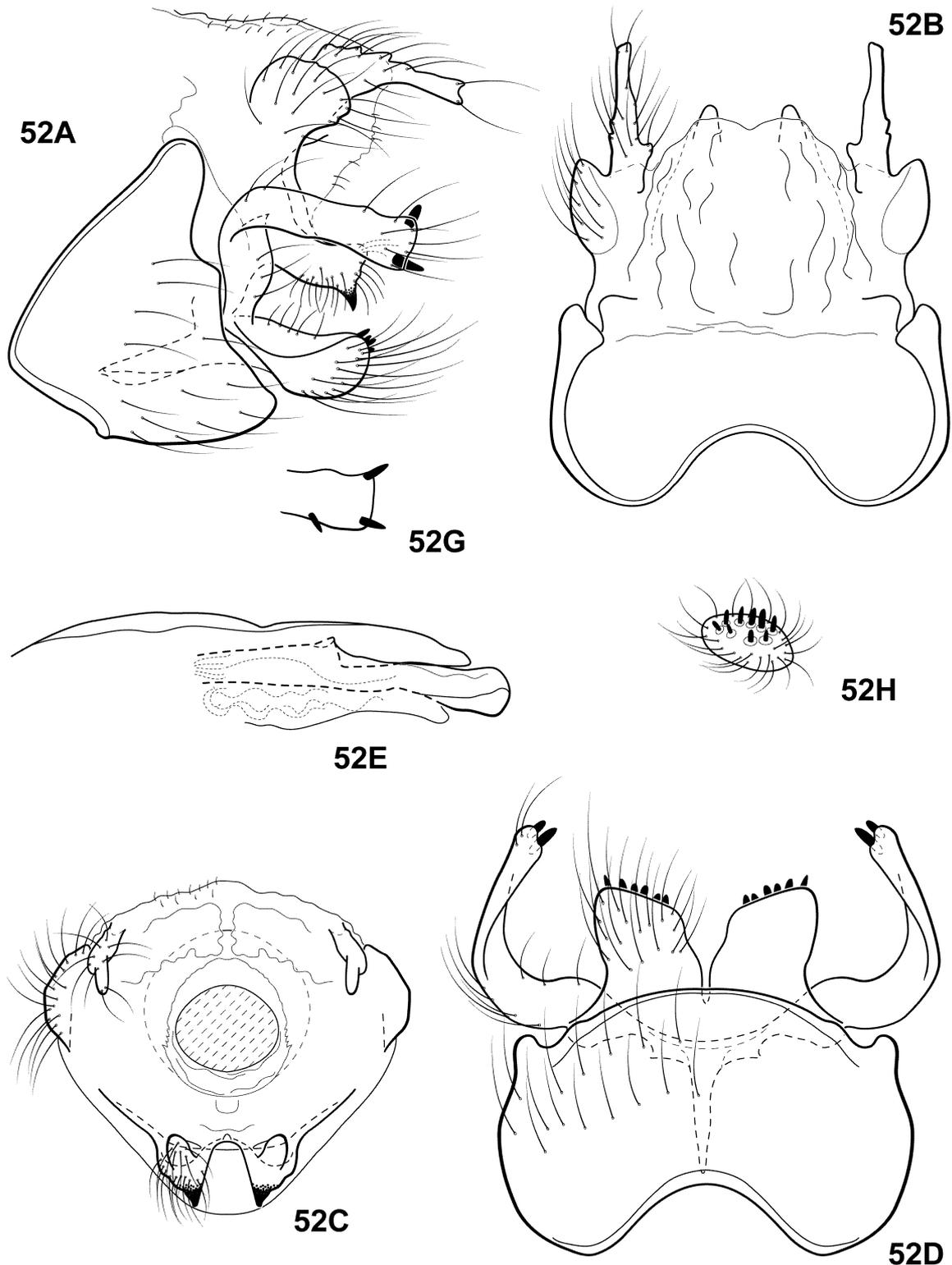


FIGURE 52. Male genitalia of *Polyplectropus perpendicularis* Chamorro–Lacayo & Holzenthal, 2004 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view; G—apex of dorsal branch of right inferior appendage, mesal view; H—ventral branch of left inferior appendage, caudal view.

Polyplectropus perpendicularis can be easily identified by the L-shaped dorsal branch of the inferior appendage. This species resembles *P. mignoniae* Bueno-Soria in the overall shape of the phallus, intermediate and preanal appendages, as well as the ventral branch of the inferior appendage. *Polyplectropus*

perpendicularis can be distinguished from *P. mignonae* by the more or less truncate apex of the intermediate appendage (rounded in *P. mignonae*) and by the shape of sternum IX.

Adult. Length of forewing 5 mm, n = 1. Color of head, thorax, and legs brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long erect brown setae; setae on wings brown with few scattered grey markings.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate and medially produced; in ventral view rectangular, anterior margin highly concave, posterior margin convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage as long as inferior appendage, narrowly digitate with long setae throughout; in dorsal view digitate, linear; in caudal view digitate, directed posterad. Preanal appendage bipartite; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose, in lateral view quadrate with ventrad-directed sclerotized apex, anteroventral margin straight, posterior margin truncate; in caudal view processes separated, ventral margin of process acute with sclerotized point and basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view L-shaped, apex truncate, bearing 2–3 sclerotized spines; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, elongate, bearing a row of 4–7 robust, sclerotized spines along posterior margin; in lateral view clavate, rounded posterad; in ventral view subquadrate, posterior margin angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex pandurate to oblong; apex of dorsal phallic sclerite in dorsal view emarginate; endothecal membrane without embedded spines.

Material Examined. **COSTA RICA: Puntarenas:** Río Bellavista trib[utary], Las Alturas, road to quarry, 8°57'07"N, 82°50'53"W, 1480 m, 19.iii.1991, Holzenthal, Muñoz & Huisman—1 male [holotype] (UMSP).

Distribution. Costa Rica.

***Polyplectropus petrae*, new species**

Figs. 17C, 53, 132

Polyplectropus petrae is superficially very similar to *P. panamensis* Bueno-Soria. Both species lack a dorsolateral process of the preanal appendage and have a “mitten-shaped” inferior appendage (i.e., with shallowly fused dorsal and ventral branches). Additionally, the mesoventral processes of the preanal appendage are completely fused to each other, thus forming a rounded, entire structure below the phallocrypt. The fused mesoventral processes bear numerous peg-like setae. Furthermore, both species have similar intermediate appendage bearing basal and apical setae. *Polyplectropus petrae* can be easily distinguished from *P. panamensis* by the presence of a dorsal digitate lobe on the mesoventral process of the preanal appendage and peg-like setae on the inferior appendage. The dorsal branch of the inferior appendage is also broader than in *P. panamensis*.

Adult. Length of forewing 4 mm, n = 1. Color of head and thorax brown, legs yellowish-brown.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin submedially produced; in ventral view rectangular, anterior margin entire, posterior margin concave and with median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage longer than inferior appendage, oblong, with long basal and few apical setae; in dorsal view oblong and tapering mesally to rounded apex; in caudal view narrowly digitate, directed mesoventrad. Preanal appendage bipartite; mesolateral process setose; in dorsal view oblong, in lateral view broadly deltoid; mesoventral process setose;

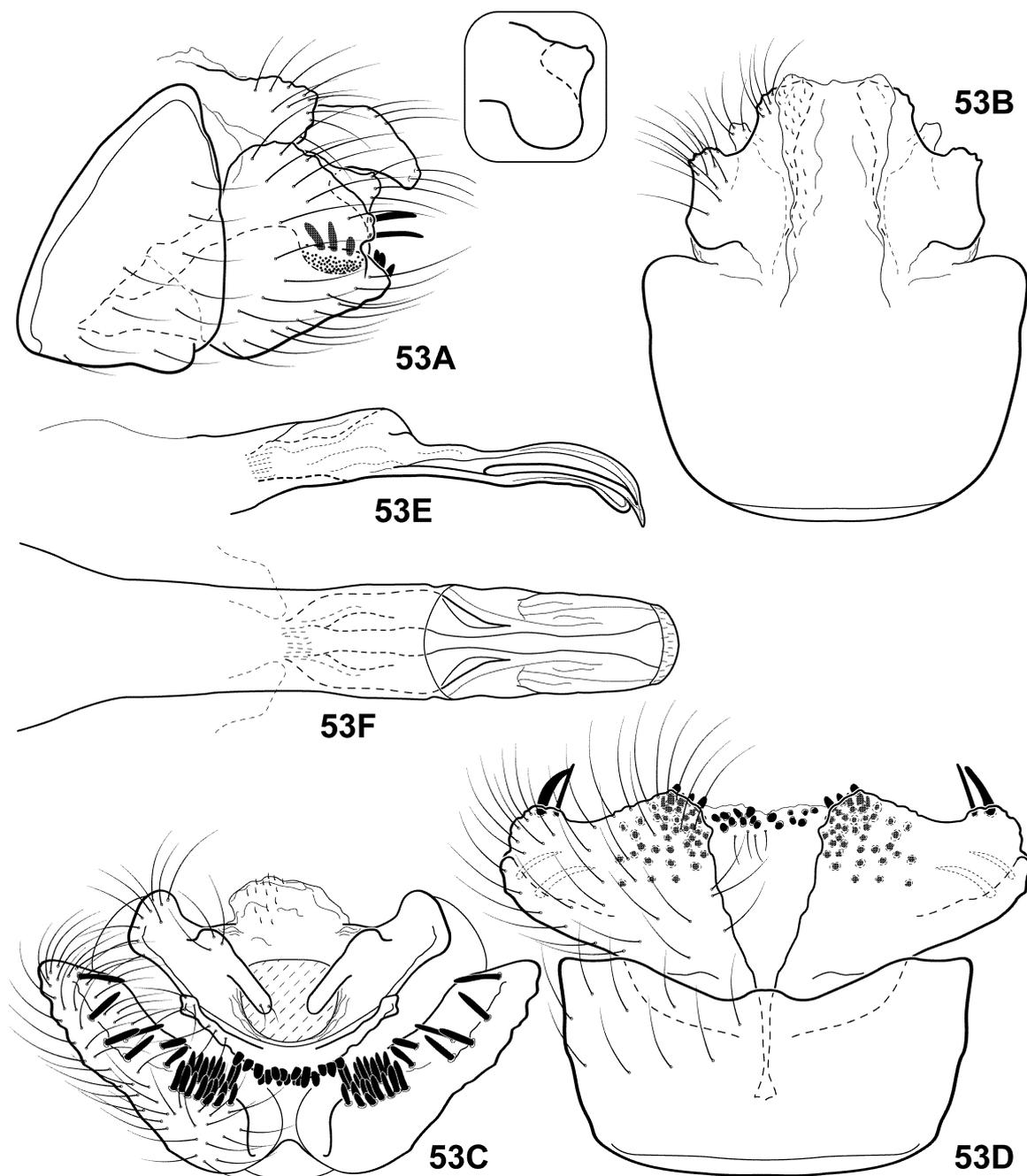


FIGURE 53. Male genitalia of *Polyplectropus petrae*, new species (holotype): A—left lateral view, with inset of mesoventral process of left preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

in lateral view rounded, directed ventrad and with broad dorsal digitate lobe, ventral margin concave, posterior margin concave; in caudal view fused to form a single continuous structure, ventral margin of process rounded, with ventral margin bearing many sclerotized, peg-like setae. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view subquadrate, broadly narrowing posterad, with several apical, sclerotized spines; in ventral view broad, lateral margin convex, undulate, posterior margin rounded, shallowly fused to ventral branch; ventral branch setose, elongate, bearing robust, sclerotized spines medially and apically; in lateral view oblong and almost forming a continuous structure with dorsal branch, narrowing posterad; in ventral view deltoid to rounded, mesal margin acutely angled, gradually converging mesally. Phallus long; dorsal

phallic sclerite in lateral view cylindrical, apex tapering ventrally; apex of dorsal phallic sclerite in dorsal view rounded; endothelial membrane without embedded spines.

Holotype male. BRAZIL: Minas Gerais: Estação Ecológica do Tripuí, Córrego Tripuí, 20°23'22"S, 43°32'32"W, 1070 m, 21.ii.1999, Paprocki, Braga & Amarante—(UMSP000046959) (MZUSP).

Distribution. Brazil.

Etymology. Named with great affection for the senior author's daughter, Petra.

***Polyplectropus trilobatus* Flint**

Figs. 54, 132

Polyplectropus trilobatus Flint, 1981: 16. [Type locality: Venezuela, Aragua, Río El Limón, fish hatchery, Maracay; NMNH, male.]

This species is most similar to *P. clauseni* Chamorro-Lacayo & Holzenthal in the overall shape of the inferior appendage and the dorsolateral and mesolateral processes of the preanal appendage. Both species have submedially, deeply concave posterior margin of sternum IX. *Polyplectropus trilobatus* differs from *P. clauseni* and all other species in the group in having the intermediate appendage fused to the mesoventral process of the preanal appendage. Furthermore, this species has basally fused but apically divergent (forked) mesoventral processes of the preanal appendage and an elongate ventral branch of the inferior appendage. The shape of the apex of the phallus is unique in having laterally produced dorsolateral arm of the dorsal phallic sclerite.

Adult. Length of forewing 4 mm, n = 1. Color of head, thorax, and legs yellow (specimen preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin sinuate, posterior margin sinuate and supramedially concave; in ventral view rectangular, anterior margin entire, posterior margin with median flange and submedially deeply concave. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage fused to mesoventral process of preanal appendage, quadrate, with long apical setae; in dorsal view oblong, mesally fused to papillate lobe; in caudal view digitate, membranous base enclosing phallocrypt (funnel-like), directed posteromesad, mesoventrally produced into highly sclerotized bifurcated process, with acute apices (this process is part of preanal appendage). Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view sickle-shaped, in lateral view orbicular; mesoventral process fused to intermediate appendage, basally digitate, mesally tapering ventrally into sclerotized apex, ventral margin sinuate; in caudal view rounded ventrolaterally, produced mesoventrally into highly sclerotized bifurcated process, bearing acute apices. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view oblong; in ventral view broad, lateral margin convex, undulate, mesal margin undulate, convex, shallowly fused to ventral branch; ventral branch setose, elongate, bearing 4–7 robust, sclerotized spines basally and apically; in lateral view robustly oblong, rounded posterad; in ventral view oblong, posteromesal margin convex, mesal margin straight, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate; apex of dorsal phallic sclerite in dorsal view emarginate; dorsolateral arm of dorsal phallic sclerite in lateral view tapering posterad, produced dorsad into rounded apex; in dorsal view directed posterolaterad, apex angled; endothelial membrane without embedded spines.

Material Examined. **VENEZUELA: Aragua:** Río El Limón, fish hatchery, Maracay, [10°14'49"N, 67°35'45"W], 28.iv.1975, F. H. Weibezahn—1 male [holotype] (NMNH).

Distribution. Venezuela.

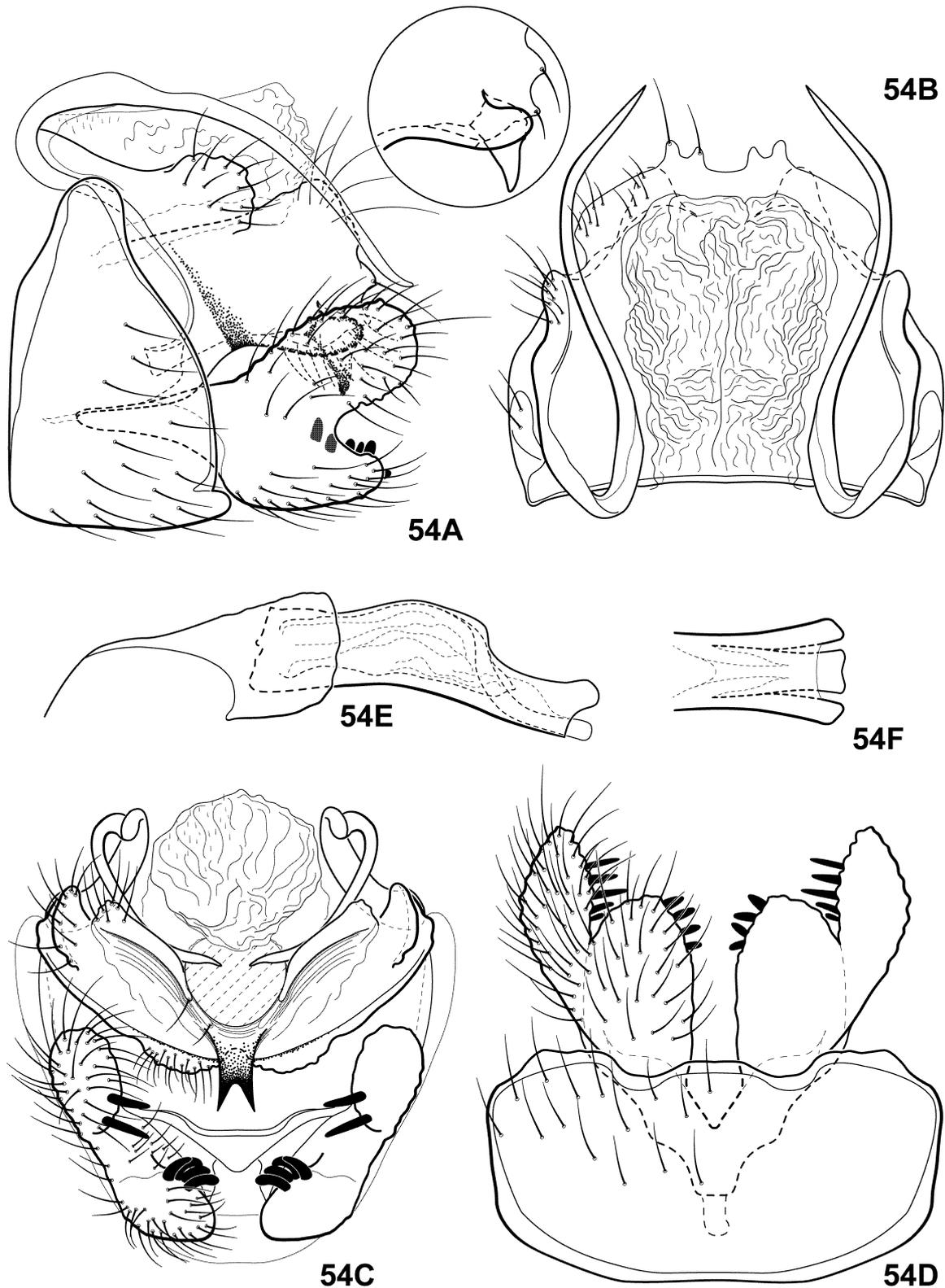


FIGURE 54. Male genitalia of *Polyplectropus trilobatus* Flint, 1981 (holotype): A—left lateral view, with inset of ventrolateral process of left preanal appendage fused to basal portion of intermediate appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—apex, ventral view.

Polyplectropus woldai, new species

Figs. 17G, 55, 132

Polyplectropus woldai can be readily distinguished from all other species in the group by the peculiar shape of the intermediate appendage. The intermediate appendage is elongate, basally broad and narrowing apically. It is directed ventrally and bears 2 long apical spines. In addition, the intermediate appendage appear to be fused basally to the mesoventral process of the preanal appendage, thus forming a complex structure. The mesoventral processes of the preanal appendage are digitate, located lateroventral of the intermediate appendage and broadly separated from each other. *Polyplectropus woldai* also has a short dorsolateral process of the preanal appendage and the inferior appendages are “mitten-shaped”, but nonetheless are elongate and broad.

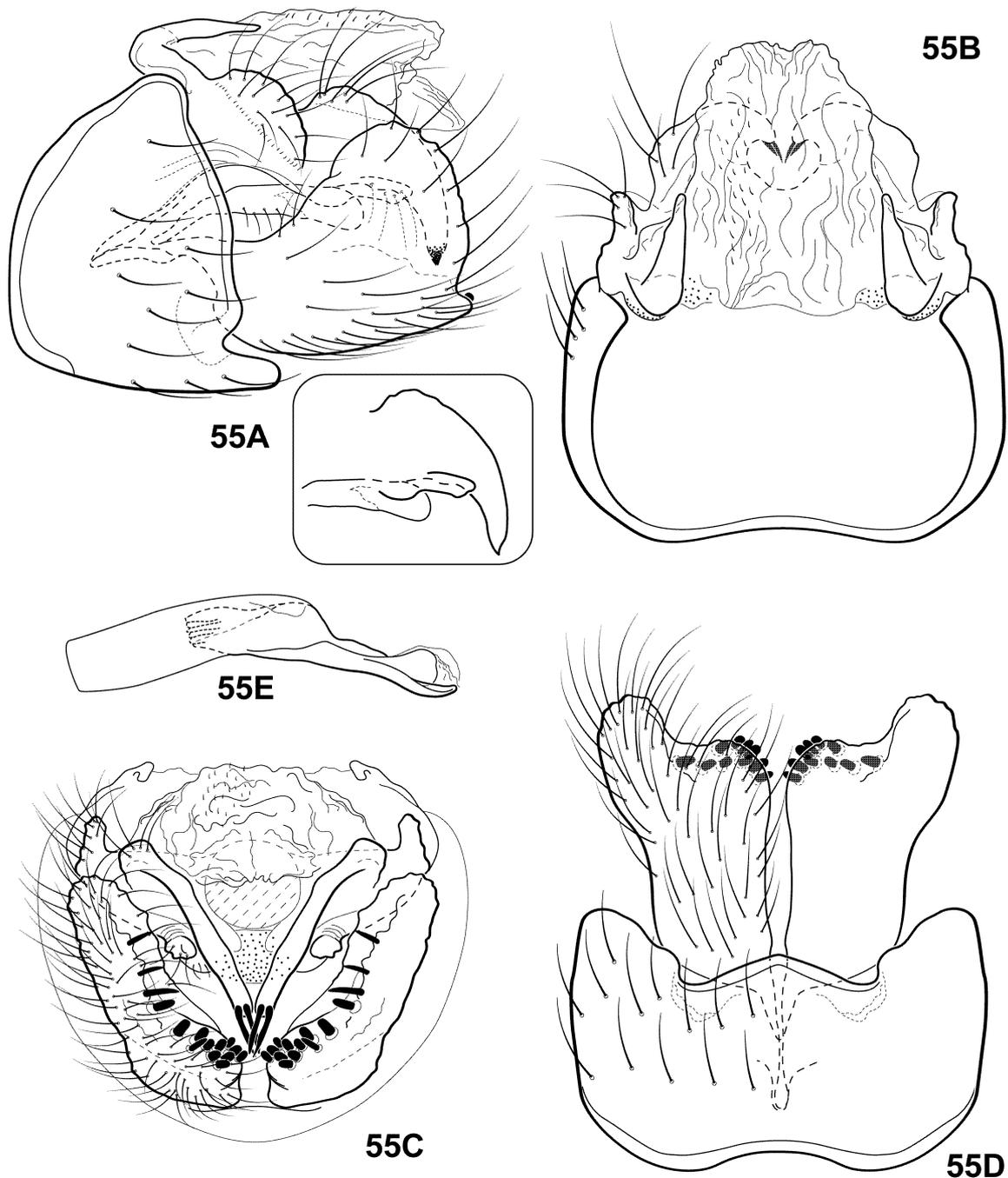


FIGURE 55. Male genitalia of *Polyplectropus woldai*, new species (holotype): A—left lateral view, with inset of intermediate and preanal appendages; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

This species resembles *P. brasilensis* in having shallowly fused dorsal and ventral branches of the inferior appendage and in having a submedially, deeply concave posterior margin of sternum IX.

Adult. Length of forewing 5.5 mm, n = 2. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin with median flange and submedially deeply concave. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, digitate and with ventral, elongate digitate projection, with long basal setae and apically with 2 stout spines; in dorsal view basally broad, tapering into curved lanceolate rods; in caudal view basally broad, narrowing into elongate, digitate lobe bearing 2 stout apical spines, directed mesoventrad. Preanal appendage tripartite; dorsolateral process short, originating from dorsum of mesolateral process, recurved posterad, tapering into acute apex; mesolateral process setose; in dorsal view sickle-shaped, in lateral view orbicular; mesoventral process setose; in lateral view oblong, mesoventral process basodorsally fused to intermediate appendage, directed posterad, ventral margin linear, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral margin of process rounded. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, apically convex; in ventral view broad, lateral margin apically produced, sinuate, posterior margin rounded, shallowly fused to ventral branch; ventral branch setose, elongate, bearing robust, sclerotized spines apically; in lateral view oblong and almost forming a continuous structure with dorsal branch, rounded posterad; in ventral view rounded, mesal margin straight, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex narrowing apically; endothecal membrane without embedded spines, membranous dorsad.

Holotype male: PANAMA: Chiriquí: Fortuna Dam Site nr. Hornitos, 8°55'00"N, 82°16'00"W, 1050 m, 8.iii.–16.v.1978, H. Wolda—(UMSP000100599) (NMNH);

Paratypes: PANAMA: Chiriquí: Fortuna Dam Site nr. Hornitos, 8°55'00"N, 82°16'00"W, 1050 m 17.v.–25.vii.1978, H. Wolda—1 male (UMSP).

Distribution. Panama.

Etymology. Named in honor of Henk Wolda, who collected not only this, but several other new species as a result of his Trichoptera research in Panama.

Key to males of *P. bredini* species group

- 1 Intermediate appendage narrow and elongate; bearing setae throughout (Figs. 37, 45) 2
- Intermediate appendage broader as usually not longer than inferior appendage (Fig. 36A), or if narrow curved ventrad (Fig. 55A); setae present basally, apically or both (Figs. 36, 43, 55) 10
- 2 Dorsolateral process of preanal appendage present (Fig. 46) 3
- Dorsolateral process of preanal appendage absent (Fig. 37) 5
- 3(2) Inferior appendage with peg-like setae on either branch or both (Figs. 46, 49) 4
- Inferior appendage lacking peg-like setae on both branches (Fig. 45) *P. kingsolveri* Bueno-Soria, p. 92
- 4(3) Dorsal branch of inferior appendage lacking peg-like setae (Fig. 46) *P. maesi* Chamorro-Lacayo, p. 94
- Dorsal and ventral branches of inferior appendage with peg-like setae (Fig. 49) *P. misolja* Bueno-Soria, p. 99
- 5(2) Dorsal branch of inferior appendage greatly narrowed, sinuate and elongate; not L-shaped (Fig. 47) *P. mathisi* Bueno-Soria, p. 96
- Dorsal branch of inferior appendage not more than 3 x longer than wide (when measured from widest part of branch) and not as above (Figs. 50, 52) 6

6(5)	Dorsal branch not L-shaped	7
-	Dorsal branch of inferior appendage abruptly angled, L-shaped (Fig. 52)	
	..... <i>P. perpendicularis</i> Chamorro-Lacayo & Holzenthal, p. 104.	
7(6)	Dorsal and ventral branches of inferior appendage with peg-like setae; mesoventral process quadrate in lateral view	8
-	Ventral branch of inferior appendage lacking peg-like setae; mesoventral process rounded (Fig. 50)	
	..... <i>P. nicaraguensis</i> Chamorro-Lacayo, p. 101.	
8(7)	Peg-like setae on dorsal branch as long as wide; apex of dorsal branch narrowed (Fig. 48)	9
-	Peg-like setae on dorsal branch at least 2 x longer than wide; apex of dorsal branch not narrowed, scalloped (Fig. 37)	
	..... <i>P. bredini</i> Flint, p. 75.	
9(8)	Dorsal branch basally broader than apex; peg-like setae restricted to apex (Figs. 48A-E)	
	..... <i>P. mignonae</i> Bueno-Soria, p. 97.	
-	Dorsal branch basally as broad as apex; peg-like setae located apically and subapically (Figs. 48F-H)	
	..... <i>P. adamsae</i> , n. sp., p. 77.	
10	Dorsolateral process of preanal appendage present; mesoventral processes of preanal appendage not fused completely (Figs. 36, 55)	11
-	Dorsolateral process of preanal appendage absent; mesoventral processes of preanal appendage apically fused completely into rounded structure (Figs. 51, 53)	17
11(10)	Dorsal and ventral branches of inferior appendage shallowly fused, appearing as a single structure; “mitten-shaped” (Figs. 39, 55)	12
-	Dorsal and ventral branches of inferior appendage well defined (Fig. 54)	14
12(11)	Dorsolateral process elongate (Fig. 35)	13
-	Dorsolateral process short (Fig. 55)	
	..... <i>P. woldai</i> , n. sp., p. 110.	
13(12)	Mesoventral process of preanal appendage narrow (when viewed caudally), both processes meet mesally, not fused (Fig. 35C); ventral branch of inferior appendage with fewer than 3 apical peg-like setae (Fig. 35)	
	..... <i>P. brasiliensis</i> , n. sp., p. 78.	
-	Mesoventral process of preanal appendage broad (when viewed caudally); ventral branch of inferior appendage with more than 3 apical peg-like setae (Figs. 39, 40)	
	..... <i>P. clauseni</i> Chamorro-Lacayo & Holzenthal, p. 82.	
14(11)	Intermediate appendage not forming an entire structure with mesoventral process of preanal appendage (Fig. 41)	15
-	Intermediate appendage forming an entire structure with mesoventral process of preanal appendage, ventrally fused into a highly sclerotized bifurcating process (Fig. 54)	
	..... <i>P. trilobatus</i> Flint, p. 108.	
15(14)	Ventral branch of inferior appendage with peg-like setae; mesoventral process of preanal appendage with peg-like setae	16
-	Ventral branch of inferior appendage without peg-like setae; mesoventral process of preanal appendage with a basal dorsal digitate lobe and lacking peg-like setae (Fig. 41)	
	..... <i>P. colombianus</i> , n. sp., p. 85.	
16(15)	Posterior margin of tergum VIII with a pair of digitate processes; mesoventral process of preanal appendage with few (<4) peg-like setae; apex of intermediate appendage slightly sculptured, rounded (Fig. 42)	
	..... <i>P. corniculatus</i> , n. sp., p. 87.	
-	Posterior margin of tergum VIII unmodified; mesoventral process of preanal appendage with many (>6) peg-like setae; apex of intermediate appendage sclerotized, acute (Fig. 43)	
	..... <i>P. flintorum</i> , n. sp., p. 89.	
17(10)	Inferior appendage without peg-like setae; mesoventral process of preanal appendage without broadened, basal dorsal digitate lobe; dorsal branch of inferior appendage oblong (Fig. 51)	
	..... <i>P. panamensis</i> Bueno-Soria, p. 103.	

- Inferior appendage with peg-like setae; mesoventral process of preanal appendage with broadened, basal digitate lobe; dorsal branch of inferior appendage deltoid to quadrate (Fig. 53) *P. petrae*, n. sp., p. 106.

***Polyplectropus charlesi* species group**

When establishing this group Bueno-Soria (1990) discussed the features shared by the *P. santiago* and *P. charlesi* groups, but did not mention synapomorphies of only the *P. charlesi* group. According to Bueno-Soria, the synapomorphy of the *P. santiago* + *P. charlesi* clade is the presence of a ventral, hook-shaped projection of the elongate inferior appendage. Based on personal observation of species originally included in both groups, no hook-shaped process projects from the inferior appendage. Bueno-Soria may have been referring to the mesoventral processes of the preanal appendages, which have a ventrad-directed apex in the form of a hook and when viewed laterally appear to originate from the base of the inferior appendage (e.g., Fig. 58A).

Species previously assigned, either by original or subsequent designation, to the *P. charlesi* group included *P. beutelspacheri* Bueno-Soria, *P. charlesi* (Ross), *P. exilis* Chamorro-Lacayo & Holzenthal, *P. hymenochilus* Chamorro-Lacayo & Holzenthal, *P. kingsolveri* Bueno-Soria, *P. kylistos* Chamorro-Lacayo & Holzenthal, *P. mathisi* Bueno-Soria, *P. mignoniae* Bueno-Soria, *P. misolja* Bueno-Soria, *P. nicaraguensis* Chamorro-Lacayo, and *P. perpendicularis* Chamorro-Lacayo & Holzenthal. Several of these species, with the exception of *P. charlesi*, *P. exilis*, and *P. kylistos*, have been removed from this group and transferred to the *P. bredini* group, or in the case of *P. beutelspacheri*, not assigned to a group. The 3 remaining species in the *P. charlesi* group are characterized by the combination of the following traits:

1. Pronounced ventral median projection of sternum IX (less pronounced in *P. exilis*) (Fig. 56D; synapomorphy);
2. The absence of a dorsolateral process of the preanal appendage (Fig. 56A)
3. The presence of a papillate lobe (Fig. 56C);
4. And by the presence of a plate-like, oblong intermediate appendage (Figs. 56A–C).

***Polyplectropus charlesi* (Ross)**

Figs. 15C, 56, 123

Polycentropus charlesi Ross, 1941: 74. [Type locality: United States, Texas, San Felipe Springs, Del Rio; INHS; male];—Flint, 1968:21 [to *Polyplectropus*].

Polyplectropus charlesi is most similar to *P. kylistos* based on the pronounced ventral median projection of sternum IX, the lobate, rounded intermediate appendage, the broadly separated ventral branches of the inferior appendage, and the overall shape of the dorsal branch of the inferior appendage. In addition, *P. charlesi* and *P. kylistos* bear peg-like setae on both branches of the inferior appendage (absent in *P. exilis*). Some specimens of *P. charlesi* with an apically narrowed dorsal branch have subapical spines on a small membranous stalk, similar to those found in *P. kylistos*. However, in *P. kylistos* these stalked spines are located more basally and proximal to the ventral branch. *Polyplectropus charlesi* can also be distinguished from *P. kylistos* by the shorter, apically rounded ventral branch of the inferior appendage, by the broader and sometimes slightly narrower and less arched dorsal branch of the inferior appendage, by the less acute apices of the mesoventral process of the preanal appendage, and by the posteriorly directed endothecal phallic spines (directed laterad in *P. kylistos*).

Adult. Length of forewing 3.5–7.8 mm, n = 213. Color of head, thorax, and legs yellowish-brown.

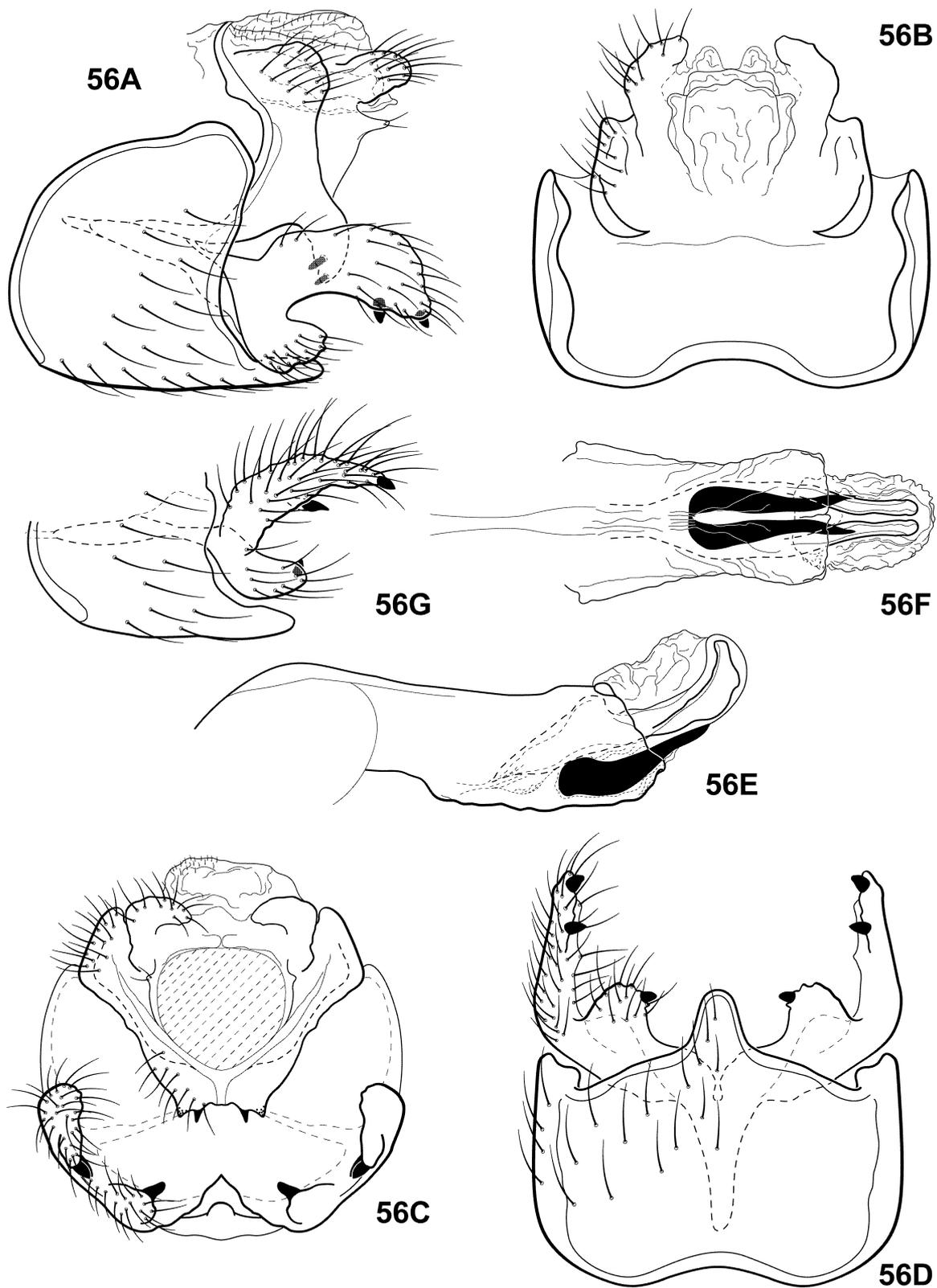


FIGURE 56. Male genitalia of *Polyplectropus charlesi* (Ross, 1941) (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view; G—left inferior appendage, variation, left lateral view.

Male genitalia. Sternum IX in lateral view rounded, anterior margin highly convex, posterior margin submedially concave and ventrally produced; in ventral view rectangular, anterior margin concave, posterior

margin with pronounced median projection. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view emarginate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, digitate, with long setae throughout; in dorsal view broad, tapering mesoventrally to subacute apex; in caudal view digitate, curved, directed mesally; median papillate lobe very small, flanking phallocrypt laterally, bearing small apical setae. Preanal appendage bipartite; apparently with basal remnant of dorsolateral process of preanal appendage; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view digitate, directed ventrad, anteroventral margin concave, posterior margin convex; in caudal view ventral margin of process truncate, bearing sclerotized spines. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, curved ventrad, variant form lanceolate and curved ventrad, bearing 1–2 sclerotized spines; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin sinuate, straight, becoming concave, expanding posterad into ventral branch; ventral branch setose, short, bearing apical sclerotized spine; in lateral view ovate; in ventral view rounded, mesal margin concave, gradually converging mesally, ventral branches greatly separated mesally from each other. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex curved dorsad; apex of dorsal phallic sclerite in dorsal view truncate; dorsolateral arm of dorsal phallic sclerite in lateral view digitate; in dorsal view digitate, not extending beyond apex of phallic sclerite, apex rounded; endothecal membrane with 2 medium-sized, lightly sclerotized spines.

Material examined. **MEXICO: Durango:** Peñon Blanco (La Concha), [24°47'23"N, 104°02'12"W], 16.vii.1985, E Barrera—1 male (IBUNAM); **Guerrero:** Río Bejucos, [17°11'00"N, 99°24'00"W], 8.vii.1999, A Rojas, & R. Gavino—1 male (IBUNAM); **Michoacán:** Apatzingan, W. of Apatzingan 5 mi, 19°04'59"N, 102°20'59"W, 366 m, 13.viii.1941, Hoogstraal—1 male; Aguililla, 31.vii.1985, R Barba, & F Arias—1 male; **Oaxaca:** Tuxtepec, 18°06'00"N, 96°07'00"W, 5.xii.1933, M. Fraire—1 male; Putla, Río Las Peñas, [17°02'00"N, 97°56'00"W], 3.iii.1986, E. Mariño—1 male, 1 female (IBUNAM); Chiltepec, [16°08'59"N, 95°55'59"W], 11.xii.1937, A. Dampf—1 male (INHS); Totoltepec, [15°53'51"N, 96°28'37"W], 2.xi.1987, R. Barba, F. Arias, E. Barrera—1 male (IBUNAM); **Puebla:** Cuetzalan Rancho Pahuata 14.6 km de Cuetzalan, [20°02'00"N, 97°31'00"W], 29.vi.1996, Contreras and Barba—1 male, 3 females (IBUNAM); **San Luis Potosí:** Tamazunchale, [21°16'00"N, 98°46'59"W], 29.iii.1951, Lattin & Walker—1 male; Palitla, [21°16'00"N, 98°49'59"W], 5.viii.1966, O S Flint—1 male, 2 females (NMNH); 2 km S of Tamasunchale (R. 1 km 363), [21°16'00"N, 098°47'00"W], 213 m, 31.v.1948, W. Nutting & F Werner—1 male; **Tamaulipas:** Santa Engracia (Hacienda), [24°01'00"N, 99°12'00"W], 21.iii.1936, A. Dampf—1 male (INHS); 9.iii.1939, CCP—2 males (INHS); 44 mi. N. Ciudad Victoria, [23°43'00"N, 99°07'59"W], 16.viii.1953, R. B. & J.M. Selander—1 male (INHS); **Veracruz:** Chicontepec, [20°58'00"N, 98°10'00"W], 14.x.1975, J Bueno-Soria—1 male (IBUNAM); Tebanca 15 km S.E. Estacion de Biología Los Tuxtlas, [18°23'00"N, 95°00'00"W], 3.iii.1988 Barba & Barrera—5 males, 5 females (IBUNAM); Catemaco, Tebanca, [18°25'00"N, 95°07'00"W], E Barrera—1 male (IBUNAM); Los Tuxtlas, Río La Palma, 2.xii.1988, H & R Barba—1 male (IBUNAM); **UNITED STATES: Arizona:** Apache Co., 5 mi W Eagar, Little Colorado R., [34°06'40"N, 109°17'27"W], 29.vi.1961, Kingsolver—2 males (INHS); Yavapai Co., Converg. Oak Cr. & Verde R., [34°33'42"N, 112°22'58"W], 10.ix.1976, Sanderson—1 female (INHS); **Texas:** Bandera County, Winans Creek @ TX Hwy16 ca. 4 mi N. Bandera, 29°43'35"N, 99°04'24"W, 12.iv.1992, Moulton & Stewart—11 males (DRC); Blanco Co., Pedernales River, in Pedernales Falls State Park, downstream falls @ picnic area, 30°05'52"N, 98°25'16"W, 244 m, 24.vii.1985, Brigham & Brower—5 males (INHS); Guadalupe Co., San Marcos River @ TX 1979 bridge, S. Martindale, ca 5 mi. ESE I-35 @ San Marcos (city), 29°49'56"N, 97°50'30"W, 149 m, 5.ix.1986, AR Brigham—18 males (INHS); Hays Co., San Marcos River in San Marcos, Rio Vista Dam @ Cheatham Street/Houston Rd., 29°52'45"N, 97°55'55"W, 171 m, AR Brigham—1 male (INHS); Kerr Co., North Fork, Guadalupe River @ TX1340 about 7 mi w intersection of TX1340 & TX 39 (Bee Caves Creek),

30°03'25"N, 99°25'10"W, 561 m, 23.vii.1985, Brigham & Brower—1 male (INHS); North Fork, Guadalupe River @ TX 1340 1 mi W Intersection of TX 1340/TX 39, 30°04'25"N, 99°21'17"W, 536 m, Brigham & Brower—1 male (INHS); [Val Verde County], San Felipe Springs, Del Rio, [29°22'06"N, 100°53'06"W], 19.iv.1939, H. H & J. A. Ross—1 male (INHS) [holotype] ["INHS Trichop. 24566"].

Specimens examined of variable forms of *P. charlesi*: **MEXICO: Chiapas:** nr. Pijijiapan, 5.vii.1965, P J Spangler—1 male, 1 female (NMNH); Chintul, Río Chintul (trib. R. Grijalva) Rt. 187, 17°14'33"N, 93°35'07"W, 20.ix.1996, Bueno-Soria, Barba, Contreras—6 males (IBUNAM); **Durango:** Peñon Blanco, Balneario Belem, [24°47'23"N, 104°02'13"W], 1640 m, 10.vii.1985, E Barrera—6 males, 2 females (IBUNAM); **Oaxaca:** Valle Nacional, [17°46'59"N, 96°19'00"W], 2.iii.1932, A. Dampf—3 males (INHS); Putla, Río Las Peñas, [17°02'00"N, 97°56'00"W], 3.iii.1983, E Mariño—1 male, 1 female (IBUNAM); Rancho Monter, [16°53'53"N, 96°24'51"W], 14.xii.1937, A. Dampf—3 males (INHS); 16.xii.1937, A. Dampf—2 males (INHS); Chiltepec, [16°08'59"N, 95°55'59"W], 9.xii.1937, A. Dampf—2 males (INHS); 11.xii.1937, A. Dampf—2 males (INHS); **Tabasco:** Municipio Huimanguillo, Est. 10, Arroyo Las Flores, Villa de Gpe. 2 Secc. Los Chimalapas, km 5 +920 carr, Malpasito-Carlos A. Madrazo, 17°22'03"N, 93°36'15"E, 25.iii.1998, Bueno-Soria & Barba—8 males, 3 females (IBUNAM); Río Teapa, Villahermosa, [17°59'00"N, 92°55'00"W], 6.v.1985, H. Velasco—9 males, 2 females (IBUNAM); **Veracruz:** Ocotla, Taxisapa, [20°36'00"N, 98°19'00"W], 8.xii.1985, R Barba—1 male (IBUNAM); Tebanca 15 km S.E. Estacion de Biología Los Tuxtlas, [18°23'00"N, 95°00'00"W], 3.iii.1988, Barba & Barrera—38 males, 1 female (IBUNAM); Catemaco, Tebanca, [18°25'00"N, 95°07'00"W], R Barba, *et al.*—16 males, 7 females (IBUNAM); **UNITED STATES: Arizona:** Coconino Co., Oak Cr. Grasshopper Pt., [35°59'00"N, 112°11'51"W], 12.vii.1977, Sanderson—1 male (INHS); Oak Cr. Chavez Crossing, [35°59'40"N, 112°11'00"W], 20.vi.1961, Kingsolver—2 males (INHS); 20.vii.1977, Sanderson—1 male (INHS); 20.vi.1961, Kingsolver—2 females (INHS); Navajo County, 9 mi. N. White River, North Fork White River, nr Roberts Ranch, [35°07'27"N, 109°32'15"W], 28.vi.1961, Kingsolver—2 males, 5 females (INHS); Yavapai Co., Oak Cr. at Mormon Crossing, 34°37'01"N, 110°47'13"W, 3–4.v.1984, Sanderson—2 males, 1 female (INHS); Converg. Oak Cr. & Verde R., [34°33'42"N, 112°22'58"W], 3.viii.1978, Sanderson—1 male (INHS); Oak Cr., Page Spgs., [34°46'03"N, 111°53'34"W], 14.vii.1977, Sanderson—1 male, 1 female (INHS).

Distribution. Mexico, Nicaragua, Panama, and USA (Flint *et al.* 1999).

Remarks. The dorsal branch of the inferior appendage varies across the entire range of this species. The holotype has an apically broader dorsal branch of the inferior appendage, becoming narrower in other specimens. Even though the different forms have been collected from the same localities, no 2 forms were collected together. The observed variability of the dorsal branch among the specimens examined was not discrete, but instead was continuous. When the dorsal branch is apically broad, 2 (or sometimes more) apical spines are present. In the narrower dorsal branches, these spines are retained but the more basal spine also retains a small basal process or stub. This spine-and-stub complex resembles those present on the inferior appendage of *P. kylistos* (Fig. 58A). However, in *P. kylistos* the spine-and-stub complex is basal and closer to the ventral branch.

***Polyplectropus exilis* Chamorro-Lacayo & Holzenthal**

Figs. 57, 123

Polyplectropus exilis Chamorro-Lacayo & Holzenthal, 2004: 205. [Type locality: Costa Rica, Reserva Tapantí, Quebrada Segunda at administration building; UMSP; male].

Polyplectropus exilis is the most distinct species in the group and can be distinguished from *P. charlesi* (Ross) and *P. kylistos* Chamorro-Lacayo & Holzenthal by the absence of peg-like setae on either the dorsal or ventral branches of the inferior appendage, by the absence of endothelial phallic spines, by the acute apex of the

mesoventral process of the preanal appendage, and by the presence of a narrow, lightly sclerotized process between the dorsal and ventral branches. This species resembles *P. charlesi* in the presence of a pronounced ventral median projection of sternum IX, a lobate, rounded intermediate appendage, and comparable dorsal branches of the inferior appendage.

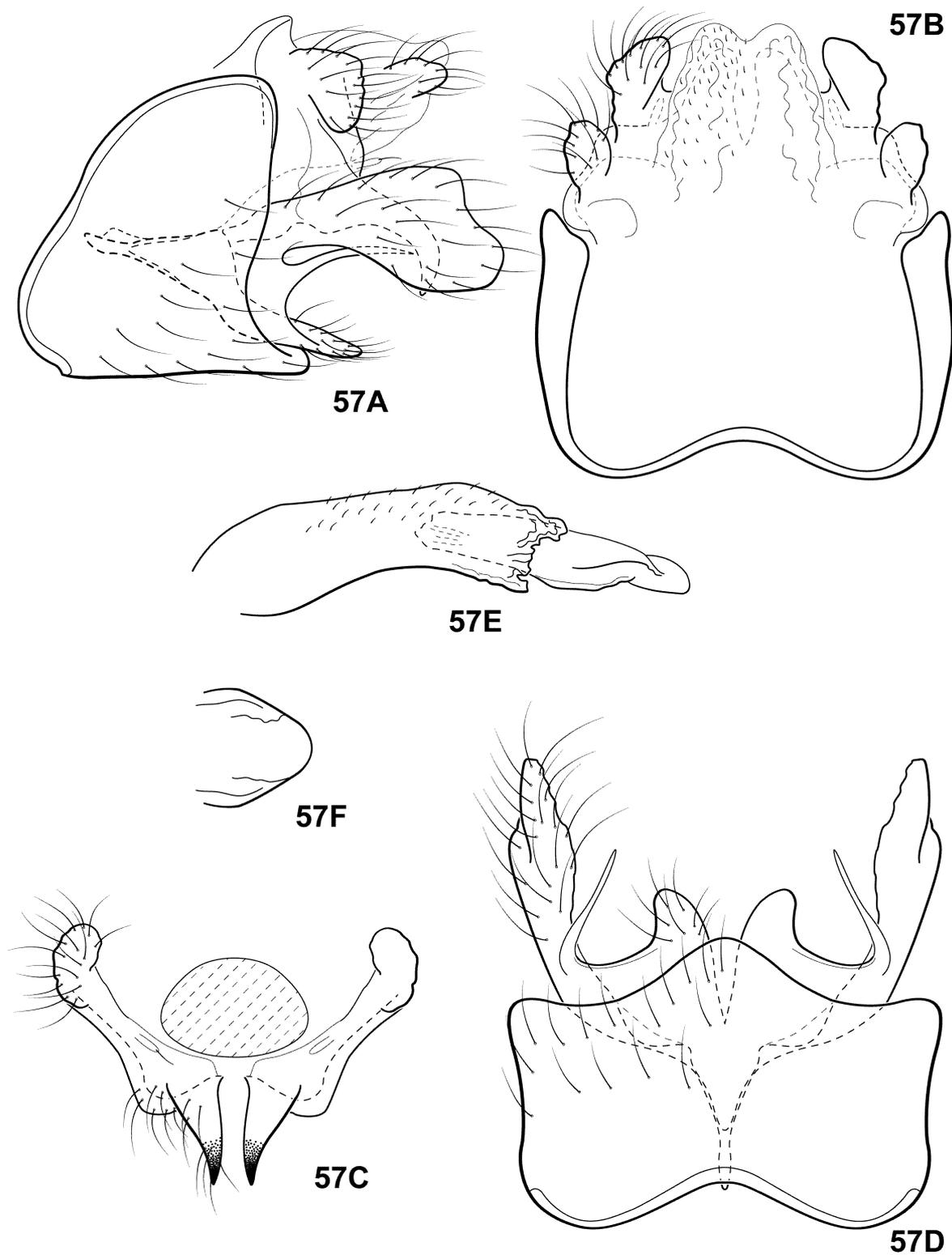


FIGURE 57. Male genitalia of *Polyplectropus exilis* Chamorro–Lacayo & Holzenthal, 2004 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E —left lateral view; F—apex, dorsal view.

Adult. Length of forewing 5–5.9 mm, n = 20. Color of head, thorax, and legs yellowish-brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long erect brown setae; setae on wings brown with scattered patches of golden setae.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin sinuate, posterior margin submedially concave; in ventral view rectangular, anterior margin concave, posterior margin with pronounced medial projection. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, digitate, setose; in dorsal view basally broad, tapering mesally to rounded apex; in caudal view digitate, directed posteromesad; median papillate lobe very small, flanking phallocrypt laterally, bearing small apical setae. Preanal appendage bipartite; mesolateral process setose; in dorsal view ovate, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin convex; in caudal view processes separated, ventral margin of process acute, with basolateral margin produced laterad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, posteroventrally produced; in ventral view narrow, lateral margin subapically produced, sinuate, posterior margin subacute, mesal margin slightly undulate, subapically expanded, becoming concave, expanding posterad into ventral branch, dorsal branch with lightly sclerotized, lanceolate process arising between dorsal and ventral branches, directed posteromesally, longer than ventral branch (medial process broken in some paratypes); ventral branch setose, short, in lateral view lanceolate, narrowing posterad; in ventral view deltoid, posteromesal margin rounded, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex oblong; apex of dorsal phallic sclerite in dorsal view rounded; endothelial membrane without embedded spines, phallobase bearing dorsal microsetae.

Material examined. **COSTA RICA: Alajuela:** Reserva Forestal San Ramón, Río San Lorencito & trib[utaries], 10°12'58"N, 84°36'25"W, 980 m, 30.iii.–1.iv.1987, Holzenthal, Hamilton & Heyn—1 male (UMSP); **Cartago:** Reserva Tapantí, Quebrada Segunda @ administration building, 9°45'40"N, 83°47'13"W, 1250 m, 9–10.v.1990, Holzenthal & Blahnik—1 male (UMSP); **Puntarenas:** Río Cotón, in Las Alturas, 8°56'17"N, 82°49'34"W, 1360 m, 18.iii.1991, Holzenthal, Muñoz & Huisman—1 male (UMSP); Río Guineal, ca 1 km (air) E Finca Helechales, 9°04'34"N, 83°05'31"W, 840 m, 22.ii.1986, Holzenthal, Morse & Fasth—4 males (UMSP); same, 4.viii.1987, Holzenthal, Morse & Clausen—3 males, 4 females (UMSP); Río Singrú, ca 2 km (air) S Finca Helechales, 9°03'25"N, 83°04'55"W, 720 m, 21.ii.1986, Holzenthal Morse & Fasth—6 males (UMSP).

Distribution. Costa Rica.

***Polyplectropus kylistos* Chamorro-Lacayo & Holzenthal**

Figs. 58, 123

Polyplectropus kylistos Chamorro-Lacayo & Holzenthal, 2004: 208. [Type locality: Costa Rica, Guanacaste, Parque Nacional Guanacaste, Estación Pitilla, Río Orosí; UMSP; male].

Polyplectropus kylistos resembles *P. charlesi* (Ross) based on the pronounced ventral median projection of sternum IX, the lobate, rounded intermediate appendage, the broadly separated ventral branches of the inferior appendage, and the overall shape of the dorsal branch of the inferior appendage. In addition, *P. kylistos* and *P. charlesi* bear peg-like setae on both branches of the inferior appendage (absent in *P. exilis*). The variable forms of *P. charlesi* having an apically narrowed dorsal branch have subapical spines on a small membranous stalk, similar to those found in *P. kylistos*. However, in *P. kylistos* these stalked spines are located more proximal to the ventral branch. *Polyplectropus kylistos* also differs from *P. charlesi* in the deltoid, apically

acute ventral branch of the inferior appendage, the narrower and more arched dorsal branch of the inferior appendage, the more acute apices of the mesoventral process of the preanal appendage, and the laterally directed endothecal phallic spines (in *P. charlesi* not as highly curved laterad).

Adult. Length of forewing 4.6 mm, n = 3. Color of head, thorax, and legs yellowish-brown.

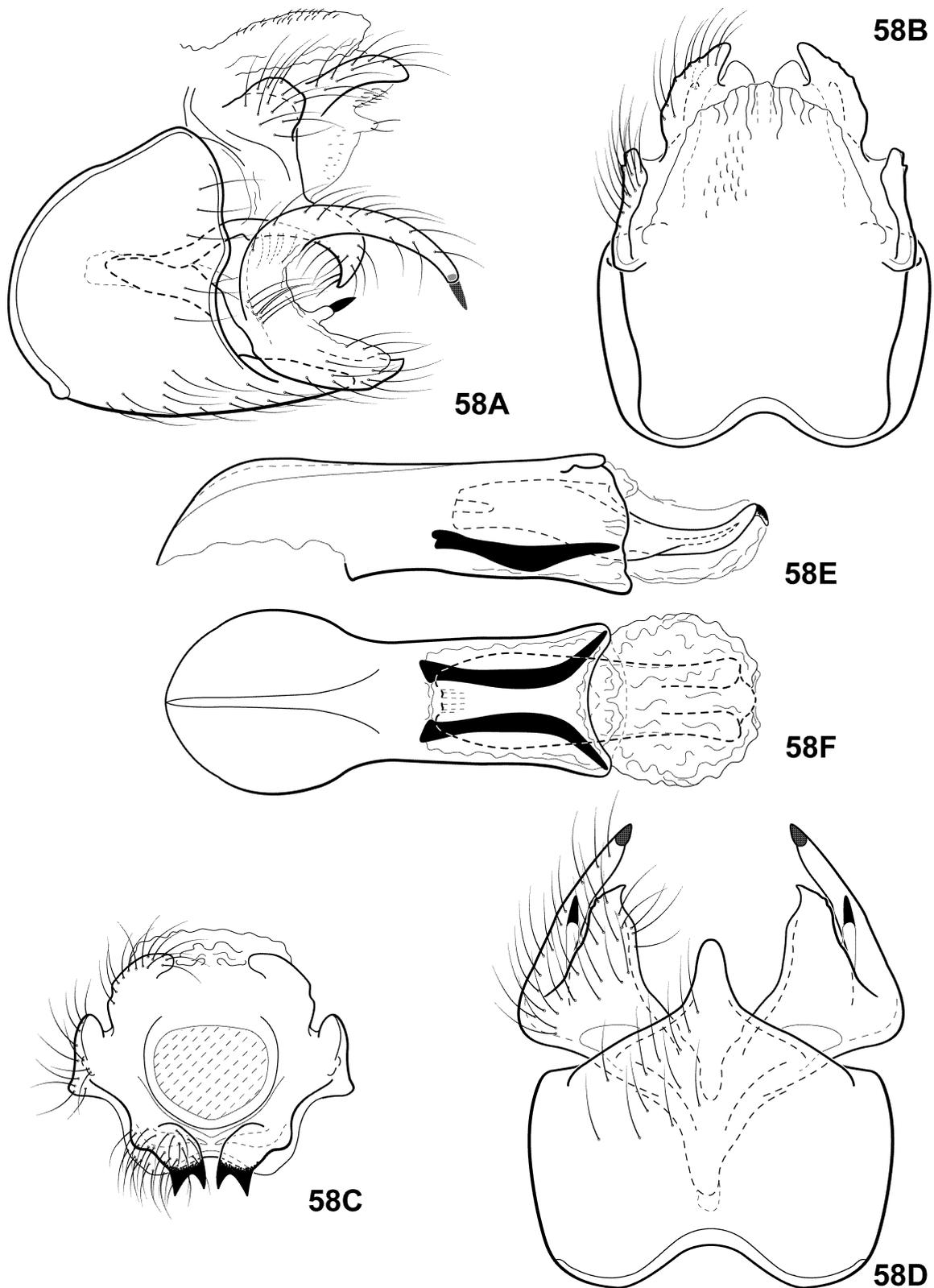


FIGURE 58. Male genitalia of *Polyplectropus kylistos* Chamorro-Lacayo & Holzenthal, 2004 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Male genitalia. Sternum IX in lateral view rounded, anterior margin highly convex, posterior margin submedially concave and ventrally produced; in ventral view rectangular, anterior margin highly concave, posterior margin with pronounced median projection. Tergum X membranous, oblong, bearing dorsal microsetae; digitate; in dorsal view digitate; in caudal view membrane surrounding phallocrypt. Intermediate appendage not longer than inferior appendage, digitate, setose; in dorsal view basally broad, tapering mesally to rounded apex; in caudal view digitate, curved, directed posteromesad; median papillate lobe very small, flanking phallocrypt laterally, bearing small apical setae. Preanal appendage bipartite; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin convex; in caudal view processes separated, ventral margin of process highly concave. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, curved ventrad and tapering apically into posteroventrad-directed spine; in ventral view narrow, lateral margin produced basolaterad, entire, posterior margin acute, mesal margin entire, expanding posterad into ventral branch; ventral branch setose, broad, bearing a basal membranous lobe with a robust sclerotized apical spine on a membranous stalk or stub; in lateral view digitate, narrowing posterad; in ventral view deltoid, apex cuspidate, posteromesal margin angled and sinuate, gradually converging mesally, ventral branches broadly separated mesally from each other. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex narrowing apically and bent dorsad, apex with ventrad-directed, highly sclerotized point; apex of dorsal phallic sclerite in dorsal view subacute; dorsolateral arm of dorsal phallic sclerite in lateral view tapering posterad, apex rounded and turned anterodorsad; in dorsal view digitate, not extending beyond apex of phallic sclerite, apex rounded; endothecal membrane with 2 stout, sclerotized spines, directed posterolaterad.

Material examined. **COSTA RICA: Alajuela:** Río Pizote, ca. 5 km (air) S Brasilia, 10°58'19"N, 85°20'42"W, 390 m, 12.iii.1986, Holzenthal & Fasth—2 males (UMSP); **Guanacaste:** Parque Nacional Guanacaste, Río Orosí, Estación Pitilla, 10°59'28"N, 85°25'41"W, 700 m, 22–25.v.1990, Holzenthal & Blahnik—1 male (UMSP).

Distribution. Costa Rica.

Key to males of *P. charlesi* species group

- 1 Peg-like setae present on inferior appendage; endothecal phallic spines present (Figs. 56, 58) 2
- Peg-like setae absent on inferior appendage; endothecal phallic spines absent (Fig. 57)
. *P. exilis* Chamorro-Lacayo & Holzenthal, p. 116.
- 2(1) Dorsal branch of inferior appendage acutely narrowed and highly curved; ventral branch elongate and apically pointed (appreciated best in ventral view) (Fig. 58) *P. kylistos* Chamorro-Lacayo & Holzenthal, p. 118.
- Dorsal branch of inferior appendage curved and may be apically broad or slightly narrower; ventral branch short (Fig. 56). *P. charlesi* (Ross), p. 111.

Polyplectropus fuscatus species group, newly recognized

With the exception of the presence or absence of the dorsolateral process of the preanal appendage, the species in the *P. fuscatus* group are largely homogeneous, particularly in the shape of the inferior appendage. *Polyplectropus beutelspacheri*, an unassigned species, may belong in the *P. fuscatus* group based on similarities in the shapes of the inferior appendage and mesoventral process of the preanal appendage, and on the complexity of the intermediate appendage. However, this relationship was not supported in the phylogenetic analysis. *Polyplectropus beutelspacheri* possesses features shared by species in other groups,

hence its unresolved placement in the phylogeny. As a result, 3 species are currently recognized in the *P. fuscatus* group, which is characterized by the combined possession of the following traits:

1. A complex intermediate appendage bearing more than 1 lobe (Figs. 59C, 61C);
2. A pandurate dorsal branch of the inferior appendage having a truncate apex (Fig. 59A);
3. A basal dorsal digitate lobe on the mesoventral process of the preanal appendage (Figs. 60A, C).

***Polyplectropus fuscatus* Flint**

Figs. 59, 140

Polyplectropus fuscatus Flint, 1983: 28. [Type locality: Argentina, Pcia., Misiones, Arroyo Piray Guazú, N San Pedro; NMNH; male].

Polyplectropus fuscatus can be distinguished from the other 2 species in the group by the absence of a dorsolateral process of the preanal appendage and by the fused mesoventral processes of the preanal appendage (free in *P. tragularius* and *P. rondoniensis*, new species). *Polyplectropus fuscatus* is most similar to *P. tragularius*, new species. Both species have a bipartite intermediate appendage, a pair of narrow, medium-sized endothecal phallic spines, and a dorsal, digitate lobe of the mesoventral process of the preanal appendage. These species also have similar inferior appendages, namely a pandurate dorsal branch. *Polyplectropus fuscatus* differs from *P. tragularius* in the rounded ventral lobe of the intermediate appendage (longer and apically broader in *P. tragularius*) and in the rectangular ventral branch of the inferior appendage (oblong in *P. tragularius*). *Polyplectropus fuscatus* also resembles *P. beutelspacheri* Bueno-Soria based on the absence of a dorsolateral process of the preanal appendage, on the shape of the inferior appendage, and on having a bipartite intermediate appendage. However, *P. beutelspacheri* does not have a dorsal digitate lobe on the mesoventral process of the preanal appendage, thus distinguishing it from all other species in the *P. fuscatus* group.

Adult. Length of forewing 4.2–5.1 mm, n = 22. Color of head, thorax, and legs brown; setae on wings dark-brown with grey and yellow setae.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin sinuate; in ventral view rectangular, anterior margin highly concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, bipartite, digitate with mesoventral oblong lobe with long setae throughout; in dorsal view primary lobe oblong; in caudal view broadly digitate, secondary lobe rounded. Preanal appendage bipartite; small remnant of dorsolateral process of preanal appendage; mesolateral process setose; in dorsal view orbicular, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, dorsally produced into digitate lobe with ventrad-directed sclerotized apex, ventral margin concave, posterior margin rounded; in caudal view apically fused to form a single continuous structure, with ventral margin emarginate. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate; in ventral view narrow, lateral margin angled, entire, posterior margin subacute, mesal margin slightly undulate, angled, expanding posterad into ventral branch; ventral branch setose, elongate, bearing a basal digitate lobe; in lateral view clavate, narrowing posterad and apically cuspidate; in ventral view subquadrate, mesal margin slightly angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex curved dorsad; apex of dorsal phallic sclerite in dorsal view truncate; endothecal membrane with 2 thin, medium-sized spines.

Material examined. **ARGENTINA: Misiones:** San Pedro, A[rrroy]o Piray-Guazú No., [26°37'59"S, 54°07'59"W], 22.xi.1973, O S Flint—1 male (NMNH) [holotype] ["USNM Type No. 100492"]; **BRAZIL:**

Santa Catarina: Nova Teutônia, [27°03'00"S, 52°24'00"W], x.1963, F. Plaumann—8 males, 1 female (NMNH) [paratypes]; Nova Teutônia, [27°11'00"S, 52°23'00"W], 300–500 m, xi.1963, F. Plaumann—6 males (NMNH) [paratypes]; i.1964, F. Plaumann—5 males (NMNH) [paratypes]; **URUGUAY:** **Salto:** Río Uruguay, Salto Grande, [31°22'59"S, 57°58'00"W], 10.xi.1955, C S Carbonell—1 male (FHCU) [paratype].

Distribution. Argentina, Brazil, and Uruguay.

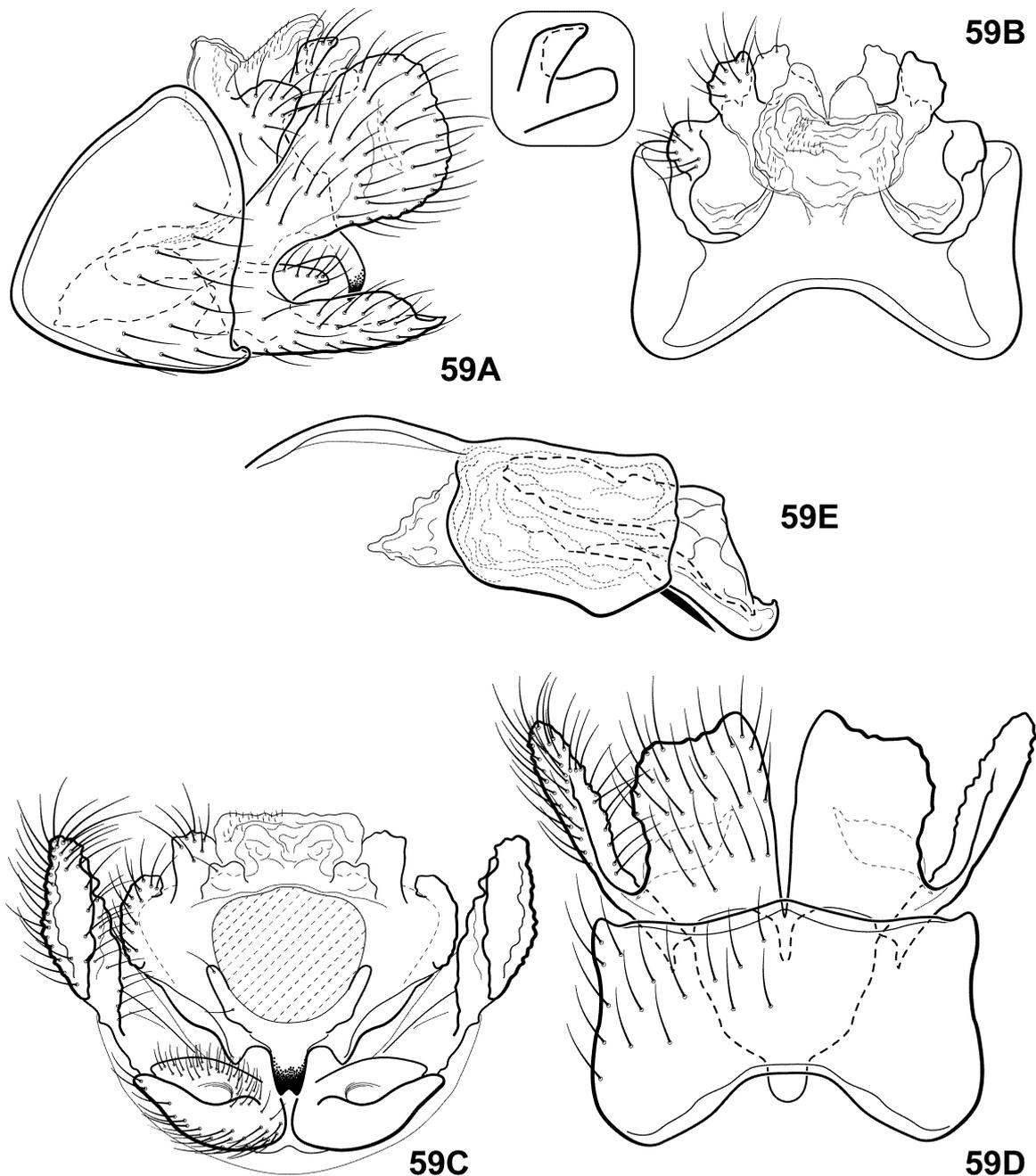


FIGURE 59. Male genitalia of *Polyplectropus fuscatus* Flint, 1983 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

***Polyplectropus rondoniensis*, new species**

Figs. 60, 97B, 137

This species is very similar to *P. fuscatus* Flint and *P. tragularius*, new species by the presence of a bipartite intermediate appendage, a pair of narrow, medium-sized endotheal phallic spines, and a dorsal, digitate lobe

of the mesoventral process of the preanal appendage. All 3 species have similar inferior appendage, particularly the pandurate dorsal branch. *Polyplectropus rondoniensis* can be distinguished from *P. fuscatus* by the presence of a dorsolateral process of the preanal appendage and by the apically free mesoventral processes of the preanal appendage (fused in *P. fuscatus*). *Polyplectropus rondoniensis* differs from *P. tragularius* by the more robust, basally fused endothecal phallic spines, by the more prominent dorsal digitate lobe of the mesoventral process, by the shape of the secondary ventral lobe of the intermediate appendage, being deltoid in *P. rondoniensis* and quadrate in *P. tragularius*, and by the presence of a median projection on the dorsal surface of the ventral branch of the inferior appendage.

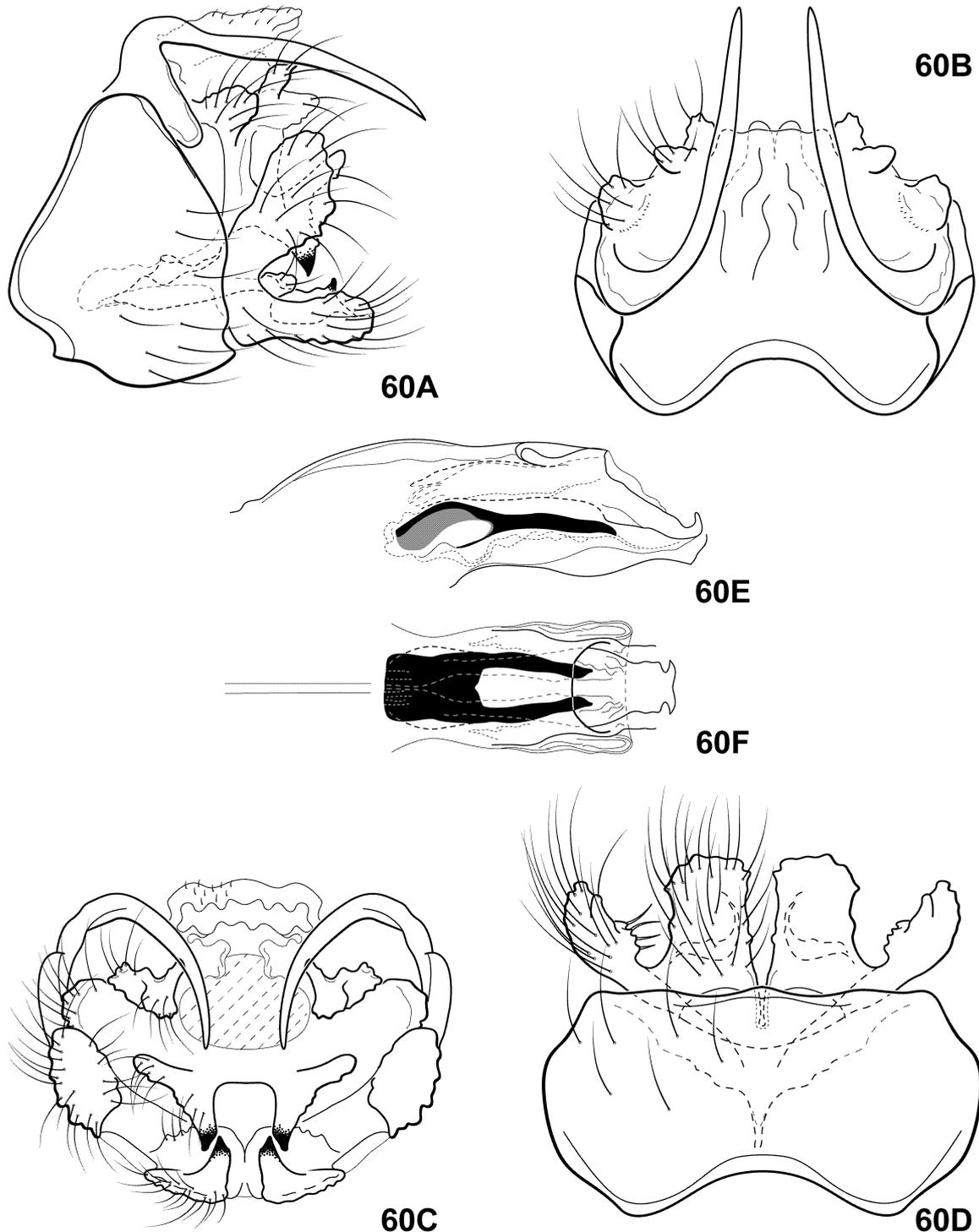


FIGURE 60. Male genitalia of *Polyplectropus rondoniensis*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Adult. Length of forewing 4.3–4.7 mm, n = 32. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate and medially produced; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate. Intermediate appendage not longer than inferior appendage, multilobate with ventral digitate projection, setose; in dorsal view rounded with digitate ventral setose lobe and medial membranous lobe; in caudal view tripartite, primary lobe ventromesally produced into digitate setose lobe and medially into membranous oblong lobe. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view deltoid, in lateral view oblong; mesoventral process setose; in lateral view hook-like, with dorsal digitate lobe and ventrad-directed sclerotized apex, ventral margin concave, posterior margin concave; in caudal view fused basomesally, processes separated with dorsal digitate lobe, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate; in ventral view clavate, lateral margin produced basolaterad, sinuate, posterior margin acute, mesal margin sinuate, concave, subbasally produced, expanding posterad into ventral branch; ventral branch setose, elongate; in lateral view oblong, basally produced, rounded posterad; in ventral view oblong posteromesal margin gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view subacute; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; endothelial membrane with 2 basally fused, medium-sized spines.

Holotype male: BRAZIL: Rondônia: creek 8 km S of Cacauplandia, 21.xi.1991, D. Petr—(UMSP000100990) (MZUSP).

Paratypes: BRAZIL: Rondônia: creek 8 km S of Cacauplandia, 21.xi.1991, D. Petr—4 males, 27 females (NMNH) (UMSP).

Distribution. Brazil.

Etymology. This species is named for the type locality, the state of Rondônia in Brazil.

***Polyplectropus tragularius*, new species**

Figs. 17F, 61, 97D, 137

Polyplectropus tragularius is a typical species of the *P. fuscatus* group by having a bipartite intermediate appendage, a pair of narrow, medium-sized endothelial phallic spines, a dorsal, digitate lobe of the mesoventral process of the preanal appendage as well as a pandurate dorsal branch. This species can be distinguished from *P. fuscatus* Flint by the presence of a dorsolateral process of the preanal appendage, by the apically free mesoventral processes of the preanal appendage (fused in *P. fuscatus*), by the long, apically broader and rounded ventral lobe of the intermediate appendage (rounded in *P. fuscatus*), and by the oblong ventral branch of the inferior appendage (quadrate in *P. fuscatus*). *Polyplectropus tragularius* differs from *P. rondonienseis*, new species by the narrower endothelial phallic spines, by the less prominent dorsal digitate lobe of the mesoventral process, by the shape of the secondary ventral lobe of the intermediate appendage, being quadrate in *P. tragularius* and deltoid in *P. rondonienseis*, and by the absence of a median projection on the dorsal surface of the ventral branch of the inferior appendage.

Adult. Length of forewing 4–4.8 mm, n = 32. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings darker brown along costal margin, rest of wing lighter shade of brown with scattered patches of grey setae.

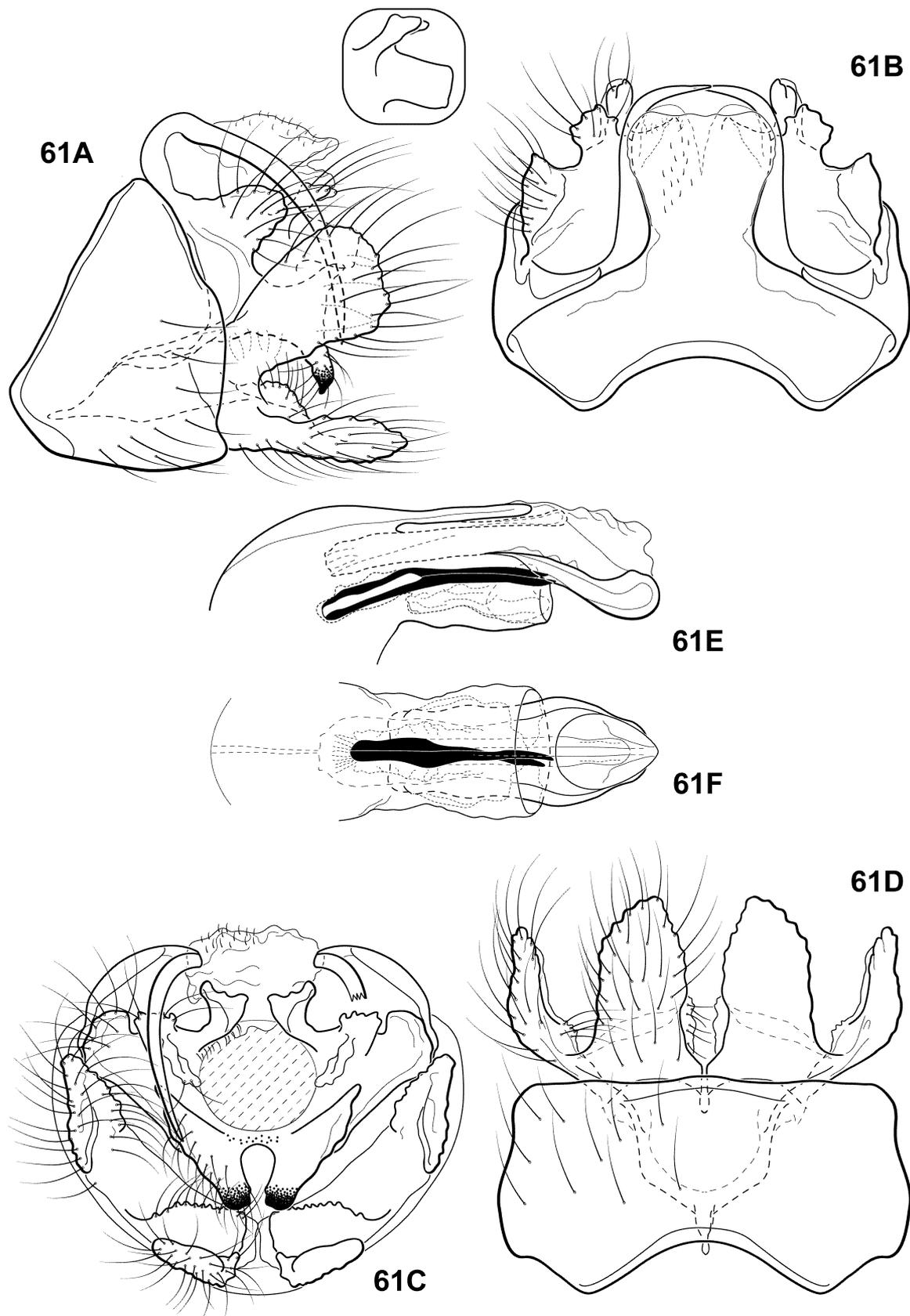


FIGURE 61. Male genitalia of *Polyplectropus tragularius*, new species (holotype): A—left lateral view and inset of intermediate appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate and medially produced; in ventral view rectangular, anterior margin highly concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate. Intermediate appendage not longer than inferior appendage, multilobate with ventral digitate projection, setose; in dorsal view rounded with digitate ventral setose lobe and medial membranous lobe bearing ventral microsetae dorsad of phallocrypt (may be part of lower lip of tergum X); in caudal view tripartite, primary lobe ventrally produced into digitate setose lobe and medially into membranous inversely deltoid lobe with ventral microsetae dorsally flanking phallocrypt. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view deltoid, in lateral view oblong; mesoventral process setose; in lateral view hook-like, with dorsal digitate lobe and ventrad-directed sclerotized apex, ventral margin concave, posterior margin concave; in caudal view fused basomesally, processes separated with dorsal digitate lobe, ventral margin of process truncate to rounded. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate; in ventral view narrow, lateral margin produced basolaterad, sinuate, posterior margin subacute, mesal margin sinuate, concave, subbasally produced, expanding posterad into ventral branch; ventral branch setose, elongate; in lateral view clavate, basally produced, narrowing posterad; in ventral view oblong, posteromesal margin angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view subacute; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; endothelial membrane with 2 thin, medium-sized spines.

Holotype male: BRAZIL: Minas Gerais: Parque Nacional Peruaçu, Rio Peruaçu, 15°06'40"S, 44°14'29"W, 590 m, 16.xi.2001, Holzenthal, Amarante, Blahnik & Paprocki—(UMSP000080851) (MZUSP).

Paratypes: BRAZIL: Espírito Santo: Fazenda Santa Clara, 15 km SE Santa Teresa, [19°55'00"S, 40°36'00"W], 460 m, 22.iv.1977, C & O Flint—1 male (NMNH); 24 km SE of Santa Teresa, [19°55'00"S, 40°36'00"W], 280 m, 22.iv.1977, C & O Flint—4 males, 1 female (NMNH); **Minas Gerais:** Parque Nacional Peruaçu, Rio Peruaçu, 15°06'40"S, 44°14'29"W, 590 m, 16.xi.2001, Holzenthal Amarante Blahnik & Paprocki—2 males, 5 females (UMSP); Aldeia de Cachoeira das Pedras, 20°06'49"S, 44°01'25"W, 925 m, 28–29.ix. 2000, Paprocki & Braga—1 male, 7 females (MZUSP); **São Paulo:** Pedregulho, 20°09'07"S, 47°30'38"W, 617 m, 16.ix.2003, Holzenthal Paprocki & Calor—9 males (UMSP).

Distribution. Brazil.

Etymology. The species name comes from the Latin word “tragularius” meaning “javelin-thrower” (Brown 1985). The name is in reference to the lightly sclerotized, narrow endothelial phallic spines.

Key to males of *P. fuscatus* species group

- 1 Dorsolateral process of preanal appendage present; mesoventral process of preanal appendage not fused apically (Figs. 60, 61)2
- Dorsolateral process of preanal appendage absent; mesoventral process of preanal appendage almost entirely fused apically (Fig. 59) *P. fuscatus* Flint, p. 121

- 2(1) Endothelial phallic spines long, robust, basally fused (forming a “U”); dorsal surface of ventral branch with acute projection (Fig. 60) *P. rondoniense*, n. sp., p. 122
- Endothelial phallic spines long, narrow and lightly sclerotized; dorsal surface of ventral branch without acute projection (Fig. 61) *P. tragularius*, n. sp., p. 124

***Polyplectropus guyanae* species group, newly recognized**

This newly established group includes 2 new species and is characterized by the combined possession of the following traits (Figs. 62, 63):

1. Dorsal digitate lobe on the mesoventral process of the preanal appendage;
2. Presence of peg-like spines in the phallic endothelial membrane;
3. Oblong intermediate appendage with a pair of apical setae;
4. Absence of a dorsolateral process of the preanal appendage;
5. Clavate dorsal branch of the inferior appendage.

***Polyplectropus guyanae*, new species**

Figs. 16C, 62, 138

Polyplectropus guyanae can be readily distinguished from *P. peruvianus*, new species by the presence of an apically bifurcating mesoventral process of the preanal appendage (completely fused apically and bearing rows of peg-like setae in *P. peruvianus*). Additionally, *P. guyanae* has a rounded apex of the intermediate appendage (concave with mesal papillate lobes bearing apical setae in *P. peruvianus*), an oblong apex of the dorsal phallic sclerite (ventrally produced and sclerotized in *P. peruvianus*), and an oblong ventral branch of the inferior appendage (narrowing apically in *P. peruvianus*).

Adult. Length of forewing 3.5–3.8 mm, n = 6. Color of head, thorax, and legs brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings darker brown along costal margin, rest of wing lighter shade of brown with scattered patches of grey setae.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin submedially concave; in ventral view narrowly rectangular, anterior margin highly concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, digitate, with a pair of long apical setae; in dorsal view digitate, apex narrowing mesad; in caudal view rounded, curved, directed laterodorsad. Preanal appendage bipartite; possible small remnant of dorsolateral process of preanal appendage; mesolateral process setose; in dorsal view orbicular, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, dorsally produced into elongate, digitate lobe, anteroventral margin angled, posterior margin truncate; in caudal view fused basomesally, processes slightly separated apically, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate; in ventral view narrow, lateral margin apically produced, sinuate and undulate, posterior margin acute, mesal margin slightly undulate, angled, expanding posterad into ventral branch; ventral branch setose, elongate, in lateral view digitate, rounded posterad; in ventral view oblong, posteromesal margin convex, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex narrowly oblong; apex of dorsal phallic sclerite in dorsal view rounded; endothelial membrane with many short, sclerotized, peg-like spines, when everted spines arranged in a circle, dorsally not as densely packed, also visible is a horseshoe-shaped sclerite (not readily visible when endotheca is not everted).

Holotype male. GUYANA: Dubulay Ranch, Aramatani Cr[reek], 6°33'00"N, 57°48'00"W, 15–18.iv.1995, O S Flint—(UMSP000107501) (NMNH)

Paratype. GUYANA: Dubulay Ranch, Aramatani Cr[reek], 6°33'00"N, 57°48'00"W, 15–18.iv.1995, O S Flint—2 males, 2 females (NMNH); **VENEZUELA: Territorio Federal Amazonas [Estado Amazonas]:** Cerro de la Neblina, small stream east side of basecamp, [00°51'00"N, 66°10'00"W], 140 m, 20–24.iii.1984, Flint & Louton—1 male (NMNH).

Distribution. Guyana and Venezuela.

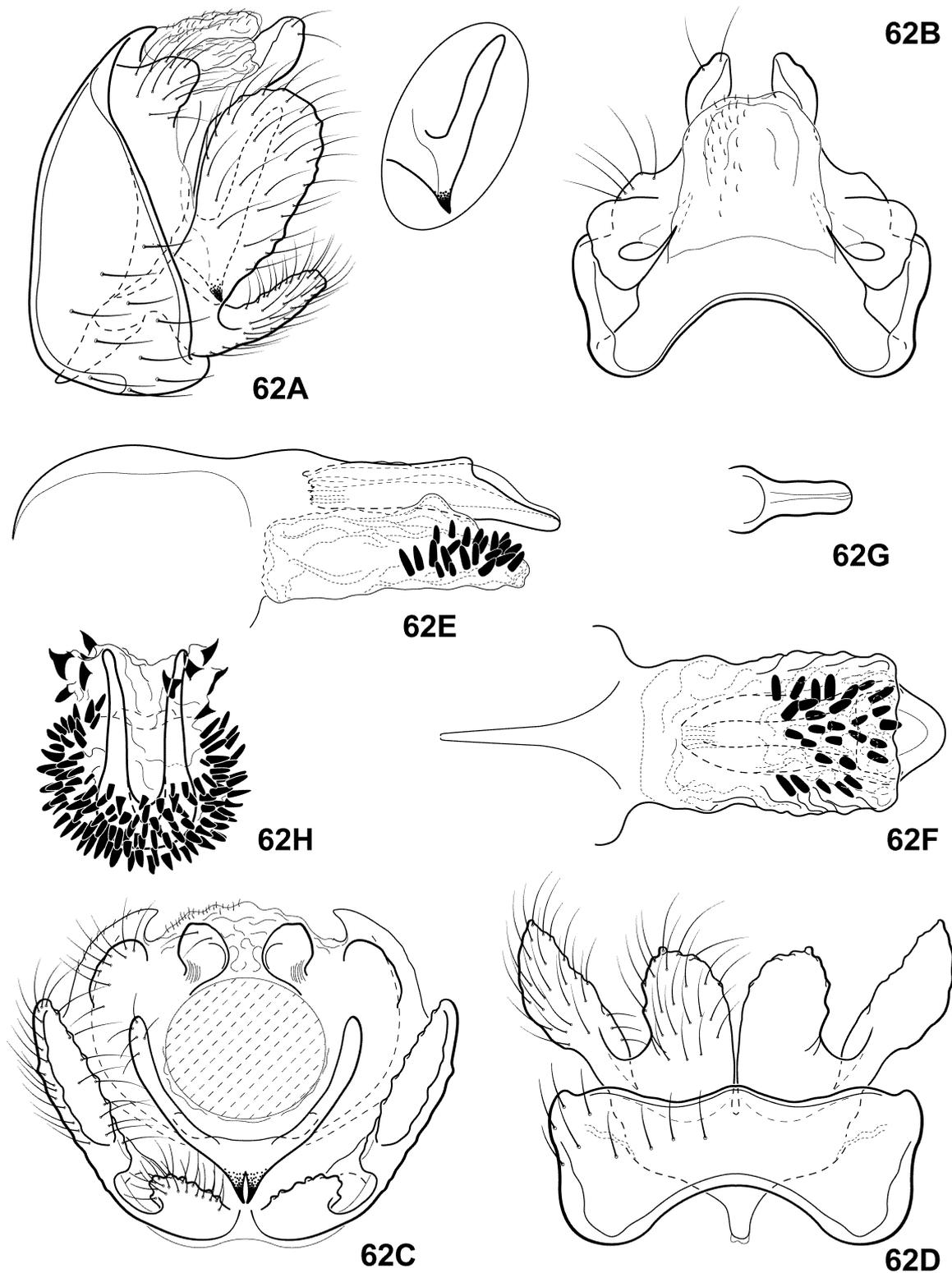


FIGURE 62. Male genitalia of *Polyplectropus guyanae*, new species (holotype): A—left lateral view and inset of mesoventral process of preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E–H—phallus: E—left lateral view; F—dorsal view; G—apex dorsal view; (paratype): H—apex, caudal view.

Etymology. This species is named for the country of Guyana where the holotype and several paratypes were collected.

Polyplectropus peruvianus, new species

Figs. 17A, 63, 138

Polyplectropus peruvianus is easily distinguished from *P. guyanae* by the fused apex of the mesoventral process of the preanal appendage bearing rows of peg-like setae (apically bifurcating and lacking peg-like setae in *P. guyanae*). Furthermore, the intermediate appendage in *P. peruvianus* is apically concave and has apical setae on mesal papillate lobes (with a simple rounded apex in *P. guyanae*), and the apex of the dorsal phallic sclerite is ventrally produced (simple and oblong in *P. guyanae*), and the ventral branch of the inferior appendage is broadly deltoid (oblong in *P. guyanae*).

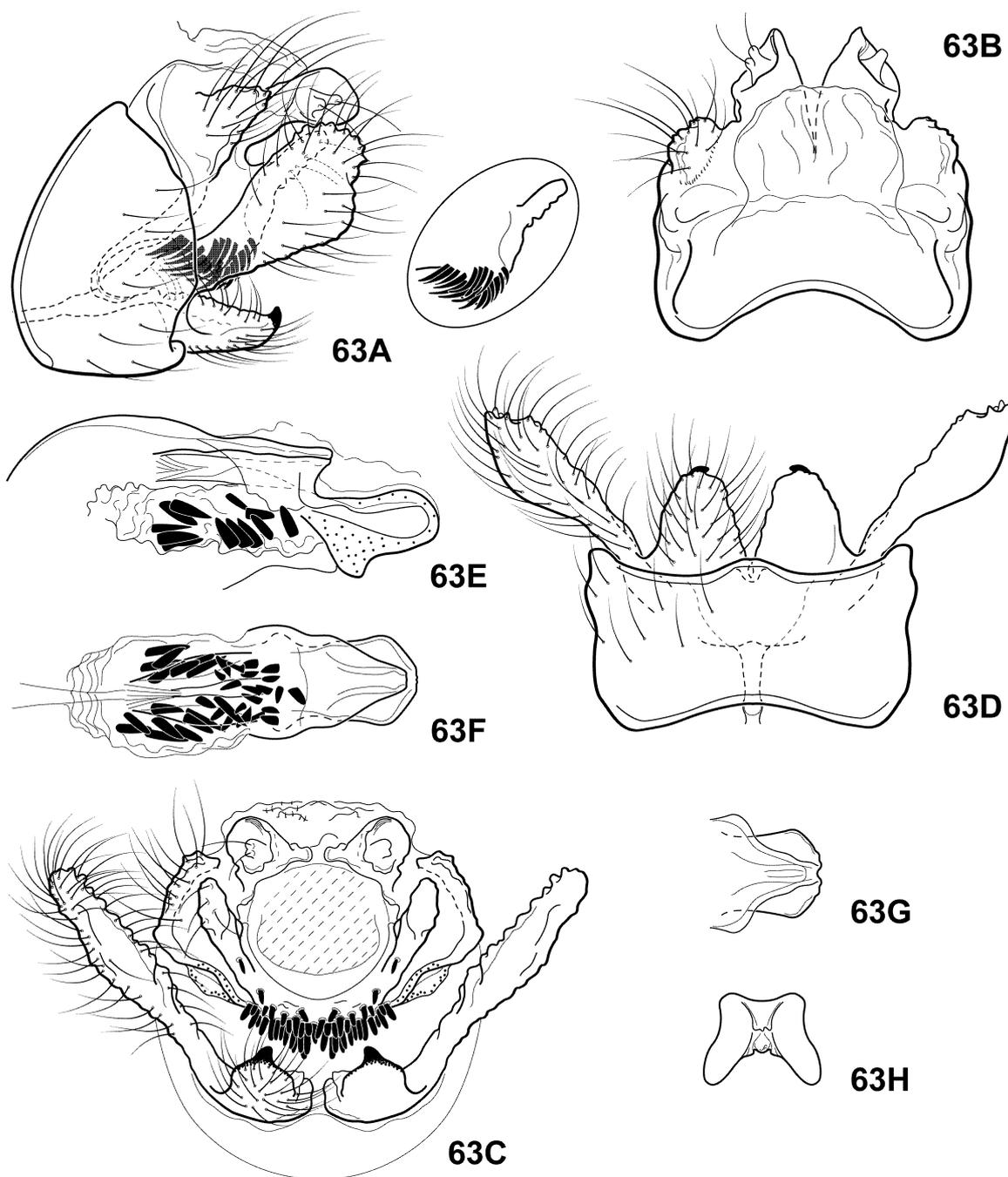


FIGURE 63. Male genitalia of *Polyplectropus peruvianus*, new species (holotype): A—left lateral view and inset of mesoventral process of left preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E—H—phallus: E—left lateral view; F—dorsal view; G—apex, ventral view; H—apex, caudal view.

Adult. Length of forewing 4–4.5 mm, n = 2. Color of head, thorax, and legs brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings darker brown along costal margin, rest of wing lighter shade of brown with scattered patches of grey setae.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin medially produced; in ventral view rectangular, anterior margin concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, cylindrical, with apical setae on papillate lobes; in dorsal view cylindrical, apically concave with papillate lobes in middle of concavity; in caudal view rounded, apically concave with median papillate lobes, directed posterolaterad. Preanal appendage bipartite; possible small remnant of dorsolateral process of preanal appendage; mesolateral process setose; in dorsal view orbicular, in lateral view deltoid; mesoventral process setose; in lateral view rounded, with dorsal digitate lobe, anteroventral margin concave, posterior margin concave; in caudal view processes apically fused to form a single continuous structure, ventral margin of process rounded, bearing sclerotized peg-like setae. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, posteroventrally produced; in ventral view narrow, broadening apically, lateral margin, sinuate, posterior margin acute, mesal margin slightly undulate, angled, expanding posterad into ventral branch; ventral branch setose, short, in lateral view deltoid, bent dorsad and narrowing into acute sclerotized point; in ventral view broadly deltoid, posteromesal margin convex, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex broad, oblong, subapically produced ventrad; apex of dorsal phallic sclerite in dorsal view rounded, apex in caudal view trapezoidal (large structure may be fused dorsolateral arms of phallic sclerite); endothecal membrane with many short, sclerotized, peg-like spines.

Holotype male. PERU: Loreto: Callicebus Research Station, Mishana, Río Nanay, 25 km SW Iquitos, [3°44'53"S, 73°14'50"W], 120 m, 10–17.i.1980, J B Heppner—(UMSP000107492) (NMNH).

Allotype. PERU: Loreto: Callicebus Research Station, Mishana, Río Nanay, 25 km SW Iquitos, [3°44'53"S, 73°14'50"W], 120 m, 10–17.i.1980, J B Heppner—1 female (NMNH).

Distribution. Peru.

Etymology. This species is named for the country of Peru where the holotype and paratype were collected.

Key to males of *P. guyanae* species group

- 1 Apex of mesoventral process of preanal appendage fused into rounded, entire structure with many peg-like setae; apex of dorsal phallic sclerite enlarged (Fig. 63)*P. peruvianus*, n. sp., p. 129
- Base of mesoventral process of preanal appendage fused, apex free and peg-like setae absent; Apex of dorsal phallic sclerite not enlarged (Fig. 62)*P. guyanae*, n. sp., p. 127

Polyplectropus manuensis species group, newly recognized

The male genitalia of the 3 species included in this group are homogeneous, with the exception of the shape of the mesoventral process of the preanal appendage and to a lesser extent the shape of the ventral branch of the inferior appendage. The *P. manuensis* group is characterized by the combined possession of the following traits (Figs. 64–66):

1. A small, bulbous intermediate appendage located laterad almost at the base of the mesolateral lobe of the preanal appendage;
2. Pronounced lower lip of segment X;
3. Basally fused mesoventral processes of the preanal appendage;

4. Mesoventral process of preanal appendage not curved or hooked, but more or less at 45° angle;
5. Presence of an elongate, sclerotized, cylindrical dorsolateral process of the preanal appendage;
6. Dorsolateral process of preanal appendage basally curving mesally then laterally (less so in *P. manuensis*);
7. Mesal margin of dorsal branch of inferior appendage with internal flange;
8. Dorsal branch oblong, narrow and directed almost at a 90 degree angle;
9. Ventral branch small, almost indistinguishable from dorsal branch (in lateral view).

***Polyplectropus manuensis*, new species**

Figs. 64, 139

This is a typical species of the *P. manuensis* group differing from *P. robertsonae*, new species and *P. tripunctatum*, new species by the bifid apex of the mesoventral process of the preanal appendage (trifid in *P. tripunctatum* and *P. robertsonae*, yet middle lobe attenuate in the latter species) and by the shape of the ventral branch of the preanal appendage, produced as a small lobe when viewed in lateral view, not bifid as in *P. tripunctatum* or downturned and basally rounded as in *P. robertsonae*.

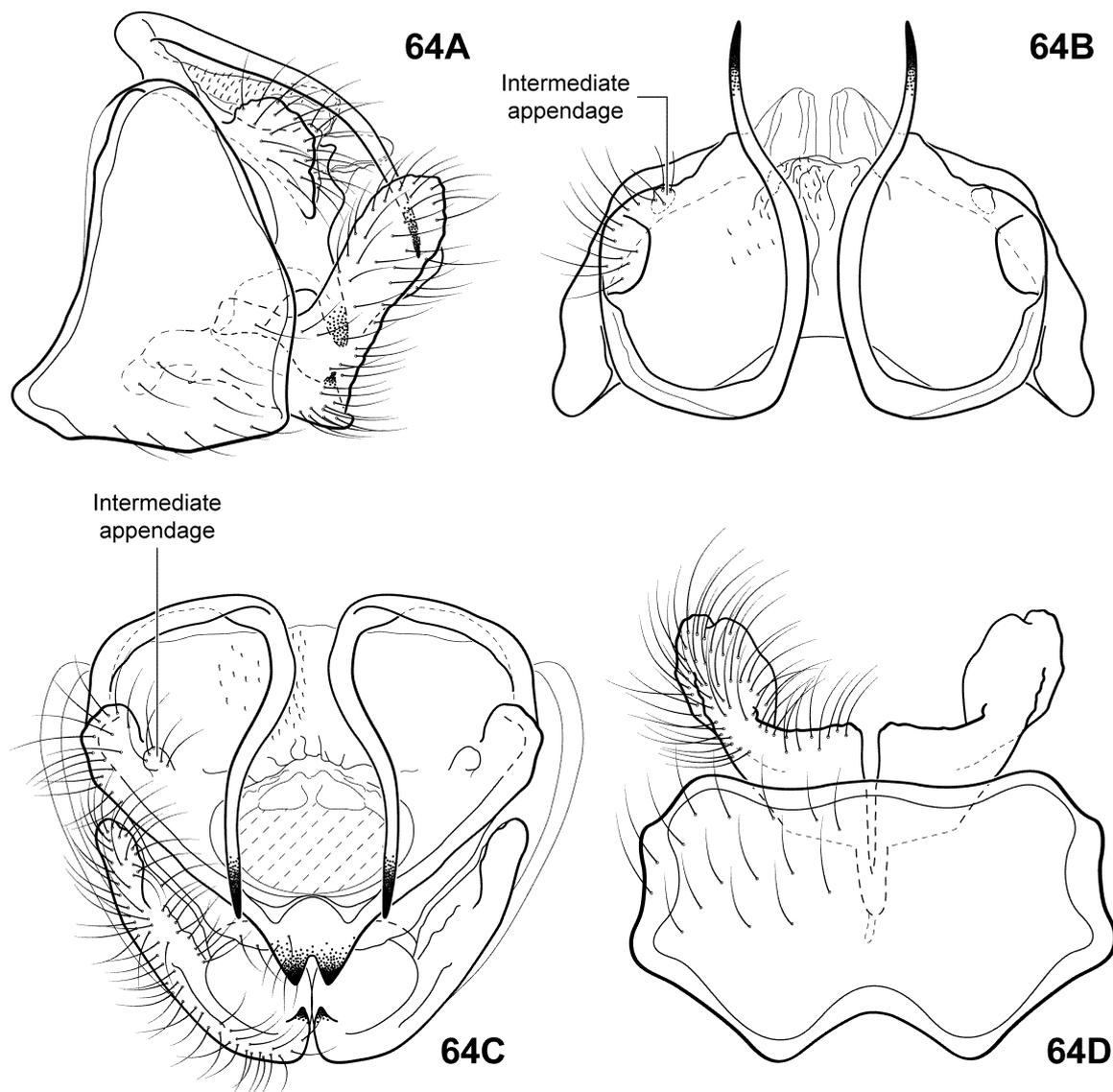


FIGURE 64. Male genitalia of *Polyplectropus manuensis*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

Adult. Length of forewing 4.8–5.5 mm, n = 2. Color of head, and thorax brown, legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin ventrally produced, posterior margin submedially produced; in ventral view rectangular, anterior margin sinuate and medially highly concave, posterior margin sinuate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate and elongate; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, small, digitate, with long setae throughout; in dorsal view deltoid; in caudal view rounded, small, arising at base of mesolateral process of preanal appendage, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering into acute apex; mesolateral process setose; in dorsal view obovate, in lateral view broadly convex; mesoventral process setose, in lateral view digitate, tapering ventrally into sclerotized apex, ventral margin concave, posterior margin slightly angled; in caudal view fused basomesally, ventral margin of process acute, basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view narrowly oblong, directed dorsad; in ventral view narrow, broadening apically, lateral margin subapically produced, sinuate, posterior margin emarginate, mesal margin sinuate, shallowly fused to ventral branch; ventral branch setose, short, in lateral view digitate, narrowing posterad; in ventral view subquadrate, mesal margin straight, posterior margin truncate, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view rounded.

Holotype male. PERU: Madre de Dios: Amazonia Lodge, Toma del Agua (stream), 12°52'13"S, 71°22'34"W, 415 m, 29.vi.1993, Blahnik & Pescador—(UMSP000107441) (NMNH).

Paratypes. PERU: Madre de Dios: Amazonia Lodge, Toma del Agua (stream), 12°52'13"S, 71°22'34"W, 415 m, 29.vi.1993, Blahnik & Pescador—1 female (NMNH).

Distribution. Peru.

Etymology. This species is named after Manú National Park where the specimens were collected.

***Polyplectropus robertsonae*, new species**

Figs. 65, 139

Polyplectropus robertsonae has a trifid mesoventral process of the preanal appendage, as does *P. tripunctatum*, new species (bifid in *P. manuensis*), but the median lobe in *P. robertsonae*, new species is lightly sclerotized, whereas in *P. tripunctatum* this median lobe is larger than adjacent lobes and strongly sclerotized. In addition, *P. robertsonae* has a downturned and basally rounded ventral branch (bifid in *P. tripunctatum* or a small, simple lobe in *P. manuensis*).

Adult. Length of forewing 4.5 mm, n = 3. Color of head and thorax brown, legs yellowish-brown (specimen preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin ventrally produced, posterior margin submedially produced; in ventral view rectangular, anterior margin sinuate and medially highly concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, with microsetae, digitate and elongate; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, small, bulbous, with long setae throughout; in dorsal view bulbous; in caudal view bulbous, small, arising at base of mesolateral process of preanal appendage, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved

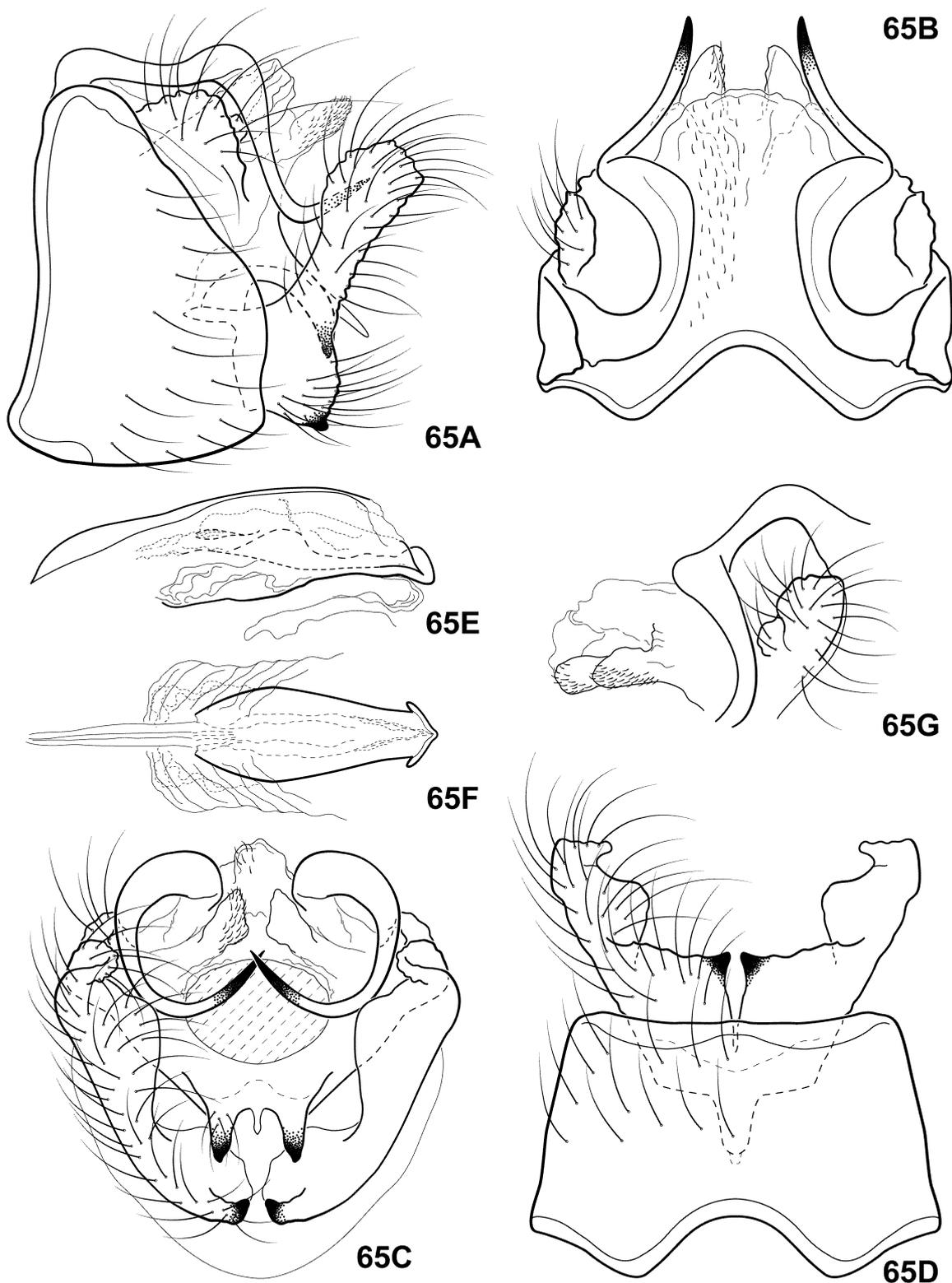


FIGURE 65. Male genitalia of *Polyplectropus robertsonae*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view; G—left preanal appendage, oblique–lateral view.

posteromesad then posterodorsad, tapering mesoventrad into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view deltoid; mesoventral process setose; in lateral view forked with distal lobe lightly sclerotized, proximal lobe with ventrad-directed sclerotized apex, anteroventral margin concave, posterior

margin angled; in caudal view basally fused to form a single continuous structure, ventral margin of process trilobed, median lobe narrower and lightly sclerotized than adjacent lobes. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view narrowly oblong, directed dorsad and subapically slightly produced posterad; in ventral view narrow, broadening apically, lateral margin apically produced, posterior margin undulate, mesal margin undulate, apically expanded, becoming concave, widening into an internal flange and shallowly fused to ventral branch; ventral branch setose, short; in lateral view almost forming a continuous structure with dorsal branch, basally rounded and narrowing ventrad into rounded sclerotized point; in ventral view quadrate, mesal margin slightly angled, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view obtuse.

Holotype male. BOLIVIA: Santa Cruz: P[arque] N[acional] & A[rea] N[atural] [de] M[anejo] I[ntegrado] Amboró, Guarda Parque Mataracú, Confluence of Quebrada Verde Uno y Dos, 17°33'11"S, 63°52'09"W, 371 m, 23.xi.2004, Robertson, Garcia, Vidaurre—(UMSP000101111) (UASC).

Paratypes. BOLIVIA: Santa Cruz: P[arque] N[acional] & A[rea] N[atural] [de] M[anejo] I[ntegrado] Amboró, Guarda Parque Mataracú, Confluence of Quebrada Verde Uno y Dos, 17°33'11"S, 63°52'09"W, 371 m, 23.xi.2004, Robertson, Garcia, Vidaurre—2 males (NMNH) (UMSP).

Distribution. Bolivia.

Etymology. We are pleased to name this species in honor of Desiree Robertson, fellow Trichopterologist and friend who collected the only known specimens of this species.

***Polyplectropus tripunctatum*, new species**

Figs. 66, 139

Polyplectropus tripunctatum is very similar to the other 2 species in the *P. manuensis* group. This species has a trifid mesoventral process of the preanal appendage, as does *P. robertsonae* (bifid in *P. manuensis*), but the median lobe in *P. tripunctatum* resembles adjacent lobes in shape and sclerotization. In *P. robertsonae* this median lobe is not as pronounced and it is weakly pigmented. In addition, *P. tripunctatum* has a bifid ventral branch (downturned and basally rounded in *P. robertsonae* or a small, simple lobe in *P. manuensis*).

Adult. Length of forewing 4 mm, n = 1. Color of head and thorax brown, legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin ventrally produced, posterior margin submedially produced; in ventral view rectangular, anterior margin sinuate and highly concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate and elongate; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, small, digitate, with long setae throughout; in dorsal view rounded; in caudal view rounded, small, arising at base of mesolateral process of preanal appendage, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterodorsad, tapering mesoventrad into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view bilobed, with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin angled; in caudal view apex fused to form a single continuous structure, ventral margin of process trilobed, basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view narrowly oblong, directed dorsad and subapically slightly produced posterad; in ventral view narrow, broadening apically, lateral margin apically produced, posterior margin

undulate, mesal margin undulate, apically expanded, becoming concave, widening into an internal flange and shallowly fused to ventral branch; ventral branch setose, short; in lateral view almost forming a continuous structure with dorsal branch, emarginate posterad; in ventral view deltoid, mesal margin slightly angled, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view obtuse.

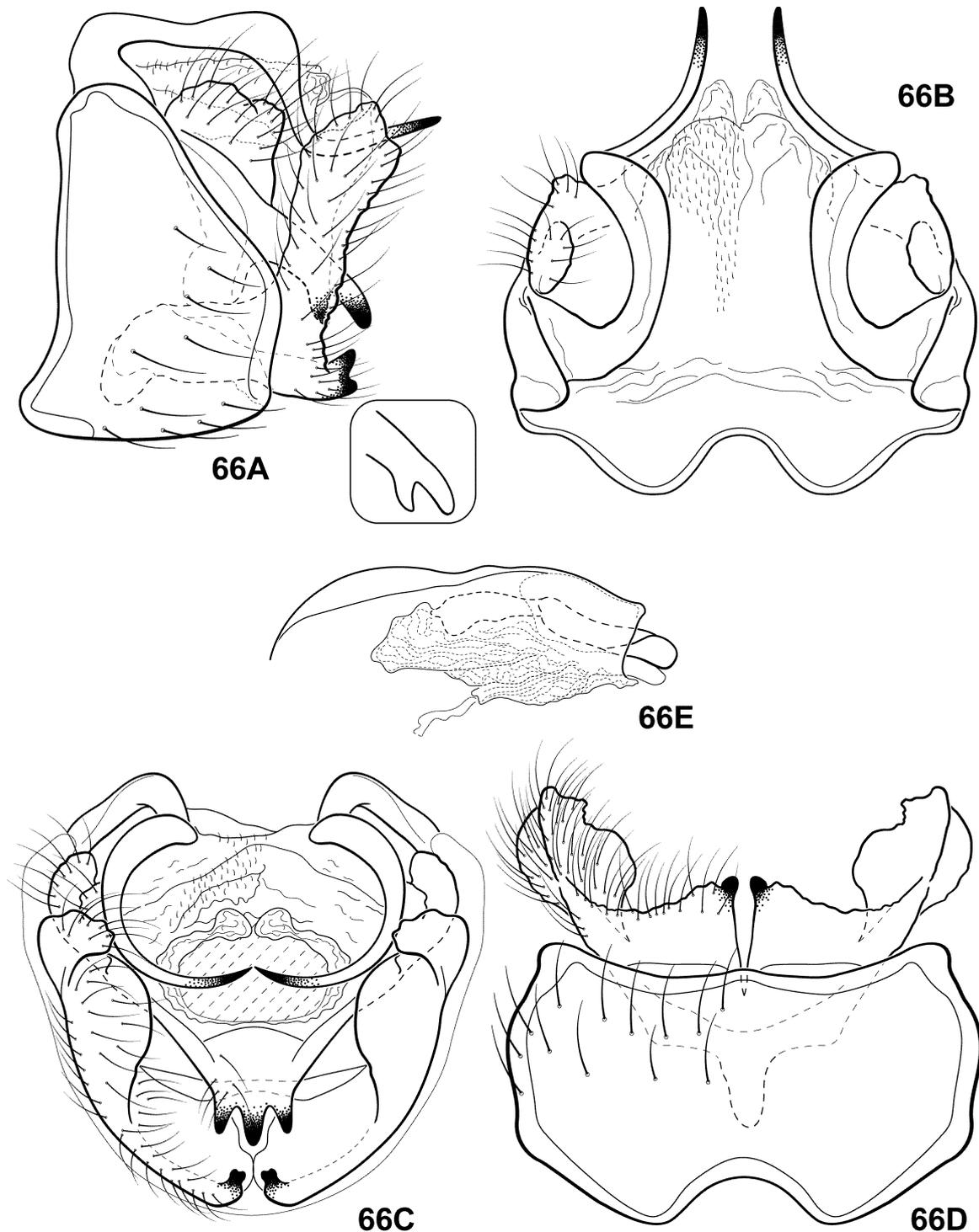


FIGURE 66. Male genitalia of *Polyplectropus tripunctatum*, new species (holotype): A—left lateral view and inset of mesoventral process of preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

Holotype male. PERU: Cuzco: Paucartambo to Pilcopata rd., Quebrada Quitacalzón at Puente Quitacalzón, 13°01'34"S, 71°29'58"W, 1050 m, 25–27.vi.1993, Blahnik & Pescador—(UMSP000107421) (NMNH).

Distribution. Peru.

Etymology. The species name originates from the Latin words for 3 “tri” and point “punctus” (Brown 1985) in reference to the diagnostic trifid apex of the mesoventral process of the preanal appendage.

Key to males of *P. manuensis* species group

- 1 Apex of mesoventral process of preanal appendage trifid (median lobe may be lightly sclerotized and seem absent) (Figs. 65, 66)2
- Apex of mesoventral process of preanal appendage bifid (Fig. 64) *P. manuensis*, n. sp., p. 131

- 2(1) Median lobe of the trifid apex of the mesoventral process of the preanal appendage lightly sclerotized appearing absent; apex of ventral branch of inferior appendage not bifid (Fig. 65) *P. robertsonae*, n. sp., p. 132
- Median lobe of trifid apex of the mesoventral process of the preanal appendage sclerotized and prominent; apex of ventral branch of inferior appendage bifid (Fig. 66) *P. tripunctatum*, n. sp., p. 134

Polyplectropus narifer species group, newly recognized

This group is established to include 2 previously described species, *P. narifer* Flint and *P. ulmeriana* Flint, and 3 new species; *P. hollyae*, *P. juliae*, and *P. minensium*. The *P. narifer* group is characterized by the combined possession of the following traits:

1. A complex, multilobate intermediate appendage (except *P. hollyae*) (Fig. 68C);
2. Presence of a dorsal digitate process on the mesoventral process of the preanal appendage (Figs. 69A, C);
3. Presence of a cylindrical, sclerotized dorsolateral process of the preanal appendage (bipartite in *P. juliae*) (Fig. 67A);
4. Apically acute dorsal branch of the inferior appendage (Fig. 67A);
5. Dorsally expanded apex of the dorsal phallic sclerite (slightly less in *P. hollyae*) (Figs. 68E, F);
6. Presence of small to medium-sized endothelial phallic spines (Figs. 69E, F).

Polyplectropus hollyae, new species

Figs. 67, 133

Polyplectropus hollyae is readily distinguished from other species in the group by the presence of a simple, unilobed intermediate appendage, completely fused mesoventral processes of the preanal appendage, and by the less expanded apex of the phallic sclerite (elongate and apically produced dorsally in other species in the group). This species is most similar to *P. minensium*, new species based on the presence of an elongate dorsal digitate lobe on the mesoventral process of the preanal appendage, a single dorsolateral process of the preanal appendage, and small, robust endothelial phallic spines. Both species also have very similar inferior appendages.

Adult. Length of forewing 5–5.5 mm, n = 6. Color of head and thorax brown, legs yellowish-brown; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

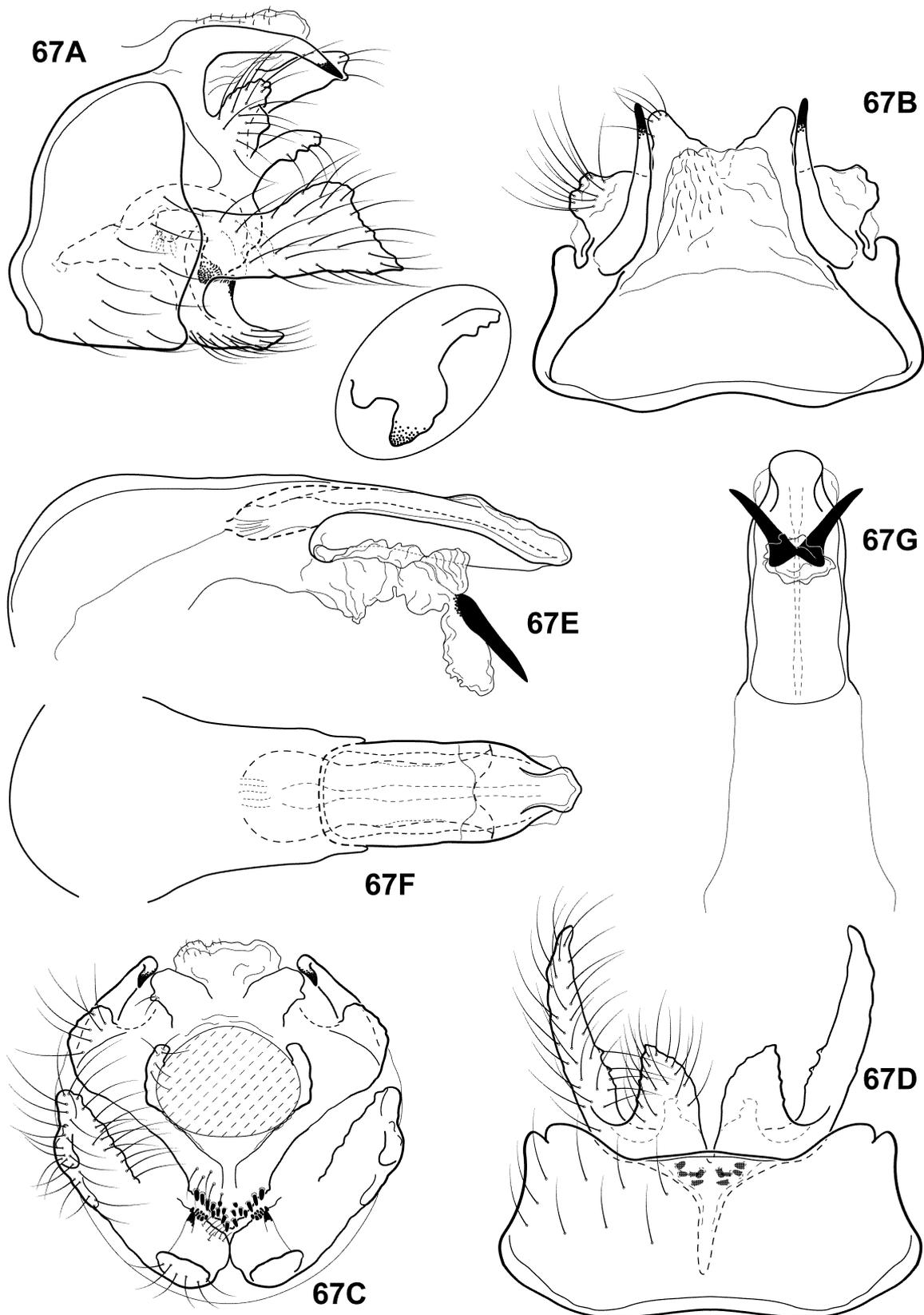


FIGURE 67. Male genitalia of *Polyplectropus hollyae*, new species (holotype): A—left lateral view and inset of mesoventral process of left preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E—G—phallus; E—left lateral view; F—dorsal view; G—ventral view.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin sinuate, posterior margin sinuate and medially produced; in ventral view rectangular, anterior margin entire, posterior margin concave. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, digitate, with long apical setae; in dorsal view deltoid, broadly rounded apically; in caudal view digitate, subapically with small setose lobe, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering into acute apex; mesolateral process setose; in dorsal view deltoid and emarginate, in lateral view apically emarginate, deltoid overall; mesoventral process setose; in lateral view hook-like, with basal dorsal digitate lobe, ventral margin concave; in caudal view fused to form a single continuous structure and dorsal digitate lobe flanking phallocrypt laterally, ventral margin of process acute, apically bearing many sclerotized, peg-like setae. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate with acute apex, subapically produced dorsad; in ventral view narrow, lateral margin slightly convex, undulate, posterior margin acute, mesal margin entire, angled, expanding posterad into ventral branch; ventral branch setose, short and basally broad, bearing acute, basal projection and bearing robust, sclerotized spines basally; in lateral view deltoid, narrowing posterodorsad; in ventral view deltoid, posteromesal margin convex, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex oblong; apex of dorsal phallic sclerite in dorsal view obtuse; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; endothecal membrane with 2 stout laterally directed, medium-sized, sclerotized spines.

Holotype male: BRAZIL: Minas Gerais: Cachoeira do Abacaxi, Vale do Tropeiro, 20°12'16"S, 43°38'10"W, 1120 m, 7.xi.2001, Holzenthall, Amarante, Blahnik & Paprocki—(UMSP000081585) (MZUSP).

Paratypes. BRAZIL: Minas Gerais: Cachoeira do Abacaxi, Vale do Tropeiro, 20°12'16"S, 43°38'10"W, 1120 m, 7.xi.2001, Holzenthall, Amarante, Blahnik & Paprocki—5 females (MZUSP).

Distribution. Brazil.

Etymology. We are pleased to name this species in honor of the late Ms. Hollis Williams, Museum Specialist, Smithsonian Institution for her hospitality and kindness during the senior author's tenure at that Institution.

***Polyplectropus juliae*, new species**

Figs. 68, 133

This species differs from all other species in the group in having a bifid dorsolateral process of the preanal appendage. *Polyplectropus juliae* is most similar to *P. ulmeriana*, new species based on the deltoid shape of the dorsal branch of the inferior appendage, which bears a posterobasal process, on the short, deltoid ventral branch of the inferior appendage, on the overall shape of the mesoventral process of the preanal appendage, and on the digitate lobes of the intermediate appendage. *Polyplectropus juliae* can be distinguished from *P. ulmeriana* by the elongate endothecal phallic spines (almost 2x longer in *P. juliae*) and by the more elongate and apically produced dorsal phallic sclerite. Furthermore, the posterobasal process on the dorsal branch of the inferior appendage is curved dorsally in *P. juliae* (linear in *P. ulmeriana*).

Adult. Length of forewing 5–5.5 mm, n = 11. Color of head and thorax brown, legs yellowish-brown; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin medially produced; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, digitate, with a pair of long apical setae and ventral microsetae; in dorsal view digitate, apex narrowing laterad; in caudal view digitate, laterally and medially produced, median lobe longer and curved

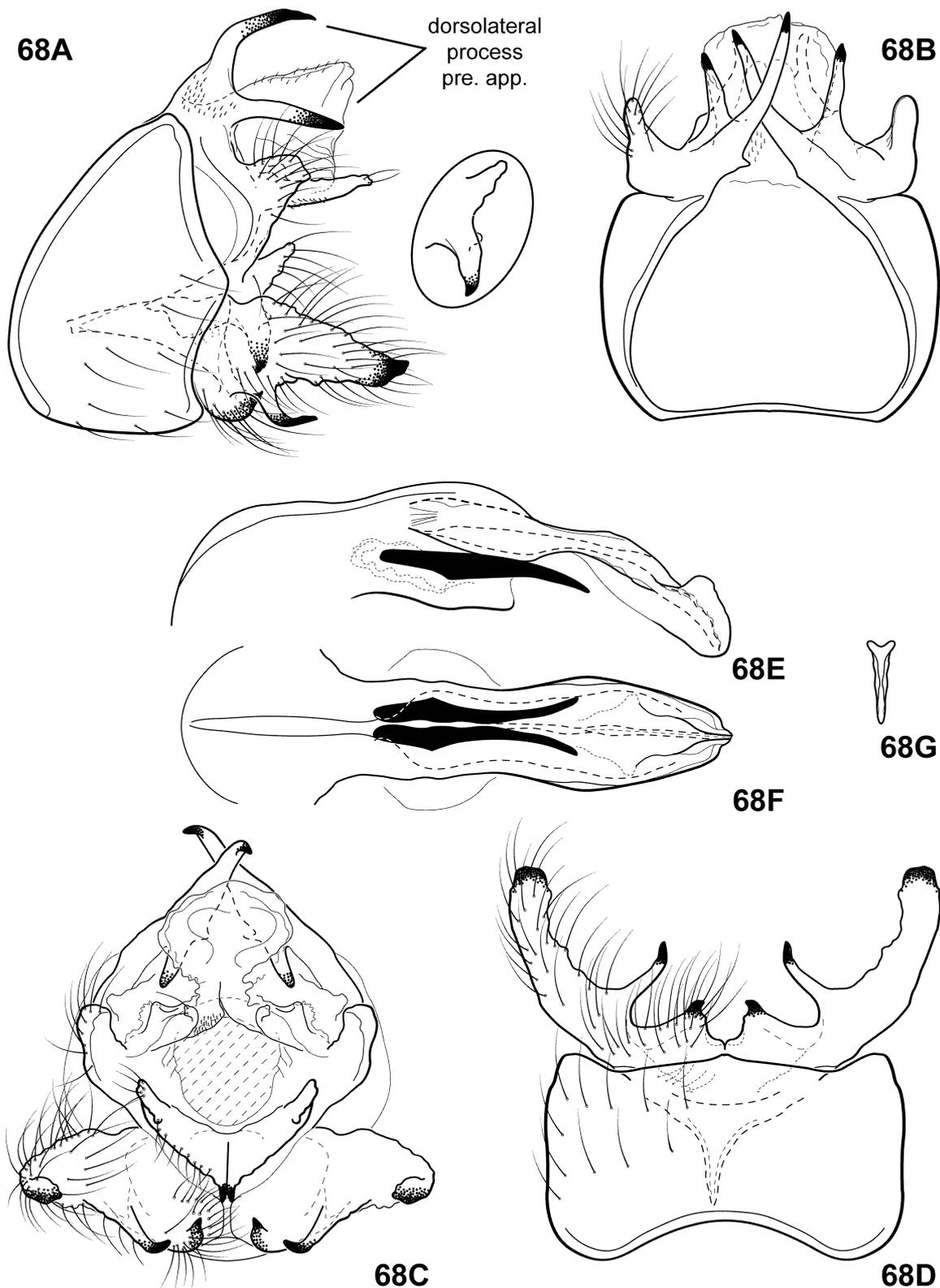


FIGURE 68. Male genitalia of *Polyplectropus juliae*, new species (holotype): A—left lateral view and inset of mesoventral process of preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E–G—phallus; E—left lateral view; F—dorsal view; G—apex, caudal view.

laterad, basally meeting medially and bearing ventral microsetae. Preanal appendage tripartite; dorsolateral process bipartite, originating from dorsum of mesolateral process, 2 medium-sized processes directed posterad, one being more dorsad and curved while other more linear, tapering mesally into acute apex, basally

bearing dorsal microsetae; mesolateral process setose; in dorsal view oblong, basally broad, in lateral view subquadrate; mesoventral process setose; in lateral view hook-like, with basal dorsal digitate lobe, ventral margin concave, posterior margin concave; in caudal view fused basomesally, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view deltoid, apex acute and with basoventral posterodorsally curved lanceolate projection; in ventral view narrow, lateral margin convex, posterior margin rounded, mesal margin slightly undulate, concave, basally with lanceolate process, shallowly fused to ventral branch; ventral branch setose, short, in lateral view digitate, bent dorsad and narrowing into acute sclerotized point; in ventral view deltoid, with acute apex and basally broad, rapidly converging mesally. Phallus long; dorsal phallic sclerite in lateral view slightly sinuate, dorsally produced subapically, apex pandurate; apex of dorsal phallic sclerite in dorsal view obtuse; in caudal view dorsally emarginate; endothecal membrane with 2 thin, medium-sized spines.

Holotype male: BRAZIL: Minas Gerais: Parque Estadual do Rio Preto, Rio Preto, 18°07'10"S, 43°20'28"W, 830 m, 14.xi.2001, Blahnik & Amarante—(UMSP000079551) (MZUSP).

Paratypes. BRAZIL: Minas Gerais: Parque Estadual do Rio Preto, Rio Preto, 18°07'10"S, 43°20'28"W, 830 m, 14.xi.2001, Blahnik & Amarante—1 male, 7 females (UMSP); Rio Preto, 20 km (rd) S São Gonçalo do Rio Preto, 18°07'00"S, 43°20'22"W, 650 m, 19.v.1998, Holzenthal & Paprocki—1 male, 1 female (NMNH).

Distribution. Brazil

Etymology. In honor of the senior author's sister, Julia E. Chamorro Callejas.

***Polyplectropus minensium*, new species**

Figs. 16D, 69, 143

Both *P. minensium* and *P. narifer* Flint have a tripartite intermediate appendage with at least one lobe being sclerotized. Both species have a single dorsolateral process of the preanal appendage and a rounded apex (instead of acute) of the ventral branch of the inferior appendage (best observed in ventral view). However, *P. minensium* can be distinguished from *P. narifer* by the dorsally directed hook-shaped sclerotized lobe of the intermediate appendage (posteriorly directed in *P. narifer*), by the acute apex of the dorsal branch of the inferior appendage (apparently rounded in *P. narifer*), by the elongate dorsal digitate lobe of the mesoventral process of the preanal appendage, and by the smaller, less robust apex of the dorsal phallic sclerite.

Adult. Length of forewing 5–5.5 mm, n = 13. Color of head and thorax brown, legs yellowish-brown; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate and submedially produced; in ventral view rectangular, anterior margin highly concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, tripartite and basally with digitate dorsally directed primary lobe, apically becoming hook-like and upturned dorsad, mesally broadly membranous, with long setae throughout and ventral microsetae; in dorsal view digitate, apex narrowing laterad, basally produced into lateral lobe and mesoventrally into membranous digitate lobe; in caudal view tripartite, basomesal digitate lobe flanking phallocrypt dorsad and directed dorsad and ventrally bearing microsetae, basolateral lobe setose, apical lobe lanceolate, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering into acute apex; mesolateral process setose; in dorsal view orbicular, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex and with elongate, dorsal

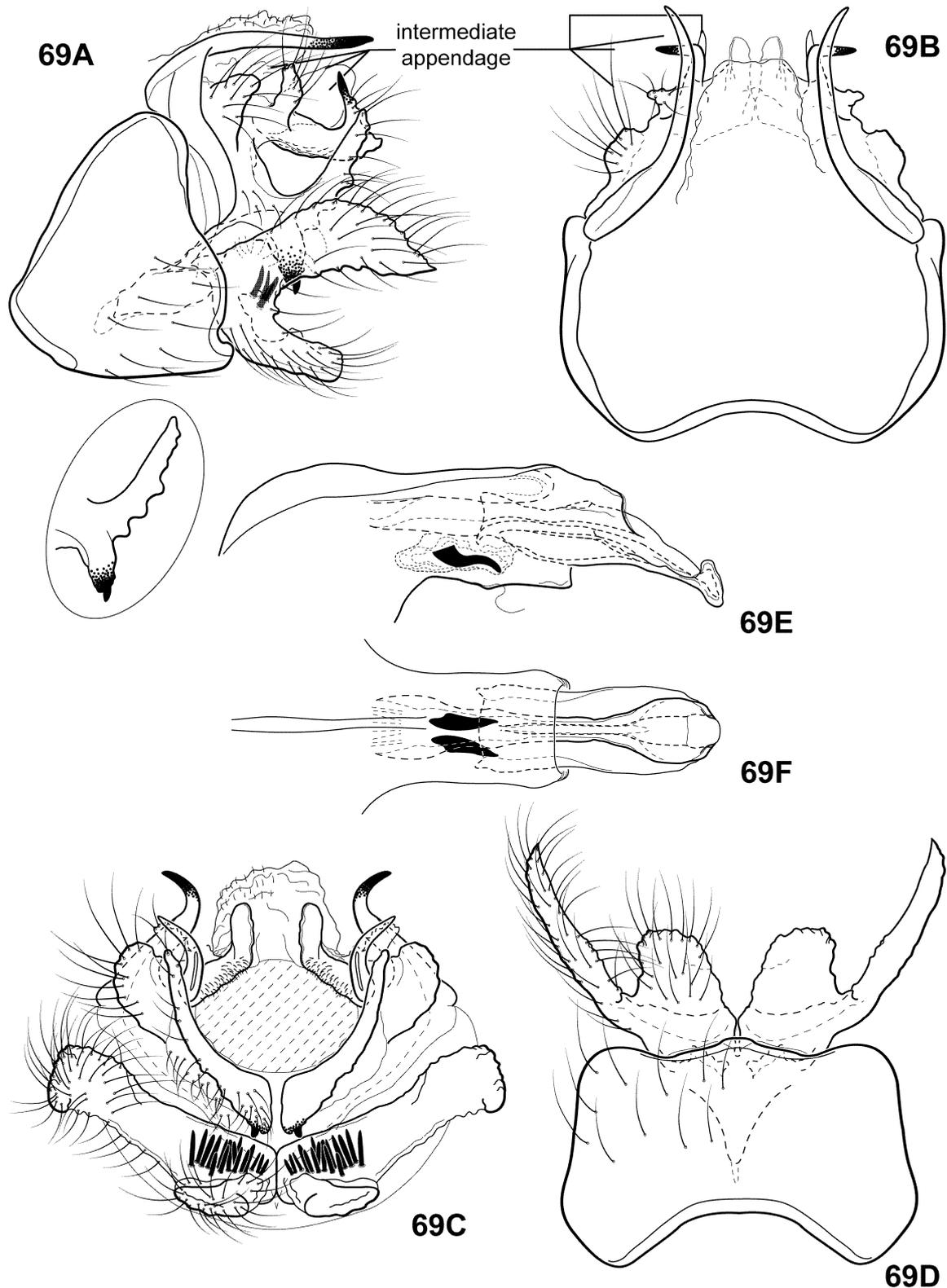


FIGURE 69. Male genitalia of *Polyplectropus minensium*, new species (holotype): A—left lateral view and inset of mesoventral process of preanal appendage.; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus; E—left lateral view; F—dorsal view.

digitate lobe extending beyond phallocrypt, yet flanking it laterad, ventral margin concave, posterior margin undulate; in caudal view processes separated, ventral margin of process acute. Inferior appendage bipartite

with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, apex acute and slightly curved ventrad; in ventral view narrow, lateral margin slightly convex, sinuate, posterior margin acute, mesal margin entire, angled, expanding posterad into ventral branch; ventral branch setose, elongate, bearing robust, sclerotized spines basally; in lateral view digitate, truncate posterad; in ventral view subquadrate, mesal margin slightly angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; endothecal membrane with 2 stout, short, sinuate, sclerotized spines.

Holotype male: BRAZIL: Minas Gerais: Parque Estadual do Itacolomi, trib[utary] to Rio Belchior, 20°25'18"S, 43°25'42"W, 700 m, 6.xi.2001, Holzenthal, Amarante, Blahnik & Paprocki—(UMSP000081577) (MZUSP).

Paratypes: BRAZIL: Minas Gerais: Parque Estadual do Itacolomi, trib[utary] to Rio Belchior, 20°25'18"S, 43°25'42"W, 700 m, 6.xi.2001, Holzenthal, Amarante, Blahnik & Paprocki—3 males, 5 females (UMSP); P[arque] E[stadual] de São Gonçalo do Rio Preto, Córrego das Éguas, 18°08'43"S, 43°22'09"W, 891 m, 14.x.2000, Paprocki, Amarante & Isaac—1 male, 1 female (NMNH); Cachoeira do Abacaxi, Vale do Tropeiro, 20°12'16"S, 43°38'10"W, 1120 m, 7.xi.2001, Holzenthal, Amarante, Blahnik & Paprocki—2 males (MZUSP).

Distribution. Brazil.

Etymology. This species is named after the State of Minas Gerais in Brazil where the holotype and paratypes were collected.

***Polyplectropus narifer* Flint**

Figs. 70, 134

Polyplectropus narifer Flint, 1974: 35. [Type locality: Surinam, Brownsberg, mountain creek near Golddiggers camp; RNH; male].

Polyplectropus narifer was recovered as sister to *P. minensium*, new species in the species-level phylogenetic analysis, even though many characters were coded as missing for *P. narifer*. In this instance, the original description and illustrations of *P. narifer* were suitable for this study. Besides possessing features characteristic of the group, both species have a tripartite intermediate appendage, with at least one of the lobes sclerotized and a rounded apex (instead of acute) of the ventral branch of the inferior appendage. *Polyplectropus narifer* can be distinguished from *P. minensium* by the rounded apex of the dorsal branch of the inferior appendage, by the short dorsal digitate lobe of the mesoventral process of the preanal appendage, by the posteriorly directed hook-shaped sclerotized lobe of the intermediate appendage (dorsally directed in *P. minensium*), and by the broader, more robust apex of the dorsal phallic sclerite.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate; in ventral view rectangular, anterior margin highly concave, posterior margin entire. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, bipartite and laterally hook-like, medially digitate, setose; in dorsal view lateral process deltoid with cuspidate apex, mesal process deltoid with rounded apex. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posterad, tapering into acute apex; mesolateral process setose; in dorsal view deltoid, in lateral view digitate; mesoventral process setose; in lateral view hook-like, with basal dorsal digitate lobe, ventral margin concave, posterior margin truncate. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate; in ventral view narrow, lateral margin angled, entire, posterior margin rounded, mesal margin sinuate, angled, expanding

posterad into ventral branch; ventral branch setose, elongate, in lateral view oblong, apically acute; in ventral view rounded, mesal margin slightly angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate.

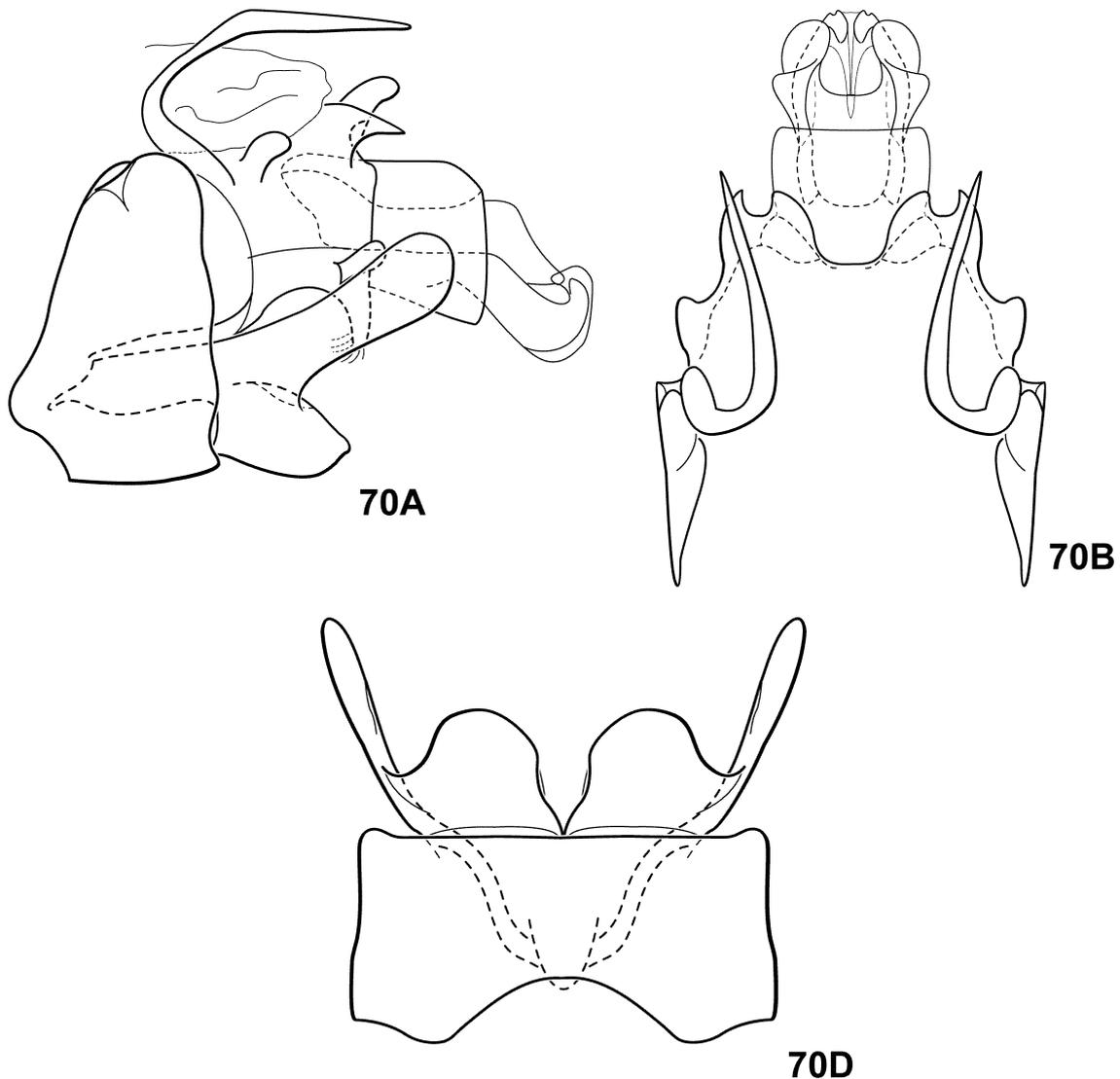


FIGURE 70. Male genitalia of *Polyplectropus narifer* Flint, 1974 (after Flint 1974) A—left lateral view; B—dorsal view; D—ventral view.

Distribution. Surinam

Remarks. No material was examined for this species and description of the male genitalia is based on the original publication (Flint 1974).

***Polyplectropus ulmeriana* Flint**

Figs. 71, 143

Polyplectropus ulmeriana Flint, 1983: 27. [Type locality: Argentina, Pcia. Misiones, Arroyo Piray Mini, Rt. 17 W Dos Hermanas; NMNH; male].

This species resembles *P. juliae*, new species in the deltoid shape of the dorsal branch of the inferior appendage, which bears a posterobasal process, on the short, deltoid ventral branch of the inferior appendage,

the overall shape of the mesoventral process of the preanal appendage, and on the more or less digitate lobes of the intermediate appendage. These 2 species can be easily distinguished by the presence of a short, dorsolateral process of the preanal appendage in *P. ulmeriana* (bipartite in *P. juliae*), by the linear posterobasal process on the dorsal branch of the inferior appendage (curved dorsally in *P. juliae*), by the shorter endothelial phallic spines (about $\frac{1}{2}$ as long in *P. ulmeriana*), and by the narrower apex of the phallic sclerite.

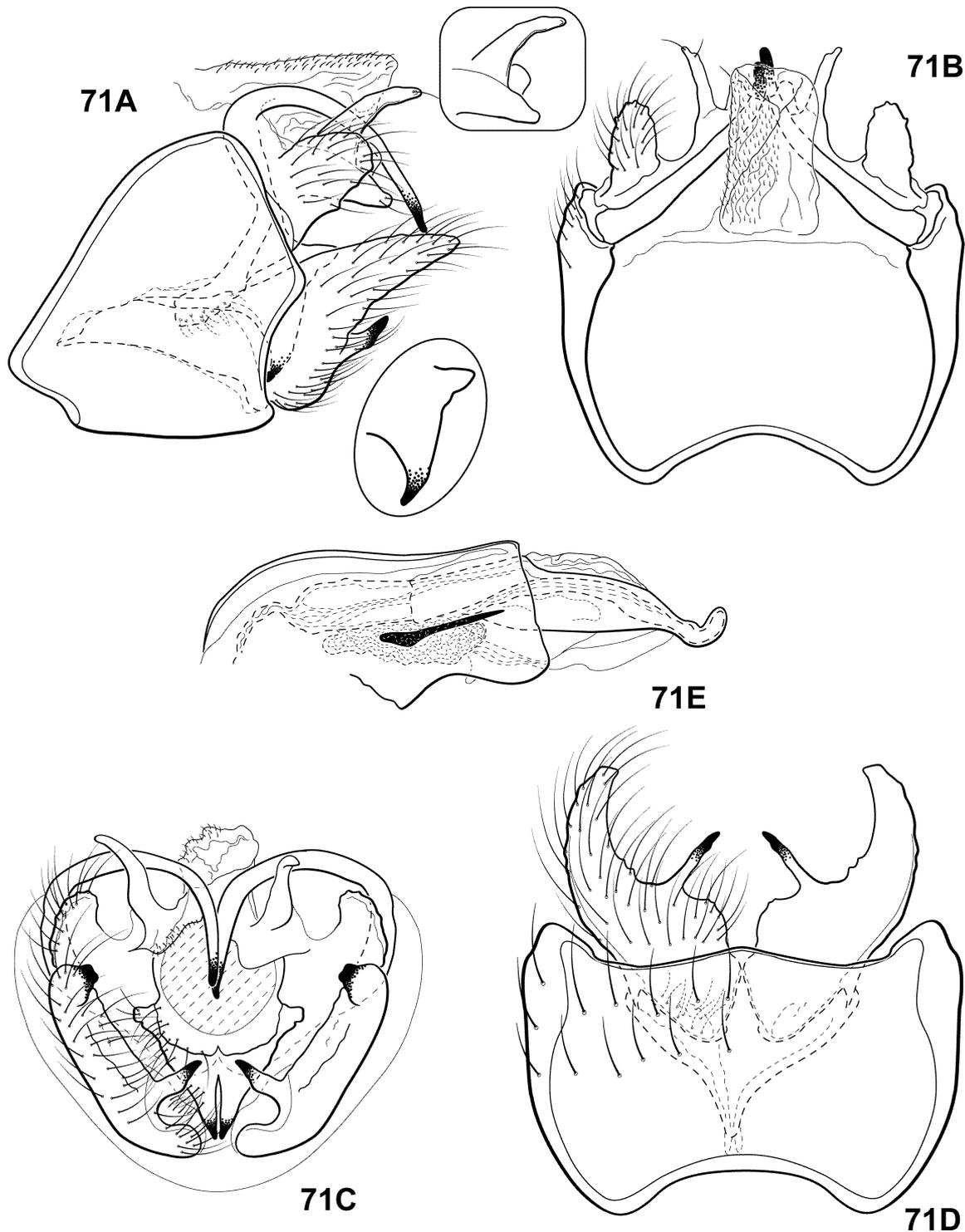


FIGURE 71. Male genitalia of *Polyplectropus ulmeriana* Flint, 1983 (holotype): A—left lateral view and inset of intermediate appendage and mesoventral process of preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

Adult. Length of forewing 5–6 mm. Color of head and thorax brown, legs yellowish-brown; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin medially produced; in ventral view rectangular, anterior margin concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, bipartite and both lobes digitate with short apical setae; in dorsal view digitate, apex narrowing laterad or produced mesally into smaller digitate lobe; in caudal view digitate, basally broad, bearing ventral microsetae, directed posterolaterad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, recurved posterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view ovate, in lateral view oblong; mesoventral process setose; in lateral view hook-like, with basal dorsal digitate lobe and ventrad-directed sclerotized apex, anteroventral margin concave; in caudal view fused basomesally, processes slightly separated apically, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view deltoid to lanceolate, basally with short, lanceolate process; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin entire, concave, basally with lanceolate projection, shallowly fused to ventral branch; ventral branch setose, short, in lateral view orbicular, rounded posterad; in ventral view rounded, posteromesal margin basally rounded, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex narrowing apically and bent dorsad into rounded apex; endothecal membrane with 2 thin, medium-sized spines.

Material examined. **ARGENTINA: Entre Rios:** A[rroyo] Piray Mini W, Dos Hermanas, [33°10'00"S, 58°53'59"W], 23.xi.1973, O S Flint—3 males [holotype & paratypes] (NMNH); **BRAZIL: Santa Catarina:** Nova Teutônia, 27°11'00"S, 52°23'00"W, 300–500 m, .xi.1963, F Plaumann—2 males [paratypes] (NMNH); **PARAGUAY: Itapúa:** Pirapo, [26°51'00"S, 55°31'59"W], .i.1972, G. & L E Peña—1 male [paratype] (NMNH).

Distribution. Argentina, Brazil, Paraguay.

Key to males of *P. narifer* species group

- 1 Ventral branch of inferior appendage not prominent without clear demarcation distinguishing it from dorsal branch (Figs. 68, 71) 2
- Ventral branch of inferior appendage prominent and visible as a separate structure from dorsal branch (Fig. 69) ...
..... 3
- 2(1) Dorsolateral process of preanal appendage bipartite (Fig. 68) *P. juliae*, n. sp., p. 138
- Dorsolateral process of preanal appendage with only a single process (Fig. 71) *P. ulmeriana* Flint, p. 143
- 3(1) Intermediate appendage with a single process, not multilobate; apex of mesoventral process of preanal appendage fused (Fig. 67) *P. hollyae*, n. sp., p. 136
- Intermediate appendage complex, multilobate; apex of mesoventral process free (Figs. 69, 70) 4
- 4(3) Dorsal branch of inferior appendage apically broad and rounded (Fig. 70) *P. narifer* Flint, p. 142
- Dorsal branch of inferior appendage apically narrowing abruptly to a sclerotized pointed (Fig. 69)
..... *P. minensium*, n. sp., p. 140

***Polyplectropus santiago* species group**

The definition of the *P. santiago* group is broadened to also include 2 distinct subsets of species; *P. bravoae*, *P. ecuadoriensis*, and *P. laminatus* (*P. laminatus* species subset) and *P. andinensis*, *P. bolivianus*, *P. brborichorum*, and *P. robacki* (*P. robacki* species subset). Species in the *P. laminatus* subset have an elongate dorsolateral arm, produced beyond the apex of the dorsal phallic sclerite, a rather short and narrow dorsal branch of the inferior appendage, and a largely membranous, quadrate to oblong intermediate appendage. On the other hand, the species in the *P. robacki* subset have a narrow, curved dorsal branch of the inferior appendage, a digitate lobe on the mesoventral process of the preanal appendage and a short and basally broad intermediate appendage.

For the most part, the male genitalia of species in the *P. santiago* group *sensu stricto* are homogenous, with most species distinguished by differences in the phallus. Namely, these differences lie in the size, shape, and direction of the endothecal phallic spines of the phallus. The *P. santiago* group is characterized by the combined possession of the following traits (Figs. 72–96):

1. Bulbous dorsolateral process of the preanal appendage bearing dorsal microsetae;
2. Elongate anterior basal plate of the inferior appendage (anteriorly beyond sternum IX);
3. Pronounced lower lip of segment X (entire in most, bilobed in *P. robacki* subset);
4. Highly sclerotized, lanceolate intermediate appendage (confused by some with dorsolateral process of preanal appendage) (membranous in *P. laminatus* subset);
5. Dorsal branch of inferior appendage more than 4 times longer than wide (*P. robacki* subset have a narrow, recurved dorsal branch);
6. Ventral branch short, both ventral branches shallowly fused (fusion 1/3rd of entire anterior basal plate length);
7. Peg-like setae absent on inferior appendage;
8. Females with a pair of variously shaped, parallel internal sclerotized rods.

***Polyplectropus alleni* (Yamamoto)**

Figs. 72,122

Polycentropus alleni Yamamoto, 1967: 127. [Type locality: Costa Rica, Puerto Viejo; INHS; male].—Flint, 1968b:21 [to *Polyplectropus*].—Blahnik, Paprocki, & Holzenthal, 2004 [distributed in Brazil, misidentification]

Polyplectropus alleni is similar to *P. dubitatus* Flint and *P. elongatus* (Yamamoto) but can be distinguished by the shape of the spines in the endothecal membrane of the phallus. In *P. alleni* the spine bifurcates apically, while *P. dubitatus* and *P. elongatus* clearly have 2 basally bifurcate spines. Additionally, the intermediate appendage of *P. alleni* is more linear and may have a basal lateral projection, whereas in the other 2 species the intermediate appendage curve laterad.

Adult. Length of forewing 3.5 mm, n = 2. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid to rounded, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, with long basal setae and few scattered subapically; in dorsal view lanceolate, sinuate, with slight lateral projection and sclerotized apex; in caudal view lanceolate, curved, narrowing and becoming sclerous apically, directed mesodorsad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process,

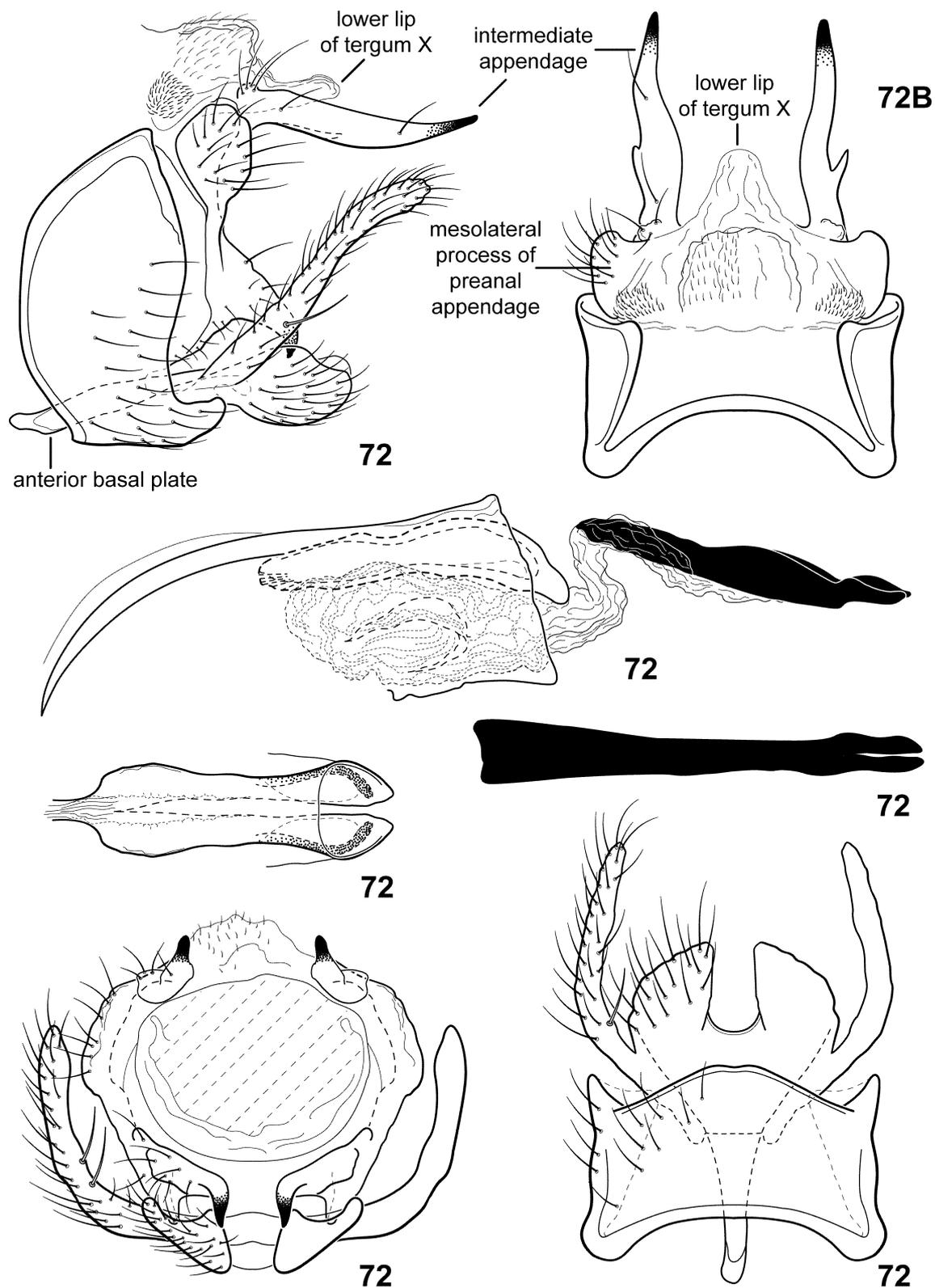


FIGURE 72. Male genitalia of *Polyplectropus alleni* (Yamamoto, 1967) (holotype). A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–G phallus: A—left lateral view, spines oblique lateral; F—phallic sclerite, dorsal view; G—phallic spines, dorsal view.

bearing dorsal microsetae; mesolateral process setose; in dorsal view ovate, in lateral view oblong; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, ventral margin

concave, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin tapering ventrad into sclerotized point. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view narrowly oblong, elongate, with posteroventral margin slightly concave subapically; in ventral view narrow, lateral margin convex, slightly undulate, posterior margin subacute, mesal margin slightly undulate, concave, expanding posterad into ventral branch; ventral branch setose, basally broad; in lateral view ovate, broadly narrowing posterad; in ventral view broadly rhombate, mesal margin straight, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex tapering ventrally; apex of dorsal phallic sclerite in dorsal view obcordate; endothecal membrane with 1 stout, elongate, apically bifurcating sclerotized spine.

Material examined. **COSTA RICA: Heredia:** Parque Nacional Braulio Carrillo, Río Peje, Estación Magsasay, 10°24'07"N, 084°03'00"W, 130 m, 25–26.viii.1990, Holzenthal Blahnik & Huisman—1 male (UMSP); Puerto Viejo, 13.viii.1965, R. T. Allen—1 male (INHS) ["INHS Trichop. 24560"].

Distribution. Costa Rica.

***Polyplectropus andinensis*, new species**

Figs. 15A, 73, 131

Polyplectropus andinensis resembles *P. robacki* (Yamamoto), *P. bolivianus*, new species, and *P. brborichorum*, new species (*P. robacki* subset) in the overall shape of the male genitalia, particularly in the acutely curved, narrow dorsal branch of the inferior appendage. *Polyplectropus andinensis* can be distinguished from these species by the more robust intermediate appendage. *Polyplectropus bolivianus* also has a robust intermediate appendage, however it is shorter and the endothecal membrane of the phallus has 2 stout, sclerotized spines. In addition to the differences in the intermediate appendage, the dorsal branch of the inferior appendage does not usually extend beyond the apex of the ventral branch, characteristic also observed in *P. brborichorum*.

Adult. Length of forewing 6.0–6.5 mm, n=5. Color of head, thorax, and legs brown; setae on body grey and yellow; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view broadly deltoid, anterior margin concave, posterior margin highly convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, stout basally broad with long basal setae; in dorsal view basally broad, tapering into curved rods, directed laterad; in caudal view lanceolate, curved, narrowing and becoming sclerous apically, directed medially, with apex curved posterolaterad. Preanal appendage tripartite; dorsolateral process bulbous; mesolateral process setose; in dorsal view ovate, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, with basodorsal digitate lobe, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with basal, digitate, setose dorsolateral projection. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, basally setose and broader, becoming highly curved, directed anterad beyond half of segment IX, recurved posteromesally; in ventral view narrow, basally sclerotized with digitate, laterally directed lobe, narrowing and recurving apically, expanding posterad into ventral branch; ventral branch setose, basally broad; in lateral view obovate, rounded posterad; in ventral view subquadrate, mesal margin straight, posterior margin rounded to truncate, shallowly converging mesally.

Phallus short; dorsal phallic sclerite in lateral view cylindrical, apex pandurate; apex of dorsal phallic sclerite in dorsal view acute; endothecal membrane without embedded spines.

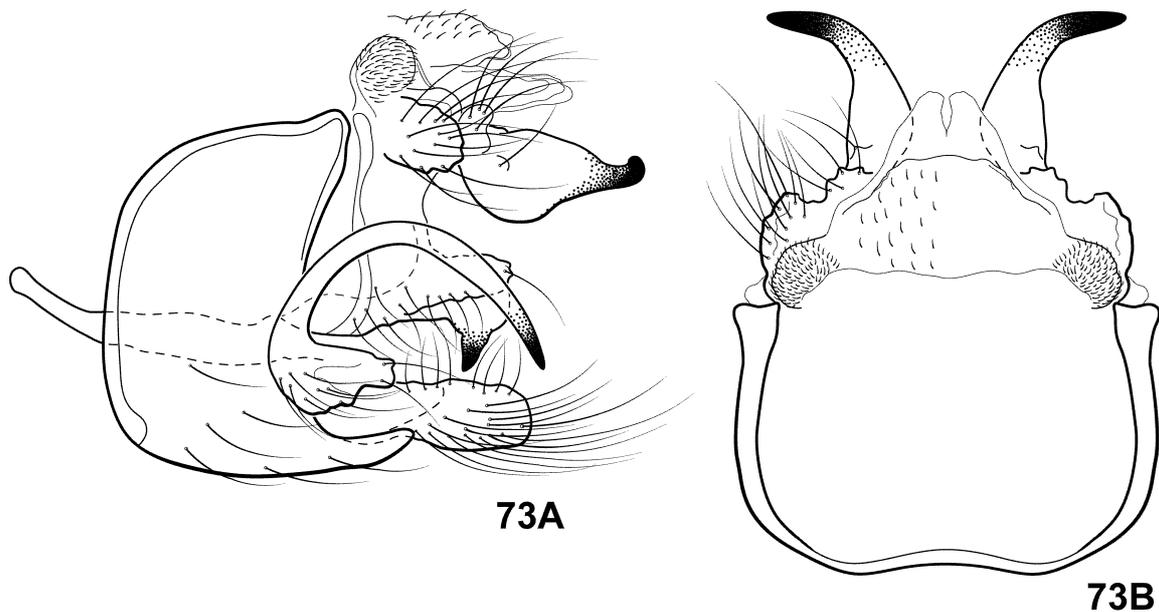


FIGURE 73. Male genitalia of *Polyplectropus andinensis*, new species (holotype): A—left lateral view; B—dorsal view.

Holotype male: BOLIVIA: Chuquis[aca]: Monteagudo, 1300 m, 24.xii.1984, L. E. Peña G.—(UMSP000085577) (NMNH).

Paratypes: ARGENTINA: Salta: 5 km. S[outh] Orám, 13.x.1973, O. S. Flint—1 male (NMNH); BOLIVIA: Chuquis[aca]: Monteagudo, 1300 m, 24.xii.1984, L. E. Peña G.—3 males (NMNH).

Distribution. Argentina and Bolivia.

Etymology. This species is named for the Andes mountain range of South America, at the Eastern edge of which this species was collected.

Polyplectropus banksianus Flint

Figs. 74, 136

Polyplectropus banksianus Flint, 1971: 27. [Type locality: Brazil [Edo. Amazonas], Manaus; MCZ (on loan to NMNH); male;—Banks, 1913: 88 [as *Ecnomodes buchwaldi*, misidentification].

This species is similar to *P. maculatus*, new species and *P. hamulus* Flint in the overall shape of the male genitalia, particularly in the shape of the inferior appendage. *Polyplectropus banksianus* can be distinguished from *P. maculatus* by the cylindrical apex of the dorsal branch of the inferior appendage (expanded ventrad in *P. maculatus*) and by the shorter spines in the endothecal membrane of the phallus, which are 2x as long in *P. maculatus*. *Polyplectropus banksianus* can be distinguished from *P. hamulus* by the subapically produced and apically oblong of the dorsal phallic sclerite (pandurate in *P. hamulus*), by the shape of the ventral branch of the inferior appendage, by the narrower mesoventral process, and by the curved endothecal phallic spines (straight in *P. hamulus*).

Adult. Length of forewing 4.5 mm, n = 2. Color of head and thorax brown, legs yellowish-brown; setae on body grey and golden brown; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

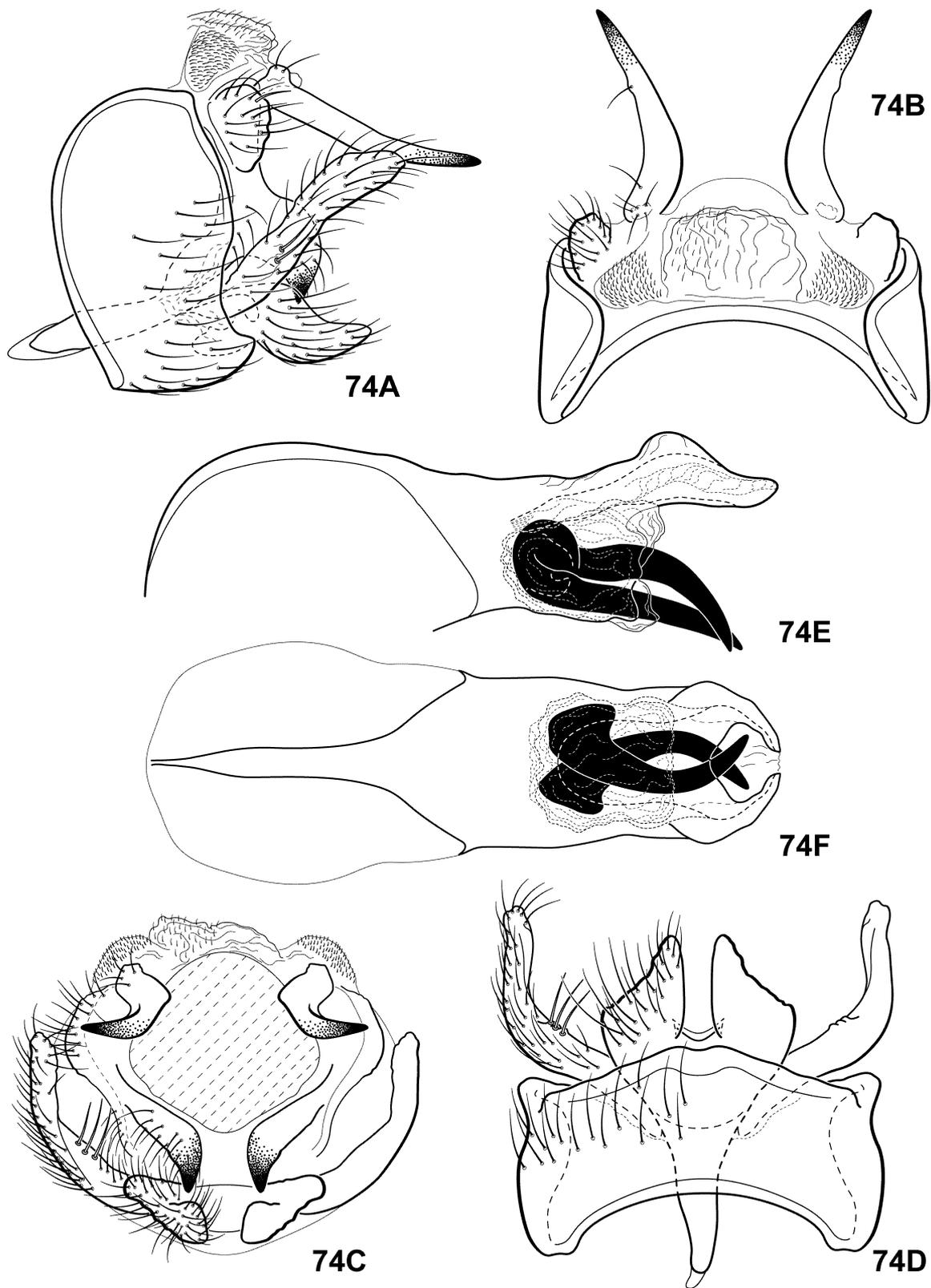


FIGURE 74. Male genitalia of *Polyplectropus banksianus* Flint, 1971 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F phallus: E—lateral view; F—dorsal view.

Male genitalia. Sternum IX in lateral view rounded, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex, medially

shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, with long basal setae and few scattered subapically; in dorsal view lanceolate; in caudal view lanceolate, curved, narrowing and becoming sclerous apically, directed posterolaterad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin tapering ventrad into sclerotized point. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, elongate, with posteroventral margin slightly concave subapically; in ventral view narrow, lateral margin convex, entire, posterior margin rounded, mesal margin entire, apically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, basally broad, in lateral view ovate, narrowing posterad; in ventral view deltoid, posteromesal margin produced posterad into pointed apex, mesal margin slightly convex, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view slightly sinuate, dorsally produced subapically, apex oblong; apex of dorsal phallic sclerite in dorsal view membranous; endothelial membrane with 2 stout, medium-sized, sclerotized spines.

Material examined. **BRAZIL: [Amazonas]:** Manaus, [no date], Mann—2 males (MCZ) [“MCZ 321/10”].

Distribution. Brazil.

***Polyplectropus bolivianus*, new species**

Figs. 75, 131

Polyplectropus bolivianus is readily distinguished from all other species in the *P. robacki* subset by the narrow and elongate dorsal branch of the inferior appendage (present also in *P. robacki* (Yamamoto), *P. andinensis*, new species, and *P. brborichorum*, new species) and by the presence of endothelial phallic spines. The intermediate appendage of *P. bolivianus* is shorter and more robust than in *P. andinensis*, *P. robacki*, and *P. brborichorum*.

Adult. Length of forewing 6.5 mm, n=1. Color of head, thorax, and legs brown; setae on body grey and yellow; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view broadly deltoid, anterior margin concave, posterior margin highly convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, stout, with long basal setae; in dorsal view basally broad, broadly tapering apically, directed laterad; in caudal view broad, curved, broadly narrowing and becoming sclerous apically, directed medially, with apex curved posterolaterad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view ovate, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, with basodorsal digitate lobe, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with basal, digitate, setose dorsolateral projection. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal

branch setose, in lateral view lanceolate, basally setose and broader, becoming highly curved, directed anterad beyond half of IX segment, recurved posteromesally; in ventral view narrow, basally sclerotized with digitate, laterally directed lobe, narrowing and recurving apically, expanding posterad into ventral branch; ventral branch setose, basally broad, in lateral view obovate, rounded posterad; in ventral view subquadrate, mesal margin straight, posterior margin rounded to truncate, shallowly converging mesally. Phallus short; dorsal phallic sclerite in lateral view cylindrical, apex pandurate; apex of dorsal phallic sclerite in dorsal view acute and sclerotized; endothelial membrane with 2 stout, medium-sized, sclerotized spines.

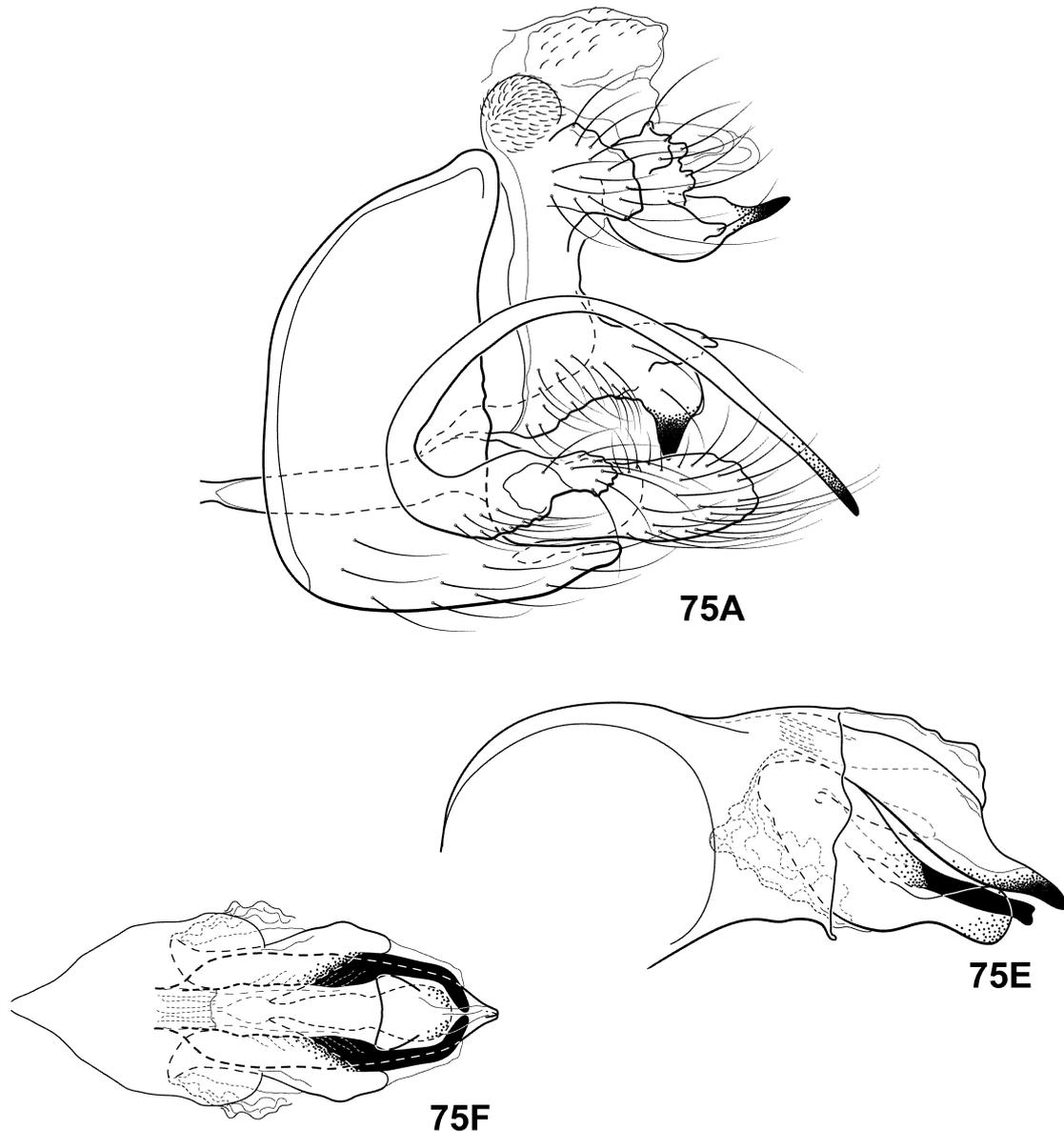


FIGURE 75. Male genitalia of *Polyplectropus bolivianus*, new species (holotype): A—left lateral view; E–F phallus: E—left lateral view; F—dorsal view.

Holotype male: BOLIVIA: La Paz: Río Coroico, 1200 m, 23–26.xi.1984, L. E. Peña G.—(UMSP000085581) (NMNH)

Distribution. Bolivia.

Etymology. This species is named for the country of Bolivia where the type was collected.

Polyplectropus brachyscolus Flint

Figs. 76, 137

Polyplectropus brachyscolus Flint, 1971: 27. [Type locality: Brazil [Edo. Amazonas], Rio Marauaiá, Endstation vor langer Cachoeira; NMNH; male.

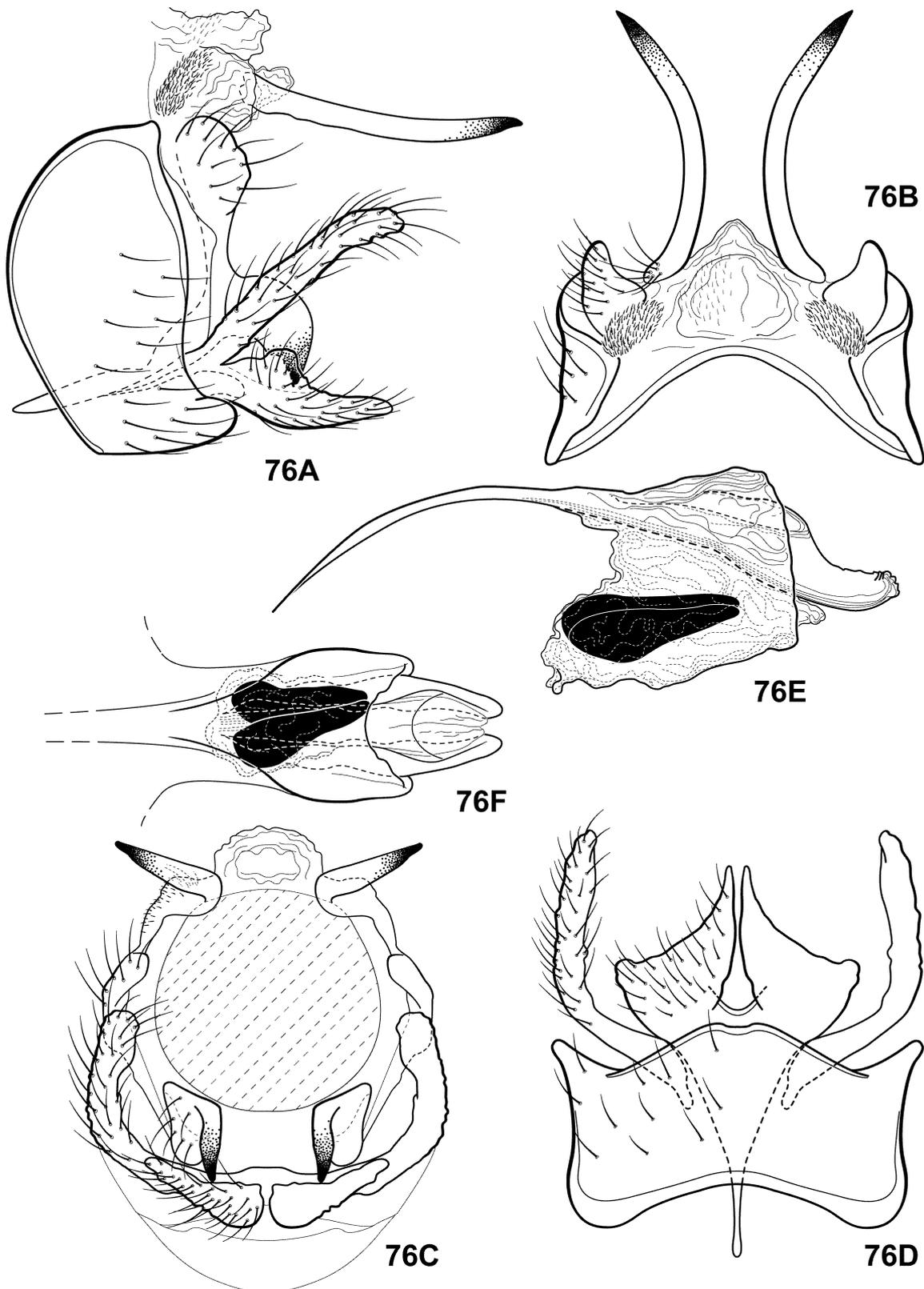


FIGURE 76. Male genitalia of *Polyplectropus brachyscolus* Flint, 1971 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Polyplectropus brachyscolus is most similar to *P. hamulus* Flint in the shape of the phallus and embedded spines. This species also superficially resembles *P. herrerae* Bueno & Hamilton in the shapes of the intermediate appendage and ventral branch of the inferior appendage. *Polyplectropus brachyscolus* can be distinguished from *P. hamulus* by the more acute apex of the ventral branch of the inferior appendage and by the longer intermediate appendage. The linear apex of the dorsal phallic sclerite (curved in *P. herrerae*), the presence of 2 spines in the endothelial phallic membrane, and a shorter dorsal branch of the inferior appendage distinguish *P. brachyscolus* from *P. herrerae*.

Adult. Length of forewing 3.6–4.5 mm, n=4. Color of head and thorax brown, legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view rounded, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, with long basal setae; in dorsal view lanceolate, directed posterolaterad; in caudal view lanceolate, curved, narrowing and becoming sclerous apically, directed laterodorsad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view obovate, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin concave and sinuate, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin produced ventrad. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view narrowly oblong; in ventral view narrow, lateral margin convex, undulate, posterior margin subacute, mesal margin slightly undulate, concave, expanding posterad into ventral branch; ventral branch setose, elongate, in lateral view deltoid, narrowing posterad; in ventral view deltoid, posteromesal margin produced posterad into pointed apex, mesal margin convex, posterolateral margin concave, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view membranous; dorsolateral arm of dorsal phallic sclerite in lateral view digitate; in dorsal view digitate, extending beyond apex, apex directed medially; endothelial membrane with 2 stout, medium-sized, sclerotized spines.

Material examined. **BRAZIL: Amazonas:** Rio Marauíá, Endstation langer Cachoeira, Fluß tritt hier aus dem Gebirge mit starkem Gefälle, 28.i.1963, E. J. Fittkau—1 male (NMNH) [holotype] [“USNM Type No. 74124”] [“A-502”]; **GUYANA: Potaro:** Kaieteur Falls, 5°10'30"N, 59°28'54"W, 411 m, 21–23.viii.1997, O. S. Flint—3 males (NMNH) [paratype].

Distribution. Brazil, Guyana, and Surinam (Flint, 1974).

***Polyplectropus bravoae* Bueno-Soria**

Figs. 15G, 77, 125

Polyplectropus bravoae Bueno-Soria, 1990: 396. [Type locality: Costa Rica, Guanacaste, Río Tempisquito, ca 3 km S de Route 1, 10.790°N, 89.552°W; NMNH; male].

Polyplectropus bravoae resembles other species in the *P. laminatus* subset (*P. laminatus* (Yamamoto) and *P. ecuadoriensis*, new species). *Polyplectropus bravoae* superficially resembles *P. laminatus*, however the dorsolateral arm of the phallic sclerite is subapically broader in *P. bravoae* (narrower and uniformly wide in *P. laminatus*). Additionally, the intermediate appendage of *P. bravoae* is evenly wide throughout its length, whereas in *P. laminatus* it is produced laterad and even more so in *P. ecuadoriensis*. *Polyplectropus bravoae* can be distinguished from *P. ecuadoriensis* by the obdeltoid ventral branch of the inferior appendage (in ventral view) (digitate in *P. ecuadoriensis*) and a longer, more rounded apex of the dorsal branch of the

inferior appendage. In addition, the endothecal phallic spines are shorter in *P. bravoae* (2x larger in *P. ecuadoriensis*).

Adult. Length of forewing 3.9–4.8 mm, n = 159. Color of head and thorax brown, legs yellowish-brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings brown with scattered patches of golden setae.

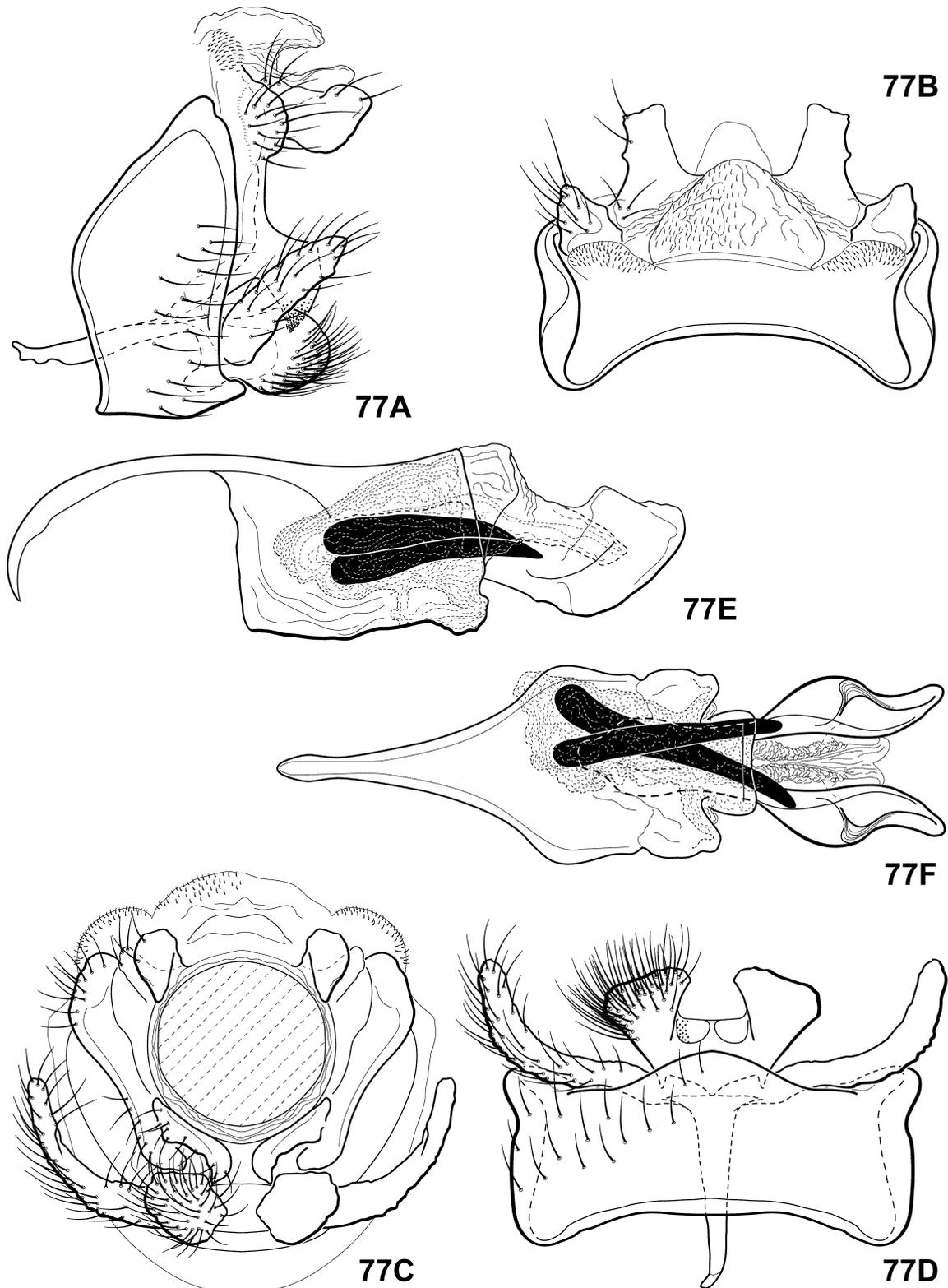


FIGURE 77. Male genitalia of *Polyplectropus bravoae* Bueno, 1990 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E— lateral view; F—dorsal view.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin submedially concave; in ventral view rectangular, anterior margin concave, becoming straight, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, broad and membranous, with long basal setae and few scattered apically; in dorsal view rectangular, basally slightly broadened, apically truncate; in caudal view setose base digitate, apex rounded, subapically produced ventrad, directed posterad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view deltoid, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin rounded to truncate; in caudal view not fused basomesally, processes slightly separated, ventral margin of process acute, with ventrolateral margin slightly produced. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, short, apex acute; in ventral view narrow, lateral margin convex, undulate, posterior margin subacute, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, short and broad, in lateral view obovate; in ventral view obdeltoid, mesal margin acutely angled, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex obliquely angled; apex of dorsal phallic sclerite in dorsal view emarginate; dorsolateral arm of dorsal phallic sclerite in lateral view broad, subapically expanded, narrowing apically; in dorsal view digitate, sinuate, extending beyond apex, apex directed laterodorsad; endothecal membrane with 2 stout, medium-sized, sclerotized spines.

Material examined. **BELIZE: Cayo:** San Ignacio (14 km S) Chaa River Cottage, [17°09'22"N, 89°04'17"W], 23.v.1986, P Spangler & R. Faitoute—1 male (NMNH); **COSTA RICA: Alajuela:** Río Pizote, ca. 5 km N Dos Rios, 10°56'53"N, 85°17'28"W, 470 m, 9.iii.1986, Holzenthal & Fasth—41 males (UMSP); Río Pizote, ca. 5 km (air) S Brasilia, 10°58'19"N, 85°20'42"W, 390 m, 12.iii.1986, Holzenthal & Fasth—1 male (UMSP); 9.iii.1986, Holzenthal & Fasth—52 females (UMSP); **Guanacaste:** 10 mi. NW Liberia, [10°38'00"N, 85°26'00"W], 25.vii.1965, P J Spangler—1 male, 1 female (NMNH) [paratypes]; Río Tempisque, ca. 3 km S Route 1, 10°47'24"N, 85°33'07"W, 75 m, 6.iii.1986, Holzenthal & Fasth—2 males (NMNH) [holotype] ["Type No. 104460"], 1 female (UMSP); Río Tizate, 7.2 km NE Cañas Dulces, 10°46'23"N, 85°26'56"W, 275 m, 28.vi.1986, Holzenthal, Heyn & Armitage—1 male (UMSP); Parque Nacional Guanacaste, Quebrada Pedregal, El Hacha, 10°58'59"N, 85°32'20"W, 300 m, 27.vii.1987, Holzenthal, Morse & Clausen—1 male (UMSP); **Heredia:** La Selva Field Station near Puerto Viejo, 21–28.iii.1988, Steiner, Hill, Swearingen & Mitchell—2 males, 2 females (NMNH); 1.5 mi S. of Potrerillos, [9°58'00"N, 84°10'00"W], 27.vii.1967, O S Flint—1 male, 1 female (IBUNAM) [paratypes]; Río Sarapiquí, 7 km W Puerto Viejo, 10°27'07"N, 84°04'01"W, 50 m, 11.ii.1986, Holzenthal, Morse & Fasth—1 male, 2 females (UMSP); Río Bijagual, on road to Magsasay, 10°24'29"N, 84°04'34"W, 140 m, 12.ii.1986, Holzenthal, Morse & Fasth—1 male (UMSP); Estación Biología La Selva, Quebrada Sura, 10°26'13"N, 84°00'36"W, 50 m, 20–21.vi.1986, Holzenthal, Heyn & Armitage—10 males, 11 females (UMSP); Parque Nacional Braulio Carrillo, Río Peje, Est[acion] Magsasay, 10°24'07"N, 84°03'00"W, 130 m, 25–26.viii.1990, Holzenthal, Blahnik & Huisman—8 males (UMSP); **Puntarenas:** Río Ceibo, route 2 ca. 6 km W rd to Buenos Aires, 9°08'56"N, 83°22'37"W, 250 m, 20.ii.1986, Holzenthal, Morse & Fasth—1 male, 3 females (UMSP); 9 mi NW Esparta, [09°59'00"N, 84°40'00"W], 22.vii.1965, P J Spangler—1 male (NMNH); **HONDURAS: Olanchito:** Río Agua Amarilla, Pacayal, 5 km S El Carbon, [15°07'00"N, 86°03'00"W], 27.vii.1989, Lentz & Lopez—2 males, 5 females (NMNH); **MEXICO: Veracruz:** Catemaco, Tebanca, [18°25'00"N, 95°07'00"W], 3.iii.1988, R Barba, *et al.*—3 females (IBUNAM); Chintul, [22°02'00"N, 98°22'00"W], 6.iii.1988, R Barba—2 females (IBUNAM); A Cadena—1 female (IBUNAM); **NICARAGUA: Río San Juan:** Refugio Bartola, Río San Juan/Río Bartola, 10°58'00"N, 84°21'00"W, 35 m, 9.viii.2000, M L Chamorro—1 male (UMSP);

Región Autónoma Atlántico Norte [Zelaya]: Rio Waspuk, Rápido Waula Kumbas, 14°21'00"N, 84°36'00"E, 75 m, ix.1996, Maes & Hernández—1 male (MEL).

Distribution. Costa Rica, Honduras, Mexico, and Nicaragua.

***Polyplectropus brborichorum*, new species**

Figs. 78, 131

Polyplectropus brborichorum can be distinguished from species in the *P. robacki* subset by the digitate, apically attenuate intermediate appendage; the apex is so lightly pigmented that the intermediate appendage may at times appear missing. In addition to the differences in the intermediate appendage, the dorsal branch of the inferior appendage does not extend beyond the apex of the ventral branch, characteristic also present in *P. andinensis*. No characteristics differentiating the female of *P. brborichorum* from *P. costalis* (Banks) (only known from the female) were found. However, since no male has ever been associated with *P. costalis* and given the largely homogeneous morphology of *Polyplectropus* female genitalia, we here describe the specimens from Ecuador as new.

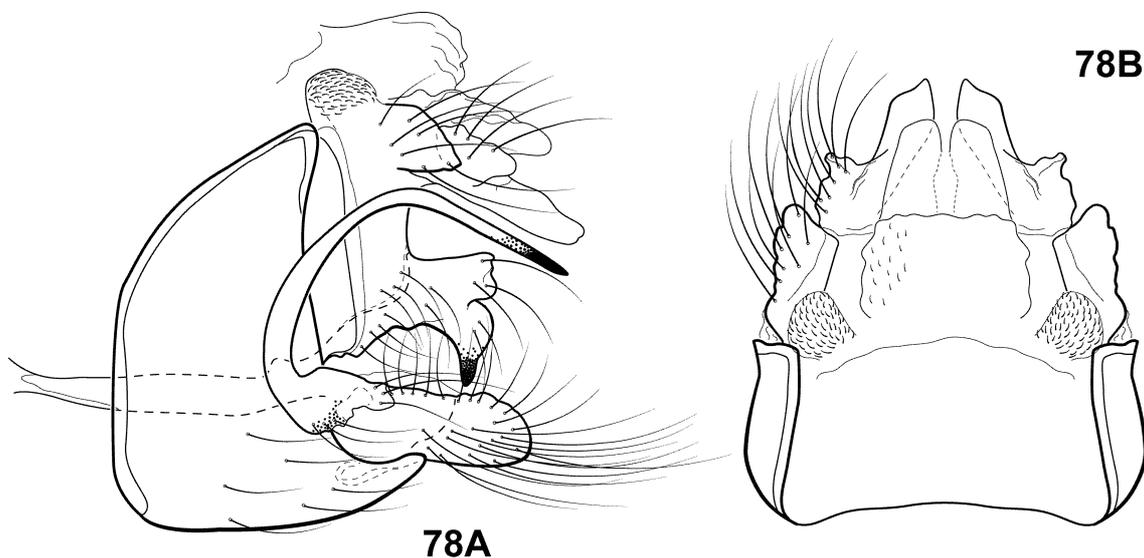


FIGURE 78. Male genitalia of *Polyplectropus brborichorum*, new species (holotype): A—left lateral view; B—dorsal view.

Adult. Length of forewing 5.3–6.0 mm, n=3. Color of head, thorax, and legs brown; setae on body grey and yellow; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view broadly deltoid, anterior margin concave, posterior margin highly convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage as long as inferior appendage, lightly sclerotized, digitate, with long basal setae; in dorsal view digitate, directed posterad; in caudal view dorsoventrally flattened, apex quadrate, becoming lightly sclerotized almost invisible (other male specimen had a slightly more sclerotized intermediate appendage, yet overall shape was same). Preanal appendage tripartite; dorsolateral process bulbous; mesolateral process setose; in dorsal view ovate, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, with short basodorsal digitate lobe, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral

margin of process acute. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, basally setose and broader, becoming highly curved, directed anterad beyond half of IX segment, recurved posteromesally; in ventral view narrow, basally sclerotized with digitate, laterally directed lobe, narrowing and recurving apically, expanding posterad into ventral branch (dorsal branch differed in size between 2 specimens, being shorter in holotype); ventral branch setose, basally broad; in lateral view obovate, rounded posterad; in ventral view subquadrate, mesal margin straight, posterior margin rounded to truncate, shallowly converging mesally. Phallus short; dorsal phallic sclerite in lateral view cylindrical, apex pandurate; apex of dorsal phallic sclerite in dorsal view acute; endothelial membrane without embedded spines.

Female genitalia. Very similar to *P. costalis*.

Holotype male: ECUADOR: Past[aza]: Est[ación] Fluv[ial] Métrica, Puyo (27 km N), 4.ii.1976, Spangler *et al.*—(UMSP000085574) (NMNH).

Paratypes: ECUADOR: Pichincha: Río Umachaca, For[est] Sta[tion] Maquipucuna, 00°07'30"N, 078°37'00"W, 1250 m, ca. 5 km E Nanegal, 4–5.ix.1990, O. S. Flint—1 male (UMSP), 1 female (NMNH).

Distribution. Ecuador.

Etymology. This species (currently known only from Ecuador) is named with much affection in honor of M.L. Chamorro's Ecuadorian-Yugoslavian uncle, Ladislao (Lalo) Brborich and his family, Gloria Callejas, Rossina, Claudia and Ladislao (Lalito) for their generosity and hospitality throughout the years.

Polyplectropus buchwaldi* (Ulmer), *nomen dubium

Ecnomodes buchwaldi Ulmer, 1911: 18. [Type locality: Ecuador; ZSZMH; male; abdomen lost]; 1962: 5 [to *Ecnomodellina*].—Weidner, 1964: 74 [lectotype male].—Flint, 1968:21 [to *Polyplectropus*].

In the original description by Ulmer of the monotypic genus *Ecnomodes* he states “Genitalanlänge leider nicht sichtbar, da der Hinterleib beider Stücke verletzt ist” (Ulmer 1911: 18). Therefore stating the abdomens were damaged. Consequently, no record exists of the specific identity of *P. buchwaldi*, save detailed descriptions of the wings and types without abdomens housed at the ZSZMH. The holotype and paratype are in poor condition and were not fit for transport in the mail; therefore, they were not examined. The specimens Banks described as *E. buchwaldi* in 1913 (p. 18) were subsequently described by Flint (1971) as *P. banksianus*. Flint (1971: 27) wrote :

“...[*P. banksianus*] is being described from that material BANKS recorded as *Ecnomodes buchwaldi* ULM. Unfortunately, the types of the latter are reported to be lacking their abdomens, and considering the large number of superficially similar species of restricted range in the genus, it seems unlikely that we will ever know the specific identity of *buchwaldi*, or that these example[s] are actually the latter which was from Ecuador.”

The wing vein pattern, as illustrated by Ulmer (1911: 18, Fig. 4) and the identification by Banks of *P. banksianus* as *E. buchwaldi* suggests this species belongs in the *P. santiago* group. However, Flint may be correct in stating that the identity of *P. buchwaldi* is unlikely to be resolved. Therefore, *P. buchwaldi* is here designated as a *nomen dubium*.

Distribution. Ecuador.

***Polyplectropus costalis* (Banks)**

Figs. 79, 131.

Cordillopsyche costalis (Banks), 1913: 238. [Type locality: Colombia, Tolima, Cañon del Norte; MCZ (on loan to NMNH); female; in *Cordillopsyche*].—Lestage, 1925:105.—Flint, 1967: 7 [to *Polyplectropus*].

Polyplectropus costalis apparently belongs to the *P. robacki* subset of species (*P. andinensis*, *P. bolivianus*, *P. robacki*, and *P. brborichorum*). The female of *P. brborichorum* (from Ecuador) is almost identical to *P. costalis*. Of the 4 species in the *P. robacki* species subset, only *P. brborichorum* had a male/female series. Given the largely homogeneous nature of *Polyplectropus* female genitalia, we hesitate to specify a male for *P. costalis*. Females of other species in the *P. santiago* group also have internal sclerotized rods, however the shape of these rods vary from short and broad to long and narrow (Figs. 97A, C).

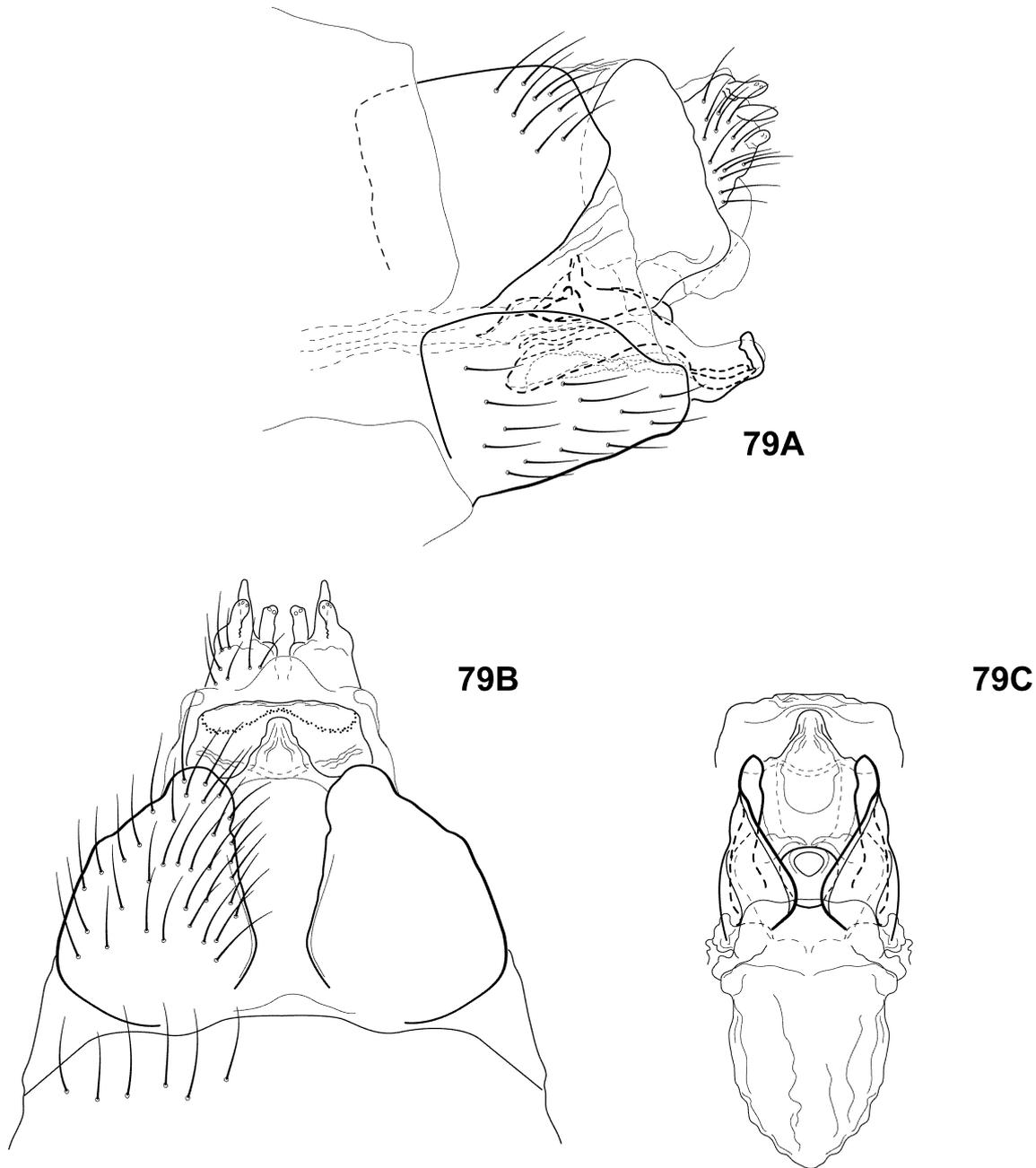


FIGURE 79. Female genitalia of *Polyplectropus costalis* (Banks, 1913) (holotype): A—left lateral view; B—ventral view; C—ventral view, internal structures.

Adult. Length of forewing 6 mm (n = 1). Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Female genitalia. Ventral plates of segment VIII setose, in ventral view ovate, narrowing posteromesally; in lateral view deltoid, narrowing posterad, narrowly fused to sternite VIII; external part of gonopod of

segment VIII in ventral view with posterior margin truncate; in lateral view clavate, curved posterad. Tergum IX devoid of setae, lightly sclerotized. Segment X setose, apically bearing a pair of sclerotized cerci surrounded by 2 pairs of membranous digitate processes. Genital chamber opening to processus spermathecae through sclerotized circular opening of ductus spermathecae and dorsolaterad to circular opening a pair of sinuate, sclerotized, elongate cylindrical rods.

Material Examined. **COLOMBIA: Tolima:** Cañon del Norte, 1,700 m, March, Fassl—1 female (MCZ) [holotype].

Distribution. Colombia.

***Polyplectropus dubitatus* Flint**

Figs. 15D, 80, 81, 142

Polyplectropus dubitatus Flint, 1983: 28. [Type locality: Argentina, Pcia. Misiones, Río Iguazú, Camp Nañdu; NMNH; male.

This species is similar to *P. alleni* (Yamamoto) and *P. elongatus* (Yamamoto) in the overall shape of the male genitalia, especially in the presence of elongate, stout spines in the endothecal membrane of the phallus. *Polyplectropus dubitatus* can be distinguished from *P. alleni* by the presence of 2 spines in the endothecal membrane (1 apically bifurcating spine in *P. alleni*). *Polyplectropus dubitatus* differs from *P. elongatus* in the almost circular sternum IX, the more robust spines of the phallus, and in the longer ventral branch and robust dorsal branch of the inferior appendage.

Adult. Length of forewing 4.2–5.5 mm, n=19. Color of head, thorax, and legs brown; setae on wings brown with scattered patches of golden setae.

Male genitalia. Sternum IX in lateral view rounded, anterior margin highly convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin highly concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view oblong; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, with long basal setae; in dorsal view lanceolate, curved medially; in caudal view lanceolate, curved, narrowing and becoming sclerous apically, directed medially, with apex curved posterolaterad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view deltoid, in lateral view oblong; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin produced ventrad. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate; in ventral view narrow, lateral margin convex, undulate, posterior margin subacute, mesal margin slightly undulate, straight, becoming concave, expanding posterad into ventral branch; ventral branch setose, broad, in lateral view ovate, rounded posterad; in ventral view deltoid, mesal margin slightly convex, apically subacute, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view membranous; dorsolateral arm of dorsal phallic sclerite in lateral view digitate; in dorsal view digitate, extending beyond apex, apex directed medially, horseshow-shaped; endothecal membrane with 2 stout, elongate, sclerotized spines.

Material examined. **ARGENTINA: Misiones:** Río Iguazú, Camp. Nañdu, 25.xi.1973, O. S. Flint—1 male (NMNH) [holotype] [“USNM Type No. 100493”]; **BRAZIL: Minas Gerais:** Rio Pandeiros, Pandeiros, ca. 50 km W Januária, 15°30'44"S, 44°30'15"W, 495 m, 17.xi.2001, Holzenthall & Amarante—1 male, 3 females (UMSP); Rio Santo Antônio, downstream from Morro do Pilar, 19°08'08"S, 43°21'15"W, 530 m,

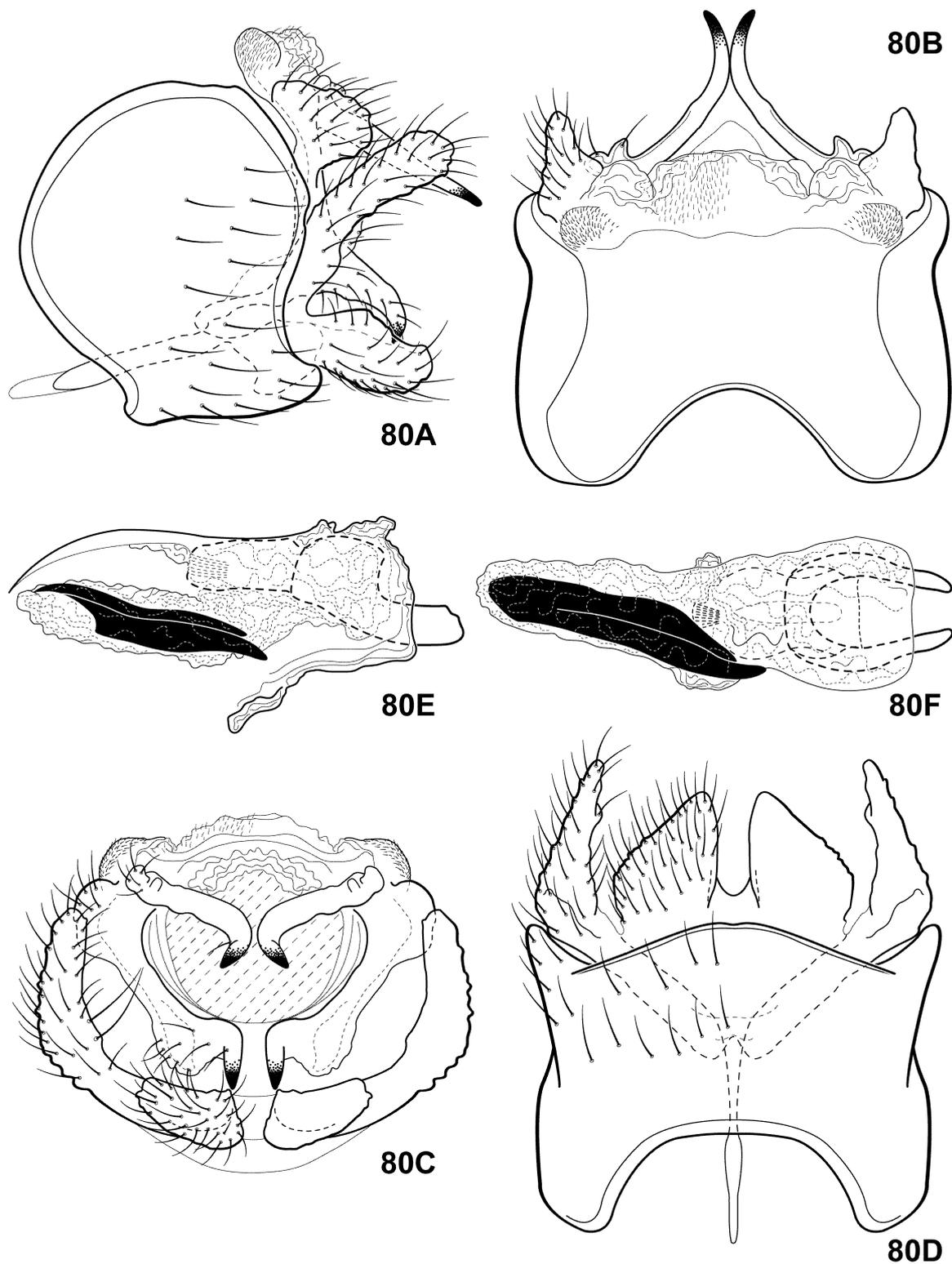


FIGURE 80. Male genitalia of *Polyplectropus dubitatus* Flint, 1983 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E— lateral view; F—dorsal view.

17.x.2000, Paprocki & Ferreira—2 males, 1 female (UMSP); spring trib[utary] to Rio Macauba, near Pandeiros, 15°28'38"S, 44°44'38"W, 525 m, Paprocki & Blahnik—2 males, 2 females (UMSP); **Paraná:** Foz do Iguaçu, Cataratas, 19.viii.2000, W. Mey—3 males (NMNH); **Santa Catarina:** Nova Teutônia, [27°11'00"S, 52°23'00"W], 300–500 m, ii. 1964 F. Plaumann—1 male (NMNH) [paratype]; **URUGUAY:** **Salto:** Río Uruguay, Salto Grande, 10.xi.1955, C S. Carbonell—4 males, 2 females (FHCU) [paratypes].

Distribution. Argentina, Brazil, and Uruguay.

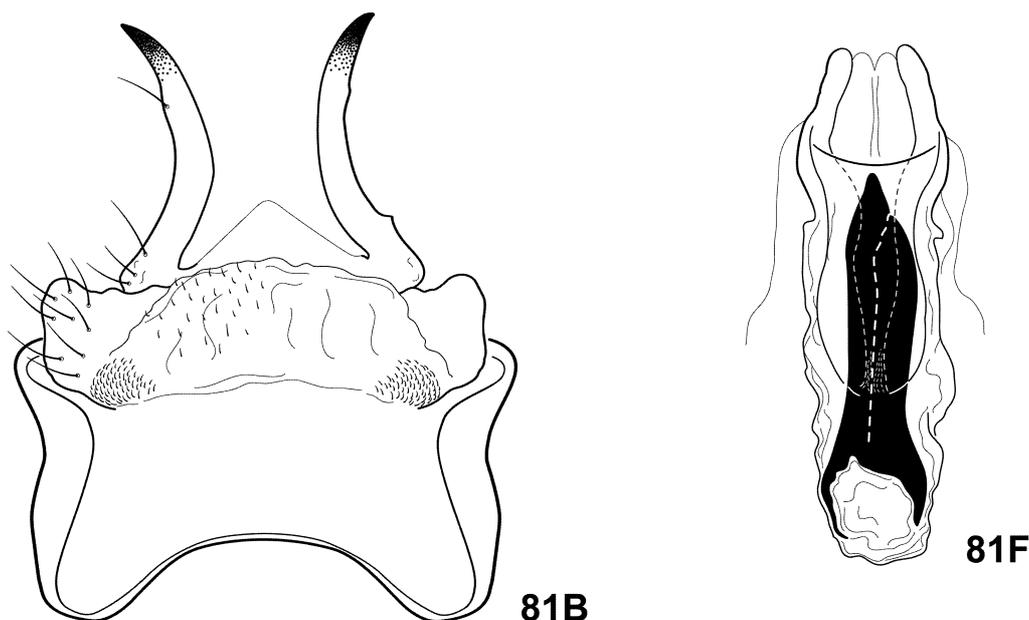


FIGURE 81. Male genitalia of *Polyplectropus dubitatus* Flint, 1983: B—dorsal view; F—phallus, dorsal view.

***Polyplectropus ecuadoriensis*, new species**

Figs. 82, 138

Polyplectropus ecuadoriensis resembles species in the *P. laminatus* subset (*P. laminatus* (Yamamoto) and *P. bravoae* Bueno). However, *Polyplectropus ecuadoriensis* differs from both species in having a digitate ventral branch with a longer, less acute apex of the dorsal branch of the inferior appendage (obdeltoid ventral branch, in ventral view, in *P. laminatus* and *P. bravoae*), as well as having an apically concave and laterally produced intermediate appendage and longer endothecal phallic spines.

Adult. Length of forewing 4.2–4.6 mm, n=20. Color of head and thorax brown, legs yellowish-brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings brown with scattered patches of golden setae.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin submedially concave; in ventral view rectangular, anterior margin concave, becoming straight, posterior margin convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, elongate; in dorsal view emarginate; in caudal view produced dorsad of phallocrypt. Intermediate appendage as long as inferior appendage, quadrate, apex concave, with long basal setae and few scattered apically; in dorsal view broadest apically, slightly narrowing basally and produced basolaterad; in caudal view almost rectangular, broadening apically, directed mesally. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view obovate, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with slight basal, setose, dorsolateral digitate lobe. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, subbasally slightly bent dorsad; in ventral view narrow, lateral margin convex, posterior margin subacute, mesal margin slightly undulate, concave, expanding posterad into ventral branch; ventral branch

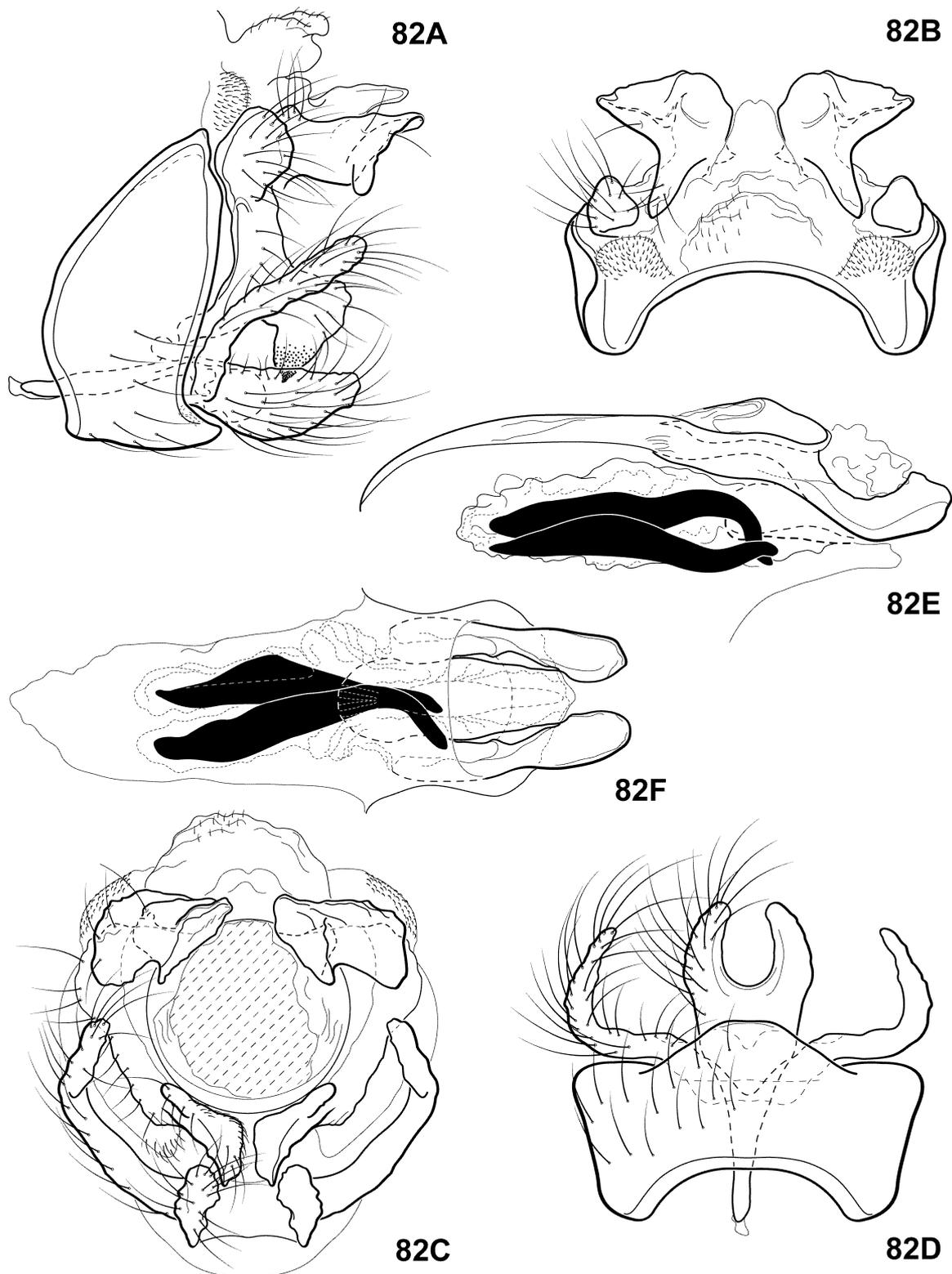


FIGURE 82. Male genitalia of *Polyplectropus ecuadoriensis*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E— lateral view; F—dorsal view.

setose, elongate and broad, in lateral view oblong, broadly narrowing posterad; in ventral view digitate, mesal margin concave, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate; apex of dorsal phallic sclerite in dorsal view subacute; dorsolateral arm of dorsal phallic sclerite in lateral view broadening, apically curved dorsad; in dorsal view digitate, broadening apically, extending beyond apex

of phallic sclerite, apex rounded; endothelial membrane with 2 stout, elongate, sclerotized spines, subapically bent.

Holotype male: ECUADOR: Sucumbios: Lago Agrio (5km N), 00°05'20"N, 76°52'09"W, 26.ix.1975, A Langley—(UMSP000107531) (NMNH).

Paratypes: BOLIVIA: La Paz: A[rea] N[atural] [de] M[anejo] I[ntegrado] Madidi, Rio Tuichi at entrance to Chalalan lodge and tributary, 14°25'01"S, 067°54'23"W, 300 m, 29.vii.2003, Robertson and Blahnik—8 males, 1 female (UMSP); **Santa Cruz:** P[arque] N[acional] & A[rea] N[atural] [de] M[anejo] I[ntegrado] Amboró, Guarda Parque Mataracú, Confluence of Quebrada Verde Uno y Dos, 17°33'11"S, 63°52'09"W, 371 m, 23.xi.2004, Robertson, Garcia, Vidaurre—32 males, 95 females (UASC); P[arque] N[acional] & A[rea] N[atural] [de] M[anejo] I[ntegrado] Amboró, Guarda Parque Mataracú, Q[uebrada] Verde Uno, 17°33'14"S, 63°52'09"W, 374, 19–23.xi.2004, Robertson, Garcia, Vidaurre—5 males (UMSP); **ECUADOR: Cotopaxi:** Latacunga, 133 km W, [00°55'59"S, 78°37'00"W], 329 m, 2.vii.1975, Langley & Cohen—2 females (NMNH); **Napo:** Tena, [00°59'00"S, 77°49'00"W], 25.v.1977, Spangler & Givens—1 female (NMNH); Tena (4 Kms S), [00°59'00"S, 77°49'00"W], 26.v.1977, Spangler & Givens—2 females (NMNH); Tena (17 Kms SW), [00°59'00"S, 77°49'00"W], 28.v.1977, Spangler & Givens—1 male (NMNH); Lago Agrio (48 Kms W), Rio Aguarico, [00°05'20"S, 76°52'09"W], 20.ix.1975, Langley & Cohen—1 female (NMNH); **Pastaza:** Est[ación] Fluv[ial] Metrica, Puyo (27 km N), [01°28'00"S, 77°58'59"W], 4.ii.1976, Spangler *et al.*—1 male (NMNH); **Puyo:** [1°28'00"S, 77°59'00"W], 1–7.ii.1976, Spangler *et al.*—1 female (NMNH); **Sucumbios:** Lago Agrio (5km N), [00°05'20"N, 76°52'09"W], 26.ix.1975, A Langley—1 male, 1 female (NMNH); Lago Agrio (18 kms E), Rio Aguarico, [00°05'20"N, 76°52'09"W], 23.ix.1975, A Langley—1 female (NMNH).

Distribution. Bolivia and Ecuador.

Eymology. This species is named for the country of Ecuador where the holotype and several of the paratypes were collected.

***Polyplectropus elongatus* (Yamamoto)**

Figs. 83, 136

Polycentropus elongatus Yamamoto, 1966: 909. [Type locality: Argentina, Pcia. Misiones, Iguazú; IML (housed at INHS); male].—Flint, 1968b: 21 [to *Polyplectropus*].

Polyplectropus elongatus is most similar to *P. dubitatus* Flint in the overall shape of the male genitalia, especially in the presence of elongate, stout spines in the endothelial membrane of the phallus. *Polyplectropus elongatus* can be distinguished from *P. dubitatus* by the oblong sternum IX (rounded in *P. dubitatus*), by the shorter ventral branch and slender and more sinuate dorsal branch of the inferior appendage, and by the thinner spines of the phallus.

Adult. Length of forewing 3.5–4.0 mm, n=3. Color of head and thorax brown, legs yellowish-brown; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view rounded, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, with long basal setae and few scattered subapically; in dorsal view lanceolate, directed mesad; in caudal view lanceolate, curved, narrowing and becoming sclerous apically, directed medially, with apex curved posterolaterad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal

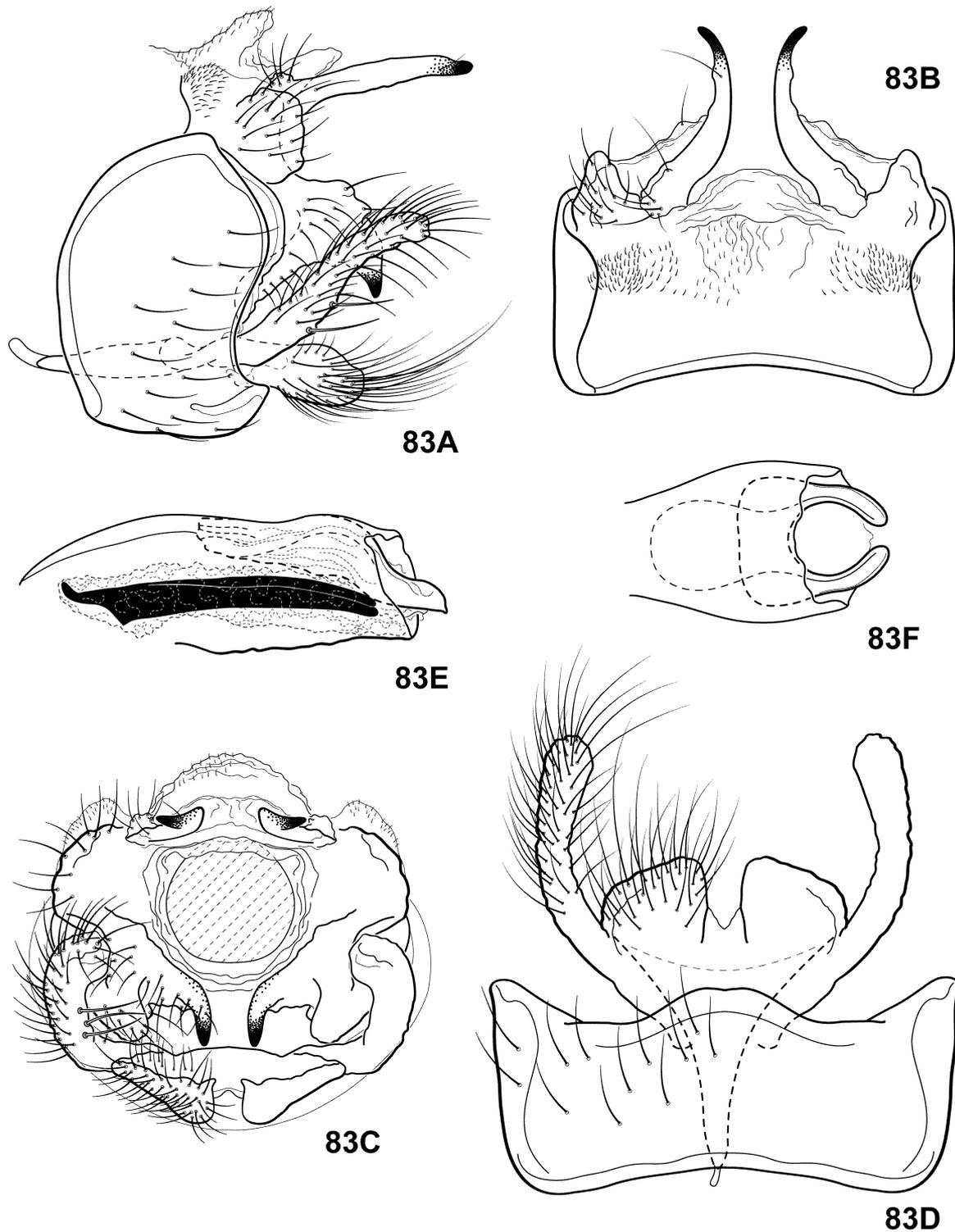


FIGURE 83. Male genitalia of *Polyplectropus elongatus* (Yamamoto, 1966) (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—lateral view; F—apex, dorsal view.

microsetae; mesolateral process setose; in dorsal view deltoid, in lateral view subquadrate; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin produced ventrad. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral

view narrowly oblong, with posteroventral margin slightly concave subapically; in ventral view narrow, lateral margin convex, slightly undulate, posterior margin rounded, mesal margin slightly undulate, concave, expanding posterad into ventral branch; ventral branch setose, basally broad, in lateral view ovate, rounded posterad; in ventral view subquadrate, mesal margin straight, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view membranous; dorsolateral arm of dorsal phallic sclerite in lateral view digitate, horseshow-shaped; endothecal membrane with 2 stout, elongate, sclerotized spines.

Material examined. **ARGENTINA: Misiones:** Iguazú, 30.i.–13.iii.1945, Haywood, Willing & Golbach—1 male (IML, currently at INHS) [holotype]; **BRAZIL: Minas Gerais:** Río Santo Antônio, downstream from Morro do Pilar, 19°08'08"S, 43°21'15"W, 530 m, 17.x.2000, Paprocki & Ferreira—2 males, 1 female (UMSP).

Distribution. Argentina and Brazil.

Remarks. Type never deposited at IML, currently housed at INHS.

***Polyplectropus flavicornis* Ulmer**

Figs. 84, 142

Polyplectropus flavicornis Ulmer, 1905a: 103. [Type locality: Brazil, Santa Catarina; PAN; male].—Flint, 1966b: 4 [lectotype male, female].

This is a very distinctive species having a tripartite intermediate appendage.. *Polyplectropus squalus* Bueno also has a multi-partite intermediate appendages, however, in this species it is bipartite and the dorsal process is shorter than the ventral one, whereas in *P. flavicornis* all 3 processes are of equal size. Additionally, *P. squalus* has several medium-sized spines in the phallic endothecal membrane, whereas *P. flavicornis* lacks any spines in the endothecal membrane.

Adult. Length of forewing 5.5–7 mm, n = 80. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings brown with scattered patches of golden setae.

Male genitalia. Sternum IX in lateral view rounded, anterior margin highly convex, posterior margin sinuate; in ventral view rectangular, anterior margin highly concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallicrypt. Intermediate appendage as long as inferior appendage, tripartite, all rod-like with long basal setae, basally divided into a dorsal, ventral and median lanceolate processes, dorsal process curved posterodorsad, median process curved mesad, ventrolateral process curved mesoventrad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view deltoid, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin tapering ventrad into sclerotized point. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, with posteroventral margin slightly concave subapically; in ventral view narrow, lateral margin convex, slightly undulate, posterior margin rounded, mesal margin slightly undulate, concave, expanding posterad into ventral branch; ventral branch setose, basally broad, in lateral view ovate, broadly narrowing posterad; in ventral view deltoid, mesal margin straight, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view acute; dorsolateral arm of dorsal phallic sclerite in lateral view digitate; in dorsal view digitate,

extending beyond apex, apex directed medially, apex angled, membranous; endothelial membrane without embedded spines.

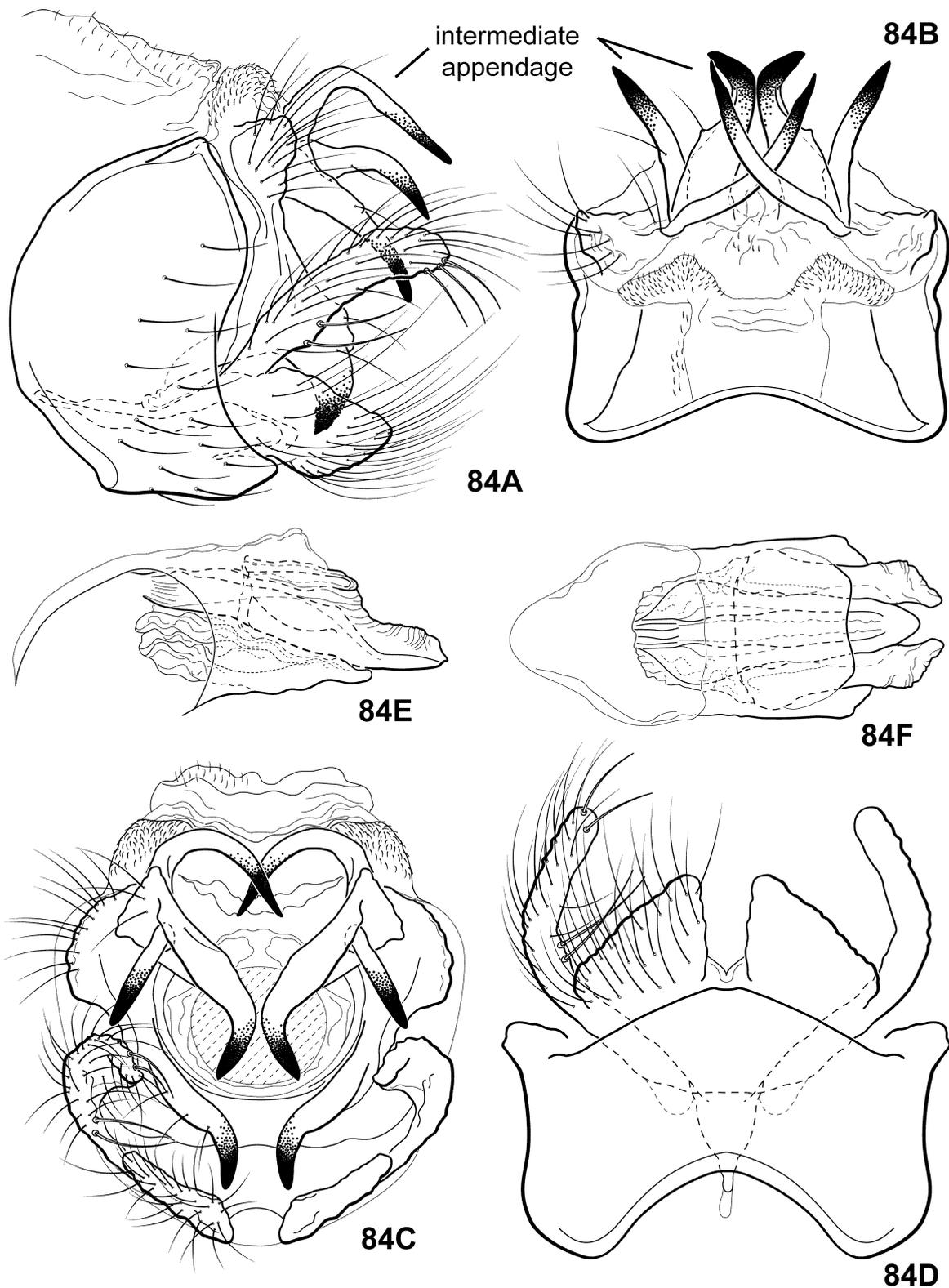


FIGURE 84. Male genitalia of *Polyplectropus flavicornis* Ulmer, 1905: A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Material examined. **BRAZIL: Minas Gerais:** Rio das Velhas, upstream from São Bartolomeu, 20°18'39"S, 43°33'57"W, 18.ix.1998, Paprocki & Amarante—32 males, 70 females (UMSP) (MZUSP);

URUGUAY: Artigas: San Gregorio, 29.xi.1959, Carbonell, Mesa & San Martin—1male (NMNH) [illustrated UMSP000101012], 1 male, 1 female (FHCU).

Distribution. Brazil and Uruguay.

Remarks. When Flint (1983: 27) described *P. ulmeriana* he wrote:

“This species is undoubtedly the one figured by Ulmer in his original description of *P. flavicornis*. The type series, however, must have been mixed, because the male in the syntypic series that I studied and designated as lectotype (Flint 1966) was a very different species. Consequently the species here described was left without a name.”

The syntypic series of *P. flavicornis* was mixed. As a consequence, when Flint (1966) designated a lectotype for *P. flavicornis*, which he illustrated and redescribed, he inadvertently selected a buried species different from the one Ulmer had illustrated and described in 1905a. In 1983 Flint realized the species he had designated in 1966 as the lectotype for *P. flavicornis* was not the one illustrated and described by Ulmer (1905a). Flint (1983) later described *Polyplectropus ulmeriana* for a species collected in Argentina, which corresponds to the same species Ulmer had originally illustrated and described in 1905a under the name *P. flavicornis*. Therefore, the species that has the name *P. flavicornis* is not the one illustrated and described by Ulmer in 1905a; Ulmer's 1905a illustration and description is of the later described *P. ulmeriana*. Both names are currently valid.

***Polyplectropus hamatus* Bueno-Soria**

Figs. 85, 122

Polyplectropus hamatus Bueno-Soria, 1990: 388. [Type locality: Mexico, Chiapas, Agua Azul, a 50 km SE de Palenque; IBUNAM; male].

Polyplectropus hamatus is readily distinguished from species in the group by the dorsally curved (curved laterad in most other species) intermediate appendage having a highly sclerotized base and by the presence of 2 short, stout spines in the phallus. This species, however, superficially resembles *P. oaxaquensis* Bueno and *P. banksianus* Flint in the shape of the inferior appendage, the dorsal phallic sclerite, and the mesoventral process of the preanal appendage.

Adult. Length of forewing 3.8–4.6 mm, n=38. Color of head and thorax yellowish-brown, legs yellow; setae on wings darker brown along costal margin, rest of wing lighter shade of brown with scattered patches of grey setae.

Male genitalia. Sternum IX in lateral view rounded, anterior margin convex, posterior margin submedially concave; in ventral view rectangular, anterior margin highly concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, with long basal setae; in dorsal view lanceolate; in caudal view lanceolate, curved, directed ventrolaterad, apex turned dorsad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view orbicular, in lateral view oblong; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin concave and sinuate, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin produced ventrad. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate; in ventral view narrow, lateral margin slightly convex, entire, posterior margin subacute, mesal margin slightly undulate, subapically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, basally broad, in lateral view ovate, narrowing

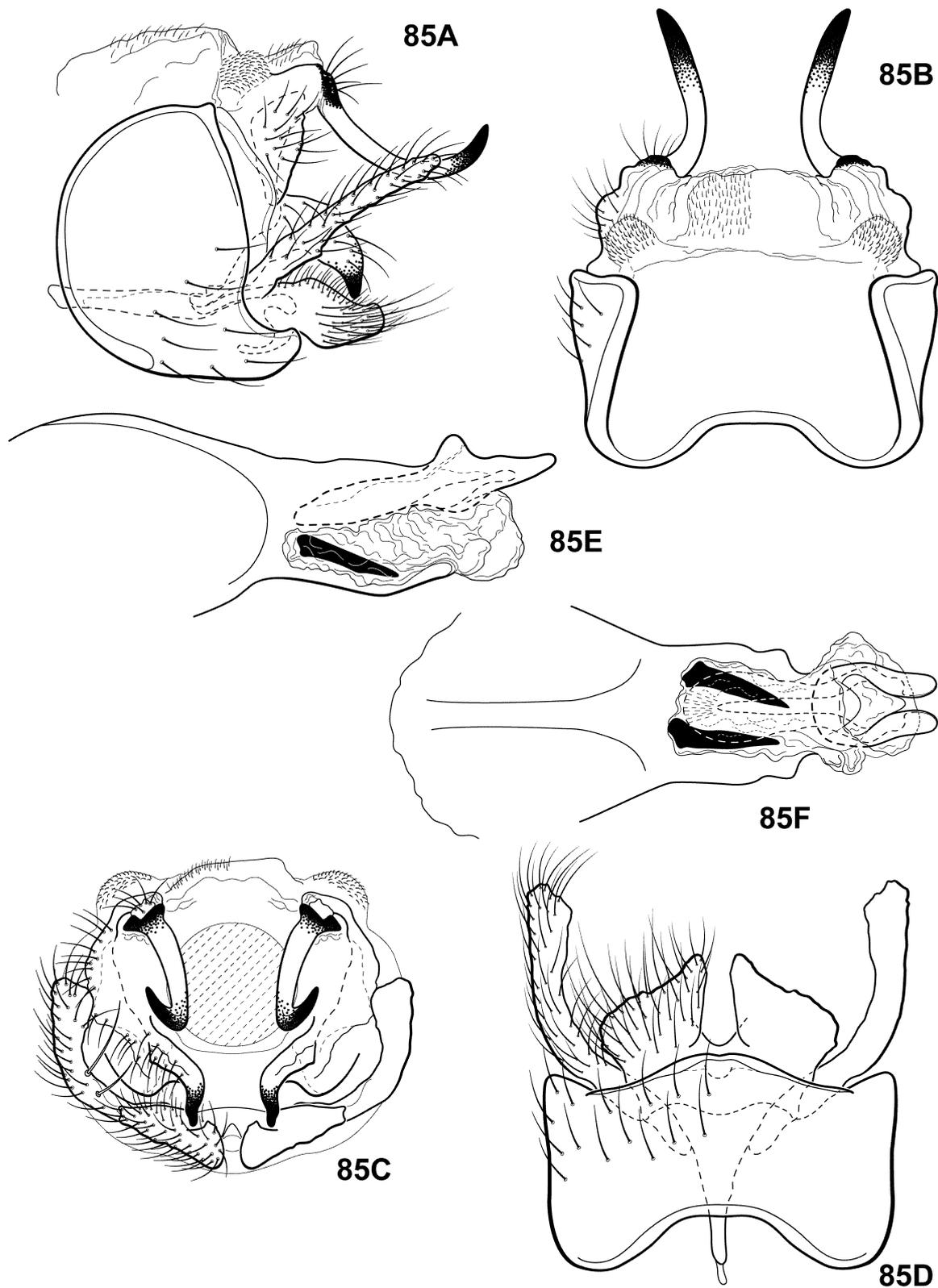


FIGURE 85. Male genitalia of *Polyplectropus hamatus* Bueno, 1990 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E— lateral view; F—dorsal view.

posterad; in ventral view deltoid, mesal margin straight, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view slightly sinuate, dorsally produced subapically, apex narrowly oblong; apex of dorsal phallic sclerite in dorsal view acute; dorsolateral arm of dorsal phallic sclerite in lateral view digitate;

in dorsal view digitate, extending beyond apex, apex directed medially, apex rounded; endothelial membrane with 2 stout, sclerotized spines.

Material examined. **BELIZE: Cayo:** Río Privassion, Blancaneaux Lodge, [17°03'00"N, 88°58'00"W], 9–11.vii.1973, Y. Sedman—1 male, 8 females (NMNH); Mountain Pine Ridge, 27–29.vi.1971, G. Stacell—2 males, 12 females (NMNH); **Toledo:** Blue Creek Village, 10.vi.1981, W. E. Steiner—1 male (NMNH); **MEXICO: Chiapas:** Cascada Misolja, 20 km S Palenque, 17–18.v.1981, C & O Flint—1 male (NMNH) [paratype]; Cascada de Misolja, 18.v.1981, J. Bueno-Soria—1 female (IBUNAM) [paratype]; Bonampak, 20–25.v.1980, J. Bueno-Soria—1 male, 3 females (IBUNAM) [paratype]; Agua Azul, 23.vii.1978, J. Bueno-Soria—4 males (IBUNAM) [holotype] [paratypes]; Boca Lacantun, 24.v.1984, Barrera et. al.—1 male (IBUNAM) [paratypes]; Palenque, Río Chacamax-Nututum, 17°29'10"N, 91°58'24"W, 15.vii.1998 R. Barba—2 males (IBUNAM); **Oaxaca:** Rta. Juchitan-Tehuantepec a 17 km de Tehuantepec, 23.vii.1978, J. Bueno-Soria—1 male (IBUNAM); 23.v.1981, J. Bueno-Soria—1 female (IBUNAM).

Distribution. Belize and Mexico.

***Polyplectropus hamulus* Flint**

Figs. 86, 142

Polyplectropus hamulus Flint, 1972: 228. [Type locality: Argentina, Misiones, Puerto Rico; NMNH; male].

Polyplectropus hamulus is similar to *P. brachyscolus* Flint in the shape of the phallus and endothelial spines and to *P. banksianus* Flint in the overall shape of the male genitalia. *Polyplectropus hamulus* can be distinguished from *P. brachyscolus* by the less acute apex of the ventral branch of the inferior appendage and by the shorter intermediate appendage. *Polyplectropus hamulus* differs from *P. banksianus* in the pandurate apex of the dorsal phallic sclerite (subapically produced and apically oblong in *P. banksianus*), in the broader mesoventral process, and the straight endothelial phallic spines (curved in *P. banksianus*).

Adult. Length of forewing 4 mm, n = 1. Color of head, thorax, and legs yellowish-brown; setae on body brown with clusters of grey setae on apex of head; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view rounded, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin highly concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, with long basal setae; in dorsal view lanceolate, curved mesad; in caudal view lanceolate, curved, directed mesoventrad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view oblong, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin slightly produced. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate; in ventral view narrow, lateral margin slightly convex, slightly undulate, posterior margin truncate, mesal margin sinuate, straight, becoming concave, expanding posterad into ventral branch; ventral branch setose, broad, in lateral view ovate, narrowing posterad; in ventral view broadly rhombate, posteromesal margin produced posterad into pointed apex, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex pandurate; endothelial membrane with 2 stout, medium-sized, sclerotized spines.

Material examined. **ARGENTINA: Misiones:** Puerto Rico, 26°48'00"S, 55°02'00"W, 4–8.iv.1971, C & O Flint—1 male (NMNH).
Distribution. Argentina.

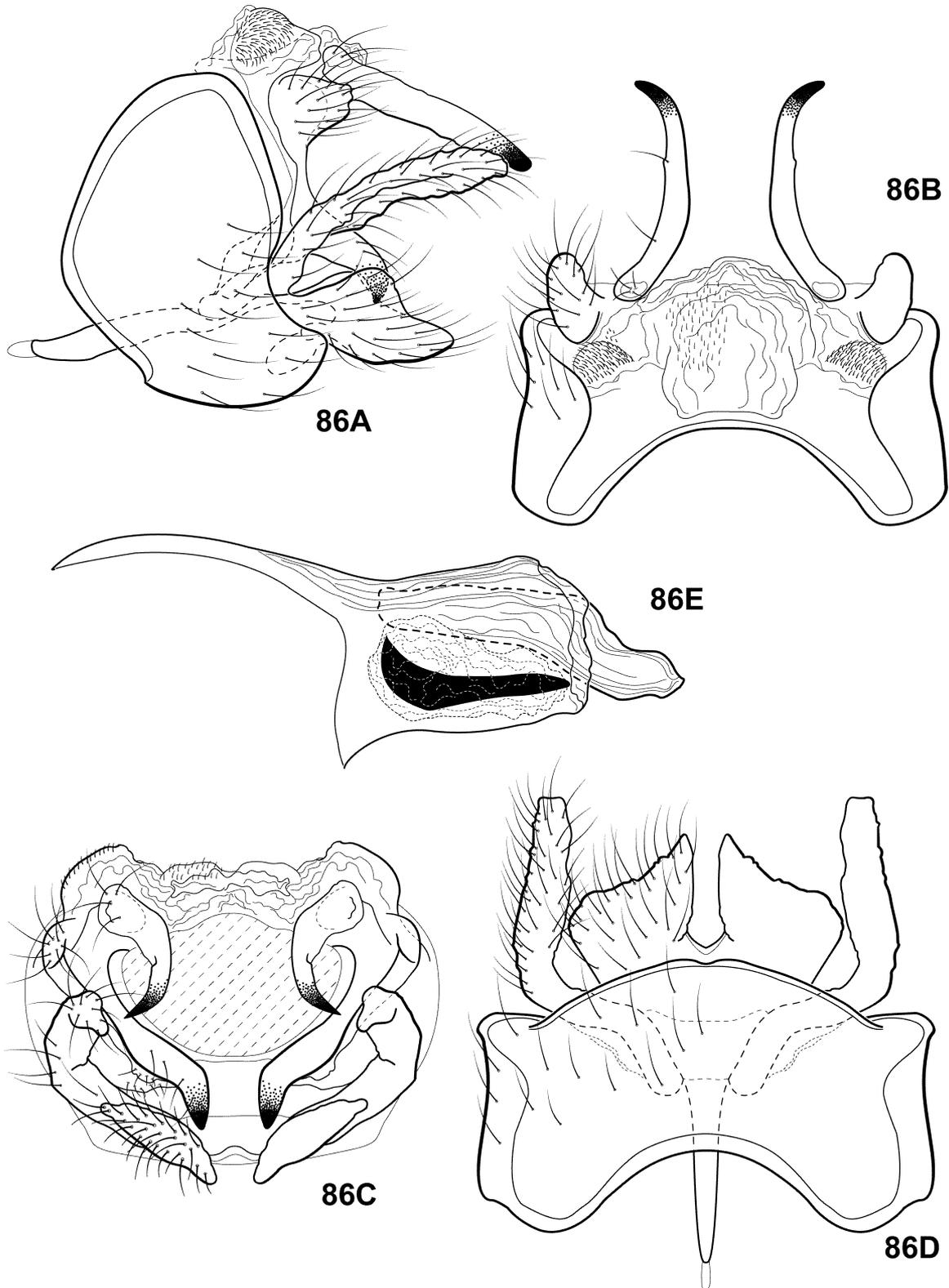


FIGURE 86. Male genitalia of *Polyplectropus hamulus* Flint, 1972 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

***Polyplectropus herrerae* Bueno-Soria & Hamilton**

Figs. 87, 97A, 121

Polyplectropus herrerae Bueno-Soria & Hamilton, in Bueno-Soria 1990: 386. [Type locality: Mexico, Chiapas, Cascada de Misolja, a 20 kms al SE de Palenque; IBUNAM; male; female].

Polyplectropus herrerae has a downturned and dorsally curved dorsolateral arm of the dorsal phallic sclerite, making this species easy to distinguish. Additionally, this species has 4 spines in the phallus robust spines in the endothelial membrane of the phallus. *Polyplectropus herrerae* is most similar to *P. brachyscolus* Flint in the acute apex of the ventral branch of the inferior appendage and in the direction and shape of the intermediate appendage. However, *P. brachyscolus* only has 2 spines in the endothelial membrane of the phallus and the dorsal branch of the inferior appendage is longer in *P. herrerae*.

Adult. Length of forewing 4.5–5.5 mm, n=69. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view rounded, anterior margin highly convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, rod-like, with long basal setae; in dorsal view basally broad, tapering into curved lanceolate rods; in caudal view lanceolate, curved, directed mesoventrad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view deltoid, in lateral view subquadrate; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin produced ventrad. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view digitate, curved ventrad; in ventral view narrow, lateral margin convex, slightly undulate, posterior margin subacute, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, elongate and basally broad, in lateral view digitate, broadly narrowing posterad; in ventral view subquadrate, posteromesal margin produced posterad into pointed apex, shape almost deltoid, ventral branches, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, dorsolateral arm downturned and curved dorsad; endothelial membrane with 4 medium-sized, highly sclerotized spines, 2 median spines fused roughly midway and curved laterad, outer spines curved mesad.

Material examined. **MEXICO: Chiapas:** trib[utary] to Rio de Teapa on Mex. 195, 1.5 mi. N Ixhuatan, 23.xii.1983, Hamilton, Holzenthal & Kovach—21 males [paratypes] (NMNH); Cascada Misolja, 20 km S Palenque, 17–18.v.1981, C & O Flint—11 males, 8 females [paratypes] (NMNH) (IBUNAM); Cascada de Misolja, 18.v.1981, J. Bueno-Soria—1 male [holotype] (IBUNAM), 2 females [paratypes] (IBUNAM); Río Lacanja, 19.v.1981, J. Bueno-Soria—8 males, 1 female [paratypes] (IBUNAM); Palenque, Río Chacamax-Nututum, 17°29'10"N, 91°58'24"W, 15.vii.1998, R. Barba—3 males [paratypes] (IBUNAM); Tecpatan, 30.viii.1946, A. Dampf—3 males [paratype] (INHS); **Morelos:** San Rafael Vicente Aranda, 18.vi.1982, H. Velasco—1 female [paratype] (IBUNAM); 12.vii.1982, H. Velasco—1 female [paratype] (IBUNAM); **Tabasco:** Río Puyacatengo, Grutas Cocona, 7.iii.1988, R. Barba, Barrera, Cadena—8 males [paratypes] (IBUNAM); Teapa, Río Puyacatengo, 17°32'47"N, 92°55'52"W, 11.x.1996, Bueno-Soria, Santiago, Barba, Contreras—1 male [paratype] (IBUNAM).

Distribution. Mexico.

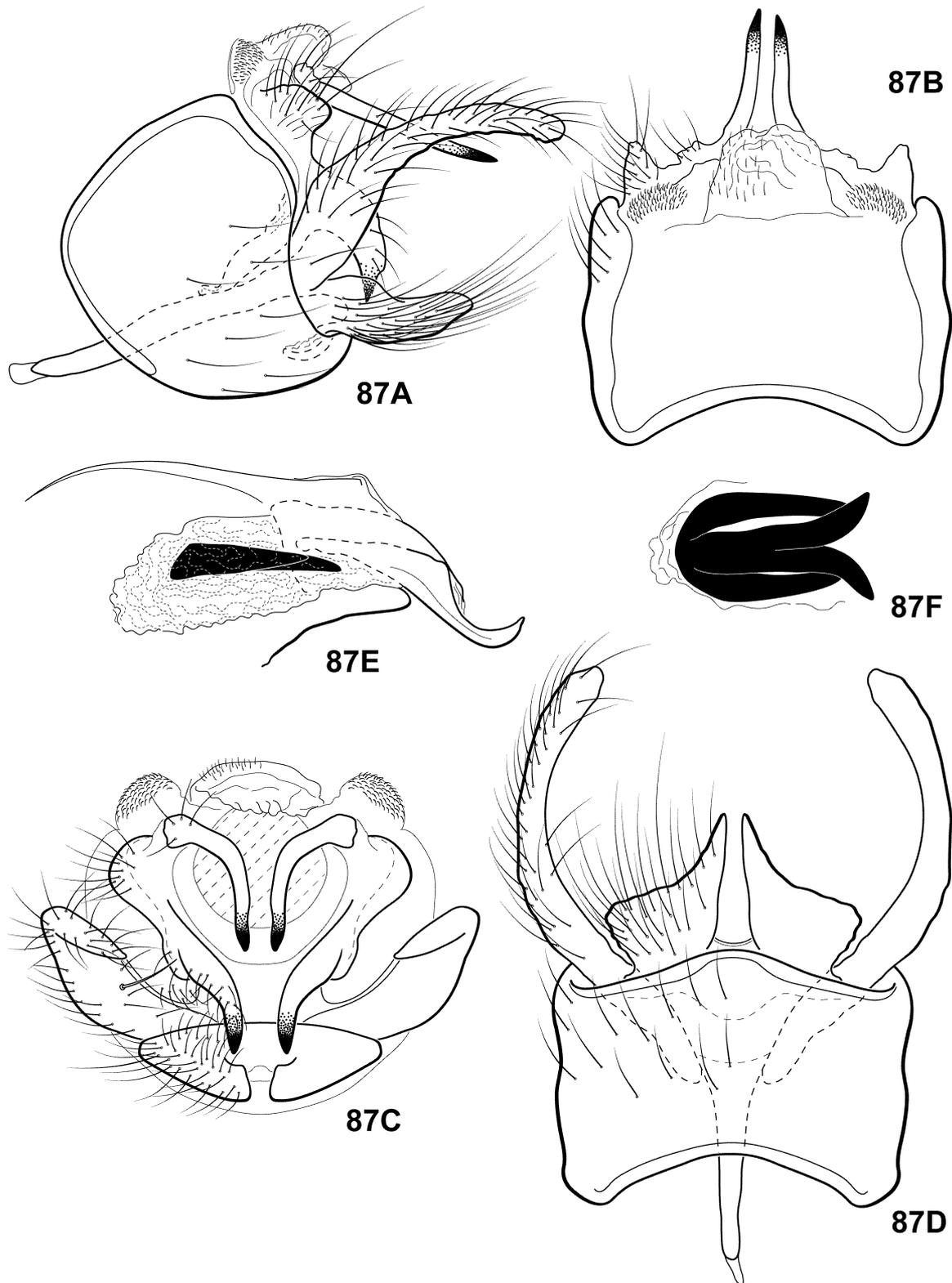


FIGURE 87. Male genitalia of *Polyplectropus herrerae* Bueno & Hamilton, 1990 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—phallic spines, dorsal view.

***Polyplectropus laminatus* (Yamamoto)**

Figs. 88, 138

Polycentropus laminatus Yamamoto, 1966: 909. [Type locality: Ecuador, El Oro, 9 miles South of Santa Rosa; CAS (housed at INHS); male].

Polyplectropus laminatus resembles species in the *P. laminatus* subset (*P. bravoae* Bueno and *P. ecuadoriensis*, new species). These species have an elongate dorsolateral arm of the phallic sclerite, produced beyond the apex of the dorsal phallic sclerite, short and narrow dorsal branch of the inferior appendage, and membranous, quadrate to oblong intermediate appendage. A narrowed dorsolateral arm of the phallic sclerite is a distinguishing feature of *P. laminatus* (subapically broader in *P. bravoae*). Additionally, the apex of the intermediate appendage of *P. laminatus* is produced laterad (not produced in *P. bravoae* but further produced laterad and more concave in *P. ecuadoriensis*). Furthermore, *P. laminatus* has an obdeltoid ventral branch of the inferior appendage (in ventral view) (digitate in *P. ecuadoriensis*) and endothecal phallic spines smaller than in *P. ecuadoriensis* or *P. bravoae*.

Adult. Length of forewing 4.3–4.5 mm, n = 64. Color of head and thorax brown, legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings yellow with small patches of brown setae.

Male genitalia. Sternum IX in lateral view subquadrate, anterior margin supramedi ally convex, posterior margin submedially concave; in ventral view rectangular, anterior margin concave, becoming straight, posterior margin highly convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, apex turned dorsad; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage as long as inferior appendage, stout, with long basal setae and few scattered apically; in dorsal view subquadrate, apex truncate, broadening mesally and laterally, apicolateral margin produced posterolaterad, in some specimens not as broad apically; in caudal view setose base digitate, apex quadrate, directed posterolaterad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view obovate, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view not fused basomesally, ventral margin of process subacute, with ventrolateral margin produced ventrad. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, with dorsal and ventral margins convex and concave, respectively and apex acute; in ventral view narrow, lateral margin convex, entire, posterior margin acute, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, broad, in lateral view obovate, rounded posterad; in ventral view subquadrate, mesal margin straight, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view tapering posterad, apex rounded and turned anterodorsad; in dorsal view digitate, extending beyond apex of phallic sclerite, apex directed dorsolaterad, apex rounded; endothecal membrane with 2 stout, sclerotized spines.

Material examined. **COLOMBIA: Antioquia:** Río Claro, [5°35'24"N, 75°52'02"W], 3.v.1984, U Matthias—1 male; Valle del Cauca, Río Raposo, [3°53'36"N, 77°04'11"W], i.1965, V. H. Lee—21 males, 6 females; **COSTA RICA: Puntarenas:** 9 mi NW Esparta, [9°59'00"N, 84°40'00"W], 22.vii.1965, P J Spangler—1 male (NMNH); **ECUADOR: El Oro:** 9 mi South of Santa Rosa, 3°27'00"S, 79°58'00"W, 23.i.1955, Schlinger & Ross—1 male (CAS currently at INHS) (holotype); **Los Rios:** Quevedo (56 km N), Rio Palenque Biological Station, 01°01'59"S, 079°27'00"W, 250 m, 28–29.vii.1976, J Cohen—10 males; **PANAMA: Colón:** Canal Zone, Gamboa, Pipeline Road, [8°30'00"N, 79°58'00"W], 3.v.1984, W W Wirth—5 male & females (NMNH); **VENEZUELA: Portuguesa:** Río Las Marias at Finca Los Cerajones, ca. 5 km

NE Potrero, 9°12'20"N, 69°42'27"W, 270 m, 25.iii.1997, Holzenthal & Flecker—4 males, 14 females (UMSP); **Zulia:** Caño Carichuano, 3.4 km SE Carbones del Guasare, 11°00'07"N, 72°17'06"W, 70 m, 12–13.i.1994, Holzenthal Cressa & Rincón—1 male (UMSP).

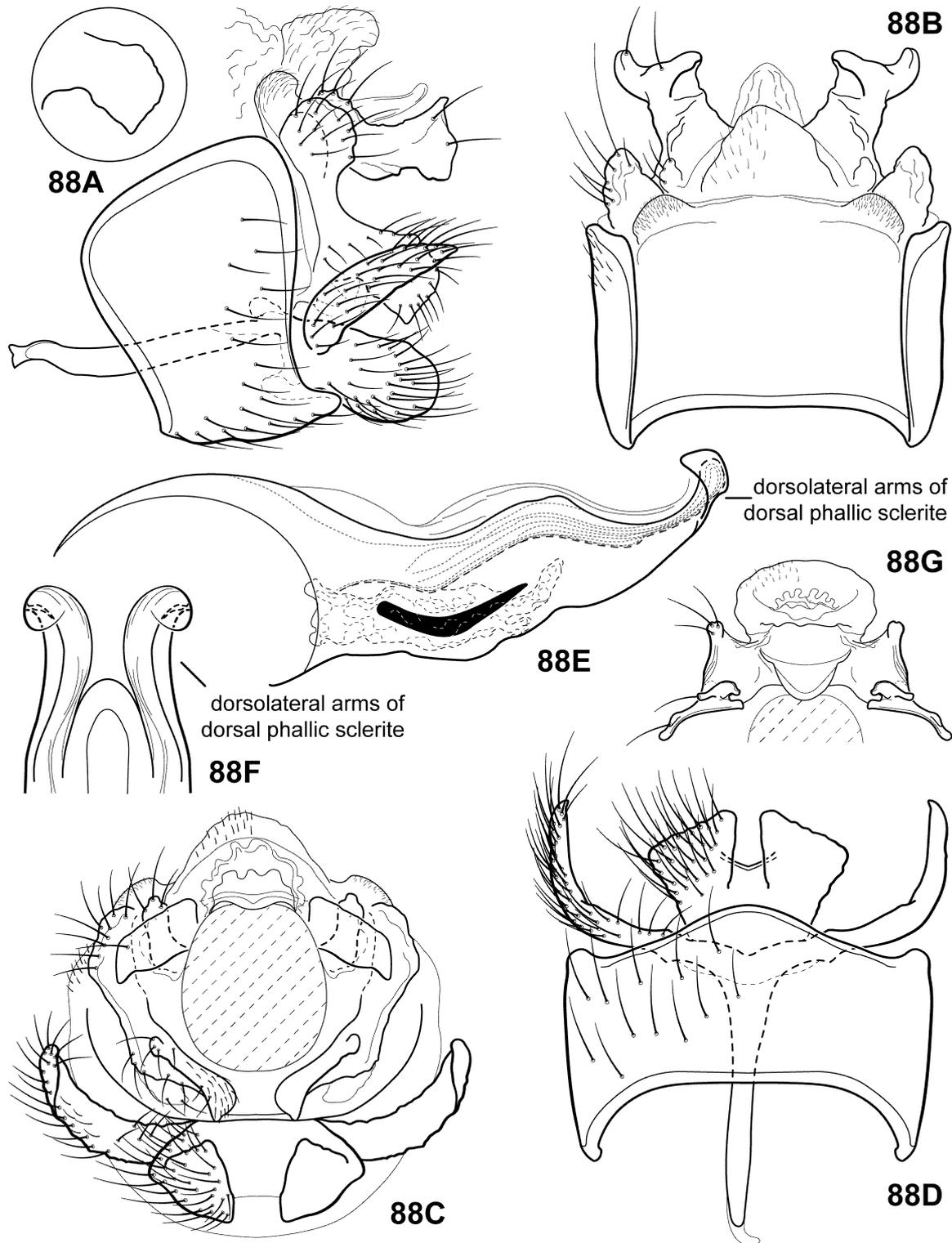


FIGURE 88. Male genitalia of *Polyplectropus laminatus* (Yamamoto, 1966) (holotype): A—left lateral view and inset of mesoventral process preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view (drawn free hand); G—intermediate appendage and X segment (not to scale), dorsocaudal view.

Distribution. Colombia, Costa Rica, Ecuador, Honduras, Panama, and Venezuela.

Remarks. Type never deposited at CAS, currently at INHS.

***Polyplectropus maculatus*, new species**

Figs. 89, 136

Polyplectropus maculatus is most similar to *P. banksianus* Flint in the shapes of the ventral branch of the inferior appendage, mesoventral process of preanal appendage, and sternum IX. It also resembles *P. elongatus* (Yamamoto) in the shape of the phallus and presence of elongate, stout spines, and in the shape and direction of the intermediate appendage. *Polyplectropus maculatus* differs from *P. banksianus* in the subapical expansion of the ventral margin of the dorsal branch of the inferior appendage and in the presence of elongate spines in the endothelial membrane of the phallus (spines more than 2x as long as in *P. banksianus*). *Polyplectropus maculatus* can be distinguished from *P. elongatus* in the more acute apex of the ventral branch (rounded in *P. elongatus*) and expanded apex of the dorsal branch (being cylindrical in *P. elongatus*) of the inferior appendage. Also, the endothelial spines in the phallus are more robust in *P. maculatus*.

Adult. Length of forewing 4–5.1 mm, n=99. Color of head, thorax, and legs yellowish-brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view rounded, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, with long basal setae and few scattered subapically; in dorsal view slightly broad basally, tapering into curved rods; in caudal view lanceolate, curved, directed posterolaterad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view deltoid, in lateral view rectangular; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin slightly produced. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, with apicoventral margin produced ventrad; in ventral view narrow, lateral margin sinuate, entire, posterior margin angled and truncate, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, elongate, in lateral view digitate, narrowing posterad; in ventral view deltoid, posteromesal margin produced posterad into pointed apex, mesal margin slightly convex, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view tapering ventrally; in dorsal view digitate, extending beyond apex, apex directed medially, apex rounded; endothelial membrane with 2 stout, elongate, sclerotized spines.

Holotype male: VENEZUELA: Territorio Federal Amazonas [Estado Amazonas]: Cerro de la Neblina, Basecamp, 00°51'N, 66°10'W, 140 m 19.iii.1984, Flint & Louton—(UMSP000107510) (NMNH).

Paratypes: VENEZUELA: Territorio Federal Amazonas [Estado Amazonas]: Cerro de la Neblina, Basecamp, 140 m, 24.xi.–1.xii.1984, R L Brown—1 male (NMNH); Cerro de la Neblina, Basecamp, 00°51'N, 66°10'W, 140 m, 4–12.ii.1984, Davis & McCabe—31 males (NMNH); 13–20.ii.1984, Davis & McCabe—3 males, 1 female (NMNH); 21–29.ii.1984, Davis & McCabe—11 males (NMNH); 21–28.ii.1985, Spangler, Faitoute & Steiner—1 female (NMNH); in rainforest, 20.ii.1985, Spangler, Faitoute & Steiner—1 male (NMNH); 13–20.ii.1984, Davis & McCabe—1 female (NMNH); 21–29.ii.1984, Davis & McCabe—8 females; 4–12.ii.1984, Davis & McCabe—11 females (NMNH); Agua Blanca, 00°49'00"N, 66°08'00"W, 160

m, 20–21.iii.1984, Flint & Louton—9 males, 7 females (UMSP); Camp IV, 00°58'00"N, 65°57'00"W, 760 m, 15–18.iii.1984, O S Flint—5 males (NMNH); Cerro de la Neblina, small stream east side of basecamp, 00°51'00"N, 66°10'00"W, 140 m, 20–24.iii.1984, Flint & Louton—5 males, 2 females (NMNH); Cerro de la Neblina, Basecamp, 00°50'00"N, 66°09'44"W, 140 m, 1–10.iii.1984, Davis & McCabe—4 males (NMNH).

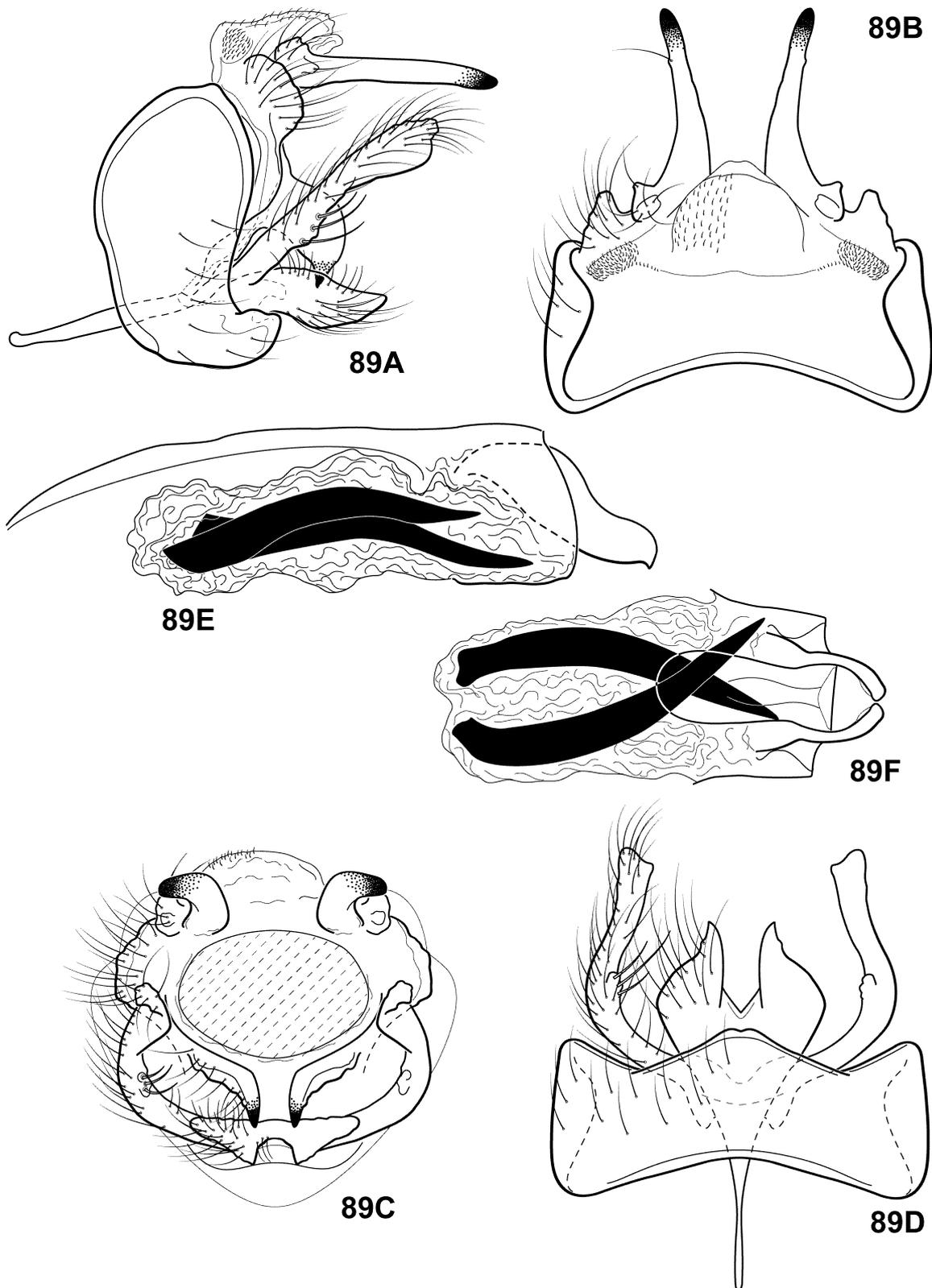


FIGURE 89. Male genitalia of *Polyplectropus maculatus*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Distribution. Venezuela.

Etymology. This species is named for the lighter colored mottling on the forewing.

***Polyplectropus oaxaquensis* Bueno-Soria**

Figs. 90, 136

Polyplectropus oaxaquensis Bueno-Soria, 1990: 395. [Type locality: Mexico, Oaxaca, Laguna superior de Juchitán; INHS; male].

Polyplectropus oaxaquensis can be distinguished from all other species in the group by the elongate, stout, linear phallic spines. The spines may even be visible without clearing of the abdomen. Otherwise, this species is most similar to *P. banksianus* Flint in the overall shape of the genitalia and the dorsal phallic sclerite.

Adult. Length of forewing 4.5 mm, n = 5. Color of head and thorax brown, legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid to rounded, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, with long basal setae; in dorsal view slightly broad basally, tapering into curved rods; in caudal view lanceolate, curved, directed posterolaterad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view deltoid, in lateral view oblong; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral margin of process subacute, with ventrolateral margin produced ventrad. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, apex acute; in ventral view narrow, lateral margin convex, sinuate, posterior margin subacute, mesal margin entire, straight, becoming concave, expanding posterad into ventral branch; ventral branch setose, basally broad, in lateral view ovate, narrowing posterad; in ventral view broadly rhombate, mesal margin straight, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view slightly sinuate, dorsally produced subapically, apex oblong; endothecal membrane with 2 stout, elongate, sclerotized spines, form from Peru has slightly more basally robust spines and slightly longer than holotype.

Material examined. **MEXICO: Oaxaca:** Laguna Superior de Juchitán, 30.iv.1932, A. Dampf—4 males (holotype & paratypes) (INHS). **PERU: [Oxapampa]:** Puerto Bermudez, Río Pichis, 15.vii.1920 [No data about collector]—1 male (NMNH).

Distribution. Mexico and Peru.

Remarks. We identified the specimen from Peru as *P. oaxaquensis*. Apart from slight differences in the phallic spines (specimen from Peru had slightly wider and longer spines), we did not find substantial differences to warrant the Peruvian specimen to be recognized as new and different from *P. oaxaquensis*. Further collecting may reveal *P. oaxaquensis* to be present in Central America and Northern South America. On the other hand, more specimens collected from Peru may reveal additional characters we may have overlooked, warranting the description of a new species.

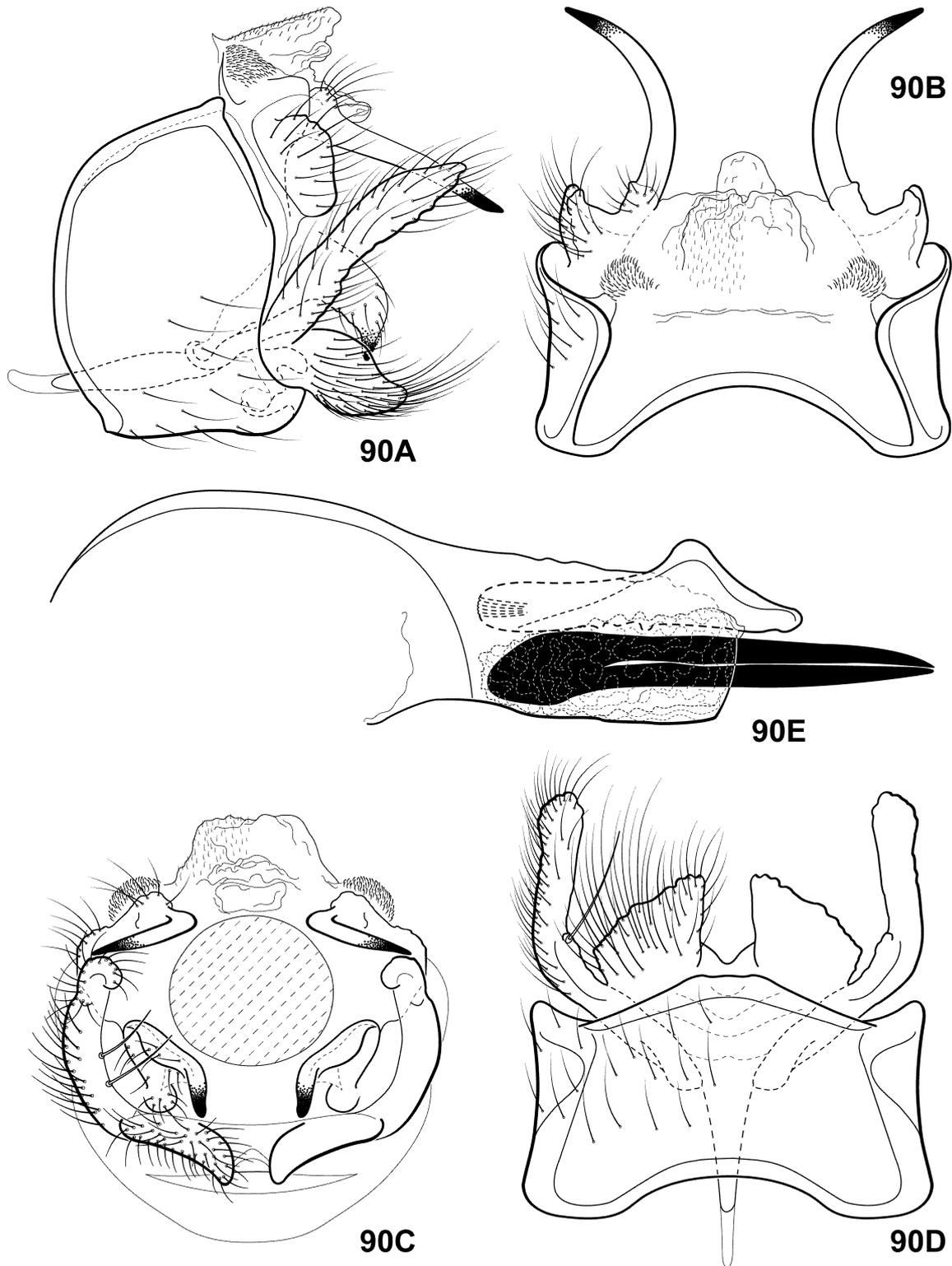


FIGURE 90. Male genitalia of *Polyplectropus oaxaquensis* Bueno, 1990 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

Polyplectropus robacki (Yamamoto)

Figs. 91, 131

Polycentropus robacki Yamamoto, 1966: 911. [Type locality: Peru, Huanuco, Huallaga River, Tingo María; INHS; male].—Flint, 1968b: 21 [to *Polyplectropus*].

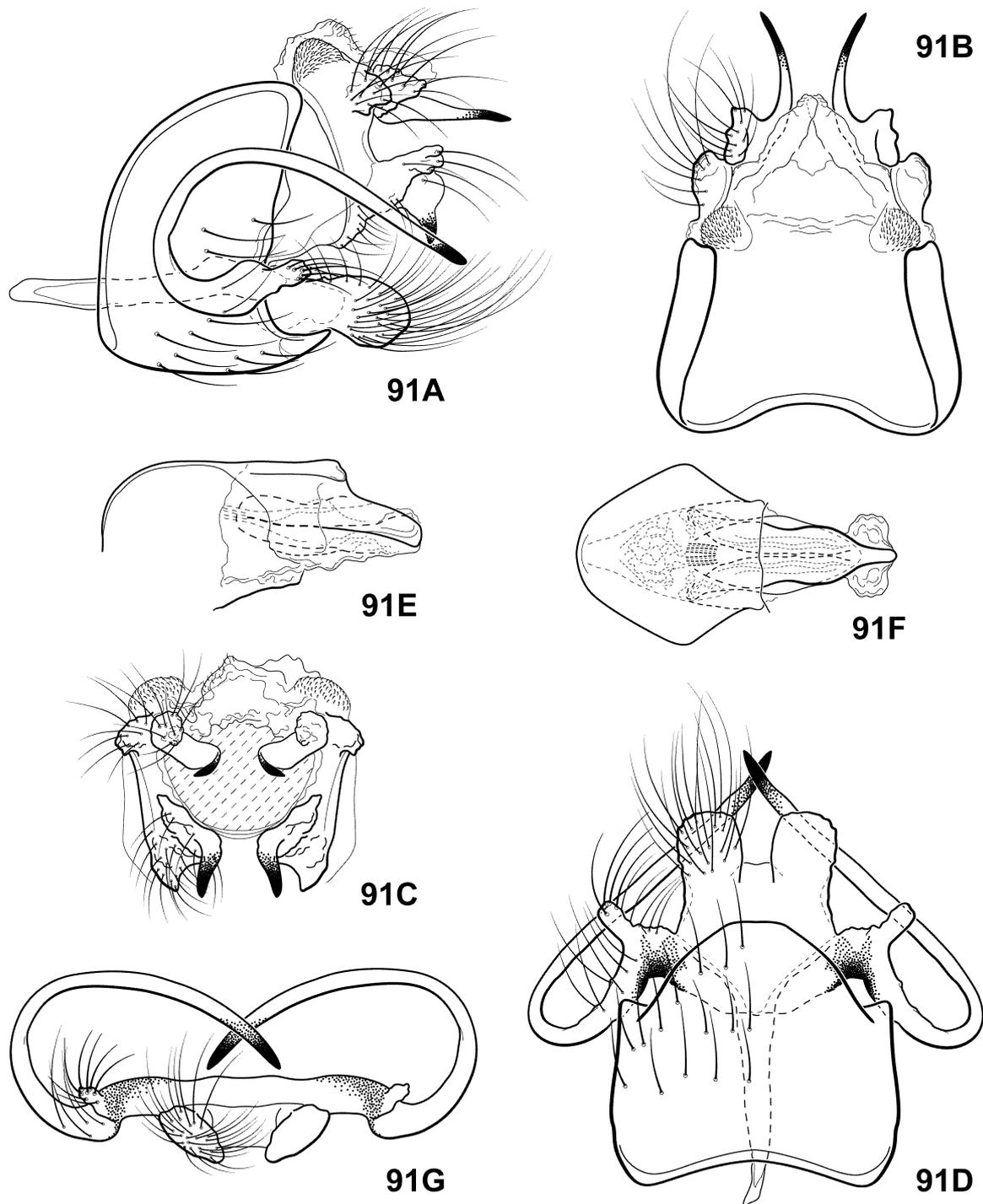


FIGURE 91. Male genitalia of *Polyplectropus robacki* (Yamamoto, 1966) (holotype): A—left lateral view; B—dorsal view; C—caudal view minus inferior appendages; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view; G—inferior appendages, caudal view.

Polyplectropus robacki is similar to *P. brborichorum*, new species, *P. bolivianus*, new species, and *P. andinensis*, new species in the overall shape of the male genitalia, which is unique for this subset of species in that the dorsal branch of the inferior appendage is thin and recurved. *Polyplectropus robacki* differs from

these species in the more linear intermediate appendage (being more robust in *P. bolivianus* and *P. andinensis* and digitate in *P. brborichorum*). In addition, *P. robacki* lacks endothecal phallic spines (present in *P. bolivianus*).

Adult. Length of forewing 5–7 mm, n=2. Color of head, thorax, and legs brown; setae on body grey and yellow; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view broadly deltoid, anterior margin concave, posterior margin highly convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like and stout, with long basal setae; in dorsal view basally broad, tapering into curved lanceolate rods, directed laterad; in caudal view lanceolate, curved, laterally flattened, narrowing and becoming sclerous apically, directed medially, with apex curved posterolaterad. Preanal appendage tripartite; dorsolateral process bulbous originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view ovate, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, with basodorsal digitate lobe, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with basal, digitate, setose dorsolateral projection. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, basally setose and broader, becoming highly curved, directed anterad beyond half of IX segment, recurved posteromesally; in ventral view narrow, basally sclerotized with digitate, laterally directed lobe, narrowing and recurving apically, expanding posterad into ventral branch; ventral branch setose, basally broad, in lateral view obovate, rounded posterad; in ventral view subquadrate, mesal margin straight, posterior margin rounded to truncate, shallowly converging mesally. Phallus short; dorsal phallic sclerite in lateral view cylindrical, apex pandurate; apex of dorsal phallic sclerite in dorsal view acute; endothecal membrane without embedded spines.

Material examined. **PERU: Cuzco:** Paucartambo, Paucartambo to Pilcopata rd., streamlet 50 m E Quita Calzon, 1050 m, 26.vi.1993, Blahnik & Pescador—1 male (NMNH); **Huanuco:** Tingo Maria, Huallaga River, 24–27.ix.1955, Roback—1 male (INHS) [holotype].

Distribution. Peru.

Remarks. The holotype is in moderately poor condition. The inferior appendage has become detached from the rest of the genital capsule.

***Polyplectropus santiago* (Ross)**

Figs. 92, 97C, 122

Polycentropus santiago Ross, 1947: 136. [Type locality: Mexico, Nuevo León, Villa Santiago; INHS; male].—Flint, 1968: 21 [to *Polyplectropus*].

—*proditus* Edwards, 1973: 502 [Type locality: United States, Texas, Frio River, Barksdale, Edwards Co. (erroneous, see Moulton, 1996); type destroyed].—Moulton, 1996: 273 [Neotype: United States, Texas, Bandera Co., Winans Creek @ TX Hwy 16, 4 mi N. Bandera; INHS; male; to synonymy].

Polyplectropus santiago conforms closely to other species in the group and is similar to *P. hamulus* Flint in the size and shape of the phallic spines as well as similarities in the shape of the ventral branch of inferior appendage. However, *P. santiago* is easily distinguished from *P. hamulus* and other members of the group by a shorter, laterally directed, and basally broader intermediate appendage. Additionally, the dorsal phallic sclerite is apically broad and highly sinuate (directed ventrad).

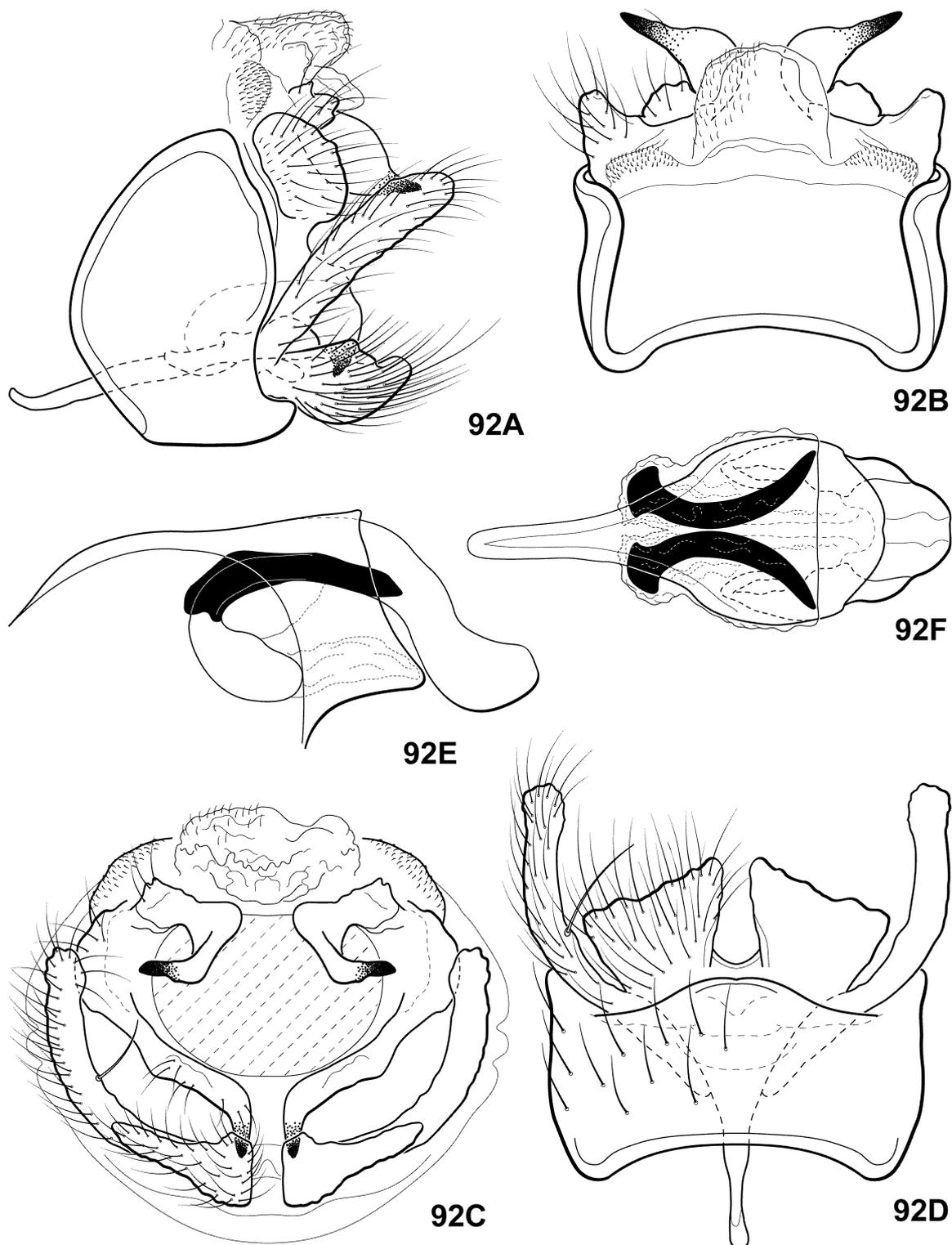


FIGURE 92. Male genitalia of *Polyplectropus santiago* (Ross, 1947) (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E— lateral view; F—dorsal view.

Adult. Length of forewing 6–6.5 mm, n=54. Color of head, thorax, and legs brown; setae on body grey and yellow; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view rounded, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X

membranous, smooth, without dorsal microsetae, digitate; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, basally broad and narrowing apically, with long basal setae and few scattered subapically; in dorsal view broad, tapering mesoventrally to acute apex; in caudal view lanceolate, curved, laterally flattened, narrowing and becoming sclerous apically, directed medially, with apex curved posterolaterad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process, bearing dorsal microsetae; mesolateral process setose; in dorsal view deltoid, in lateral view oblong; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin produced ventrad. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, directed posterodorsad; in ventral view narrow, lateral margin convex, slightly undulate, posterior margin rounded, mesal margin slightly undulate, concave, expanding posterad into ventral branch; ventral branch setose, basally broad, in lateral view ovate, broadly narrowing posterad; in ventral view broadly rhombate, mesal margin straight, shallowly converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex large, subquadrate; apex of dorsal phallic sclerite in dorsal view rounded; endothelial membrane with 2 stout, medium-sized, laterally directed, sclerotized spines.

Material examined. **MEXICO: Nuevo Leon:** Villa Santiago, 250 m, 22.vi.1940 Hoogstraal—1 male [holotype] (INHS); Municipio de Allende, Raíces, Río Ramos, 25°15'00"N, 100°02'00"W, 28.v.1985, Bueno-Soria & Contreras—1 male (IBUNAM); **San Luis Potosí:** El Salto Falls, 19.vi.1962, Mockford—2 males; **UNITED STATES: Texas: Bandera County:** Sabinal River @ FM 337, 14 mi E Leakey, 13.x.1995, Moulton & Abbot—11 males (DRC); Winans Creek @ TX Hwy16 ca. 4 mi N. Bandera, 12.iv.1992, Moulton & Stewart—9 males (DRC); **Blanco County:** Pedernales River, in Pedernales Falls State Park, downstream falls @ picnic area, 244 m, 24.vii.1985, Brigham & Brower—2 males (INHS); **Kerr County:** North Fork, Guadalupe River @ TX1340 about 7 mi w intersection of TX1340 & TX 39 (Bee Caves Creek), 30°03'25"N, 99°25'10"W, 561 m, 23.vii.1985, Brigham & Brower—2 males (INHS); Guadalupe River @ Kerrville, 0.1 mi downstream TX 16 in Louise Hays Park, 30°02'40"N, 99°08'25"W, 488 m, 24.vii.1985, A. Brower—1 males; **Uvalde County:** Nueces River, 18 mi NW Uvalde @ 19 mi crossing on TX 55, 29°23'45"N, 100°00'05"W, 335 m, 4.ix.1986, AR Brigham—23 males; **Val Verde County:** Devils River, Riffle 0.6 at upstream, TX 163 @ Rakers Crossings, 20 mi N. Comstock (Bakers Crossing 7.5 map), 29°58'10"N, 101°09'20"W, 457 m, 22.vii.1985, Brigham & Brower—2 males (DRC).

Distribution. Costa Rica, Honduras, Mexico, Nicaragua, Panama, USA (Texas) (Bueno-Soria 1990; Flint *et al.* 1999).

***Polyplectropus spiculifer* Flint**

Figs. 93, 136

Polyplectropus spiculifer Flint, 1971: 27. [Type locality: Brazil [Edo. Amazonas], Rio Maraujá, Endstation vor langer Cachoeira; NMNH; male].

Polyplectropus spiculifer is unique among this group of species in that a dorsolateral process arises dorsad of the mesolateral process and the bulbous structure with microsetae, usually present in other species of the group, is not as strongly defined. This dorsolateral process may be mistaken for a bipartite intermediate appendage, however, the intermediate appendage is simple, sinuate, and slender. The other structures of the male genitalia resemble *P. elongatus* (Yamamoto), however *P. spiculifer* has 2 medium-sized endothelial phallic spines, as well as the above mentioned characteristic making it easily distinguishable from all other species.

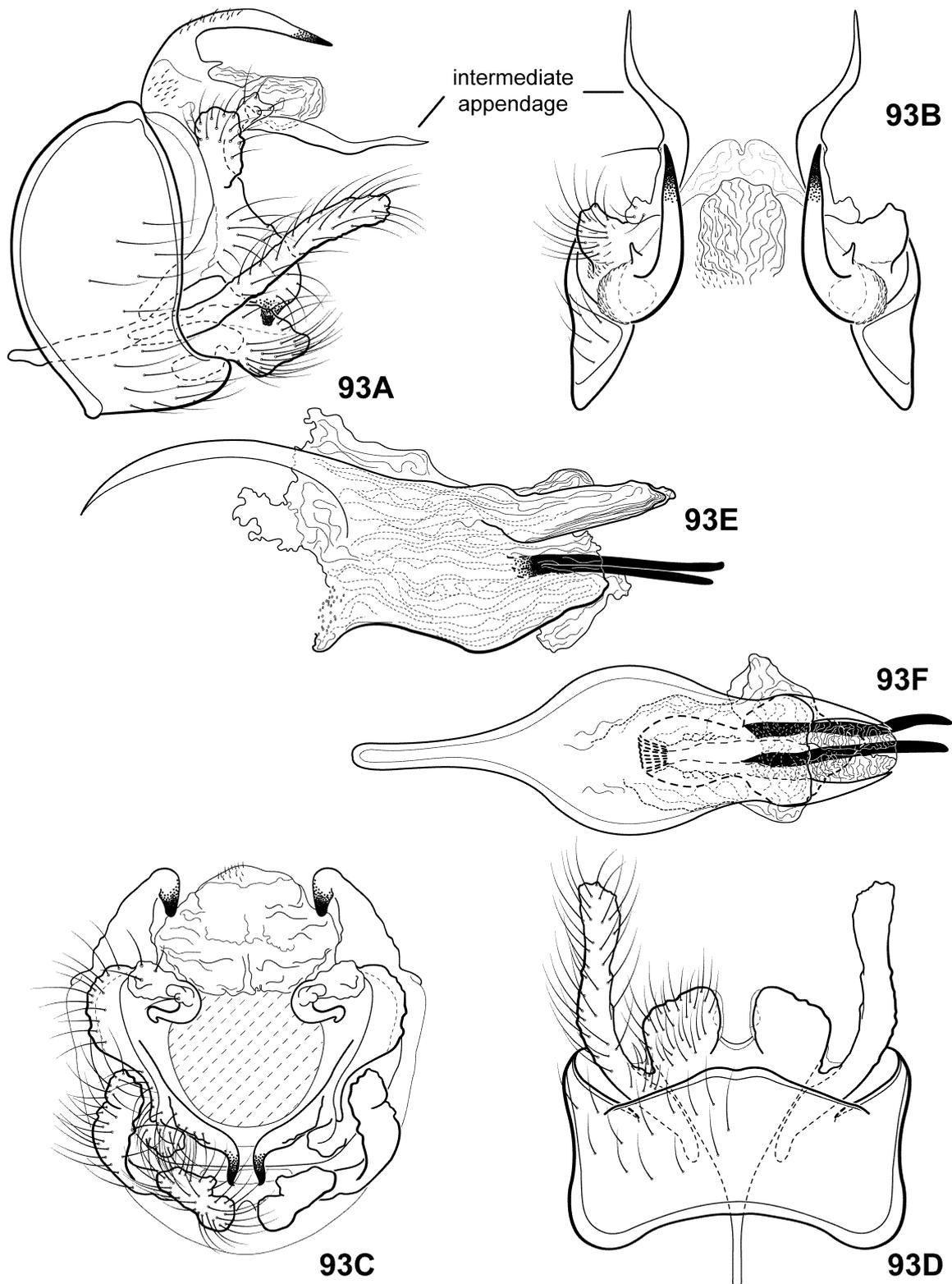


FIGURE 93. Male genitalia of *Polyplectropus spiculifer* Flint, 1971. (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Adult. Length of forewing 4.5 mm, n=1. Color of head, thorax, and legs brown; mottled wing (specimen preserved in alcohol).

Male genitalia. Sternum IX in lateral view rounded, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex, medially

shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obcordate; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, rod-like, with long basal setae; in dorsal view lanceolate, base circular; in caudal view lanceolate, elongate, apically curved, directed posterolaterad. Preanal appendage tripartite; dorsolateral process short, originating from dorsum of mesolateral process, recurved posterad, tapering mesally into acute apex, posteromedially with short spine and bearing basal and dorsal microsetae; mesolateral process setose; in dorsal view deltoid, in lateral view oblong; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin sinuate, posterior margin rounded; in caudal view not fused basomesally, processes separated, ventral margin of process cuspidate, with ventrolateral margin produced ventrad. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, slightly curved apically; in ventral view narrow, lateral margin sinuate, slightly undulate, posterior margin angled, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, short and basally broad, in lateral view ovate, broadly narrowing posterad; in ventral view subquadrate, mesal margin slightly convex, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view slightly sinuate, dorsally produced subapically, apex oblong; apex of dorsal phallic sclerite in dorsal view rounded; endothelial membrane with 2 thin, medium-sized spines.

Material examined. **BRAZIL: Amazonas:** Rio Marauíá, Endstation langer Cachoeira, Fluß tritt hier aus dem Gebirge mit starkem Gefälle, 28.i.1963, E. J. Fittkau—1 male (NMNH) [holotype].

Distribution. Brazil.

Polyplectropus squalus Bueno-Soria

Fig. 94, 121

Polyplectropus squalus Bueno-Soria, 1990: 385. [Type locality: Mexico, Chiapas, Chajul 90°30' y 91°E, y 16°00' y 16°30'N; IBUNAM; male].

Polyplectropus squalus is a typical species of the group, however it can be distinguished from all other species by the bipartite intermediate appendage, which has a shorter dorsal and a longer ventral process. In addition, the dorsal phallic sclerite has an emarginate apex and a pair of spines dorsally, which are directed anterad. The endothelial membrane of the phallus bears several highly curved, medium-sized endothelial spines. *Polyplectropus squalus* superficially resembles *P. santiago* (Ross) or *P. spiculifer* (Flint).

Adult. Length of forewing 4–4.5 mm, n = 9. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view rounded, anterior margin convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin convex, medially shallowly emarginate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, bipartite, with long basal setae and few scattered apically, with shorter dorsal lanceolate rod and twice as long ventral lanceolate rod, both, directed ventrolaterad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process; mesolateral process setose; in dorsal view deltoid, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin slightly produced. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, with apicoventral margin produced ventrad and curved ventrad; in ventral view narrow,

lateral margin convex and subapically concave, entire, posterior margin rounded, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, elongate and broad, in lateral view obovate, rounded posterad; in ventral view subquadrate, mesal margin slightly convex, shallowly converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, dorsally bearing anteriorly directed, stout sclerotized spine, apex oblong; endothecal membrane with 3 to 4, stout, medium-sized, highly curved spines.

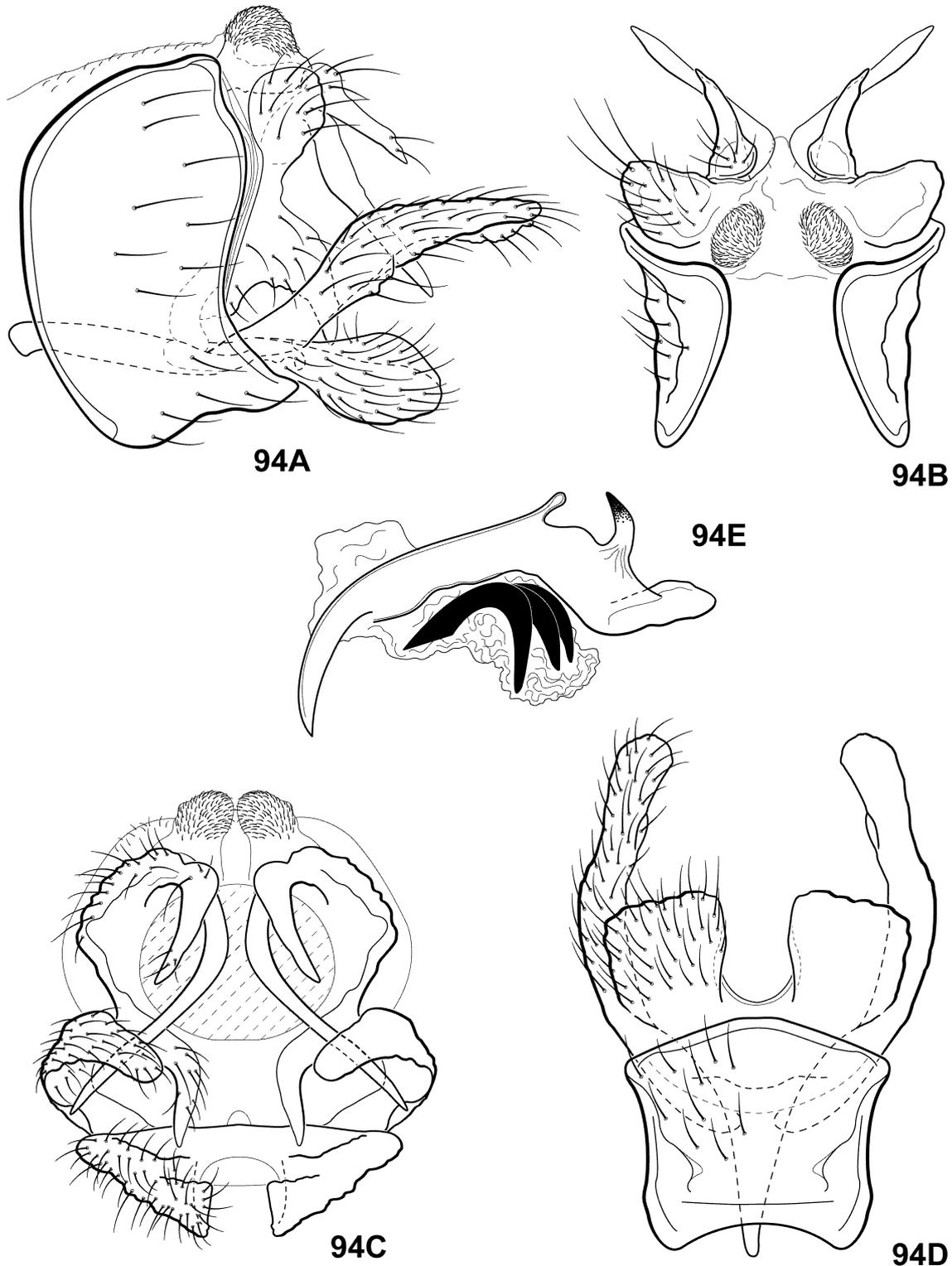


FIGURE 94. Male genitalia of *Polyplectropus squalus* Bueno, 1990 (paratype, specimen slightly damaged): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

Material examined. **MEXICO: Chiapas:** Ocosingo, Reserva Montes Azules, 23.iv.1986, R. Barba—6 males, 3 females (IBUNAM) (paratypes).

Distribution. Mexico.

Remarks. The holotype was not examined since the former keeper of Trichoptera at IBUNAM, Joaquin Bueno-Soria, was unable to locate it.

***Polyplectropus zamoranoensis*, new species**

Figs. 95, 121

Polyplectropus zamoranoensis is most similar to *P. zaragozai* Bueno in several aspects of the male genitalia, particularly in the inferior appendage and superficially in the phallus. *Polyplectropus zamoranoensis* can be distinguished from *P. zaragozai* by the number, shape and direction of the endothecal spines in the phallus; 2 short, ventrally curved in *P. zamoranoensis* and 6 medium-sized spines in *P. zaragozai* on the whole directed posterad. Additionally, the dorsolateral arm of the phallic sclerite is relatively larger and directed dorsad in *P. zamoranoensis* and the dorsal branch of the inferior appendage is also longer.

Adult. Length of forewing 6.5 mm, n=4. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view rounded, anterior margin highly convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin highly concave, posterior margin convex and sinuate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, rod-like, with long basal setae; in dorsal view slightly broad basally, tapering into curved rods; in caudal view lanceolate, curved, narrowing and becoming sclerous apically, directed mesoventrad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process; mesolateral process setose; in dorsal view deltoid, in lateral view subquadrate; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin convex; in caudal view not fused basomesally, processes separated, ventral margin of process acute, with ventrolateral margin slightly produced. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, basally broad and narrowing apically; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, elongate, in lateral view ovate, narrowing posterad; in ventral view deltoid, posteromesal margin produced posterad into pointed apex, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view slightly sinuate, dorsally produced subapically, apex pandurate; apex of dorsal phallic sclerite in dorsal view emarginate, dorsolateral arm of phallic sclerite apically acute and extending beyond apex of sclerite and directed dorsolaterad; endothecal membrane with 2 short, ventrad-directed spines.

Holotype male: HONDURAS: El Zamorano, 8.iv.1966, G. F. Freytag—(UMSP000100919) (NMNH).

Paratypes: HONDURAS: El Zamorano, 8.iv.1966, G. F. Freytag—3 females (NMNH).

Distribution. Honduras.

Etymology. This species is named for the type locality and the world recognized Institution therein located, which bears the same name, Zamorano.

Remarks. This species was originally part of the paratype series of *P. zaragozai*.

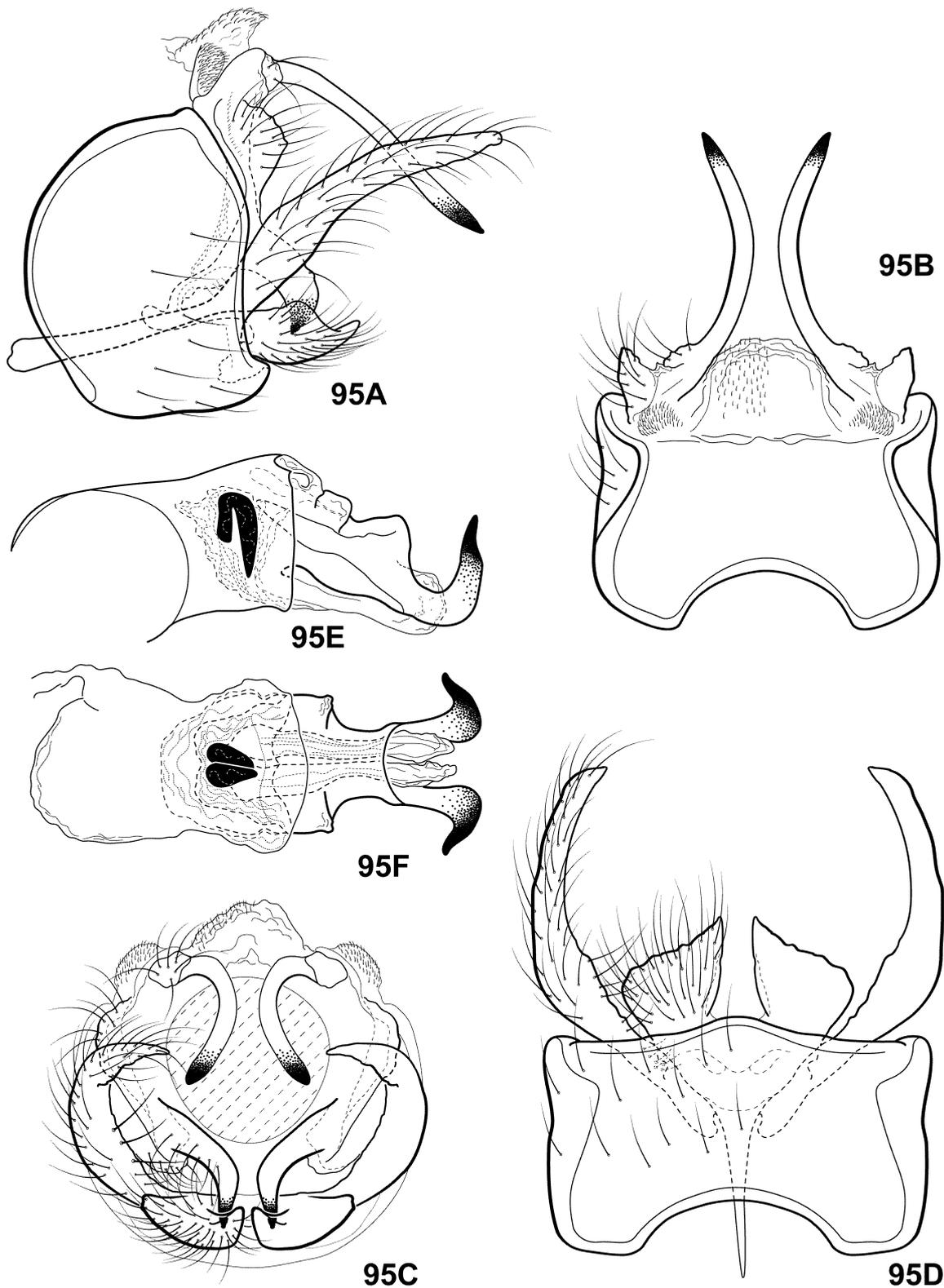


FIGURE 95. Male genitalia of *Polyplectropus zamoranoensis*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E— lateral view; F—dorsal view.

***Polyplectropus zaragozai* Bueno-Soria**

Figs. 96, 121

Polyplectropus zaragozai Bueno-Soria, 1990: 387. [Type locality: Mexico, Hidalgo, carretera 105, a 60 kms al NO de Pachuca en el Río Tulancingo, Puente Venados; IBUNAM; male].

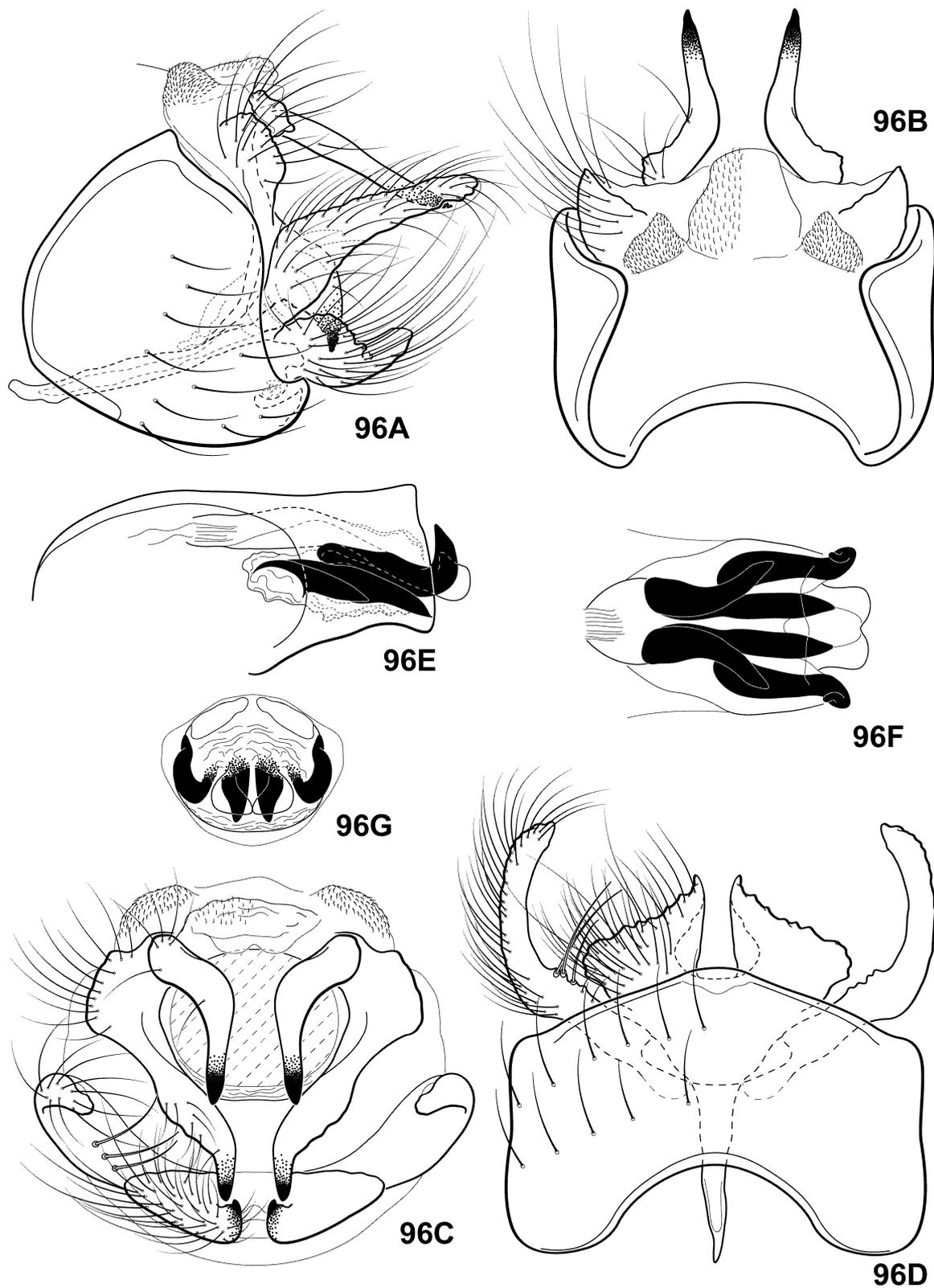


FIGURE 96. Male genitalia of *Polyplectropus zaragozai* Bueno, 1990 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–G—phallus: E—lateral view; F—dorsal view; G—caudal view.

Polyplectropus zaragozai resembles *P. zamoranoensis*, new species. Both species have comparable male genitalia, particularly in the inferior appendage, but less so in the phallus. *Polyplectropus zaragozai* has 6

medium-sized spines in endothecal membrane of the phallus. In *P. zaragozai* there is a mesal pair directed posterad, a dorsobasal pair curved laterad, and an apicodorsal pair directed dorsad. *P. zamoranoensis* has 2 short, ventrally curved spines in the endothecal membrane. Additionally, the dorsolateral arm of the phallic sclerite is relatively smaller in *P. zaragozai* (in *P. zamoranoensis* these are directed dorsolateral, are very prominent and may be confused for endothecal spines), as well as the dorsal branch of the inferior appendage.

Adult. Length of forewing 6–6.5 mm, n=16. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

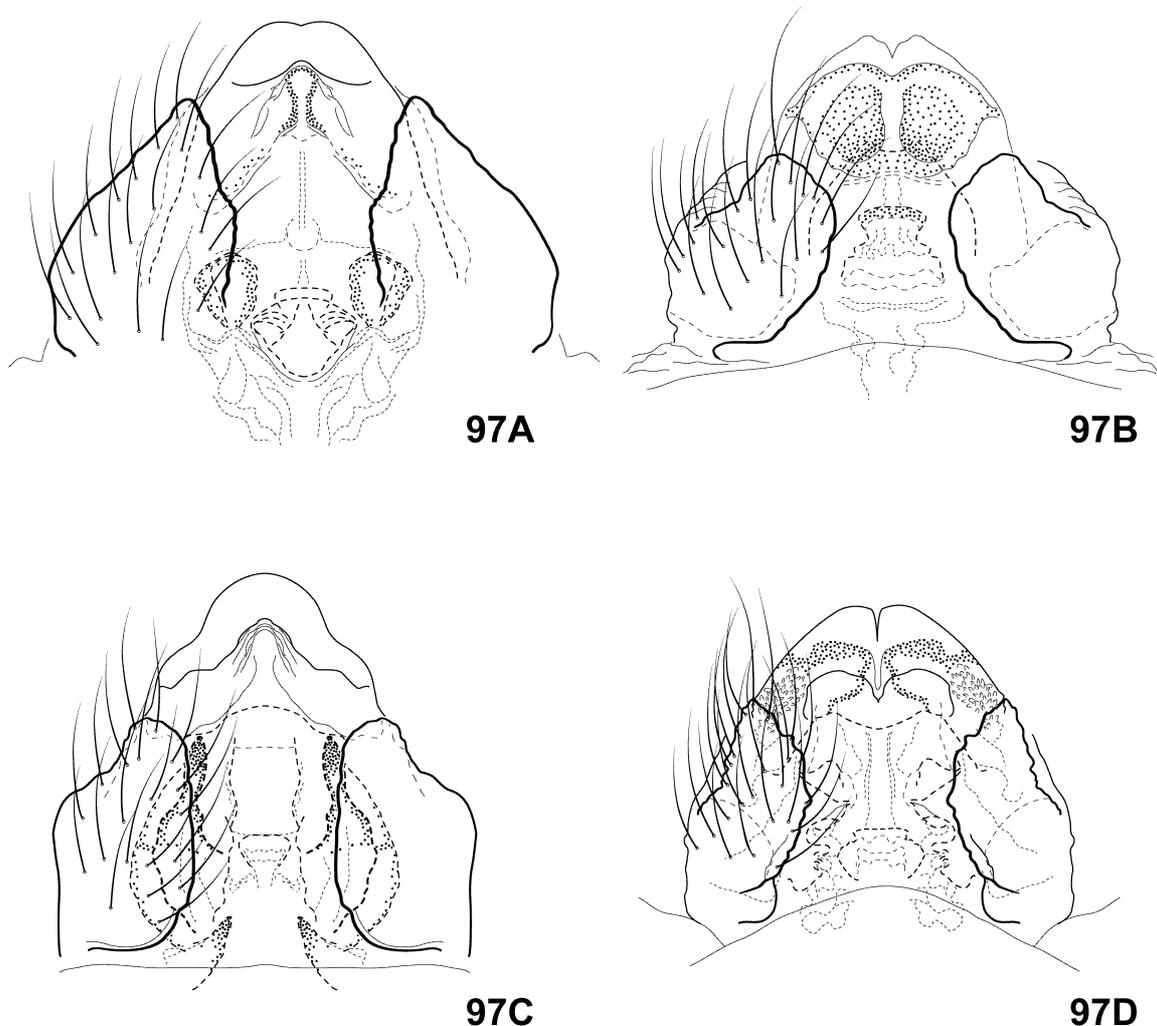


FIGURE 97. Female genitalia of *Polyplectropus* spp. Ventral view of ventral plates and S VIII: A—*Polyplectropus herrerae* Bueno & Hamilton, 1990; B—*Polyplectropus rondoniensis*, new species; C—*Polyplectropus santiago* (Ross, 1947); D—*Polyplectropus tragularius*, new species.

Male genitalia. Sternum IX in lateral view rounded, anterior margin highly convex, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin highly concave, posterior margin convex and sinuate. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obtuse; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, rod-like, with long basal setae; in dorsal view slightly broad basally, tapering into curved rods; in caudal view lanceolate, curved, narrowing and becoming sclerous apically, directed mesoventrad. Preanal appendage tripartite; dorsolateral process bulbous, originating from dorsum of mesolateral process; mesolateral process setose; in dorsal view deltoid, in lateral view subquadrate; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin convex; in caudal view not fused basomesally, processes

separated, ventral margin of process acute, with ventrolateral margin slightly produced. Inferior appendage bipartite with anterior basal plate extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view lanceolate, basally broad and narrowing apically; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin entire, concave, expanding posterad into ventral branch; ventral branch setose, elongate, in lateral view ovate, narrowing posterad; in ventral view deltoid, posteromesal margin produced posterad into pointed apex, shallowly converging mesally. Phallus long; dorsal phallic sclerite in lateral view slightly sinuate, dorsally produced subapically, apex pandurate; apex of dorsal phallic sclerite in dorsal view emarginate; endothecal membrane with 6 stout sclerotized spines, a mesal pair directed posterad, a dorsobasal pair curved laterad, and an apicodorsal pair directed dorsad.

Material examined. **MEXICO: Hidalgo:** Río Tulancingo, 60 km N.E. de Pachuca, [20°07'00"N, 98°44'00"W], 17.v.1980, J. Bueno-Soria—2 males [paratype]; 1 female (IBUNAM); Río Venados, [20°24'00"N, 98°58'00"W], 30.iii.1980. P. Carter—2 males (IBUNAM); 19.iv.1980, P. Carter—3 males (IBUNAM); 12.vii.1980, P. Carter—5 males (IBUNAM); **Veracruz:** Puente Sotepaan, 18°14'00"N, 94°52'00"W, 8.xii.1985, R. Barba—2 males, 1 female [paratypes] (IBUNAM).

Distribution. Guatemala, Honduras, Mexico (Bueno-Soria 1990).

Key to males of *P. santiago* species group

- 1 Dorsolateral process of preanal appendage absent, only short bulbous structure with dorsal microsetae present (Fig. 80) 2
- Short dorsolateral process of preanal appendage present, small remnant basal bulbous structure also visible (Fig. 93) *P. spiculifer*, n. sp., p. 183

- 2(1) Intermediate appendage with a single process (Figs. 72, 77) 4
- Intermediate appendage with multiple processes (more than 1) (Figs. 84, 94) 3

- 3(2) Intermediate appendage with 3 processes of roughly equal size (Fig. 84); phallus dorsally unmodified *P. flavicornis* Ulmer, p. 166
- Intermediate appendage with 2 processes of unequal size; phallus with paired, anteriorly directed dorsal projections (Fig. 94) *P. squalus* Bueno-Soria, p. 185

- 4(2) Dorsal branch of inferior appendage highly curved, narrow and elongate, base slightly enlarged (Fig. 73) ... 5
- Dorsal branch of inferior appendage not highly curved, clavate (Fig. 72) 8

- 5(4) Intermediate appendage apically highly sclerotized (Fig. 80) 6
- Intermediate appendage apically lightly sclerotized (apex may not be easily visible) (Fig. 78) *P. brborichorum*, n. sp., p. 157

- 6(5) Endothecal phallic spines absent (Fig. 73) 7
- Endothecal phallic spines present (Fig. 75) *P. bolivianus*, n. sp., p. 151

- 7(6) Dorsal branch of inferior appendage short and basally slightly produced anterad; intermediate appendage gradually narrowing apically (Fig. 73) *P. andinensis*, n. sp., p. 148
- Dorsal branch of inferior appendage elongate and basally produced anterad to almost half of sternum IX; intermediate appendage rapidly narrowing apically (Fig. 91) *P. robacki* (Yamamoto), p. 180

- 8(4) Intermediate appendage highly sclerotized (Figs. 72, 89); dorsolateral arm of dorsal phallic sclerite slightly produced beyond apex or not 11
- Intermediate appendage membranous; dorsolateral arm of dorsal phallic sclerite greatly produced beyond apex

	(Fig. 88)	9
9(8)	Dorsolateral arm of phallic sclerite narrow, digitate in lateral view (Fig. 82)	10
-	Dorsolateral arm of phallic sclerite broad, quadrate in lateral view; intermediate appendage apically not produced laterad (Fig. 77)	<i>P. bravoae</i> Bueno-Soria, p. 154
10(9)	Dorsal branch of inferior appendage short; endothelial phallic spines short; apex of dorsolateral arm of phallic sclerite turned dorsad (Fig. 88)	<i>P. laminatus</i> (Yamamoto), p. 174
-	Dorsal branch of inferior appendage elongate; endothelial phallic spines long, sinuate (Fig. 82); apex of dorsolateral arm of phallic sclerite slightly turned dorsad (Fig. 82E)	<i>P. ecuadoriensis</i> , n. sp., p. 162
11(8)	Endothelial phallic spines as long as or longer than dorsal phallic sclerite	12
-	Endothelial phallic spines shorter than dorsal phallic sclerite	16
12(11)	Apex of ventral branch rounded (Fig. 72A); endothelial phallic spines not curved laterad in opposite directions (Figs. 80F, 81F); dorsal branch of inferior appendage subapically not produced ventrad (Fig. 72A)	13
-	Apex of ventral branch acute; endothelial phallic spines curved laterad (each in opposite directions); dorsal branch of inferior appendage subapically produced ventrad (Fig. 89A)	<i>P. maculatus</i> , n. sp., p. 176
13(12)	Endothelial phallic spines basally fused no more than ¼ of entire length of spine (Figs. 83, 90)	14
-	Endothelial phallic spine basally fused more than ¾ of entire length of spine (Fig. 72)	<i>P. alleni</i> (Yamamoto), p. 146
14(13)	Endothelial phallic spines not robust, less than 1 ½ times size of dorsal phallic sclerite, apex rounded (Figs. 80E,F, 81F)	15
-	Endothelial phallic spines robust and almost 1 ½ times size of dorsal phallic sclerite, apex acute (Fig. 90E) ..	<i>P. oaxaquensis</i> Bueno-Soria, p. 178
15(14)	Ventral branch of inferior appendage short, posterior margin slightly truncate; dorsal branch sinuate (Fig. 83A)	<i>P. elongatus</i> (Yamamoto), p. 164
-	Ventral branch of inferior appendage deltoid (Fig. 80D); dorsal branch entire (Fig. 80A); sternum IX rounded (Fig. 80A)	<i>P. dubitatus</i> Flint, p. 160
16(11)	Intermediate appendage not basally broad, lanceolate (Fig. 87A); apex of dorsal phallic sclerite digitate (Fig. 86E) or narrowed (Fig. 87E)	17
-	Intermediate appendage basally broad, robust (Figs. 92A, B); apex of dorsal phallic sclerite broadened, directed ventrad (Fig. 92E)	<i>P. santiago</i> (Ross), p. 181
17(16)	More than 2 endothelial phallic spines	18
-	Two endothelial phallic spines	19
18(17)	Four endothelial phallic spines; apex of dorsal phallic sclerite curved dorsad (Fig. 87)	<i>P. herrerae</i> Bueno-Soria & Hamilton, p. 172
-	Six endothelial phallic spines and apicodorsal pair apically turned dorsad (Fig. 96)	<i>P. zaragozai</i> Bueno-Soria, p. 188
19(18)	Endothelial phallic spines not acutely curved ventrad; apex of dorsolateral arm of phallic sclerite not modified (Fig. 86E)	20
-	Endothelial phallic spines acutely curved ventrad; apex of dorsolateral arm of phallic sclerite sclerotized and directed dorsad (Figs. 95E, F)	<i>P. zamoranoensis</i> , n. sp., p. 187
20(19)	Base of intermediate appendage not sclerotized, linear (Fig. 76A)	21
-	Base of intermediate appendage sclerotized and apically upturned (Fig. 85A)	<i>P. hamatus</i> Bueno-Soria, p. 168

- 21(20) Ventral branch of inferior appendage not acutely pointed; base of endothecal phallic spines not broadened (Fig. 74) 22
 - Ventral branch of inferior appendage acutely pointed; base of endothecal phallic spines broadened, spines not curved (Fig. 76) *P. brachyscolus* Flint, p. 153
- 22(21) Endothecal phallic spines curved; dorsal phallic sclerite subapically produced dorsad (Figs. 74E, F)
 *P. banksianus* Flint, p. 149
 - Endothecal phallic spines linear; apex of dorsal phallic sclerite pandurate and subapically not produced dorsad (Fig. 86E) *P. hamulus* Flint, p. 170

***Polyplectropus thilus* species group**

This group was designated by (Yamamoto 1967) and included *P. deltoides* (Yamamoto) and *P. thilus* (Denning). Several species originally in this group are now in the *P. bredini* group. Species in the group are quite homogeneous with mostly differing in the shape of the intermediate appendage, the mesoventral process of the preanal appendage, and in slight differences in the shape of the inferior appendage. The *P. thilus* group is characterized by the combined possession of the following traits (Figs. 98-116):

1. Presence of an elongate, sclerotized dorsolateral process of the preanal appendage;
2. presence of a papillate lobe;
3. shape of intermediate appendage with apex turned mesally;
4. presence of microsetae interspersed throughout surface of intermediate appendage;
5. dorsolateral arm of dorsal phallic sclerite tapering subapically.

***Polyplectropus blahniki*, new species**

Figs. 98, 99A, B, 135

—[as *Polyplectropus recurvatus* (Yamamoto), Flint 1981: 16].

This species was identified by Flint (1981) as *P. recurvatus* (Yamamoto), however it differs from this and other species in the *P. thilus* group by the presence of a digitate flange bearing 3–4 sclerotized spines along the posteroventral margin of the dorsal branch of the inferior appendage. *Polyplectropus blahniki* also resembles *P. zuliae*, new species on the overall shape of the intermediate appendage, on the rounded shape of the mesolateral process of the preanal appendage, on the shape of the phallus, and on the shape of the median papillate lobe. Additional characters distinguishing *P. blahniki* from *P. zuliae* and *P. recurvatus* are the presence of a short, rounded ventral branch of the inferior appendage (best observed in ventral view), the shape of the posterior margin of the mesoventral process of the preanal appendage, and the more rounded shape of the intermediate appendage. The females of *P. blahniki* and *P. zuliae* are indistinguishable.

Adult. Length of forewing 4.7–5 mm, n = 6. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin sinuate, posterior margin sinuate; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view digitate. Intermediate appendage not longer than inferior appendage, stout, with long and short setae throughout; in dorsal view broad, tapering mesoventrally to rounded apex; in caudal view digitate, narrowing apically, directed posteromesad; median papillate lobe very small, flanking phallocrypt

laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering

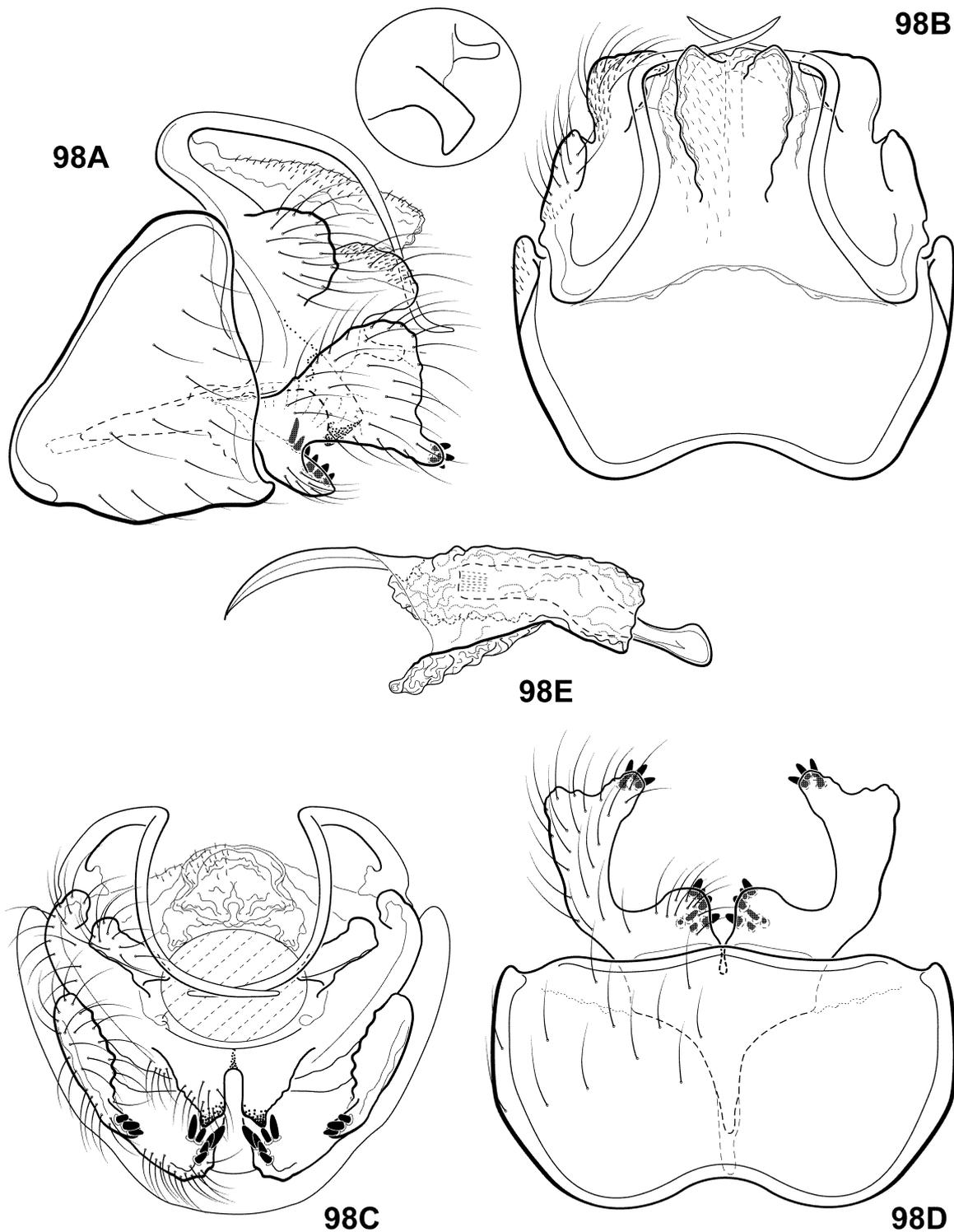


FIGURE 98. Male genitalia of *Polyplectropus blahniki*, new species (holotype): A—left lateral view and inset of mesoventral process of preanal appendage and papillate lobe; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin angled, in caudal processes slightly separated, ventral margin of process

rounded, basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view deltoid, posteroventral margin produced posterad into digitate flange, bearing 3–4 sclerotized spines; in ventral view narrow, lateral margin slightly convex, sinuate, posterior margin undulate and concave, apically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, short, bearing 4–7 robust, sclerotized spines basally and apically; in lateral view oblong, narrowing posterad; in ventral view rounded, mesal margin slightly concave, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view emarginate; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; in dorsal view tapering subapically; endothelial membrane without embedded spines.

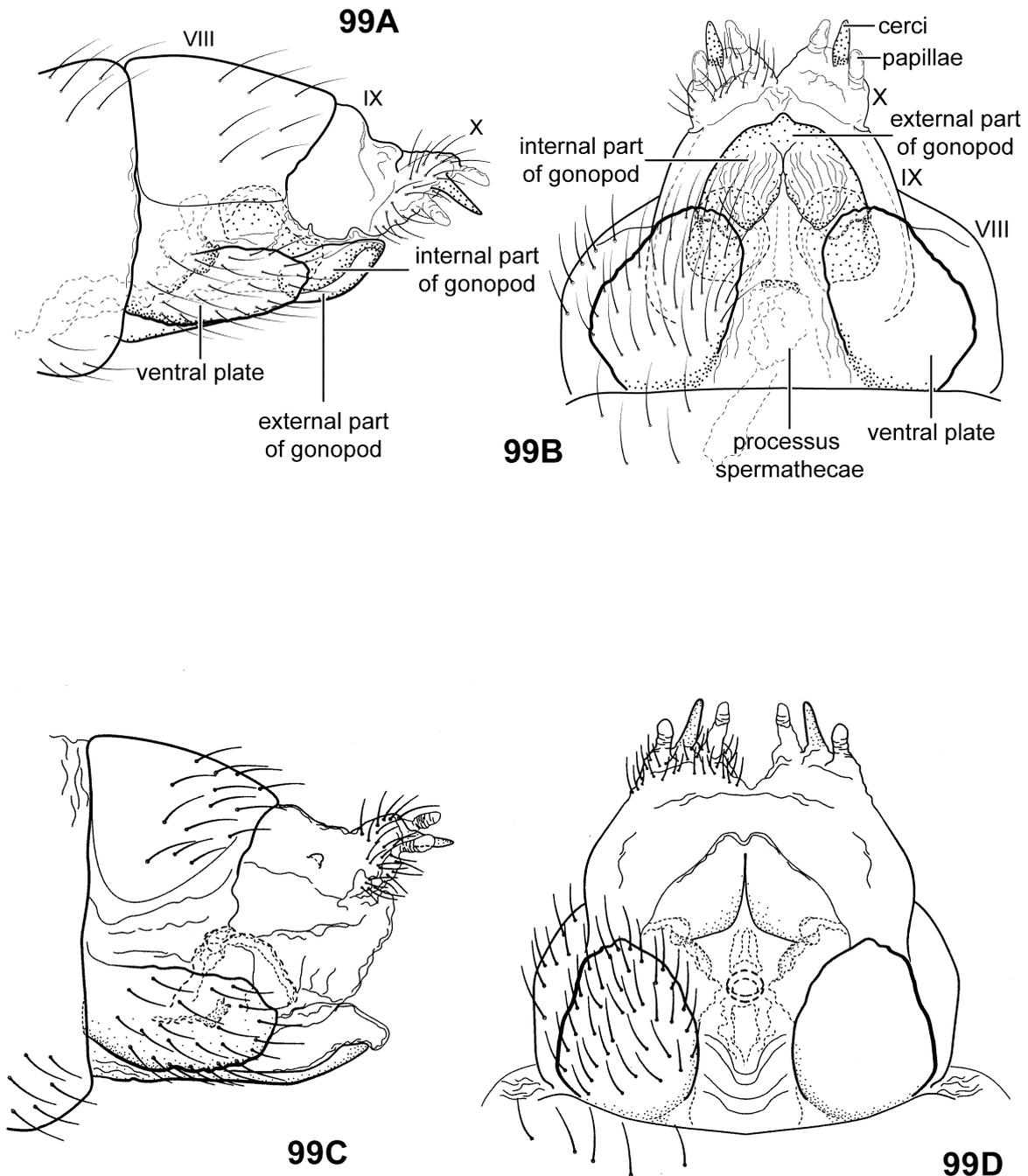


FIGURE 99. Female genitalia: *Polyplectropus blahniki*, new species. A—left lateral view; B—ventral view; *Polyplectropus venezolanus*, new species. C—left lateral view; D—ventral view.

Female genitalia. Ventral plates of segment VIII setose, in ventral view oblong, lateral margin narrowing medially; in lateral view oblong, narrowly fused to sternite VIII; external part of gonopod of segment VIII in ventral view with posterior margin acuminate; in lateral view clavate, curved dorsad; internal part of gonopod sclerotized, in ventral view with mesal margin acutely angled posterad, meeting mesally, surface rugous. Tergum IX devoid of setae, lightly sclerotized. Segment X setose, apically bearing a pair of sclerotized cerci surrounded by 2 pairs of membranous digitate processes. Genital chamber opening to processus spermathecae through sclerotized circular opening of ductus spermathecae.

Holotype male: VENEZUELA: Falcón: P. N. Cueva de la Quebrada del Toro, 10°49'35"N, 69°07'59"W, 530 m, 11.vi.2001, Holzenthall, Blahnik, Paprocki & Cressa—(UMSP000074855) (UMSP).

Paratypes: VENEZUELA: Aragua: Río El Limon, fish hatchery, Maracay, 10°14'49"N, 67°35'45"W, 19–20.xi.1974, F. H. Weibezahn—1 male (NMNH); 30.i.1975, F. H. Weibezahn—3 males (NMNH); 25–26.ii.1975, F. H. Weibezahn—1 female (NMNH).

Distribution. Venezuela.

Etymology. It gives us great pleasure to name this species in honor of a great Trichopterozoologist, collector, and scientist, Dr. Roger J. Blahnik; who was one of the collectors of this species, and whose discussions and exchanges we value greatly.

***Polyplectropus carolae* Bueno-Soria**

Figs. 100, 126

Polyplectropus carolae Bueno-Soria, 1990: 364. [Type locality: Mexico, Veracruz, Estación de Biología—UNAM "Los Tuxtlas" unnamed stream E. of station, NMNH, male.]

Polyplectropus carolae resembles *P. thilus* (Denning) in the presence of an elongate, dorsolateral process and shape of the mesoventral process of the preanal appendage, in the shape of the dorsal branch of the inferior appendage, and in the overall shape of the phallus. *Polyplectropus carolae* can be distinguished from *P. thilus* by the elongate ventral branch of the inferior appendage, being almost $\frac{2}{3}$ as long as the dorsal branch and $\frac{1}{2}$ as long as in *P. thilus*, by the broader intermediate appendage, by the more robust papillate lobe, and by the shorter, yet still elongate, dorsolateral process of the preanal appendage.

Adult. Length of forewing 3.8 mm, n = 2. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin sinuate and submedially produced; in ventral view rectangular, anterior margin concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, broad and membranous and with long apical setae and ventral digitate lobe; in dorsal view digitate; in caudal view broadly deltoid, produced posteroventrad, directed posterolaterad, ventral projection may be papillate lobe. Preanal appendage tripartite; dorsolateral process elongate, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view obovate, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin convex; in caudal view processes separated, ventral margin of process acute, with ventrolateral margin slightly produced. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, posterior margin truncate; in ventral view narrow, lateral margin slightly convex, slightly undulate, posterior margin rounded, mesal margin entire, expanding posterad into ventral branch; ventral branch setose, elongate, bearing 4–7 robust, sclerotized spines along entire dorsal surface; in lateral view lanceolate, narrowing posterad; in ventral

view deltoid, posteromesal margin convex, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; apex of dorsal phallic sclerite in dorsal view emarginate; endotheal membrane without embedded spines.

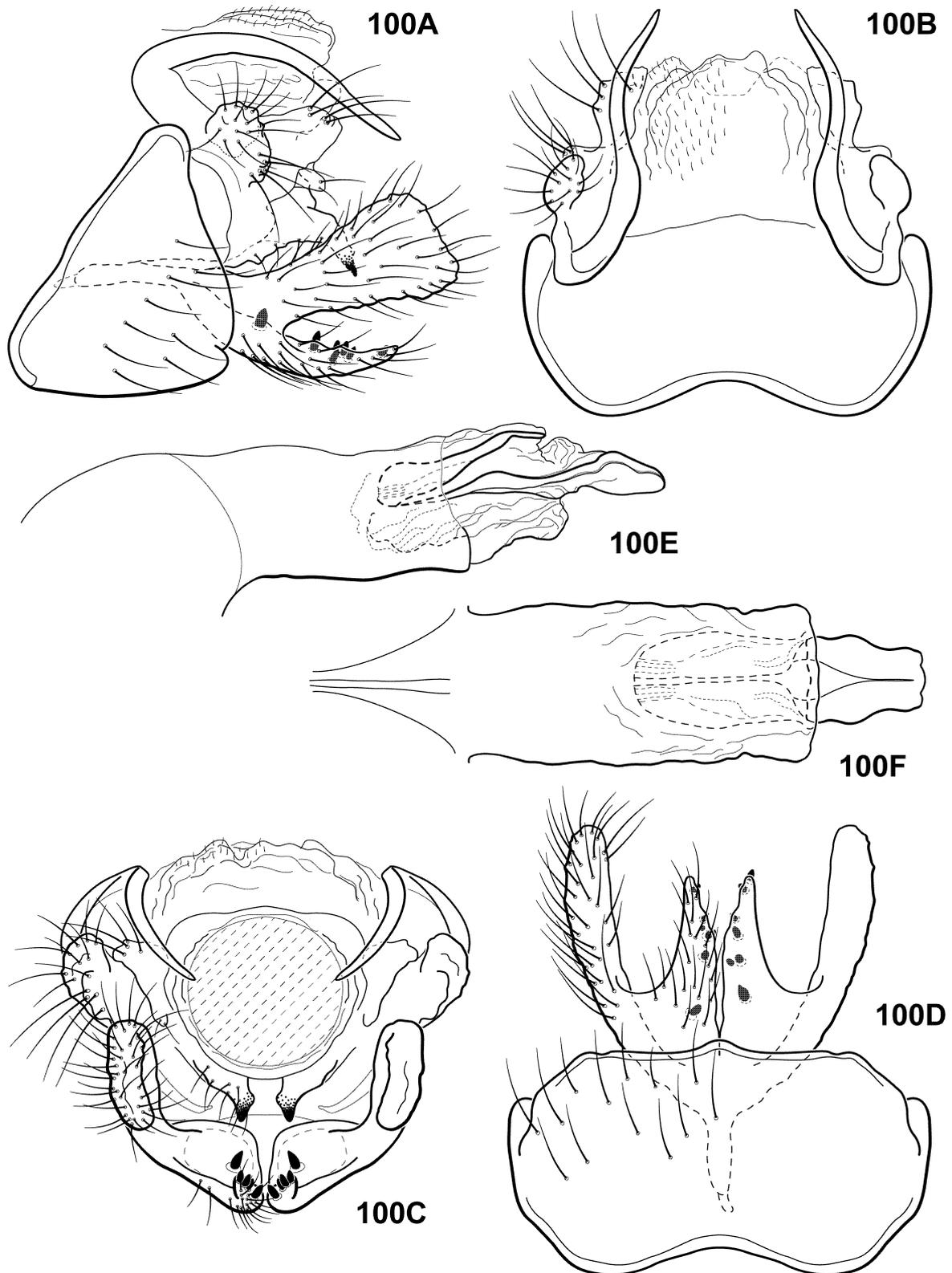


FIGURE 100. Male genitalia of *Polyplectropus carolae* Bueno, 1990 (paratype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F— dorsal view.

Material Examined. **MEXICO: Veracruz:** Estación de Biología—UNAM "Los Tuxtlas" unnamed stream, E. of station, 18.xii.1983, Hamilton, Holzenthal & Kovach—2 males [holotype] (NMNH) [paratype] (UMSP).

Distribution. Mexico.

Remarks. The abdomen of the holotype was not found in the vial. However, paratype were compared with the original description and illustrated.

***Polyplectropus cressae*, new species**

Figs. 101, 126

Polyplectropus cressae differs from all other species in the group by the broad dorsal branch of the inferior appendage, which has a truncate posterior margin and mesally has medial semicircular ridges, and by the broad shape of the intermediate appendage. This species superficially resembles *P. deltoides* in the shapes of the dorsolateral and mesoventral process of the preanal appendage.

Adult. Length of forewing 4–4.9 mm, n = 6. Color of head and thorax brown, legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin sinuate and submedially produced, posterior margin sinuate; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obcordate. Intermediate appendage not longer than inferior appendage, stout, with long and short setae throughout; in dorsal view quadrate, rounded posterad; in caudal view digitate, parallel sided, broadly rounded apically, directed posteromesad; median papillate lobe very small, flanking phallocrypt laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex, slightly expanding subapically; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose, in lateral view subquadrate with ventrad-directed sclerotized apex, anteroventral margin angled, posterior margin convex; in caudal view processes slightly separated, ventral margin of process subacute, with posterior margin sinuate, tapering mesally. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view broadly pandurate, with posterior margin truncate to slightly convex; in ventral view broad, lateral margin convex, entire, mesal margin undulate, convex, becoming concave, expanding posterad into ventral branch, dorsal branch in oblique lateral view mesally with medial semicircular ridges; ventral branch setose, short, bearing 4–7 robust, sclerotized spines basally and apically; in lateral view digitate, narrowing posterad; in ventral view deltoid, mesal margin subapically produced, rapidly converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; in dorsal view tapering subapically; endothecal membrane without embedded spines.

Female genitalia. Ventral plates of segment VIII setose, in ventral view ovate, narrowing posteromesally; in lateral view deltoid, narrowing posterad, broadly fused to sternite VIII; external part of gonopod of segment VIII in ventral view with posterior margin slightly obtuse; in lateral view scirrhus, curved posterad; internal part of gonopod sclerotized, in ventral view with mesal margin rounded, meeting mesally. Tergum IX devoid of setae, lightly sclerotized. Segment X setose, apically bearing a pair of sclerotized cerci surrounded by 2 pairs of membranous digitate processes. Genital chamber opening to processus spermathecae through sclerotized circular opening of ductus spermathecae.

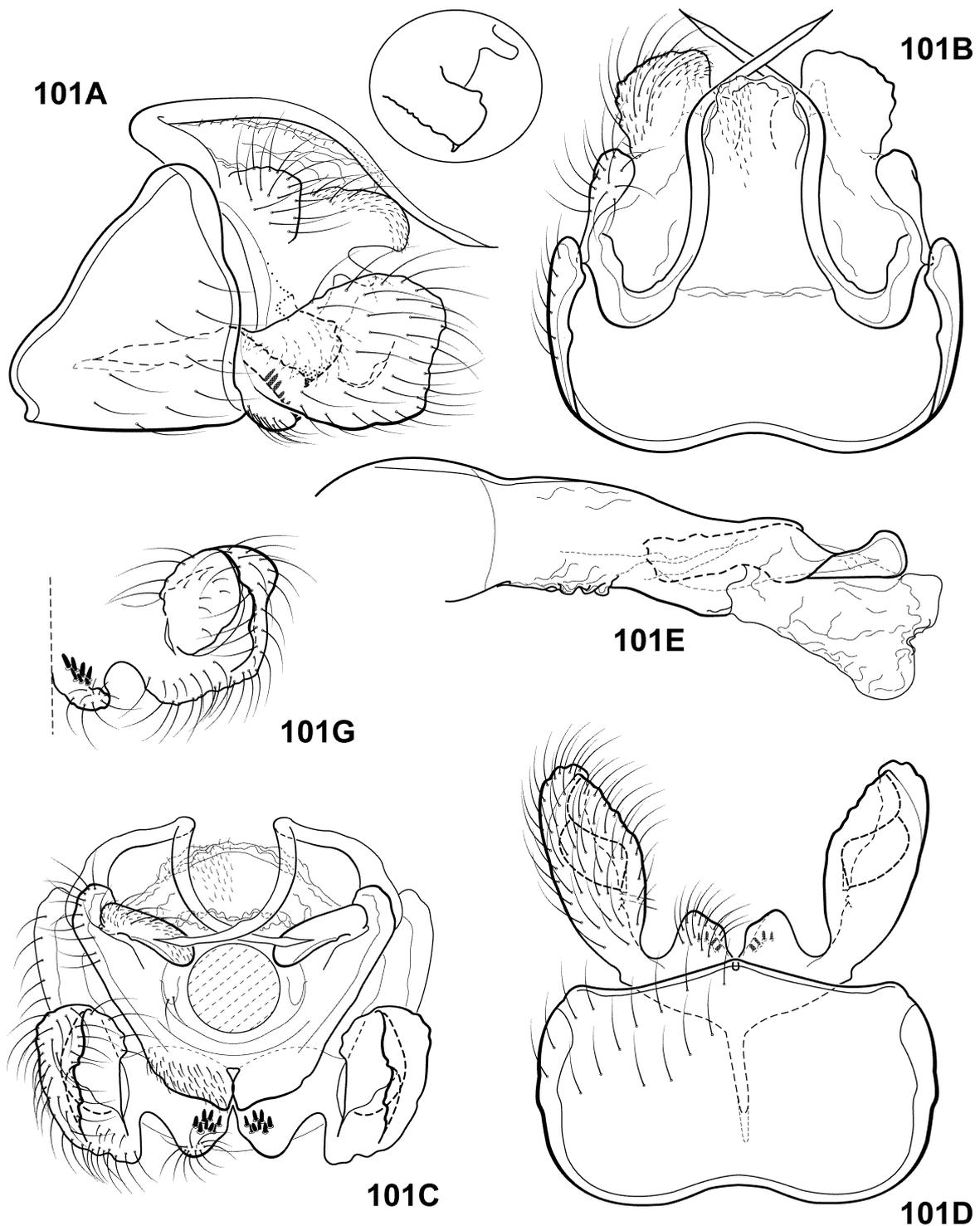


FIGURE 101. Male genitalia of *Polyplectropus cressae*, new species (holotype): A—left lateral view and inset of mesoventral process of the preanal appendage and papillate lobe of the intermediate appendage; B—dorsal view; C—caudal view; D—ventral view; E—phallus, with endothecal membrane everted, lateral view; G—inferior appendage, oblique lateral view.

Holotype male: VENEZUELA: Lara: Parque Nacional Terepaima, Quebrada San Antonio, 9°51'45"N, 69°13'06"W, 631 m, 17.vi.2001, Holzenthal, Blahnik, Paprocki & Cressa—(UMSP000074841) (UMSP).

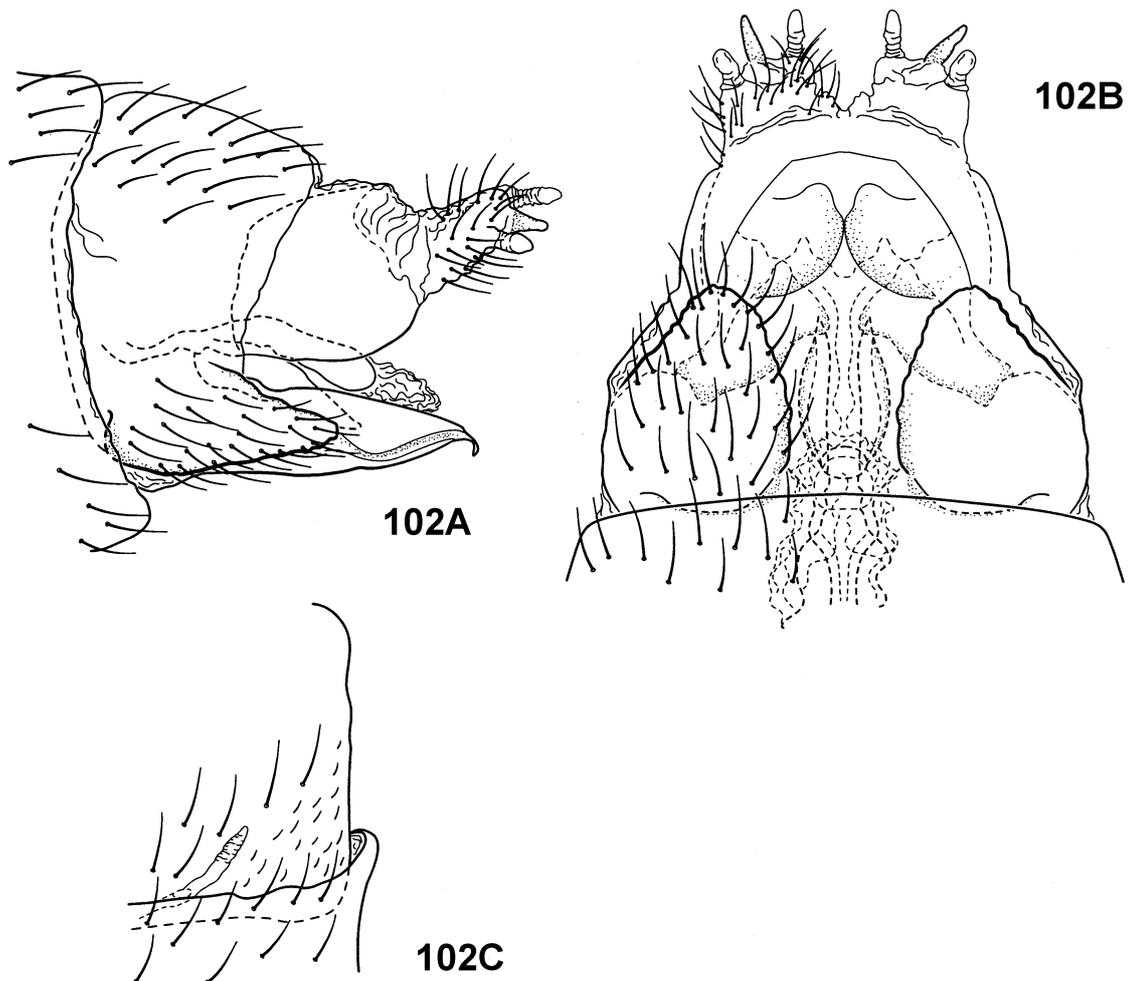


FIGURE 102. Female genitalia of *Polyplectropus cressae*, new species. A—left lateral view; B—ventral view; C—abdominal sternum V.

Paratypes: VENEZUELA: Lara: Parque Nacional Terepaima, Quebrada San Antonio, 9°51'45"N, 69°13'06"W, 631 m, 17.vi.2001, Holzenthal, Blahnik, Paprocki & Cressa—3 males, 3 females.

Distribution. Venezuela.

Etymology. Named in honor of Dr. Claudia Cressa, distinguished Venezuelan scientist and 1 of the collectors of this species.

***Polyplectropus cuzcoensis*, new species**

Figs. 103, 135

Polyplectropus cuzcoensis is readily distinguished from all species in the group by the cylindrical mesoventral process of the preanal appendage, which bears microsetae (hook-like in other species of the group), by the spiny apex of the dorsolateral process of the preanal appendage (unmodified in all other species in the group), and by the more rounded intermediate appendage. *Polyplectropus cuzcoensis* is similar to *P. denticulus* Bueno and *P. deltoides* (Yamamoto) on the overall shape of the inferior appendage, on the presence of a dorsolateral process of the preanal appendage, and on the overall shape of the intermediate appendage.

Adult. Length of forewing 5.5–7.5 mm, n = 9. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

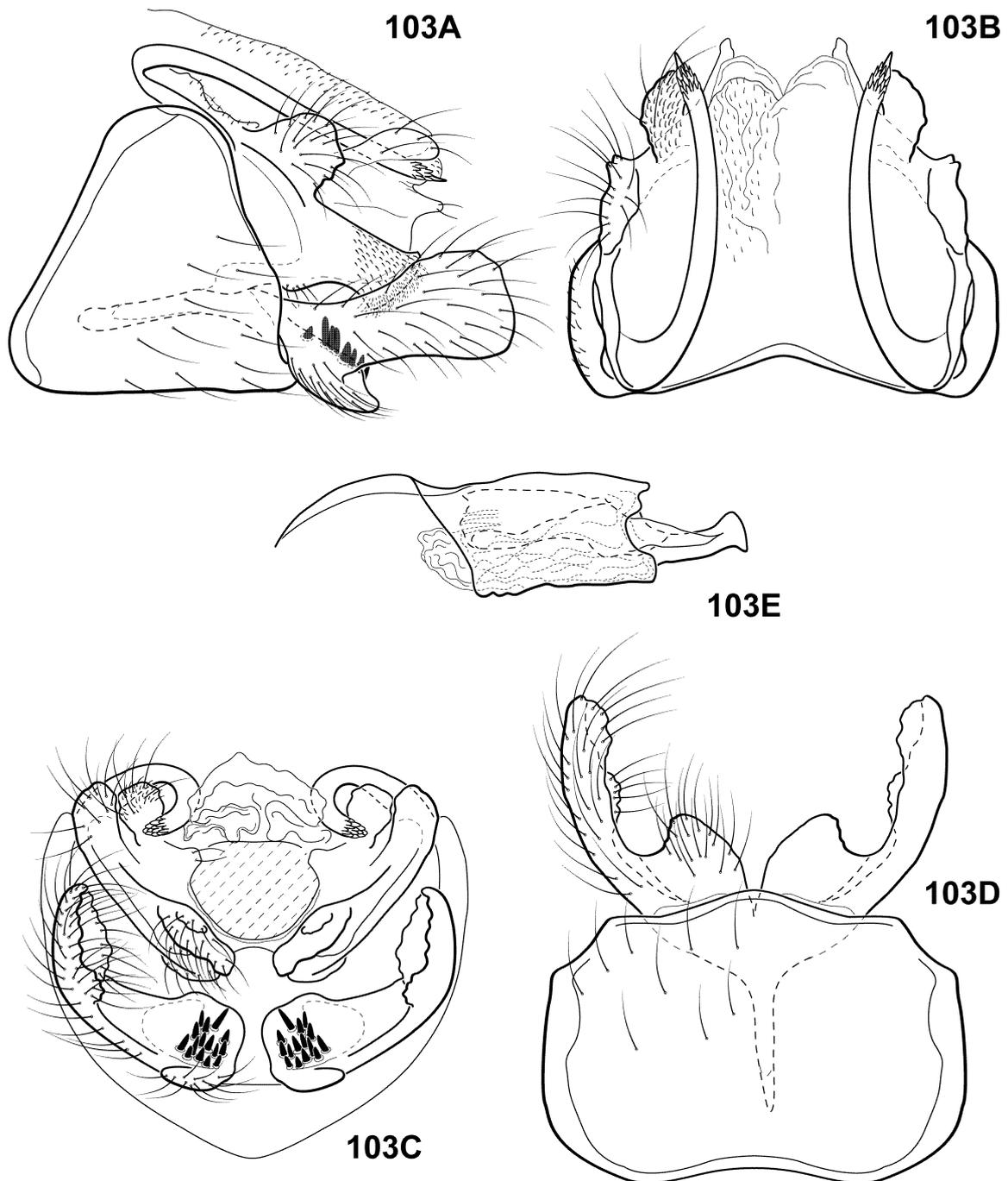


FIGURE 103. Male genitalia of *Polyplectropus cuzcoensis*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin sinuate and submedially produced; in ventral view rectangular, anterior margin concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in caudal view produced dorsad of phallosome. Intermediate appendage not longer than inferior appendage, digitate, with long and short setae throughout; in dorsal view broad, tapering mesoventrally to rounded apex; in caudal view rounded, directed posterodorsad; median papillate lobe small, flanking phallosome laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering into acute apex, with small apical, scale-like spines; mesolateral

process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view cylindrical, directed ventrad, ventral margin concave, posterior margin angled; in caudal view processes separated, ventral margin of process subacute, with basolateral margin produced laterad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, apex truncate to rounded; in ventral view narrow, lateral margin convex, entire, posterior margin rounded, mesal margin undulate, apically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, short and basally broad, bearing robust, sclerotized spines along entire dorsal surface; in lateral view digitate, narrowing posterad; in ventral view deltoid, posteromesal margin convex, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex truncate tapering ventrally; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; in dorsal view tapering subapically; endothelial membrane without embedded spines.

Female genitalia. Similar to the female of *P. blahniki*.

Holotype male: PERU: Cuzco: Paucartambo to Pilcopata rd., river at Puente Unión, 13°04'13"S, 71°34'00"W, 1670 m, 21–23.vi.1993, Blahnik & Pescador—(UMSP000107432) (NMNH).

Paratypes: PERU: Cuzco: Paucartambo to Pilcopata rd., river at Puente Unión, 13°04'13"S, 71°34'00"W, 1670 m, 21–23.vi.1993, Blahnik & Pescador—2 males, 4 females (NMNH); Paucartambo to Pilcopata rd., Río San Pedro at Puente San Pedro, 13°03'18"S, 71°32'47"W, 1445 m, 24.vi.1993, Blahnik & Pescador—1 male, 1 female (UMSP).

Distribution. Peru.

Etymology. Named for the type locality, Cuzco, the former capital city of the Inca Empire.

***Polyplectropus deltoides* (Yamamoto)**

Figs. 104, 125

Polycentropus deltoides Yamamoto, 1967: 130. [Type locality: Panama, Cerro Punta; INHS; male; in *Polycentropus*].—Flint, 1968: 21 [to *Polyplectropus*].

Polyplectropus deltoides is most similar to *P. cuzcoensis*, new species based on the overall shape of the inferior appendage, on the presence of a dorsolateral process of the preanal appendage, and on the overall shape of the intermediate appendage. *Polyplectropus deltoides* can be distinguished from *P. cuzcoensis* by the hook-like shape of the mesoventral process of the preanal appendage, being cylindrical in *P. cuzcoensis*, by the longer and sinuate dorsolateral process of the preanal appendage, which lacks modifications on the apex, by the shorter, more rounded ventral branch and broader dorsal branch of the inferior appendage, and by the elongate intermediate appendage.

Adult. Length of forewing 4.2–8 mm, n = 30. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin sinuate; in ventral view rectangular, anterior margin sinuate, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, digitate, with long and short setae throughout; in dorsal view oblong; in caudal view digitate, narrowing apically, directed posteromesad; median papillate lobe small, flanking phallocrypt laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior

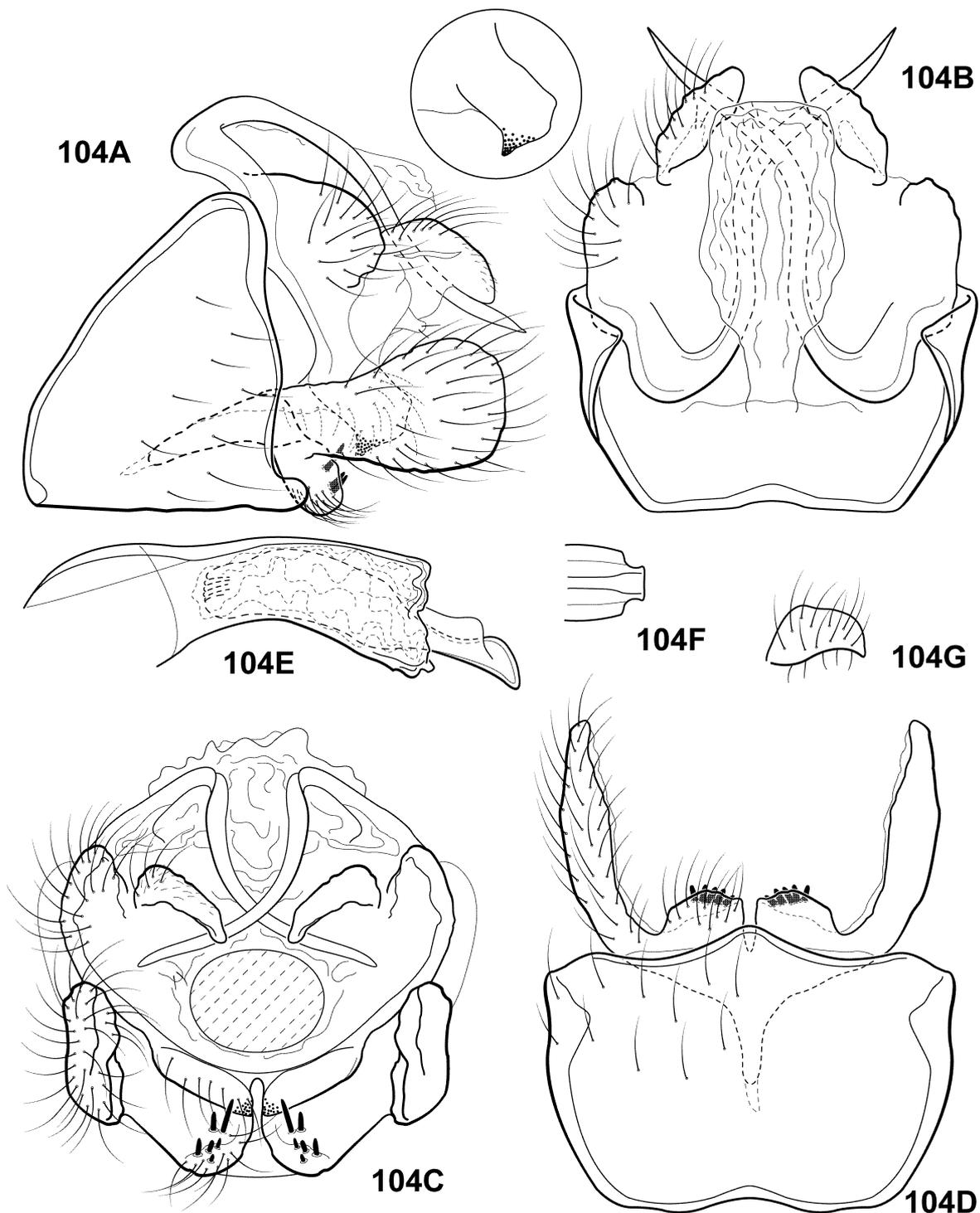


FIGURE 104. Male genitalia of *Polyplectropus deltoides* (Yamamoto, 1967) (holotype): A—left lateral view and inset of mesoventral process of preanal appendage and papillate lobe of intermediate appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—apex (drawn free hand), dorsal view; G—mesoventral process of left preanal appendage (drawn free hand), ventral view.

margin convex; in caudal view processes slightly separated, ventral margin of process subacute, with ventrolateral margin entire. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, posterior margin variable, from truncate to rounded; in ventral view narrow, lateral margin slightly convex, entire, posterior margin subacute, mesal margin slightly undulate, slightly convex, becoming concave, expanding posterad into ventral branch; ventral branch setose, short, bearing 4–7 robust, sclerotized spines basally and

apically; in lateral view clavate, rounded posterad; in ventral view subquadrate, mesal margin straight, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex tapering ventrally; apex of dorsal phallic sclerite in dorsal view truncate; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; in dorsal view tapering subapically; endothecal membrane without embedded spines.

Female genitalia. Typical of the group.

Material Examined. **COSTA RICA: Cartago:** Reserva Tapantí, Río Grande de Orosí, 9°41'10"N, 83°45'22"W, 1650 m, 8–9.vii.1986, Holzenthal, Heyn & Armitage—5 males (UMSP); 18–21.iii.1987, Holzenthal, Heyn & Armitage—1 male, 5 females (UMSP); Quebrada Palmitos & falls, ca. 9 km (road) NW tunnel, 9°43'12"N, 83°46'48"W, 1400 m, 2–3.vi.1990, Holzenthal, Blahnik & Muñoz—1 male (UMSP); **Puntarenas:** Río Bellavista, ca. 1.5 km NW Las Alturas, 8°57'04"N, 82°50'46"W, 1400 m, 18.ii.1986, Holzenthal, Morse & Fasth—1 male (UMSP); 15–17.vi.1986, Holzenthal, Heyn & Armitage—2 males (UMSP); 8–9.iv.1987, Holzenthal, Hamilton & Heyn—1 male (UMSP); 2–3.viii.1987, Holzenthal, Morse & Clausen—1 male (UMSP); 10–11.viii.1990, Holzenthal Blahnik & Muñoz—3 males (UMSP); Reserva Bosque Nubosa Monte Verde, Quebrada Cuecha, 10°18'36"N, 84°47'24"W, 1550 m, 28.ii.1986, Holzenthal & Fasth—1 male (UMSP); **PANAMA: Chiriquí:** Fortuna Dam Site nr. Hornitos, 8°55'00"N, 82°16'00"W, 1050 m, 17.v.–25.vii.1978, H. Wolda—3 males, 2 females (NMNH); Cerro Punta, 4.xi.1955, R. M. Altman—4 males [holotype] (, INHS).

Distribution. Costa Rica and Panama.

***Polyplectropus denticulus* Bueno-Soria**

Figs. 105, 127

Polyplectropus denticulus Bueno-Soria, 1990: 369. [Type locality: Costa Rica, Limón, Río General, Pacuare; NMNH; male.]

Polyplectropus denticulus is similar to *P. thilus* (Denning) and *P. yolandae* Chamorro-Lacayo & Holzenthal, but differs in having a shorter, rounded intermediate appendage, which is almost the same size as the papillate lobe and an apically acute mesoventral process of the preanal appendage. Additionally, *P. denticulus* has a relatively narrower dorsal branch of the inferior appendage than *P. yolandae*.

Adult. Length of forewing 3.5–5.5 mm, n = 16. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; setae on wings yellow with small patches of brown setae.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin sinuate and submedially produced, posterior margin sinuate and submedially concave; in ventral view rectangular, anterior margin concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, digitate, with long setae throughout; in dorsal view subquadrate; in caudal view digitate, directed posterolaterad; median papillate lobe small, flanking phallocrypt laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view obovate, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin rounded; in caudal view processes separated, ventral margin of process acute, with ventrolateral margin produced ventrad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, posterior margin truncate; in ventral view narrow, lateral margin slightly convex, entire, posterior margin rounded, mesal margin slightly undulate, angled, expanding posterad into ventral branch; ventral branch setose, elongate, bearing robust, sclerotized spines along entire dorsal surface; in lateral view digitate,

narrowing posterad; in ventral view deltoid, posteromesal margin angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex oblong; endothelial membrane without embedded spines.

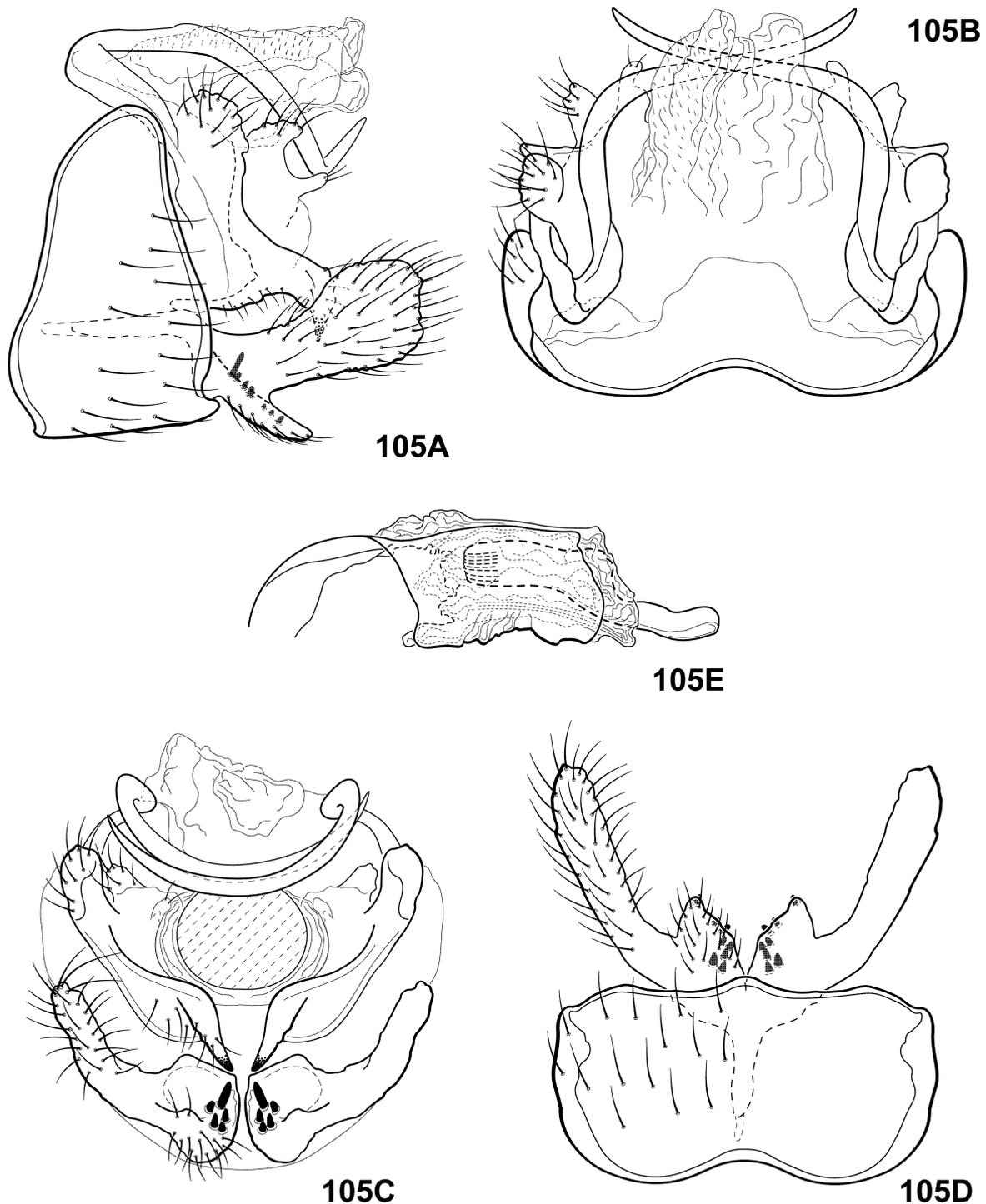


FIGURE 105. Male genitalia of *Polyplectropus denticulus* Bueno, 1990. (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

Material Examined. COSTA RICA: Guanacaste: Quebrada Garcia, 10.6 km ENE Quebrada Grande, 10°51'43"N, 85°25'41"W, 470 m, 8.iii.1986, Holzenthal & Fasth—1 male (UMSP); Parque Nacional Guanacaste, Quebrada Alcornoque, El Hacha, 11°00'32"N, 85°34'37"W, 250 m, 26.vii.1987, Holzenthal, Morse & Clausen—1 male (UMSP); Río Orosí, Estación Pitilla, 10°59'28"N, 85°25'41"W, 700 m, 22–

25.v.1990, Holzenthal & Blahnik—1 male (UMSP); **Heredia**: Parque Nacional Braulio Carrillo, Río Peje, Puesto El Ceiba, 10°19'37"N, 84°04'41"W, 480 m, 29–31.v.1990, Holzenthal, Blahnik & Muñoz—1 male (UMSP); [**Limón**]: Río General, Pacuare, 1.vii.1967, Flint & Ortiz—1 male [holotype] (NMNH) ["USNM Type No. 104449"]; **Puntarenas**: Río Jaba, rock quarry, 1.4 km (air) W Las Cruces, 8°47'24"N, 82°58'12"W, 1150 m, 15.iii.1991, Holzenthal, Muñoz & Huisman—3 males, 1 female (UMSP); San Miguel, 10–14.xi.1991, F. A. Quesada—3 males (UMSP); **San José**: Reserva Biológica Carara, Río del Sur, 1.5 km (rd) S Carara, 9°46'08"N, 84°31'52"W, 160 m, 13.iii.1991, Holzenthal, Muñoz & Huisman—1 male (UMSP); **NICARAGUA**: **Jinotega**: Cerro Muzú, 14°33'00"N, 85°07'00"W, 220 m, 7–10.ix.1997, Maes & Hernandez—1 male (MEL).

Distribution. Costa Rica, Mexico (Bueno-Soria 1990), and Nicaragua.

Remarks. The right dorsal branch of the inferior appendage and the left mesoventral process of the preanal appendage of the holotype are broken. Paratypes from Alajuela were actually *P. yolandae*.

***Polyplectropus insularis*, new species**

Figs. 106, 125

Polyplectropus insularis is very distinctive and easily distinguished from all other species in the group by the much more robust intermediate appendage and enlarged ventrally positioned papillate lobe. This species resembles *P. puyoensis*, new species in having the dorsal and ventral branches of the inferior appendage shallowly fused and on the overall shape of the dorsolateral process of the preanal appendage.

Adult. Length of forewing 4.5 mm, n = 1. Color of head, thorax, and legs yellowish-brown (specimen preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate; in ventral view rectangular, anterior margin highly concave, posterior margin with median flange and convex. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in dorsal view digitate; in caudal view membrane surrounding phallocrypt. Intermediate appendage not longer than inferior appendage, robust bearing apical setae; in dorsal view rounded, produced ventromesally into enlarged papillate lobe; in caudal view bipartite, dorsolateral digitate lobe produced ventromesally into dorsally curved papillate lobe. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view oblong; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin sinuate, posterior margin concave; in caudal view processes slightly separated, ventral margin of process acute, with sclerotized point and with ventrolateral margin slightly produced. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, apex truncate; in ventral view broad, lateral margin convex, entire, posterior margin subacute, mesal margin slightly undulate, convex, shallowly fused to ventral branch; ventral branch setose, short, bearing robust, sclerotized spines along entire dorsal surface; in lateral view oblong and almost forming a continuous structure with dorsal branch, narrowing posterad; in ventral view deltoid, posteromesal margin convex, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex truncate; apex of dorsal phallic sclerite in dorsal view rounded; endothecal membrane without embedded spines.

Holotype male: PANAMA: Panama: Barro Colorado Island, Snyder-Molino Trail, marker 3, 27.ix.–30.x.1989, H. Wolda—(UMSP000100586) (NMNH).

Distribution. Panama.

Etymology. Named in reference to the type locality, Barro Colorado Island. "Insularis" is the Latin word for "island".

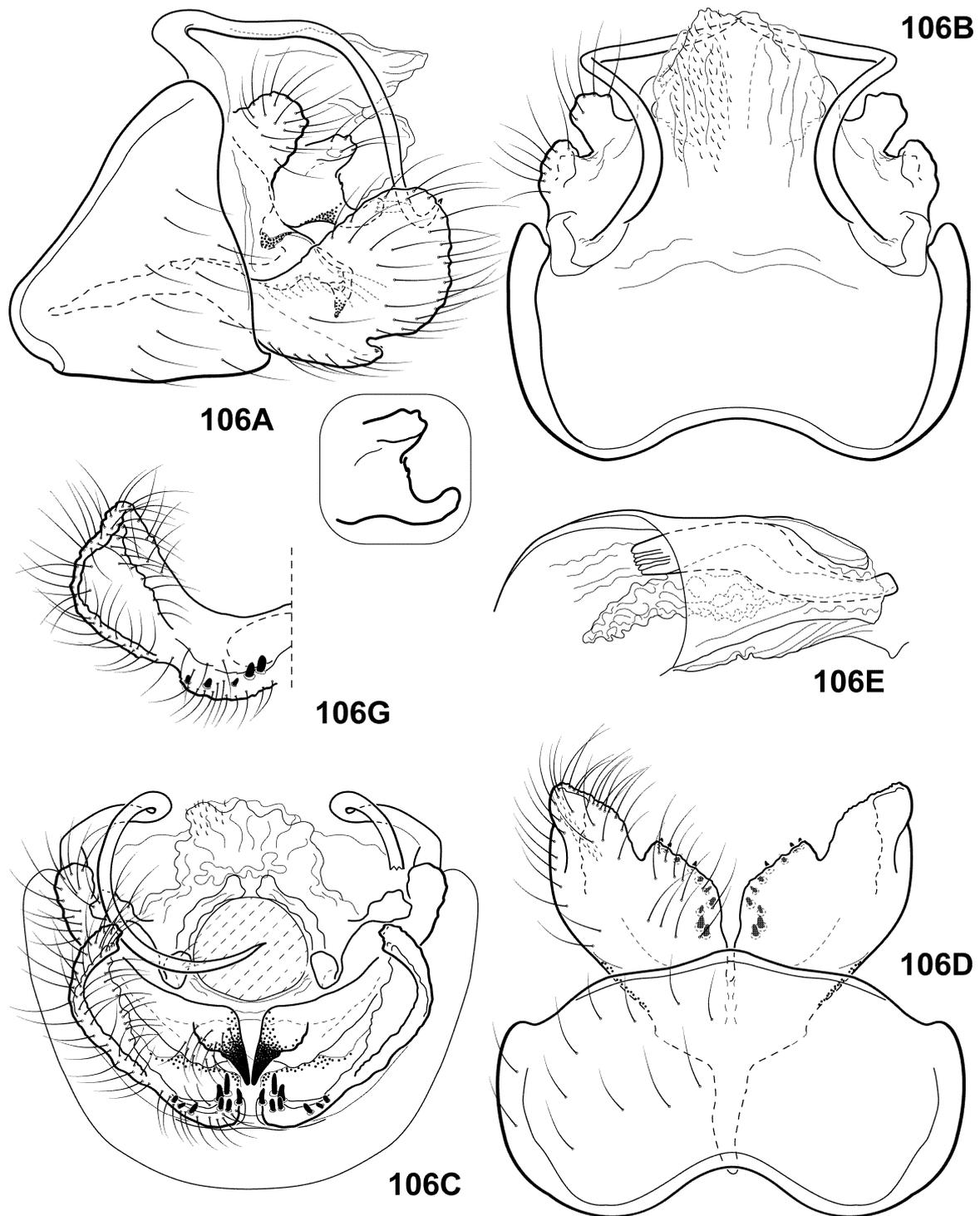


FIGURE 106. Male genitalia of *Polyplectropus insularis*, new species (holotype): A—left lateral view, with inset of intermediate appendage; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view; G—inferior appendage, dorsocaudal view.

***Polyplectropus paradelpae* Chamorro-Lacayo & Holzenthal**

Figs. 107, 126

Polyplectropus paradelpae Chamorro-Lacayo & Holzenthal, 2004: 210. [Costa Rica, Limón, Reserva Biológica Hitoy-Cerere, Río Cerere, Est. Miramar; UMSP; male.]

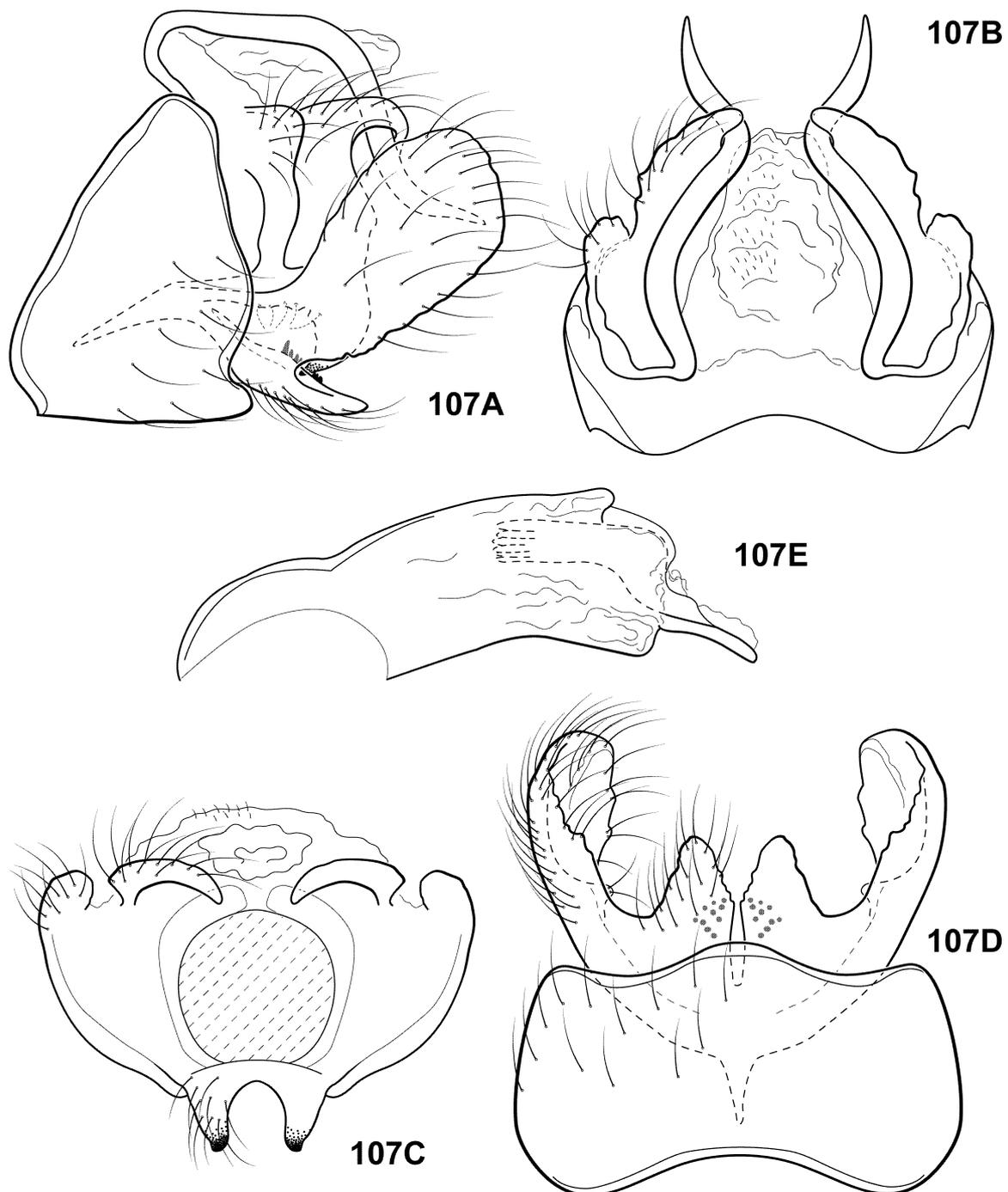


FIGURE 107. Male genitalia of *Polyplectropus paradelphae* Chamorro–Lacayo & Holzenthal, 2004 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

Polyplectropus paradelphae is similar to *P. yolandae* Chamorro-Lacayo & Holzenthal in the general form of the preanal appendage, the shape and direction of the intermediate appendage, and in the shape of the ventral branch of the inferior appendage. This species can be distinguished from *P. yolandae* by the more elongate and thicker dorsal branch of the inferior appendage, by the shape and more separated mesoventral processes of the preanal appendage, by the narrower apex of the phallic sclerite, by the reduced size of the papillate lobe, and by the presence of a membrane surrounding the phallocrypt. *Polyplectropus paradelphae* and *P. thilus* (Denning) both have a membrane surrounding the phallocrypt, yet it is lightly pigmented in *P. paradelphae*. Furthermore, *P. paradelphae* differs from *P. thilus* in the broader dorsal branch and wider ventral branch of the inferior appendage.

Adult. Length of forewing 5 mm, n = 2. Color of head, thorax, and legs yellowish-brown.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin sinuate and medially produced; in ventral view rectangular, anterior margin concave, posterior margin with median flange and sinuate. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, digitate, setose; in dorsal view broad, tapering mesoventrally to subacute apex; in caudal view digitate, narrowing apically, directed posteromesad, basoventrally membrane surrounding phallocrypt. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, posteromesally again, and tapering laterally into acute apex; mesolateral process setose; in dorsal view obovate, in lateral view deltoid; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin rounded; in caudal view processes separated, ventral margin of process subacute, basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, directed posterodorsad; in ventral view broad, lateral margin convex, entire, posterior margin rounded, mesal margin undulate, concave, expanding posterad into ventral branch, dorsal branch in oblique lateral view with small submedial lobe; ventral branch setose, elongate, bearing robust, sclerotized spines basally and medially; in lateral view lanceolate, narrowing posterad; in ventral view deltoid, posteromesal margin convex, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex narrowly oblong; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; endothecal membrane without embedded spines.

Material Examined. **COSTA RICA: Limón:** Reserva Biológica Hitoy-Cerere, Río Cerere, Est[acion] Miramar, 9°40'16"N, 83°01'41"W, 90 m, 23–24.iii.1987, Holzenthal, Hamilton & Heyn—1 male [holotype] (UMSP). Reserva Biológica Barbilla, Río Dantas, 15 km (rd) S Pacuarito, 9°59'38"N, 83°26'35"W, 300 m, 27–30.i.1992, Holzenthal, Muñoz & Kjer—1 male (UMSP).

Distribution. Costa Rica.

***Polyplectropus pugiunculatus* Botosaneanu**

Figs. 108, 135

Polyplectropus pugiunculatus Botosaneanu, in Botosaneanu & Alkins-Koo, 1993: 31. [Type locality: Trinidad, Northern Range, stream just below Blue Basin Waterfall; ZMUA; male; female.]

This species is most similar to *P. venezolanus*, new species in the shape of the inferior appendage and presence and arrangement of the peg-like setae on the dorsal and ventral branches. *Polyplectropus pugiunculatus* differs in having an elongate dorsolateral process of the preanal appendage (short in *P. venezolanus*), by the shapes of the mesoventral process of the preanal appendages and intermediate appendage. *Polyplectropus pugiunculatus* is distinctive in having an apicoventral peg-like seta on the medial (interior surface) of the dorsal branch of the inferior appendage (2 present in *P. venezolanus*).

Adult. Length of forewing 4.4 mm, n = 5. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin entire; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, digitate, with long and short setae throughout; in dorsal view broad, tapering mesoventrally to acute apex; in caudal view digitate, short, curved apically, directed posteromesad; median papillate lobe small, flanking phallocrypt laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad,

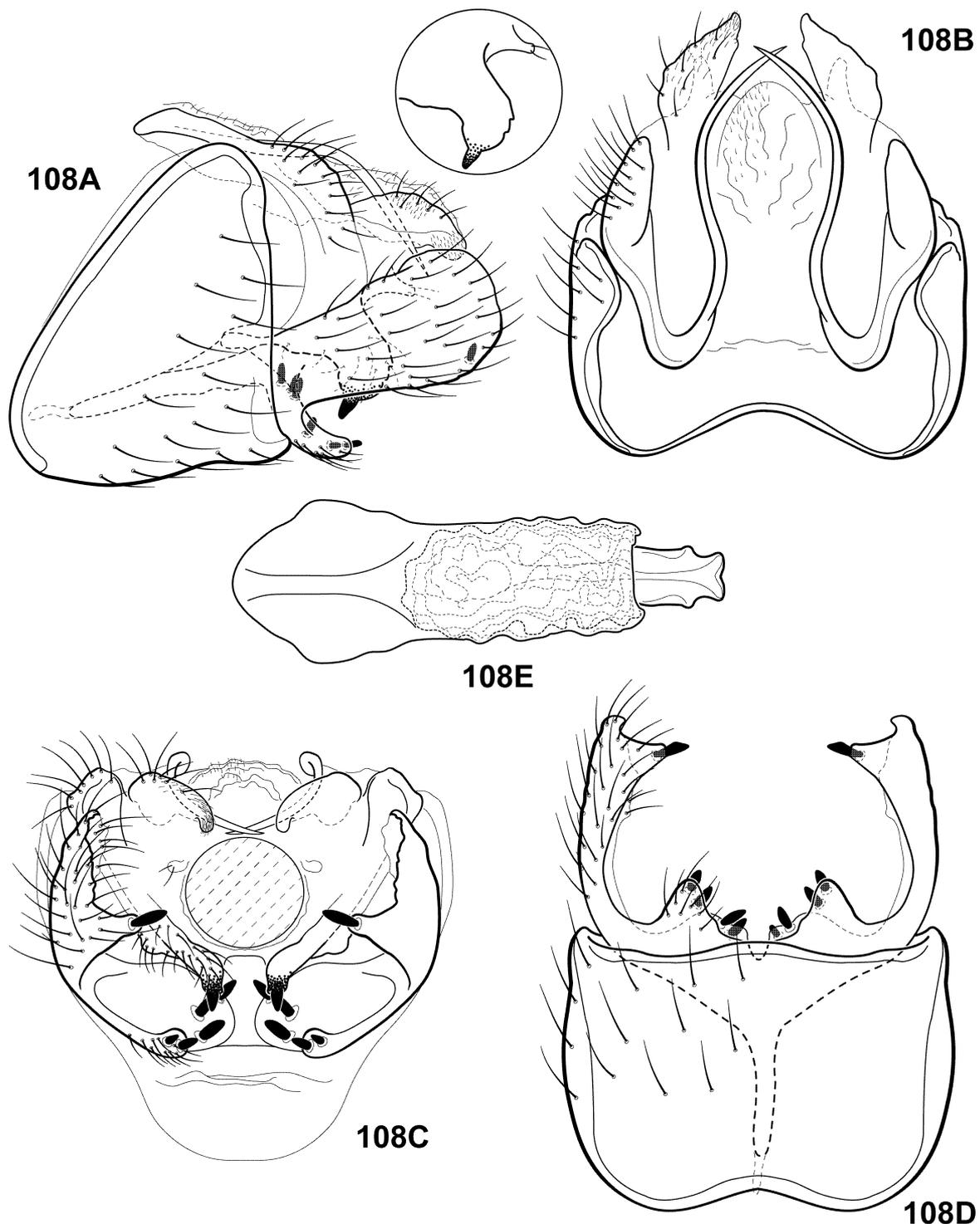


FIGURE 108. Male genitalia of *Polyplectropus pugiunculatus* Botosaneanu, 1993 (holotype): A—left lateral view and inset of mesoventral process of preanal appendage and papillate lobe of intermediate appendage; B—dorsal view; C—caudal view; D—ventral view; E—phallus, dorsal view.

tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view broadly convex; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view processes separated, ventral margin of process truncate. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, bearing medial apical spine; in ventral view narrow, lateral margin convex, entire, posterior margin undulate, subapically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, short, bearing 4–7 robust,

sclerotized spines basally and apically; in lateral view digitate, rounded posterad; in ventral view deltoid, mesal margin acutely angled, unguulate, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view emarginate; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; in dorsal view tapering subapically; endothelial membrane without embedded spines.

Material Examined. **TRINIDAD:** Northern Range, stream just below Blue Basin Waterfall, 17.iv.1991, L. Botosaneanu & D. Sakal [holotype] (ZMUA); Maracas River, 10–11.xii.1990, coll. University of West Indies—2 male, 1 female [paratypes] (NMNH); **TOBAGO:** Roxborough 5.9 km N, C2/4, 11°17'00"N, 60°35'00"W, 400 m, 15–16.vi.1993, Adams & Mathis—1 male (NMNH); Bloody Bay, River tributary, Forest Reserve, 29.iv.1996, D. Bass—1 male (NMNH).

Distribution. Trinidad & Tobago.

***Polyplectropus puyoensis*, new species**

Figs. 109, 135

Polyplectropus puyoensis is easily recognized by the shallowly fused dorsal and ventral branches of the inferior appendage and a basally broad dorsal branch. In addition, the ventral branches are broadly separated from each other (closer in other species in the group) (best seen in ventral view) and have basomesal peg-like setae (absent or not as large in other species). In overall genitalic features, particularly the intermediate and preanal appendages, this species is most similar to *P. recurvatus* (Yamamoto).

Adult. Length of forewing 4.5–5 mm, n = 7. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate; in ventral view rectangular, anterior margin highly concave, posterior margin with median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, digitate, with long and short setae throughout; in dorsal view broad, tapering mesoventrally to rounded apex; in caudal view digitate, elongate, apically curved, directed posteromesad; median papillate lobe flanking phallocrypt laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view subquadrate; mesoventral process setose, in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view processes separated, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view subquadrate, apex truncate to slightly rounded; in ventral view narrow, lateral margin convex, entire, posterior margin acute, mesal margin undulate, convex, shallowly fused to ventral branch; ventral branch setose, short, bearing robust, sclerotized spines basally and apically; in lateral view digitate and almost forming a continuous structure with dorsal branch, rounded posterad; in ventral view rounded, posteromesal margin convex, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view truncate; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; in dorsal view tapering subapically; endothelial membrane without embedded spines.

Female genitalia. Similar to female of *P. blahniki*.

Holotype male: **ECUADOR: Pastaza:** Puyo (16 kms. W), 3.ii.1976, P. J. Spangler (UMSP000107553) (NMNH).

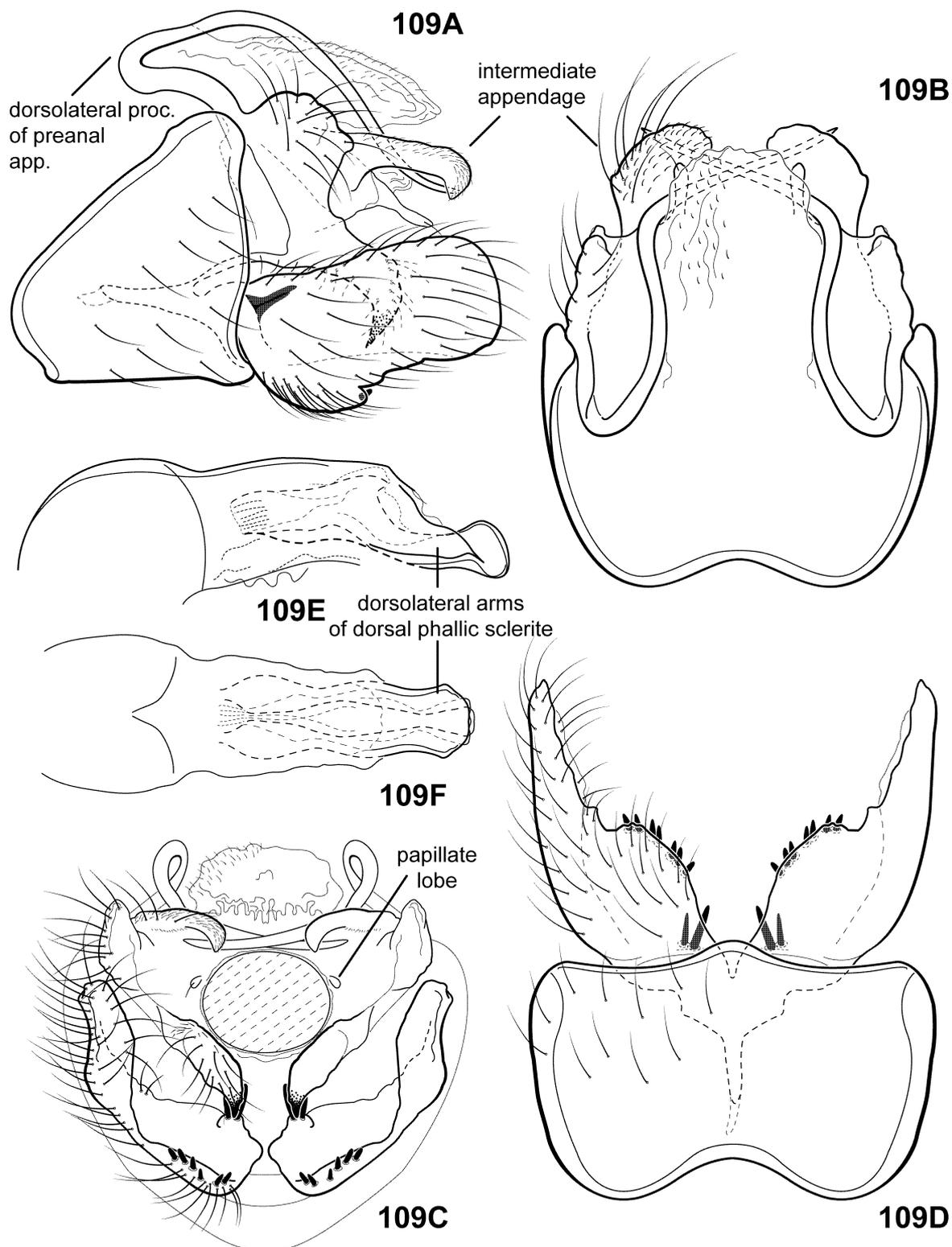


FIGURE 109. Male genitalia of *Polyplectropus puyoensis*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Paratypes: ECUADOR: Pastaza: Puyo (12 Kms. W), 9.v.1977, Spangler & Givens—1 male (NMNH); Estación Fluvial Metrica, Puyo (27 km N), 4.ii.1976, Spangler *et al.*—2 males, 3 females (NMNH).

Distribution. Ecuador.

Etymology. Named for the type locality, Puyo in Ecuador.

Polyplectropus recurvatus (Yamamoto)

Figs. 110–112, 135

Polycentropus recurvatus Yamamoto, 1966: [Type locality: Colombia, Tolima, 18 mi. W Honda; CAS found in INHS; male.]—Flint, 1968b:21 [to *Polyplectropus*].

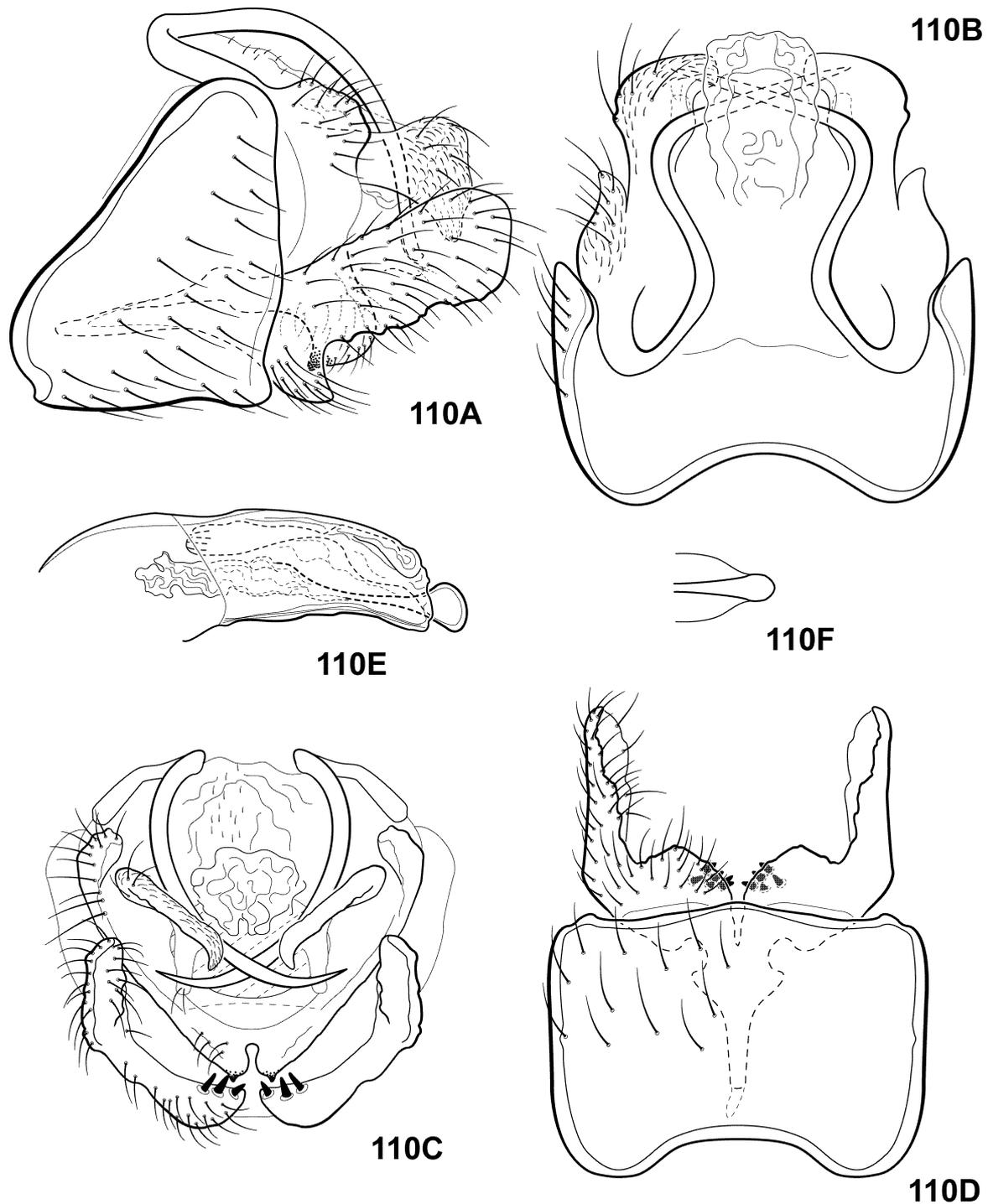


FIGURE 110. Male genitalia of *Polyplectropus recurvatus* (Yamamoto, 1966) (holotype): A—left lateral view and inset of mesoventral lobe of preanal appendage and papillate lobe of intermediate appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—apex, dorsal view.

Polyplectropus recurvatus is most similar to *P. puyoensis*, new species in the overall shape of the intermediate and preanal appendages. *Polyplectropus recurvatus* can be distinguished from *P. puyoensis* and other species of the group by the shape of the inferior appendage, having a short ventral branch and an oblong dorsal branch. The ventral branches of the inferior appendages are closer to each other (farther apart in *P. puyoensis*) (best viewed in ventral view). Furthermore, the intermediate appendage and mesoventral process of the preanal appendage are broader in *P. recurvatus*.

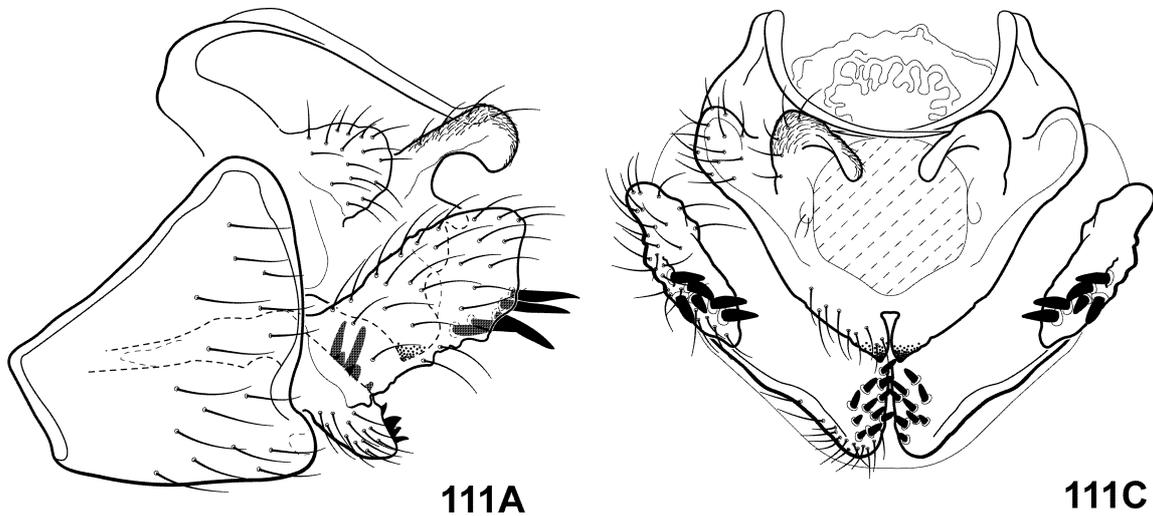


FIGURE 111. Variable form of male genitalia of *Polyplectropus recurvatus* (Yamamoto, 1966): A—left lateral view; C—caudal view.

Adult. Length of forewing 4.3 mm, n = 5. Color of head and thorax brown, legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin sinuate, posterior margin sinuate; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage not longer than inferior appendage, stout, with long and short setae throughout; in dorsal view broad, tapering mesoventrally to rounded apex; in caudal view digitate, elongate, apically curved, directed posteromesad; median papillate lobe small, flanking phallosome laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view digitate, apex tapering posterad (shape of apex may vary), in lateral view orbicular; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view processes slightly separated, ventral margin of process rounded (may appear truncate in some). Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view oblong, with ventral margin undulate; in ventral view narrow, lateral margin with submedial flange, entire, mesal margin undulate, straight, becoming concave, expanding posterad into ventral branch, variable form with apical stout, spine-like setae; ventral branch setose, short, bearing 4–7 robust, sclerotized spines basally and apically; in lateral view deltoid, narrowing posterad; in ventral view deltoid, posteromesal margin convex, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view emarginate to rounded; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; in dorsal view tapering subapically; endothecal membrane without embedded spines.

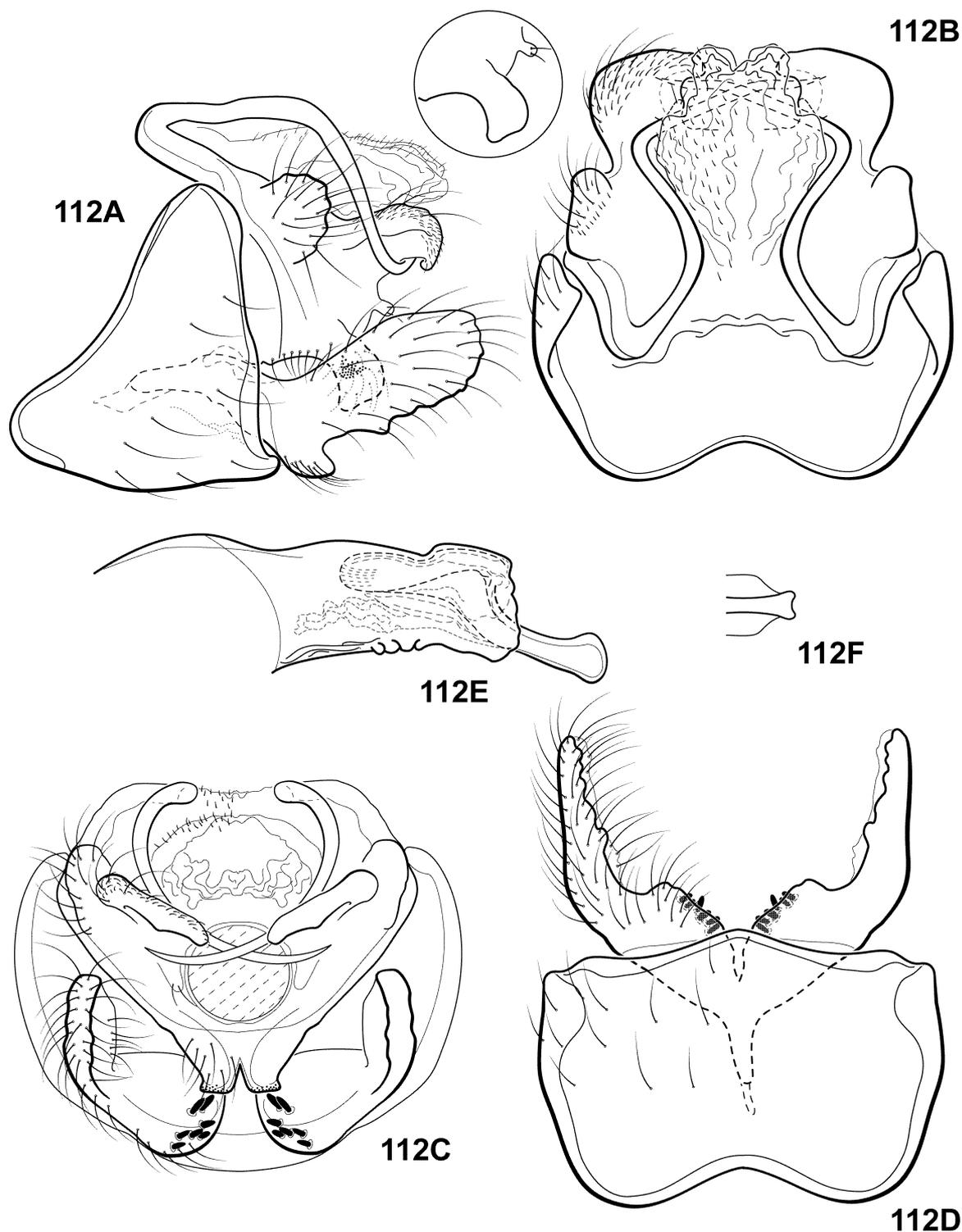


FIGURE 112. Variable form of male genitalia of *Polyplectropus recurvatus* (Yamamoto, 1966): A—left lateral view and inset of mesoventral process of preanal appendage and papillate lobe of intermediate appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—apex, dorsal view.

Female genitalia. Typical of species group.

Material Examined. **COLOMBIA: Tolima:** 18 mi. W Honda, 16.iii.1955, Schlinger & Ross—1 male [holotype] (INHS); **ECUADOR: Cotopaxi:** Latacunga, 133 km W, 329 m, 2.vii.1975, Langley & Cohen—1 male, 3 females [variant] (NMNH); Los Rios, Quevedo (56 km N), Rio Palenque Biological Station, 250 m,

28–29.vii.1976, J. Cohen—1 male [variant] (NMNH); **VENEZUELA: Lara:** Parque Nacional Terepaima, Río Auro near Sabana Alta, 9°44'44"N, 69°16'37"W, 480 m, 16.vi.2001, Holzenthal Blahnik, Paprocki & Cressa—1 male [variant] (UMSP).

Distribution. Colombia, Ecuador, and Venezuela.

Remarks. *Polyplectropus recurvatus* from Ecuador differs from the Colombian and Venezuelan forms by the presence of elongate, apical spine-like setae on the dorsal branch of the inferior appendage (Fig. 111). The Venezuelan form differs from the Colombian form only in minor variations in the shapes of the intermediate appendage, inferior appendage, and the mesoventral process of the preanal appendage. The only specimen from Ecuador is slightly damaged and several features of the male genitalia were difficult to observe. Type was never deposited at CAS, currently at INHS.

***Polyplectropus thilus* (Denning)**

Figs. 17E, 113, 125

Polycentropus thilus Denning, 1962:407. [Type locality: Mexico, Jalisco, 17 mi S. of Mazamitla; CAS; male.]—Flint 1968: 21 [to *Polyplectropus*].

Polyplectropus thilus conforms closely to *P. carolae* Bueno-Soria in the presence of an elongate, dorsolateral process of the preanal appendage and in the shapes of the mesoventral process of the preanal appendage, the dorsal branch of the inferior appendage, and of the phallus. *Polyplectropus thilus* can be distinguished from *P. carolae* by the rounded shape of the intermediate appendage, by the shorter ventral branch of the inferior appendage, about ½ as long as the dorsal branch, by the mesal expansion of the intermediate appendage, which forms a lower, membranous lip enveloping the phallocrypt, and by the more elongate dorsolateral process of the preanal appendage. *Polyplectropus thilus* also resembles *P. paradelphae* Chamorro-Lacayo & Holzenthal, however the membrane surrounding the phallocrypt is produced more caudad in *P. thilus*. Additionally, the ventral branch of the inferior appendage in *P. paradelphae* is shorter and narrower and the dorsal branch is longer than in *P. thilus*. All 3 species have a reduced papillate lobe and a membrane surrounding the phallocrypt. The membrane surrounding the phallocrypt is visible in dorsal view as a deltoid to digitate lobe flanking phallocrypt. A variable form of *P. thilus* was collected from Nicaragua. This variable form has a truncate mesoventral process of the preanal appendage and a broader and more concave dorsal branch of the inferior appendage.

Adult. Length of forewing 6.5–7 mm, n = 5. Color of head, thorax, and legs yellowish-brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin sinuate and submedially produced; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange and sinuate. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage and fused along membrane to mesoventral process of preanal appendage, digitate, with long basal setae; in dorsal view digitate and broad, tapering mesoventrally to subacute apex; in caudal view digitate, narrowing apically, directed posteromesad. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view orbicular, in lateral view orbicular; mesoventral process setose membrane surrounding phallocrypt; in lateral view hook-like with ventrad-directed sclerotized apex, ventral margin concave, posterior margin rounded; in caudal view processes separated, ventral margin of process acute, with sclerotized point and basally broad. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, apex concave; in ventral view broad, lateral margin apically produced, entire, posterior margin subacute, mesal margin entire, concave, expanding posterad into

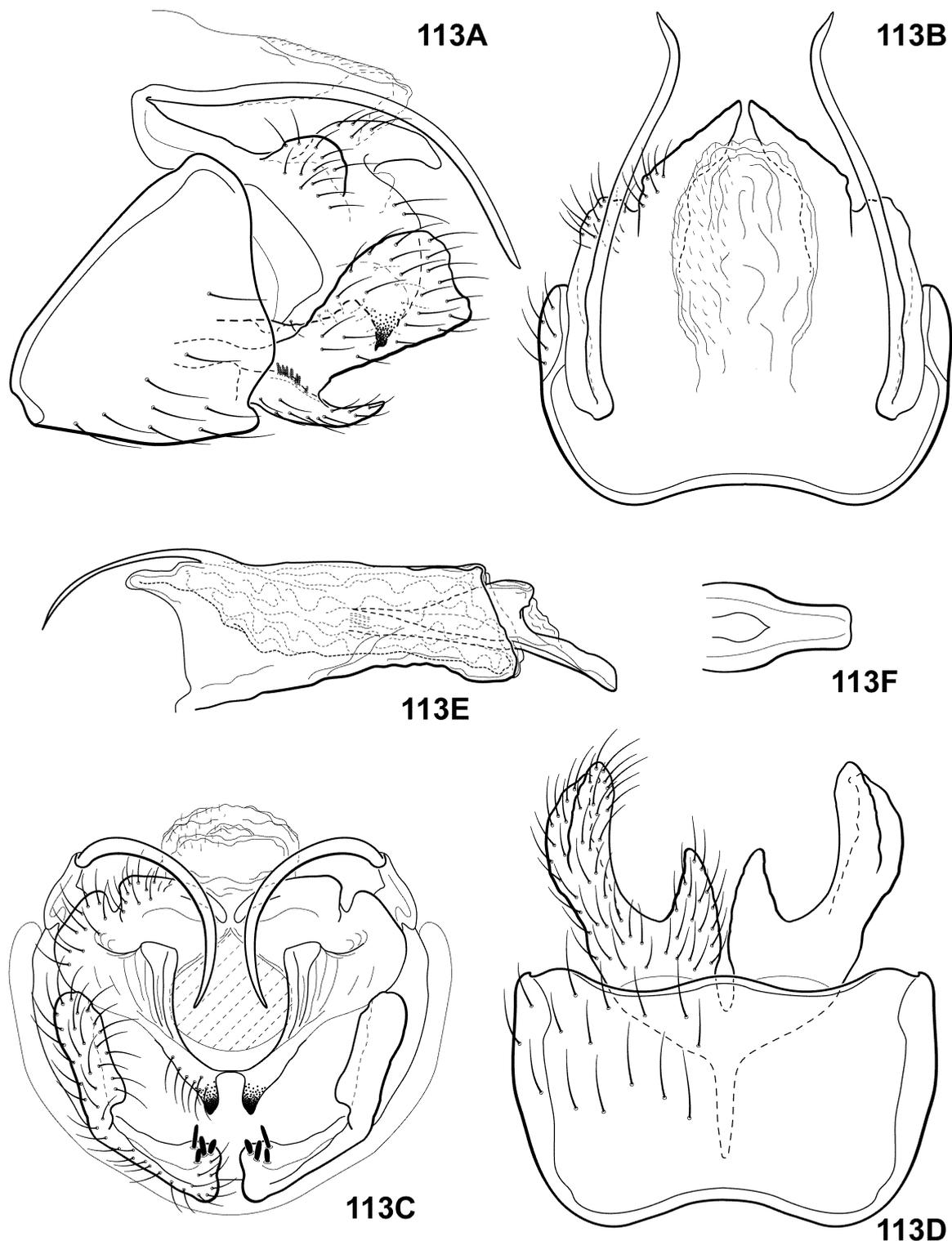


FIGURE 113. Male genitalia of *Polyplectropus thilus* (Denning, 1962) (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—apex, dorsal view (drawn free hand).

ventral branch; ventral branch setose, short, bearing robust, sclerotized spines basally; in lateral view lanceolate, narrowing posterodorsad; in ventral view deltoid, posteromesal margin convex, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view sinuate, apex narrowly oblong; apex of dorsal phallic sclerite in dorsal view emarginate; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; endothecal membrane without embedded spines.

Material Examined. **MEXICO: Chiapas:** Río Contento, 7 km N. Ocosingo, 20.v.1981, C & O Flint—1 male, 1 female (IBUNAM); Colón (Lagartero), 14°50'15"N, 92°15'00"W, 6.iv.1979, J Bueno-Soria—1 male (IBUNAM); **Jalisco:** 17 mi S. of Mazamitla, 5.xii.1948, E. S. Ross—1 male (CAS) [holotype] [type no. 9464]; **NICARAGUA: Estelí:** Area Protegida Mirafior, Quebrada Grande, 13°13'20"N, 86°15'33"W, 1200 m, 19.vii.2000, Chamorro & Lacayo—1 male (UMSP).

Distribution. Mexico, Nicaragua.

Polyplectropus venezolanus, new species

Figs. 99C, D, 114, 130

This species is most similar to *P. pugiunculatus* Botosaneanu, but differs in the presence of a shortened dorsolateral process of the preanal appendage (elongate in *P. pugiunculatus*), by the narrower mesoventral process of the preanal appendage and intermediate appendage. *Polyplectropus venezolanus* also differs from other members of the group by the presence of 2 apicoventral peg-like setae on the interior margin (mesal margin) of the dorsal branch of the inferior appendage (1 present in *P. pugiunculatus*).

Adult. Length of forewing 5 mm, n = 3. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin entire; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, digitate, with long and short setae throughout; in dorsal view broad, tapering mesoventrally to subacute apex; in caudal view digitate, narrowing apically, directed posteromesad; median papillate lobe flanking phallocrypt laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process short, originating from dorsum of mesolateral process, directed anterad, recurved posterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view processes separated, ventral margin of process rounded. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate, with ventral margin undulate, bearing several apical, sclerotized spines; in ventral view narrow, lateral margin slightly convex, entire, posterior margin subacute, subapically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, short, bearing 4–7 robust, sclerotized spines basally and apically; in lateral view digitate, narrowing posterad; in ventral view deltoid, posteromesal margin convex, rapidly converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view emarginate; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; in dorsal view tapering subapically; endothelial membrane without embedded spines.

Female genitalia. Ventral plates of segment VIII setose, in ventral view oblong, medial margin narrowing posterolaterally; in lateral view oblong, narrowly fused to sternite VIII; external part of gonopod of segment VIII in ventral view with posterior margin obcordate; in lateral view acute, curved dorsad; internal part of gonopod sclerotized, in ventral view with mesal margin linear. Tergum IX devoid of setae, lightly sclerotized. Segment X setose, apically bearing a pair of sclerotized cerci surrounded by 2 pairs of membranous digitate processes. Genital chamber opening to processus spermathecae through sclerotized circular opening of ductus spermathecae.

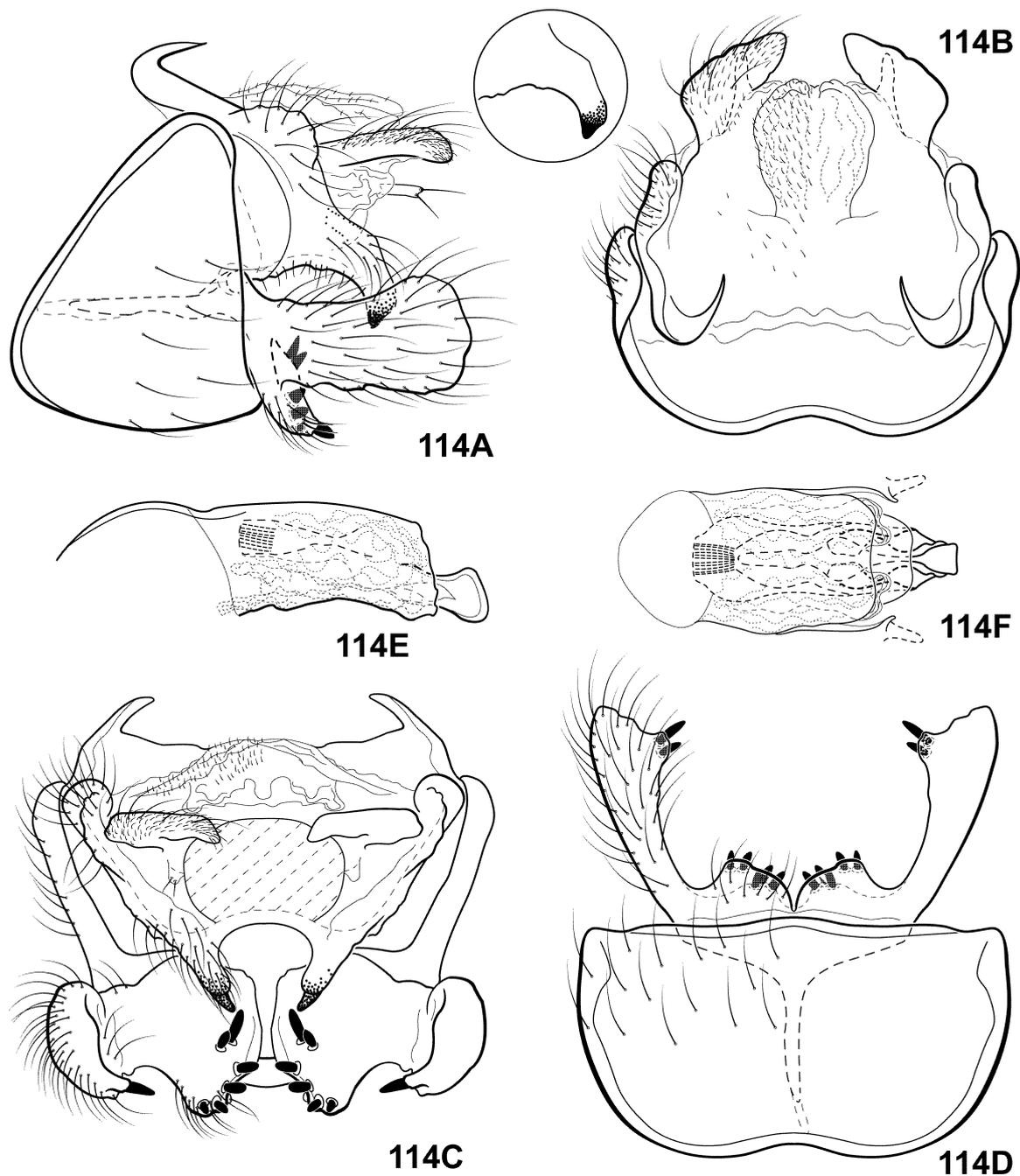


FIGURE 114. Male genitalia of *Polyplectropus venezolanus*, new species (holotype): A—left lateral view and inset of mesoventral process of the preanal appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Holotype male: VENEZUELA: Sucre: Rio Cocollar, 1.5 km SE Las Piedras de Cocollar, 10°09'37"N, 63°47'36"W, 810 m, 7–8.iv.1995, Holzenthal & Flint (UMSP).

Paratypes: VENEZUELA: Sucre: Q[ue]b[ra]d[a] Zapateral, 1.5 km SE Las Piedras de Cocollar, 10°09'45"N, 63°47'35"W, 810 m, 9.iv.1995, Holzenthal & Flint—1 female (NMNH); Rio Cocollar, 1.5 km SE Las Piedras de Cocollar, 10°09'37"N, 63°47'36"W, 810 m, 7–8.iv.1995, Holzenthal & Flint—1 male (UMSP).

Distribution. Venezuela.

Etymology. This species is named for the country of Venezuela, type locality of the species.

***Polyplectropus yolandae* Chamorro-Lacayo & Holzenthal**

Figs. 115, 130

Polyplectropus yolandae Chamorro-Lacayo & Holzenthal, 2004: 213. [Type locality: Costa Rica, Guanacaste, Parque Nacional Guanacaste, Río Tempisque, Maritza; UMSP; male.]

Polyplectropus yolandae is most similar to *P. zuliae*, new species in the overall shape of the preanal and inferior appendages and in the shape of the phallus. *Polyplectropus yolandae* can be distinguished from *P. zuliae* by the shape of the mesoventral process of the preanal appendage, being apically rounded in *P. yolandae*, by the narrower and more elongate intermediate appendage, and by the broader dorsal branch of the inferior appendage.

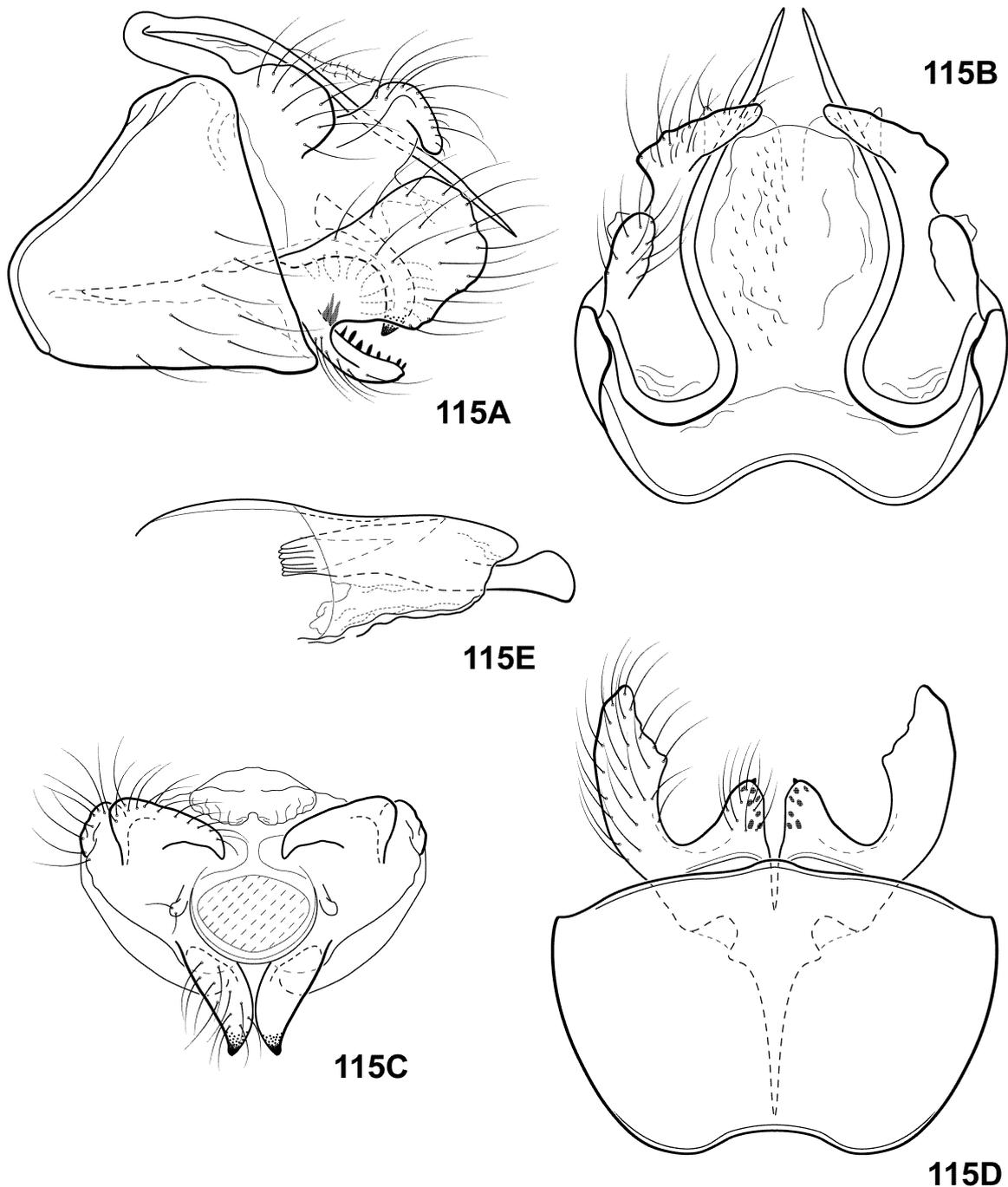


FIGURE 115. Male genitalia of *Polyplectropus yolandae* Chamorro-Lacayo & Holzenthal, 2004 (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, lateral view.

Adult. Length of forewing 4.8–5 mm, n = 25. Color of head, thorax, and legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin entire; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, digitate, with long and short setae throughout; in dorsal view broad, tapering mesoventrally to subacute apex; in caudal view digitate, narrowing apically, directed posteromesad; median papillate lobe flanking phallocrypt laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view broadly convex; mesoventral process setose; in lateral view hook-like, directed ventrad, anteroventral margin concave, posterior margin convex; in caudal view processes slightly separated, ventral margin of process acute. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate (variable form from Nicaragua has broader dorsal branch and is larger overall), posteroventral margin produced medially; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin slightly undulate, subapically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, elongate, bearing robust, sclerotized spines along entire dorsal surface; in lateral view digitate, narrowing posterad; in ventral view deltoid, mesal margin slightly angled, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; in dorsal view tapering subapically; endothecal membrane without embedded spines.

Female genitalia. Typical of species group.

Material Examined. **COSTA RICA:** **Alajuela:** Parque Nacional Rincón de la Vieja, Quebrada Provisión, 10°46'08"N, 85°16'52"W, 810 m, 4.iii.1986, Holzenthal & Fasth—1 male (UMSP); unnamed river, Cerro Campana ca. 6 km (air) NW Dos Rios, 10°54'00"N, 85°24'00"W, 640 m, 15–16 .ii.1986, Holzenthal & Fasth—1 male, 1 female (UMSP) (used to be paratypes of *P. denticulus*); Reserva Forestal San Ramón, Río San Lorencito & tribs., 10°12'58"N, 84°36'25"W, 980 m, 30.iii.–1.iv.1987, Holzenthal, Hamilton & Heyn—2 males; 13–16.vi.1988, C. & O. Flint and Holzenthal—1 male; 6–10.iii.1991, Holzenthal, Muñoz & Huisman—2 males; **Guanacaste:** Parque Nacional Guanacaste, Río Tempisquito, Maritza, 10°57'29"N, 85°29'49"W, 550 m, 19–20.vii.1987, Holzenthal, Morse & Clausen—2 males; 30–31.viii.1990, Huisman Blahnik & Quesada—9 males, 2 females ?; Estación Maritza, Río Tempisquito, 10°57'29"N, 85°29'49"W, 550 m, 13–16.vii.1992, F. Muñoz-Quesada—4 male (INBIO); Río Tempisquito Sur, Maritza, 10°57'00"N, 85°28'48"W, 600, 30–31.viii.1990, coll. Huisman & Quesada—3 males; Río Orosí, Estación Pitilla, 10°59'28"N, 85°25'41"W, 700 m, 22–25.v.1990, Holzenthal & Blahnik—1 male; ca. 0.7 km N Est[acion] Maritza, 10°57'36"N, 85°30'00"W, 550 m, 31.viii.1990, Huisman & Quesada—1 male; **Heredia:** Rara Avis Biol[ogical] Stat[ation] Quebrada Chiquiza, 31.iii.1989, Blahnik and Solis—1 male; **NICARAGUA:** **Región Autónoma Atlántico Norte [Zelaya]:** Cerro Saslaya, 13°44'00"N, 85°01'00"W, 700 m, iv.1996, Maes & Hernandez—2 males, 4 females (NMNH) (variable inferior appendage and mesoventral process of preanal appendage); **PANAMA:** **Chiriquí:** Fortuna Dam Site nr. Hornitos, 8°55'00"N, 82°16'00"W, 1050 m, 25.iv.–1.v.1979, H. Wolda—1 male (NMNH); **Panama:** Barro Colorado Island, Snyder-Molino Trail, marker 3, 22–28.xi.1978, H. Wolda—1 male (NMNH).

Distribution. Costa Rica, Nicaragua, and Panama.

Polyplectropus zuliae, new species

Figs. 116, 130

This species is very similar to *P. yolandae* Chamorro-Lacayo & Holzenthal in the overall shape of the preanal and inferior appendages and in the shape of the phallus. However, *P. zuliae* differs in having an apically acute mesoventral process of the preanal appendage, a rounded intermediate appendage, and a narrower dorsal branch of the inferior appendage.

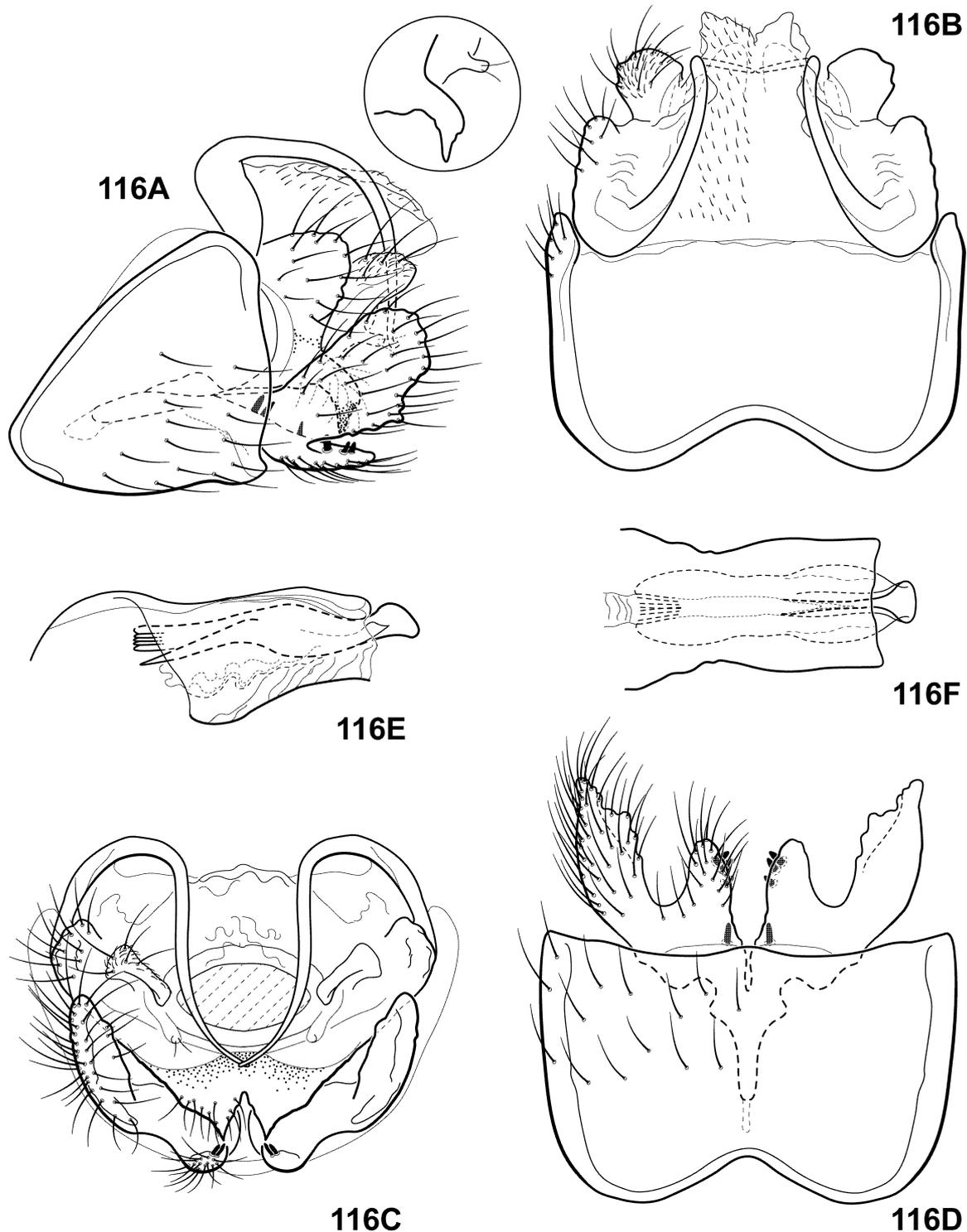


FIGURE 116. Male genitalia of *Polyplectropus zuliae*, new species (holotype): A—left lateral view and inset of mesoventral process of preanal appendage and papillate lobe of intermediate appendage; B—dorsal view; C—caudal view; D—ventral view; E–F—phallus: E—left lateral view; F—dorsal view.

Adult. Length of forewing 4.5–5 mm, n = 7. Color of head and thorax brown, legs yellowish-brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings golden brown along costal margin with patches of grey setae interspersed along margin and on most of wing surface.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin sinuate; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view obcordate. Intermediate appendage not longer than inferior appendage, stout, with long and short setae throughout; in dorsal view rounded; in caudal view digitate, narrowing apically, directed posteromesad; median papillate lobe flanking phallocrypt laterally, bearing small apical setae. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posteromesad then posterolaterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view oblong, in lateral view broadly deltoid; mesoventral process setose; in lateral view hook-like, tapering ventrally into sclerotized apex, anteroventral margin concave, posterior margin convex; in caudal view processes slightly separated, ventral margin of process cuspidate, with sclerotized point. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view oblong, with ventromedian flange; in ventral view narrow, lateral margin convex, entire, mesal margin undulate, subapically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, elongate, bearing 4–7 robust, sclerotized spines basally and apically; in lateral view deltoid, narrowing posterad; in ventral view deltoid, mesal margin slightly concave, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex pandurate; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; in dorsal view tapering subapically; endothecal membrane without embedded spines.

Female genitalia. Similar to female of *P. blahniki*.

Holotype male: VENEZUELA: Zulia: Los Angeles del Tucuco, 15–16.iv.1981, Menke & Hollenberg (NMNH) (UMSP000085318).

Paratypes: VENEZUELA: Zulia: Los Angeles del Tucuco, 15–16.iv.1981, Menke & Hollenberg—5 males, 1 female.

Distribution. Venezuela.

Etymology. This species is named for the province in Venezuela, Zulia, where the holotype and paratypes were collected.

Key to the males of *P. thilus* species group

- | | | |
|------|--|---|
| 1 | Dorsal branch of inferior appendage with peg-like setae (Fig. 98A) | 2 |
| - | Dorsal branch of inferior appendage without peg-like setae (Fig. 100A) | 4 |
| 2(1) | Dorsolateral process of preanal appendage long (Fig. 105A) | 3 |
| - | Dorsolateral process of preanal appendage short (Fig. 114A) | <i>P. venezolanus</i> , n. sp., p. 218 |
| 3(2) | Dorsal branch with more than 1 peg-like setae on small ventral projection (Figs. 98A, D) | |
| | <i>P. blahniki</i> , n. sp., p. 193 | |
| - | Dorsal branch with 1 peg-like spine (Figs. 108A, D) | <i>P. pugiunculatus</i> Botosaneanu, p. 209 |
| 4(1) | Dorsolateral process of preanal appendage without apical sculpturing (Fig. 106A); mesoventral process of preanal appendage not quadrate but apically hooked (Figs. 106A, 109A) | 5 |
| - | Dorsolateral process of preanal appendage with apical sculpturing (Figs. 103A, B); mesoventral process of preanal appendage quadrate (Fig. 103A) | <i>P. cuzcoensis</i> , n. sp., p. 200 |

5(4)	Dorsal and ventral branches of inferior appendage shallowly fused (Fig. 106A)	6
-	Dorsal and ventral branches of inferior appendage not shallowly fused (Fig. 107A)	7
6(5)	Intermediate appendage broad, ventrally with enlarged digitate papillate lobe (Figs. 106A, C)	
	. . . . . <i>P. insularis</i> , n. sp., p. 206	
-	Intermediate appendage narrow; papillate lobe small (Fig. 109A, C)	<i>P. puyoensis</i> , n. sp., p. 211
7(5)	Intermediate appendage with distinctive membrane surrounding phallocrypt (Figs. 107A, C)	8
-	Intermediate appendage entire, without distinctive membrane surrounding phallocrypt (Figs. 101A, C)	10
8(7)	Dorsal branch of inferior appendage thin, posterior margin truncate (Fig. 113A)	9
-	Dorsal branch of inferior appendage 'thick' (Fig. 107D); posterior margin rounded (Fig. 107A)	
	. . . . . <i>P. paradelphae</i> Chamorro-Lacayo & Holzenthal, p. 207	
9(8)	Ventral branch of inferior appendage elongate and acutely pointed; peg-like setae along entire dorsal surface (Figs. 100A, D); dorsolateral process of preanal appendage medium-size (Fig. 100A)	
	. . . . . <i>P. carolae</i> Bueno-Soria, p. 196	
-	Ventral branch of inferior appendage short (Figs. 113A, D); peg-like setae basal on dorsal surface (Figs. 113A, C); dorsolateral process of preanal appendage elongate (Figs. 113A)	<i>P. thilus</i> (Denning), p. 216
10(7)	Dorsal branch oblong, length more than twice as wide (Fig. 116A)	11
-	Dorsal branch of inferior appendage wide, length no more than twice the width (Fig. 101A); mesal margin (interior) of dorsal branch with ridges (Fig. 101G)	<i>P. cressae</i> , n. sp., p. 198
11(10)	Ventral branch digitate in ventral view (Fig. 115D)	12
-	Ventral branch deltoid to quadrate and short (Fig. 104D)	13
12(11)	Apex of mesoventral process of preanal appendage acutely pointed (Fig. 116C)	<i>P. zuliae</i> , n. sp., p. 222
-	Apex of mesoventral process of preanal appendage rounded (Fig. 115C)	
	. . . . . <i>P. yolandae</i> Chamorro-Lacayo & Holzenthal, p. 220	
13(12)	Ventral branch of inferior appendage deltoid (with mesal margin angled) (Fig. 105D)	14
-	Ventral branch of inferior appendage quadrate (with mesal margin straight) (Fig. 104D)	
	. . . . . <i>P. deltoides</i> (Yamamoto), p. 202	
14(13)	Mesoventral process of preanal appendage apically acute (Figs. 105A, C)	<i>P. denticulus</i> Bueno-Soria, p. 204
-	Mesoventral process of preanal appendage apically truncate (Fig. 112C) or slightly rounded (Fig. 110C)	
	. . . . . <i>P. recurvatus</i> (Yamamoto), p. 213	

Unassigned *Polyplectropus* species

Based on the phylogenetic analysis of New World *Polyplectropus*, the following 4 species did not fall within any of the here recognized species groups with any consistency. To avoid redundancy, monotypic species groups were not recognized for these species.

Polyplectropus beccus Hamilton & Holzenthal

Fig. 117

Polyplectropus beccus Hamilton & Holzenthal, 2005: 11. [Type locality: Venezuela, T. F. Amazonas [=Estado Amazonas]: Puerto Ayacucho (40 km S), El Tobogan, Caño Coromoto; NMNH; male].

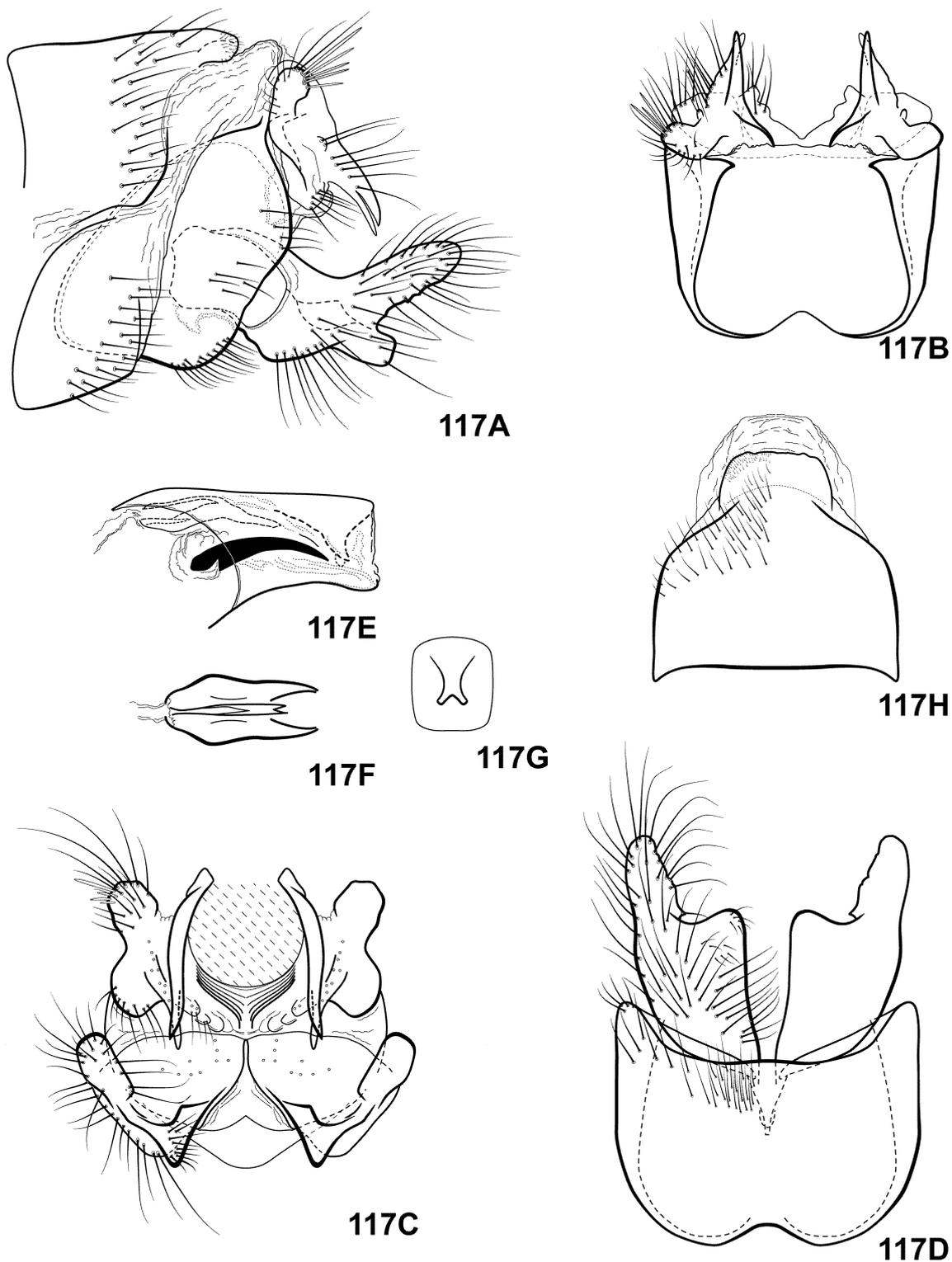


FIGURE 117. Male genitalia of *Polyplectropus beccus* Hamilton & Holzenthal, 2005 (holotype) (drawn by Hamilton & Holzenthal 2005): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–G—phallus: E—left lateral view; F—phallic sclerite, dorsal view; G—caudal view; H—tergum VIII, dorsal view.

As indicated by Hamilton & Holzenthal (2005) this is a very distinctive species. The bifurcate, beak-like apex of the intermediate appendage, having a sclerotized dorsal lobe and a more slender, less pigmented, closely appressed ventral lobe, sets this species apart from all others in the genus. Furthermore, the mesoventral

processes of the preanal appendage are located laterad, similar to *P. insularis*, new species, but in *P. beccus* it is bulbous and not as elongate. The inferior appendage of this species is distinct in having a broad, elongate base with the dorsal and ventral branches diverging apically into a longer dorsal and shorter, truncate ventral branch. The anterior basal plate of the inferior appendage is unlike other species in the genus, with the exception of *P. nayaritensis*, in being uniformly broad and not tapering anteriorly.

Adult. Length of forewing 5.5 mm, n = 1. Color of head, thorax, and legs yellowish-brown; setae on wings brown to dark brown with scattered patches of golden setae.

Male genitalia. Sternum IX in lateral view deltoid to slightly quadrate, anterior margin entire, posterior margin sinuate; in ventral view rectangular, anterior margin concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage shorter than inferior appendage, triangular, directed ventrad, with long mesolateral setae, apex bifurcate, beak-like, with sclerotized dorsal lobe and more slender, less sclerotized, closely appressed ventral lobe; in dorsal view narrowing posteriorly; in caudal view dorsal lobe rod-like, directed ventrolaterad, apex acute. Preanal appendage bipartite; mesolateral process setose, in dorsal and in lateral view circular; mesoventral process setose, located laterally, bulbous; in caudal view not fused basomesally, processes broadly separated, ventral margin of process rounded. Inferior appendage bipartite with anterior basal plate short and uniformly broad, not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate; in ventral view narrow, lateral margin entire, posterior margin rounded, mesal margin entire, slightly angled, expanding posterad into shallowly fused ventral branch; ventral branch setose, elongate, basally broad narrowing apically; in lateral view digitate, apically truncate; in ventral view quadrate to deltoid, posteromesal margin angled, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view cylindrical, apex acute; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; endothecal membrane with pair of medium-sized, curved spines.

Material examined. **VENEZUELA: T[erritorio] F[ederal] Amazonas [=Estado Amazonas]:** Puerto Ayacucho (40 km S) El Tobogán, Caño Coromoto [5°39'50"N, 67°37'25"W], 24.i.1989, Spangler, Faitoute & Barr—1 male (UMSP) [paratype].

***Polyplectropus beutelspacheri* Bueno-Soria**

Figs. 118, 124

Polyplectropus beutelspacheri Bueno-Soria, 1990: 378. [Type locality: Mexico, Guerrero, Zihuaquío, km. 95 Carretera 94, Coyuca-Zihuatanejo; IBUNAM; male].

Polyplectropus beutelspacheri is very similar to species in the *P. fuscatus* group, especially *P. fuscatus* based on the absence of a dorsolateral process of the preanal appendage, on the shape of the inferior appendage, and on having a bipartite intermediate appendage. *Polyplectropus beutelspacheri* does not have a dorsal digitate lobe on the mesoventral process of the preanal appendage unlike *P. fuscatus* Flint. *Polyplectropus beutelspacheri* has apically free mesoventral processes like *P. tragularius* and *P. rondoniensis*, and not apically fused as in *P. fuscatus*. In addition, the bipartite intermediate appendage of *P. beutelspacheri* has a smaller ventral lobe (broader and more prominent in the species mentioned above). Lastly, *P. beutelspacheri* bears peg-like setae on the ventral branch of the inferior appendage and has endothecal phallic spines, both traits absent in *P. fuscatus*, *P. tragularius*, and *P. rondoniensis*.

Adult. Length of forewing 4–5 mm, n = 20. Color of head, thorax, and legs brown (specimens preserved in alcohol).

Male genitalia. Sternum IX in lateral view rounded, anterior margin highly convex, posterior margin sinuate and medially produced; in ventral view rectangular, anterior margin highly concave, posterior margin

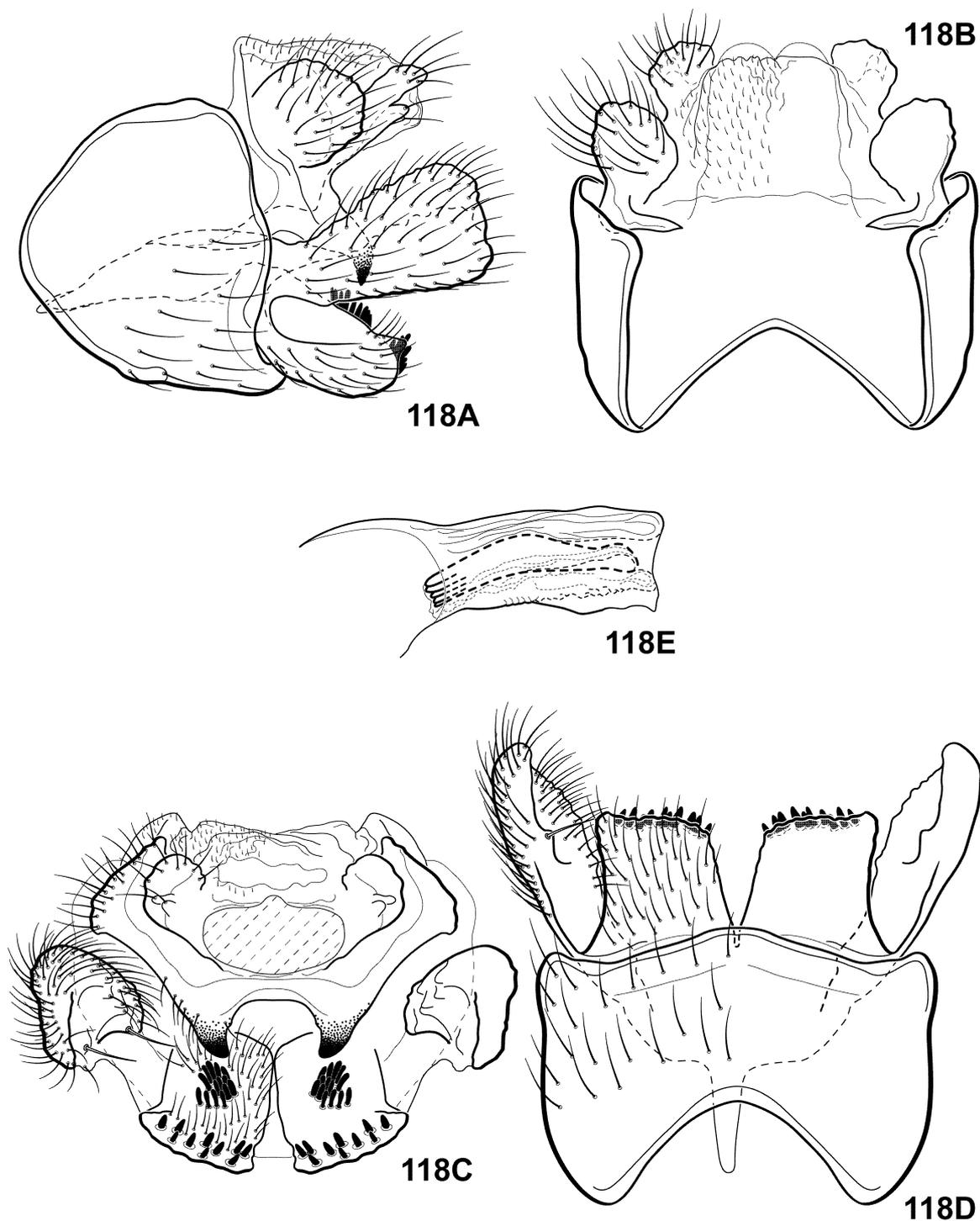


FIGURE 118. Male genitalia of *Polyplectropus beutelspacheri* Bueno, 1990 (paratype). A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E—phallus, left lateral view.

with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae; in dorsal view digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage not longer than inferior appendage, bipartite, digitate, with a pair of long apical setae with 2 basal papillate lobes bearing small apical setae; in dorsal view primary lobe rounded; in caudal view primary lobe rounded, directed posterodorsad. Preanal appendage bipartite; dorsolaterally with small remnant of process; mesolateral process setose; in dorsal view ovate, in lateral view orbicular; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, anteroventral

margin sinuate, posterior margin angled; in caudal view processes separated, ventral margin of process subacute with sclerotized point. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view pandurate; in ventral view broad, lateral margin angled, entire, posterior margin subacute, mesal margin slightly undulate, subapically expanded, expanding posterad into ventral branch; ventral branch setose, elongate and broad, bearing robust, sclerotized spines medially and apically; in lateral view oblong, apically produced dorsad; in ventral view subquadrate, mesal margin slightly angled, gradually converging mesally. Phallus short; dorsal phallic sclerite in lateral view sinuate, apex pandurate; endothecal membrane without embedded spines.

Material examined. **MEXICO: Guerrero:** Zihuaquio, Km 95, ruta Ciudad Altamirano-Zihuatanejo, [17°38'00"N, 101°33'00"W], 24.vii.1985, R Barba—1 male (IBUNAM) [paratype]; 25.vii.1985, R Barba—2 males (UMSP000100897 specimen drawn) (IBUNAM) (NMNH) [paratype]; Ruta 134, Río Placeres del Oro, [18°13'45"N, 100°54'15"W], 22.ii.1984, H. Velasco—1 male (IBUNAM) [paratype]; **Morelos:** Cuernavaca, [18°55'00"N, 99°15'00"W], 23.ii.1932, A. Dampf—1 male (INHS) [paratype]; 29.ii.1932, A. Dampf—1 male (INHS) [paratype]; 2.iii.1932, Dampf & Plummer—1 male (INHS) [paratype]; 23–29.iii.1932, Dampf & Plummer—1 male (INHS) [paratype]; 8–11.iv.1932, Dampf & Plummer—2 males (INHS) [paratype]; Cuautla, [18°48'00"N, 98°57'00"W], 1312 m, 27.vii.1937, A. Dampf—1 male (INHS); [paratype]30.viii.1937, A. Dampf—1 male (INHS) [paratype]; 12.ix.1937, A. Dampf—1 male (INHS) [paratype]; Camomilas, [18°44'00"N, 99°04'00"W], 9.v.1942, A. Dampf—7 males (INHS) [paratype].

Distribution. Mexico.

Remarks. The holotype was not examined. The former curator of Trichoptera at IBUNAM, J. Bueno-Soria, was unable to locate it.

***Polyplectropus kanukarum*, new species**

Figs. 16A, 119, 134

Polyplectropus kanukarum resembles several species in the *P. bredini* group based on the presence of an elongate dorsolateral process, on the submedially produced anterior margin of sternum IX (lateral view), and on the clavate shape of the ventral branch of the inferior appendage (especially when viewed laterally). *Polyplectropus kanukarum* also resembles *P. flintorum* in the shape of the oblong intermediate appendage bearing few apical setae and in the shape of the inferior appendage. However, *P. kanukarum* can be distinguished from all other species in the genus by the undulating posterior margin of sternum IX, by the presence of a lateral, single peg-like phallic spine in the endothecal membrane, and by the deltoid ventral branch of the inferior appendage, which has a highly sclerotized apex (when viewed ventrally).

Adult. Length of forewing 3.5–4 mm, n = 11. Color of head, thorax, and legs brown; setae on body grey and golden brown; tegulae with long, golden brown and grey setae; setae on wings darker brown along costal margin, rest of wing lighter shade of brown with scattered patches of grey setae.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin submedially produced, posterior margin undulate; in ventral view rectangular, anterior margin highly concave, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae; lower lip of tergum X membranous, smooth, without dorsal microsetae, digitate; in caudal view produced dorsad of phallocrypt. Intermediate appendage longer than inferior appendage, oblong, with long basal setae and few scattered apically; in dorsal view broad basally, narrowing posterolaterad; in caudal view digitate, curved, directed ventrolaterad, apex rounded. Preanal appendage tripartite; dorsolateral process elongate, originating from dorsum of mesolateral process, directed anterad, recurved posterad, tapering mesally into acute apex; mesolateral process setose; in dorsal view obovate, in lateral view subquadrate; mesoventral process setose; in lateral view hook-like, with ventrad-directed sclerotized apex, ventral margin concave, posterior margin

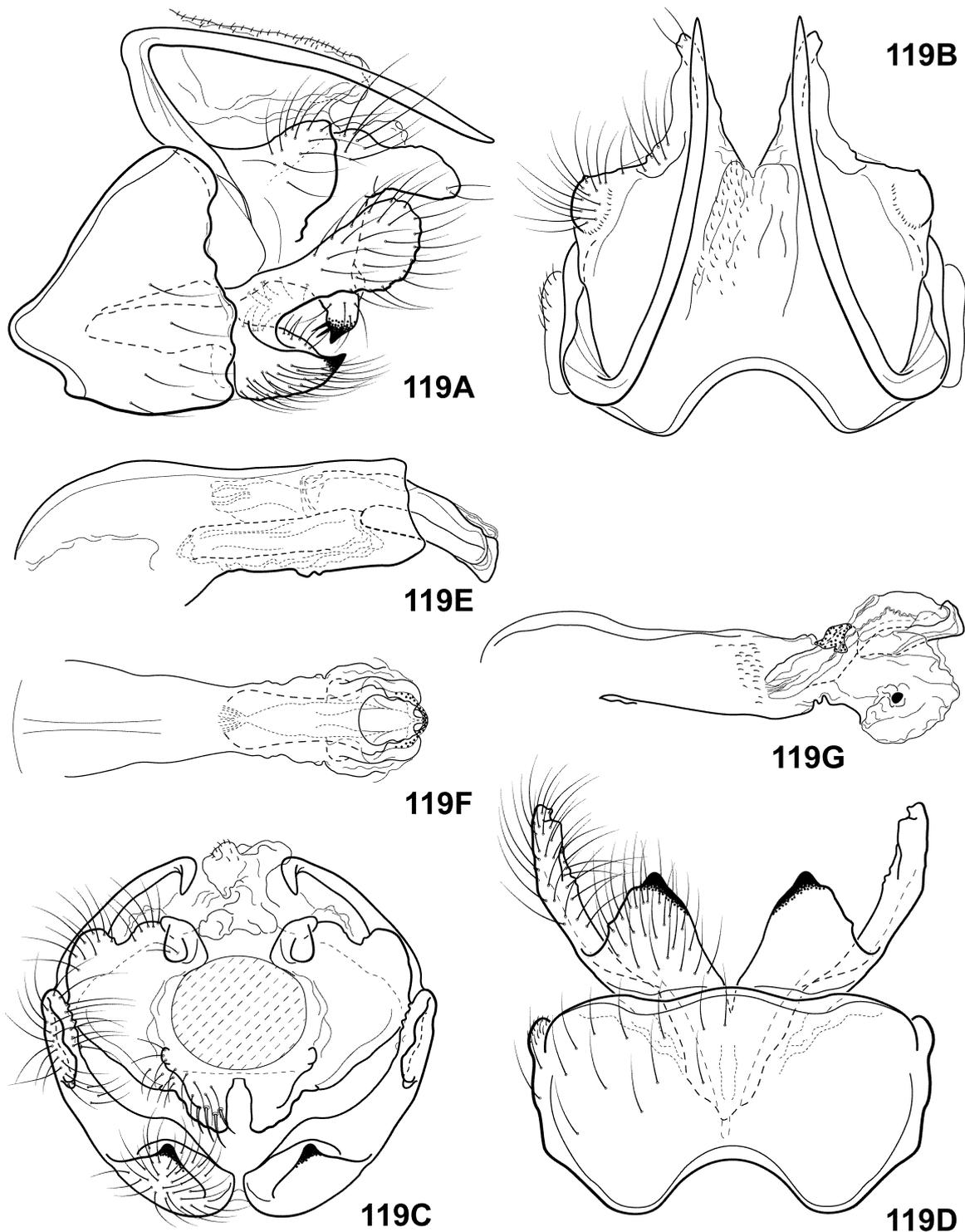


FIGURE 119. Male genitalia of *Polyplectropus kanukarum*, new species (holotype): A—left lateral view; B—dorsal view; C—caudal view; D—ventral view; E–G—phallus: E—left lateral view; F—dorsal view; G—left lateral view with endophallus protracted (everted) (paratype).

convex; in caudal view fused basomesally, processes separated, ventral margin of process subacute, basodorsally produced. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, with posteroventral margin slightly produced ventrad; in ventral view narrow, lateral margin convex, entire, posterior margin subacute, mesal margin entire, angled, expanding posterad into ventral branch; ventral branch setose, short

and basally broad, in lateral view digitate, apically acute; in ventral view deltoid, posteromesal margin angled, gradually converging mesally. Phallus long; dorsal phallic sclerite in lateral view cylindrical, apex truncate; apex of dorsal phallic sclerite in dorsal view rounded; dorsolateral arm of dorsal phallic sclerite in lateral view tapering subapically; when endothecal membrane is everted, a small, peg-like spine everts laterad.

Holotype male. GUYANA: [Upper Takutu-Upper Essequibo]: Kanuku M[oun]t[ain]s, Moco Moco River, [3°18'02"N, 59°38'54"W] 29.iv.1995, O S Flint—(UMSP000107494) (NMNH).

Paratypes. GUYANA: [Upper Takutu-Upper Essequibo]: Kanuku M[oun]t[ain]s, Kumu River & Falls, [3°15'54"N, 059°43'30"W], 29.iv.1995, O S Flint—2 males, 2 females; Kanuku M[oun]t[ain]s, Moco Moco River, [3°18'02"N, 59°38'54"W] 29.iv.1995, O S Flint—6 males.

Distribution. Guyana.

Etymology. This species is named for the Kanuku mountains in the country of Guyana where the holotype and paratypes were collected.

***Polyplectropus nayaritensis* Bueno-Soria**

Figs. 16H, 120, 124

Polyplectropus nayaritensis Bueno-Soria, 1990: 362. [Type locality: Mexico, Nayarit, Compostela; IBUNAM; male].

The holotype of this species is in poor condition and the male genitalia was considerably damaged, preventing proper observations of presence and connection of certain structures. Only the lateral and ventral aspects of the male genitalia were conserved enough to illustrate. Fortunately, a forewing remained intact, thus revealing the cubital 2 (Cu₂) vein to be apically entire when reaching the margin at the arculus (not bent distally as in all other New World *Polyplectropus*, with the exception of *P. beccus*) and a highly pigmented Anal 1 vein (A1), which is directed towards Anal veins 2 and 3 (not towards Cu₂ as in other New World *Polyplectropus*). Furthermore, a sister relationship between *P. nayaritensis* and *P. panamensis* sensu Bueno-Soria (1990) was not supported by the phylogenetic analysis. Superficially, these species may resemble each other in the shape of the intermediate appendage, these being oblong in both species, and in the oblong and dorsally upturned dorsal branch of the inferior appendage. However, the shape of the ventral branch of the inferior appendage and its relative position to the dorsal branch in *P. nayaritensis* is quite different and distinct from anything in the genus.

Adult. Length of forewing 5 mm, n = 1. Color of head yellow, thorax and legs yellow.

Male genitalia. Sternum IX in lateral view deltoid, anterior margin entire, posterior margin sinuate; in ventral view rectangular, anterior margin entire, posterior margin with slight median flange. Tergum X membranous, oblong, bearing dorsal microsetae. Intermediate appendage as long as inferior appendage, oblong, with long basal setae; in dorsal view basally broad, tapering mesally to rounded apex; in caudal view digitate, membranous. Preanal appendage bipartite; mesolateral process setose; in dorsal view oblong, in lateral view orbicular; mesoventral process setose; in lateral view digitate, with ventrad-directed sclerotized apex, anteroventral margin concave, posterior margin rounded. Inferior appendage bipartite with anterior basal plate not extending anterad beyond sternum IX when observed in lateral view; dorsal branch setose, in lateral view clavate, curved ventrad; in ventral view narrow, lateral margin convex, undulate, posterior margin rounded, mesal margin entire, apically expanded, becoming concave, expanding posterad into ventral branch; ventral branch setose, elongate, in lateral view lanceolate, rounded posterad; in ventral view basally rectangular, abruptly narrowing apically, sclerotized apex curved posteromesad, ventral branch not visible in lateral view, gradually converging mesally. Phallus long; endothecal membrane with 3 to 4 stout, short, linear, sclerotized spines.

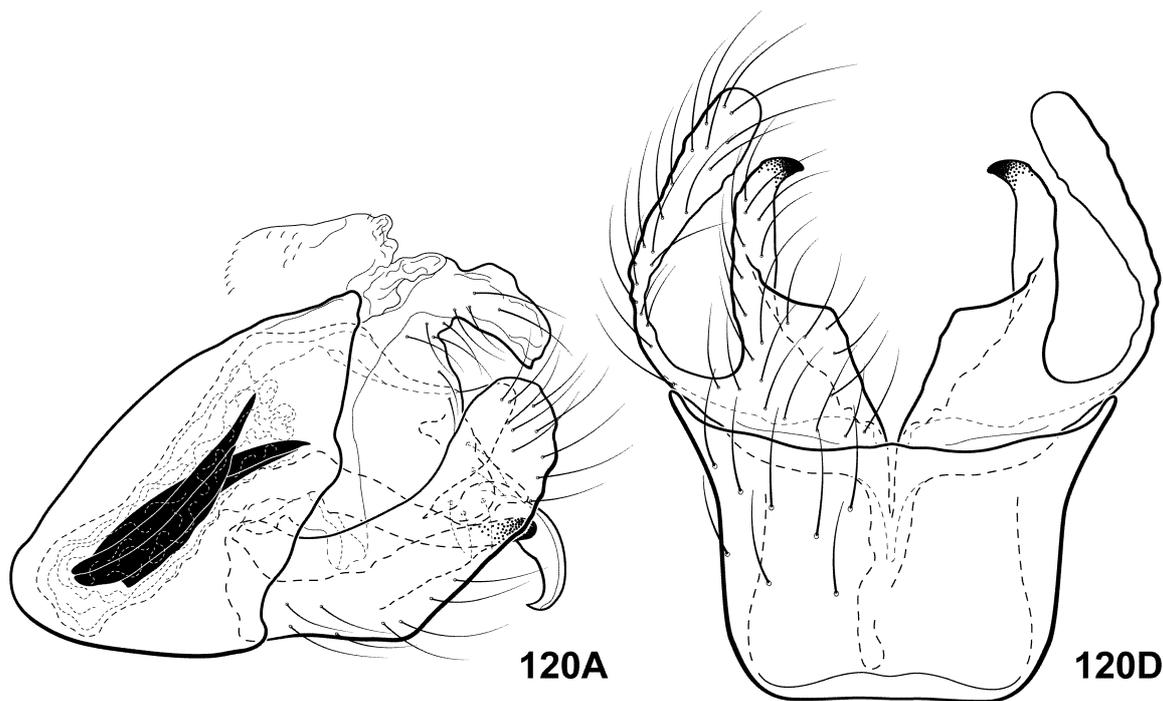


FIGURE 120. Male genitalia of *Polyplectropus nayaritensis* Bueno, 1990 (drawn from damaged specimen) (holotype): A—left lateral view with embedded phallus; D—ventral view.

Material examined. **MEXICO: Nayarit:** Compostela, [21°14'00"N, 104°55'00"W], 21.x.1982, Ibarra & García—1 male (IBUNAM) [holotype].

Distribution. Mexico.

Conclusions

The current phylogenetic analysis is the first to take a quantitative approach to uncover relationships among species of New World *Polyplectropus* and to test explicitly the monophyly of established species groups. This study incorporates character systems traditionally used in species discrimination, such as characters of the male genitalia, as well as character systems usually not recognized to be informative at lower levels in Polycentropodidae, such as wing venation. The use of wing venation characters proved to be informative when distinguishing among certain species groups, for example in the *P. santiago* group. Female characters hold potential phylogenetic value, but their use is limited by the number of positively associated male/female pairs. Future morphological research should take advantage of fresh approaches to imaging, such as confocal laser scanning microscopy, to examine difficult-to-observe internal morphology, muscle tissue, and cuticular ultrastructure (Geraci & Laughlin 2006; Klaus *et al.* 2003; Zill *et al.* 2000). The 2 approaches implemented to analyze the data resulted in minor topological differences. Bayesian methods resulted in less resolution due to conflicting estimates of relationship among most species groups (except for *P. annulicornis* group) and among several species in the *P. narifer* and *P. thilus* groups. High variation in rates of change among characters and an overall low number of characters may have led to reduced resolution in the Bayesian tree.

Based on our results, a new classification for New World *Polyplectropus* is proposed with revised characterization of each of the 10 species groups recognized. Nevertheless, 4 species remain unassigned to species group. Our understanding of the diversity and evolutionary relationships of New World *Polyplectropus* has undoubtedly improved through recent field-work in the Neotropical region. As a result of this taxonomic revision the total number of species currently known increased by more than 42% (39 new

species). The distribution of known New World *Polyplectropus* species is largely Neotropical, with the majority restricted to the Mexican and Brazilian subregions. Large expanses of land remain unexplored, such as most of the Amazon Basin. The urgency to explore and describe the fauna in these regions is great as freshwater systems face increasing environmental pressure. We hope this study spurs continued discovery of species and their habits and further improves our knowledge and understanding of this morphologically diverse, ecologically important, and interesting group of insects.

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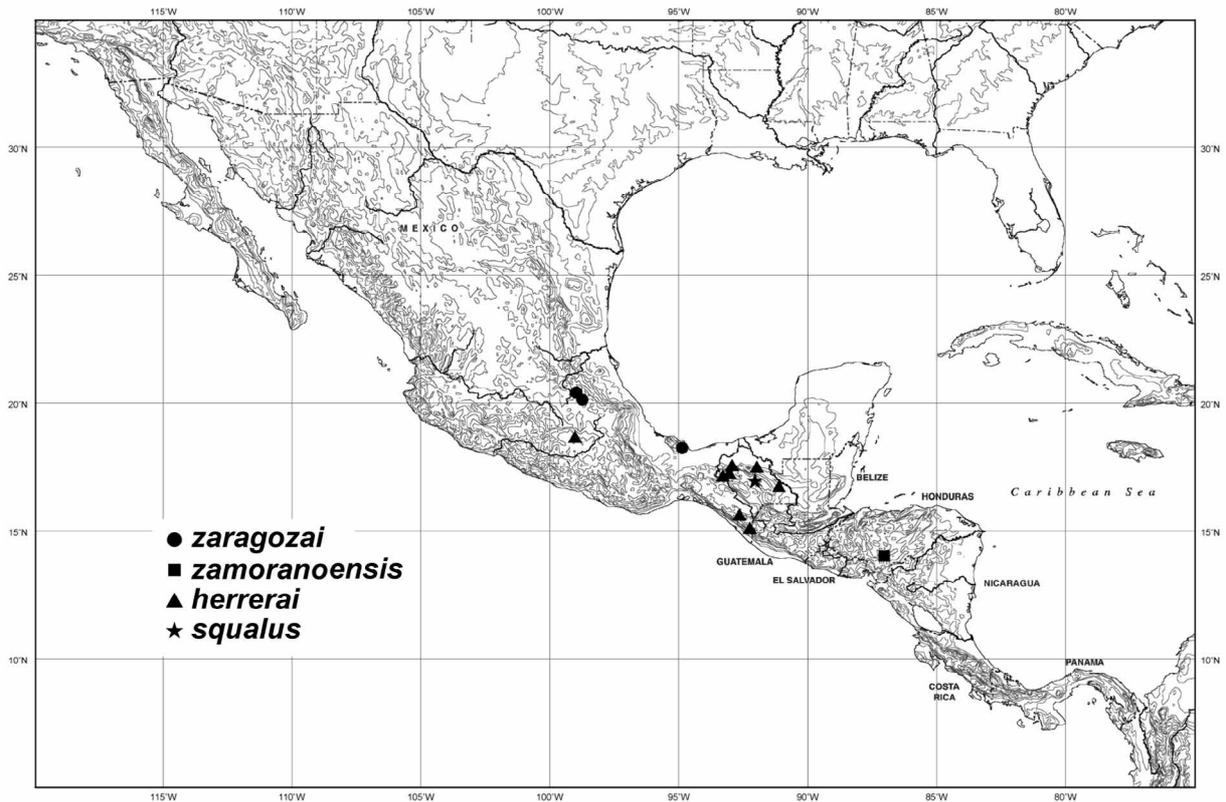


FIGURE 121. Distributions of *Polyplectropus zaragozai* Bueno, 1990; *Polyplectropus zamoranoensis*, new species; *Polyplectropus herrerae* Bueno & Hamilton, 1990; and *Polyplectropus squalus* Bueno, 1990.

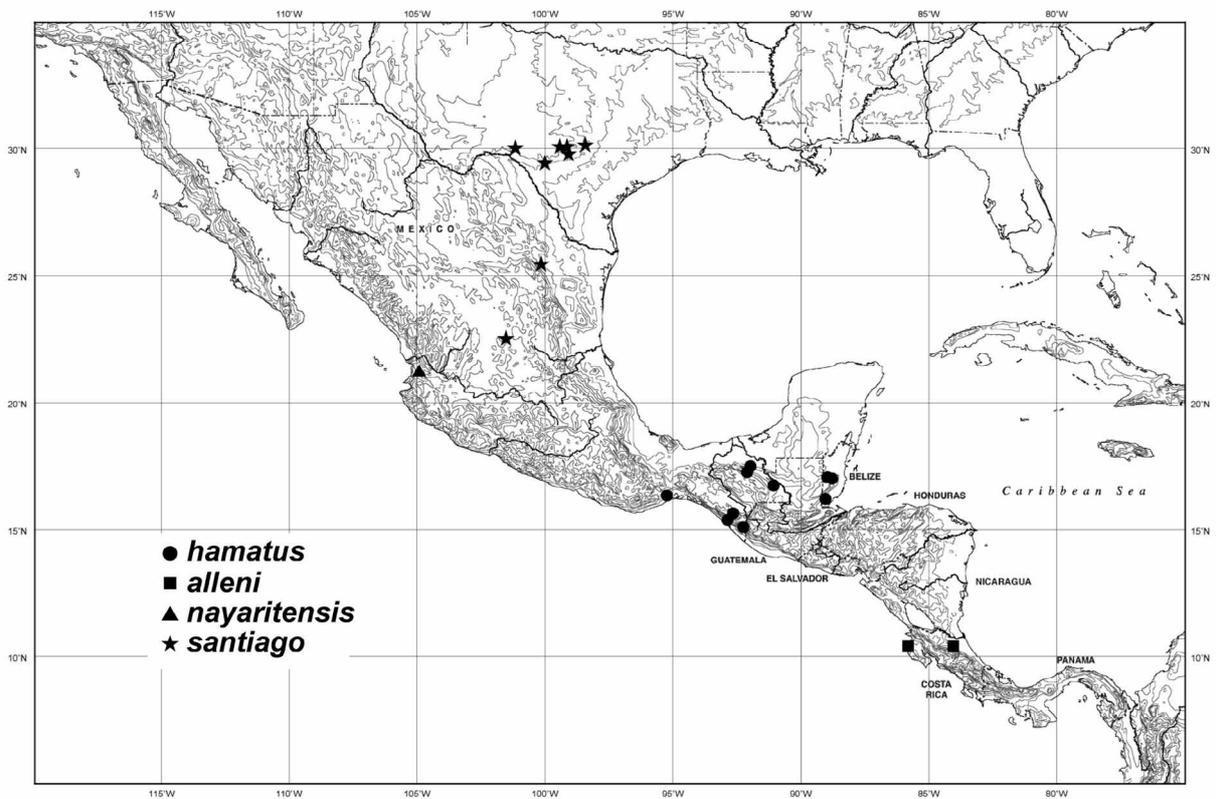


FIGURE 122. Distributions of *Polyplectropus hamatus* Bueno, 1990; *Polyplectropus alleni* (Yamamoto, 1966); *Polyplectropus nayaritensis* Bueno, 1990; and *Polyplectropus santiago* Bueno, 1990.

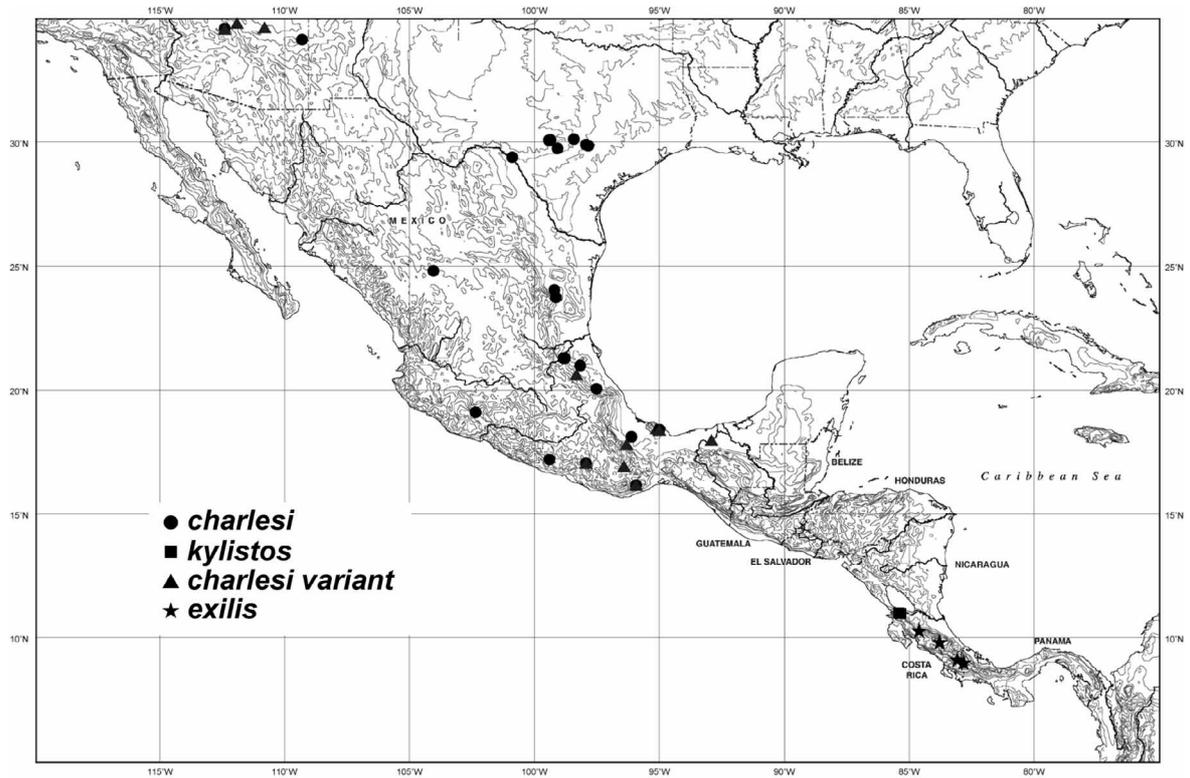


FIGURE 123. Distributions of *Polyplectropus charlesi* (Ross, 1941); *Polyplectropus kylistos* Chamorro–Lacayo & Holzenthal, 2004; *Polyplectropus charlesi* variant (Ross, 1941); and *Polyplectropus exilis* Chamorro–Lacayo & Holzenthal, 2004.

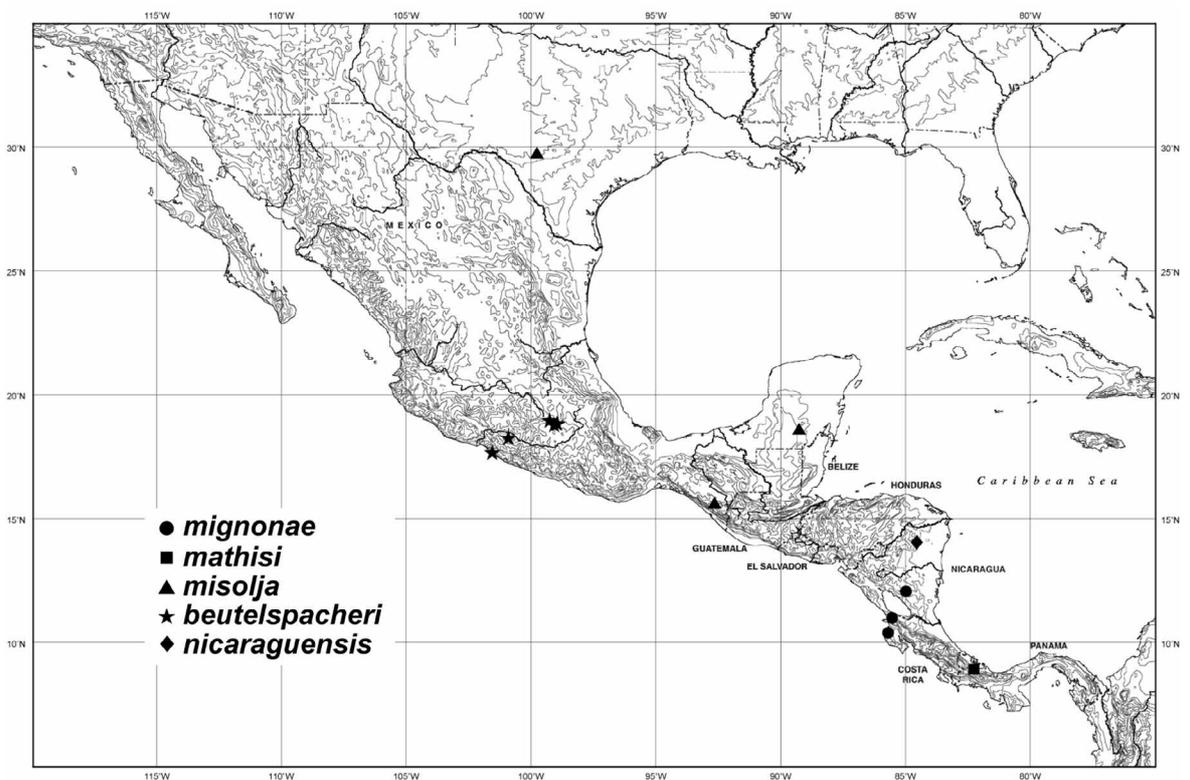


FIGURE 124. Distributions of *Polyplectropus mignonae* Bueno, 1990; *Polyplectropus mathisi* Bueno, 1990; *Polyplectropus misolja* Bueno, 1990; *Polyplectropus beutelspacheri* Bueno, 1990; and *Polyplectropus nicaraguensis* Chamorro–Lacayo, 2003.

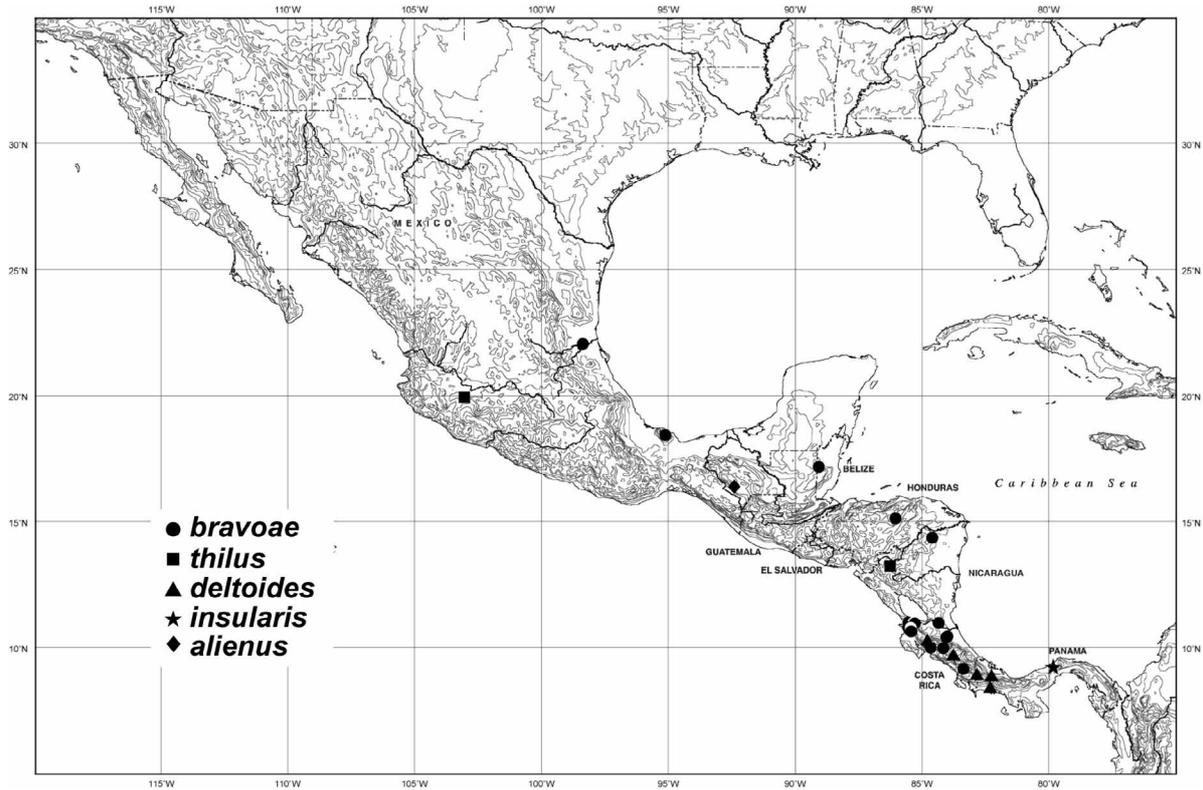


FIGURE 125. Distributions of *Polyplectropus bravoae* Bueno, 1990; *Polyplectropus thilus* (Denning, 1962); *Polyplectropus deltoides* (Yamamoto, 1967); *Polyplectropus insularis*, new species; and *Polyplectropus alienus* Bueno, 1990.

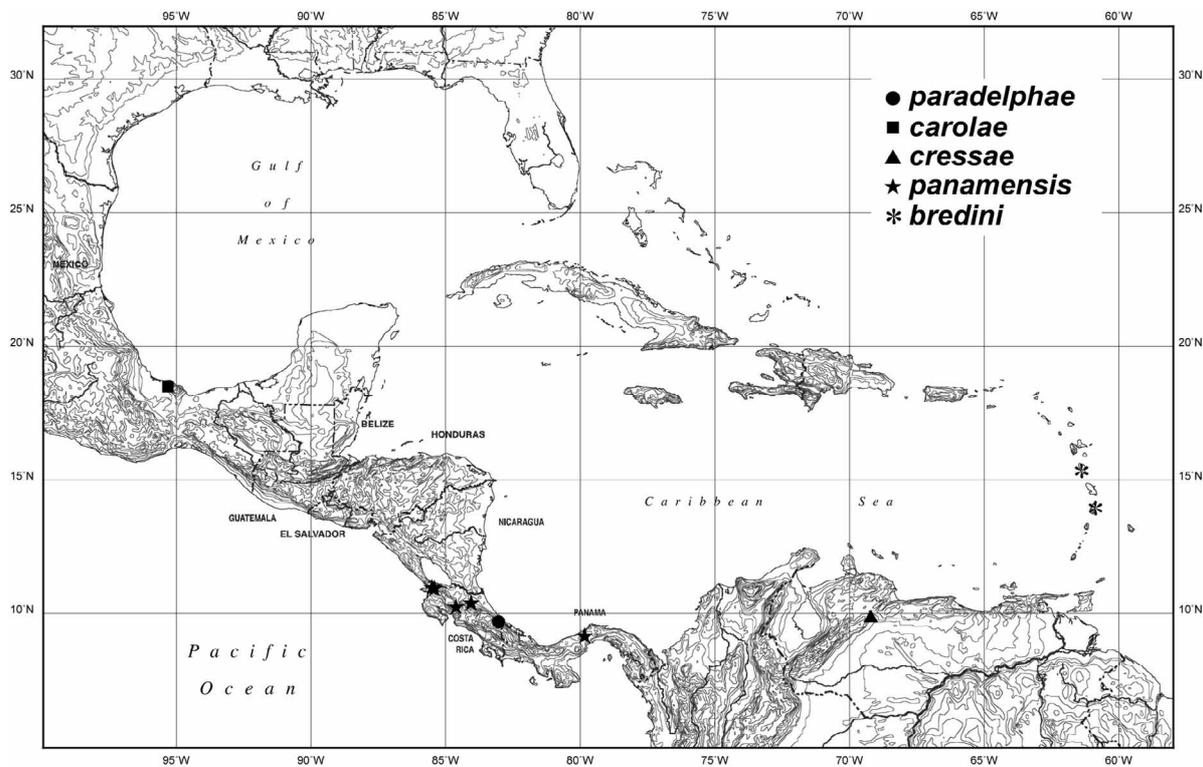


FIGURE 126. Distributions of *Polyplectropus paradelphae* Chamorro–Lacayo & Holzenthal, 2004; *Polyplectropus carolae* Bueno, 1990; *Polyplectropus cressae*, new species; *Polyplectropus panamensis* Bueno, 1990; and *Polyplectropus bredini* Flint, 1968.

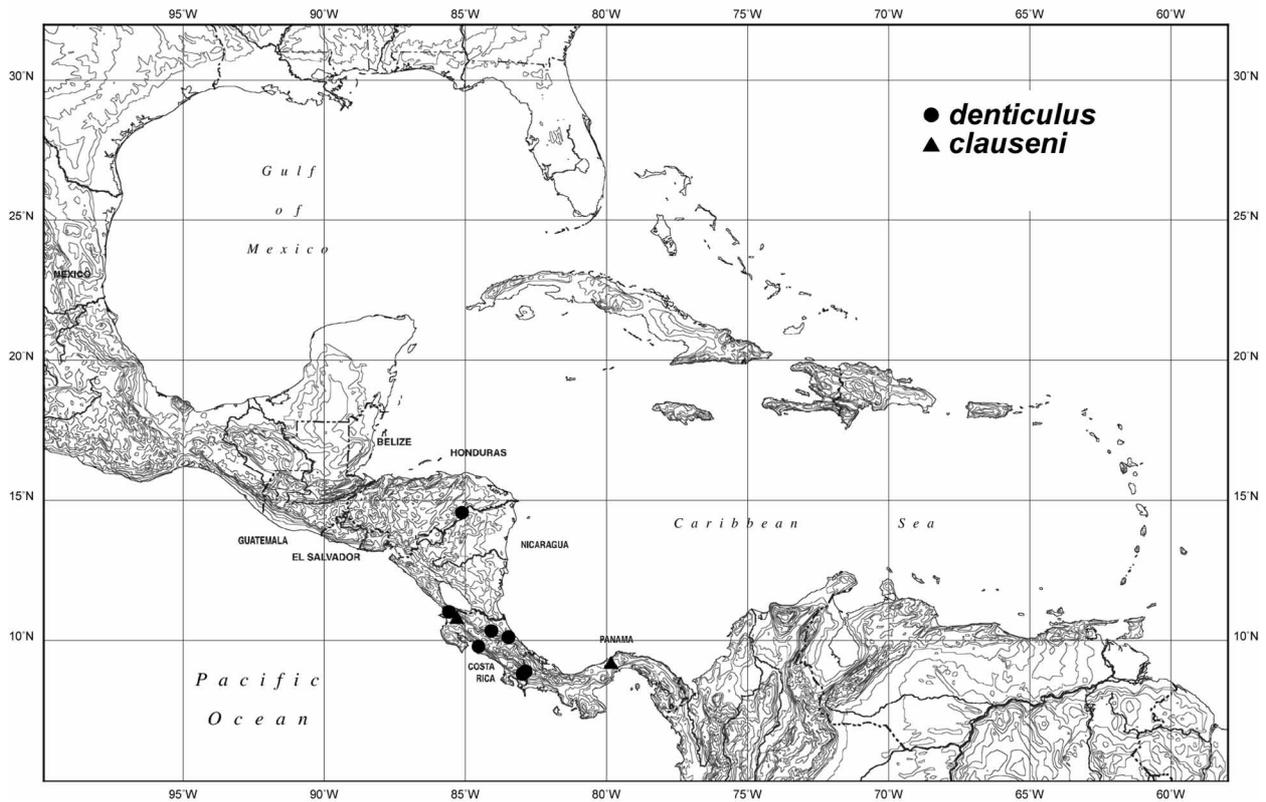


FIGURE 127. Distributions of *Polyplectropus denticulus* Bueno, 1990 and *Polyplectropus clauseni* Chamorro–Lacayo & Holzenthal, 2004.

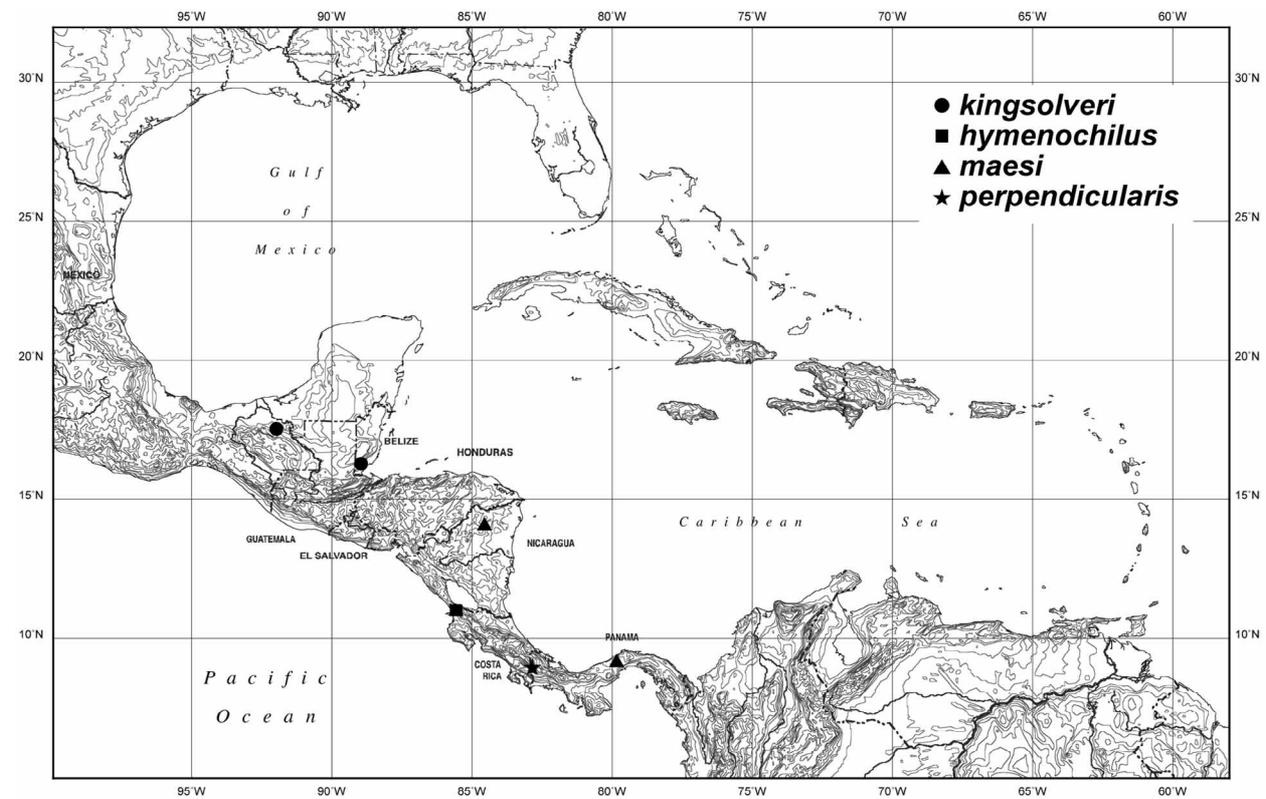


FIGURE 128. Distributions of *Polyplectropus kingsolveri* Bueno, 1990; *Polyplectropus hymenochilus* Chamorro–Lacayo & Holzenthal, 2004; *Polyplectropus maesi* Chamorro–Lacayo, 2003; and *Polyplectropus perpendicularis* Chamorro–Lacayo & Holzenthal, 2004.

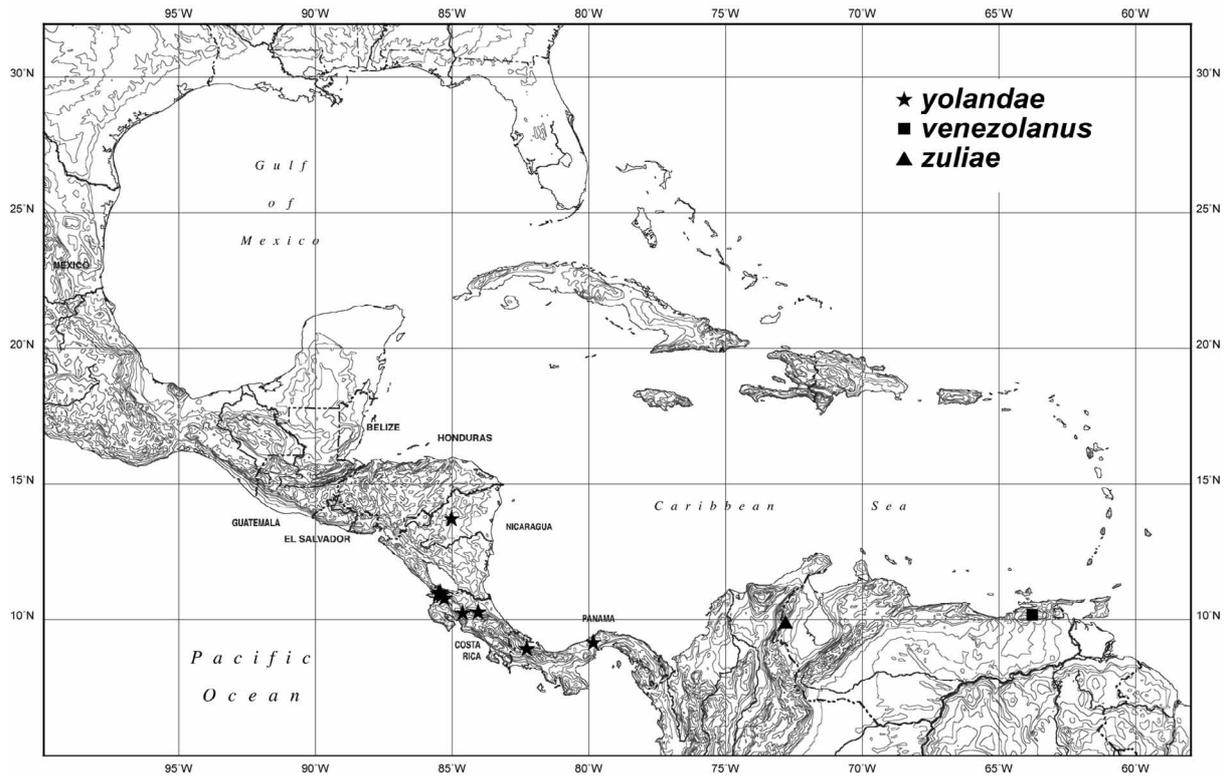


FIGURE 129. Distributions of *Polyplectropus yolandae* Chamorro–Lacayo & Holzenthal, 2004; *Polyplectropus venezolanus*, new species; and *Polyplectropus zuliae*, new species.

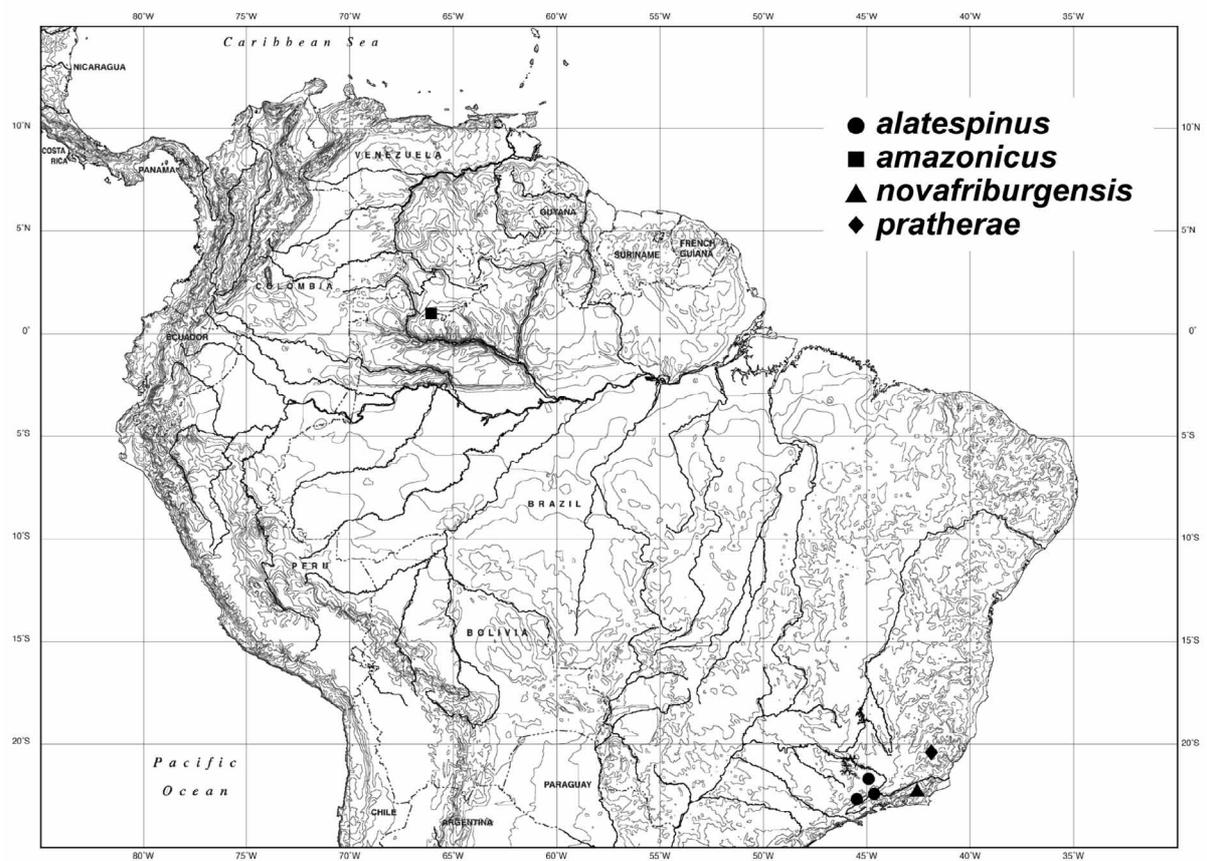


FIGURE 130. Distributions of *Polyplectropus alatespinus*, new species; *Polyplectropus amazonicus*, new species; *Polyplectropus novafriburgensis*, new species; and *Polyplectropus pratherae*, new species.

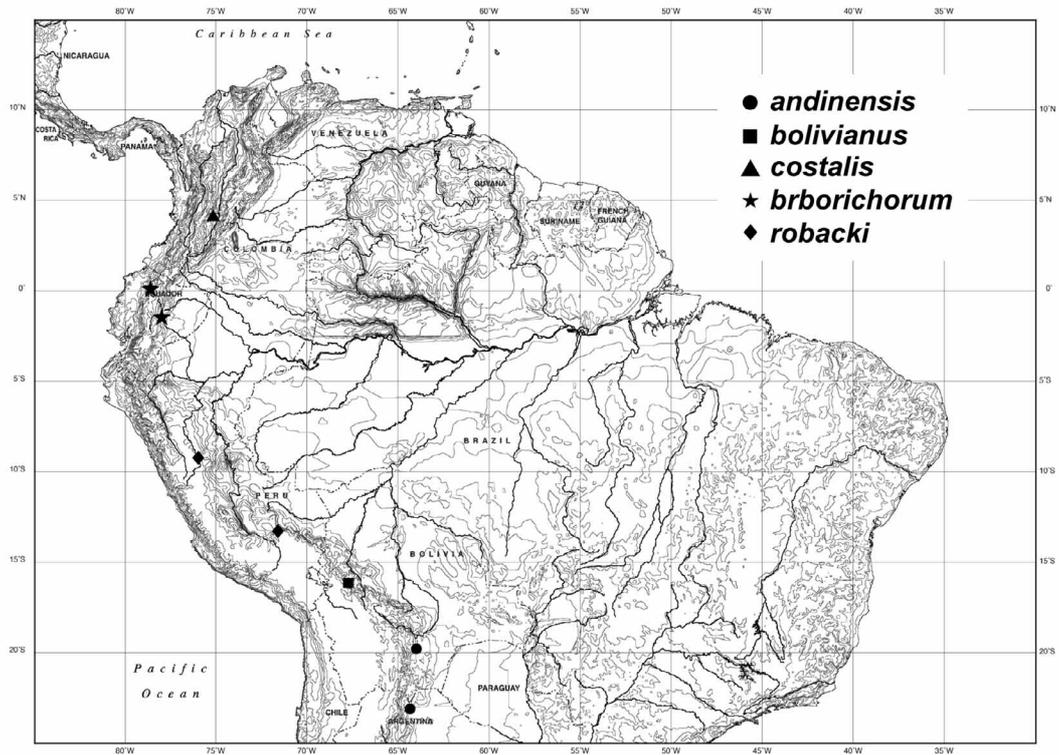


FIGURE 131. Distributions of *Polyplectropus andinensis*, new species; *Polyplectropus bolivianus*, new species; *Polyplectropus brborichorum*, new species; *Polyplectropus costalis* (Banks, 1913); and *Polyplectropus robacki* (Yamamoto, 1966).

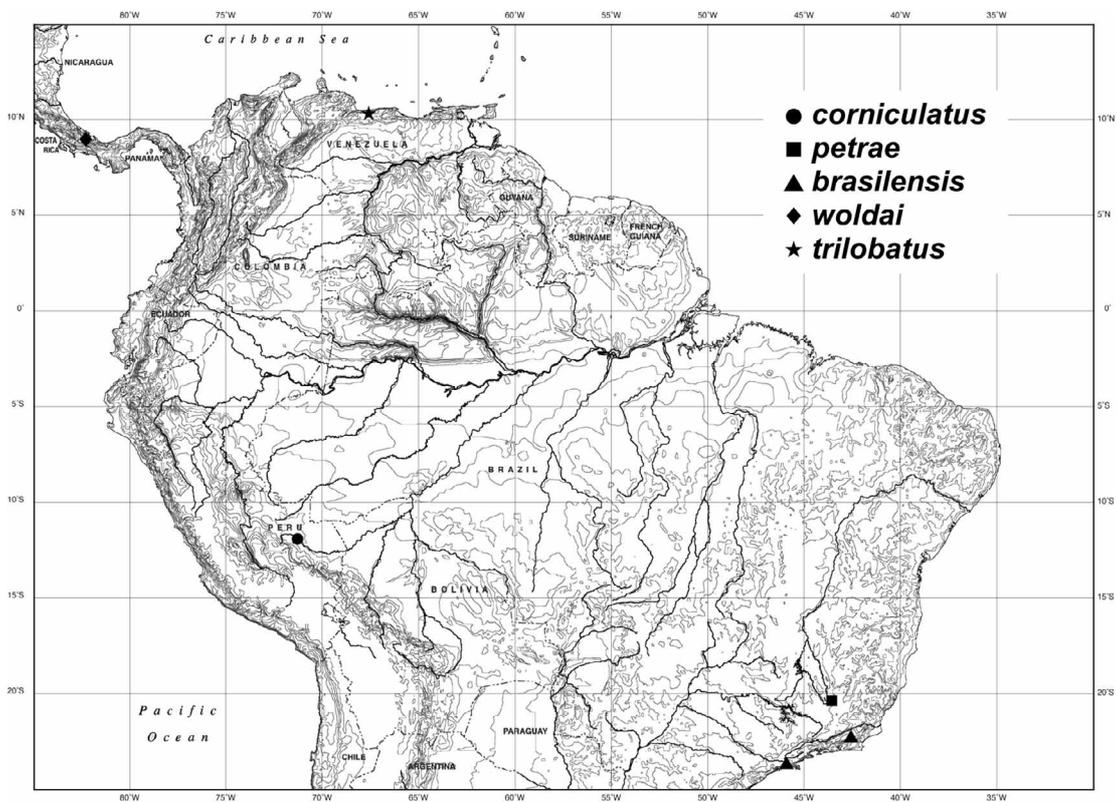


FIGURE 132. Distributions of *Polyplectropus corniculatus*, new species; *Polyplectropus petrae*, new species; *Polyplectropus brasilensis*, new species; *Polyplectropus woldai*, new species; and *Polyplectropus trilobatus* Flint, 1981.

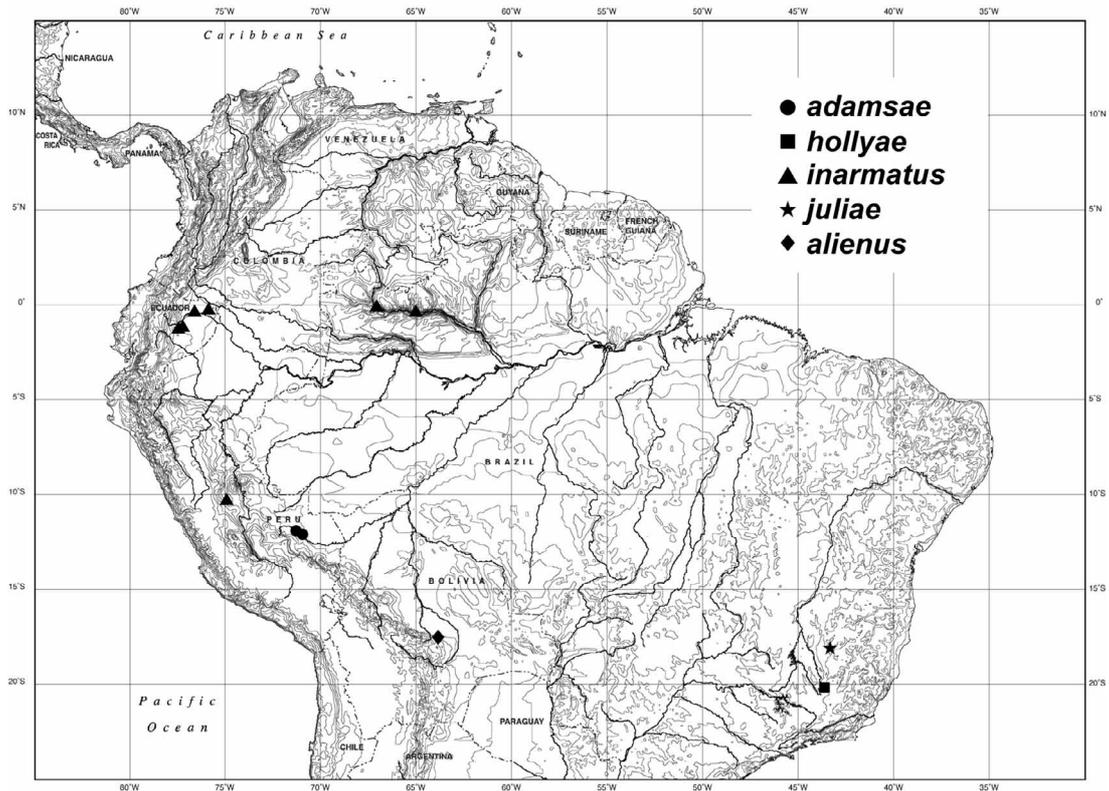


FIGURE 133. Distributions of *Polypectropus adamsae*, new species; *Polypectropus hollyae*, new species; *Polypectropus inarmatus* Flint, 1971; *Polypectropus juliae*, new species; and *Polypectropus alienus* Bueno, 1990.

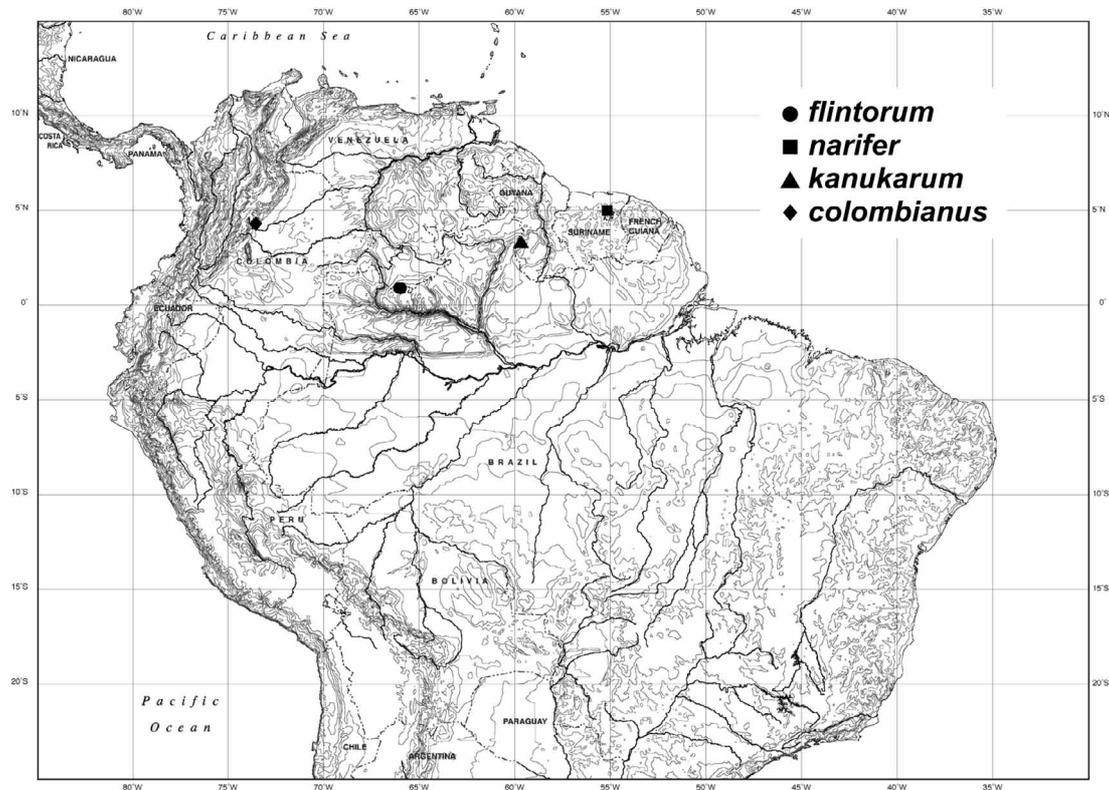


FIGURE 134. Distributions of *Polypectropus flintorum*, new species; *Polypectropus narifer* Flint, 1974; *Polypectropus kanukarum*, new species; and *Polypectropus colombianus*, new species.

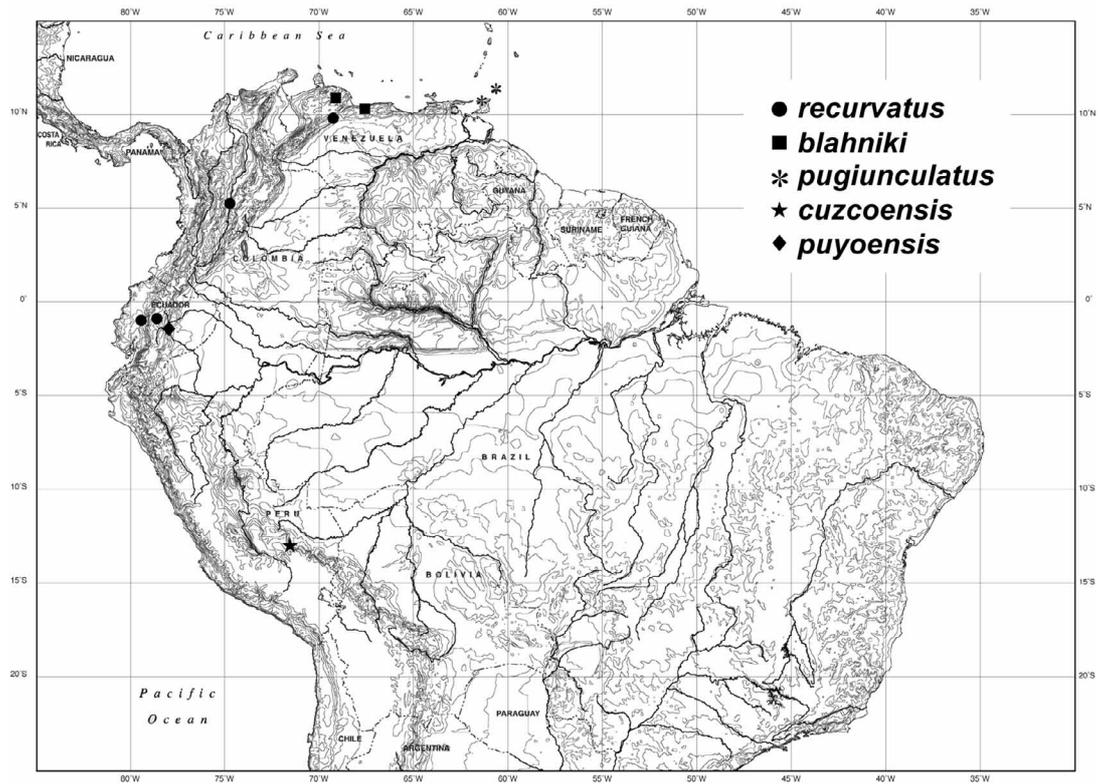


FIGURE 135. Distributions of *Polyplectropus recurvatus* (Yamamoto, 1966); *Polyplectropus blahniki*, new species; *Polyplectropus pugiunculatus* Botosaneanu, 1993; *Polyplectropus cuzcoensis*, new species; and *Polyplectropus puyoensis*, new species.

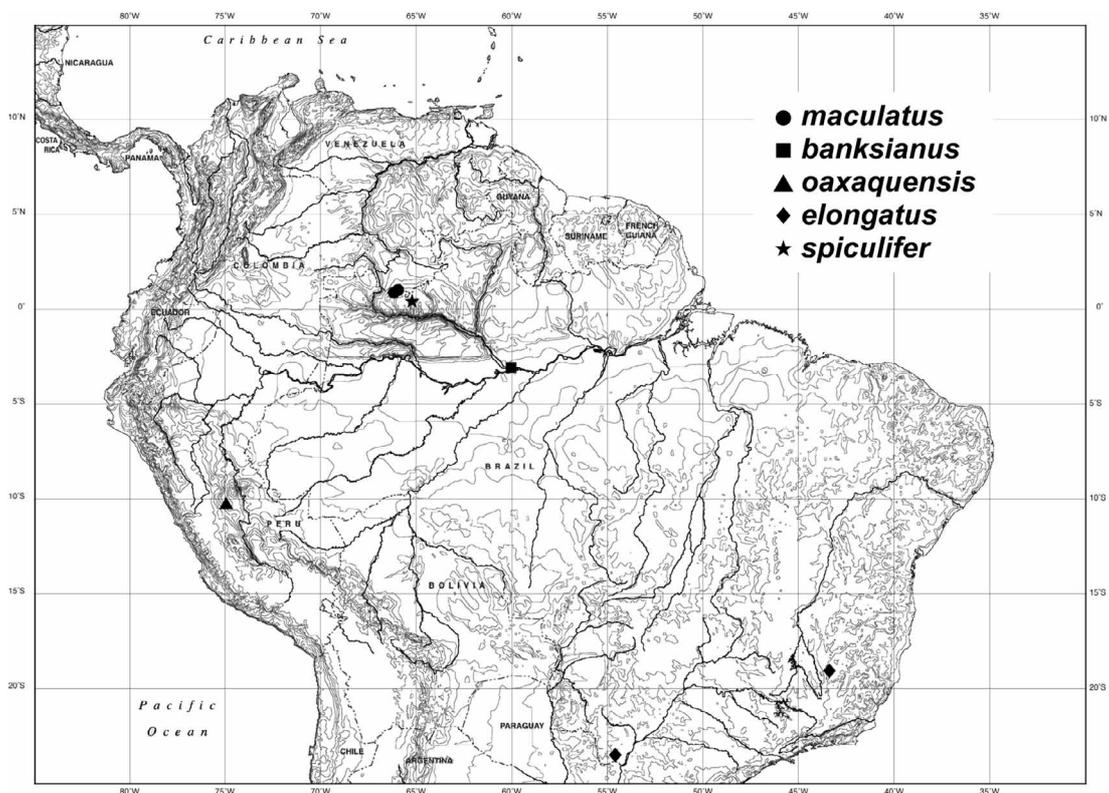


FIGURE 136. Distributions of *Polyplectropus maculatus*, new species; *Polyplectropus banksianus* Flint, 1971; *Polyplectropus oaxaquensis* Bueno, 1990; *Polyplectropus elongatus* (Yamamoto, 1966); and *Polyplectropus spiculifer* Flint, 1971.

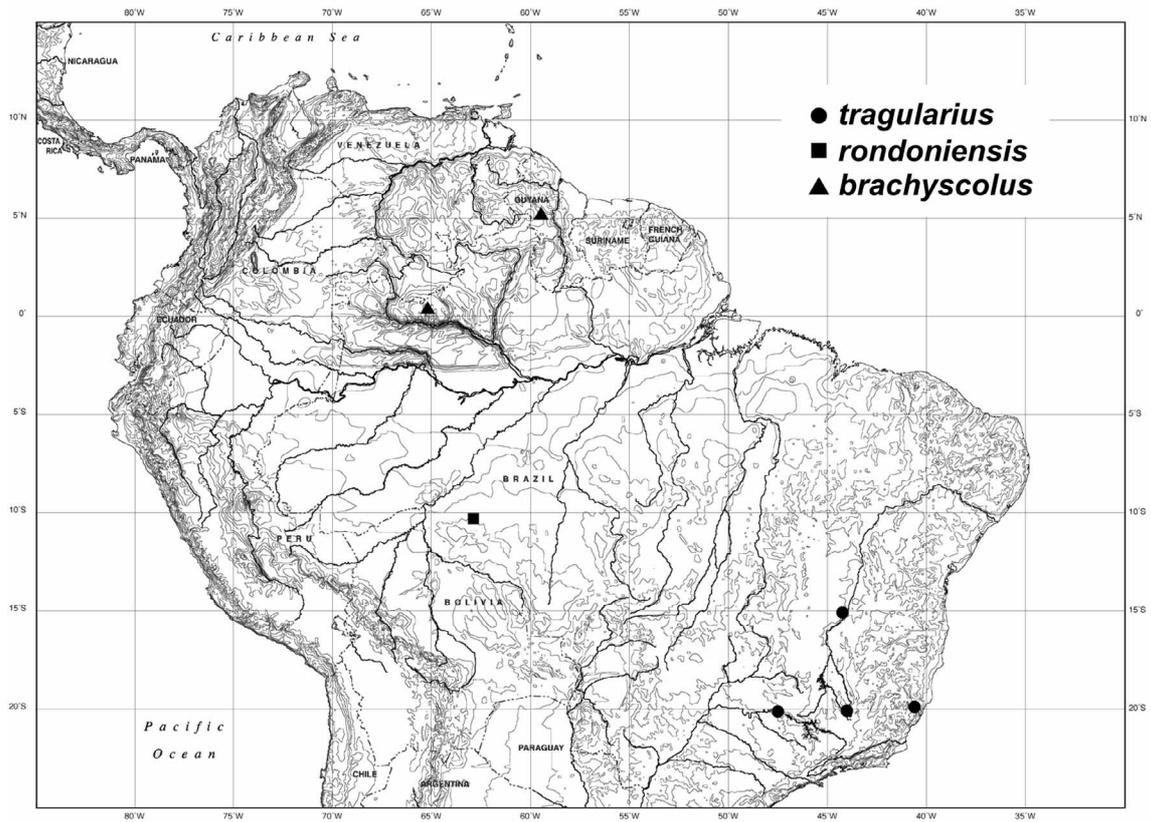


FIGURE 137. Distributions of *Polyplectropus tragularius*, new species; *Polyplectropus rondoniensis*, new species; and *Polyplectropus brachyscolus* Flint, 1971.

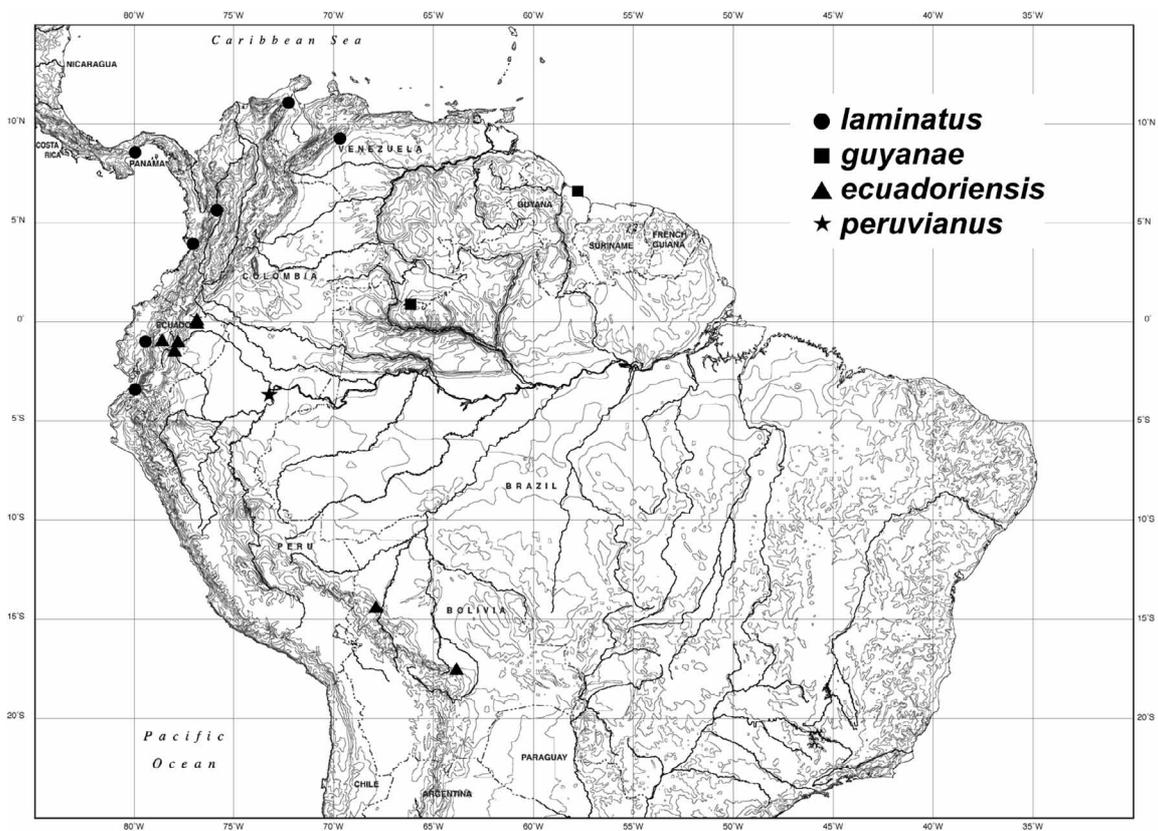


FIGURE 138. Distributions of *Polyplectropus laminatus* (Yamamoto, 1966); *Polyplectropus guyanae*, new species; *Polyplectropus ecuadoriensis*, new species; and *Polyplectropus peruvianus*, new species.

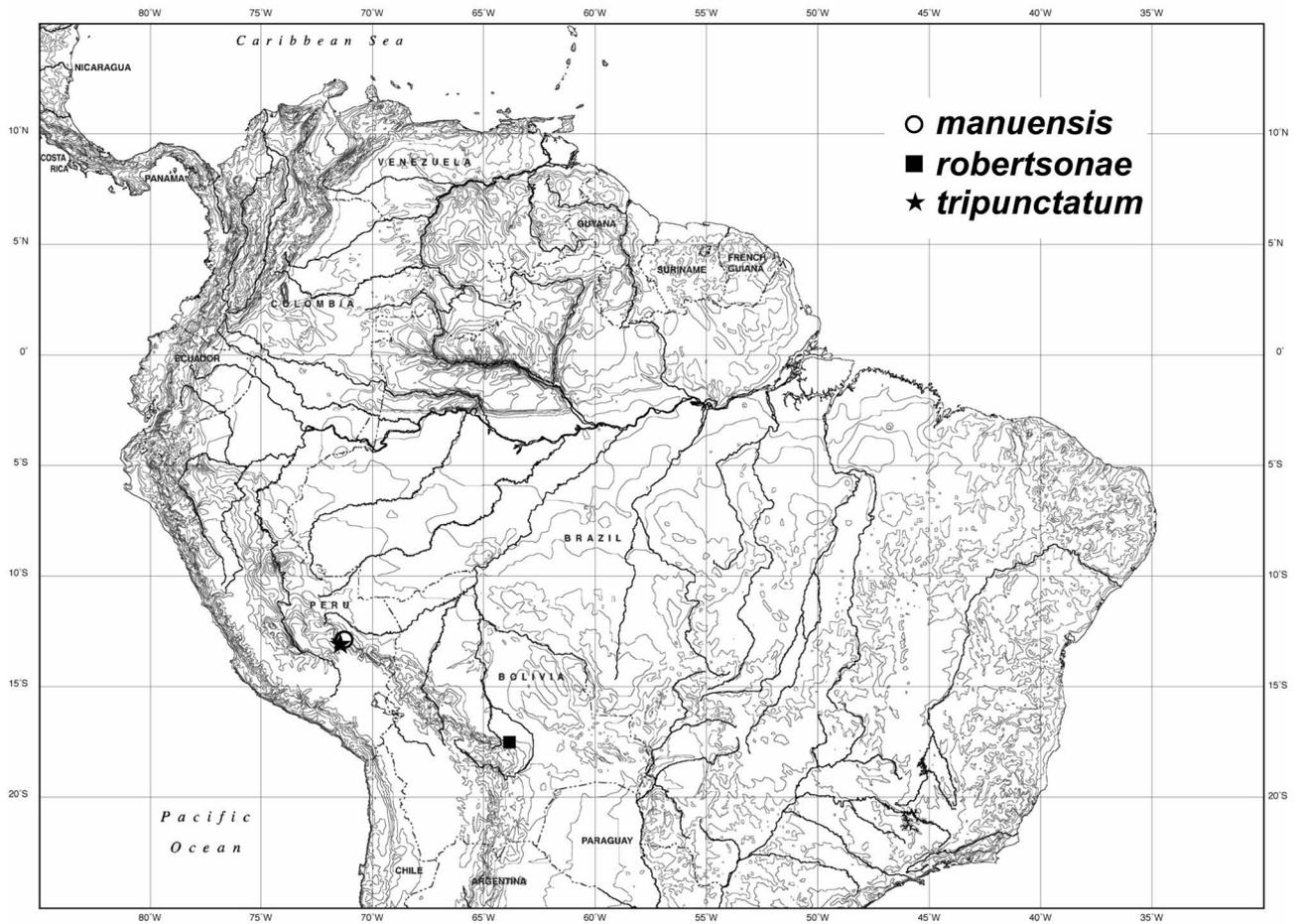


FIGURE 139. Distributions of *Polyleptropus manuensis*, new species; *Polyleptropus robertsonae*, new species; and *Polyleptropus tripunctatum*, new species.



FIGURE 140. Distributions of *Polyplectropus hystricosus*, new species; *Polyplectropus gaesum*, new species; *Polyplectropus matatlanticus*, new species; *Polyplectropus fuscatus* Flint, 1983; and *Polyplectropus rodmani*, new species.

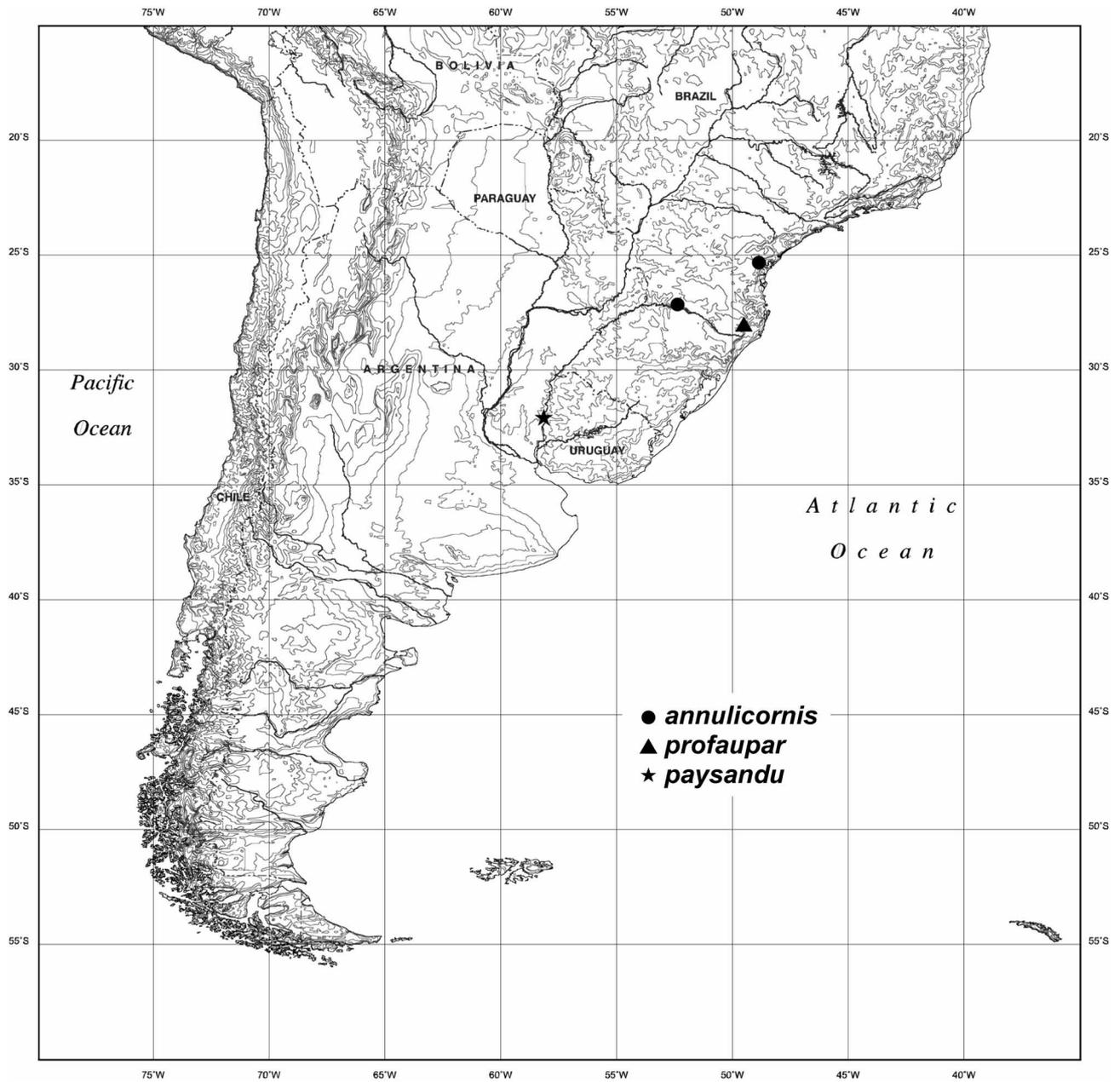


FIGURE 141. Distributions of *Polyplectropus annulicornis* Ulmer, 1905; *Polyplectropus profaupar* Holzenthal & Almeida, 2003; and *Polyplectropus paysandu* Angrisano, 1994.



FIGURE 142. Distributions of *Polyplectropus dubitatus* Flint, 1983; *Polyplectropus flavicornis* Ulmer, 1905; and *Polyplectropus hamulus* Flint, 1972.



FIGURE 143. Distributions of *Polyplectropus ulmeriana* Flint, 1983 and *Polyplectropus minensium*, new species.

REFERENCES

- Adler, P.H., Currie, D.C. & Wood, D.M. (2004) *The black flies (Simuliidae) of North America*. Cornell University Press, Ithaca, 941 pp.
- Angrisano, E.B. (1994) Contribución al conocimiento de los Trichoptera de Uruguay. I: familias Ecnomidae y Polycentropodidae. *Revista de la Sociedad Entomológica Argentina*, 53, 129–139.
- Banks, N. (1913) Neuropteroid insects from Brazil. *Psyche*, 20, 83–89.
- Banks, N. (1936) Trichoptera from the Fiji islands. *Psyche*, 43, 29–36.
- Biovolution (2006) *iMap 3.5. Biovolution*. Available from: <http://biovolution.com/imap/index.html> (Accessed 11 August 2009).
- Blahnik, R.J. (1998) A revision of the Neotropical species of the genus *Chimarra*, subgenus *Chimarra* (Trichoptera: Philopotamidae). *Memoirs of the American Entomological Institute*, 59, vi+1–318.
- Blahnik, R.J., Holzenthal, R.W. & Prather, A.L. (2007) The lactic acid method for clearing Trichoptera genitalia. In: Bueno-Soria, J., Barba-Alvarez, R. & Armitage, B. J. (Eds), *Proceedings of the XIIIth International Symposium on Trichoptera*. The Caddis Press, Columbus, Ohio, pp. 9–14.
- Blahnik, R.J., Paprocki, H. & Holzenthal, R.W. (2004) New distribution and species records of Trichoptera from southern and southeastern Brazil. *Biota Neotropica*, 4, 1–6.
- Botosaneanu, L. (1988) Trichoptères de la Martinique. *Annales de la Société Entomologique Française (N.S.)*, 24, 215–228.
- Botosaneanu, L. & Alkins-Koo, M. (1993) The caddis flies (Insecta: Trichoptera) of Trinidad and Tobago, West Indies. *Bulletin de l'Institut des Sciences Naturelles de Belgique, Entomologie*, 63, 5–45.
- Brauer, F. (1865) Zweiter bericht uber die auf der Weltfahrt der kais. Fregatte Novara gesammelten Neuroptera. *Verhandlungen der Kaiserlich-koniglichen Zoologischen-Botanischen Gessellschaft in Wien*, 15, 415–422.
- Bremer, K. (1988) The limits of amino acid sequence data in angiosperm phylogenetic reconstruction. *Evolution*, 42, 795–803.
- Bremer, K. (1994) Branch support and tree stability. *Cladistics*, 10, 295–304.
- Brown, R.W. (1985) *Composition of scientific words, A manual of methods and lexicon of materials for the practice of logotechnics*. Smithsonian Institution Press, Washington, D.C., 882 pp.
- Bueno-Soria, J. (1990) Estudios en insectos acuáticos VIII. revision para Mexico y Centroamérica del género *Polyplectropus* Ulmer (Trichoptera: Polycentropodidae). *Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología*, 61, 357–404.
- Bryant, H.N. (1995) Why autapomorphies should be removed: a reply to Yeates. *Cladistics*, 11, 381–384.
- Chamorro-Lacayo, M.L. (2003) Seven new species of Polycentropodidae (Trichoptera) from Nicaragua and Costa Rica. *Proceedings of the Entomological Society of Washington*, 105, 484–498.
- Chamorro-Lacayo, M.L. (2009) *Systematics of the family Polycentropodidae (Insecta: Trichoptera: Psychomyioidae) and taxonomic revision of New World Polyplectropus Ulmer*. University of Minnesota, Saint Paul, 525 pp.
- Chamorro-Lacayo, M.L. & Holzenthal, R.W. (2004) Seven new species of *Polyplectropus* Ulmer (Trichoptera: Polycentropodidae) from Costa Rica. *Proceedings of the Entomological Society of Washington*, 106, 202–216.
- Colwell, R.K. (2003) *Biota 2: the biodiversity database manager*. Sinauer Associates, Sunderland, Massachusetts.
- Curtis, J. (1834) Descriptions of some hitherto nondescript British species of mayflies of anglers. *The London and Edinburgh Philosophical Magazine and Journal of Science*, 3, 212–218.
- Curtis, J. (1835) *British Entomology being Illustrations and Descriptions of the Genera of Insects found in Great Britain and Ireland Containing Coloured Figure from Nature of the Most Rare and Beautiful Species, and in Many Instances of the Plants Upon Which They are Found (Vol. XII)*. Richard Taylor, London.
- Dallwitz, M.J., Paine, T.A. & Zurcher, E.J. (1999 onwards) *User's guide to the DELTA Editor*. Available from: <http://delta-intkey.com/www/delta-ed.htm> (Accessed 11 August 2009).
- Denning, D.G. (1962) New Trichoptera from Mexico. *Journal of Kansas Entomological Society*, 35, 402–408.
- Edwards, S.W. (1973) Texas caddisflies. *Texas Journal of Science*, 24, 491–516.
- Evenhuis, N.L. (2008) *The insect and spider collections of the world website*. Available from: <http://hbs.bishopmuseum.org/codens/> (7 April 2008).
- Falling Rain Genomics (2006) *Global Gazetteer version 2.1. Falling Rain Genomics Inc.* Available from: <http://www.fallingrain.com/world/index.html> (Accessed 11 August 2009)
- Felsenstein, J. (1985) Confidence Limits on Phylogenies: An Approach Using the Bootstrap. *Evolution*, 39, 783–791.
- Fitch, W.M. (1971) Toward Defining the Course of Evolution: Minimum Change for a Specific Tree Topology. *Systematic Zoology*, 20, 406–416.
- Flint, O.S., Jr. (1964) Notes on some Nearctic Psychomyiidae with special reference to their larvae (Trichoptera). *Proceedings of the United States National Museum*, 115, 467–481.
- Flint, O.S., Jr. (1966a) Notes on certain Nearctic Trichoptera in the Museum of Comparative Zoology. *Proceeding of the United States National Museum*, 118, 373–389.

- Flint, O.S., Jr. (1966b) Studies of Neotropical caddis flies, III: types of some species described by Ulmer and Brauer. *Proceedings of the United States National Museum*, 120, 1–20, plates 21–22.
- Flint, O.S., Jr. (1967) Studies of Neotropical caddis flies, V: types of the species described by Banks and Hagen. *Proceeding of the United States National Museum*, 123, 1–37, plate 31.
- Flint, O.S., Jr. (1968) Bredin-Archbold-Smithsonian Biological Survey of Dominica, 9. The Trichoptera (Caddisflies) of the Lesser Antilles. *Proceedings of the United States National Museum*, 125, 1–86.
- Flint, O.S., Jr. (1971) Studies of Neotropical caddisflies, XII: Rhyacophilidae, Glossosomatidae, Philopotamidae, and Psychomyiidae from the Amazon Basin (Trichoptera). *Amazoniana*, 3, 1–67.
- Flint, O.S., Jr. (1972) Studies of Neotropical caddisflies, XIV: on a collection from northern Argentina. *Proceedings of the Biological Society of Washington*, 85, 223–248.
- Flint, O.S., Jr. (1974) The Trichoptera of Surinam. Studies of Neotropical caddisflies, XV. *Studies on the Fauna of Suriname and other Guyanas*, 14, 1–151, plates 151–154.
- Flint, O.S., Jr. (1981) Studies of Neotropical caddisflies, XXVIII: The Trichoptera of the Río Limón Basin, Venezuela. *Smithsonian Contributions to Zoology*, 330, 1–61.
- Flint, O.S., Jr. (1983) Studies of Neotropical caddisflies, XXXIII: New Species from Austral South America (Trichoptera). *Smithsonian Contributions to Zoology*, 377, 1–100.
- Flint, O.S., Jr., Holzenthal, R.W. & Harris, S.C. (1999) *Catalog of the Neotropical Caddisflies (Trichoptera)*. Ohio Biological Survey, Columbus, Ohio, 239 pp.
- Geraci, C.J. & Laughlin, R.C. (2006) Examining Trichoptera Genitalia with Confocal Laser Scanning Microscopy. In: Chamorro-Lacayo, M. L. (Ed), *Nectopsyche, Neotropical Trichoptera Newsletter*. University of Minnesota, Saint Paul, pp. 1–4.
- Hamilton, S.W. (1986) *Systematics and Biogeography of the New World Polycentropus sensu stricto (Trichoptera: Polycentropodidae)*. Clemson University, Clemson, 257 pp.
- Hamilton, S.W. & Holzenthal, R.W. (2005) Five new species of Polycentropodidae (Trichoptera) from Ecuador and Venezuela. *Zootaxa*, 810, 1–14.
- Hamilton, S.W. (1987) Phylogeny of the *Polycentropus insularis* species-group (Trichoptera: Polycentropodidae). In: Bournaud, M. & Tachet, H. (Eds), *Proceedings of the 5th International Symposium on Trichoptera*. Dr. W. Junk, Dordrecht, The Netherlands, pp. 145–148.
- Harris, S.C. & Holzenthal, R.W. (1993) Phylogeny of the species groups of *Alisotrichia*, sensu lato, with the description of a new species from Costa Rica (Trichoptera: Hydroptilidae). In: Otto, C. (Ed), *Proceedings of the 7th International Symposium on Trichoptera*. Backhuys Publishers, Leiden, The Netherlands, pp. 155–160.
- Hawkins, J.A., Hughes, C.E. & Scotland, R.W. (1997) Primary homology assessment, characters and character states. *Cladistics*, 13, 275–283.
- Holzenthal, R.W. (1995) The caddisfly genus *Nectopsyche*: new gemma group species from Costa Rica and the Neotropics (Trichoptera: Leptoceridae). *Journal of the North American Benthological Society*, 14, 61–83.
- Holzenthal, R.W. (2008) Digital illustration of insects. *American Entomologist*, 54, 218–221.
- Holzenthal, R.W. & Almeida, G.L.d. (2003) New species of Polycentropodidae (Trichoptera) from southeastern and southern Brazil. *Proceedings of the Entomological Society of Washington*, 105, 22–29.
- Holzenthal, R.W. & Andersen, T. (2004) The caddisfly genus *Triaenodes* in the Neotropics (Trichoptera: Leptoceridae). *Zootaxa*, 511, 1–80.
- Huelsenbeck, J.P. & Ronquist, F. (2001) MRBAYES: Bayesian inference of phylogeny. *Bioinformatics*, 17, 754–755.
- Ivanov, V.D. (1990) Structure and function of setose warts of caddisflies [in Russian]. *Latvijas Entomologs*, 33, 96–110.
- Johanson, K.A. & Ward, J.B. (2009) Description of twenty-one new *Polyplectropus* species from New Caledonia (Trichoptera: Polycentropodidae). *Annales de la Societe entomologique de France (nouvelle Serie)* 45, 1, 11–47.
- Kass, R.E. & Raftery, A.E. (1995) Bayes factors. *Journal of the American Statistical Association*, 90, 773–795.
- Kearney, M. (2002) Fragmentary Taxa, Missing Data, and Ambiguity: Mistaken Assumptions and Conclusions. *Systematic Biology*, 51, 369–381.
- Kearney, M. & Clark, J.M. (2003) Problems Due to Missing Data in Phylogenetic Analyses Including Fossils: A Critical Review. *Journal of Vertebrate Paleontology*, 23, 263–274.
- Kitching, I.J., Forey, P.L., Humphries, C.J. & Williams, D.J. (1998) *Cladistics (Second edition) The theory and practice of parsimony analysis*. Systematic Association Publication 11. Oxford University Press, Oxford, xii+228 pp.
- Klaus, A.V., Kulasekera, V.L. & Schawaroch, V. (2003) Three-dimensional visualization of insect morphology using confocal laser scanning microscopy. *Journal of Microscopy*, 212, 107–212.
- Konstantinov, A.S. & Lingafelter, S.W. (2002) Revision of the Oriental Species of *Aphthona* Chevrolat (Coleoptera: Chrysomelidae). *Entomological Society of Washington*, 2002, 1–349.
- Lestage, J.A. (1925) Notes Trichopterologiques. VIII. Etude de Groupe Polycentropidien et Catalogue Systématique des Genres et Espèces Décrits depuis 1907 (in Genera Insectorum). *Bulletin et Annales de la Société Entomologique Belgique*, 65, 93–120.

- Lewis, P.O. (2001) A Likelihood Approach to Estimating Phylogeny from Discrete Morphological Character Data. *Systematic Biology*, 50, 913–925.
- Li, Y.J. & Morse, J.C. (1997) *Polyplectropus* species (Trichoptera: Polycentropodidae) from China, with considerations of their phylogeny. *Insecta Mundi*, 11, 300–310.
- Lincoln, R., Boxshall, G. & Clark, P. (1998) *A dictionary of ecology, evolution, and systematics. Second edition.* Cambridge University Press, Cambridge, 361 pp.
- Maddison, W.P., Donoghue, M.J. & Maddison, D.R. (1984) Outgroup Analysis and Parsimony. *Systematic Zoology*, 33, 83–103.
- Maddison, D.R. & Maddison, W.P. (2000) *MacClade 4: Analysis of phylogeny and character evolution. Version 4.0.* Sinauer Associates, Sunderland, Massachusetts.
- Maddison, W.P. (1993) Missing Data versus Missing Characters in Phylogenetic Analysis. *Systematic Biology*, 42, 576–581.
- Malicky, H. (1991) Some unusual caddisflies (Trichoptera) from southeastern Asia (Studies on caddisflies of Thailand, No. 5). In: Tomaszewski, C. (Ed), *Proceedings of the 6th International Symposium on Trichoptera*. Adam Mickiewicz University Press, Poznan, Poland, pp. 381–384.
- Malicky, H. (1997) Weitere neue Köcherfliegen-Arten (Trichoptera) aus Asien. *Linzer Biologische Beitrage*, 29, 217–238.
- Marshall, I.K. (2003) A morphological phylogeny for four families of amblyceran lice (Phthiraptera: Amblycera: Menoponidae, Boopiidae, Laemobothriidae, Ricinidae). *Zoological Journal of the Linnean Society*, 138, 39–82.
- McLachlan, R. (1864) On the Trichopterous Genus *Polycentropus*, and the Allied Genera. *The Entomologist's Monthly Magazine*, 1, 25–31.
- Morse, J.C. (2010) *Trichoptera World Checklist*. Clemson University. Available from: <http://entweb.clemson.edu/database/trichopt/index.htm> (Accessed 25 April 2010).
- Mosely, M.E. & Kimmins, D.E. (1953) *The Trichoptera of Australia and New Zealand*. British Museum (Natural History), London, 550 pp.
- Moulton, S.R., II (1996) Neotype designations and synonyms of some Texas caddisflies (Trichoptera). *Journal of the Kansas Entomological Society*, 69, 272–273.
- Neboiss, A. (1989) The *Oecetis reticulata* species-group from the South-West Pacific area (Trichoptera: Leptoceridae). *Bijdragen tot de Dierkunde*, 59, 191–202.
- Nielsen, A. (1957) A comparative study of the genital segments and their appendages in male Trichoptera. *Biologiske Skrifter Danske Videnskabernes Selskab*, 8, 1–159.
- Nielsen, A. (1970) Trichoptera. In: Tuxen, S.L. (Ed), *Taxonomist's Glossary of Genitalia in Insects, 2nd Edition*, Munksgaard, Copenhagen, pp. 104–115.
- Nielsen, A. (1980) A comparative study of the genital segments and the genital chamber in female Trichoptera. *Biologiske Skrifter Danske Videnskabernes Selskab*, 23, 1–200.
- Nixon, K.C. (1999) The Parsimony Ratchet, a new method for rapid parsimony analysis. *Cladistic*, 15, 407–414.
- Novacek, M.J. (1992) Fossils, Topologies, Missing Data, and Higher Level Phylogeny of Eutherian Mammals. *Systematic Biology*, 41, 58–73.
- Nylander, J.A.A., Ronquist, F., Huelsenbeck, J. P. & Nieves-Aldrey, J. L. (2004) Bayesian Phylogenetic Analysis of Combined Data. *Systematic Biology*, 53, 47–67.
- Oláh, J., & Johanson, K.A. (2010) Generic review of Polycentropodidae with description of 32 new species and 19 new species records from the Oriental, Australian and Afrotropical Biogeographical Regions. *Zootaxa*, 2435, 1–63.
- Poe, S. & Wiens, J.J. (2000) Character selection and the methodology of morphological phylogenetics. In: Wiens, J.J. (Ed), *Phylogenetic analysis of morphological data*. Smithsonian Institution, Washington, D. C., pp. 20–36.
- Prather, A.L. (2003) Revision of the Neotropical caddisfly genus *Phylloicus* (Trichoptera: Calamoceratidae). *Zootaxa*, 275, 1–214.
- Ronquist, F. & Huelsenbeck, J. P. (2003) MRBAYES 3: Bayesian phylogenetic inference under mixed models. *Bioinformatics*, 19, 1572–1574.
- Ronquist, F., Huelsenbeck, J.P. & van der Mark, P. (2007) *MrBayes 3.2 Manual*. Florida State University. Available from: <http:// mrbayes.csit.fsu.edu/wiki/index.php/Manual> (Accessed August, 11, 2009)
- Ross, H.H. (1941) Descriptions and records of North American Trichoptera. *Transactions of the American Entomological Society*, 67, 35–126.
- Ross, H.H. (1944) The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey*, 23, 1–326.
- Ross, H.H. (1947) Descriptions and records of North American Trichoptera, with synoptic notes. *Transactions of the American Entomological Society*, 73, 105–124.
- Roy, D., Décamps, H. & Harper, P.P. (1980) Taxonomy of male and female *Plectrocnemia* (Trichoptera; Polycentropodidae) from the French Pyrenees. *Aquatic Insects*, 2, 19–31.
- Schmid, F. (1958) Trichoptères de Ceylan. *Archiv für Hydrobiologie*, 54, 1–173.

- Schmid, F. (1970) Le genre *Rhyacophila* et la famille des Rhyacophilidae (Trichoptera). *Memoires de la Société Entomologique du Canada*, 66, 1–230.
- Schmid, F. (1980) *Genera des trichoptères du Canada et des états adjacents* (Vol. 1692). Agriculture Canada Publications, Ottawa, 296 pp.
- Schmid, F. (1998) *Genera of the Trichoptera of Canada and adjoining or adjacent United States*. NRC Research Press, Ottawa, 319 pp.
- Schuh, R.T. (2000) *Biological Systematics: Principles and applications*. Cornell University Press, Ithaca, ix+239 pp.
- Sikes, D.S. & Lewis, P.O. (2001a) *beta software, version 1. PAUPRat: PAUP* implementation of the parsimony ratchet*. Distributed by the authors. Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs.
- Sikes, D.S. & Lewis, P.O. (2001b) *Software manual for PAUPRat: A tool to implement Parsimony Ratchet searches using PAUP**. Available from: http://users.iab.uaf.edu/~derek_sikes/software2.htm (Accessed 11 August 2009)
- Snodgrass, R.E. (1935) *Principles of Insect Morphology*. McGraw-Hill Book Company, Inc, New York, xiv + 667 pp.
- Sorenson, M.D. & Franzosa, E.A. (2007) *TreeRot, version 3*. Boston University, Boston.
- Stephens, J.F. (1836) *Illustrations of British Entomology; or, a Synopsis of Indigenous Insects: containing their generic and specific distinctions; with an account of their metamorphoses, times of appearance, localities, food, and economy, as far as practicable: Mandibulata Vol. VI*. Baldwin and Cradock, London, pp. 146–179; Plates XXXII, XXXIV.
- Strong, E.E. & Lipscomb, D. (1999) Character Coding and Inapplicable Data. *Cladistics*, 15, 363–371.
- Swofford, D.L. (2003) PAUP*. *Phylogenetic Analysis Using Parsimony (* and Other Methods), Version 4*. Sinauer Associates, Sunderland.
- Swofford, D.L., Olsen, G.J. Waddell, P.J. & Hillis, D.M. (1996) Phylogenetic Inference. In: Hillis, D.M., Moritz C. & Mable, B.K. (Eds), *Molecular Systematics, 2nd edition*. Sinauer, Sunderland, Massachusetts, pp. 407–514.
- Tuxen, S.L. (1970) *Taxonomist's Glossary of Genitalia in Insects, 2nd Edition*. Munksgaard, Copenhagen, 359 pp.
- Ulmer, G. (1905a) Zur Kenntniss außereuropäischer Trichopteren. *Stettiner Entomologische Zeitung*, 66, 1–119.
- Ulmer, G. (1905b) Neue und wenig bekannte außereuropäische Trichopteren, hauptsächlich aus dem Wiener Museum. *Annalen des K.K. Naturhistorische Hofmuseums Wien*, 20, 59–98.
- Ulmer, G. (1911) Einige Südamerikanische Trichopteren. *Annales de la Société Entomologique de Belgique*, 55, 15–26.
- Ulmer, G. (1962) Ein neuer Name für *Ecnomodes* Ulm. (Trichoptera). *Mitteilungen der Deutschen Entomologischen Gesellschaft*, 21, 5.
- Vishivkova, T. (2006) *Phylogeny of family Limnephilidae (Insects: Trichoptera) with emphasis on tribe Limnephilini (subfamily Limnephilinae)*. UMI Dissertation Services: i–xxiii + 1–686.
- Wallace, A.R. (1876) *The geographical distribution of animals with a study of relations of living and extinct faunas as elucidating the past changes of the Earth's surface with maps and illustrations (Vol. I & II)*. MacMillan, London, 503 and 607 pp.
- Weidner, H. (1964) Die Entomologische Sammlungen des Zoologischen Staatsinstituts und Zoologischen Museums Hamburg. X. Teil, Insecta VII. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut*, 62, 55–100.
- Wiens, J.J. (2004) The Role of Morphological Data in Phylogeny Reconstruction. *Systematic Biology*, 53, 653–661.
- Wiens, J.J. (2006) Missing data and the design of phylogenetic analyses. *Journal of Biomedical Informatics*, 39, 34–42.
- Wiens, J.J., Fetzner, J.W., Parkinson, C.L. & Reeder, T.W. (2005) Hylid Frog Phylogeny and Sampling Strategies for Speciose Clades. *Systematic Biology*, 54, 719–748.
- Wiens, J.J. & Moen, D.S. (2008) Missing data and the accuracy of Bayesian phylogenetics. *Journal of Systematics and Evolution*, 46, 307–314.
- Wiggins, G.B. (1996) *Larvae of the North American Caddisfly Genera (Trichoptera)*. University of Toronto Press, Toronto, 457 pp.
- Wilkinson, M. (1992) Ordered versus unordered characters. *Cladistics*, 8, 375–385.
- Wilkinson, M. (1995) A Comparison of Two Methods of Character Construction. *Cladistics*, 11, 297–308.
- Yamamoto, T. (1966) Five new species of the caddisfly genus *Polycentropus* from South America (Trichoptera: Polycentropodidae). *Canadian Entomologist*, 98, 908–912.
- Yamamoto, T. (1967) New species of the caddisfly genus *Polycentropus* from Central America (Trichoptera: Polycentropodidae). *Kansas Entomological Society*, 40, 127–132.
- Yeates, D. (1992) Why Remove Autapomorphies? *Cladistics*, 8, 387–389.
- Zhong, H., Yang, L. & Morse, J.C. (2010) Four new species and two new records of *Polyplectropus* from China (Trichoptera: Polycentropodidae). *Zootaxa*, 2428, 37–46.
- Zill, S.N., Frazier, S.F., Neff, D., Quimby, L., Carney, M., Dicaprio, R., et al. (2000) Three-dimensional graphic reconstruction of insect exoskeleton through confocal imaging of endogenous fluorescence. *Microscopy Research and Technique*, 48, 367–384.

APPENDIX 1 Character Matrix for *Polyplectropus* species.

	1	1	2	3	4	5	5
	0	0	0	0	0	0	9
<i>Plectrocnemia conspersa</i>	0001000-00	00100--000	0000000 0	2 1	0030--1100	1004200010	000000000
<i>Polycentropus chilensis</i>	0000-30-40	00100--010	0010000 1	2 1	0010--0---	--0410?000	000001010
<i>P. adamsae</i>	1101000-01	10100--011	0010001 4	0 1	0011210---	--0410?121	111111210
<i>P. alatespinus</i>	1100010-01	0010110011	0211000 0	1 1	10111-1000	1004100111	111111010
<i>P. alienus</i>	1100-10-40	201010-000	0010000 2	2 1	2010--1200	1102300121	111011211
<i>P. alleni</i>	1121130-41	121010-000	0010100 0	1 0	6100--1200	011420?121	111011211
<i>P. amazonicus</i>	1100-10-00	0010110011	0211000 1	1 1	1010--1000	110020?111	111111010
<i>P. andinensis</i>	1121030-31	221010-000	0210100 3	0 2	0100--0---	--0400?121	111011211
<i>P. annulicornis</i>	1100-10-00	0010110011	0211000 1	1 1	1010--1100	1004100111	111111010
<i>P. banksianus</i>	1121130-41	121010-000	0010100 0	1 0	2100--1100	111410?121	111011211
<i>P. beccus</i>	1100-20-41	22100--312	0000000 0	0 1	0030--1100	110400?110	001011010
<i>P. beutelspacheri</i>	1101000-01	60100--000	0010000 1	2 1	0001110---	--0400?121	111111211
<i>P. blahniki</i>	1100001021	0011111000	0010001 1	2 1	40011-0---	--04000121	111011211
<i>P. bolivianus</i>	1121030-31	221010-000	0210100 3	0 2	0100--1100	110400?121	111011211
<i>P. brachyscolus</i>	1121130-41	121010-000	0010100 0	1 0	2100--1100	110420?121	111011211
<i>P. brasiliensis</i>	1110010-01	0010111100	1010010 0	1 1	3021200---	--0410?121	111111211
<i>P. bravoae</i>	1121130-00	301010-000	0010100 4	1 1	6100--1100	1101201121	111011210
<i>P. brborichorum</i>	1121030-01	301010-000	0210100 3	0 2	0100--0---	--0400?121	111011211
<i>P. bredini</i>	1101000-01	10100--011	0010001 0	1 1	0021210---	--04100121	111111210
<i>P. carolae</i>	1100000-01	0011111000	0010000 1	2 1	50011-0---	--0400?121	111011211
<i>P. charlesi</i>	1131000-21	00110--000	00100012&40&11	4 2	11201101	1104100121	111111211
<i>P. clauseni</i>	1110030-01	0011111111	1010000 0	1 1	3021200---	--04100121	111111211
<i>P. colombianus</i>	1140-30-01	6011111112	0101001 0	0 1	0020--1001	1104?0?121	111101210
<i>P. corniculatus</i>	1150030-41	0010111112	1010001 1	1 1	00211-0---	--0410?121	111111211
<i>P. cressae</i>	1100001021	0011111012	0010000 1	2 1	40011-0---	--04000121	111011211
<i>P. cuzcoensis</i>	1100000-21	0011111012	0010000 1	2 1	40011-0---	--0400?121	111011211
<i>P. deltoides</i>	1100001021	0011111002	0010000 1	2 1	40011-0---	--0400?121	111011211
<i>P. denticulus</i>	1100000-01	0011111000	0010000 1	2 1	20011-0---	--0400?121	111011211
<i>P. dubitatus</i>	1121130-41	121010-000	0010100 0	1 0	2100--1200	110420?121	111011211
<i>P. ecuadoriensis</i>	1121130-30	301010-000	0010100 0	1 0	1100--1200	1101201121	111011210
<i>P. elongatus</i>	1121130-41	121010-000	0010100 0	1 0	4100--1200	110420?121	111011211
<i>P. exilis</i>	1131000-21	00110--000	0010000 2	1 1	1010--0---	--04000121	111111211
<i>P. flavicornis</i>	1121130-41	821010-000	0010100 0	1 0	2100--0---	--04201121	111011211
<i>P. flintorum</i>	1100031121	1110111011	1010001 4	0 1	0021200---	--0410?121	111111211
<i>P. matatlanticus</i>	1100-10-00	0010110011	0211000 1	1 1	1010--1000	100410?111	111111010
<i>P. fuscatus</i>	1101000-01	60100--100	0110000 1	2 1	0020--1001	110400?121	111011210
<i>P. gaesum</i>	1100-10-00	0010110011	0211000 1	1 1	1010--1200	100410?111	111111010
<i>P. guyanae</i>	1100010-00	00100--111	0210000 0	2 1	0010--1010	210400?101	111001211
<i>P. hamatus</i>	1121130-41	121010-000	0010100 0	1 0	6100--1000	111420?121	111011211
<i>P. hamulus</i>	1121130-41	121010-000	0010100 0	1 0	6100--1100	110420?121	111011211
<i>P. herrerae</i>	1121130-41	121010-000	0010100 0	0 0	2100--1100	2102201121	111011211
<i>P. hollyae</i>	1100?10-00	0010110200	1110000 3	0 1	20110-1000	110400?121	111011211
<i>P. hymenochilus</i>	1101000-01	0010111011	0010001 4	0 1	002121????	??0410?121	111111?1?
<i>P. hystricosus</i>	1101010-01	0010110011	0211000 0	1 1	10111-1120	010410?111	111111010
<i>P. inarmatus</i>	1100-10-40	201010-000	0010000 2	2 1	0010--1200	010430?121	111011211

APPENDIX 1 (continued)

	1	1 0	2 0	3 0	4 0	5 0	5 9
<i>P. insularis</i>	1100-00-01	0011111000	00100001	2130211-0---	--0400?121	111011211	
<i>P. juliae</i>	1100011100	6010110100	01100004	012100--1100	110401?121	111011210	
<i>P. kanukarum</i>	1100030-01	0010111000	00100000	210010--1010	110400?121	111111211	
<i>P. kingsolveri</i>	1101000-01	1010111011	00100000	210010--0---	--0410?121	111111210	
<i>P. kyllistos</i>	1131000-21	00110--000	00100014	015220--1101	1104100121	111111211	
<i>P. laminatus</i>	1121130-00	301010-000	00101004	116100--1100	1101201121	111011210	
<i>P. maculatus</i>	1121130-41	121010-000	00101000	202100--1200	1104201121	111011211	
<i>P. maesi</i>	1101000-01	1010111011	00100002	210021210---	--04100121	111111112	
<i>P. manuensis</i>	1101000-01	4000111103	00100100	113020--0---	--0400?121	111111211	
<i>P. mathisi</i>	1100000-01	10100--011	00100004	020010--0---	--0410?121	111111210	
<i>P. mignonae</i>	1101000-01	10100--011	00100014	010011210---	--0410?121	111111210	
<i>P. minensium</i>	1101011110	7110110100	01100003	0100110-1000	110401?121	111011210	
<i>P. misolja</i>	1101000-01	1010111011	00100012	210011210---	--0410?121	111111210	
<i>P. narifer</i>	110?????0?	711?110?00	?11?0000	110010--????	??04?1?1?1	111?11?1?	
<i>P. nayaritensis</i>	110?????4?	001?????00	?0000001	117030--1200	21?????110	0000?????	
<i>P. nicaraguensis</i>	1101000-01	00100--012	00100010	100010--0---	--0410?121	111111111	
<i>P. novafriburgensis</i>	1100-10-01	0010110011	02110000	111010--1101	110410?111	111111010	
<i>P. oaxaquensis</i>	1121130-41	121010-000	00101000	006100--1200	1114101121	111011211	
<i>P. panamensis</i>	1100030-41	00100--202	10100000	113020--0---	--0410?121	111111211	
<i>P. paradelpheae</i>	1100000-21	0011111000	00100000	2120111-0---	--0400?121	111011211	
<i>P. paysandu</i>	1200-10-10	00100--000	00110001	211010--1100	110410?101	111111010	
<i>P. perpendicularis</i>	1101000-01	10100--011	00100011	100011210---	--0410?121	111111?1?	
<i>P. peruvianus</i>	1100010-00	00100--212	12100000	210010--1010	210400?111	111011210	
<i>P. petrae</i>	1150030-41	00100--202	12100111	113021200---	?-0410?121	111111211	
<i>P. pratherae</i>	1100-10-01	0010110011	02110000	1110111-1200	110410?111	111111010	
<i>P. profaupar</i>	1100-10-00	0010110011	02110000	111010--1200	110410?111	111111010	
<i>P. pugiunculus</i>	1100001021	0011111002	00100010	2120011-0---	--0400?121	111011211	
<i>P. puyoensis</i>	1100001021	0011111000	00100000	113001010---	--0400?121	111011211	
<i>P. recurvatus</i>	1100001021	0011111002	00100000	1140011-0---	--0400?121	111011211	
<i>P. robacki</i>	1121030-01	221010-000	02101003	020100--0---	--04001121	111011211	
<i>P. robertsonae</i>	1101000-01	4000111103	00100100	113010--0---	--0400?121	111111211	
<i>P. rodmani</i>	1101010-00	0010110011	02110000	111010--1100	100410?111	111111010	
<i>P. santiago</i>	1121130-31	221010-000	00101000	104100--1100	110400?121	111011211	
<i>P. spiculifer</i>	1121130-01	1210110000	00101000	104100--1101	111410?121	111011211	
<i>P. squalus</i>	1121130-41	121010-000	00101000	104100--1100	210320?121	111011211	
<i>P. thilus</i>	1100-00-21	0011111000	00100001	2150110-0---	--0400?121	111011211	
<i>P. tragularius</i>	1101001101	6010110000	01100001	210020--1101	110400?121	111011210	
<i>P. trilobatus</i>	1110030-21	5011111111	00100010	110021200---	--0410?121	111111211	
<i>P. tripunctatum</i>	1101000-01	4000111103	00100100	113010--0---	?-0400?121	111111211	
<i>P. ulmeriana</i>	1100011100	6010110100	01100004	013100--1001	110401?121	111011210	
<i>P. venezolanus</i>	1100001021	0011111000	00100010	2140011-0---	--04000121	111011211	
<i>P. woldai</i>	1110030-21	0011111312	00100110	213021200---	--0410?121	111111211	
<i>P. yolandae</i>	1100001021	0011111000	00100000	2110111-0---	--04000121	111011211	
<i>P. zamoranoensis</i>	1121130-41	121010-000	00101000	006100--1000	1101201121	111011211	
<i>P. zaragozai</i>	1121130-41	121010-000	00101000	006100--1100	210410?121	111011211	
<i>P. zuliae</i>	1100001021	0011111000	00100000	2110011-0---	--04000121	111011211	