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NEW SPECIES OF *LEPIDOSTOMA* FROM MEXICO AND CENTRAL AMERICA (TRICHOPTERA: LEPIDOSTOMATIDAE)

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Abstract.—Five new species of *Lepidostoma* (Trichoptera: Lepidostomatidae) are described and illustrated: ***L. chiriquiensis***, from Panama, ***L. ectopium***, from Costa Rica and Panama, ***L. polylepidum***, from Costa Rica, ***L. tapanti***, from Costa Rica and Panama, and ***L. xolotl***, from Mexico. All are included in the *Lepidostoma* (*Nosopus*) *Mexicanum* Group as defined by Weaver (1988).

Key Words: Trichoptera, *Lepidostoma,* new species, Mexico, Central America

Recent collecting in Costa Rica, western Panama, and northwestern Mexico has revealed five species of *Lepidostoma* previously unknown to science. Dr. O. S. Flint, Jr., Smithsonian Institution, Washington, D.C., kindly forwarded to us the two Mexican specimens (through Mr. David Faulkner) as well as the Panamanian material (through Dr. Henk Wolda). The Costa Rican material was collected mainly by us during an ongoing survey of the Trichoptera of Costa Rica. The descriptions of these new species bring to 21 the number of species now known in Weaver's (1988) *Lepidostoma* (*Nosopus*) *Mexicanum* Group, a group entirely confined to the southwestern United States, Mexico, and Central America. The distributions of these species are indicated in Table 1 and complete citations to works containing original descriptions are included in the Literature Cited. Weaver (1988) placed all of the Neotropical species in the *Mexicanum* Group and his revision should be consulted for keys, descriptions, and illustrations of these species. The new species are all associated with middle to upper elevation streams flowing through forested areas.

Types of species described herein are deposited in the collections of the Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica (INBIO), the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (NMNH), the San Diego Natural History Museum, San Diego, California (SDMNH), and the University of Minnesota Insect Collection, St. Paul, Minnesota (UMSP).

Lepidostoma chiriquiensis, NEW SPECIES

Fig. 1A–E

This species is similar to *L. delongi* Ross, but differs from it in characteristics of tergum X and the inferior appendages as described below.

Male: Length of forewing 8 mm. Color brown. All specimens preserved in alcohol, badly rubbed, vestiture lacking, except for spatulate scales on the mesal surfaces of the one-segmented maxillary palpi. Tibial spur

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Table 1. *Lepidostoma Mexicanum* Group species and distributions.

Species	Distribution
Lepidostoma acarolum Denning 1962	USA: Arizona, New Mexico
Lepidostoma aztecum Flint and Bueno 1977	MEXICO: Morelos, Veracruz
Lepidostoma chiriquiensis, new species	PANAMA
Lepidostoma dafila Bueno and Contreras 1986	MEXICO: Oaxaca
Lepidostoma delongi Ross 1946	MEXICO: Chiapas, Michoacan, Morelos
Lepidostoma denningi Weaver 1988	MEXICO: Chiapas
Lepidostoma ectopium, new species	COSTA RICA; PANAMA
Lepidostoma frontale (Banks) 1901	MEXICO: Hidalgo, Veracruz
Lepidostoma heveli Flint and Bueno 1977	GUATEMALA
Lepidostoma lacinatum Flint 1967	MEXICO: Durango, Sinaloa; USA: Arizona
Lepidostoma leonilae Bueno and Contreras 1986	MEXICO: Nuevo León
Lepidostoma mexicanum (Banks) 1901	USA: Arizona, Colorado; MEXICO; GUATEMALA, COSTA RICA, PANAMA
Lepidostoma oaxacense Bueno and Contreras 1986	MEXICO: Oaxaca
Lepidostoma polylepidum, new species	COSTA RICA
Lepidostoma quila Bueno and Padilla 1981	MEXICO: México, Morelos
Lepidostoma rectangulare Flint 1967	MEXICO: Durango
Lepidostoma reimoseri Flint and Bueno 1977	COSTA RICA
Lepidostoma steinhauseri Flint and Bueno 1977	EL SALVADOR
Lepidostoma talamancense Flint and Bueno 1977	COSTA RICA; PANAMA
Lepidostoma tapanti, new species	COSTA RICA; PANAMA
Lepidostoma xolotl, new species	MEXICO: Durango, Nayarit

formula 2–4–4. *Genitalia:* Segment IX annular. In lateral view, segment X broadly rounded apically with scattered setae and small spinose projections; ventral edge of X with lobe-like extension mesally; in dorsal view, with V-shaped cleft. Inferior appendage broad, with terete basodorsal process, slightly sinuate middorsal process, and shorter apicodorsal process; apical edge of inferior appendage with sharp sclerotized flange. Phallobase short; phalicata tubular, curved; parameres long, apical halves covered with short, spinose setae; phallotremal sclerite present.

Holotype: ♂, PANAMA: Chiriquí: Guadalupe Arriba, 8°52′26″N, 82°33′13″W, 26.vi.–2.vii.1985, H. Wolda (NMNH). *Paratypes:* Same data as holotype, except 21–27.xii.1983, 1 ♂ (UMSP); same, except 1–7.viii.1984, 1 ♂ (INBIO); same, except 12–18.vi.1985, 2 ♂ (one specimen with phallus and inferior appendages missing) (NMNH).

Etymology: Named for the type locality, the province of Chiriquí, Panama.

Lepidostoma ectopium, New Species
Figs. 2A–E, 3

Based on male genitalic features, *Lepidostoma ectopium* seems to be most closely related to *L. oaxacense* Bueno and Contreras. In lateral view, segment X of the new species is excavated less deeply than that of *L. oaxacense,* but otherwise the two structures are similarly shaped. The unusual nature of the inferior appendage, with its long, heavily spinose basodorsal process and its curved pointed subapicodorsal process, strikingly differentiates *L. ectopium* from *L. oaxacense.*

Male: Length of forewing 7 mm. Head setal warts bearing long, filiform, brown scales. Antennal scape cylindrical, long, about equal to intraocular distance, irregularly dispersed with short to long, brown and yellow setae; pedicel with short brown setae; mesal surfaces of antennal flagellomeres basally with linear yellowish-white

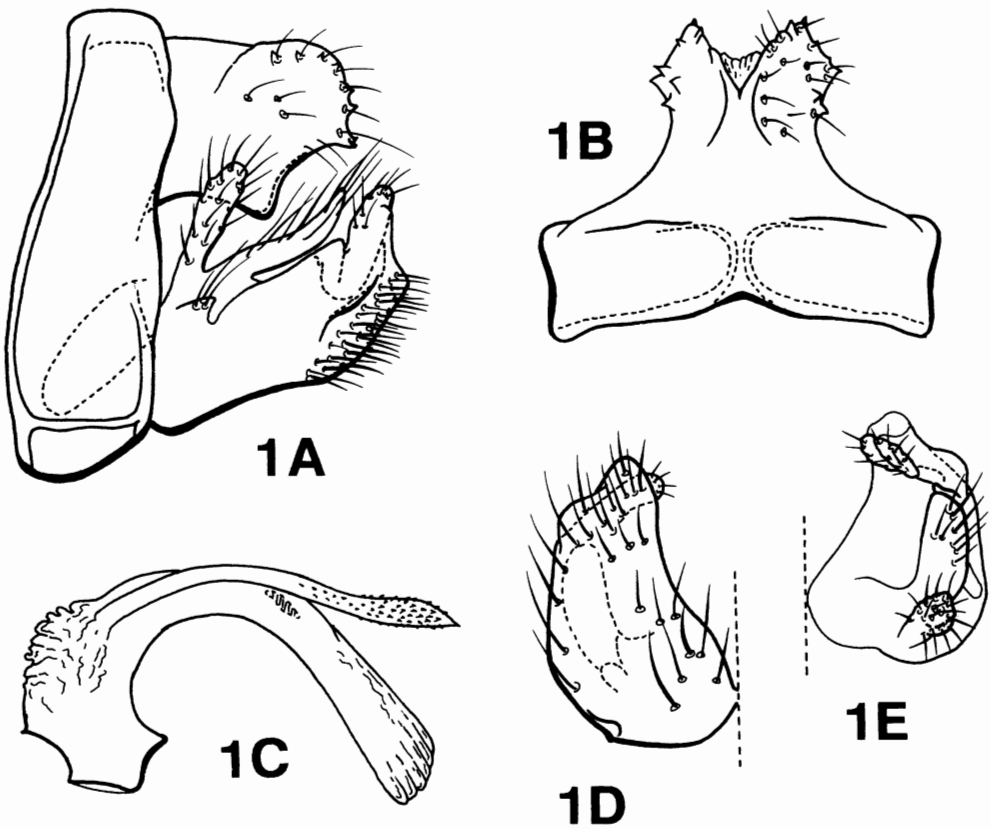
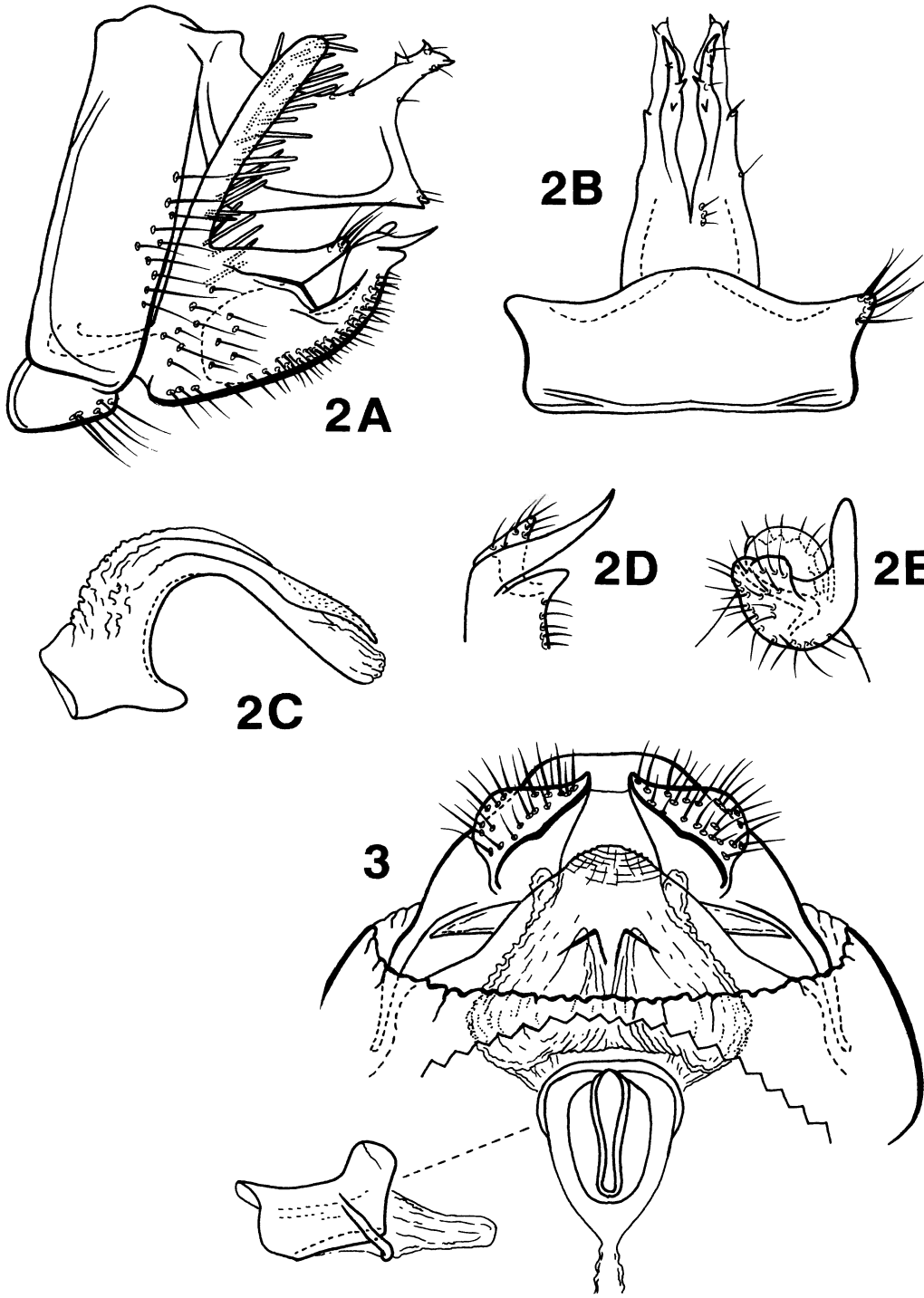


Fig. 1. *Lepidostoma chiriquiensis,* new species, male genitalia: A, segments IX, X, inferior appendage, lateral; B, segments IX, X, dorsal; C, phallus, lateral; D, inferior appendage, ventral; E, same, dorsal.

scales, apically with linear, brown scales, lateral surfaces of flagellomeres densely clothed with fine, apically hooked, brown hairs. Maxillary palpi apparently one-segmented, short, ovate, their apices rounded, covered with long brown and yellow setae; maxillary palpi held against each other apically and together against frons, appressed surfaces concave and bearing long, spatulate, brown scales. Thoracic sclerites brown with scattered long, brown hairs. Legs yellow, sparsely covered with brown and yellow setae. Tibial spur formula 2–4–4. Forewing covered with brown and yellow setae and linear scales; hindwing with light brown setae. *Genitalia:* Segment IX annular. In lateral view, segment X saddle-shaped, mesally cleft; with apicodorsal and apicoventral spinose projections. Inferior appendage broad basally, basodorsal process very long bearing long spine-like setae (these blunt apically and originating from inner surface of basodorsal process); middorsal process narrow, apically setose; apex of inferior appendage with curved, pointed process and pair of blunt processes; ventral surface of inferior appendage covered with short, stout setae. Phallobase short; phalicata tubular; parameres as long as phalicata, abruptly attenuated, and with very small, faint, apical setae; phallotremal sclerite may be present but difficult to discern.

Female: Structure and color similar to male. Sternum VIII broad, sclerotized, slightly concave. Tergum IX saddle-shaped in lateral view, with anterolateral apo-



Figs. 2, 3. *Lepidostoma ectopium,* new species: 2, male genitalia: A, segments IX, X, inferior appendage, lateral; B, segments IX, X, dorsal; C, phallus, lateral; D, apex of inferior appendage, lateral; E, same, dorsal. 3, female genitalia (drawn to same scale as male), ventral; inset, spermathecal sclerite, lateral.

demes. Segment X small, rounded, fused to segment IX. Segments IX+X bearing pair of prominent, apicoventral, setose, appendage-like lobes. Sternum IX with apex striated, bluntly acute, and with pair of small, triangular pockets midventrally. Spermathecal sclerite as illustrated in Fig. 3 and inset; oval in ventral view, saddle-shaped in lateral view with long axis of sclerite horizontally oriented; keyhole shaped area subequal to length of spermathecal sclerite.

Holotype: ♂, COSTA RICA: Puntarenas: Río Bellavista, ca. 1.5 km NW Las Alturas, 8.951°N, 82.846°W, 1400 m, 8–9.iv.1987, Holzenthal, Hamilton, Heyn (NMNH). *Paratypes:* PANAMA: Chiriquí: Guadalupe Arriba, 8°52′26″N, 82°33′13″W, 11–17.i.1984, H. Wolda, 1 ♂ (NMNH); same, except 18–24.i.1984, 1 ♂ (NMNH); same, except 28.ii.–6.iii.1984, 1 ♀ (NMNH); same, except 14–20.iii.1984, 1 ♂ (UMSP); same, except 21–27.iii.1984, 1 ♂ (UMSP); same, except 28.iii.–3.iv.1984, 1 ♀ (UMSP); same, except 4–10.iv.1984, 1 ♂ (INBIO); same, except 18–24.iv.1984, 1 ♂ (NMNH); same, except 16–22.v.1984, 1 ♂ (NMNH); same, except 22–28.viii.1984, 1 ♀ (INBIO); same, except 8–14.v.1985, 1 ♂ (NMNH).

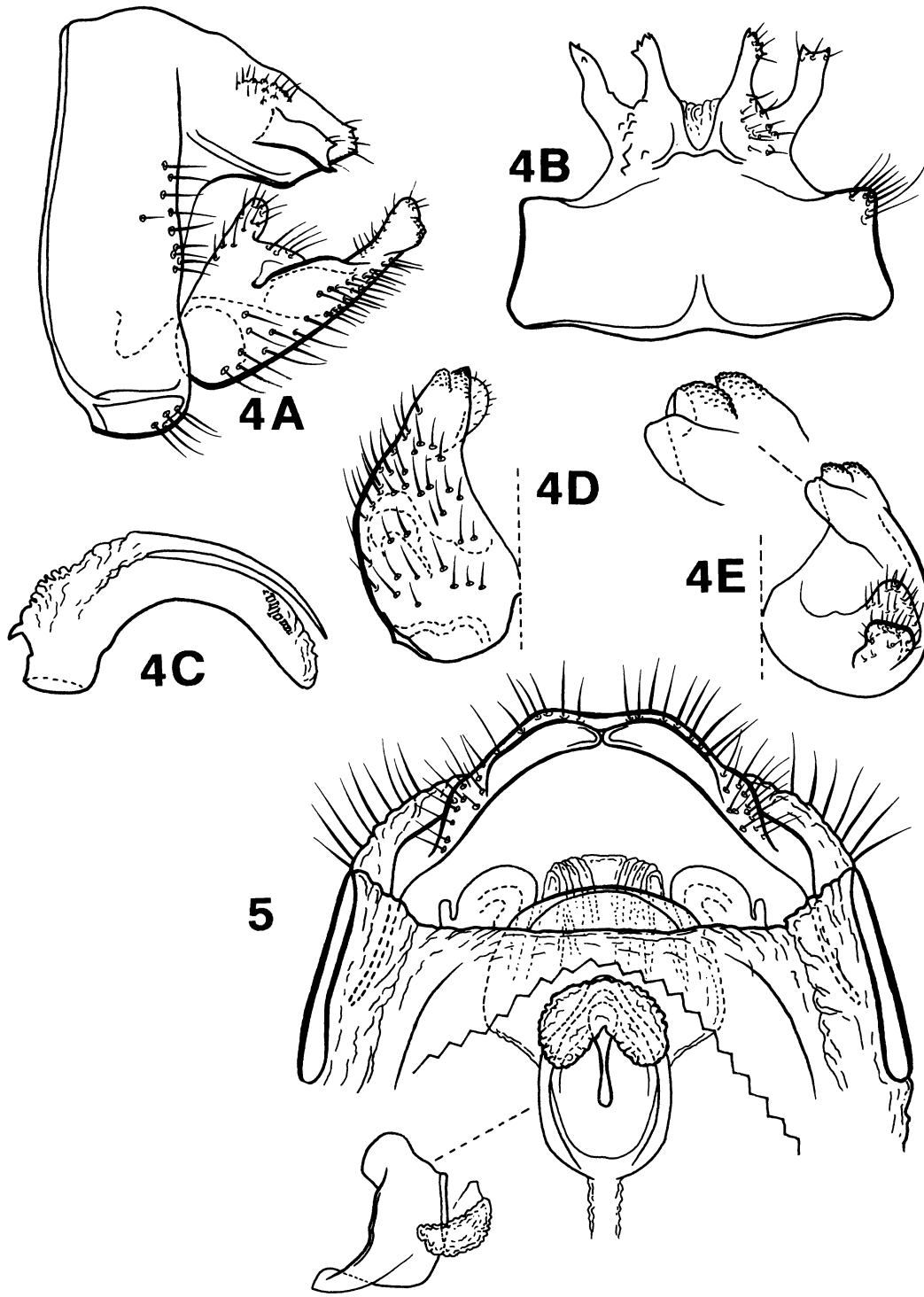
Etymology: From the Greek *ektopius* meaning out of place, odd, strange, or unnatural; in reference to the unusual male genitalia of the species.

Lepidostoma polylepidum, New Species
Figs. 4A–E, 5

Males of *Lepidostoma polylepidum* are unique among the Neotropical species in the possession of heavily scaled head, maxillary palpi, antennae, and wings. The male genitalia, especially the inferior appendages, are similar to those of *Lepidostoma talamancense* Flint, but the presence of midlateral processes on segment X of the new species serves to separate it from *L. talamancense.*

Male: Length of forewing 10 mm. Head with frontal setal warts bearing oblong spatulate brown scales, anterior setal warts with oblong yellowish-white scales, posterior setal warts with long, filiform yellowish-white scales. Antennal scape cylindrical, long, about 1½ times intraocular distance, mesal ⅔ of its surface covered with oblong to spatulate brown scales, lateral ⅓ of surface with more scattered linear yellowish-white scales; pedicel with short spatulate brown scales; mesal surfaces of antennal flagellomeres covered with spatulate brown scales, lateral surfaces densely clothed with fine, silky, apically hooked yellow setae. Maxillary palpi one-segmented, short, ovate, their apices attenuated, covered with oblong yellowish-white scales; maxillary palpi held appressed against frons. Thoracic sclerites yellowish-brown, with scattered long, narrow hairs. Legs yellow, dorsal surfaces covered with short brown setae, ventral surfaces covered with short yellow setae. Tibial spur formula 2–4–4. Forewings completely covered with oblong brown scales, intermixed with patches of yellow scales, with scaleless, concave furrow between Sc and R1; hindwings slightly less densely covered with brown scales and fewer yellow scales. *Genitalia:* Segment IX annular. Segment X triangular in lateral view with short basodorsal setae; in dorsal view, deeply cleft mesally; X bearing pair of sclerotized midlateral projections, these projections varying in length from about ½ length of X to much shorter, their apices with 1–3 sharp points. Inferior appendage broad basally, narrow apically; basodorsal process narrow, round, apically setose; middorsal process short, bearing long setae; apex of inferior appendage narrow, extending beyond tergum X, with subapical serrate ectal flange; in ventral view inferior appendage with two serrate apical processes and subapical mesal thumblike process. Phallobase short, with basal spur; phalicata tubular; parameres as long as phalicata; phallotremal sclerite present.

Female: Length of forewing 11 mm. Antennal scape cylindrical, long, with long, gold and brown setae; flagellomeres apically with brown hairs forming band around segment, basally with yellow hairs. Maxillary palpi 5-segmented. Forewing covered with patch-



Figs. 4, 5. *Lepidostoma polylepidum,* new species: 4, male genitalia: A, segments IX, X, inferior appendages, lateral; B, segments IX, X, dorsal; C, phallus, lateral; D, inferior appendage, ventral; E, same, dorsal; inset, detail of apex of same. 5, female genitalia (drawn to same scale as male), ventral; inset, spermathecal sclerite, lateral.

es of brown and yellowish setae creating mottled pattern similar to that created by patches of scales on male forewings; some hairs along major longitudinal veins very long and erect; hindwing brown, with brown setae. Remaining nongenitalic structure and color similar to male. Genitalia: Sternum VIII broad, sclerotized, slightly concave. Tergum IX saddle-shaped in lateral view, with anterolateral apodemes. Segment X small, fused to segment IX. Segment IX+X bearing pair of apicoventral, setose, appendage-like lobes. Sternum IX broad, rounded, sclerotized, bounded laterally by pair of globose semimembranous lobes; membranous lobe protruding from above sternum IX. Spermathecal sclerite as illustrated in Fig. 5 and inset; oval in ventral view, saddle-shaped in lateral view with long axis of sclerite vertically oriented; keyhole shaped area about ½ length of sclerite; reniform membranous structure present at posterior end of spermathecal sclerite.

Holotype: ♂, COSTA RICA: San José: Río Parrita Chiquito, rt 12, 6.5 km SW jct rt 2, 9.703°N, 83.970°W, 1990 m, 10.iv.1987, Holzenthal, Hamilton, Heyn (NMNH). *Paratypes:* Same data as holotype, 16 ♂, 4 ♀ (UMSP), 2 ♂, 2 ♀ (INBIO), 2 ♂, 2 ♀ (NMNH); COSTA RICA: Puntarenas: Río Bellavista, ca. 1.5 km NW Las Alturas, 8.951°N, 82.846°W, 1400 m, 8–9.iv.1987, Holzenthal, Hamilton, Heyn, 12 ♂, 14 ♀ (pinned), 3 ♂, 7 ♀ (alcohol) (UMSP).

Etymology: Named for the heavily scaled appearance of the male.

Lepidostoma tapanti, New Species
Fig. 6A–D

This new species is most similar to *L. reimoseri* Flint and Bueno, but differs from it in having a more acute and less spinose segment X.

Male: Length of forewing 7.5 mm. Head setal warts bearing long, filiform, brown setae. Antennal scape cylindrical, long, about equal to intraocular distance, mesal surface with long, brown setae, lateral surface with shorter, yellow setae; pedicel with short brown setae; antennal flagellomeres unicolorous, densely clothed with fine, apically hooked, yellowish-white setae. Maxillary palpi apparently one-segmented, with long, filiform brown and yellow setae. Thoracic sclerites yellow, with scattered long yellow setae. Legs yellow, sparsely covered with narrow brown and yellow setae. Tibial spur formula 2–4–4. Forewings covered with long brown and yellow setae, with concave furrow between Sc and R1; hindwing with light brown setae. *Genitalia:* Segment IX annular. In lateral view, segment X roughly ovoid, apex bluntly acute; in dorsal view, deeply cleft mesally. Inferior appendage broad basally, with long, rounded, apically setose, basodorsal process and short, middorsal, setose process; apex narrow, rounded, with small, serrate, subapical flange; in ventral view, apex with thin apicomesal flange. Phallobase with basodorsal spur; phalicata tubular, narrow; parameres as long as phalicata; phallotremal sclerite present.

Holotype: ♂, COSTA RICA: Cartago: Reserva Tapantí, Río Dos Amigos and falls, ca. 6 km (rd) NW tunnel, 9.704°N, 83.783°W, el. 1500 m, 4–5.viii.1990, Holzenthal, Blahnik, Muñoz (NMNH). *Paratypes:* COSTA RICA: Cartago: Reserva Tapantí, Río Grande de Orosi, 9.686°N, 83.756°W, 1650 m, 8–9.vii.1986, Holzenthal, Heyn, Armitage, 1 ♂ (UMSP). PANAMA: Chiriquí: Guadalupe Arriba, 8°52′26″N, 82°33′13″W, 21–27.xii.1983, H. Wolda, 2 ♂ (NMNH); same, except 15–21.ii.1984, 2 ♂ (INBIO); same, except 4–10.iv.1984, 1 ♂ (NMNH); same, except 11–17.iv.1984, 1 ♂ (NMNH); same, except 25.iv.–1.v.1984, 2 ♂ (UMSP); same, except 16–22.v.1984, 1 ♂ (UMSP); same, except 6–12.vi.1984, 2 ♂ (INBIO); same, except 20–26.vi.1984, 1 ♂ (NMNH); same, except 19–25.ix.1984, 1 ♂ (NMNH); same, except 17–23.x.1984, 1 ♂ (NMNH); same, except 24–30.x.1984, 1 ♂ (NMNH); same, except 7–13.xi.1984, 1 ♂ (NMNH); same except 13–

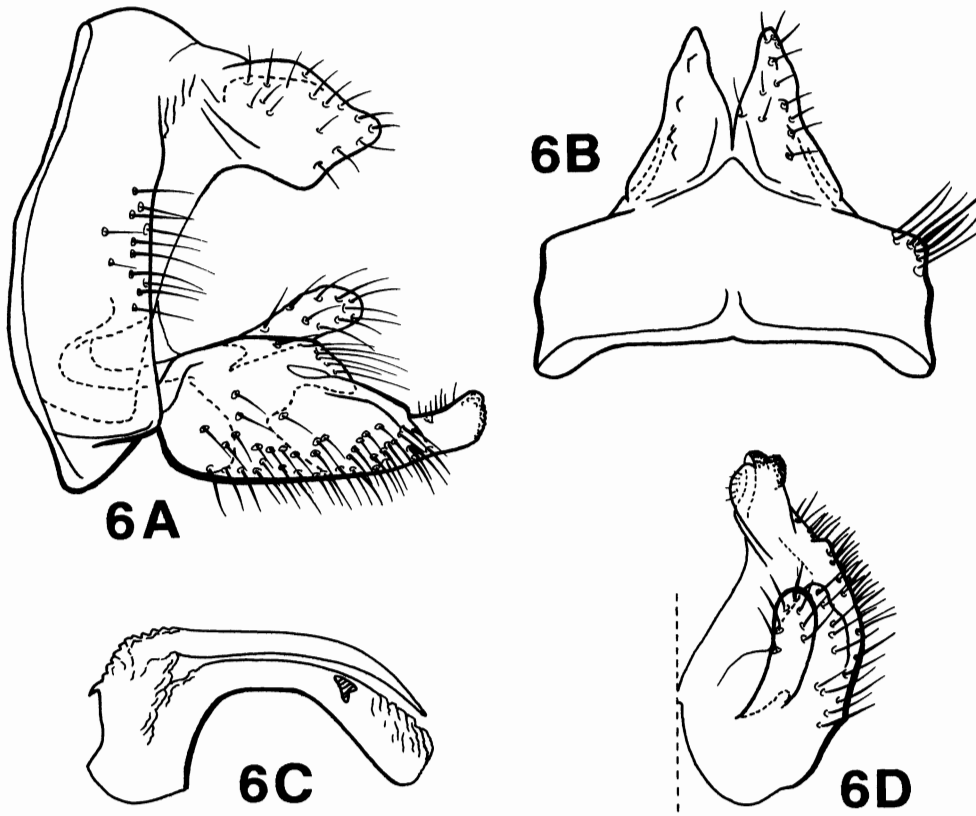


Fig. 6. *Lepidostoma tapanti,* new species, male genitalia: A, segments IX, X, inferior appendage, lateral; B, segments IX, X, dorsal; C, phallus, lateral; D, inferior appendage, dorsal.

19.ii.1985, 1 ♂ (UMSP); same, except 15–21.v.1985, 1 ♂ (INBIO); same, except 5–11.vi.1985, 1 ♂ (NMNH); same, except 28.viii.–3.ix.1985, 1 ♂ (NMNH); same, except 24–30.iv.1986, 2 ♂ (UMSP).

Etymology: Named for the type locality, Tapantí National Wildlife Reserve, Costa Rica.

Lepidostoma xolotl, New Species
Fig. 7A–E

Lepidostoma xolotl is a typical member of the *Mexicanum* Group and appears most similar to *L. delongi* Ross. It differs from that species in having glabrous parameres and a different morphology of the apex of the inferior appendage.

Male: Length of forewing 8 mm. Head setal warts bearing long, filiform, brown setae, many with base and apex yellow. Antennal scape cylindrical, long, about equal to intraocular distance, mesal surface with long setae colored as those on head, lateral surface with shorter, thinner yellow setae and patch of long yellow setae basally; pedicel with short yellow setae; lateral surfaces of flagellomeres densely clothed with fine, silky, apically hooked, yellowish-white setae; mesal surfaces covered with short yellow setae, more apical flagellomeres with brown apical setae giving banded appearance. Maxillary palpi one-segmented, long, cylindrical, held straight out from frons, covered with long, narrow, spatulate, dark brown setae, with yellow setae mesally. Thoracic sclerites brownish-yellow, with scattered long yellow setae. Legs yellow,

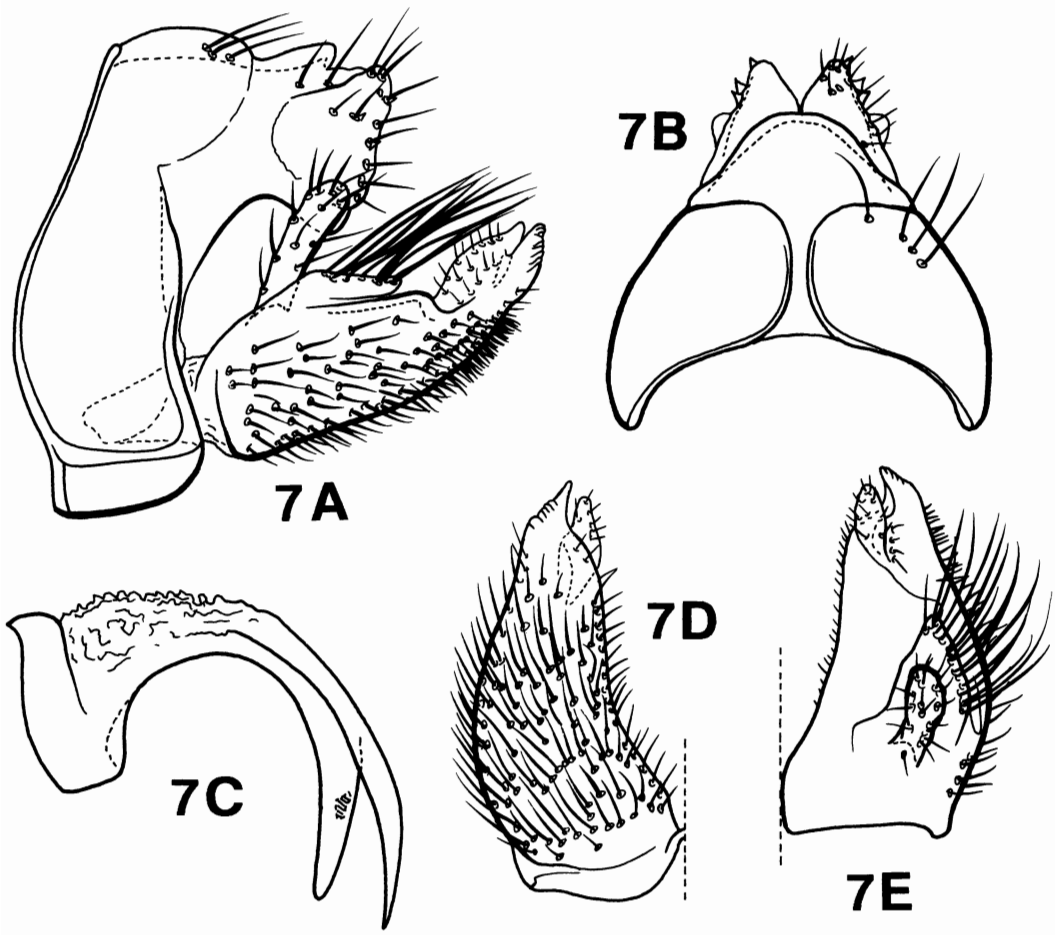


Fig. 7. *Lepidostoma xolotl,* new species, male genitalia: A, segments IX, X, inferior appendage, lateral; B, segments IX, X, dorsal; C, phallus, lateral; D, inferior appendage, ventral; E, same, dorsal.

brown setae on dorsal surfaces, yellow setae on ventral surfaces. Tibial spur formula 2–4–4. Forewings covered with short and long brown and golden setae, with shallow concave furrow between Sc and R1; hindwing with light brown setae. *Genitalia:* Segment IX annular. In lateral view, segment X roughly quadrate, about as long as wide, with small, scattered, spinose projections and long setae; in dorsal view cleft mesally. Inferior appendage very heavily setose, broad basally, with long, terete, basodorsal process and subequal, thumb-like middorsal process bearing many long, thick dorsal setae; apex of inferior appendage bifid, with terete, setose, apicomesal process and heavily sclerotized, ridged, pointed apicolateral process. Phallobase with basodorsal spur; phalicata tubular, narrow; parameres longer than phalicata, glabrous; phallotremal sclerite small.

Holotype: ♂, MEXICO: Nayarit: 49.4 mi E Venado, 18–21.v.1988, N. Bloomfield (NMNH). *Paratype:* MEXICO: Durango: El Salto, Rcho. Nuevo, 11–15.v.1988, Bloomfield, 1 ♂ (SDMNH).

Etymology: Named for *Xólotl,* Aztec god of the evening twilight; in reference to the crepuscular flight of adult Trichoptera.

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