

REVIEW OF THE NEOTROPICAL GENUS *BREDINIA* (TRICHOPTERA: HYDROPTILIDAE: STACTOBIINI)STEVEN C. HARRIS¹

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ABSTRACT

The Neotropical genus *Bredinia* is reviewed, with descriptions and figures provided for the 16 species presently known, including 13 new species: *B. guanacasteca* n.sp., *B. emarginata* n.sp., and *B. selva* n.sp. from Costa Rica; *B. davenporti* n.sp. and *B. pilcopata* n.sp. from Peru; *B. manabiensis* n.sp. and *B. spangleri* n.sp. from Ecuador; *B. alza* n.sp. from Paraguay; *B. mexicana* n.sp. from Mexico; *B. sucrensis* n.sp. and *B. zulia* n.sp. from Venezuela; *B. espinosa* n.sp. from Brazil, Ecuador, and Venezuela, and *B. venezuelensis* n.sp. from Venezuela, Peru, and Ecuador. New records and illustrations are provided for *B. costaricensis* (Flint), *B. dominicensis* Flint, and *B. appendiculata* Flint and Sykora. A key is provided to separate the males and the associated females.

KEY WORDS: Trichoptera, Hydroptilidae, Neotropics, *Bredinia*, new species, key, systematics

INTRODUCTION

This paper on the genus *Bredinia* represents an addition to a series initiated to describe the microcaddisflies of Costa Rica. However, to place the systematics of the group under review in context, we have expanded the scope of this study to encompass the entire Neotropical region. The genus *Bredinia* was previously thought to be small in terms of species and restricted in distribution (Flint et al., 1999a), but these ideas are revised with this paper. Herein we describe 13 new species from the Neotropical region and provide illustrations and redescriptions of the three species previously described, and a key to the species of males and known females.

The genus *Bredinia* was erected by Flint (1968) for *B. dominicensis*, which was originally collected near the mouth of the Hodges River in Dominica. A second species, *B. appendiculata* Flint and Sykora from Grenada, was added in 1993. More recently, a third species, *B. costaricensis* (Flint), was transferred from *Neotrichia* into *Bredinia* (Flint et al., 1999b). Material examined in this work comes largely from collections at the University of Minnesota and the National Museum of Natural History.

Bredinia is assigned to the tribe Stactobiini, which as currently defined contains ten genera, most of which occur in the Old World. In the New World Stactobiini, there are three genera presently known: *Stactobiella* Martynov in the Nearctic

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region, and *Bredinia* and *Flintiella* Angrisano in the Neotropics (Flint et al., 1999a). Two additional genera from the Neotropics are described and a key provided for the New World Stactobiini in Harris et al. (In Press).

Types of species described in this paper, as indicated by acronyms in the text, are deposited in the collections of the National Museum of Natural History, Smithsonian Institution, Washington (NMNH), University of Minnesota Insect Collection, St. Paul (UMSP), Cornell University, Ithaca (CU), Universidad Nacional Autonoma de Mexico, Mexico City (UNAM), Florida State Collection of Arthropods, Gainesville (FSCA), Academy of Natural Sciences, Philadelphia (ANSP), Carnegie Museum of Natural History, Pittsburgh (CMNH), and Instituto Nacional de Biodiversidad, Heredia, Costa Rica (INBIO). Terminology follows that of Marshall (1979). Length is measured from the tip of the head to the end of the wings and is given as a range within a series of specimens.

SYSTEMATIC ENTOMOLOGY

Bredinia Flint (Fig. 1)

Bredinia Flint, 1968:50. Type species. *Bredinia dominicensis* Flint, 1968, original designation.

Diagnosis.—Adults of *Bredinia* are minute (1–2 mm in length), and typically gray in color, with silvery bands of hairs on the forewings. There are 3 ocelli on the head (Fig. 1A) with simple antenna having 17–19 segments. The mesoscutellum is divided by a transverse suture; the metascutellum is narrow and rectangular, and nearly as wide as scutum. Legs have a tibial spur formula of 0, 2, 4 (Fig. 1B). Wings are narrow, with reduced venation (Fig. 1C). The tibial spur formula and the presence of ocelli serve to separate *Bredinia* from other New World genera. Unique to males in this genus is the presence of an elongate, thickened seta from the posterior of the inferior appendages and elongate apodemes from the anterior of abdominal segment IX. Females of most of the Neotropical stactobiines are unknown, so it is premature at this point to speculate on distinguishing characters. Larvae have been described by Angrisano (In Press), but as with female stactobiines, too few species are known in the larval stage to permit diagnoses.

Male.—Abdominal segment VII annular, without a ventromesal process. Segment VIII annular and complete dorsally, often with anterolateral margins developed as thin apodemes. Segment IX usually reduced ventrally with anterolateral margins developed as apodemes which vary in length. Inferior appendages each with heavy, elongate seta originating on posteroventral margin. Subgenital plate shelflike. Phallus tubular with apex distinctive for the species.

Female.—Abdominal segment VII annular. Segment VIII rectangular, ring of setae on posterior margin, pair of mesal and lateral apodemes. Segment IX narrow and rectangular, pair of lateral apodemes connecting anteriorly with apodemes of VIII. Segment X short and conical, bearing pair of apical papillae. Bursa copulatrix round, rectangular or triangular in ventral aspect, with or without posterior extensions; anteriorly with pair of elongate lateral processes attached to and paralleling narrow mesal process.

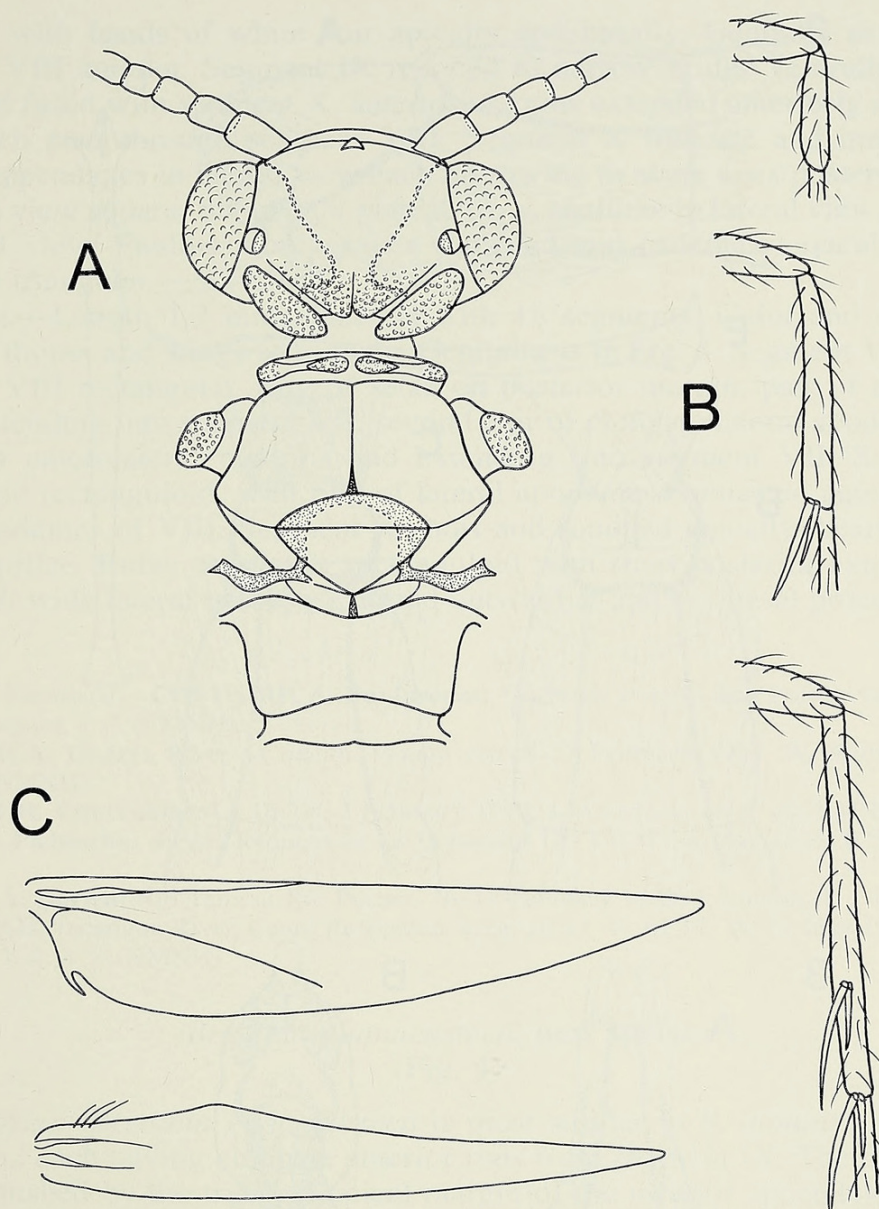


Fig. 1.—*Bredinia costaricensis* (Flint), adult: A. Head and thorax, dorsal. B. Fore, mid and hindleg. C. Fore and hindwing.

Bredinia dominicensis Flint
(Figs. 2, 3)

Bredinia dominicensis Flint, 1968:51.

Diagnosis.—*Bredinia dominicensis*, along with *B. selva* n. sp., and *B. guana-
casteca* n. sp., is recognized by the elongate rods extending from the margins of
segment IX. *Bredinia dominicensis* is most similar to *B. selva*, but is separated
by the acute ventral margin of the inferior appendages in lateral aspect, and the
structure of the phallus apex, which has contiguous inner processes. We have
records of *B. dominicensis* from Costa Rica, Dominica, Ecuador, Panama, and
Trinidad.

Male.—Length 1.5–1.6 mm. Antenna with 18 segments. Silvery gray in color,

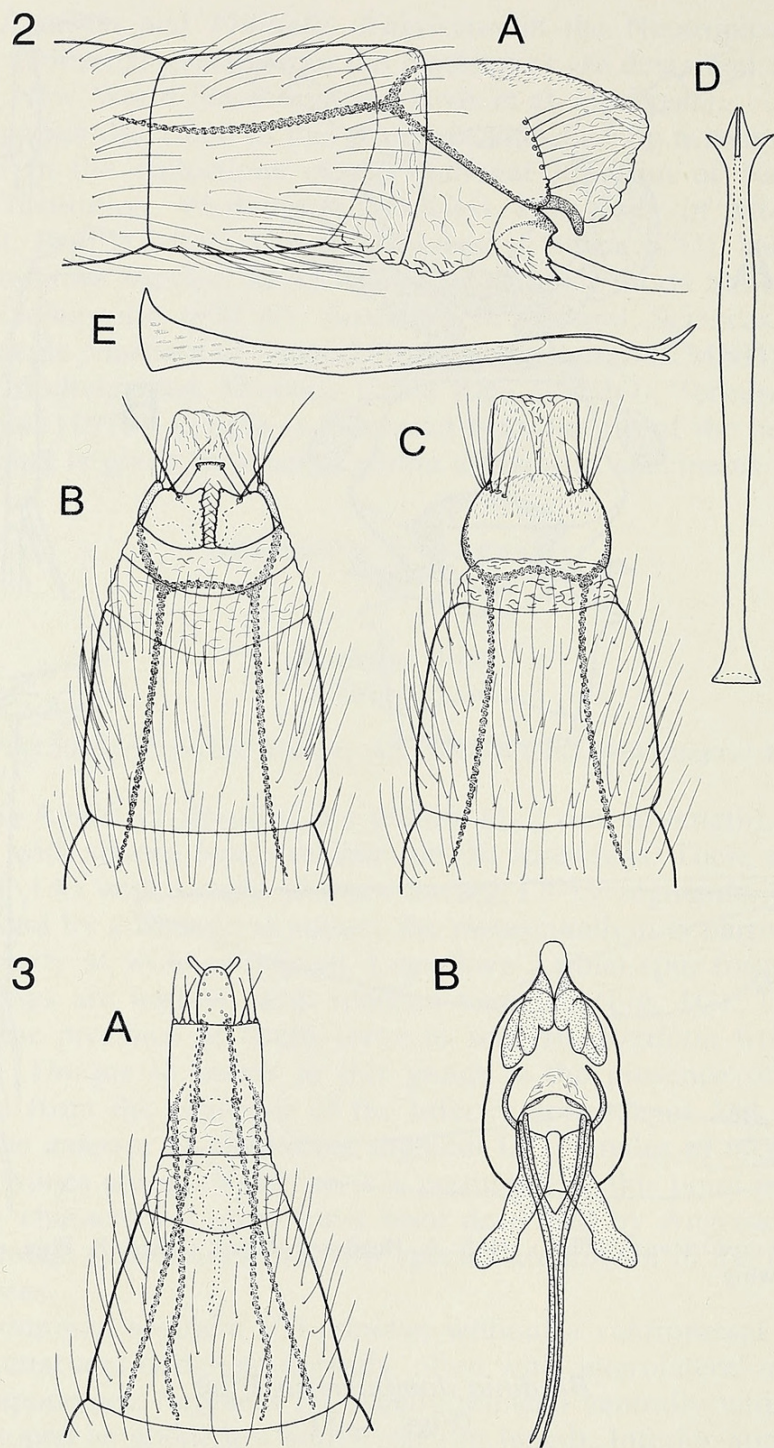


Fig. 2.—*Bredinia dominicensis* Flint, male genitalia, redrawn from paratype: A. Lateral. B. Ventral C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Fig. 3.—*Bredinia dominicensis* Flint, female genitalia. A. Terminal abdominal segments, ventral. B. Bursa copulatrix, ventral.

forewing with bands of white hair apically and basally. Genitalia as in Fig. 2. Segment VIII annular. Segment IX reduced to narrow bridge ventrally; dorsally round and fused with segment X, anterior margins extended anteriorly as elongate rods which pass through segment VIII. Segment X truncate and membranous. Inferior appendages in lateral view each narrowing to acute apex posteroventrally; in ventral view square. Subgenital plate narrow, shelflike in lateral view; triangular in ventral view. Phallus tubular, apex flattened and tridentate, ejaculatory duct short and triangular.

Female.—Length 1.7 mm. Antenna with 18 segments. Color and features of the head, thorax and wings as in male. Genitalia as in Fig. 3. Segment VII annular. Segment VIII rectangular, ring of setae on posterior margin, pair of mesal apodemes extending into segment VII, second pair of elongate lateral apodemes originating at anterolateral margins and extending into segment VII. Segment IX narrow and rectanguloid, with pair of lateral apodemes connected anteriorly with mesal apodemes of VIII. Segment X short and rounded apically, bearing pair of apical papillae. Bursa copulatrix rectanguloid with short posterior extension; anterior with wide lateral processes turned outward at apices, mesal process divided apically.

Material Examined.—**COSTA RICA. Puntarenas**: Quebrada Potrero near Potrero Grande, 5 July 1992, T. Shepard, 1 ♂ (CMNH).

DOMINICA. Hodges River, at mouth, swamp forest, 27 February 1965, W. Wirth, 2 ♂, 2 ♀ paratypes (NMNH).

ECUADOR. Esmeraldas: La Union, 3 February 1979, J. Anderson, 16 ♂ (4♂NMNH, 4♂UMSP, 4♂CMNH). **Pichincha**: Santo Domingo de los Colorados (29 km W), 6 May 1975, P. Spangler, 1 ♂ (NMNH).

PANAMA. Darien: Río Tuira at Río Pucura, 16–17 February 1983, J. Louton, 1 ♂ (NMNH).

TRINIDAD. Tacarigua River, Caura Recreation Area, 10°43' N, 61°17' W, 22 June 1993, O. Flint, N. Adams, 1 ♂, 4 ♀ (NMNH).

Bredinia guanacasteca, new species (Fig. 4)

Diagnosis.—*Bredinia guanacasteca* is most similar to *B. dominicensis* and *B. selva* n.sp., each having elongate anterior rods from segment IX. The new species is distinguished by the truncate apical margin of the inferior appendages, seen in lateral aspect, and the structure of phallus apex, which terminates in a pair of elongate inner processes. *Bredinia guanacasteca* is known only from the type locality in Costa Rica.

Male.—Length 1.8 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 4. Segment VIII annular, venter emarginate posteriorly. Segment IX reduced to narrow bridge ventrally; dorsally round; anterior margins extended anteriorly as elongate rods passing through segment VIII. Segment X elongate, shelflike in lateral view; dorsum rectangular, slightly emarginate on posterior margin. Inferior appendages nearly square in lateral view, sinuate on posterior margin; square in ventral view, diverging on mesal margin. Subgenital plate narrow, shelflike. Phallus tubular, apex with pair of narrow, elongate inner processes, lateral processes short and contiguous, ejaculatory duct short and wishbone-shaped.

Female.—Unknown.

Type Material.—Holotype ♂. **COSTA RICA. Guanacaste**: Río Tempisque, ca 3 km S route 1, 10.790°N, 85.552°W, el. 75 m, 6 March 1986, Holzenthal and Fasth (NMNH).

Etymology.—Named for the Costa Rican province of Guanacaste.

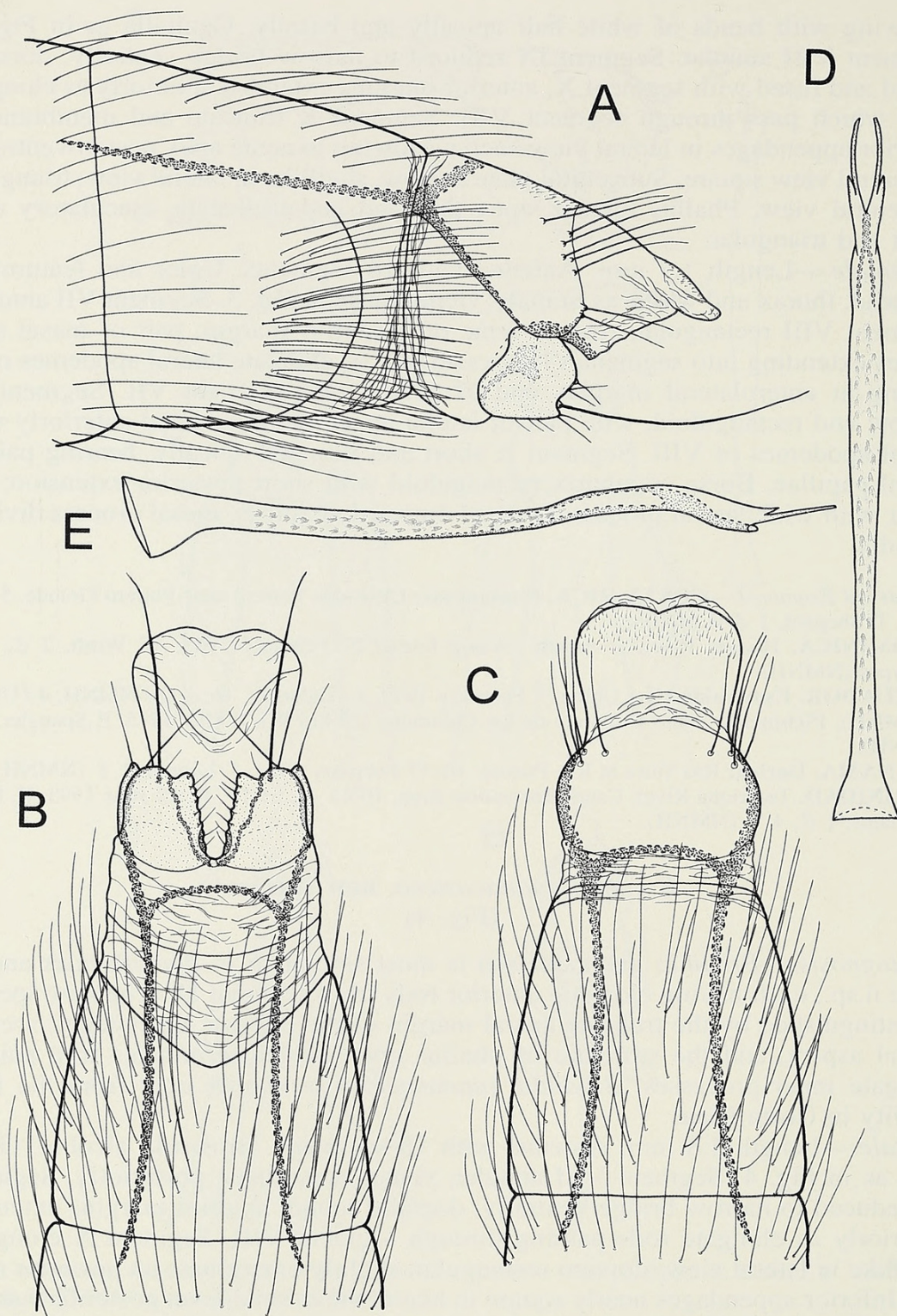


Fig. 4.—*Bredinia guanacasteca* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

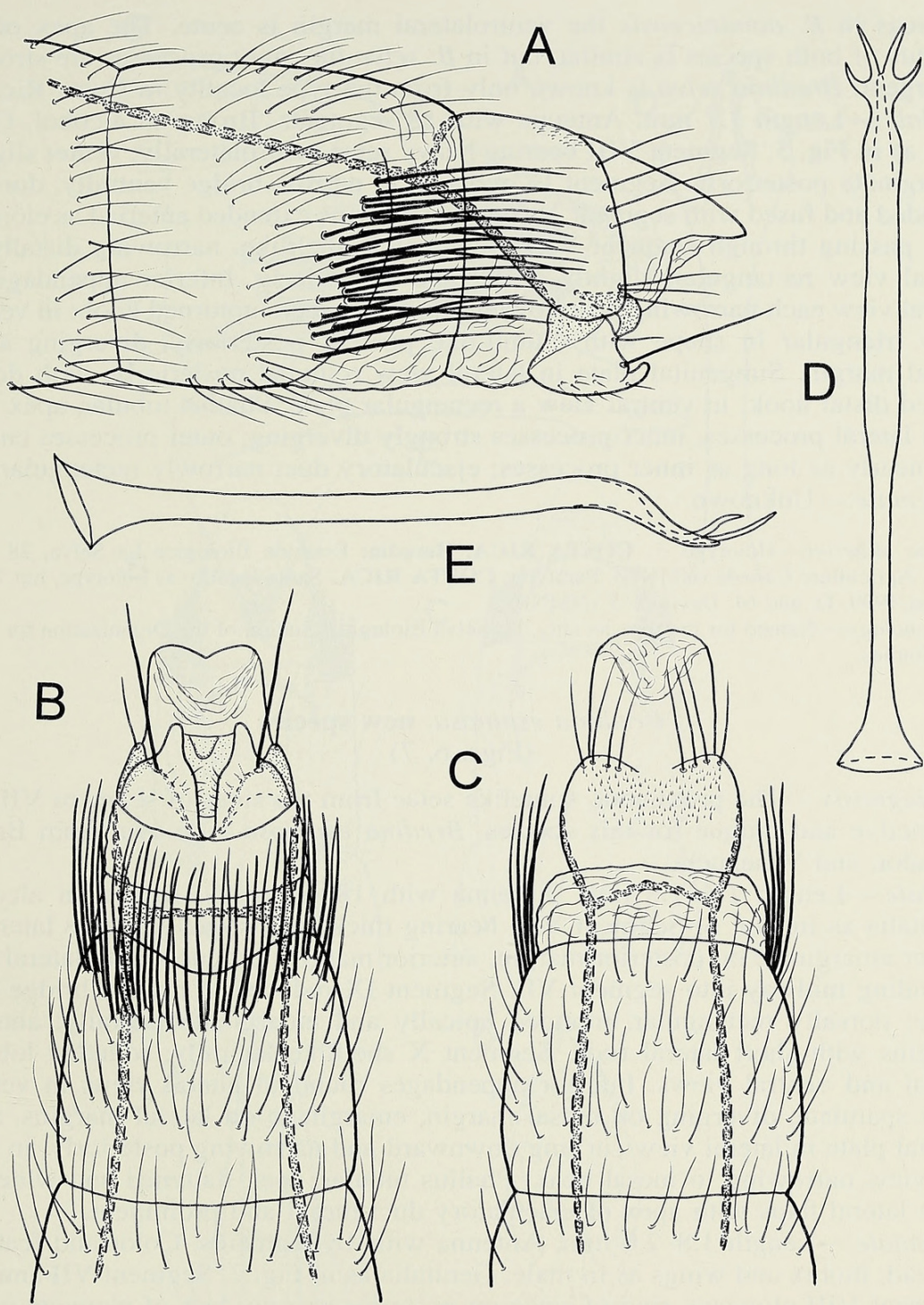


Fig. 5.—*Bredinia selva* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Bredinia selva, new species
(Fig. 5)

Diagnosis.—*Bredinia selva* is separated from the similar *B. dominicensis* by the shape of the inferior appendages and phallus apex. The inferior appendage of *B. selva* ends in a rounded upturned projection from the ventrololateral margin,

whereas in *B. dominicensis* the ventrolateral margin is acute. The apex of the phallus of both species is similar, but in *B. selva* the inner processes are strongly divergent. *Bredinia selva* is known only from the type locality in Costa Rica.

Male.—Length 1.7 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 5. Segment VIII bearing heavy setae ventrolaterally; venter slightly emarginate posteriorly. Segment IX reduced to narrow bridge ventrally, dorsally rounded and fused with segment X; anterior margins extended anteriorly as elongate rods passing through segment VIII. Segment X shelflike, narrowing distally; in dorsal view rectangular, slightly emarginate posteriorly. Inferior appendages in lateral view each narrowing posteroventrally to rounded, upturned knob; in ventral view triangular in shape with thumb-like process posteriorly, diverging along mesal margin. Subgenital plate in lateral view rounded posteriorly, with downturned distal hook; in ventral view a rectangular plate. Phallus tubular, apex with bifid lateral processes, inner processes strongly diverging, outer processes curved and nearly as long as inner processes; ejaculatory duct narrowly rectangular.

Female.—Unknown.

Type Material.—Holotype ♂. **COSTA RICA. Heredia:** Estación Biológica La Selva, 28 April 1989, Agriculture Canada (NMNH). Paratype: **COSTA RICA.** Same locality as holotype, but 21–24 August 1999, D. and M. Davis, 1 ♂ (NMNH).

Etymology.—Named for the type locality, La Selva Biological Station of the Organization for Tropical Studies.

Bredinia espinosa, **new species**
(Figs. 6, 7)

Diagnosis.—The prominent, spinelike setae from the sides of segment VIII are distinctive and unique for this species. *Bredinia espinosa* is known from Brazil, Ecuador, and Venezuela.

Male.—Length 1.4–1.8 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 6. Segment VIII bearing thickened, spinelike setae laterally; venter emarginate on posterior margin, anterior margins produced into lateral rods extending midway into segment VII. Segment IX reduced to narrow bridge ventrally; dorsally rectangular, rounded apically and emarginate laterally; anterior margins with short lateral rods. Segment X shelflike laterally; rounded lobe in dorsal and ventral views. Inferior appendages round in lateral view; in ventral view spatulate, diverging on mesal margin, emarginate on lateral margins. Subgenital plate in lateral view curving downward and narrowing posteriorly; in ventral view narrowing to mesal beak. Phallus tubular, apex flattened and widened, large lateral flaps with apex of ejaculatory duct mesal and prominent.

Female.—Length 1.8–2.0 mm. Antenna with 18 segments. Color and features of head, thorax and wings as in male. Genitalia as in Fig. 7. Segment VII annular. Segment VIII elongate, ring of setae on posterior margin, pair of elongate mesal apodemes extending through segment VII, second pair of elongate apodemes originating at anterolateral margins and extending into segment VII. Segment IX short, emarginate on posterior margin; pair of lateral apodemes which connect anteriorly with mesal apodemes of VIII. Segment X short and conical, bearing pair of apical papillae. Bursa copulatrix triangular, narrowing posteriorly, pair of sclerotized internal plates posteriorly; lateral anterior processes narrow, sinuate, and membranous apically, inner process originating as oval plate, tapering anteriorly.

Type Material.—Holotype ♂. **ECUADOR. Los Ríos:** Quevedo (56 km N), Río Palenque Biological

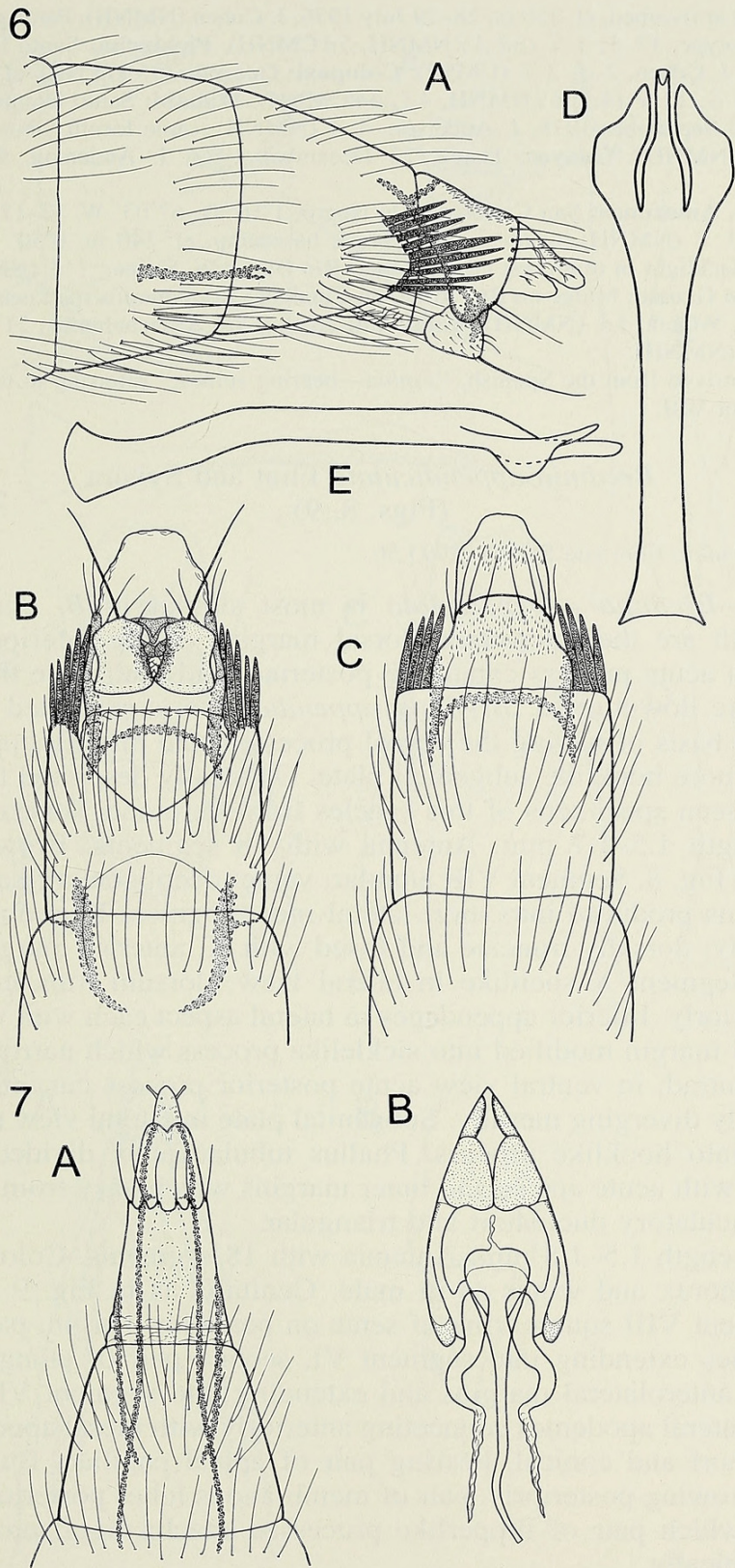


Fig. 6.—*Bredinia espinosa* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Fig. 7.—*Bredinia espinosa* new species, female genitalia: A. Terminal abdominal segments, ventral. B. Bursa copulatrix, ventral.

Station, blacklight at riverbed, el. 250 m, 28–29 July 1976, J. Cohen (NMNH). Paratypes: **ECUADOR**. Same data as holotype, 13 ♂, 1 ♀ (8♂, 1♀ NMNH, 5♂ CMNH). **Pichincha**: Santo Domingo, (47 km S), 29 July 1976, J. Cohen, 2 ♂, 2 ♀ (UMSP). **Cotopaxi**: Quevedo (36 km NE), el. 1100 m, 21 July 1976, J. Cohen, 8 ♂, 12 ♀ (4♂, 8♀ NMNH, 4♂, 4♀ CMNH). **Manabi**: Santo Domingo (29 km SW), Rancho Ronald, 6 September 1978, J. Anderson, 4 ♂ (NMNH), same locality, but 20 July 1978, J. Anderson, 1 ♀ (NMNH). **Guayas**: Daule, 23 December 1977, J. Anderson, 9 ♂ (5♂ NMNH, 4♂ UMSP).

VENEZUELA. Amazonas: San Carlos de Río Negro, 1°56' N, 67°03' W, 13–17 December 1984, R. Brown, 1 ♂, 1 ♀ (NMNH), Cerra de la Neblina, basecamp, el. 140 m, 0°50' N, 66°10' W, 10 February 1985, blacklight in rainforest clearing near Río Baria, W. Steiner, 1 ♂ (NMNH).

BRAZIL. Mato Grosso: bridge on Río Arica, on Cuiaba to Rondonopolis road near km 391 marker, 22 April 1981, D. Wojcik, 1♂ (NMNH). **Rondonia**: creek 8 km S Cacaulandia, 21 November 1991, D. Petr, 1 ♂, 1 ♀ (NMNH).

Etymology.—Derived from the Spanish, “*espin*a—bearing spines,” referring to the lateral setae of abdominal segment VIII.

Bredinia appendiculata Flint and Sykora
(Figs. 8, 9)

Bredinia appendiculata Flint and Sykora, 1993:56.

Diagnosis.—*Bredinia appendiculata* is most similar to *B. davenporti* n.sp. Unique to both are the sclerotized dorsal margins of the inferior appendages, which form an acute process extending posteriad, and both have the apex of the subgenital plate downturned. *Bredinia appendiculata* is separated from *B. davenporti* on the basis of having the dorsal process of the inferior appendage elongate, and the more hooklike subgenital plate. Originally described from Grenada, we have also seen specimens of this species from Peru and Venezuela.

Male.—Length 1.5–1.7 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 8. Segment VIII annular; venter deeply emarginate posteriorly, anterior margins produced into short lateral rods. Segment IX reduced to narrow bridge ventrally; dorsally truncate and fused with X; anterior margins with short lateral rods. Segment X shelflike in lateral view; dorsum truncate, with mesal incision posteriorly. Inferior appendages in lateral aspect each with ventral margin crenate, dorsal margin modified into sicklelike process which narrows posteriorly and curves ventrad; in ventral view acute posterior process curving mesad, posteriorly strongly diverging mesally. Subgenital plate in lateral view narrowed posteroventrally into hooklike process. Phallus tubular, apex divided into pair of narrow lobes, with acute apices and inner margins which vary from being crenate to spinose; ejaculatory duct short and triangular.

Female.—Length 1.5–1.8 mm. Antenna with 18 segments. Color and features of the head, thorax and wings as in male. Genitalia as in Fig. 9. Segment VII annular. Segment VIII square, ring of setae on posterior margin, pair of elongate mesal apodemes extending into segment VI, second pair of elongate apodemes originating at anterolateral margins and extending into segment VI. Segment IX short; pair of lateral apodemes connecting anteriorly with mesal apodemes of VIII. Segment X short and conical, bearing pair of apical papillae. Bursa copulatrix triangular, narrowing posteriorly, pair of membranous lobes posteriorly, oval plate anteriorly to which pair of flipperlike processes attach; mesal process elongate and divided apically.

Material Examined.—Holotype ♂, **GRENADA. Parish St. Andrews**: Balthazar Estate, 1 June 1990, J. Frank, A. Thomas (FSCA).

PERU. Madre de Dios: Manu, Pakitza, 12° 7'S, 70° 58'W, el. 250 m., trail 2, first stream, malaise trap, day collection, 14–23 September 1988, O. Flint, N. Adams, 6 ♂, 3 ♀ (4♂, 2♀ NMNH, 2♂,

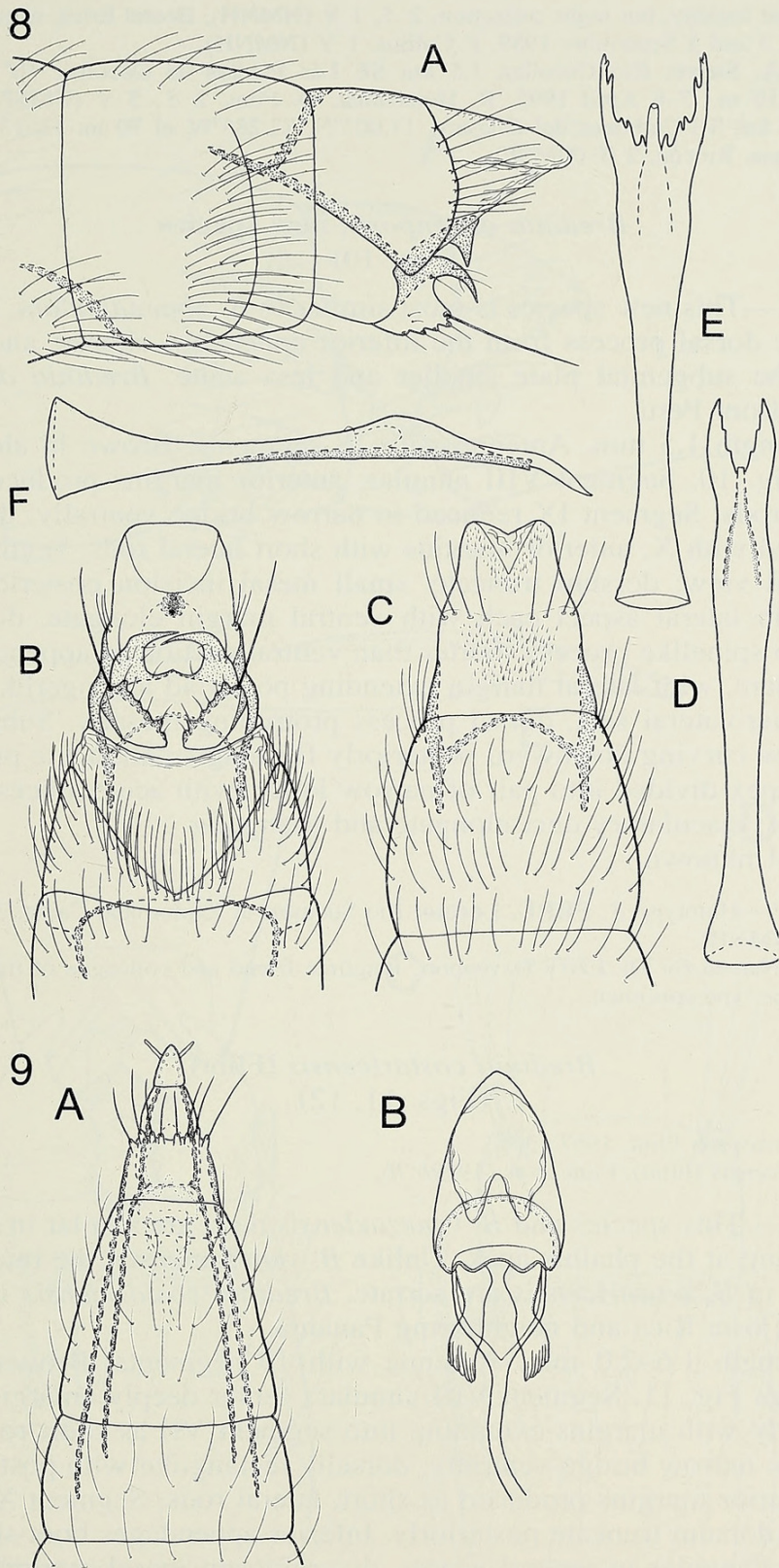


Fig. 8.—*Bredinia appendiculata* Flint and Sykora, male genitalia, redrawn from holotype: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, dorsal (specimen from Peru). F. Phallus, lateral.

Fig. 9.—*Bredinia appendiculata* Flint and Sykora, female genitalia: A. Terminal abdominal segments, ventral. B. Bursa copulatrix, ventral.

1 ♀ CMNH), same locality, but night collection, 2 ♂, 1 ♀ (NMNH), Hostel Erica, near Salvación, 12° 53'S, 71° 14'W, 3 and 5 September 1989, J. Collins, 1 ♀ (NMNH).

VENEZUELA. Sucre: Río Cocollar, 1.5 km SE Las Piedras de Cocollar, 10° 09.671'N, 63° 47.605'W, el. 810 m., 7–8 April 1995, R. Holzenthal, O. Flint, 2 ♂, 5 ♀ (UMSP). **Zulia:** Caño Carichuano, 3.4 km SE Carbones del Guasare, 11.002°N, 72.285°W, el 70 m, 12–13 January 1994, Holzenthal, Cressa, Rincón, 2 ♂ (UMSP).

Bredinia davenporti, new species

(Fig. 10)

Diagnosis.—This new species is most similar to *B. appendiculata*, but it differs in having the dorsal process from the inferior appendage shorter, and the ventral process of the subgenital plate smaller and less acute. *Bredinia davenporti* is known only from Peru.

Male.—Length 1.5 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 10. Segment VIII annular; anterior margins produced into very short lateral rods. Segment IX reduced to narrow bridge ventrally; dorsally truncate and fused with X; anterior margins with short lateral rods. Segment X shelflike in lateral view; dorsum truncate, small mesal incision posteriorly. Inferior appendages in lateral aspect each with ventral margin elongate, dorsal margin modified into spinelike process shorter than ventral portion of appendage; in ventral view square, with lateral margin extending posteriad as fingerlike lobes with elongate posterolateral seta, dorsal process protruding mesally. Subgenital plate in lateral view curving downward posteriorly forming small, acute process. Phallus tubular, apex divided into pair of narrow lobes, with acute apices and crenate outer margins; ejaculatory duct elongate and triangular.

Female.—Unknown.

Type Material.—Holotype ♂. **PERU. Loreto:** Río Sucusari at Explornapo Camp, 3 January 1997, L. Davenport (NMNH).

Etymology.—Named for Dr. Larry Davenport, longtime friend and colleague of the senior author, who collected the type specimen.

Bredinia costaricensis (Flint)

(Figs. 11, 12)

Neotrichia costaricensis Flint, 1967:13.

Bredinia costaricensis (Flint), Flint et al., 1999b:76.

Diagnosis.—This species and *B. venezuelensis* n.sp. are similar in having elaborate branching at the phallus apex. Unlike *B. venezuelensis*, the branches of the phallic apex in *B. costaricensis* are serrate. *Bredinia costaricensis* is commonly collected in Costa Rica and neighboring Panama.

Male.—Length 1.6–2.0 mm. Antenna with 19 segments. Brown in alcohol. Genitalia as in Fig. 11. Segment VIII annular; venter deeply emarginate posteriorly, anteriorly with margins extending into segment VII as short rods. Segment IX reduced to narrow bridge ventrally; dorsally rectangular with posterior margin rounded; anterior margins produced as short, lateral rods. Segment X shelflike in lateral view; dorsum truncate posteriorly. Inferior appendages boot-shaped in lateral view; rectangular in ventral aspect, diverging on mesal margin. Subgenital plate shelflike in lateral view; in ventral view rectangular with mesal hump. Phallus tubular, apex with multibranching lateral processes, anterior branches teethlike, posterior processes elongate and serrate.

Female.—Length 1.8 mm. Antenna with 18 segments. Color and features of

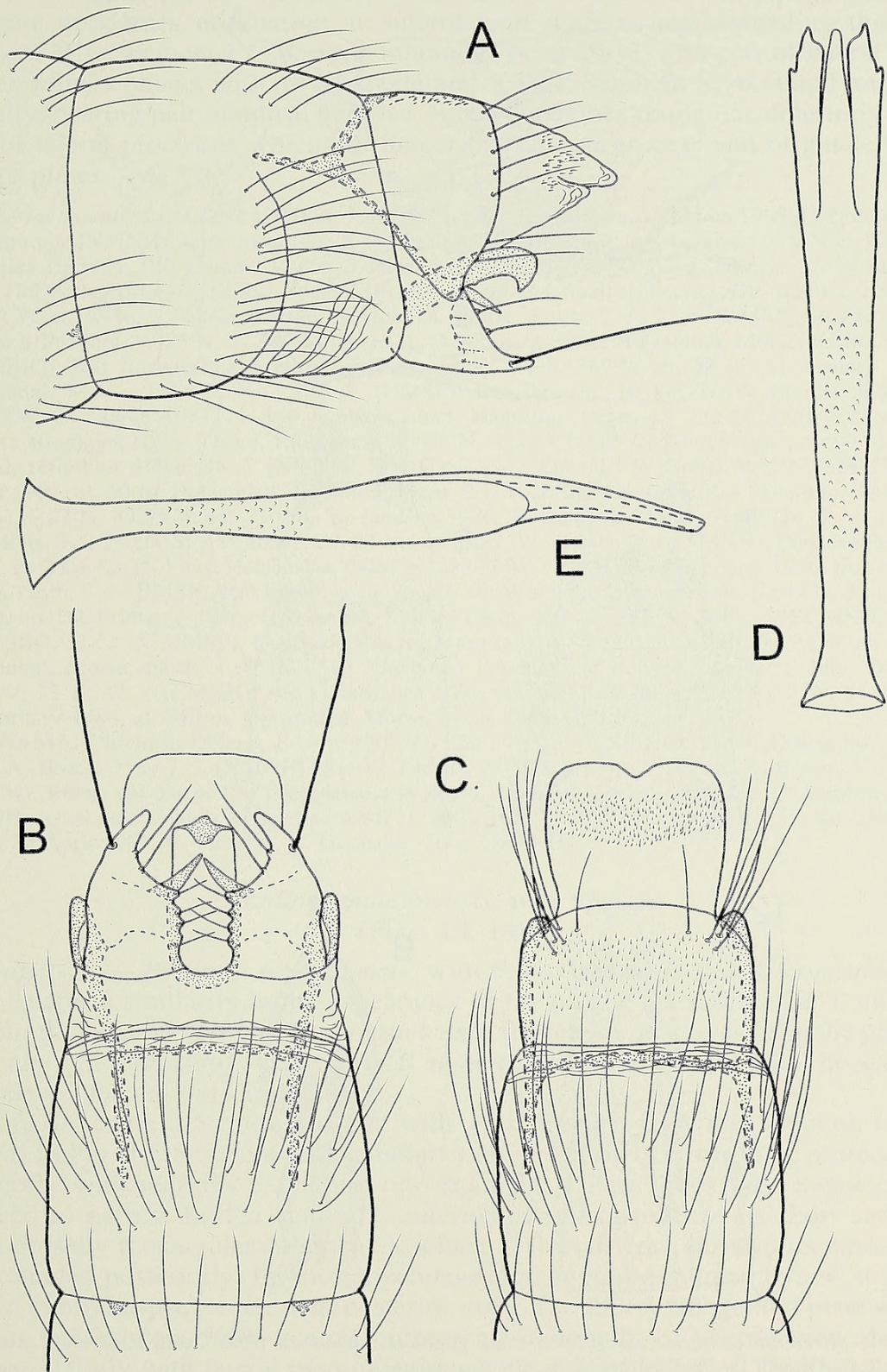


Fig. 10.—*Bredinia davenporti* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

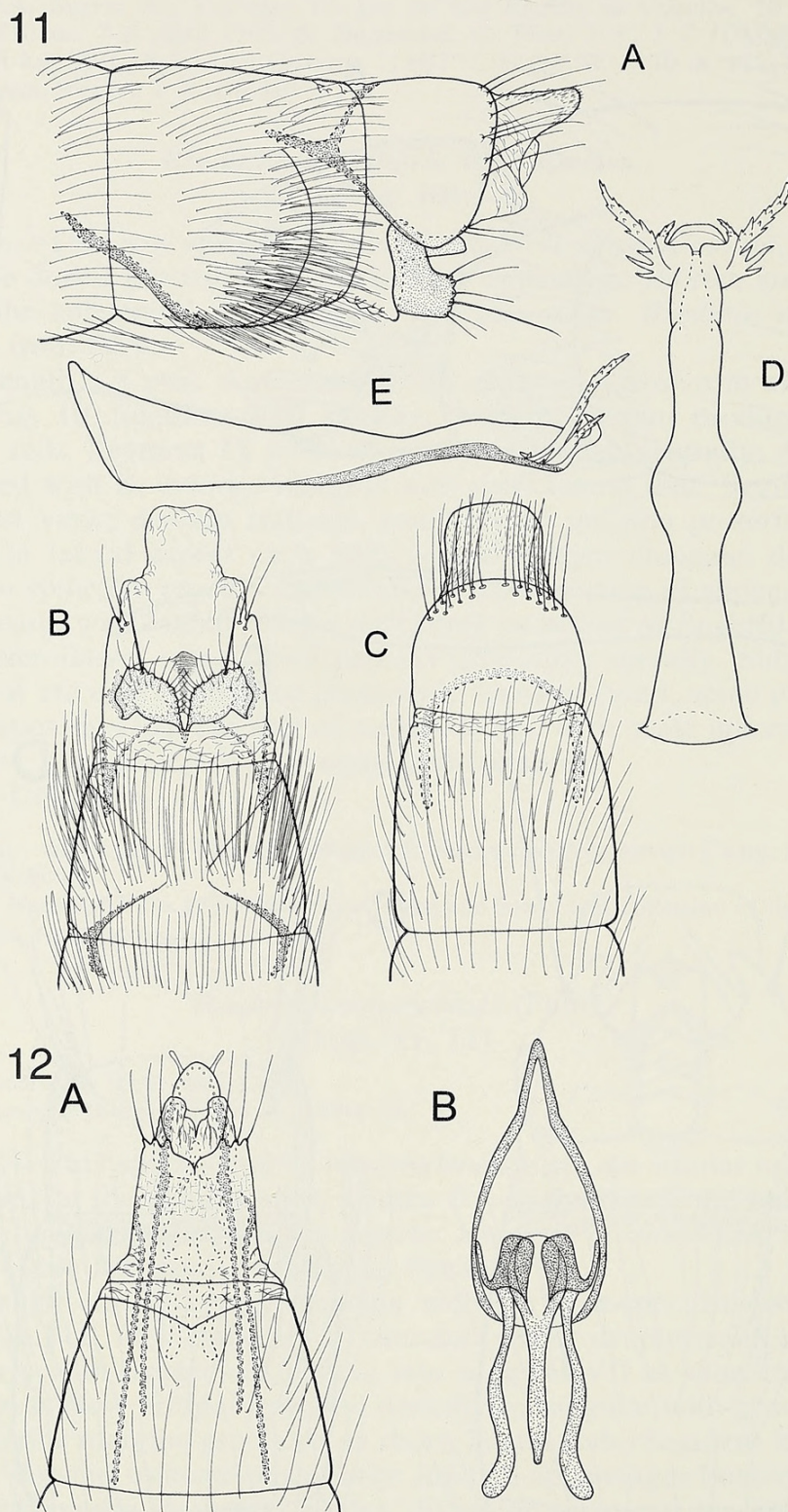


Fig. 11.—*Bredinia costaricensis* (Flint), male genitalia, specimen from Costa Rica: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Fig. 12.—*Bredinia costaricensis* (Flint), female genitalia: A. Terminal abdominal segments, ventral. B. Bursa copulatrix, ventral.

the head, thorax, and wings as in male. Genitalia as in Fig. 12. Segment VII annular. Segment VIII rectangular, ring of setae on emarginate posterior margin; pair of elongate mesal apodemes extending into segment VII, second pair of elongate apodemes originating at anterolateral margins and extending through segment VII. Segment IX short, membranous posteriorly, with pair of lateral apodemes which connect with mesal apodemes of VIII. Segment X short and rounded apically, bearing pair of apical papillae. Bursa copulatrix triangular, anteriorly with pair of lateral processes which are longer than mesal process and originate from square plates.

Material Examined.—**COSTA RICA. Limón:** La Lola near Matina, 11 March 1965, D. Duckworth, 1 ♂ paratype (NMNH), same locality, but 1 May 1957, R. Shenefelt, 1 ♂ paratype (NMNH), Reserva Biológica Barbilla, Río Dantas, 15 km S Pacuarito, 9.994°N, 83.443°W, el. 300 m, 27–30 January 1992, Holzenthal, Munoz, Kjer, 1 ♂ (UMSP), Río Telire and small tributaries, SE Suretka, 9.554°N, 82.892°W, el. 48 m, 1 February 1986, Holzenthal, Morse, Fasth, 2 ♂, 22 ♀ (UMSP), Río Bitey, ca 2.5 km S Pandora, 9.725°N, 82.963°W, el. 15 m, 3 February 1986, Holzenthal, Morse, Fasth, 3 ♂, 6 ♀ (INBIO), Río Barbilla, ca 8 km W B-Line, 10.067°N, 83.369°W, el. 30 m, 31 January 1986, Holzenthal, Morse, Fasth, 29 ♂, 155 ♀ (UMSP), Río Banano, 16 km WSW Bomba, 9.888°N, 83.167°W, 26 March 1987, el. 150 m, Holzenthal, Hamilton, Heyn, 10 ♂ (5 ♂ CMNH, 5 ♂ INBIO), Reserva Biológica Hitoy-Cerere, Río Cerere, 9.671°N, 83.028°W, 23–24 March 1987, el. 90 m, Holzenthal, Hamilton, Heyn, 46 ♂ (NMNH), Río Uatsi, ca 8 km (air) W Bribri, 9.62°N, 82.90°W, 25 March 1987, el. 60 m, Holzenthal, Hamilton, Heyn, 9 ♂ (UMSP). **Cartago:** Río Platanillo, 22 km E. Tayutic, 9.82°N, 83.55°W, el. 730 m, 30 January 1986, Holzenthal, Morse, Fasth, 14 ♂, 4 ♀ (7 ♂, 2 ♀ CMNH, 7 ♂, 2 ♀ UMSP), Pejibaye, 22–24 March 1987, W. Steiner, 2 ♂ (NMNH). **Puntarenas:** Río Singrú, ca 2 km (air) S Finca Helechales, 9.057°N, 83.082°W, el. 720 m, 21 February 1986, Holzenthal, Morse, Fasth, 8 ♂ (UMSP), Río Ciebo, route 2, ca 6 km W road to Buenos Aires, 9.149°N, 83.193°W, el. 250 m, 20 February 1986, Holzenthal, Morse, Fasth, 151 ♂, 155 ♀ (50 ♂, 50 ♀ CMNH, 50 ♂, 50 ♀ INBIO, 51 ♂, 55 ♀ UMSP), Quebrada Pita, ca 3 km (air) W Golfito, 8.642°N, 83.193°W, el. 15 m, Holzenthal, Morse, Fasth, 1 ♂ (UMSP), Quebrada Potrero near Potrero Grande, 5 July 1992, T. Shepard, 32 ♂, 47 ♀ (CMNH), Río Guineal, ca 1 km (air) E Finca Helechales, 9.076°N, 83.092°W, 22 February 1986, el. 840 m, Holzenthal, Morse, Fasth, 29 ♂ (INBIO).

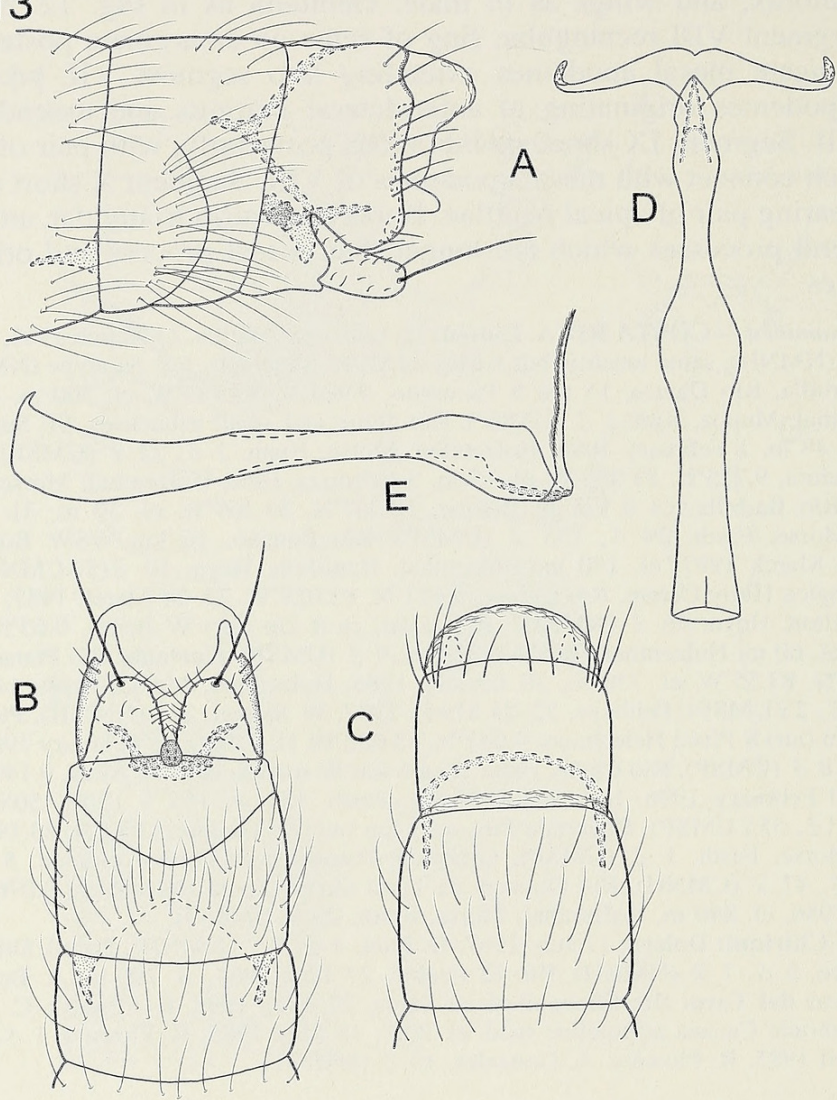
PANAMA. Chiriquí: Dolega, 17 July 1967, O. Flint, 4 ♂, 5 ♀ (NMNH), David, Dolequito, 3 June 1964, A. Broce, 5 ♂, 7 ♀ (NMNH), Río El Pueblo, 27 June 1964, el. 700 m, A. Broce, 4 ♂, 5 ♀ (NMNH). **Bocas del Toro:** Río Changuinola at Zegla, 25 April 1985, R. Flowers, C. Stephens, 1 ♂ (CMNH), Quebrada Canaza at pipeline road, el. 300', 18 May 1985, R. Flowers, 1 ♂, Río Teribe at Zegla, 20 April 1985, R. Flowers, A. Gonzales, 10 ♂ (NMNH).

Bredinia manabiensis, new species
(Figs. 13, 14)

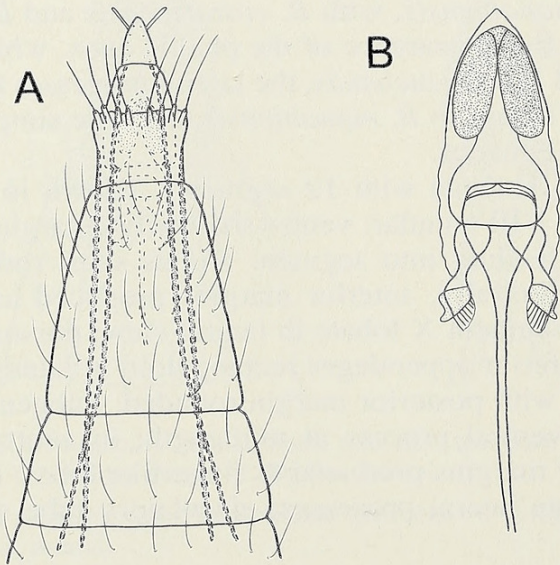
Diagnosis.—*Bredinia manabiensis*, with *B. costaricensis* and *B. venezuelensis* n.sp., shares a similarity in the appearance of the phallic apex, which is T-shaped. In both *B. costaricensis* and *B. venezuelensis*, the lateral processes from the phallic apex are multibranching, whereas in *B. manabiensis*, they are simple. The species has been collected only in Ecuador.

Male.—Length 1.5 mm. Antenna with 19 segments. Brown in alcohol. Genitalia as in Fig. 13. Segment VIII annular; venter shallowly emarginate posteriorly, anteriorly with margins extending into segment VII as short rods. Segment IX reduced to narrow bridge ventrally, anterior margins produced as short anterior rods; dorsally rectangular. Segment X lobate in lateral view; dorsum membranous and rounded posteriorly. Inferior appendages rectanguloid in lateral view; thumb-like in ventral aspect, each with posterior margin rounded. Subgenital plate shelf-like in lateral view, with ventral process at midlength; in ventral view deeply incised mesally with lateral margins produced as fingerlike lobes. Phallus tubular, apex T-shaped with elongate lateral processes; ejaculatory tube short and triangular.

13



14



Female.—Length 1.5 mm. Antenna broken, with at least 15 segments. Color and features of the head, thorax and wings as in male. Genitalia as in Fig. 14. Segment VII annular. Segment VIII square, ring of setae on posterior margin, pair of elongate mesal apodemes extending into segment V, second pair of elongate apodemes originating at anterolateral margins and extending into segment V. Segment IX trianguloid; pair of lateral apodemes connected anteriorly with mesal apodemes of VIII. Segment X short and conical, bearing pair of apical papillae. Bursa copulatrix triangular, narrowing posteriorly, pair of oval, sclerous plates posteriorly, oval plate anteriorly bearing a pair of scalelike processes sclerotized at tips; mesal process elongate and continuous with anterior plate.

Type Material.—Holotype ♂. **ECUADOR. Manabi**: 29 km W Santo Domingo, Rancho Ronald, 20 July 1978, J. Anderson (NMNH). Paratype: **ECUADOR**. Same data as holotype, 1 ♀ (NMNH).

Etymology.—Named for the province in Ecuador where the species was collected.

Bredinia venezuelensis, new species
(Figs. 15, 16)

Diagnosis.—This species is similar to *B. costaricensis*, particularly in the elaborate branching processes of the phallus apex. The structure of the inferior appendages and subgenital plate is also similar in the two species, but the T-shaped phallic apex also bears some similarity to that of *B. manabiensis*. The new species is recognized by arrangement of the multibranching processes at apex of the phallus, which are slender and fingerlike. *Bredinia venezuelensis* is known from Venezuela, Peru, and Ecuador.

Male.—Length 1.4–1.9 mm. Antenna with 17 segments. Brown in alcohol. Genitalia as in Fig. 15. Segment VIII annular; venter deeply emarginate posteriorly, anteriorly with lateral margins produced as short rods. Segment IX reduced to narrow bridge ventrally; dorsally rectangular, anterior margin extending anteriorly as narrow rods to middle of segment VIII. Segment X lobate in lateral view; broadly rounded and membranous in dorsal view. Inferior appendages square in lateral view; in ventral view square with lateral margins narrowing basally, mesal margins slightly diverging. Subgenital plate shelflike in lateral view with dorso-basal projection; in ventral view rectangular with mesal hump. Phallus tubular, apex T-shaped with elongate, fingerlike branches laterally; ejaculatory duct narrowly triangular.

Female.—Length 1.8–2.0 mm. Antenna with 17 segments. Color and features of the head, thorax and wings as in male. Genitalia as in Fig. 16. Segment VII annular. Segment VIII square, ring of setae on emarginate posterior margin, pair of elongate, mesal apodemes extending midway into segment VII, second pair of elongate apodemes originating at posterolateral margins and extending midway into VII; scaly appearance on ventral surface. Segment IX short, pair of membranous lobes ventrally, pair of lateral apodemes connecting anteriorly with mesal apodemes of VIII. Segment X short and conical, bearing pair of apical papillae.

←

Fig. 13.—*Bredinia manabiensis* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Fig. 14.—*Bredinia manabiensis* new species, female genitalia: A. Terminal abdominal segments, ventral. B. Bursa copulatrix, ventral.

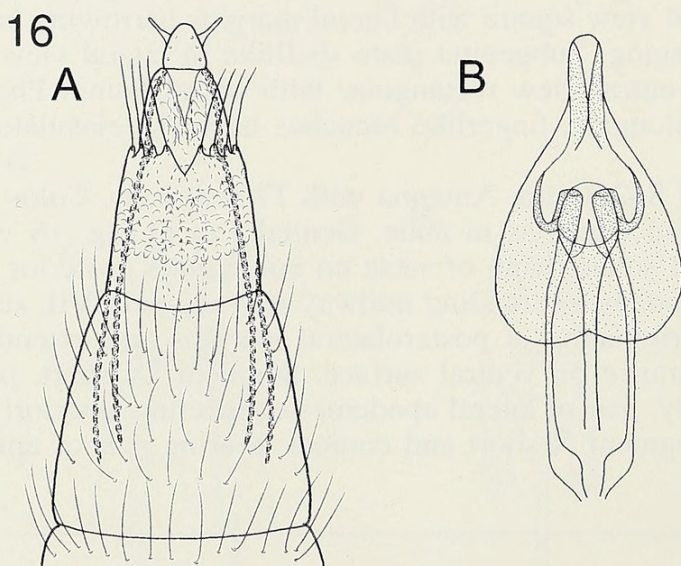
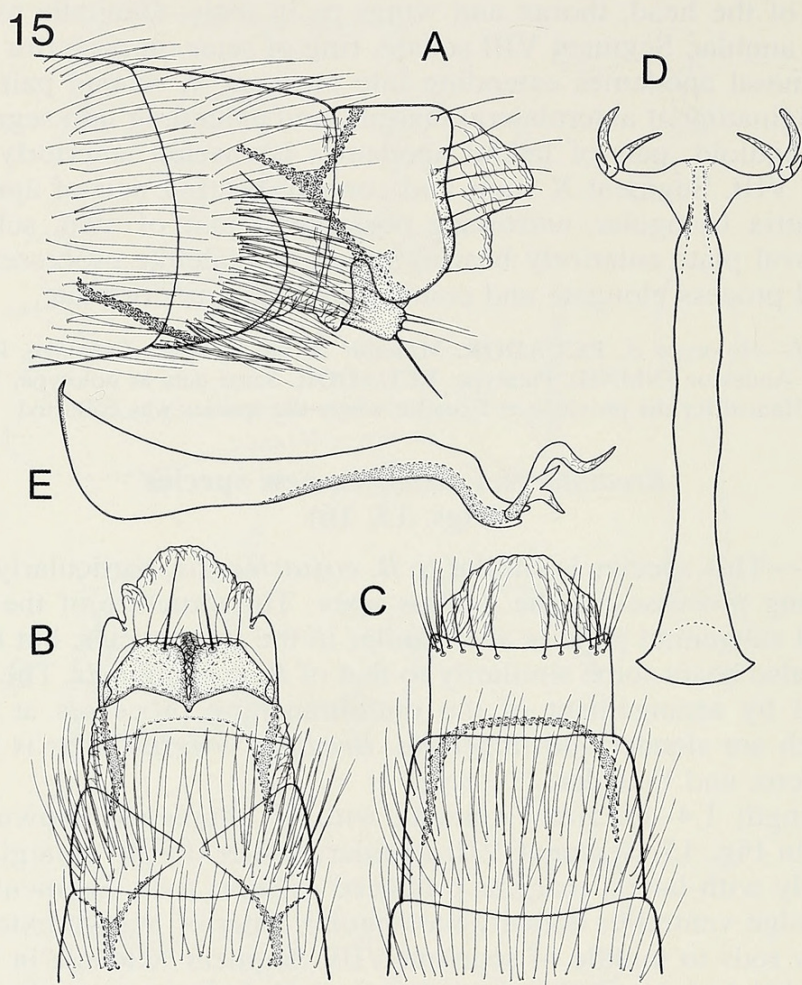


Fig. 15.—*Bredinia venezuelensis* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Fig. 16.—*Bredinia venezuelensis* new species, female genitalia: A. Terminal abdominal segments, ventral. B. Bursa copulatrix, ventral.

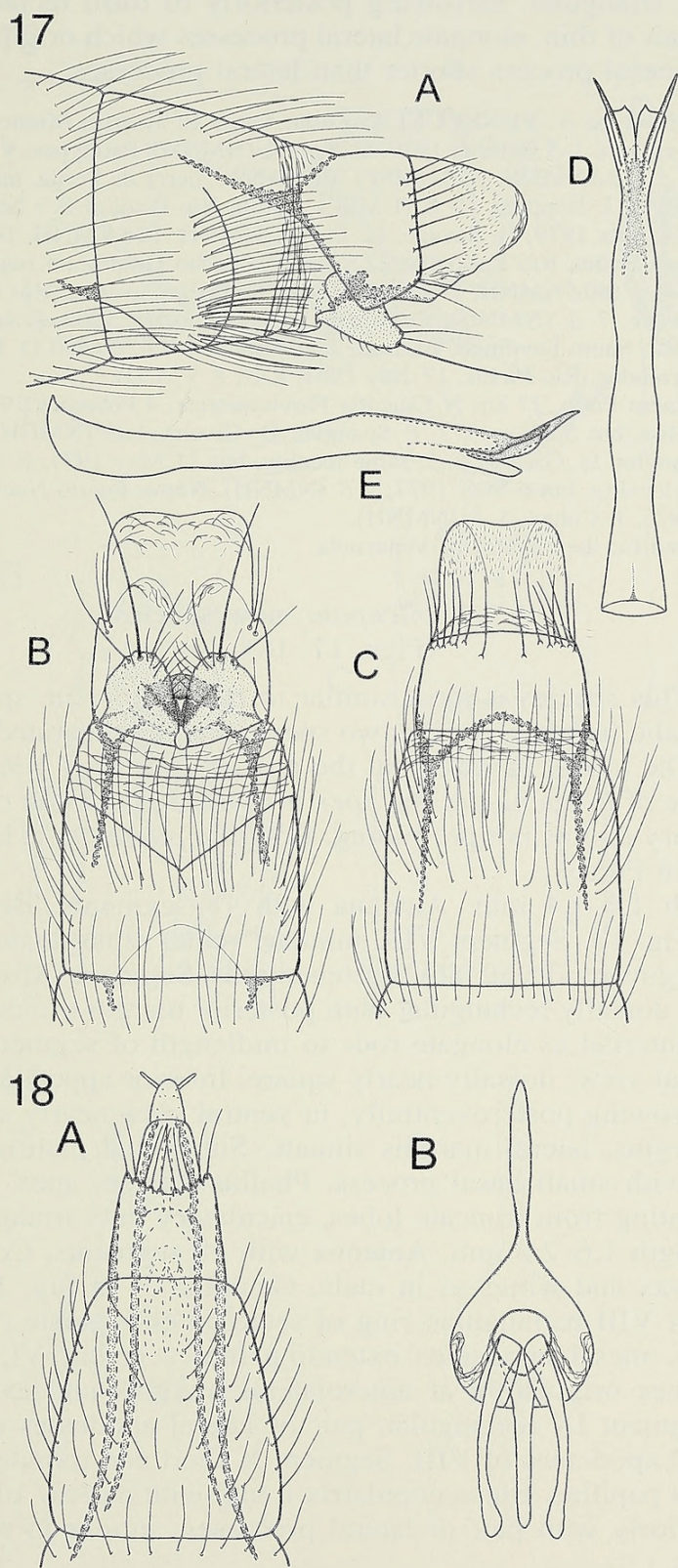


Fig. 17.—*Bredinia pilcopata* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Fig. 18.—*Bredinia pilcopata* new species, female genitalia: A. Terminal abdominal segments, ventral. B. Bursa copulatrix, ventral.

Bursa copulatrix triangular, narrowing posteriorly to form rectanguloid process; anteriorly with pair of thin, elongate lateral processes which originate from square, sclerous plates, mesal process shorter than lateral processes.

Type Material.—Holotype ♂. **VENEZUELA. Zulia:** Perija El Tucuco, Mission El Tucuco, Río El Tucuco, 11 km from church, 1–5 October 1979, H. Savage (NMNH). Paratypes: **VENEZUELA.** Same data as holotype, 53 ♂ (33♂NMNH, 20♂UMSP), El Tucuco, Sierra de Perija, montane forest, 28–29 January 1978, blacklight, J. Heppner, 19 ♂ (UMSP), Baralt, Río Pauji at rt 3 between San Juan and San Antonio, 9–11 October 1979, H. Savage, 42 ♂ (20♂NMNH, 12♂CMNH, 10♂UMSP). **Aragua:** Parque Nacional Henri Pittier, Río La Trilla, 22.5 km N Rancho Grande on road, 17–19 September 1979, H. Savage, 124 ♂ (80♂NMNH, 20♂CMNH, 24♂UMSP), Cuyagua, Río Grande, 20–23 September 1979, H. Savage, 7 ♂ (NMNH), Ocumare, 19–20 February 1969, P. and P. Spangler, 7 ♂ (NMNH). **Barinas:** Río Santo Domingo, Barinas, 17 February 1976, C. and O. Flint, 5 ♂ (NMNH). **PERU.** Puerto Bermudez, Río Pichis, 17 July 1961, 2 ♂, 8 ♀ (CU).

ECUADOR. Pastaza: Puyo, 27 km N Estación Fluvimétrica, 4 February 1976, P. Spangler, 6 ♂ (NMNH), same locality, but 5 May 1977, P. Spangler, D. Givens, 1 ♂ (NMNH), same locality, but 10 May 1977, P. Spangler, D. Givens, 1 ♂, same locality, but 21 May 1977, P. Spangler, D. Givens, 1 ♂ (NMNH), same locality, but 6 May 1977, 1 ♂ (NMNH). **Napo:** Puerto Nuevo (2 km S), 1.5 km W of river, 9 July 1976, J. Cohen, 5 ♂ (NMNH).

Etymology.—Named for the country of Venezuela.

Bredinia pilcopata, new species

(Figs. 17, 18)

Diagnosis.—This species is most similar to *B. spangleri* n. sp., in the appearance of the genitalic features, but the two species can be separated by the structure of the phallus. The lateral processes at the phallic apex in *B. pilcopata* are much shorter than those of *B. spangleri*; the apex is divided into a pair of truncate lobes; and the ejaculatory duct is not protruding. *Bredinia pilcopata* is known only from a few localities in Peru.

Male.—Length 1.3–1.4 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 17. Segment VIII annular; venter emarginate posteriorly, anteriorly with margins produced into shortened rods. Segment IX reduced to narrow bridge ventrally; dorsally rectangular with posterior margin truncate, anterior margins extending anteriorly as elongate rods to midlength of segment VIII. Segment X lobate in lateral view; dorsally nearly square. Inferior appendages triangular in lateral view, narrowing posteroventrally; in ventral view nearly square, diverging along mesal margins, lateral margins sinuate. Subgenital plate narrow, shelflike in lateral view with small basal process. Phallus tubular, apex with thin lateral processes originating from truncate lobes, ejaculatory duct triangular.

Female.—Length 1.6–2.0 mm. Antenna with 18 segments. Color and features of the head, thorax and wings as in male. Genitalia as in Fig. 18. Segment VII annular. Segment VIII rectangular, ring of setae on emarginate posterior margin, pair of elongate, mesal apodemes extending into segment VI, second pair of elongate apodemes originating at anterolateral margins and extending through segment VI. Segment IX rectangular, pair of lateral apodemes connecting anteriorly with mesal apodemes of VIII. Segment X short and rounded apically, bearing pair of apical papillae. Bursa copulatrix round with narrow, elongate posterior projection; anteriorly with pair of lateral processes, similar in width and length to mesal process.

Type Material.—Holotype ♂. **PERU. Cuzco:** Pilcopata, 8–10 December 1979, el. 600 m, J. Heppner (NMNH). Paratypes: **PERU.** Same data as holotype, 2 ♂ (NMNH, UMSP). **Huanuco:** Río Hualago, Tingo Maria, 14–16 August 1963, W. Peters, 4 ♂, 1 ♀ (3♂, 1♀NMNH, 1♂CMNH), same locality, but 24–27 September 1955, S. Roback, 4 ♂, 8 ♀, (2♂, 4♀ANSP, 2♂, 4♀NMNH), Hotel

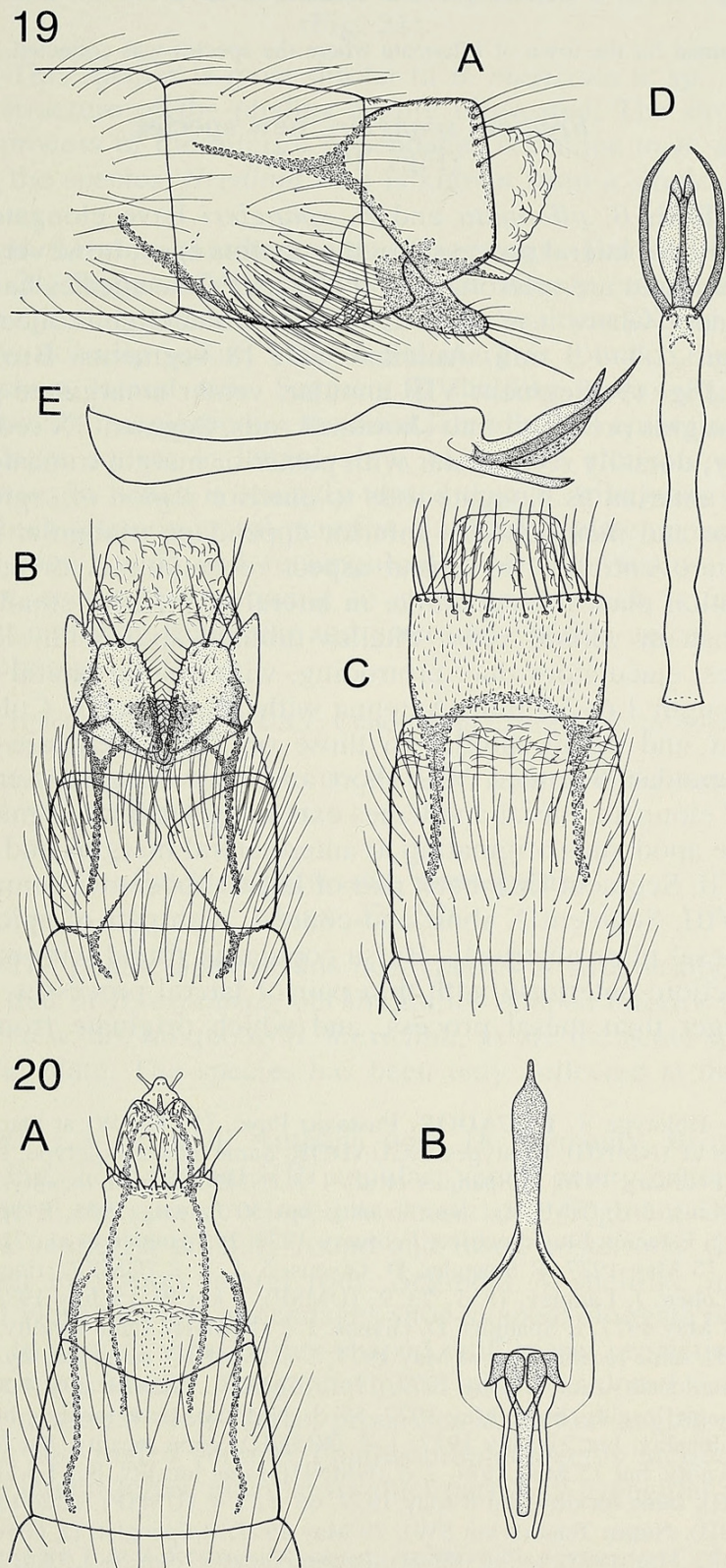


Fig. 19.—*Bredinia spangleri* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Fig. 20.—*Bredinia spangleri* new species, female genitalia: A. Terminal abdominal segments, ventral. B. Bursa copulatrix, ventral.

Tingo Maria, Tingo Maria, 6 October 1955, S. Roback, 11 ♂ (5♂ANSP, 2♂CMNH, 2♂NMNH, 2♂UMSP).

Etymology.—Named for the town of Pilcopata where the species was collected.

Bredinia spangleri, new species

(Figs. 19, 20)

Diagnosis.—Both *B. pilcopata* and *B. spangleri* have elongate anterior rods from segment IX and lateral processes at the phallus apex, however in *B. spangleri* these lateral processes are sclerotized and elongate. The species has been reported only from Ecuador where it is often abundant in blacklight collections.

Male.—Length 1.4–1.9 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 19. Segment VIII annular; venter emarginate posteriorly, anteriorly with margins produced into shortened rods. Segment IX reduced to narrow bridge ventrally; dorsally rectangular with posterior margin truncate, anterior margins extending anteriorly as elongate rods to anterior region of segment VIII. Segment X truncate and membranous. Inferior appendage triangular in lateral view, narrowing posteroventrally; in ventral aspect rectanguloid, diverging on mesal margin. Subgenital plate thin, shelflike in lateral view, with small basal process; thin and squarish in ventral view. Phallus tubular, apex with slender, elongate lateral processes; ejaculatory duct protruding, with oblong lateral lobes.

Female.—Length 1.6–2.0 mm. Antenna with 18 segments. Color and features of head, thorax and wings similar to those of male. Genitalia as in Fig. 20. Segment VII annular. Segment VIII short and wide, ring of setae on posterior margin; pair of elongate, mesal apodemes extending just into segment VII, second pair of elongate apodemes originating at anterolateral margins and extending well into segment VII. Segment IX lobate, pair of lateral apodemes connecting to mesal apodemes of VIII. Segment X short and conical, with pair of apical papillae and with narrow mesal plate anteriorly. Bursa copulatrix round with narrow, elongate posterior projection; anteriorly with thin pair of lateral processes, which are narrower and longer than mesal process, and which originate from small square plates.

Type Material.—Holotype ♂. **ECUADOR. Pastaza:** Puyo, (16 km W) at blacklight, 3 February 1976, P. Spangler et al. (NMNH). Paratypes: **ECUADOR.** Same data as holotype, 1 ♂ (NMNH), same locality, but 8–11 February 1976, P. Spangler et al., 1 ♂ (NMNH), same locality, but 16 May 1977, P. Spangler, D. Givens, 2 ♂ (NMNH), same locality, but 30 January 1976, P. Spangler, et al., 2 ♂ (NMNH), 27 km. N Estación Fluvimétrica, February 1976, P. Spangler, et al., 21 ♂, 1 ♀ (NMNH), same locality, but 15 May 1977, P. Spangler, D. Givens, 5 ♂, 2 ♀ (UMSP), riverside at blacklight, 29 May 1975, J. Cohen, J. Langley, 18 ♂, 23 ♀, (UMSP), 3 km W, 15 July 1976, J. Cohen, 14 ♂, 89 ♀ (NMNH), 21 May 1977, P. Spangler, D. Givens, 1 ♂ (NMNH), same locality, but 10 May 1977, 28 ♂, 1 ♀ (CMNH), same locality, but 14 May 1977, 5 ♂ (NMNH), same locality, but 17 May 1977, 9 ♂ (NMNH), same locality, but 11 May 1977, 17 ♂ (CMNH), same locality, but 21 May 1977, 67 ♂, 2 ♀ (UMSP), same locality, but 7 May 1977, 55 ♂ (NMNH), same locality, but 6 May 1977, 65 ♂ (UMSP), same locality, but 21 May 1977, 1 ♂ (NMNH), same locality, but 5 May 1977, 79 ♂ (NMNH), same locality, but 15 May 1977, 2 ♂ (NMNH), same locality, but 1.5 km S 14 May 1977, 15 ♂, 1 ♀ (CMNH), same locality, but 8 May 1977, 66 ♂, 1 ♀ (UMSP), same locality, but 13 May 1977, 15 ♂ (NMNH). **Napo:** Tena (8 km SW), 29 May 1977, P. Spangler, D. Givens, 1 ♂ (NMNH), same locality, but 23 May 1977, 1 ♂ (NMNH), Puerto Nuevo (2 km S) 1.5 km W to River, 9 July 1976, J. Cohen, 1 ♂ (CMNH), Río Jondachi, 30 km N Tena, el. 950 m, 10 September 1990, O. Flint, 30 ♂, 123 ♀ (NMNH), Pano, 580 m, 12 September 1990, O. Flint, 1 ♂, 4 ♀ (UMSP). **Cotopaxi:** Quevedo (36 km NE), 21 July 1976, el. 350 m, J. Cohen, 1 ♂ (NMNH).

Etymology.—Named for Dr. Paul J. Spangler, who collected many of the specimens of this species.

Bredinia alza, new species

(Fig. 21)

Diagnosis.—This species is most similar to *B. mexicana* n. sp., with both having the apical structure of the phallus deeply bifurcated. The strongly upturned posteroventral process of the inferior appendages is unique to *B. alza* and serves to differentiate the species. *Bredinia alza* is known from a single locality in Paraguay.

Male.—Length 2.0 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 21. Segment VIII annular; venter deeply emarginate posteriorly, anterior margins produced into short lateral rods. Segment IX reduced to narrow bridge ventrally; dorsally square with lateral margins rounded, anterior margins produced into short, lateral rods. Segment X shelflike, narrowing posteriorly in ventral view; dorsally membranous, rounded laterally and emarginate posteriorly. Inferior appendages square in lateral view, each with elongate extension from posteroventral margin which is strongly turned dorsad, triangular in ventral view with series of thick setae on mesal margins. Subgenital plate appearing as narrow shelf in lateral view; wide and rectanguloid ventrally. Phallus tubular, deeply divided at apex, each side narrowing to acute apex which is turned outward; ejaculatory duct narrowly triangular and protruding within apical incision.

Female.—Unknown.

Type Material.—Holotype ♂. **PARAGUAY. Concepción:** Concepción, 26 August 1989, at black-light, J. Kochalka (NMNH).

Etymology.—From the Spanish “*alzar*—to lift, or raise” referring to the distinctive inferior appendages which are upturned apically.

Bredinia mexicana, new species

(Figs. 22, 23)

Diagnosis.—The phallic apex of this new species is structurally similar to that of *B. alza*, and that of *B. espinosa*, but the mitten-shaped inferior appendages, as seen in ventral view, are unique to *B. mexicana*, as are the acute spinal processes of the subgenital plate. The species has been only collected at the type locality in Mexico.

Male.—Length 1.3–1.6 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 22. Segment VIII annular; venter emarginate posteriorly, anteriorly with lateral margins developed as small rods. Segment IX annular, only slightly reduced ventrally; dorsally round and fused posteriorly with X, anterior margin produced into short lateral rods. Segment X shelflike in lateral view; square in dorsal view. Inferior appendages shoe-shaped, elongate posteroventrally in lateral view; in ventral view mitten-shaped with mesal projection, widely separated and narrowing basally. Subgenital plate with dorsal and ventral processes in lateral view; in ventral view, dorsal processes acute and angled inward, ventral process beaklike and angled ventrad. Phallus tubular, deeply incised apically, producing elongate lateral lobes; ejaculatory duct narrowly triangular and protruding distally.

Female.—Length 1.4–1.8 mm. Antenna with 18 segments. Color and general features of head, thorax and wings as in male. Genitalia as in Fig. 23. Segment VII annular. Segment VIII square with ring of setae on posterior margin; pair of elongate, mesal apodemes extending into segment VII, second pair of elongate apodemes originating from anterolateral margins and extending into segment VI.

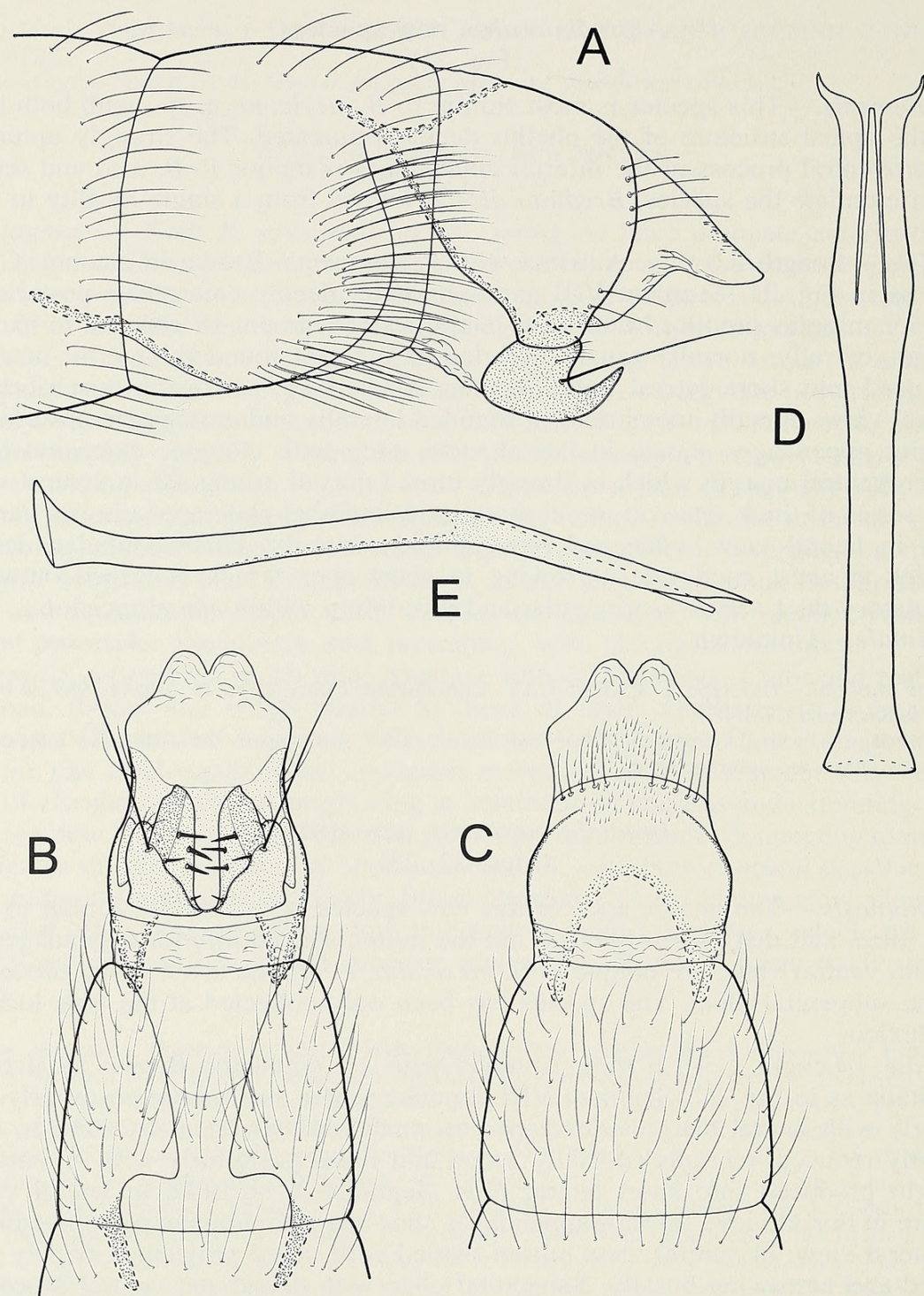


Fig. 21.—*Bredinia alza* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Segment IX rectangular with pair of lateral apodemes connecting with mesal apodemes of VIII. Segment X short and rounded apically, bearing pair of apical papillae. Bursa copulatrix rectangular with broad protrusion posteriorly; anteriorly with lateral processes widening at apices to rounded lobes.

Type Material.—Holotype ♂. **MEXICO. Tamaulipas:** Río Frio at La Poza Azul near Gómez

Farias, 18 May 1989, S. Harris, A. Contreras (NMNH). Paratypes: **MEXICO**. Same data as holotype, 12 ♂, 17 ♀ (8♂, 13♀ NMNH, 1♂, 1♀ UNAM, 2♂, 2♀ UMSP, 1♂, 1♀ CMNH).

Etymology.—Named for the country of Mexico.

Bredinia sucrensis, **new species**

(Figs. 24, 25)

Diagnosis.—While the phallic apex of *B. sucrensis* is similar to that seen in *B. alza*, the inferior appendages, in lateral aspect, more closely resemble those of *B. mexicana*. However, the inferior appendages of *B. sucrensis* are much more rectangular in ventral aspect than those seen in *B. mexicana*. This species has been only collected from a single location in Venezuela.

Male.—Length 1.6 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 24. Segment VIII annular; venter truncate posteriorly, anteriorly with lateral margins developed as small rods. Segment IX depressed dorsoventrally, anterolaterally extending into segment VIII and narrowing to pair of short, lateral apodemes; dorsally round with posterolateral margins produced as pair of short lobes. Segment X shelflike in lateral view; round posteriorly in dorsal view. Inferior appendages boot-shaped, elongate posteroventrally in lateral view; in ventral view rectangular, with mesal margins undulate and diverging posteriorly. Subgenital plate narrow in lateral view; in ventral view, thin and rectanguloid. Phallus tubular, deeply incised apically producing elongate lateral lobes flaring outward apically; ejaculatory duct narrow and protruding distally.

Female.—Length 1.6 mm. Antenna with 18 segments. Color and overall features of the head, thorax and wings as in male. Genitalia as in Fig. 25. Segment VII annular. Segment VIII square with ring of setae on posterior margin; pair of elongate, mesal apodemes extending midway into segment VII, second pair of elongate apodemes originating from anterolateral margins and extending into segment VII. Segment IX rectangular with pair of lateral apodemes connecting with mesal apodemes of VIII. Segment X short and rounded apically, bearing pair of apical papillae. Bursa copulatrix rectangular with broad protrusion posteriorly; anteriorly with lateral processes widening at apices to rounded lobes.

Type Material.—Holotype ♂. **VENEZUELA**. **Sucre**: Parque Nacional Peninsula de Paria, Uquire, Río La Viuda, 1 April 1995, 10° 42.830'N, 61° 57.661'W, el. 15 m, Holzenthal, Flint, Cressa (NMNH). Paratype: **VENEZUELA**. Same data as holotype, 1 ♀ (NMNH).

Etymology.—Named for the state in Venezuela where the species was collected.

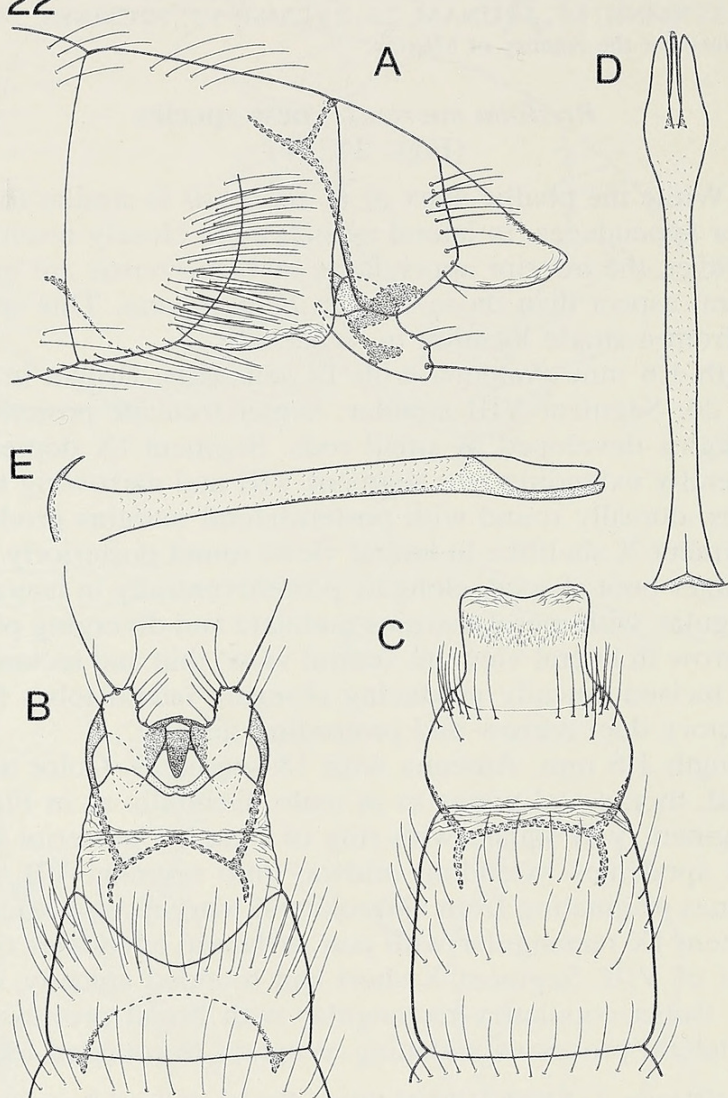
Bredinia emarginata, **new species**

(Fig. 26)

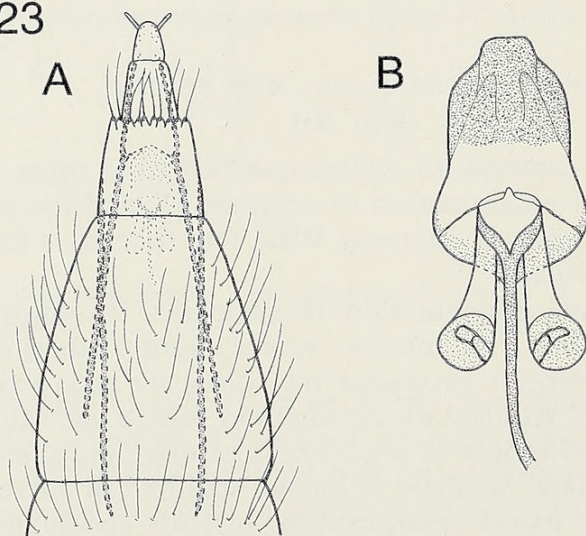
Diagnosis.—*Bredinia emarginata* is distinguished from other members of the genus by the deep dorsal emargination of segment IX and the elongate anterior rods from the lateral margins of segment VIII. The species is known only from the Río Pizote in Costa Rica.

Male.—Length 1.4 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 26. Segment VIII annular; venter slightly emarginate posteriorly, anteriorly with lateral margins produced into elongate rods extending through segment VII. Segment IX reduced to rectanguloid bridge ventrally; dorsally with deep mesal excision, bearing line of setae on inner margins, anterior margin produced into short lateral rods. Segment X lobate, shelflike in lateral view; dorsally rectangular with shallow mesal emargination. Inferior appendages triangular in lateral view, narrowing posteroventrally; in ventral view triangular, diverging on

22



23



mesal margins and narrowing posteriorly, bearing thick seta on mesal margin and elongate seta posteriorly. Subgenital plate rectangular in lateral aspect and oriented dorsoventrally; appearing as narrow, curving band in ventral view. Phallus tubular, apex with shallow excision from which tonguelike ejaculatory duct protrudes.

Female.—Unknown.

Type Material.—Holotype ♂. **COSTA RICA. Alajuela:** Río Pizote, ca 5 km N Dos Ríos, 10.948°N, 85.291°W, 9 March 1986, Holzenthal and Fasth (NMNH).

Etymology.—Named for the distinctive structure of abdominal segment IX.

Bredinia zulia, new species
(Fig. 27)

Diagnosis.—This species has several features in common with *B. emarginata*. Both have a shallow emargination at the phallic apex, and both have short, rounded inferior appendages when viewed in ventral aspect. *Bredinia zulia* is recognizable by the cuplike excision at the apex of the phallus, which creates small lateral “ears” and the dorsum of segment X which is entire rather than incised. *Bredinia zulia* is known only from the type locality in Venezuela.

Male.—Length 1.2–1.6 mm. Antenna with 18 segments. Brown in alcohol. Genitalia as in Fig. 27. Segment VIII annular, venter emarginate posteriorly, anteriorly with lateral margins produced into short lateral rods. Segment IX reduced to narrow bridge ventrally; square dorsally, anterior margins extended anteriorly as slender rods midway into segment VIII. Segment X lobate in lateral view, dorsally forming rounded lobe. Inferior appendages triangular, narrowing posteroventrally, in ventral view rounded apically, diverging along mesal margin. Subgenital plate shelflike in lateral view, with dorsoventral projection from base; rectangular in ventral view with mesal lobelike processes. Phallus tubular, apex with rounded incision; ejaculatory duct narrowly triangular.

Female.—Unknown.

Type Material.—Holotype ♂. **VENEZUELA. Zulia:** El Tucuco, Sierra de Perija, 28–29 January 1978, at blacklight, J. Heppner (NMNH). Paratypes: **VENEZUELA**. Same data as holotype, 11 ♂ (8♂NMNH, 2♂UMSP, 1♂CMNH).

Etymology.—Named for the state in Venezuela where the species was collected.

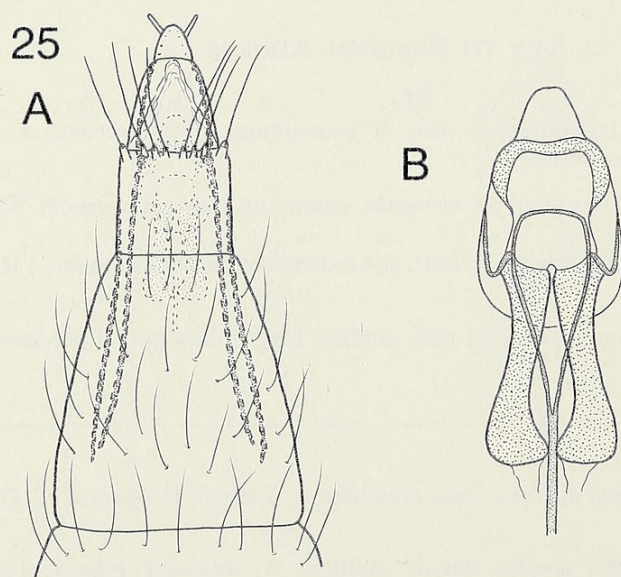
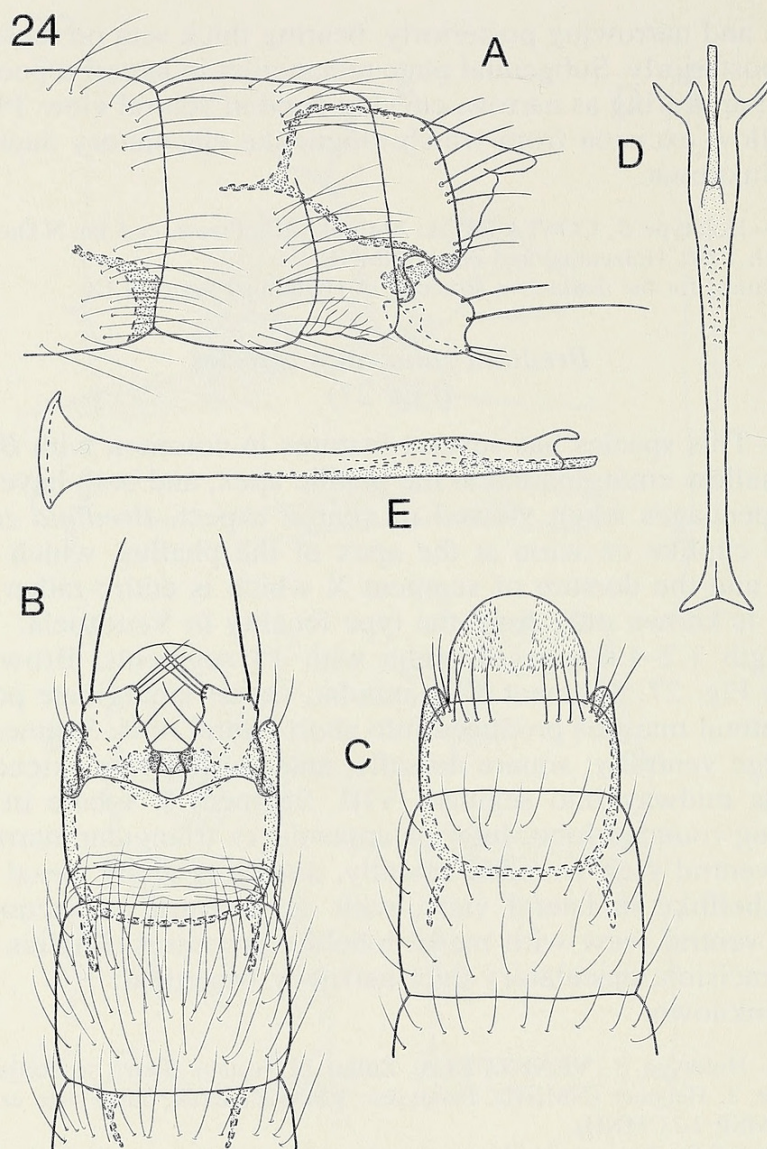
KEY TO *BREDINIA* ADULTS

- | | | |
|--------|---|----|
| 1. | Males | 2 |
| 1'. | Females (excluding females of <i>B. alza</i> , <i>B. emarginata</i> , <i>B. guanacasteca</i> , <i>B. selva</i> , and <i>B. zulia</i> , which are unknown) | 17 |
| 2 (1). | Anterolateral rods of segment IX elongate, extending through segment VIII (Figs. 2A, 4A). | 3 |
| 2'. | Anterolateral rods of segment IX short, not extending through segment VIII (Figs. 10A, 15A). | 5 |
| 3 (2). | Phallus apex with inner processes only slightly longer than lateral processes (Fig. 2D); | |

←

Fig. 22.—*Bredinia mexicana* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Fig. 23.—*Bredinia mexicana* new species, female genitalia: A. Terminal abdominal segments, ventral. B. Bursa copulatrix, ventral.



	inferior appendages each narrowing to acute or upturned apex ventrolaterally (Figs. 2A, 5A).	4
3'.	Phallus apex with inner processes thin and much longer than lateral processes (Fig. 4D); inferior appendages each not narrowing to acute apex ventrolaterally (Fig. 4A).	
	 <i>B. guanacasteca</i>	
4 (3).	Inferior appendages each narrowing to acute apex ventrolaterally (Fig. 2A), in ventral view nearly square (Fig. 2B); phallus apex with inner bifid processes straight (Fig. 2D).	
	 <i>B. dominicensis</i>	
4'.	Inferior appendages each narrowing to rounded, upturned projection (Fig. 5A), in ventral view triangular in appearance (Fig. 5B); phallus apex with inner bifid processes diverging (Fig. 5D)	
	 <i>B. selva</i>	
5 (2').	Segment VIII with thick, spinelike setae on lateral margins (Fig. 6A)	
5'.	Segment VIII without thick, spinelike setae on lateral margins (Figs. 8A, 10A)	6
6 (5').	Inferior appendages each with dorsolateral margin modified as elongate, spinelike process (Figs. 8A, 10A); subgenital plate, in lateral aspect, well developed and extending posteriorly beyond midpoint of inferior appendages (Figs. 8A, 10A)	7
6'.	Inferior appendages lacking spinelike processes from dorsolateral margins (Figs. 11A, 19A); subgenital plate in lateral aspect, poorly developed, never extending beyond midpoint of inferior appendages (Figs. 13A, 22A)	8
7 (6).	Dorsal process of each inferior appendage elongate, extending beyond ventral lobe (Fig. 8A); subgenital plate with long, acute ventral process (Fig. 8A)	
	 <i>B. appendiculata</i>	
7'.	Dorsal process of each inferior appendage shorter than ventral lobe (Fig. 10A); subgenital plate curving downward apically, forming short process (Fig. 10A)	
	 <i>B. davenporti</i>	
8 (6').	Phallus apex with elongate, lateral processes directed laterad, forming T-shape (Figs. 11D, 13D)	9
8'.	Phallus apex lacking elongate, lateral processes, or with processes directed apicad, not forming T-shape (Figs. 17D, 19D)	11
9 (8).	Lateral processes from apex of phallus multibranching (Figs. 11D, 15D); inferior appendages truncate in ventral view (Figs. 11B, 15B)	10
9'.	Lateral processes from apex of phallus simple (Fig. 13D); inferior appendages rounded in ventral view (Fig. 13A)	
	 <i>B. manabiensis</i>	
10 (9).	Multibranching lateral processes from phallus apex teethlike and acute, or serrate (Fig. 11D)	
	 <i>B. costaricensis</i>	
10'.	Multibranching lateral processes from phallic apex slender and fingerlike (Fig. 15D)	
	 <i>B. venezuelensis</i>	
11 (8').	Posterior of phallus with thin, sclerotized lateral processes, originating subapically and differentiated from shaft of phallus (Figs. 17D, 19D)	12
11'.	Phallus apex with sclerotized, lateral processes broad and not differentiated from shaft of phallus (Figs. 22D, 27D)	13
12 (11).	Lateral processes from phallic apex short, about one-sixth total phallus length, phallus apex divided into truncate lobes (Fig. 17D)	
	 <i>B. pilcopata</i>	
12'.	Lateral processes from phallus apex elongate, about one-third total phallus length, phallus apex not divided into pair of truncate processes (Fig. 19D)	
	 <i>B. spangleri</i>	
13 (11').	Phallus apex deeply incised with lateral lobes flaring outward (Figs. 21D, 24D)	14
13'.	Phallus apex shallowly incised with lateral lobes straight (Fig. 22D), or curving inward (Fig. 27D)	15

←
Fig. 24.—*Bredinia sucrensis* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

Fig. 25.—*Bredinia sucrensis* new species, female genitalia: A. Terminal abdominal segments, ventral. B. Bursa copulatrix, ventral.

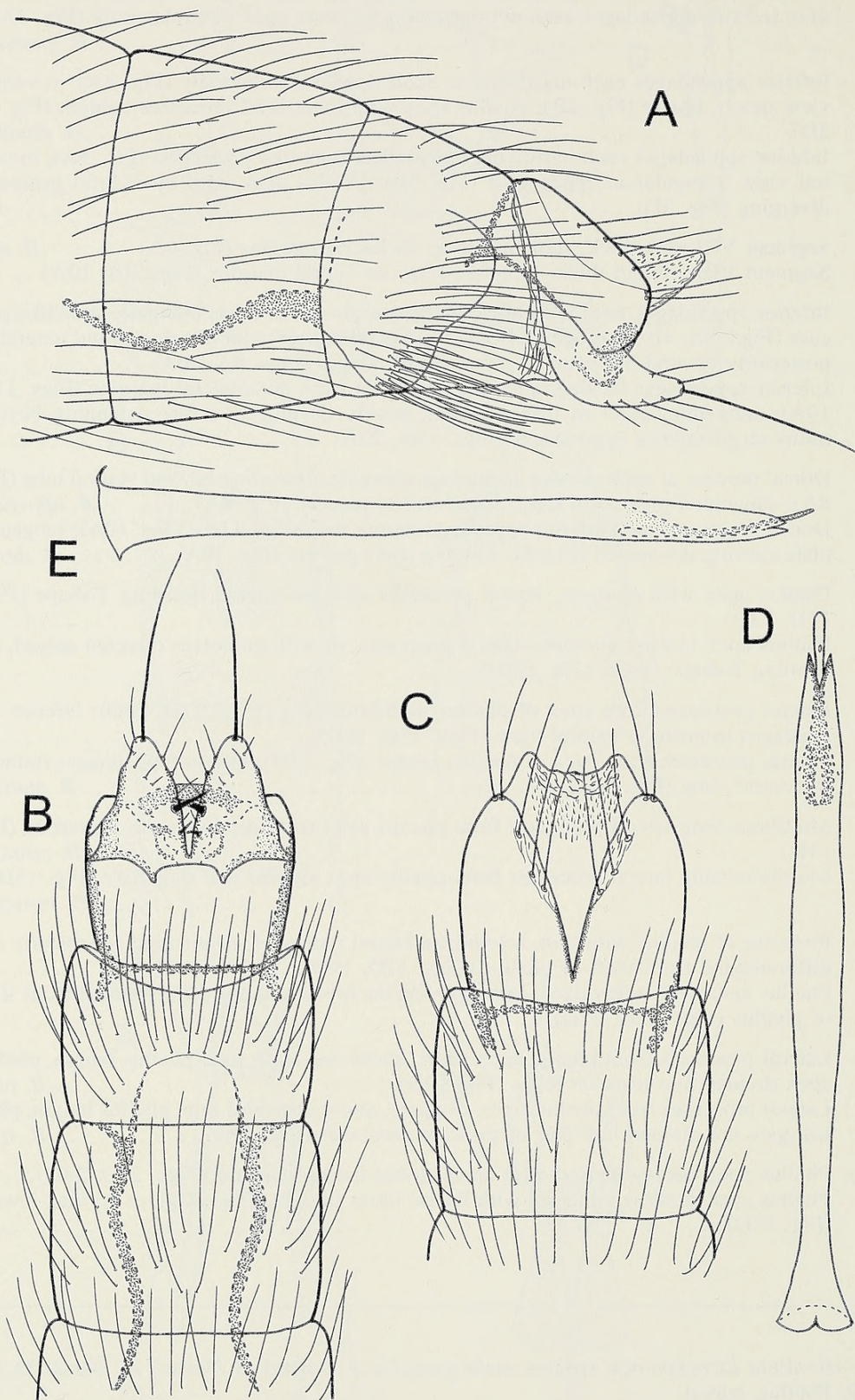


Fig. 26.—*Bredinia emarginata* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

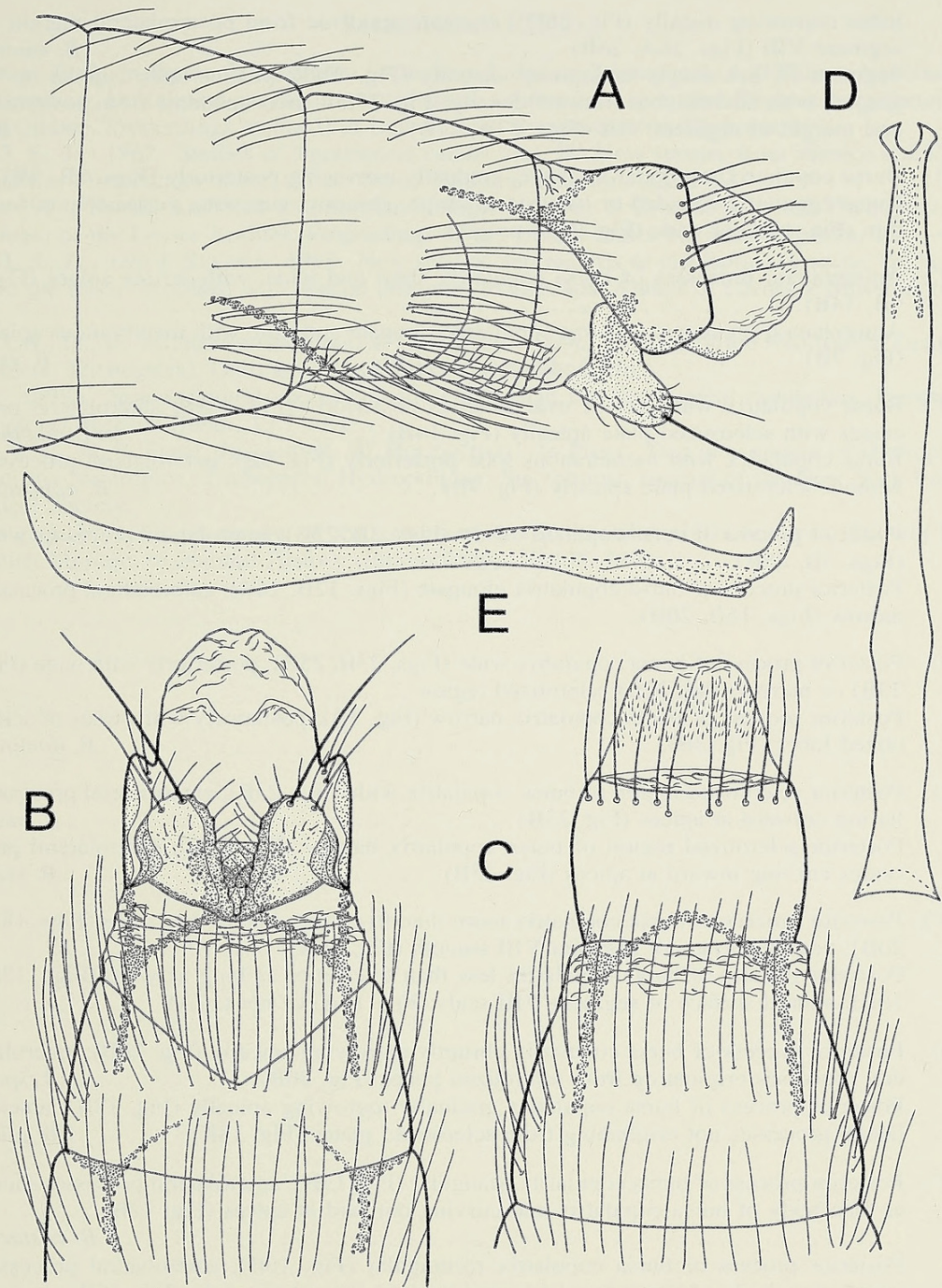


Fig. 27.—*Bredinia zulia* new species, male genitalia: A. Lateral. B. Ventral. C. Dorsal. D. Phallus, dorsal. E. Phallus, lateral.

- 14 (13). Inferior appendages each narrowing posterolaterally to acute upturned hook (Fig. 21A)
..... *B. alza*
14'. Inferior appendages each truncate posterolaterally (Fig. 24A) *B. sucrensis*
15 (13'). Inferior appendages mitten-shaped in ventral view (Fig. 22B); phallus apex enlarged
with mesal incision about one-fifth phallus length (Fig. 22D) *B. mexicana*
15'. Inferior appendages rounded in ventral view (Figs. 26B, 27B); phallus apex not enlarged
with mesal incision very shallow (Figs. 26D, 27D) 16
16 (15'). Segment IX deeply emarginate dorsally (Fig. 26C); phallus apex V-shaped with lateral

- lobes narrowing distally (Fig. 26D); elongate apodeme from posterolateral margin of segment VIII (Figs. 26A, 26B) *B. emarginata*
- 16'. Segment IX not deeply emarginate dorsally (Fig. 27C); phallus apex cuplike or U-shaped, with lateral lobes truncate distally (Fig. 27D); short apodeme from posterolateral margin of segment VIII (Figs. 27A, 27B). *B. zulia*
- 17 (1'). Bursa copulatrix triangular in shape, gradually narrowing posteriorly (Figs. 7B, 9B). . . 18
- 17'. Bursa copulatrix rounded or truncate in shape, abruptly narrowing posteriorly to form thin (Fig. 18B) or wide (Fig. 25B) process 20
- 18 (17'). Anterolateral processes of bursa copulatrix short and wide, with serrate apices (Figs. 9B, 14B). 19
- 18'. Anterolateral processes of bursa copulatrix elongate and thin, with membranous apices (Fig. 7B). *B. espinosa*
- 19 (18'). Bursa copulatrix with pair of oval sclerites posteriorly (Fig. 14B); anterolateral processes with sclerotized plate apically (Fig. 14B) *B. manabiensis*
- 19'. Bursa copulatrix with membranous lobe posteriorly (Fig. 9B); anterolateral processes without sclerotized plate apically (Fig. 9B). *B. appendiculata*
- 20 (17'). Posterior process of bursa copulatrix short (Figs. 3B, 25B); anterolateral processes wide (Figs. 3B, 25B) 21
- 20'. Posterior process of bursa copulatrix elongate (Figs. 12B, 16B); anterolateral processes narrow (Figs. 16B, 20B). 23
- 21 (20). Posterior process of bursa copulatrix wide (Figs. 23B, 25B); posteriorly with wide (Fig. 23B) or narrow (Fig. 25B) sclerotized region 22
- 21'. Posterior process of bursa copulatrix narrow (Fig. 3B); posteriorly with series of sclerotized lobes (Fig. 3B). *B. dominicensis*
- 22 (21). Posterior sclerotized region of bursa copulatrix wide (Fig. 23B); anterolateral processes flaring outward at apices (Fig. 23B). *B. mexicana*
- 22'. Posterior sclerotized region of bursa copulatrix narrow (Fig. 25B); anterolateral processes curving inward at apices (Fig. 25B). *B. sucrensis*
- 23 (20'). Posterior process of bursa copulatrix more than five times longer than wide (Figs. 18B, 20B); ventral surface of segment VIII smooth (Fig. 18A). 24
- 23'. Posterior process of bursa copulatrix less than five times as long as wide (Figs. 12B, 16B); ventral surface of segment VIII scaly (Fig. 16A) or not (12A). 25
- 24 (23). Posterior process of bursa copulatrix abruptly narrowing apically (Fig. 20B); anterolateral processes originating from sclerotized plates (Fig. 20B). *B. spangleri*
- 24'. Posterior process of bursa copulatrix gradually narrowing apically (Fig. 18B); anterolateral processes not originating from sclerotized plates (Fig. 18B) *B. pilcopata*
- 25 (23'). Posterior process of bursa copulatrix triangular (Fig. 12B); anterolateral processes shorter than body of bursa copulatrix and curving outward at apices (Fig. 12B)
- *B. costaricensis*
- 25'. Posterior process of bursa copulatrix rectangular (Fig. 16B); anterolateral processes longer than body of bursa copulatrix and curving inward at apices (Fig. 16B)
- *B. venezuelensis*

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LITERATURE CITED

- ANGRISANO, E. B. In Press. Contribution to the knowledge on Trichoptera of El Palmar National Park (Argentina). Description on the immature stages of *Bredinia* sp.n. and *Rhyacopsyche yatay* (Hydroptilidae). Proceedings of the 10th International Symposium on Trichoptera.
- FLINT, O. S., JR. 1967. Studies of Neotropical caddis flies, IV. New species from Mexico and Central America. Proceedings of the United States National Museum, 123:1–24.
- . 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., AND J. SYKORA. 1993. New species and records of caddisflies (Insecta: Trichoptera) from the Lesser Antilles, with special reference to Grenada. Annals of Carnegie Museum, 62:47–62.
- FLINT, O. S., JR., R. W. HOLZENTHAL, AND S. C. HARRIS. 1999a. Catalog of the Neotropical caddisflies (Insecta: Trichoptera). Ohio Biological Survey, Columbus, Ohio.
- . 1999b. Nomenclatural and systematic changes in the Neotropical caddisflies (Insecta: Trichoptera). Insecta Mundi, 13:73–84.
- HARRIS, S. C., O. S. FLINT, JR., AND R. W. HOLZENTHAL. In Press. Two new genera of Hydroptilidae from the Neotropics (Trichoptera: Hydroptilidae: Stactobiini). Journal of the New York Entomological Society.
- MARSHALL, J. E. 1979. A review of the genera of the Hydroptilidae (Trichoptera). Bulletin of the British Museum of Natural History (Entomology), 39:135–239.



Harris, Steven C., Holzenthal, Ralph W., and Flint, Oliver S. 2002. "Review of the Neotropical genus *Bredinia* (Trichoptera: Hydroptilidae: Stactobiini)." *Annals of the Carnegie Museum* 71(1), 13–45. <https://doi.org/10.5962/p.215804>.

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