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The caddisfly genus *Protoptila* in Costa Rica (Trichoptera: Glossosomatidae)

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ABSTRACT

Nineteen species of *Protoptila* known from Costa Rica are revised to include 11 previously described species (*P. bicornuta* Flint 1963, *P. boruca* Flint 1974, *P. burica* Flint 1974, *P. cana* Flint 1974, *P. ixtala* Mosely 1937, *P. laterospina* Flint 1967, *P. orotina orotina* Flint 1974, *P. spirifera* Flint 1974, *P. talamanca* Flint 1974, *P. tica* Bueno-Soria 1984, and *P. tojana* Mosely 1954) and 8 new species (*P. altura*, *P. bribri*, *P. chitaria*, *P. cristula*, *P. kjeri*, *P. jolandae*, *P. strepsicera*, and *P. trichoglossa*). Illustrations, diagnoses, descriptions, and distribution records are provided for all species.

Key words: Trichoptera, Glossosomatidae, Protoptilinae, *Protoptila*, caddisfly, new species, Neotropics, Costa Rica, male genitalia

INTRODUCTION

This paper owes its origin, in part, to an inventory of the caddisflies of Costa Rica, conducted by Holzenthal and his colleagues from 1986–1992 and can be considered a result of that initiative. In a broader sense, this paper is part of a larger project, whose goal is to review and revise the whole of the subfamily Protoptilinae of the family Glossosomatidae, most of whose members are Neotropical.

Protoptila is the largest genus in the subfamily Protoptilinae, currently with 80 described species, but with many additional undescribed species known in existing collections (Flint et al. 1999). The genus is widely distributed, including much of North America and extending to the southern part of South America, but excluding the Chilean subregion. Almost exactly half of the species described prior to this paper (41) occur in Mexico and Central America. Eleven species have been recorded from Costa Rica, including: *Protoptila bicornuta* Flint 1963, *P. boruca* Flint 1974, *P. burica* Flint 1974, *P. cana* Flint 1974, *P. ixtala* Mosely 1937, *P. laterospina* Flint 1967, *P. orotina orotina* Flint 1974, *P. spirifera* Flint 1974, *P. talamanca* Flint 1974, *P. tica* Bueno-Soria 1984, and *P. tojana* Mosely 1954. Eight additional species are described in this paper. Most of these species have known distributions restricted to either Costa Rica or Costa Rica and adjacent Nicaragua and Panama. Only *P. bicornuta*, *P. ixtala*, and *P. tojana*, have distributions that extend northward to Mexico. However, the distributions of most species are still very inadequately known and it remains to be seen whether species within the genus will prove to be as endemic as they currently appear to be.

Adults of the genus, like most protoptilines, are small (not larger than 5 mm), brown caddisflies with a light transverse bar and apical spots on the wings (Fig. 1). They are readily attracted to collecting lights, often appearing by the 100s in light traps. Little is known of their biology. Larvae are well known and have been described a number of times (Wiggins 1996). They feed by scraping diatoms and other periphyton from rock surfaces of streams and rivers; they are especially abundant in warm, lowland rivers.

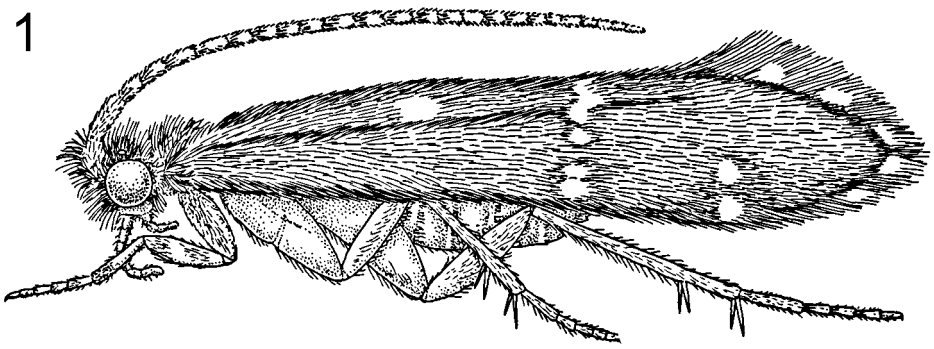

FIGURE 1. *Protoptila ixtala* Mosely, adult habitus.

MATERIAL AND METHODS

Techniques and procedures used in the preparation and examination of specimens are those outlined by Blahnik & Holzenthal (2004) and Holzenthal & Andersen (2004). Terminology for male genitalia is adapted from that presented by Flint (1974) and Morse (1988) as discussed below. In the diagnoses, species are compared with similar or closely related species where possible, but in many cases species appear to be uniquely different within the genus or relationships are difficult to assess from the literature. In this case, the diagnostic characters are given, without reference to other species. Complete synonymies and distribution records of previously described species were provided by Flint et al. 1999. Type material is deposited in the collections of the University of Minnesota Insect Collection, St. Paul, Minnesota, USA (UMSP), the National Museum of Natural History, Smithsonian Institution, Washington, DC, USA (NMNH), and the Instituto Nacional de Biodiversidad, Heredia, Costa Rica (INBIO).

SYSTEMATICS

Structures of the male genitalia

Characters of the male genitalia are used almost exclusively in diagnosing species, as they are usually very distinctively different among the species. However, it is difficult to interpret and homologize male genitalic structures in *Protoptila* with those found in other caddisflies because some structures appear to be reduced, absent, or fused, while others are of *de novo* occurrence. Our interpretation of *Protoptila* male genitalia, largely in agreement with Morse (1988), is presented in Figs. 2 and 5. Females also have diagnostic characters, but for most species females have not been reliably associated with males or are unknown.

Distinctive characters for *Protoptila*, among other protoptilines, include an enlarged, flattened, often axe-head shaped phallic apodeme and a projecting sternum VIII, which subtends segment IX and is often partially fused to this structure. The setae on the posterior margin of tergum VIII are prominent and elongate, distinctly so in some species. The small, digitate, rod-like articulated appendages at the base of the phallus are similar to those in *Mexitrichia* and *Mortoniella*, and, as in those species, fit within modified pockets on the venter of the phallobase. In addition, the phallobase externally often has paired, posteriorly projecting processes. These are sometimes divided or branched. Small modified setae or setose patches may also occur on the phallobase, particularly externally to the pockets that accommodate the small, articulated appendages.

Characters useful in diagnosing and separating species include the shape and length of sternum VIII and whether or not it is excised apically. The lateral branches of tergum X are often articulated in the middle; the apical part is extremely variable in overall shape, length, and development among the species. The phallic complex also differs greatly among the species, particularly the structure of the phallicata including its associated spines or processes, length, degree of flexion, and overall shape. The parameres may be present, reduced, or absent and the apical paramere spines vary as well. Some species have processes or branches on sternum VIII or segment IX.

Species descriptions

Protoptila altura, new species

Fig. 2

This species is unlikely to be confused with any other described species. The apical sections of tergum X are especially distinctively shaped, each divided apically to form bifurcate dorsal projections and an acuminate ventral projection. Other diagnostic characters include the elongate, paired processes from the posterolateral margins of segment IX and the bifurcate margin of the apex of sternum VIII.

Adult. Length of forewing: male 4.0–4.8 mm; female 4.2–5.0 mm. Color dark brown, with indistinct transverse bar of whitish setae along cord and whitish spot at apex of Cu2.

Male genitalia. Sternum VI process prominent, slightly curved, longer than wide, apex subacute. Tergum VIII posterior margin with row of very elongate setae with attenuate, curved apices; sternum VIII strongly produced ventrally, distinctly bifurcate apically, branches acute apically, broad basally, moderately elongate. Segment IX with anterior margin broadly rounded; sternum IX medially produced posteriorly, broadly rounded apically; posterolateral margin of segment IX with long, narrow processes, strongly bowed outward from base in ventral and dorsal views, converging apically, apex attenuate, slightly curved. Preanal appendages absent. Tergum X divided mesally to form sclerotized lateral parts with basal and apical sections; basal section ovoid, fused to tergum IX, apical

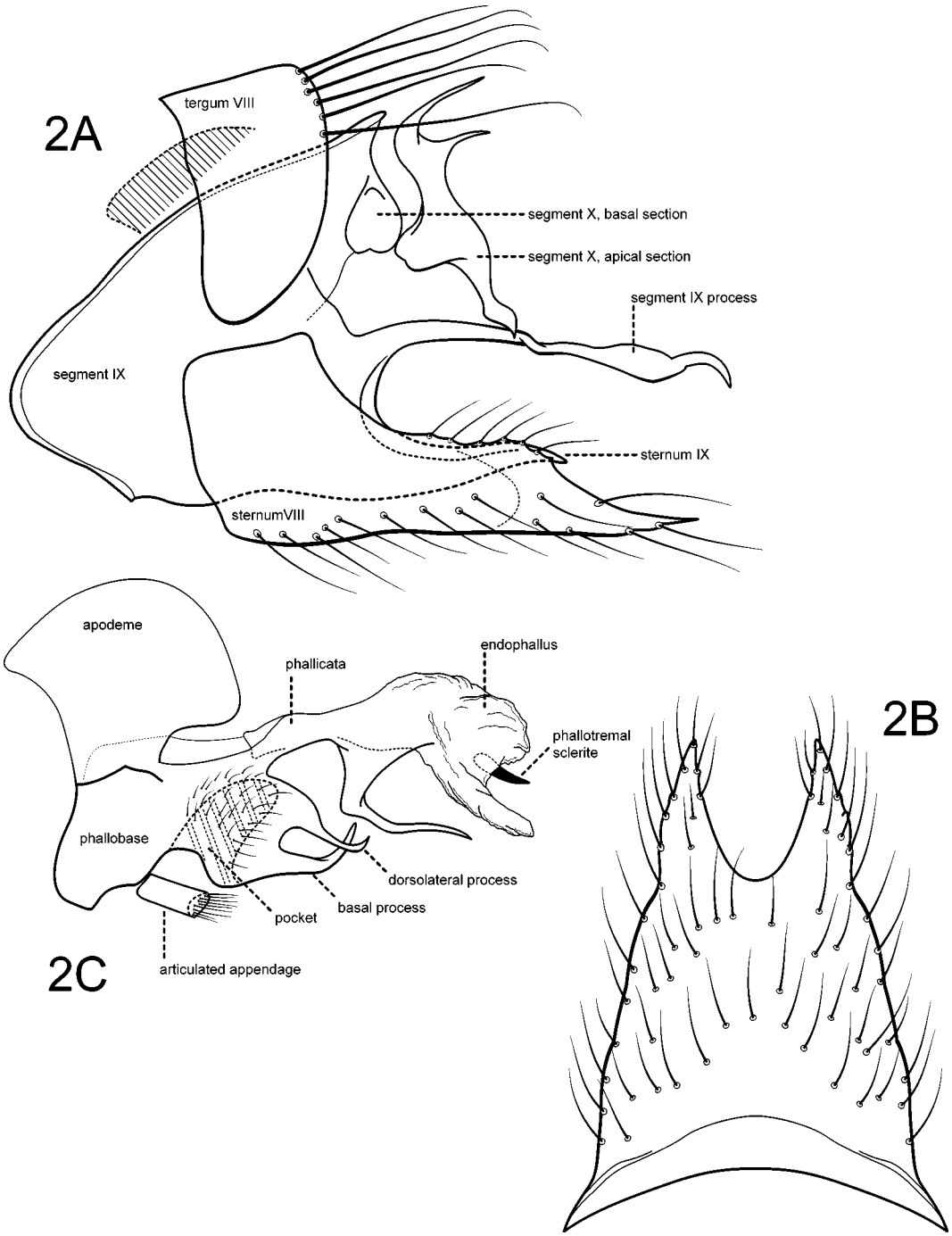

FIGURE 2. *Protoptila altura*, new species. Male genitalia: A—lateral (position of phallic complex in genital capsule indicated with cross hatches in this and subsequent figures); B—segment VIII, ventral; C—phallic complex, lateral.

section short, complex, divided apically to form bifurcate dorsal projections and acuminate ventral projection. Phallobase dorsally with large, semicircular, laterally compressed apodeme; ventrally with short, rod-like, articulated appendages with apical setae, appendages fitting into sclerotized pockets on ventral margin of phallobase; posteroventral margin of phallobase with short, paired, upturned, apically acute basal processes and also dorsolateral processes; dorsolateral processes very slender, acute, upturned apically; paramere absent; phallicata short, narrow basally, with prominent, paired, angularly bent, spine-like processes from the apicoventral margin; endophallus membranous, enlarged when everted; phallotremal sclerite spine-like, sclerotized apically, somewhat divided basally.

Holotype male: **COSTA RICA: Puntarenas:** Río Cotón, in Las Alturas, 08°56’17”N, 082°49’34”W, el. 1360 m, 12.iii.1990, Holzenthal, Blahnik, Muñoz (UMSP000002118) (UMSP).

Paratypes: COSTA RICA: **Alajuela**: Río Toro, 3.0 km (road) SW Bajos del Toro, 10°12’14”N, 084°18’58”W, el. 1530 m, 3-4.ix.1990, Holzenthal, Blahnik, Huisman — 1 male (UMSP); **Cartago**: Lago Orosi, 1.9 km SE Ujarrás, 09°49’26”N, 083°49’30”W, el. 980 m, 29.i.1986, Holzenthal, Morse, Fasth — 1 male (UMSP); **Puntarenas**: Río Cotón, in Las Alturas, 08°56’17”N, 082°49’34”W, el. 1360 m, 16.ii.1986, Holzenthal, Morse, Fasth — 3 males, 11 females (UMSP), 14 males (in alcohol) (UMSP); same, except12.viii.1990, Holzenthal, Blahnik, Muñoz — 10 females (UMSP), 1 male, 47 females (in alcohol) (UMSP); same, except 13-14.viii.1990, Holzenthal, Blahnik, Muñoz — 3 females (UMSP); same, except 18.iii.1991, Holzenthal, Muñoz, Huisman — 1 male, 5 females (UMSP), 18 males, 27 females (in alcohol) (UMSP); Río Bellavista, ca. 1.5 km NW Las Alturas, 08°57’04”N, 082°50’46”W, el. 1400 m, 18.ii.1986, Holzenthal, Morse, Fasth — 5 males, 14 females (NMNH) 7 males (in alcohol) (NMNH); same, except 15-17.vi.1986, Holzenthal, Heyn, Armitage — 3 males (in alcohol) (UMSP); same, except 8-9.iv.1987, Holzenthal, Hamilton, Heyn — 7 males, 14 females (UMSP) 25 males (in alcohol) (UMSP); same, except 2-3.viii.1987, Holzenthal, Morse, Clausen — 1 male (genitalia only) (UMSP); same, except 10-11.viii.1990, Holzenthal, Blahnik, Muñoz — 1 male, 31 females (UMSP), 2 males, 31 females (in alcohol) (UMSP); same, except 16-17.iii.1991, Holzenthal, Muñoz, Huisman — 5 males, 23 females (UMSP), 16 males, 62 females (in alcohol) (INBIO); Río Guineal, ca 1 km (air) E Finca Helechales, 09°04’34”N, 083°05’31”W, el. 840 m, 22.ii.1986, Holzenthal, Morse, Fasth — 7 males (UMSP); Río Singrí, ca 2 km (air) S Finca Helechales, 09°03’25”N, 083°04’55”W, el. 720 m, 21.ii.1986, Holzenthal, Morse, Fasth — 1 male (UMSP); Zona Protectora Las Tablas, Río Cotón, Sitio Cotón, 08°56’28”N, 082°47’13”W, el. 1460 m, 15.iv.1989, Holzenthal & Blahnik — 4 males, 32 females (in alcohol) (NMNH); Río Bellavista trib., Las Alturas, road to quarry, 08°57’07”N, 082°50’53”W, el. 1480 m, 19.iii.1991, Holzenthal, Muñoz, Huisman — 1 male, 1 female (UMSP).

Etymology. The name altura comes from the name of a community in Costa Rica, Las Alturas, near which most of the type material for this species (and a number of others, as well) was collected.

Protoptila bicornuta **Flint**
Fig. 3

Flint 1963: 475.

This species is similar to *P. cristula*, n. sp., and *P. rota* Mosely 1937 in the possession of horn-like processes or "*cornuti*" projecting from the phallicata. *Protoptila bicornuta* differs from either of those species in that the ventral margin of sternum VIII is shorter and less deeply bifurcate apically, and the ventral processes of the phallicata are much shorter.

Material examined. **COSTA RICA**: **Heredia**: Estación Biología La Selva, Río Puerto Viejo, 10°26'24"N, 084°00'43"W, el. 30 m, 10-11.ii.1986, Holzenthal — 3 males, 20 females; Río Sarapiquí, 7 km W Puerto Viejo, 10°27'07"N, 084°04'01"W, el. 50 m, 11.ii.1986, Holzenthal, Morse, Fasth — 4 males, 5 females; Estación Biología La Selva, Quebrada Sura, 10°26'13"N, 084°00'36"W, el. 50 m, 20-21.vi.1986, Holzenthal, Heyn, Armitage — 2 males (NMNH); **Limón**: Río Bitey, ca. 2.5 km S Pandora, 09°43'30"N, 082°57'47"W, el. 15 m, 3.ii.1986, Holzenthal, Morse, Fasth — 1 male (in alcohol); E .A.R.T.H., Río Destierro, Pozo Azul, 10°12'29"N, 083°34'26"W, el. 15 m, 5.ii.1992, Holzenthal, Muñoz, Kjer — 4 males, 7 females (in alcohol) (INBIO); **Puntarenas**: Quebrada Pita, ca. 3 km (air) W Golfito, 08°38'31"N, 083°11'35"W, el. 15 m, 15.ii.1986, Holzenthal, Morse, Fasth — 1 male (in alcohol). **NICARAGUA**: Río San Juan, Refugio Bartola, 1.5 km N. of station, Río Bartola, 10°58'00"N, 084°21'00"W, el. 40 m, 8.viii.2000, Chamorro & Dobbins — 2 males, 116 females (in alcohol).

Protoptila boruca **Flint**
Fig. 4

Flint 1974: 18.

This species is similar to *P. cana* and *P. chitaria*, n. sp. In both species the apical sections of tergum X are similarly developed and the apex of the ventral margin of segment IX is partially fused to the ventral apex of sternum VIII, forming what appears to be paired lateral processes. In *P. boruca* these processes are very wide basally. Also the apex of sternum VIII in *P. boruca* is more distinctly upturned than in the other species.

Material examined. **COSTA RICA**: **Puntarenas**: Río Ceibo, route 2 ca. 6 km W rd to Buenos Aires, 09°08'56"N, 083°22'37"W, el. 250 m, 20.ii.1986, Holzenthal, Morse, Fasth

— 15 males (in alcohol); Río Guineal, ca. 1 km (air) E Finca Helechales, 09°04'34"N, 083°05'31"W, el. 840 m, 22.ii.1986, Holzenthal, Morse, Fasth — 16 males (in alcohol); Río Singrí, ca. 2 km (air) S Finca Helechales, 09°03'25"N, 083°04'55"W, el. 720 m, 21.ii.1986, Holzenthal, Morse, Fasth — 145 males (pinned), 5 males (in alcohol) (UMSP), 10 males (NMNH), 5 males (INBIO).

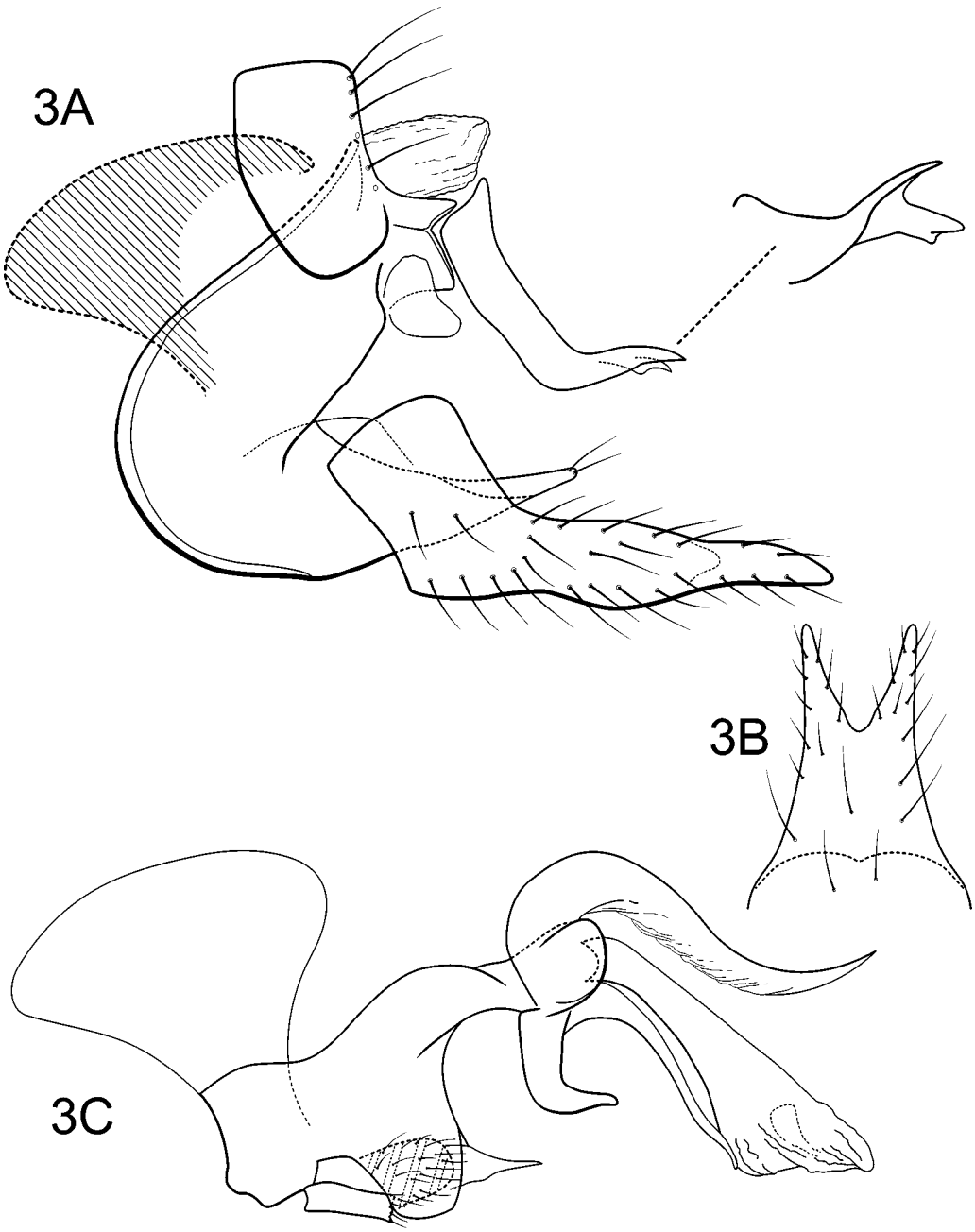

FIGURE 3. *Protoptila bicornuta*, Flint. Male genitalia: A—lateral (inset: apex of segment X, enlarged); B—segment VIII apex, ventral; C—phallic complex, lateral.

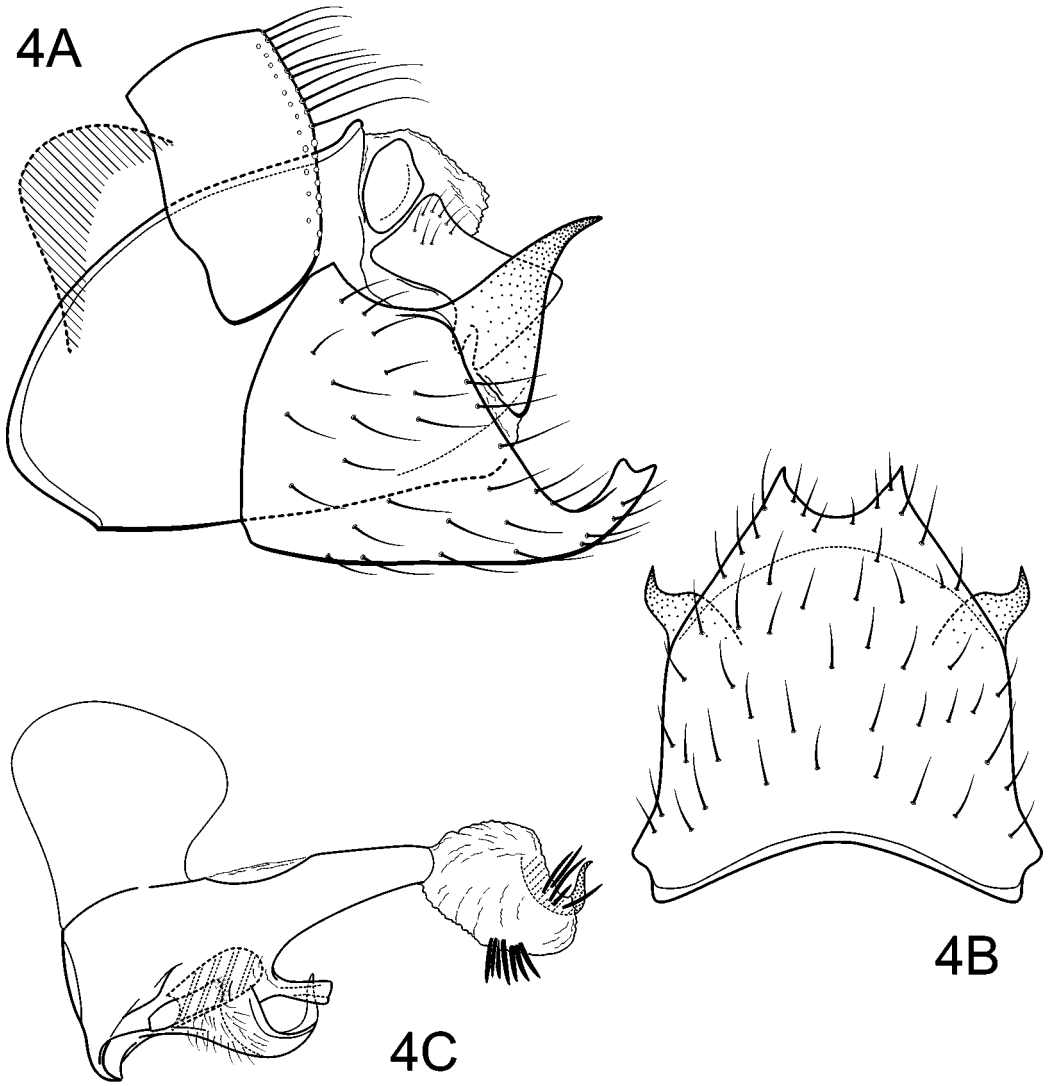

FIGURE 4. *Protoptila boruca*, Flint. Male genitalia: A—lateral; B—segment VIII, ventral; C—phallic complex, lateral.

***Protoptila bribri*, new species**
Fig. 5

This species is most similar to *P. orotina orotina*, *P. orotina raposa* Flint 1974, and *P. ixtala*. All of these species have a similarly developed phallicata, which is elongate and very angularly bent in the middle. The different species differ most diagnostically in the development of the apex of this structure. In *P. bribri* it is greatly enlarged and inflated with a sclerotized ridge on its dorsal margin. Additionally, there are minor differences among the species in the shapes of the apical section of tergum X, the parameres, and the

apex of sternum VIII, as shown in the illustrations.

Adult. Length of forewing: male 2.4–3.0 mm; female 2.7–3.3 mm. Color brown (in alcohol), with distinct transverse bar of whitish setae along cord.

Male genitalia. Sternum VI process prominent, slightly curved, longer than wide, apex subacute. Tergum VIII posterior margin with row of relatively short setae; sternum VIII strongly produced ventrally, not bifurcate apically, strongly narrowed, apex slightly broader, weakly emarginate. Segment IX with anterior margin broadly rounded; sternum IX medially produced posteriorly, long, narrow, apex slightly wider, angularly emarginate; posterolateral margin of segment IX without processes. Preanal appendages absent. Tergum X divided mesally to form sclerotized lateral parts with basal and apical sections; basal section subquadrate, longer than wide, apical section elongate, angularly bent from base, apex with acute apicodorsal process and numerous minute spine-like projections. Phallobase dorsally with large, semicircular, laterally compressed apodeme; ventrally with short, rod-like, articulated appendages with apical setae, appendages fitting into sclerotized pockets on ventral margin of phallobase; posteroventral margin of phallobase without paired basal or dorsolateral processes; paramere elongate, membranous, paramere spine elongate, fishhook-shaped, bulbous basally; phallicata very elongate, narrow throughout length, angularly bent near middle, apex much enlarged, with diverging apicodorsal sclerotized ridges; endophallus reduced, not noticeably everted; phallotremal sclerite lightly sclerotized, an incomplete basal ring, with curved, apicomesal projection.

Holotype male: **COSTA RICA**: **Alajuela**: Río Pizote, ca. 5 km (air) S Brasilia, 10°58’19”N, 085°20’42”W, el. 390 m, 9.iii.1986, Holzenthal & Fasth (in alcohol) (UMSP000208539) (UMSP).

Paratypes: Same data as holotype — 1 male (in alcohol) (NMNH); same, except 12.iii.1986, Holzenthal & Fasth — 2 males (in alcohol) (UMSP); **COSTA RICA**: **Guanacaste**: Río Mena, 4.2 km W Santa Cecilia, 11°03’32”N, 085°26’53”W, el. 260 m, 11.iii.1986, Holzenthal & Fasth — 1 male (in alcohol) (UMSP); **Heredia**: Estación Biología La Selva, Río Puerto Viejo, 10°26’24”N, 084°00’43”W, el. 30 m, 19.vi.1986, Holzenthal, Heyn, Armitage — 22 males (in alcohol) (UMSP); Quebrada Sura, 10°26’13”N, 084°00’36”W, el. 50 m, 20-21.vi.1986, Holzenthal, Heyn, Armitage — 9 males (in alcohol) (NMNH); **Limón**: Reserva Biológica Hitoy-Cerere, Río Cerere, Est. Miramar, 09°40’16”N, 083°01’41”W, el. 90 m, 23-24.iii.1987, Holzenthal, Hamilton, Heyn — 107 males (in alcohol) (UMSP); Río Telire and small trib., SE Suretka, 09°33’14”N, 082°53’31”W, el. 48 m, 1.ii.1986, Holzenthal, Morse, Fasth — 4 males (in alcohol) (NMNH); Río Uatsi, ca. 8 km (air) W Bribri, 09°37’12”N, 082°54’00”W, el. 60 m, 25.iii.1987, Holzenthal, Hamilton, Heyn — 98 males (in alcohol) (UMSP); Río Banano, 16 km WSW Bomba, 09°53’17”N, 083°10’01”W, el. 150 m, 26.iii.1987, Holzenthal, Hamilton, Heyn — 17 males, 11 females (in alcohol) (INBIO).

Etymology. *Bribri* comes from the name of the indigenous people of the Talamanca mountains of Costa Rica and Panama.

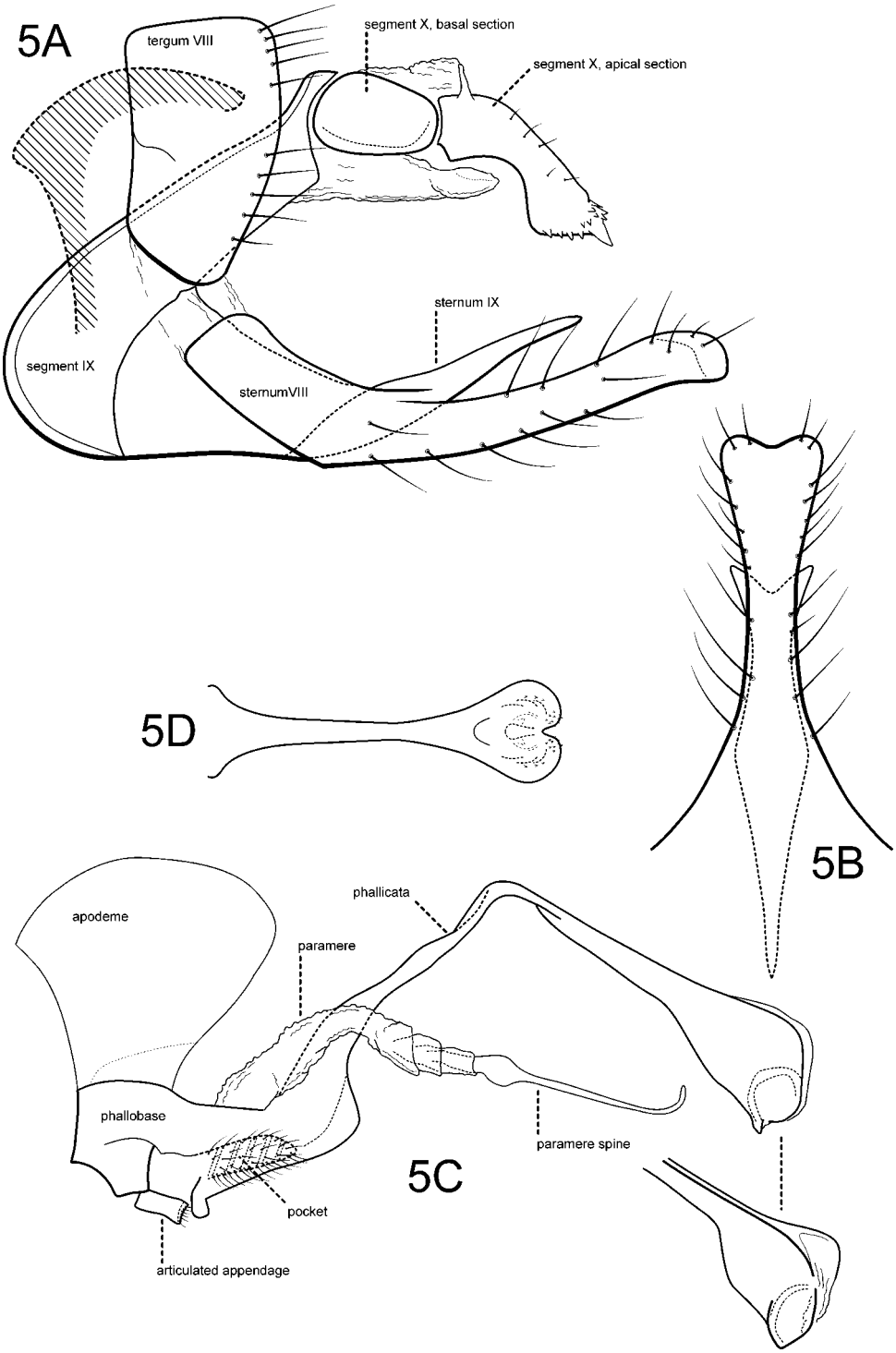

FIGURE 5. *Protoptila bribri*, new species. Male genitalia: A—lateral; B—segment VIII apex, ventral; C—phallic complex, lateral (inset: apex of phallicata, dorsolateral); D—phallicata apex, dorsal.

***Protoptila burica* Flint**
Fig. 6

Flint 1974: 17.

Flint (1967) noted the similarity of this species to *P. cristata* Flint 1967. The most distinctive and diagnostic feature of *P. burica* is the shape of the apical section of tergum X, which is branched apically into an elongate, narrow, curved dorsal projection, and three shorter ventral projections.

Material examined. **COSTA RICA**: **Cartago**: Río Chitaría, rt 10, 10 km NW Río Reventazón, 09°55'12"N, 083°36'14"W, el. 740 m, 21.iii.1991, Holzenthal, Muñoz, Huisman — 1 male; **Puntarenas**: Quebrada Pita, ca. 3 km (air) W Golfito, 08°38'31"N, 083°11'35"W, el. 15 m, 15.ii.1986, Holzenthal, Morse, Fasth — 1 male; Reserva Biológica Carara, Quebrada Bonita, 09°46'30"N, 084°36'18"W, el. 35 m, 18-20.v.1990, Holzenthal & Blahnik — 2 males (pinned), 4 males (in alcohol), 22 females; same, except 11.iii.1991, Holzenthal, Muñoz, Huisman — 42 males; **San José**: Río Negro, 3.5 km SE jct. rt. 239, 09°40'48"N, 084°23'38"W, el. 230 m, 21.iii.1986, Holzenthal & Fasth — 8 males (NMNH), 1 male, 1 female (INBIO); Reserva Biológica Carara, Río del Sur, 1.5 km (rd) S Carara, 09°46'08"N, 084°31'52"W, el. 160 m, 13.iii.1991, Holzenthal, Muñoz, Huisman — 8 males (in alcohol), 7 females (pinned); Reserva Biológica Carara, Río Carara in Carara, 09°46'41"N, 084°31'52"W, el. 200 m, 14.iii.1991, Holzenthal, Muñoz, Huisman — 1 male (pinned), 18 males (in alcohol).

***Protoptila cana* Flint**
Fig. 7

Flint 1974: 18.

This species is very similar to *P. chitaria*, n. sp., and the two undoubtedly are closely related. The most distinctive difference between them is the shape of the apex of the ventral margin of segment IX, which is closely associated with and partially fused to the ventral apex of sternum VIII. In *P. cana* this apex is more elongate than the ventral apex of sternum VIII and nearly straight, whereas in *P. chitaria* it is shorter than the ventral apex of sternum VIII and curved apically. The apices of the apical sections of tergum X are also shaped slightly different in the two species, as shown in the illustrations.

Material examined. **COSTA RICA**: **Alajuela**: 7.6 km E Artenas, Rio Grande de Tarcoles river bed, 15.xii.1987, Burdick — 1 male (in alcohol); **Cartago**: Río Chitaría, rt 10, 10 km NW Río Reventazón, 09°55'12"N, 083°36'14"W, el. 740 m, 21.iii.1991, Holzenthal, Muñoz, Huisman — 2 males; Río Reventazón, CATIE along Sendero E

spaveles, 09°53’35”N, 083°39’04”W, el. 500 m, 22.iii.1991, Muñoz-Quesada — 1 male, 23 females; **Guanacaste**: Quebrada Garcia, 10.6 km ENE Quebrada Grande, 10°51’43”N, 085°25’41”W, el. 470 m, 8.iii.1986, Holzenthal & Fasth — 7 males; Río Tizate, 7.2 km NE Cañas Dulces, 10°46’23”N, 085°26’56”W, el. 275 m, 28.vi.1986, Holzenthal, Heyn, Armitage — 4 males (in alcohol); Parque Nacional Guanacaste, Quebrada Alcornoque, El Hacha, 11°00’32”N, 085°34’37”W, el. 250 m, 26.vii.1987, Holzenthal, Morse, Clausen — 3 males, 1 female (in alcohol) (INBIO); **Limón**: Río Uatsi, ca. 8 km (air) W Bribri, 09°37’12”N, 082°54’00”W, el. 60 m, 25.iii.1987, Holzenthal, Hamilton, Heyn — 1 male; **Puntarenas**: Río Ceibo, route 2 ca. 6 km W rd to Buenos Aires, 09°08’56”N, 083°22’37”W, el. 250 m, 20.ii.1986, Holzenthal, Morse, Fasth — 2 males; Parque Nacional Corcovado, Est. Sirena, Río Camaronal, 08°28’55”N, 083°35’20”W, el. 30 m, 13.iv.1989, Holzenthal & Blahnik — 2 males (in alcohol); same, except 08°28’52”N, 083°35’38”W, el. 5 m, 12-13.iv.1989, Holzenthal & Blahnik — 8 males (in alcohol); Reserva Biológica Carara, Quebrada Bonita, 09°46’30”N, 084°36’18”W, el. 35 m, 18-20.v.1990, Holzenthal & Blahnik — 2 males (pinned), 6 males (in alcohol), 22 females (pinned); same, except 11.iii.1991, Holzenthal, Muñoz, Huisman — 6 males; **San José**: Río Negro, 3.5 km SE jct. rt. 239, 09°40’48”N, 084°23’38”W, el. 230 m, 21.iii.1986, Holzenthal & Fasth — 1 male (in alcohol); Reserva Biológica Carara, Río del Sur, 1.5 km (rd) S Carara, 09°46’08”N, 084°31’52”W, el. 160 m, 13.iii.1991, Holzenthal, Muñoz, Huisman — 1 male (pinned), 3 males (in alcohol); Reserva Biológica Carara, Río Carara in Carara, 09°46’41”N, 084°31’52”W, el. 200 m, 14.iii.1991, Holzenthal, Muñoz, Huisman — 3 males (in alcohol) (NMNH). **PANAMA: Panama:** Canal Zone, Barro Colorado Island, Snyder-Molino trail, marker 3, 13.vii-20.ix.1988, Wolda — 9 males, 7 females (in alcohol); same, except 27.vi.-13.xi.1990, Wolda, — 5 males, 6 females (in alcohol).

***Protoptila chitaria*, new species**
Fig. 8

This species is very similar to *P. cana*. They differ in the shape of the apex of the ventral margin of segment IX, which is divided, with each branch partially fused to the lateral margin of sternum VIII. In *P. chitaria* this apex is shorter than the ventral apices of sternum VIII and curved apically, whereas in *P. cana* it is more elongate and nearly straight. The shapes of the apices of the apical sections of tergum X of the two species are also slightly different, as shown in the illustrations.

Adult. Length of forewing: male 3.2–3.9 mm; female 3.5–4.2 mm. Color brown (in alcohol), wing markings indistinct.

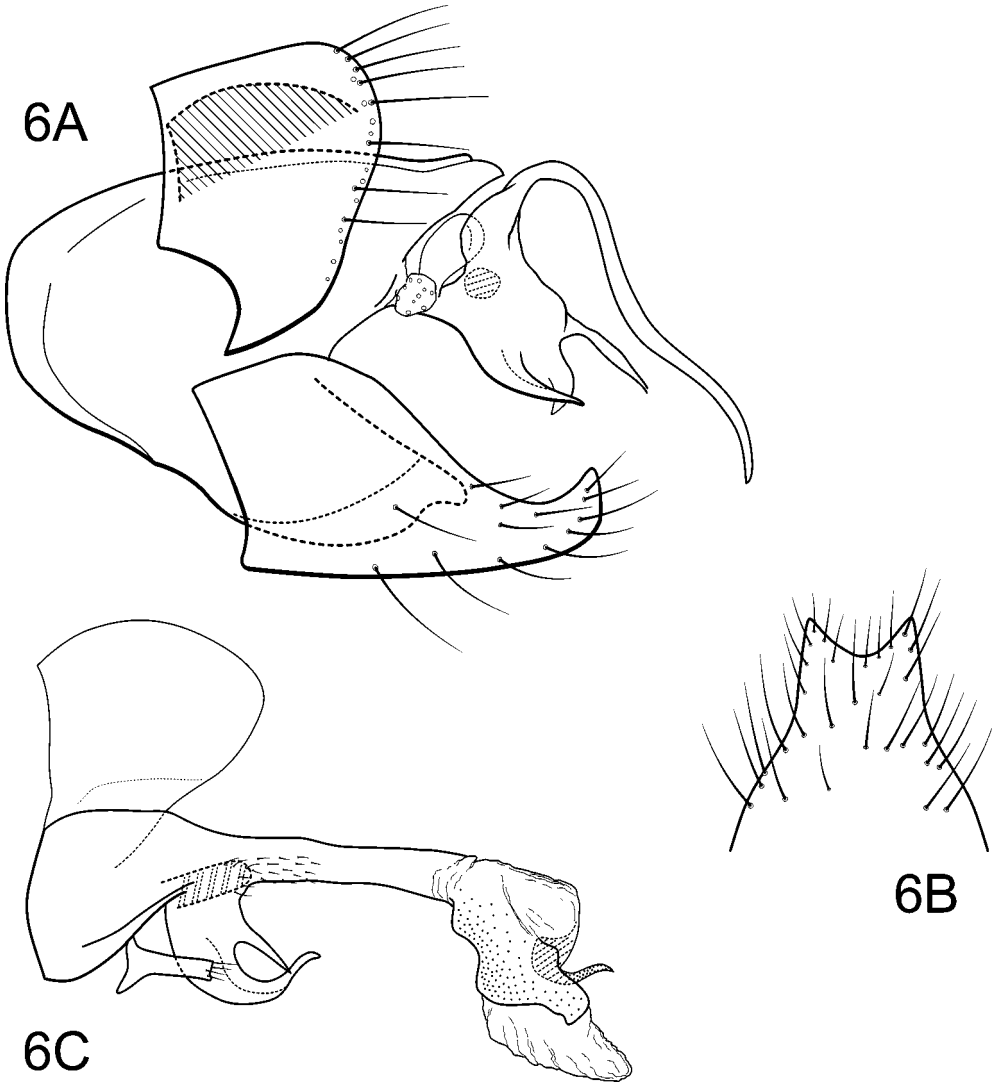

FIGURE 6. *Protoptila burica*, Flint. Male genitalia: A—lateral; B—segment VIII apex, ventral; C—phallic complex, lateral.

Male genitalia. Sternum VI process prominent, slightly curved, longer than wide, apex subacute. Tergum VIII posterior margin with row of elongate setae; sternum VIII produced ventrally, distinctly bifurcate apically, branches acute apically, broad basally, relatively short. Segment IX with anterior margin broadly rounded; sternum IX laterally produced posteriorly, forming paired sinuous processes, partially fused to lateral margin of sternum VIII, processes not extending beyond posterior margin of sternum VIII; posterolateral margin of segment IX without processes. Preanal appendages absent. Tergum X divided mesally to form sclerotized lateral parts with basal and apical sections; basal section subquadrate, about as long as wide, apical section longer than basal section, apically divided to form broadly rounded ventral lobe and acute dorsal and mesal lobes. Phallobase

dorsally with large, semicircular, laterally compressed apodeme; ventrally with short, rod-like, articulated appendages with apical setae, appendages fitting into sclerotized pockets on ventral margin of phallobase; posteroventral margin of phallobase with short, paired, upturned, apically acute basal processes and also dorsolateral processes; dorsolateral processes very short, straight, acute; paramere absent; phallicata short, narrowest basally, apex enlarged, membranous laterally, sclerotized ventrolaterally to form paired, acute, ventrally curved projection; endophallus membranous, enlarged when everted, with small apical and subapical spines; phallotremal sclerite spine-like, sinuous, sclerotized apically, somewhat divided basally.

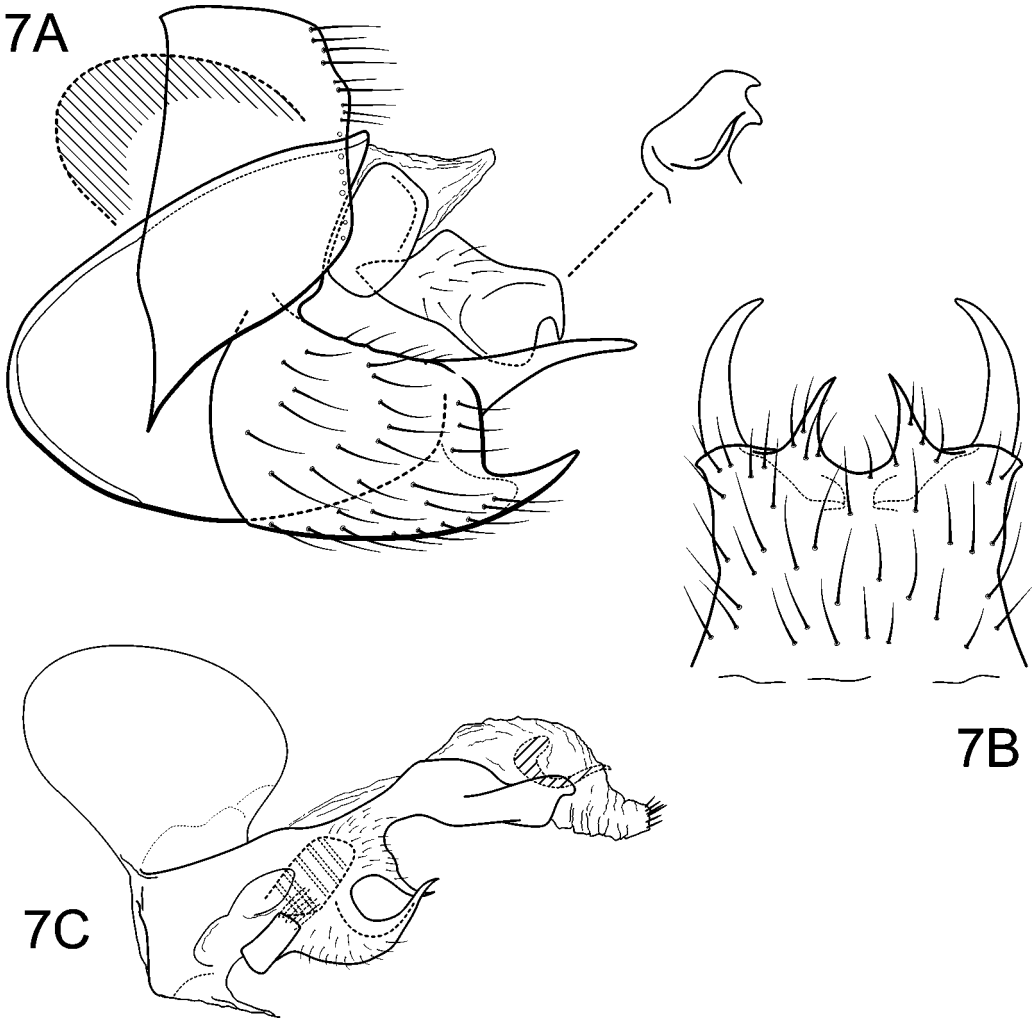

FIGURE 7. *Protoptila cana*, Flint. Male genitalia: A—lateral (inset: apex of segment X, caudal); B—segment VIII, ventral; C—phallic complex, lateral.

Holotype male: COSTA RICA: **Cartago**: Río Chitaría, rt 10, 10 km NW Río Reventazón, 09°55’12”N, 083°36’14”W, el. 740 m, 21.iii.1991, Holzenthal, Muñoz,

Huisman (in alcohol) (UMSP000208545) (UMSP).

Paratypes: Same data as holotype — 5 males, 66 females (in alcohol) (UMSP), 2 males, 4 females (in alcohol) (NMNH), 1 male, 3 females (in alcohol) (INBIO).

Etymology. This species is named for Chitaría, the town and river in Costa Rica near which the type material for this species was collected.

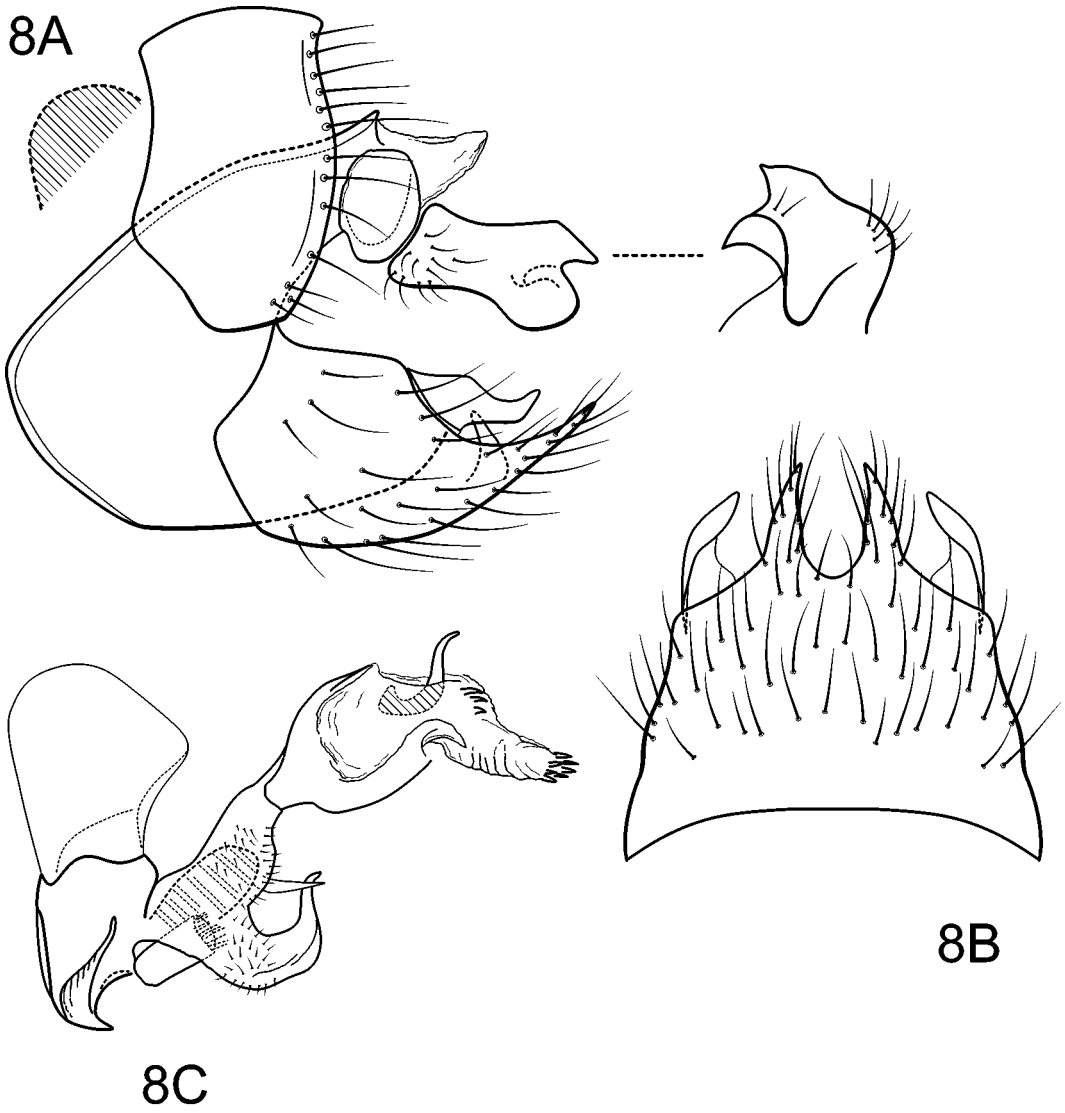

FIGURE 8. *Protoptila chitaria*, new species. Male genitalia: A—lateral (inset: apex of segment X, caudal, enlarged); B—segment VIII, ventral; C—phallic complex, lateral.

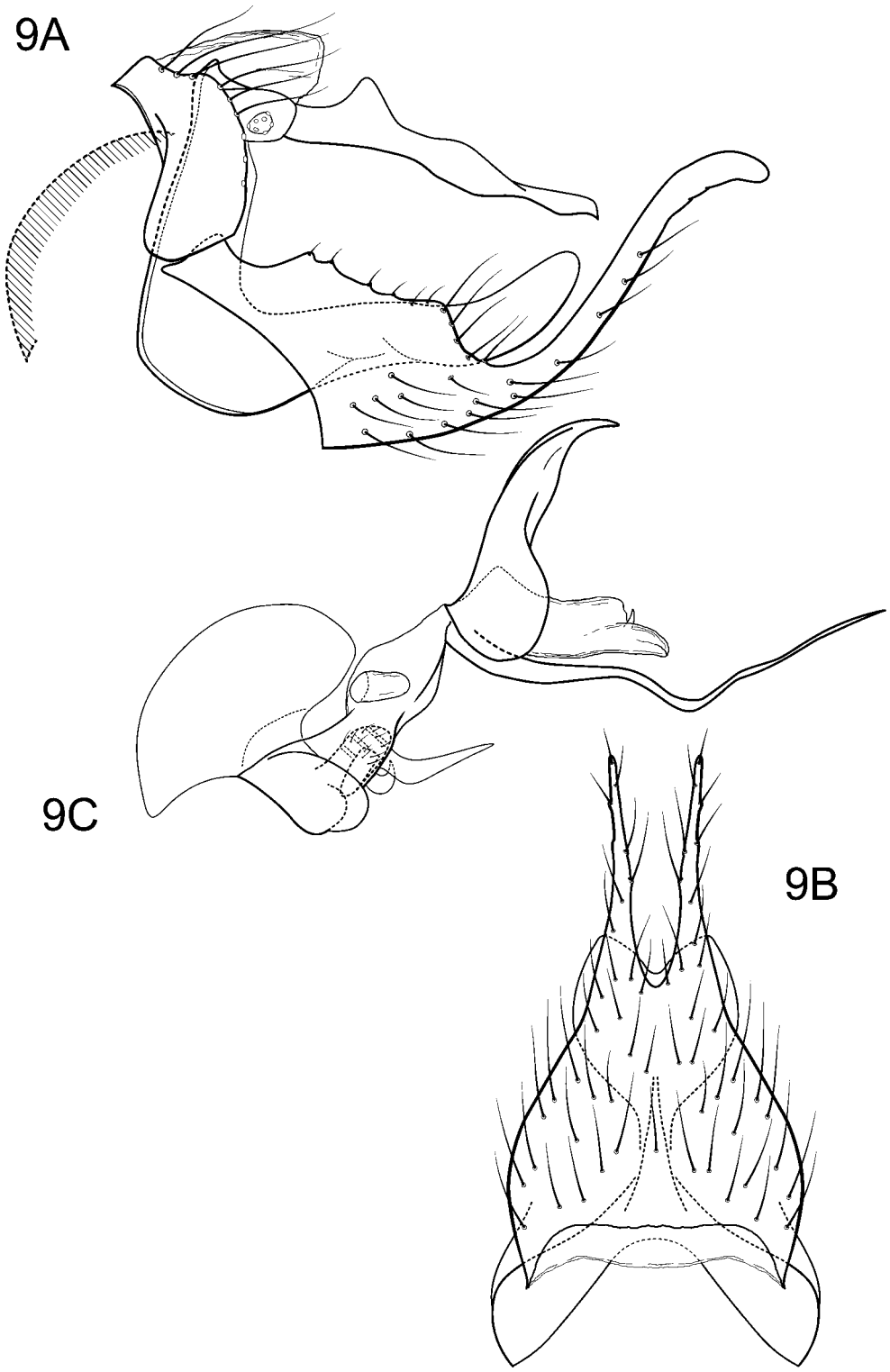

FIGURE 9. *Protoptila cristula*, new species. Male genitalia: A—lateral; B—segment VIII, ventral; C—phallic complex, lateral.

***Protoptila cristula*, new species**
Fig. 9

This species is closely related to *P. rota*, and both are similar to *P. bicornuta*. All three have horn-like processes or "*cornuti*" projecting from the phallicata. In *P. cristula*, these structures are more upright and the spine-like structures at the base of these horns are much more elongate than in either *P. rota* or *P. bicornuta*. In both *P. cristula* and *P. rota* the ventral margin of sternum VIII is much more elongate and upcurved apically than *P. bicornuta*, as well as more deeply bifurcate apicomesally. *Protoptila cristula* differs from *P. rota* in that the lateral processes of tergum X are also much more elongate and projecting.

Adult. Length of forewing: male 2.6–2.9 mm; female 2.6–3.2 mm. Color light brown (in alcohol), with distinct transverse bar of whitish setae along cord.

Male genitalia. Sternum VI process prominent, slightly curved, longer than wide, apex subacute. Tergum VIII posterior margin with row of elongate setae; sternum VIII strongly produced ventrally, distinctly bifurcate apically, branches acute apically, narrow, digitate, very elongate and strongly upturned. Segment IX with anterior margin broadly rounded; sternum IX medially produced posteriorly, in ventral view, narrow basally, broad apically, apically emarginate; posterolateral margin of segment IX without processes. Preanal appendages small, round. Tergum X divided mesally to form sclerotized lateral parts with basal and apical sections; basal section subquadrate, about as long as wide, apical section elongate, narrow, with rounded basodorsal protuberance. Phallobase dorsally with large, semicircular, laterally compressed apodeme; ventrally with short, rod-like, articulated appendages with apical setae, appendages fitting into sclerotized pockets on ventral margin of phallobase; posteroventral margin of phallobase with very short, paired, upturned, apically acute basal processes and also dorsolateral processes; dorsolateral processes prominent, slender, acute, angularly upturned near base; paramere very short, membranous, apparently vestigial; phallicata short, narrow and angularly bent near middle, with large, paired upright horn-like dorsolateral processes and very elongate, sinuous, narrow, apically acute ventral processes; endophallus membranous, enlarged when everted; phallotremal sclerite lightly sclerotized, indistinct.

Holotype male: **COSTA RICA**: **Alajuela**: Río Pizote, ca. 5 km (air) S Brasilia, 10°58'19"N, 085°20'42"W, el. 390 m, 12.iii.1986, Holzenthal & Fasth (UMSP000019033) (in alcohol) (UMSP).

Paratypes: **COSTA RICA**: **Alajuela**: Río Pizote, ca. 5 km N Dos Ríos, 10°56'53"N, 085°17'28"W, el. 470 m, Holzenthal & Fasth — 2 males (in alcohol) (UMSP). **NICARAGUA: Granada:** Reserva Silvestre Privada Domitila, río cerca manantial, 11°42.162'N, 85°57.118'W, el. 63 m, Chamorro & López — 60 males, 110 females (in alcohol) (UMSP), 3 males, 3 females (in alcohol) (NMNH).

Etymology. This species is named *cristula*, a diminutive of the Latin *crista*, meaning "crest," and referring to the crest-like processes of the phallicata of this species.

***Protoptila ixtala* Mosely**
Fig. 10

Mosely 1937: 156.

This species is most similar to *P. orotina orotina*, *P. orotina raposa*, and *P. bribri*, n. sp. All have a similarly developed phallicata, which is elongate and very angularly bent in the middle. They differ most in the development of the apex of this structure. In *P. ixtala* the apex is dorsoventrally flattened, appearing narrow in lateral view, and with the apex strongly flared in dorsal view. Additionally, there are also minor differences among the species in the shapes of the apical sections of tergum X, the parameres, and the apex of sternum VIII, as shown in the illustrations.

Material examined. **COSTA RICA**: **Guanacaste**: Río Tizate, 7.2 km NE Cañas Dulces, 10°46'23"N, 085°26'56"W, el. 275 m, 28.vi.1986, Holzenthal, Heyn, Armitage — 1 male; **Heredia**: Estación Biología La Selva, Río Puerto Viejo, 10°26'24"N, 084°00'43"W, el. 30 m, 10-11.ii.1986, Holzenthal — 1 male (NMNH); same, except 19.vi.1986, Holzenthal, Heyn, Armitage — 3 males, 4 females; **Limón**: Reserva Biológica Hitoy-Cerere: Río Cerere, Est. Miramar, 09°40'16"N, 083°01'41"W, el. 90 m, 23-24.iii.1987, Holzenthal, Hamilton, Heyn — 4 males, 6 females; Río Barbilla, ca. 8 km W B-Line, 10°04'01"N, 083°22'08"W, el. 30 m, 31.i.1986, Holzenthal, Morse, Fasth — 1 male; Río Telire and small trib., SE Suretka, 09°33'14"N, 082°53'31"W, el. 48 m, 1.ii.1986, Holzenthal, Morse, Fasth — 1 male; Río Uatsi, ca. 8 km (air) W Bribri, 09°37'12"N, 082°54'00"W, el. 60 m, 25.iii.1987, Holzenthal, Hamilton, Heyn — 2 males, 1 female (INBIO); Río Banano, 16 km WSW Bomba, 09°53'17"N, 083°10'01"W, el. 150 m, 26.iii.1987, Holzenthal, Hamilton, Heyn — 1 male, 7 females.

***Protoptila jolandae*, new species**
Fig. 11

The most diagnostic character of this species is the structure of the phallicata, which is distinctively shaped, wide preapically, as viewed laterally, and very narrow basally as viewed dorsoventrally. The apex, in dorsal view, is distinctly widened. Other characters, such as the elongate, apically bifurcate processes of tergum X, the shape of the paramere spine, and the elongate, narrowed ventral apex of sternum VIII together help diagnose the species.

Adult. Length of forewing: male 2.9 mm. Color brown (in alcohol), wing markings indistinct.

Male genitalia. Sternum VI process prominent, slightly curved, longer than wide, apex subacute. Tergum VIII posterior margin with row of relatively short setae; sternum VIII strongly produced ventrally, not bifurcate apically, strongly narrowed, apex weakly emarginate. Segment IX with anterior margin broadly rounded; sternum IX medially

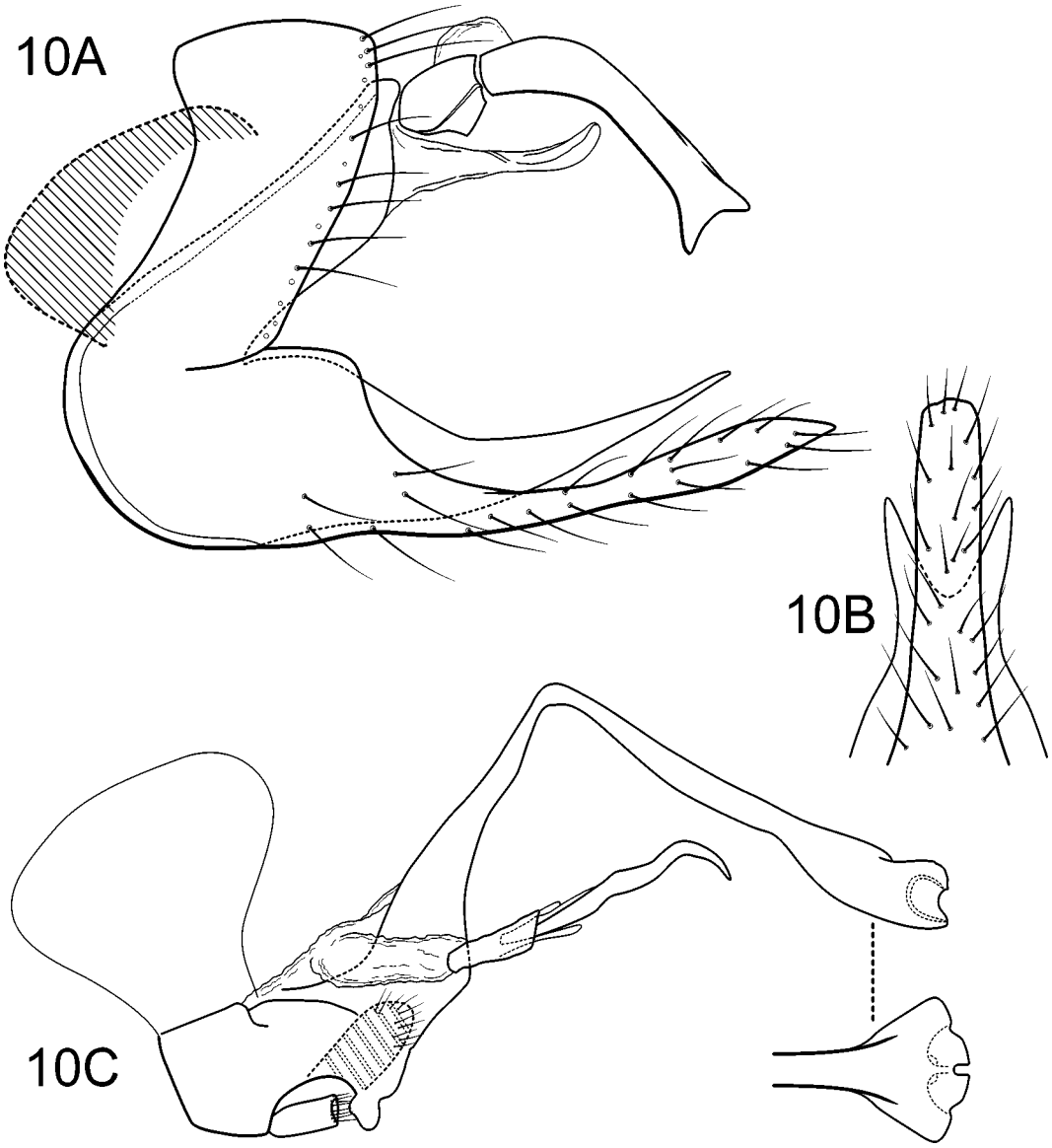

FIGURE 10. *Protoptila ixtala*, Mosely. Male genitalia: A—lateral; B—segments VIII and IX, apices, ventral; C—phallic complex, lateral (inset: apex of phallicata, dorsal).

posteriorly, long, narrow, apex acute; posterolateral margin of segment IX without processes. Preanal appendages absent. Tergum X divided mesally to form sclerotized lateral parts forming elongate sinuous apically acute process. Phallobase dorsally with large, semicircular, laterally compressed apodeme; ventrally with short, rod-like, articulated appendages with apical setae, appendages fitting into sclerotized pockets on ventral margin of phallobase; posteroventral margin of phallobase with short, paired, upturned, apically acute basal processes, but without dorsolateral processes; paramere short, wide, membranous, paramere spine short, setose, attenuate apically; phallicata short,

sinuous, wide basally in lateral view, compressed and narrow basally in dorsal view, apex widened, bulbous; endophallus membranous, enlarged when everted; phallotremal sclerite lightly sclerotized, an incomplete basal ring, with curved, apicomesal projection.

Holotype male: **COSTA RICA**: **Alajuela**: Reserva Forestal San Ramón, Río San Lorencito & tribs., 10°12’58”N, 084°36’25”W, el. 980 m, 6-10.iii.1991, Holzenthal, Muñoz, Huisman (UMSP000019035) (UMSP).

Etymology. We are pleased to name this species for Jolanda Huisman, whose brilliant idea it was to hoist a light trap into the forest canopy where the only specimen of this new species was collected.

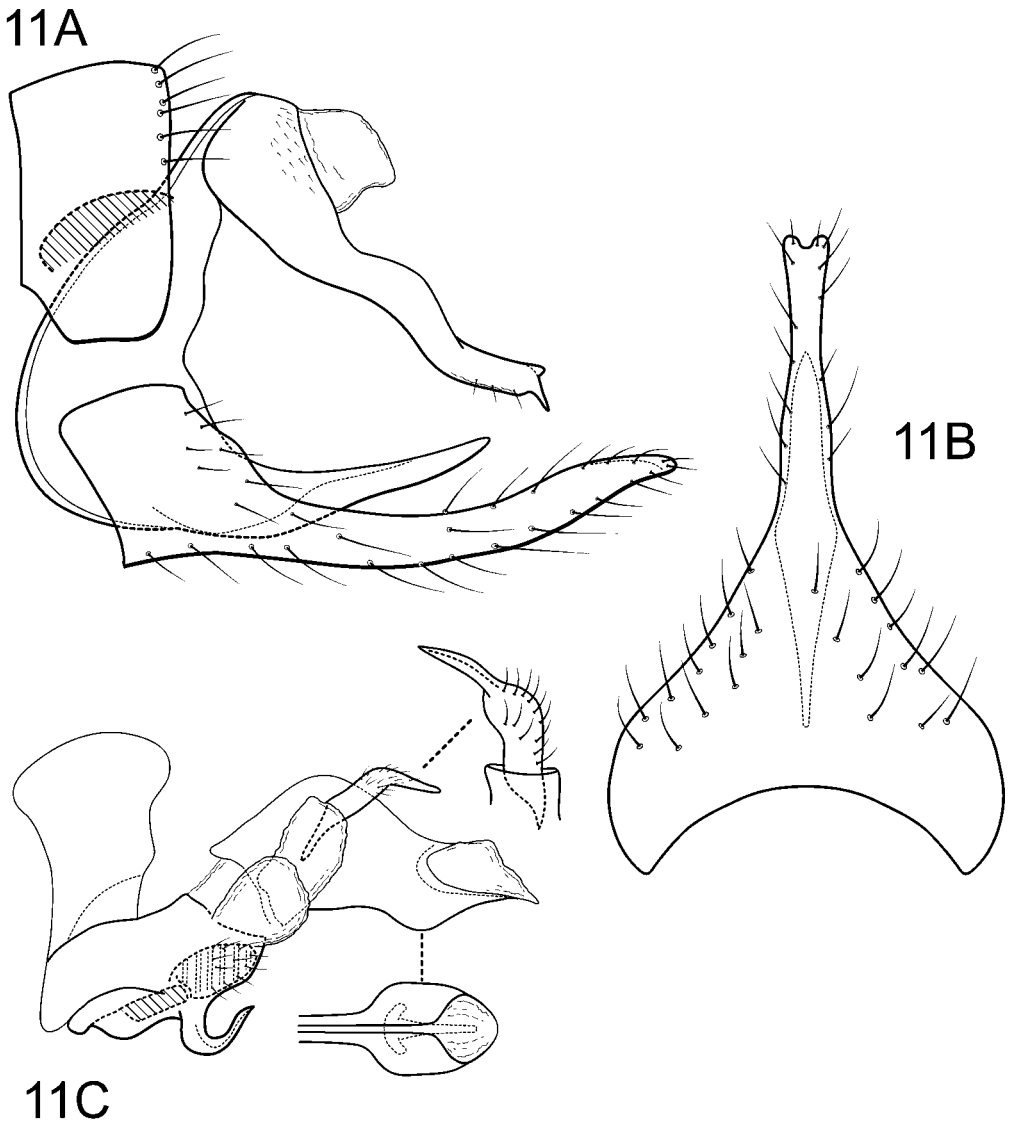

FIGURE 11. *Protoptila jolandae*, new species. Male genitalia: A—lateral; B—segment VIII, ventral; C—phallic complex, lateral (insets: paramere spine, dorsal, enlarged; apex of phallicata, dorsal).

***Protoptila kjeri*, new species**
Fig. 12

This species is somewhat similar to *P. altura*, including the branched and spine-like development of the apices of the apical section of tergum X, the elongate, paired processes from the posterolateral margins of sternum IX and the general shape and bifurcate apex of sternum VIII. However, in *P. kjeri* these structures are all quite differently developed. In particular, the dorsal branch of the apex of the apical section of tergum X is elongate and narrowed, but not bifurcate. A very diagnostic character of *P. kjeri* is the development of the apex of the phallicata, which has elongate, paired, curved apicoventral spines and short, paired preapical spines on the ventral margin.

Adult. Length of forewing: male 3.0–3.2 mm; female 3.1–3.6 mm. Color brown (in alcohol), wing markings indistinct.

Male genitalia. Sternum VI process relatively short, slightly curved, subtriangular, apex acute. Tergum VIII posterior margin with row of elongate setae; sternum VIII strongly produced ventrally, distinctly bifurcate apically, branches acute apically, narrow, digitate, moderately elongate; dorsolateral margin of sternum VIII acutely produced preapically. Segment IX with anterior margin broadly rounded; sternum IX slightly medially produced posteriorly, downcurved, fused within sternum VIII; posterolateral margin of segment IX with long, narrow processes, strongly bowed upward and outward from base in lateral view, converging apically, apex attenuate, slightly curved. Preanal appendages absent. Tergum X divided mesally to form sclerotized lateral parts with basal and apical sections; basal section subquadrate, about as long as wide, apical section short, divided apically to form prominent acuminate dorsal projection and short sinuous acuminate ventral projection. Phallobase dorsally with large, semicircular, laterally compressed apodeme; ventrally with short, rod-like, articulated appendages with apical setae, appendages fitting into sclerotized pockets on ventral margin of phallobase; posteroventral margin of phallobase with short, paired, upturned, apically acute basal processes, but without dorsolateral processes; paramere absent; phallicata elongate, narrow, straight, apicoventrally with short paired preapical spines and elongate, sinuous apicoventral spines; endophallus reduced, not noticeably everted; phallotremal sclerite large, trough-like, distinctly notched apically, with single mesobasal spine-like projection.

Holotype male: COSTA RICA: **Alajuela**: Río Pizote, ca. 5 km (air) S Brasilia, 10°58’19”N, 085°20’42”W, el. 390 m, 12.iii.1986, Holzenthal & Fasth (in alcohol) (UMSP000208543) (UMSP).

Paratypes: Same data as holotype — 8 males (in alcohol) (UMSP); **COSTA RICA**: **Alajuela**: Río Pizote, ca. 5 km N Dos Ríos, 10°56’53”N, 085°17’28”W, el. 470 m, Holzenthal & Fasth — 9 males (in alcohol) (UMSP); Quebrada Honda, 5.4 km (road) S Crucero, 10°18’40”N, 084°14’42”W, el. 650 m, 12.ii.1992, Holzenthal, Muñoz, Kjer — 1 male (in alcohol) (NMNH); **Guanacaste**: Quebrada Garcia, 10.6 km ENE Quebrada Grande, 10°51’43”N, 085°25’41”W, el. 470 m, 8.iii.1986, Holzenthal & Fasth — 1 male

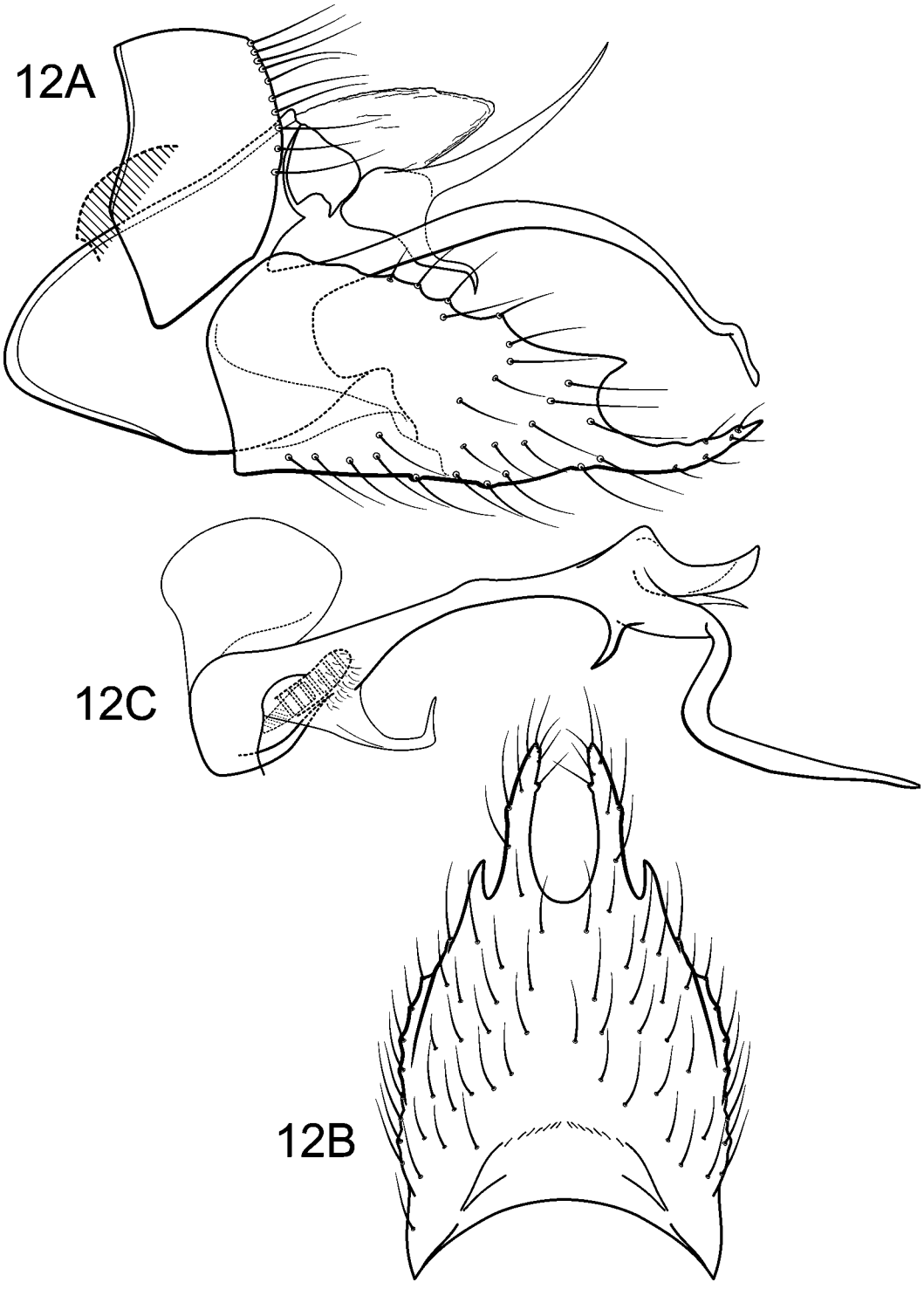

FIGURE 12. *Protoptila kjeri*, new species. Male genitalia: A—lateral; B—segment VIII, ventral; C—phallic complex, lateral.

(in alcohol) (INBIO); Río Mena, 4.2 km W Santa Cecilia, 11°03’32”N, 085°26’53”W, el. 260 m, 11.iii.1986, Holzenthal & Fasth — 3 males (in alcohol) (NMNH); Río Aguacate, 0.5 km E Aguacate, 10°33’54”N, 084°56’20”W, el. 590 m, 16.ii.1992, Holzenthal, Muñoz, Kjer — 1 male, 5 females (in alcohol) (UMSP); **Heredia**: Río Bijagual, on road to Magsasay, 10°24’29”N, 084°04’34”W, el. 140 m, 12.ii.1986, Holzenthal, Morse, Fasth — 1 male (in alcohol) (UMSP).

Etymology. We are pleased to name this species for Dr. Karl Kjer, who assisted in collecting some of the type material, for his valuable contributions to Trichoptera systematics.

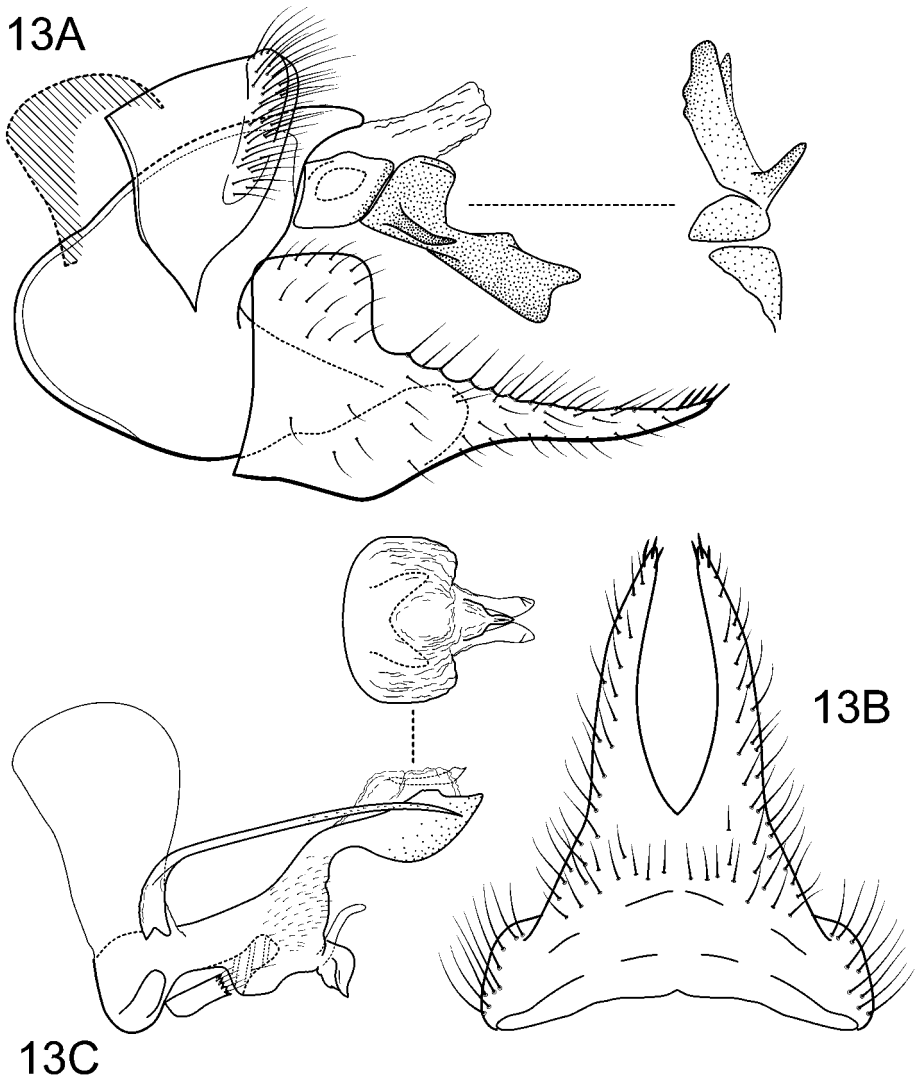

FIGURE 13. *Protoptila laterospina*, Flint. Male genitalia: A—lateral (inset: segment X, dorsal); B—segment VIII, ventral; C—phallic complex, lateral (inset: apex of phallicata, dorsal).

***Protoptila laterospina* Flint**
Fig. 13

Flint 1967: 3.

This is a very distinctive species with several interesting diagnostic characters. The character for which it is named, the lateral spine-like process on the apical section of tergum X, together with the overall shape of the apical section, is diagnostic. Other distinctive characters include the deeply bifurcate apex of sternum VIII, and the dense brush, rather than linear array, of setae on the posterior margin of tergum VIII.

Material examined. **COSTA RICA**: **Alajuela**: Reserva Forestal San Ramón, Río San Lorencito & tribs., 10°12’58”N, 084°36’25”W, el. 980 m, 6-10.iii.1991, Holzenthal, Muñoz, Huisman — 2 males, 1 female (in alcohol); **Cartago**: Río Chitaría, rt 10, 10 km NW Río Reventazón, 09°55’12”N, 083°36’14”W, el. 740 m, 21.iii.1991, Holzenthal, Muñoz, Huisman — 35 females (in alcohol); **Limón**: Reserva Biológica Hitoy-Cerere, Río Cerere, Est. Miramar, 09°40’16”N, 083°01’41”W, el. 90 m, 23-24.iii.1987, Holzenthal, Hamilton, Heyn — 1 male (pinned), 4 males (in alcohol), 8 females(pinned); Río Telire and small trib., SE Suretka, 09°33’14”N, 082°53’31”W, el. 48 m, 1.ii.1986, Holzenthal, Morse, Fasth — 1 male (in alcohol); Río Banano, 16 km WSW Bomba, 09°53’17”N, 083°10’01”W, el. 150 m, 26.iii.1987, Holzenthal, Hamilton, Heyn — 1 male (in alcohol) (INBIO); Reserva Biológica Barbilla, Río Dantas, 15 km (rd) S Pacuarito, 09°59’38”N, 083°26’35”W, el. 300 m, 27-30.i.1992, Holzenthal, Muñoz, Kjer — 3 males, 285 females (in alcohol); Reserva Biológica Barbilla, trib. to Río Dantas, 13 (km) S Pacuarito, 09°59’42”N, 083°28’37”W, el. 500 m, 1.ii.1992, Holzenthal, Muñoz, Kjer — 37 females (in alcohol).

***Protoptila orotina orotina* Flint**
Fig. 14

Flint 1974: 13.

This species is most similar to *P. orotina raposa*, *P. ixtala*, *and P. bribri*. All have a similarly developed phallicata, which is elongate and very angularly bent in the middle. The different species differ most in the development of the apex of this structure. In *P. orotina orotina* it is somewhat enlarged apically and has a subacute apicoventral projection. Diagnostic differences in the two subspecies of *P. orotina* were illustrated by Flint (1974). Considering that active selection appears to be occurring within this group for structures at the apex of the phallus, it seems possible that the two subspecies may actually represent different species. There are also minor differences among the species in the shapes of the apical section of tergum X, the parameres, and the apex of sternum VIII, as shown in the illustrations.

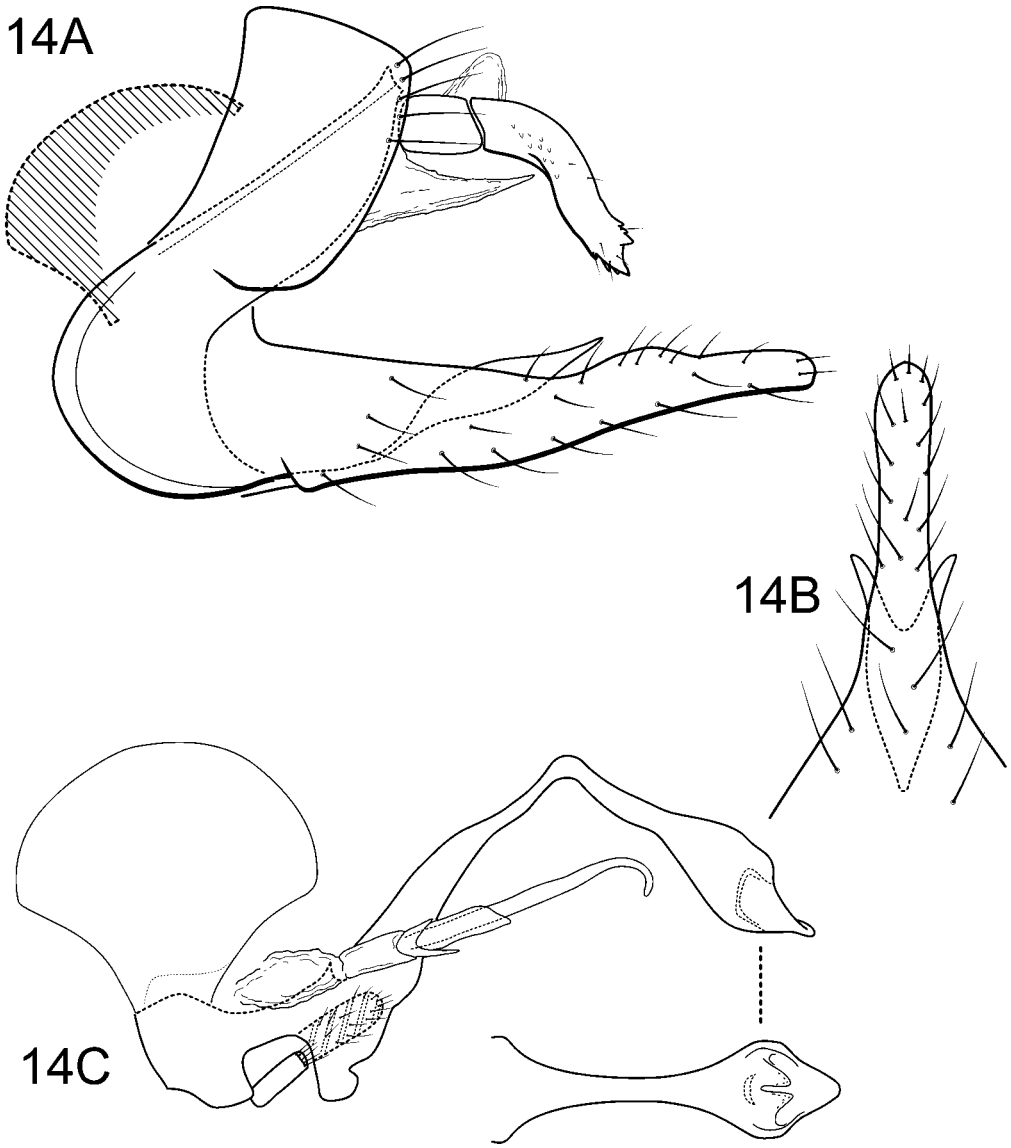

FIGURE 14. *Protoptila orotina orotina*, Flint. Male genitalia: A—lateral; B—segment VIII apex, ventral; C—phallic complex, lateral.

Material examined. **COSTA RICA**: **Guanacaste**: Río Tizate, 7.2 km NE Cañas Dulces, 10°46’23”N, 085°26’56”W, el. 275 m, 28.vi.1986, Holzenthal, Heyn, Armitage — 1 male; **Limón**: Reserva Biológica Hitoy-Cerere, Río Cerere, Est. Miramar, 09°40’16”N, 083°01’41”W, el. 90 m, 23-24.iii.1987, Holzenthal, Hamilton, Heyn —2 males, 1 female; **Puntarenas**: Río Ceibo, route 2 ca. 6 km W rd to Buenos Aires, 09°08’56”N, 083°22’37”W, el. 250 m, 20.ii.1986, Holzenthal, Morse, Fasth — 103 males (in alcohol); Río Rincón, 6.5 km (air) S Rincón, 08°38’17”N, 083°28’48”W, el. 20 m, 7.iv.1987,

Holzenthal, Hamilton, Heyn — 8 males (in alcohol); Río Singrí, ca 2 km (air) S Finca Helechales, 09°03'25"N, 083°04'55"W, el. 720 m, 21.ii.1986, Holzenthal, Morse, Fasth — 9 males (in alcohol), 2 males (in alcohol) (INBIO); Reserva Biológica Carara, Quebrada Bonita, 09°46'30"N, 084°36'18"W, el. 35 m, 18-20.v.1990, Holzenthal & Blahnik — 2 males (in alcohol); **San José**: Reserva Biológica Carara, Río del Sur, 1.5 km (rd) S Carara, 09°46'08"N, 084°31'52"W, el. 160 m, 13.iii.1991, Holzenthal, Muñoz, Huisman — 1 male (in alcohol); Reserva Biológica Carara, Río Carara in Carara, 09°46'41"N, 084°31'52"W, el. 200 m, 14.iii.1991, Holzenthal, Muñoz, Huisman — 1 male (NMNH).

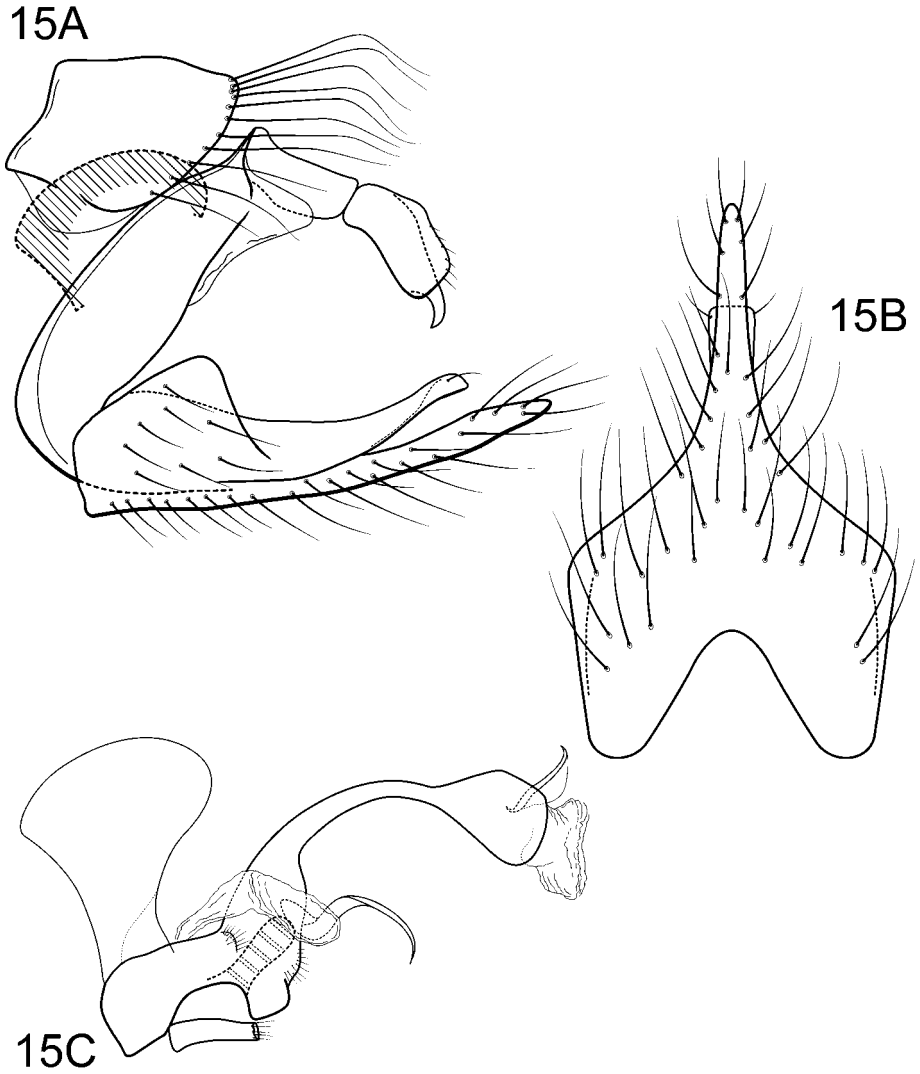

FIGURE 15. *Protoptila spirifera*, Flint. Male genitalia: A—lateral; B—segment VIII, ventral; C—phallic complex, lateral (inset: apex of phallicata, dorsal).

***Protoptila spirifera* Flint**
Fig. 15

Flint 1974: 14.

The species was named for the spiral paramere spines and seems to be a member of the *condylifera* complex of Flint (1991). As in those species the phallicata has a relatively long, narrow, arched "neck" and inflated apex and the ventral apex of segment VIII is long and narrow and not at all bifid apically. It differs from its relatives in the shape of the apical section of tergum X, which has hook-like apicomesal processes.

Material examined.**COSTA RICA: Cartago:** Ojo de Agua, rt. 2, km 75, 30.vi.1967, Flint & Ortiz — male paratype (NMNH).

***Protoptila strepsicera*, new species**
Fig. 16

This species is most similar to *P. tojana*, especially in the structure and development of the apical sections of tergum X and the shape and development the ventral apex of sternum IX. However, the species differ greatly in the processes emanating from the posterodorsal margin of sternum VIII. In *P. tojana* they are very narrow and sometimes down-curved apically (straight in the specimen illustrated by Flint, 1974), whereas in *P. strepsicera* they are very prominent, enlarged basally and tapering apically. In *P. strepsicera* these structures are also somewhat spirally curved, almost as in the horns of some antelopes, making the species very easy to identify.

Adult. Length of forewing: male 2.7–3.1. Color brown (in alcohol), wing markings indistinct.

Male genitalia. Sternum VI process prominent, slightly curved, subtriangular, apex subacute. Tergum VIII posterior margin with row of elongate setae; sternum VIII produced ventrally, not bifurcate apically, broadly rounded, sclerotized and setose basally, membranous apically, apparently fused to sternum IX apicoventrally; dorsolateral margin of sternum VIII basally with very long, prominent, sinuous, apically acute process. Segment IX with anterior margin broadly rounded; sternum IX medially produced, in lateral view forming short, acute, strongly upturned process, weakly bifid mesally when viewed ventrally; posterolateral margin of segment IX without processes. Preanal appendages absent. Tergum X divided mesally to form sclerotized lateral parts with basal and apical sections; basal section subquadrate, about as long as wide, apical section short, divided apically to form acuminate dorsal projection and more elongate, sinuously upturned, apically acuminate ventral projection. Phallobase dorsally with large, semicircular, laterally compressed apodeme; ventrally with short, rod-like, articulated appendages with apical setae, appendages fitting into sclerotized pockets on ventral

margin of phallobase; posteroventral margin of phallobase with short, paired, upturned, apically acute basal processes and also dorsolateral processes; dorsolateral processes short, apically truncate; paramere absent; phallicata very short, ventrally curved, with pair of short apicoventral spine-like processes; endophallus membranous, enlarged when everted; phallotremal sclerite spine-like, sclerotized apically, somewhat divided basally.

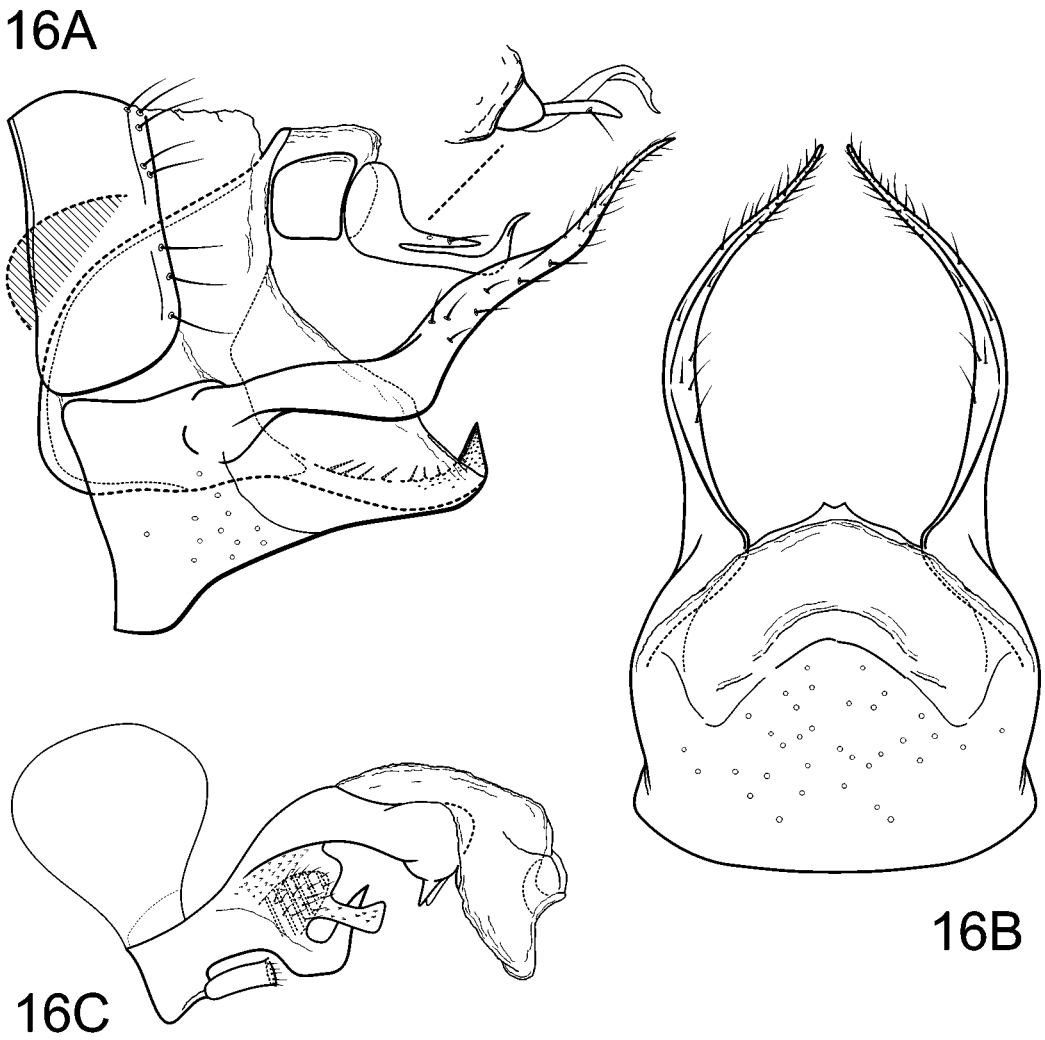

FIGURE 16. *Protoptila strepsicera*, new species. Male genitalia: A—lateral (inset: segment X, dorsal); B—segment VIII, ventral; C—phallic complex, lateral.

Holotype male: **COSTA RICA**: **Limón**: Reserva Biológica Hitoy-Cerere, Río Cerere, Est. Miramar, 09°40’16”N, 083°01’41”W, el. 90 m, 23-24.iii.1987, Holzenthal, Hamilton, Heyn (UMSP000208540) (UMSP).

Paratypes: Same data as holotype — 6 males (UMSP), 2 males (NMNH), 1 male (INBIO); **COSTA RICA**: **Limón**: Río Uatsi, ca. 8 km (air) W Bribri, 09°37’12”N, 082°54’00”W, el. 60 m, 25.iii.1987, Holzenthal, Hamilton, Heyn — 1 male (UMSP).

Etymology. The name *strepsicera* comes from Latin for "twisted horn," and refers to the processes from the lateral margin of sternum VIII of this species.

***Protoptila talamanca* Flint**
Fig. 17

Flint 1974: 14.

This is another distinctive species, unlikely to be confused with any other. Its most unusual character is the development of the ventral margin of segment IX, which possesses a pair of rod-like, apically acute processes, each of which is branched preapically to form a secondary tine-like process. Another distinctive character is the shape and structure of the phallicata, which has its apical half enlarged. The dorsal margin of this apex has two apically diverging lateral ridges, separated by a concave depression.

Material examined. **COSTA RICA**: **Alajuela**: Reserva Forestal San Ramón, Río San Lorencito & tribs., 10°12'58"N, 084°36'25"W, el. 980 m, 30.iii-1.iv.1987, Holzenthal, Hamilton, Heyn — 7 males (in alcohol) (UMSP), 2 males (in alcohol) (NMNH), 2 males (in alcohol) (INBIO); same, except 6-10.iii.1991, Holzenthal, Muñoz, Huisman — 9 males, 4 females (in alcohol); **Cartago**: Reserva Tapantí, waterfall, ca. 1 km (road) NW tunnel, 09°41'24"N, 083°45'36"W, el. 1600 m, 24.iii.1991, Holzenthal, Muñoz, Huisman — 1 male, 3 females (in alcohol); Río Reventazón, CATIE along Sendero Espaveles, 09°53'35"N, 083°39'04"W, el. 500 m, 22.iii.1991, Muñoz-Quesada — 1 male (in alcohol).

***Protoptila tica* Bueno-Soria**
Fig. 18

Bueno-Soria 1984: 392.

The species has no obvious relationship to any other described species. It is easily diagnosed by the absence of parameres and the unique structure of sternum VIII, which forms broad, widely separated apical lobes, each with a fringe of thickened apical setae and a distinct apicodorsal spine-like process.

Material examined. **COSTA RICA**: **Puntarenas**: Parque Nacional Corcovado, Río Camaronal, 08°28'55"N, 083°35'20"W, el. 30 m, 13.iv.1989, Holzenthal & Blahnik — 1 male (in alcohol); same, except 08°28'52"N, 083°35'38"W, el. 5 m, 12-13.iv.1989, Holzenthal & Blahnik — 4 males (in alcohol).

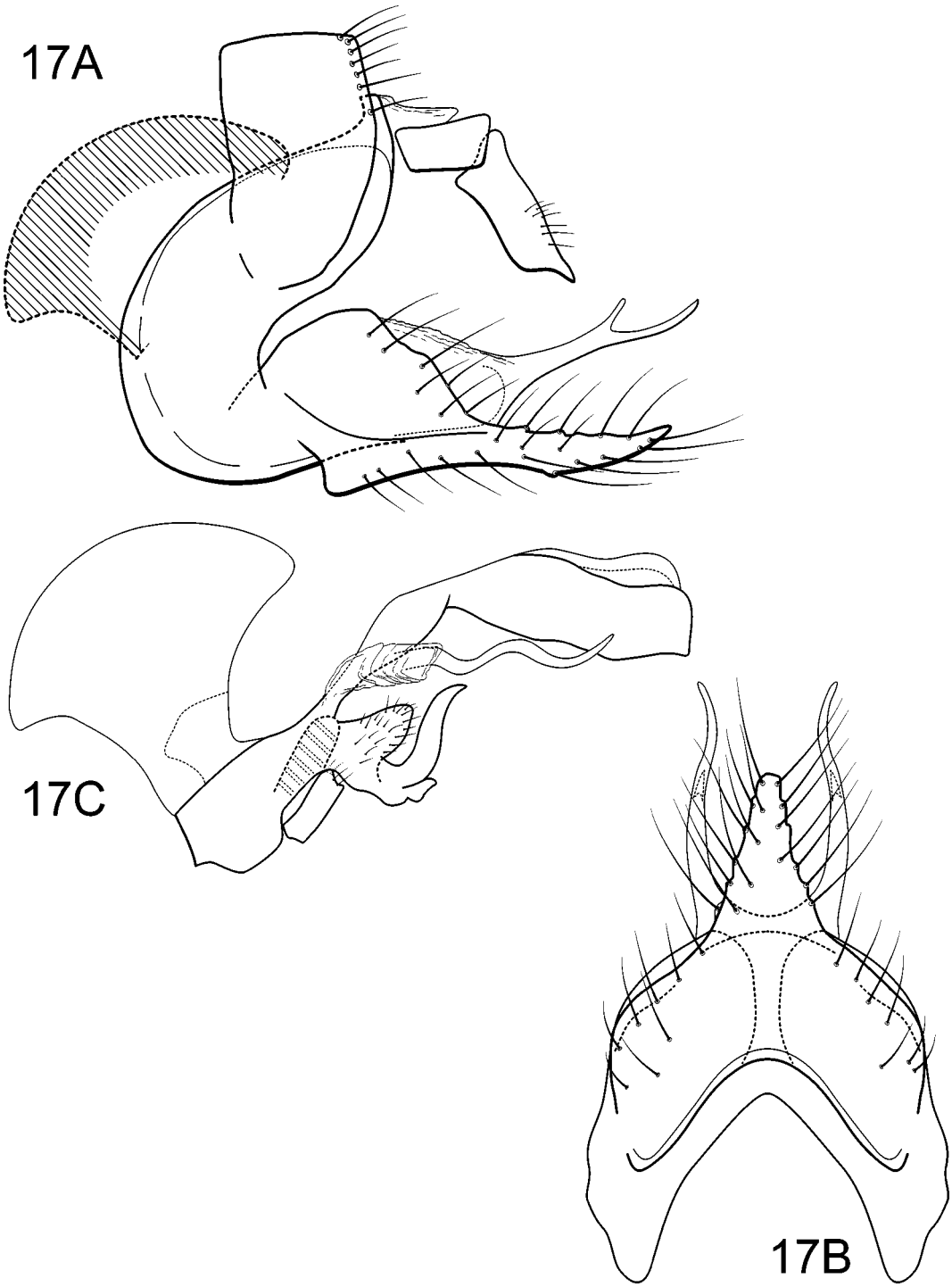

FIGURE 17. *Protoptila talamanca*, Flint. Male genitalia: A—lateral; B—segments VIII and IX, ventral; C—phallic complex, lateral.

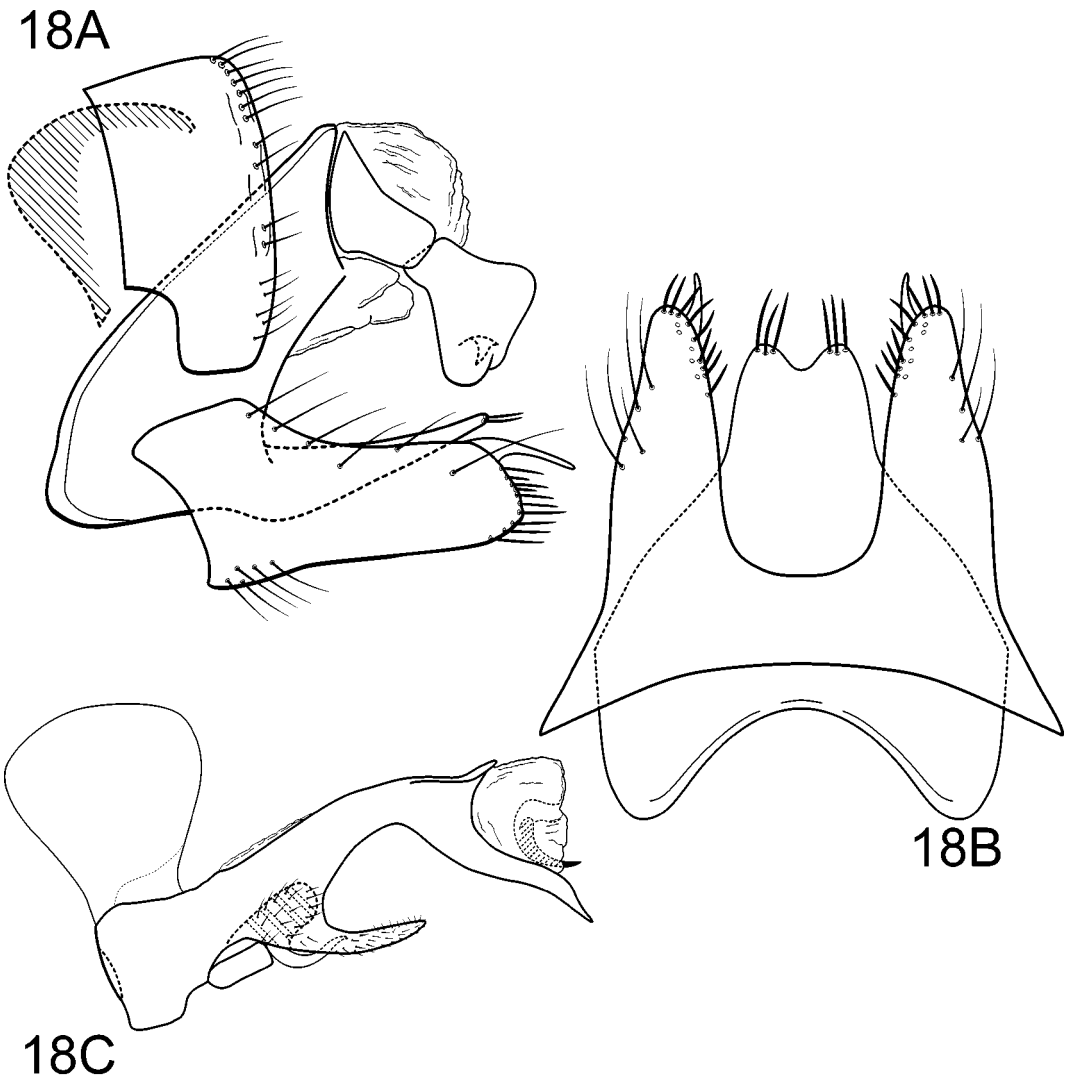

FIGURE 18. *Protoptila tica*, Bueno-Soria. Male genitalia: A—lateral; B—segments VIII and IX, ventral; C—phallic complex, lateral.

***Protoptila tojana* Mosely**
Fig. 19

Mosely 1954: 331.

This species is most similar to *P. strepsicera* and the two are undoubtedly closely related. Both species differ greatly in the processes emanating from the posterodorsal margin of sternum VIII. In *P. tojana* they are very narrow, whereas in *P. strepsicera* they are very prominent and shaped like the horns of an antelope.

Material examined. **COSTA RICA**: Alajuela: Río La Paz Pequeña, route 9, 7.8 km N Vara Blanca, 10°12’40”N, 084°09’58”W, el. 1230 m, 13.ii.1986, Holzenthal, Morse, Fasth — 1 male; **COSTA RICA**: **Alajuela**: Río La Paz Pequeña, route 9, 7.8 km N Vara Blanca, 10°12’40”N, 084°09’58”W, el. 1230 m, 13.ii.1986, Holzenthal, Morse, Fasth — 1 male; **Cartago**: Río Chitaría, rt 10, 10 km NW Río Reventazón, 09°55’12”N, 083°36’14”W, el. 740 m, 21.iii.1991, Holzenthal, Muñoz, Huisman — 2 males (in alcohol); **Guanacaste**: Río Tempisquito, ca. 3 km S Route 1, 10°47’24”N, 085°33’07”W, el. 75 m, 6.iii.1986, Holzenthal & Fasth — 3 males (in alcohol) (INBIO); Río Tizate, 7.2 km NE Cañas Dulces, 10°46’23”N, 085°26’56”W, el. 275 m, 28.vi.1986, Holzenthal, Heyn, Armitage — 1 male; Parque Nacional Santa Rosa, Río Poza Salada, 10°47’56”N, 085°39’07”W, el. 10 m, 24.vii.1987, Holzenthal, Morse, Clausen — 7 males, 15 females; **Limón**: Río Barbilla, ca. 8 km W B-Line, 10°04’01”N, 083°22’08”W, el. 30 m, 31.i.1986, Holzenthal, Morse, Fasth — 1 male, 5 females; **Puntarenas**: Quebrada Pita, ca. 3 km (air) W Golfito, 08°38’31”N, 083°11’35”W, el. 15 m, 15.ii.1986, Holzenthal, Morse, Fasth — 49 males (in alcohol); Río Bellavista, ca. 1.5 km NW Las Alturas, 08°57’04”N, 082°50’46”W, el. 1400 m, 18.ii.1986, Holzenthal, Morse, Fasth — 2 males, 13 females (in alcohol); Río Ceibo, route 2 ca. 6 km W rd to Buenos Aires, 09°08’56”N, 083°22’37”W, el. 250 m, 20.ii.1986, Holzenthal, Morse, Fasth — 4 males (in alcohol) (INBIO); Reserva Biológica Carara, Río Carara, 4.3 km (rd) E Cost. Sur, 09°48’36”N, 084°34’19”W, el. 20 m, 12.iii.1991, Holzenthal, Muñoz, Huisman — 138 males (in alcohol), 355 females (in alcohol), 3 males (pinned), 11 females (pinned); Reserva Biológica Carara, Quebrada Bonita, 09°46’30”N, 084°36’18”W, el. 35 m, 18-20.v.1990, Holzenthal & Blahnik — 89 males (in alcohol), 11 males (pinned), 53 females (pinned); same, except 11.iii.1991, Holzenthal, Muñoz, Huisman — 245 males (in alcohol), 1 male (pinned), 11 females (pinned); Río Rincón, 6.5 km (air) S Rincón, 08°38’17”N, 083°28’48”W, el. 20 m, 7.iv.1987, Holzenthal, Hamilton, Heyn — 2 males (in alcohol); Parque Nacional Corcovado, Río Claro, 1.5 km SE Est. Sirena, 08°28’19”N, 083°35’17”W, el. 15 m, 8.iv.1989, Holzenthal — 33 males, 29 females (in alcohol); Parque Nacional Corcovado, Rio Camaronal, 08°28’55”N, 083°35’20”W, el. 30 m, 13.iv.1989, Holzenthal & Blahnik — 66 males (in alcohol), 2 males (pinned), 2 females (pinned); same, except 08°28’52”N, 083°35’38”W, el. 5 m, 12-13.iv.1989, Holzenthal & Blahnik — 162 males (in alcohol); **San José**: Reserva Biológica Carara, Río del Sur, 1.5 km (rd) S Carara, 09°46’08”N, 084°31’52”W, el. 160 m, 13.iii.1991, Holzenthal, Muñoz, Huisman — 34 males (in alcohol); Reserva Biológica Carara, Río Carara in Carara, 09°46’41”N, 084°31’52”W, el. 200 m, 14.iii.1991, Holzenthal, Muñoz, Huisman — 91 males (in alcohol). **PANAMA**: **Panama**: Canal Zone, Barro Colorado Island, Snyder-Molino trail, marker 3, 22.vi.-6.ix.1988, Wolda — 2 males, 2 females (in alcohol); same, except 26.vi.-3.xii.1990, Wolda — 2 males, 1 females (in alcohol).

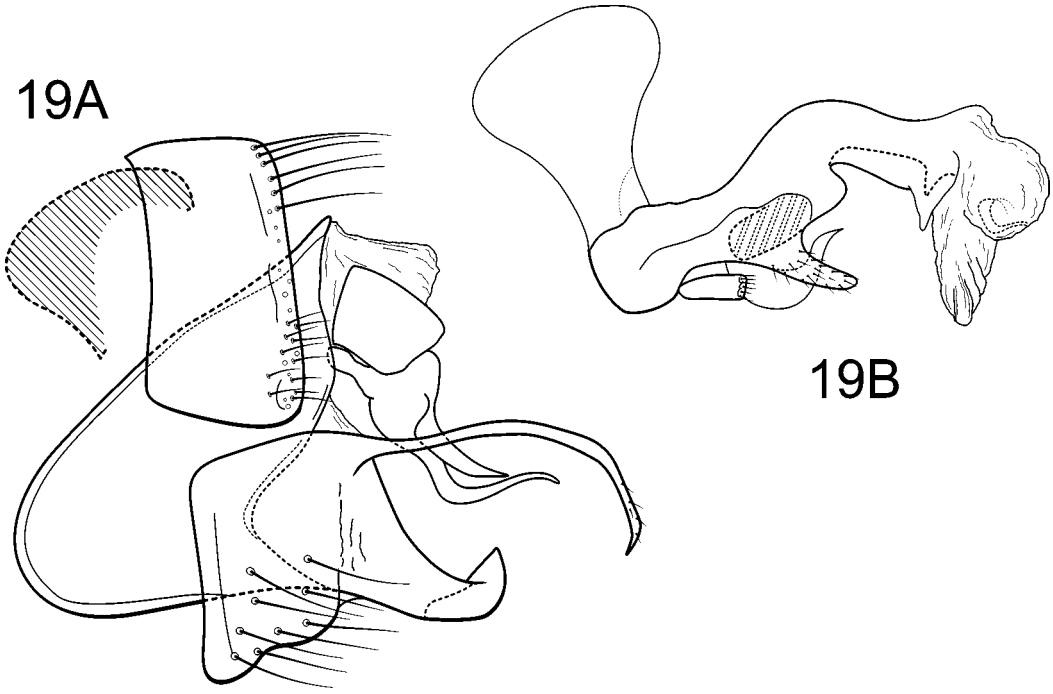

FIGURE 19. *Protoptila tojana*, Mosely. Male genitalia: A—lateral; B—phallic complex, lateral.

***Protoptila trichoglossa*, new species**
Fig. 20

This species is unique and easily diagnosed from all others by the structure of sternum VIII of the male, which is elongate and tapered apicoventrally and margined with enlarged, coarse setae. The posterodorsal margin of sternum VIII is also modified on either side into a short, digitate process terminating with enlarged setae.

Adult. Length of forewing: male 3.6–3.8 mm. Color dark brown, with distinct transverse bar of whitish setae along cord and a few whitish apical spots.

Male genitalia. Sternum VI process prominent, slightly curved, longer than wide, apex subacute. Tergum VIII posterior margin with row of very elongate setae with attenuate, curved apices; sternum VIII strongly produced ventrally, not bifurcate apically, strongly narrowed, attenuate, apex acute, dorsolateral and apical margins with thick dense setae; dorsolateral margin of sternum VIII basally with short digitate process, bearing several long thickened setae. Segment IX with anterior margin broadly rounded; sternum IX medially produced posteriorly, narrow, apically rounded, with pair of apical setae; posterolateral margin of segment IX without processes. Preanal appendages absent. Tergum X divided mesally to form sclerotized lateral parts with basal and apical sections; basal section subquadrate, longer than wide, apical section longer than basal section,

nearly uniform in width, apex narrowed and forming short, acute dorsomesal process. Phallobase dorsally with large, semicircular, laterally compressed apodeme; ventrally with short, rod-like, articulated appendages with apical setae, appendages fitting into sclerotized pockets on ventral margin of phallobase; posteroventral margin of phallobase with single, cupped, upturned, apically acute basal process, but without dorsolateral processes; paramere elongate, membranous, paramere spine short, sinuously curled, acute apically; phallicata elongate, narrow, strongly arched near middle, apex expanded and bulbous; endophallus reduced, not noticeably everted; phallotremal sclerite lightly sclerotized, an incomplete basal ring, with curved, apicomesal projection.

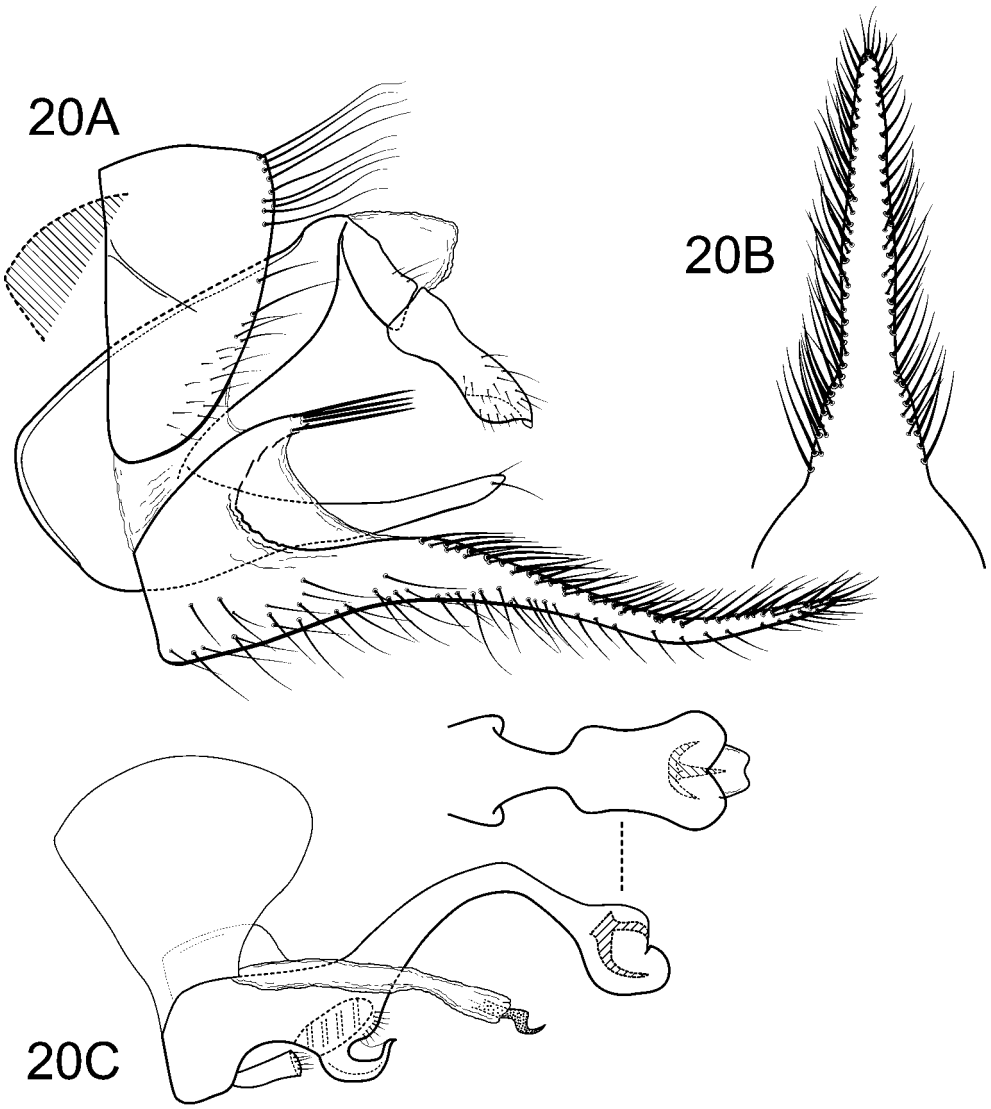

FIGURE 20. *Protoptila trichoglossa*, new species. Male genitalia: A—lateral; B—segment VIII apex, ventral; C—phallic complex, lateral (inset: apex of phallicata, dorsal).

Holotype male: **COSTA RICA**: **Puntarenas**: Río Bellavista, ca. 1.5 km NW Las Alturas, 08°57'04"N, 082°50'46"W, el. 1400 m, 18.ii.1986, Holzenthal, Morse, Fasth (UMSP000091739) (UMSP).

Paratypes: Same data as holotype — 1 male (in alcohol) (UMSP); **COSTA RICA**: **Puntarenas**: Zona Protectora Las Tablas, Río Cotón, Sitio Cotón, 08°56'28"N, 082°47'13"W, el. 1460 m, 15.iv.1989, Holzenthal & Blahnik — 1 male (in alcohol) (NMNH).

Etymology. The name *trichoglossa* comes from Greek roots for "hairy tongue" and refers to the elongate, tapered, setose sternum of segment VIII of this species.

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