

SYSTEMATICS OF NEOTROPICAL *TRIPLECTIDES*
(TRICHOPTERA: LEPTOCERIDAE)

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Systematics of Neotropical *Triplectides* (Trichoptera: Leptoceridae)

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ABSTRACT The taxonomy and systematics of the Neotropical species of *Triplectides* Kolenati (Leptoceridae: Triplectidinae: Triplectidini) are reviewed. Illustrations and generic diagnoses are provided for adult and immature stages. Eight species are described as new: *T. chilensis* Holzenthal, n. sp., from Argentina and Chile; *T. flintorum* Holzenthal, n. sp., from Mexico, Central America, and northern South America; *T. misionensis* Holzenthal, n. sp., from Argentina; *T. neblinus* Holzenthal, n. sp., *T. neotropicus* Holzenthal, n. sp., and *T. tepui* Holzenthal, n. sp., from Venezuela; *T. nevadus* Holzenthal, n. sp., from Peru and Venezuela; and *T. ultimus* Holzenthal, n. sp., from southeastern Brazil. *Triplectides ramulorurs* (Müller), *T. robustus* Schmid, and *T. multipunctatus* Schmid are designated as synonyms of *T. gracilis* (Burmeister), *T. jaffueli* Navás, and *T. nigripennis* Mosely, respectively. *Triplectides colombicus* Navás is considered a *nomen dubium*.

KEY WORDS Insecta, Leptoceridae, *Triplectides*, Neotropics

THE LONG-HORNED caddisfly genus *Triplectides* contains about 60 species worldwide, making it the most speciose of the 14 genera in the subfamily Triplectidinae. It is also the most widespread genus, with species distributed in a predominantly Southern Hemisphere arc extending from southern and eastern Asia, including India and Japan, through Indonesia, Papua-New Guinea, almost all of Australia, including Tasmania, the South Pacific islands of New Zealand, New Hebrides, and New Caledonia, among others, to southern Chile and Argentina, most of tropical South America, and through Central America to southern Mexico.

Mosely (1936) provided the latest comprehensive revision of the genus, including those species occurring in the Neotropics, and Morse & Neboiss (1982) provided a detailed review of the Australian species. Morse & Holzenthal (1987) discussed the higher classification of the Triplectidinae.

Eleven names exist in the literature for species described from the New World. *Triplectides monotona* Navás, 1918 (Navás 1918b) was synonymized with *T. jaffueli* Navás, 1918 (Navás 1918a) by Schmid (1950) and *T. fazi* Navás, 1932, was synonymized with *Hudsonema flaminii* (Navás), 1926, by Holzenthal (1986). *Triplectides princeps* (Burmeister), 1839, was synonymized with *T. gracilis* (Burmeister), 1839, by Ulmer (1905). *Triplectides multipunctatus* Schmid, 1955, and *T. robustus* Schmid, 1955, are here considered to be synonyms of *T. nigripennis* Mosely, 1936, and *T. jaffueli*, respectively; both are **New Synonyms**. *Triplectides ramulorus* (Müller), 1921, is a synonym of *T. gracilis*, **New Synonym**. *Triplectides colombicus* Navás, 1916, is considered a *nomen dubium*. The type material of *T. eglerti* Sattler, 1963, could

not be located, but the identity of this species is fairly certain. The type material of *T. gracilis* was destroyed during World War II (M. Dorn, Halle (Salle), personal communication) and a neotype is designated for it. Only four of the previously described species are recognized as valid in the present paper: *T. eglerti*, *T. gracilis*, *T. jaffueli*, and *T. nigripennis*. Males and known females of these species are redescribed and illustrated, and eight new species are described and figured.

Cases and immatures of several Neotropical *Triplectides* species were described by Müller (1879a,b, 1880a,b; 1888, 1921) (as *Tetracentron*), Sattler (1963) (*T. eglerti*), Marlier (1964) (as *Atanatolica* sp. 1 and *Atanatolica*? sp. 2), and Botosaneanu & Flint (1982) (*Triplectides* sp.). Sattler (1963) also discussed the biology of his species.

Because of the uniformity of male and female genitalia between most species of New World *Triplectides*, I have reduced some of the species descriptions to a minimum, citing instead only those structures that appear to be the most reliable in diagnosing the species. In males, these include the morphology of the mesal lobes of the inferior appendages and, to a lesser extent, the morphologies of segment X and the phallic apparatus, the tibial spur formula, and the wing venation (although the latter character does not vary nearly as much in Neotropical *Triplectides* species as it does in Australian ones). The shapes and lengths of the preanal appendages and the apicodorsal and basoventral lobes of the inferior appendages, especially in relationship to each other, are somewhat variable within and between populations and are of doubtful use in separating species. In females, the most important characters seem to be the shape of the

appendages of segment X, the presence of sensilla-bearing processes, and, as in males, wing venation and tibial spur formula. It should be noted that the size of the sensilla-bearing processes vary somewhat among individuals within populations, and the processes are often absent on one or both sides of individual specimens.

Terminology for adult and immature morphology follows that used by Holzenthal (1985). In the figures of adult genitalia, A and B are lateral and dorsal views, respectively; C is a ventral view of the male inferior appendages only; D is a lateral view of the male phallic apparatus. Fig. 6E is a dorsal view of the phallic apparatus and Fig. 27E is a dorsal view of the phallosomal sclerite. Complete bibliographies, including synonyms, for publications which appeared before 1961 can be found in the catalogues by Fischer (1965, 1972).

Material examined is from the collections of the British Museum (Natural History), London (BMNH); the Museu de Zoologia, Universidade de São Paulo, São Paulo (MZSP); Purdue University, Lafayette, Indiana (PUL); the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (NMNH, formerly USNM); and the Zoologisk Museum, Universitets Copenhagen, Copenhagen (ZMUC). Types will be deposited in these institutions, as well as the Clemson University Entomological Collection, Clemson, South Carolina (CLEM); Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City (IBUNAM); Instituto de Zoología Agrícola, Universidad Central de Venezuela, Maracay (UCV); Museo Argentino de Ciencias Naturales "Bernardino Rivadavia," Buenos Aires (MBR); Facultad de Ciencias Naturales Museo, Universidad Nacional de La Plata, La Plata, Argentina (MLP); Museo Nacional de Costa Rica, San José (MNCR); and the University of Minnesota Insect Collection, St. Paul, Minnesota (UMSP), as indicated below. Large series of *T. jaffueli* and *T. nigripennis* from the NMNH were examined, but individual collection records for these species are not given below; instead, their distributions are indicated only by country and province or state.

Triplectides Kolenati

Triplectides Kolenati 1859: 247; Mosely 1936: 91; Sattler 1963: 20; Fischer 1965: 59; 1972: 61; Morse & Neboiss 1982: 61.

Type Species. *Mystacides gracilis* Burmeister, subsequent selection of Mosely 1936.

Adult. Brown, forewing often with patches of whitish hairs. Forewing (Fig. 11A) forks I and V present in male, I, III, and V present in female; discal cell (*d*) broad apically, one-third to two-thirds as long as long, narrow thyridial cell (*th*); lengths of crossveins *s* and *r-m* often diagnostic. Hindwing (Fig. 11B) broad, forks I, III, and V present in both sexes (fork I absent in *T. chilensis*

Holzenthal, n. sp., Fig. 5B). Tibial spur formula typically 2-2-4, but 0-2-2, 0-2-3, or 2-2-3 in some species.

Male. Genitalia as in Fig. 9. Abdominal segment IX annular, narrow, generally parallel sided; tergum IX often produced posteriorly. Segment X simple, hoodlike; bearing small, apical, and lateral setae and with shallow to deep apicomeral excision. Preanal appendages (*pr. ap.*) long, narrow, heavily setose. Inferior appendages each with 1st article consisting of tubular to ovoid basal region bearing semimembranous, digitate, apicodorsal lobe (*ap. lo.*), this usually extending beyond second article; narrow, basoventral setose lobe (*bv. lo.*), flexible at its base; and heavily sclerotized mesal lobe (*me. lo.*). Second article of each inferior appendage (*2nd art.*) positioned mesoventrally on first article; heavily sclerotized, mesal surface excavated, apex sharply pointed, directed mesally, sometimes bifid. Phallic apparatus generally consisting of fused, tubular phallic apodeme and phallobase, and large, trident-shaped phallosomal sclerite (Fig. 27E); phallobase sometimes excised dorsomesally, troughlike, acting as receptacle for erectile endothelial and endophallic membranes; occasionally with long, thin, sclerotized strip along dorsal midline of phallic apparatus from phallic apodeme to apex (Fig. 6 D and E); this perhaps primitive phallicata (Morse & Neboiss 1982) or secondarily sclerotized phallic membranes; phallicata and parameres absent; phallic shield also generally absent, present in some species, extended laterally into sclerotized strips articulating with posterolateral edges of sternum IX (Fig. 12D) (see Morse [1975, 1981] for the significance of these periphallic structures).

Female. Genitalia as in Fig. 10. Sternum VIII quadrate apically, more heavily sclerotized than other abdominal sterna, darkly pigmented, covered with short, prominent setae. Sternum IX generally with transverse striae (*str.*) apically (Morse & Neboiss 1982, Fig. 88b). Appendages of segment X (*X ap.*) short, triangular to narrow-elongate, heavily setose; pair of short, sensilla-bearing processes (*s-b. p.*) below appendages of X in some species. Valves (*v.*) ventrolateral, thin, lightly sclerotized, bearing many fine setae. Internal vaginal apparatus (*v. a.*) with central keyhole-shaped sclerites, narrow to broad posterior sclerotized projection when viewed ventrally (Morse & Neboiss 1982, Fig. 95b).

Larva. Head (Fig. 1 A and B and 2A): oval; antennae long, but shorter than in other members of family; ventral apotome long, narrow, triangular to quadrate (Sattler 1963, Fig. 12), completely separating genae ventrally; pair of small, narrow sclerites present and attached by membrane to posterioventral edge of genae; head setal pattern (Fig. 2A) typical for family; anteroventral edge of labrum with brush of short, secondary setae; labral setae 1-3 peglike; mandibles more or less symmetrical, with short, apical teeth surrounding cen-

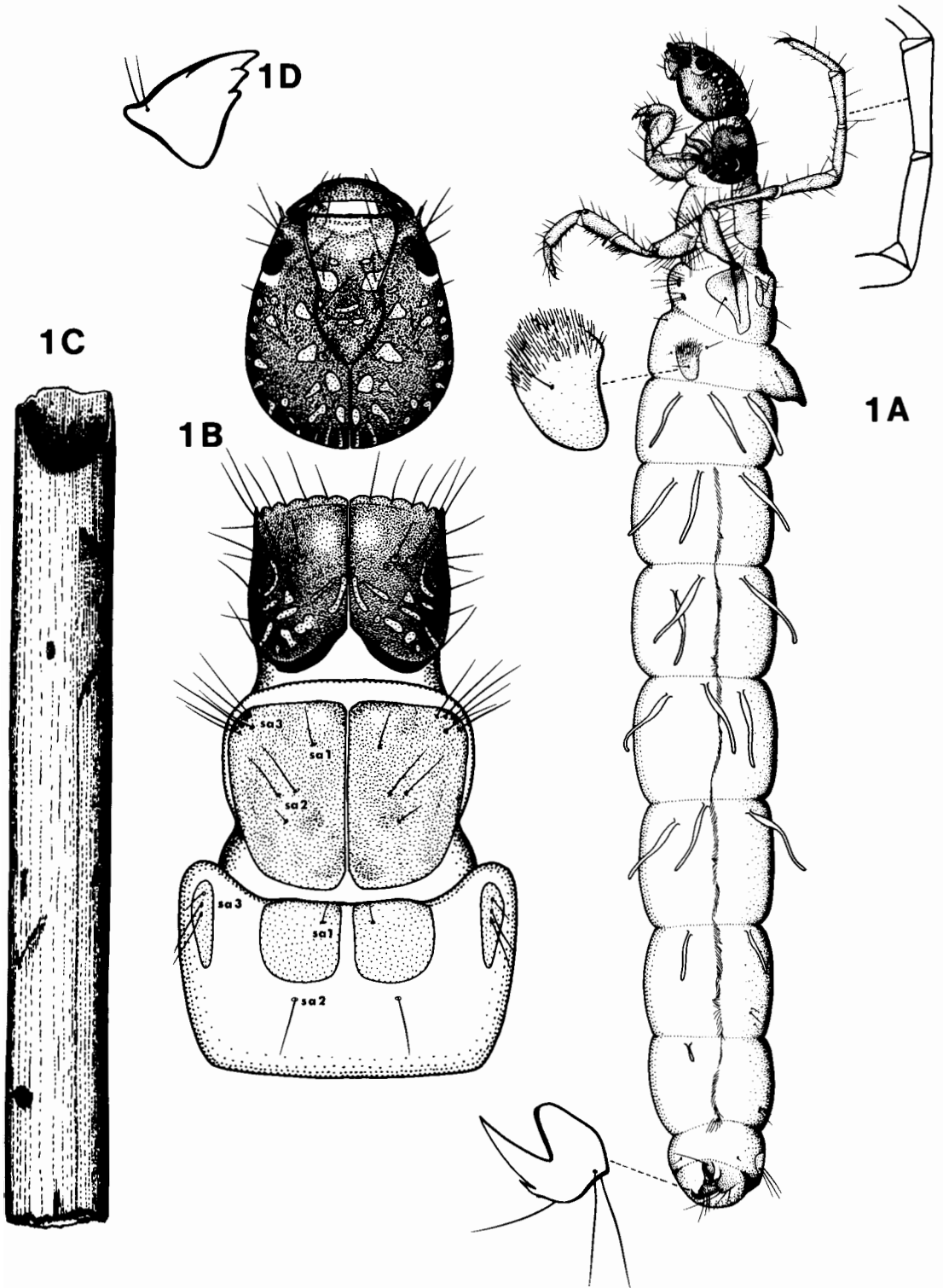


Fig. 1. *Triplectides jaffueli* Navás (CHILE: Chiloé), larva and case: (A), larva, lateral (hind tibia, lateral hump sclerite, and anal claw enlarged); (B), head and thorax, dorsal; (C), case, lateral; (D), left mandible, dorsal.

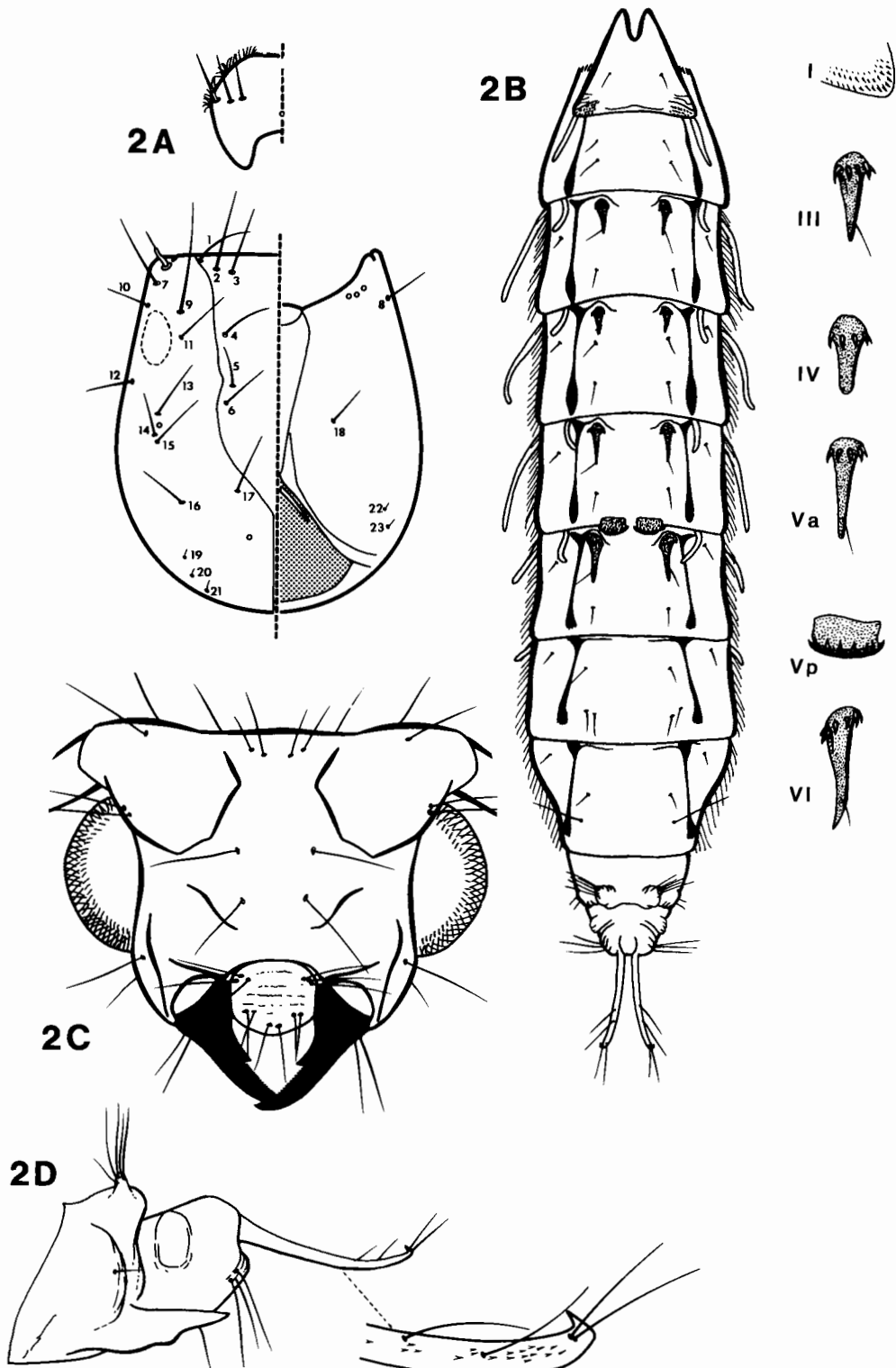


Fig. 2. *Triplectides jaffueli* Navás, larva and pupa: (A), larva, head and labrum (detached) setal pattern, left half dorsal, right half ventral; (B), pupa, abdomen, dorsal (hook plates enlarged); (C), pupa, head, frontal; (D), abdominal segment IX and anal processes, lateral (apex of anal process enlarged).

tral concavity (Fig. 1D). Thorax (Fig. 1 A and B): pronotum with anterior edge generally crenulate, anterolateral corners sometimes sharply pointed; mesonotum almost completely covered by pair of large sclerites; metanotum with two pairs of sclerites: large, quadrate *sa1* sclerites, each bearing single, subapicomeral seta, and small, elongate-oval *sa3* sclerites, each bearing approximately three long setae; single long seta at each *sa2* position without surrounding sclerite; foretrochantin horn-shaped; metasternum often with small, oval, seta-bearing sclerites; legs long, slender, sparsely setose; hind tibiae (Fig. 1A) divided into two subequal parts. Abdomen (Fig. 1A): segment I with well-developed dorsal and lateral humps; lateral hump sclerite lightly sclerotized, oval, with anterior brush of short, thin setae and single, long, central seta; abdominal fringe on segments III–VII; segment VIII with lateral tubercles anteriorly, followed by long fringe; dorsal, lateral, mesal one- to three-branched gills on segments II–VIII (often reduced in number and length on segments VII and VIII); pair of dorso-lateral setae on most abdominal segments; dorsal sclerite of segment IX with three pairs of setae: long lateral, mesal pairs, and very short pair between those pairs; lateral sclerite of anal proleg well-developed; ventral sole plate with transverse black area; anal claw with single, large, sharply pointed tooth and two or three very small dorsal accessory hooks (Fig. 1A).

Larval Case. Constructed of wide variety of plant and mineral materials (Botosaneanu & Flint 1982, Fig. 54 and 55); commonly constructed from hollowed-out twig, often up to 15 cm long, lined internally with silk, and with small, lateral hole towards posterior end (Sattler 1963, Fig. 26, Hi; Fig. 1C); some species inhabiting discarded cases of other caddisflies, including those of *Parasericostoma* in Chile and *Grumicha* in Brazil (O. S. Flint, Jr., personal communication).

Pupa. Head (Fig. 2C): setal pattern of *T. jaffeuli* as in Fig. 2C, with three pairs of setae on vertex, two pairs on each antennal scape, two pairs of long frontal setae, one pair below each eye; labrum with three long setae at each basolateral corner, three pairs along apicodorsal edge; mandibles prominent, with large apical tooth bearing fine serrations along mesal margin and smaller mesal, subapical tooth. Abdomen (Fig. 2B and D): hook plates as in Fig. 2B; each abdominal segment with dorsal setae; lateral fringe on segments III–VIII; abdominal gills distributed as in larva, but usually shorter, somewhat depressed; dorsum of segment IX with anterolateral pair of moundlike, seta-bearing protuberances; apicolateral portion of segment IX with three to six pairs of long setae; anal processes (Fig. 2D) each long, slender, with apex upturned and recurved, sharply pointed, bearing small, flat, minute setae and four long setae; ventrolateral lobes of segment IX (Fig. 2D) prominent on mature male pupa (developing adult inferior appendages), less

well developed on female and immature male pupae.

***Triplectides chilensis* Holzenthal, n. sp.**

Fig. 3–5

The male of this species is easily distinguishable from all other Neotropical species by the very reduced mesal lobes of the inferior appendages. Females can be identified by having invaginated pockets on abdominal pleura IX and by the shape of the appendages of segment X.

Male. Brown; forewing with wide, diffuse, transverse bands of whitish hairs sub-basally and at arculus. Forewing crossvein *s* straight, well distad of very short *r-m* crossvein (Fig. 5A); without hindwing fork I (Fig. 5B). Length of forewing 15–17 mm. Spurs 2–2–4. Genitalia as in Fig. 3. Segment IX narrow, tergum IX slightly produced posteriorly, some specimens with dorsomesal, semimembranous projection. Preanal appendages short, about half length of segment X. Segment X with narrow, apicomeral excision; apex quadrate in dorsal view, with apicolateral seta-bearing ridges. Mesal lobe of each inferior appendage very reduced; basoventral lobe long, narrow; second article gradually curved mesally, apex pointed. Phallic apparatus short, apex blunt.

Female. Color, structure similar to that of male. Length of forewing 12–14 mm. Genitalia as in Fig. 4. Segment IX with apicoventral, transverse striae; paired ventrolateral, invaginated pockets; small, midlateral, setose mound. Segment X produced posteriorly, triangular. Appendages of segment X auricular, each with small, subapicoventral, mesal, crecentric excision. Without sensilla-bearing processes. Valves triangular in lateral view.

Type Material. *Holotype*: Male, CHILE: Osorno: Parque Nacional Puyehue, Aguas Calientes, 6-II-1978, C. M. & O. S. Flint, Jr. (NMNH). *Paratypes*: Same data as holotype, 1 ♂, 7 ♀♀ (NMNH); ARGENTINA: Chubut: Arroyo Golondrinas, 6 km N Lago Puelo, 8-II-1974, O. S. Flint, Jr., 1 ♀ (NMNH); Río Epuyen, Hoyo de Epuyen, 10-II-1974, O. S. Flint, Jr., 2 ♀♀ (NMNH); Esquel, Lago Menendez, El Sagrario Puerto, 2–4-I-1982, 600 m, Nielsen and Karaholt, 1 ♂ (ZMUC); Neuquén: Arroyo Rosales, near San Martín de los Andes, 22-I-1974, O. S. Flint, Jr., 2 ♂♂ (NMNH); Río Totoral, 24 km NW Va. La Angostura, 20-II-1978, C. M. & O. S. Flint, Jr., 2 ♀♀ (NMNH); Río Negro: San Carlos de Bariloche, Colonia Suiza, 810 m, 11-XII-1978, 10 ♂♂, 15 ♀♀, Mision Científica Danesa (NMNH, ZMUC); CHILE: [Chiloé] Lago Coluco, S Ancud, 24–30-I-1981, M. Marin, 7 ♀♀ (NMNH); Llanquihue: El Chingue, N Correntoso (S Volcán Calbuco) 300 m, 20–25-I-1980, L. E. Peña G., 7 ♀♀ (NMNH); Osorno: Parque Nacional Puyehue, Río Anticura, 31-I–13-II-1978, C. M. & O. S. Flint, Jr., 34 ♂♂, 35 ♀♀ (MBR, NMNH, MLP); same, except 3

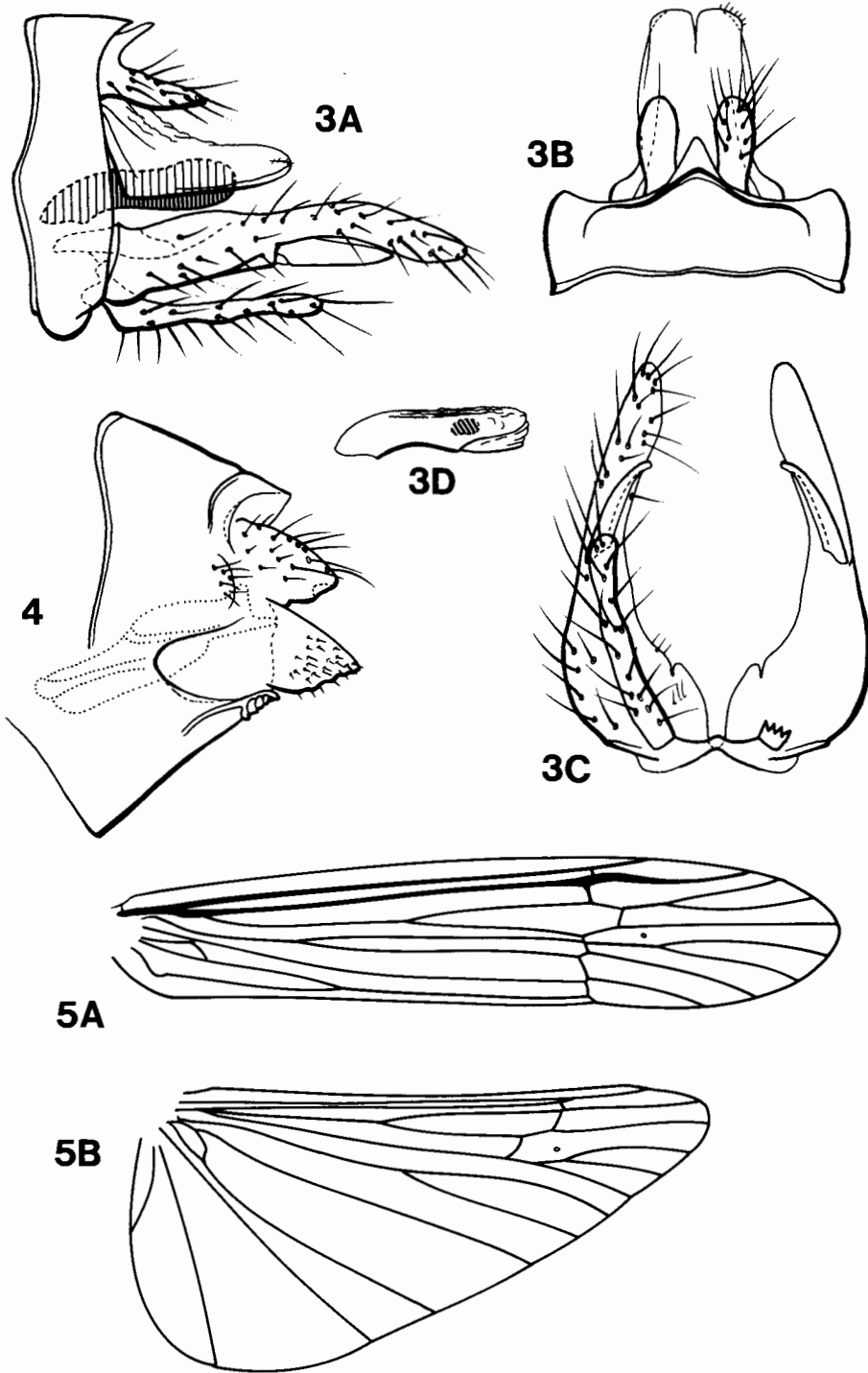


Fig. 3-5. *Triplectides chilensis* Holzenthal, n. sp. (3 A-D) Male genitalia. (4) Female genitalia, lateral view. (5) Male wings: A, forewing; B, hindwing.

km E Anticura, 3-II-1978, 9 ♂♂, 3 ♀♀ (CLEM, NMNH); same except Río Chanlefu, 1 km S Aguas Calientes, 8-9-II-1978, 2 ♂♂, 9 ♀♀ (UMSP); same, except Aguas Calientes to 2 km S, 600 m, 10-22-

II-1979, D. and M. Davis and B. Ackerbergs, 2 ♂♂ (UMSP); same, except Lago El Toro 7-8-II-1978, C. M. & O. S. Flint, Jr., 15 ♂♂, 4 ♀♀ (UMSP); Pucatrihue, 3-21-II-1967, L. E. Peña G., 1 ♀ (NMNH);

La Picada, 600 m, W Volcán Osorno, 12-22-I-1980, L. E. Peña G., 1 ♀ (NMNH).

Etymology. Named for the Chilean biogeographical subregion.

Distribution. ARGENTINA (Chubut, Neuquén, Río Negro); CHILE (Chiloé, Llanquihue, Osorno).

Triplectides colombicus Navás

Triplectides colombicus Navás 1916: 67, Fig. 8, male (whereabouts of type unknown); Mosely 1936: 126, (as *Triplectides*?). **Nomen dubium.**

Navás (1916) stated that the type, from Choachi, Colombia, was a female. However, his figures of the wings are those of a male. The venation, perhaps inaccurately illustrated, does not resemble that of any known species, including *T. gracilis*, which it is said to resemble, or *T. flintorum* Holzenthal, n. sp., which occurs in Colombia. Navás did not indicate where the type was deposited.

Triplectides eglerti Sattler

Fig. 24

Triplectides eglerti Sattler 1963: 20, Fig. 1-39, male, female, larva, pupa, biology (whereabouts of type unknown); Flint 1974a: 137, Fig. 285, male.

This species, known from only a very few specimens, was described from Belém, Pará, Brazil. Flint (1974a) recorded it from Surinam. It has also been collected near Manaus, Brazil, and in Guyana.

In an attempt to locate the type material, I corresponded with Dr. Peter Zwick, Limnologische Flusstation des Max-Planck-Instituts für Limnologie, Schlitz, West Germany (indicated by Sattler [1963] as the type depository). He informed me that the material was not in Schlitz and that the late Dr. Sattler had deposited part of his material in the Senckenbergmuseum, Frankfurt, and part in the Max-Planck-Institute für Limnologie, Plön, West Germany. Drs. Wolfgang Tobias and Wolfgang Junk, of the former and latter institutions, respectively, informed me that the types of Sattler's species were not in their institutions. I must conclude, unfortunately, that the type specimens of *T. eglerti* almost certainly are lost, if not destroyed. Fortunately, Sattler's illustrations of the male genitalia and wing venation are excellent (Sattler 1963, Fig. 2-7) and they agree with the series of NMNH specimens from Brazil, Guyana, and Surinam. These specimens also share the 2-2-3 tibial spur formula of *T. eglerti* and I am considering them to be conspecific with that species. *Triplectides eglerti* can be distinguished from its congeners by the shape of the mesal lobes of the male inferior appendages (Fig. 24). In *T. eglerti* these lobes are broad basally and each tapers to a rounded, slightly laterally directed apex. The wing venation of *T. eglerti* is virtually identical with that of *T. neblinus* Holzenthal, n. sp., and *T. nevadus* Holzenthal, n. sp.,

but these species lack spurs of the fore tibiae. In spite of their very similar wing venation, males of the three species differ substantially from each other in the morphology of the mesal lobes of the inferior appendages and, at least in one species (*T. neblinus* Holzenthal, n. sp.), the preanal appendages.

Male. Brown; forewing brown with scattered whitish hairs and dark brown hairs along base of R. Wing venation as in *T. neblinus* Holzenthal, n. sp., (Fig. 19). Length of forewing 10-11 mm. Spurs 2-2-3. Genitalia as in Fig. 24 and as illustrated in papers by Sattler (1963, Fig. 4-7) and Flint (1974a, Fig. 285). Mesal lobe of each inferior appendage (Fig. 24) broad basally, tapered to rounded, slightly laterally directed apex.

Female. Color, size, structure similar to those of male. Genitalia inseparable from *T. nevadus* Holzenthal, n. sp.

Material Examined. BRAZIL: Amazonas: Reserva Ducke, 26 km E Manaus, 1-5-II-1979, O. S. Flint, Jr., 4 ♂♂ (NMNH); GUYANA: Mazaruni-Potara District: Takutu Mountains, 6°15'N, 59°5'W, 14-XI-1983, Spangler, Faitoute, Steiner, 1 ♂, 2 ♀♀ (NMNH); same, except 5-XII-1983, 1 ♀ (NMNH); same, except 11-XII-1983, 1 ♀ (NMNH); SURINAM: Koboeri Creek, first camp, 25-III-1971, D. C. Geijskes, 1 ♂ (NMNH); Nassau Mountains, trail, km 2, mountain creek, 22-II-1949, D. C. Geijskes, 1 ♂ (NMNH); Zanderij, Coropina Creek, 29-XI-1953, D. C. Geijskes, 1 ♂ (NMNH).

Distribution. BRAZIL (Amazonas, Pará); GUYANA; SURINAM.

Triplectides flintorum Holzenthal, n. sp.

Fig. 6-8

Triplectides gracilis (nec Burmeister 1839), Ulmer 1907: 41; Mosely 1936: 96 (part); Flint 1974a: 137; Bueno-Soria & Flint 1978: 212.

After having examined a large series of *Triplectides* specimens from Mexico, Central, and northern South America and comparing them with *T. gracilis* from Argentina, Brazil, and Paraguay, I am convinced that the northern Neotropical form represents a distinct, undescribed species. All literature records of *T. gracilis* from Mexico, Central America, Colombia, Ecuador, and Venezuela, therefore, probably correctly should refer to *T. flintorum*.

The male and female genitalia and wing venation of this species are quite distinct from those of *T. gracilis* and other Neotropical species in the genus. In *T. flintorum* hindwing fork I is present and distinctly petiolate; in *T. gracilis* it is also present but is generally sessile or has a very short petiole (Fig. 11B). The shapes of the forewing discal cells of the two species are also slightly different (Fig. 8 and 11A). The mesal lobes of the inferior appendages of the male genitalia of *T. flintorum* are straight, slightly tapered, and have blunt apices

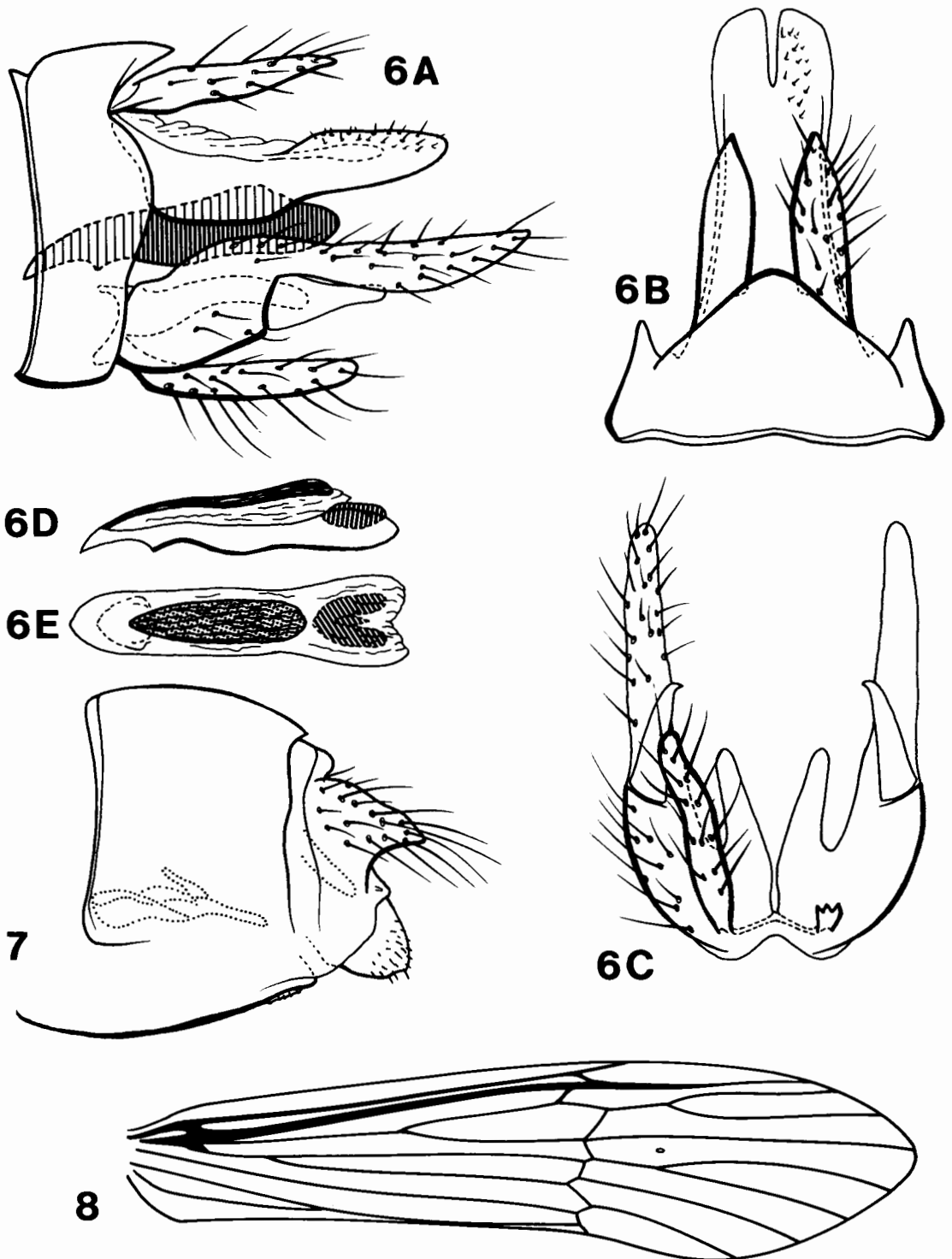


Fig. 6-8. *Triplectides flintorum* Holzenthal, n. sp. (6 A-E) Male genitalia. (7) Female genitalia, lateral view. (8) Male forewing.

when viewed ventrally (Fig. 6C). The same structures in *T. gracilis* are narrower and somewhat sinuate in ventral view (Fig. 9C). Also, in *T. flintorum* there is a long, thin, sclerotized strip along

the dorsal midline of the phallic apparatus (Fig. 6 D and E); this structure is less well developed in *T. gracilis*. The females of the two species are quite distinctive. In *T. flintorum* the appendages of seg-

ment X are generally broad and triangular in shape (Fig. 7), whereas in *T. gracilis* they are elongate and slender (Fig. 10).

Male. Brown; forewing color similar to that of *T. tepui* Holzenthal, n. sp., but generally lighter. Forewing crossvein *s* long, straight, often in direct contact with *r-m* or slightly distad of it (Fig. 8); hindwing fork I present and with distinct petiole. Length of forewing 11–16 mm. Spurs 2-2-4. Genitalia as in Fig. 6. Segment IX produced posteriorly. Segment X with apicomeral excision extending anteriorly one-third length of segment; in lateral view apical portion of segment X narrowest, bearing short, dorsal setae. Mesal lobes of each inferior appendage straight, digitate, apex blunt. Second article of each inferior appendage stout, tapered to small, pointed, mesally directed apex. Phallic apparatus with thin, sclerotized, mid-dorsal strip and large phallosomal sclerite.

Female. Color and structure similar to those of male. Length of forewing 12–19 mm. Genitalia as in Fig. 7. Appendages of segment X broad, roughly triangular in lateral view, apices often conical. With distinct membranous lobe bearing minute sensilla-bearing process below each valve (occasionally sensilla-bearing process absent on one or both sides).

Type Material. *Holotype*: Male, COSTA RICA: [Guanacaste] 2.5 mi W Tilarán, 24-VII-1967, O. S. Flint, Jr. (NMNH). *Paratypes*: Same data as holotype, 2 ♂, 1 ♀ (NMNH); COLOMBIA: Antioquia: Quebrada La Iguana, 17 km NW Medellín, 14-15-II-1983, O. S. Flint, Jr., 2 ♂ (NMNH); Quebrada Honda, 1,450 m, 12 km SW Fredonia, 22-II-1983, O. S. Flint, Jr., 1 ♂ (NMNH); [Cundinamarca] Bogotá, Chico, 25-I-1959, J. F. G. Clarke, 1 ♂, 1 ♀ (NMNH); COSTA RICA: Alajuela: Río Pizote, ca. 5 km (air) S Brasilia, 10.972°N, 85.345°W, 390 m, 12-III-1986, Holzenthal and Fath, 1 ♂ (UMSP); Heredia: Est. Biol. La Selva, Quebrada Sura, 10.437°N, 84.010°W, 50 m, 20-21-VI-1986, Holzenthal, Heyn, Armitage, 1 ♀ (UMSP); Guanacaste: Rincón Nat. Park, 22-XII-1978, D. H. Janzen, 1 ♂ (NMNH); same, except Río Negro, 10.765°N, 85.313°W, 810 m, 3-III-1986, Holzenthal and Fath, 1 ♂, 2 ♀ (UMSP); Puntarenas: Osa Peninsula, 2.5 mi SW Rincón, 08°42'N, 83°29'W, 1-7-III-1967, D. H. Janzen, 1 ♂ (NMNH); Río Bellavista, ca. 1.5 km NW Las Alturas, 8.951°N, 82.846°W, 1,400 m, 8-VI-1987, Holzenthal, Hamilton, Heyn, 2 ♂, 1 ♀ (MNCR); [Puntarenas] Villa Colón, 16 mi S Palmar Sur, 3-VII-1967, O. S. Flint, Jr., 1 ♂ (NMNH); San José: Río Parrita Chiquito, rt. 12, 6.5 km SW jct. rt. 2, 9.703°N, 83.970°W, 1,990 m, 18-VI-1986, Holzenthal, Heyn, Armitage, 1 ♂ (UMSP); ECUADOR: Loja: Celicia, 2,000 m, 16-18-VIII-1977, L. E. Peña G., 1 ♀ (NMNH); GUATEMALA: El Progreso: Finca la Cajeta, 12-20-VIII-1965, Flint and Ortiz, 2 ♂ (NMNH); Izabal: Matias de Galvez, 14-16-VIII-1965, Flint and Ortiz, 4 ♂, 2 ♀ (NMNH); same, except 14-15-VIII-1965, P. J. Spangler, 1 ♂ (NMNH); Secanquín, 11-I-1905, Maxon and Hay, 1 ♂ (NMNH); HONDURAS: Lom-

bardia, W. M. Mann, 1 ♂ (NMNH); MEXICO: Chiapas: Dolores, rt. 190, km 1,190, 7-VIII-1965, Flint and Ortiz, 3 ♂ (CLEM, NMNH); same, except 8-9-VII-1966, 2 ♂ (NMNH); 15 km N Ocosingo, 20-V-1980, C. M. & O. S. Flint, Jr., 1 ♂ (IBUNAM); 2.9 mi S Jitotol, 11-VIII-1967, O. S. Flint, Jr., 1 ♂, 2 ♀ (IBUNAM); Teopisca, 9-VII-1966, Flint and Ortiz, 2 ♂ (NMNH); Cascada Misolja, 20 km S Palenque, 17-18-V-1981, C. M. & O. S. Flint, Jr., 2 ♀ (CLEM, NMNH); Oaxaca: 8 km S Valle Nacional, 25-V-1981, C. M. & O. S. Flint, Jr., 1 ♀ (NMNH); San Luis Potosí: Huichihauyan, rt. 85, km 399, 7-VIII-1966, O. S. Flint, Jr., 1 ♀ (NMNH); Veracruz: 1.6 mi N Coscomatepec, 22-VII-1966, Flint and Ortiz, 1 ♀ (NMNH); near Huatusco, 25-26-VII-1965, Flint and Ortiz, 1 ♂ (IBUNAM); Los Tuxtlas area, near Balzapote, "Los Tuxtlas" Biol. Station, 31 km NE Catemaco, 3-15-V-1981, C. M. & O. S. Flint, Jr., 1 ♀ (NMNH); Laguna Escondida, Los Tuxtlas Estación de Biología, 19-V-1977, E. Gonzalez, 1 ♂ (IBUNAM); Arroyo de Balzapote, Estación de Biología Los Tuxtlas, 28-VI-1977, E. Gonzalez, 1 ♂, 2 ♀ (IBUNAM); NICARAGUA: Pte. Quinama, E Villa Somoza, 29-VII-1967, O. S. Flint, Jr., 1 ♀ (NMNH); PANAMA: Canal Zone: Pipeline Rd., Río Agua Salud, 8-12-VII-1967, Flint and Ortiz, 2 ♂ (NMNH); Barro Colorado Isl., 25-28-III-1965, S. S. & W. D. Duckworth, 1 ♂ (NMNH); La Chorrera, 4-III-1944, G. Ryan, 2 ♂ (PUL).

Etymology. It is with great pleasure that I name this species in honor of Dr. and Mrs. Oliver S. Flint, Jr., who together have explored much of the Neotropical Region for Trichoptera.

Distribution. COLOMBIA (Antioquia, Cundinamarca); COSTA RICA; ECUADOR; GUATEMALA; HONDURAS; MEXICO (Chiapas, Oaxaca, San Luis Potosí, Veracruz); NICARAGUA; PANAMA.

Triplectides gracilis (Burmeister)

Fig. 9-11

Triplectides gracilis (Burmeister 1839: 921) (sex not stated, but male according to Ulmer) (as *Mystacides*); Ulmer 1905: 27, Pl. 1, Fig. 23-25, male; Mosely, 1936: 96, Fig. 1, 8-10, male.

Triplectides princeps (Burmeister 1839: 921) (sex not stated); Ulmer 1905: 27, as synonym of *gracilis*.

Triplectides ramulorus (Müller 1921: 241, 243, Fig. 189b(b), 194a(d), 234, larva, pupa) (as *Tetracetrion ramulorum*); Fischer 1965: 70 (as uncertain synonym). **New Synonym.**

The male holotype of this species and the type of *T. princeps* were, unfortunately, destroyed during or shortly after World War II (M. Dorn, personal communication). *Triplectides gracilis* was described by Burmeister from a specimen collected from the vicinity of Nova Friburgo in southern Brazil. There is no indication that a syntypic series ever existed. Fortunately, the type was figured ad-

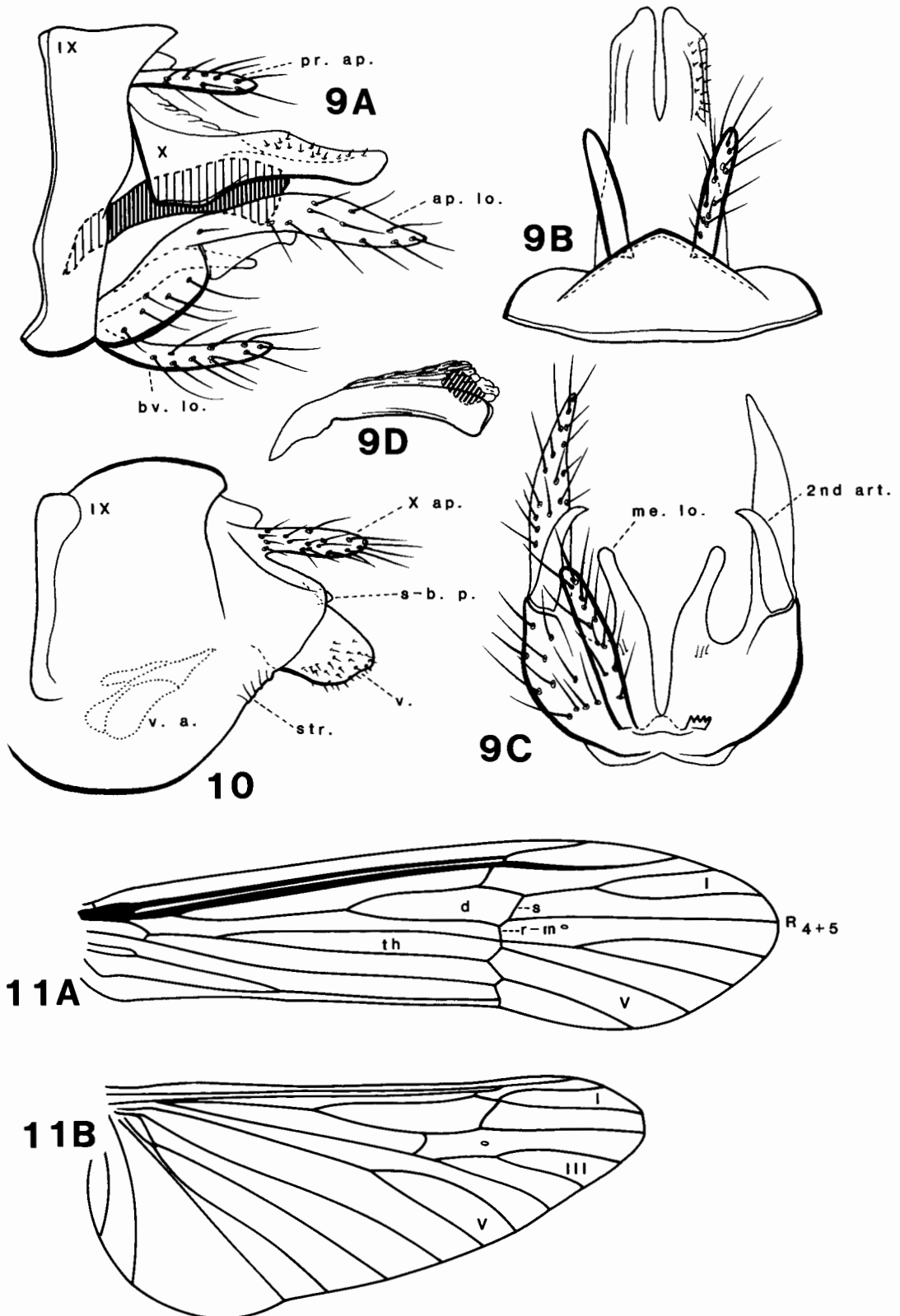


Fig. 9-11. *Triplectides gracilis* (Burmeister). (9 A-D) Male genitalia. (10) Female genitalia, lateral view. (11) Male wings: A, forewing; B, hindwing.

equately by Mosely (1936, Fig. 8-10) and his illustrations and description match perfectly a large series of *Triplectides* specimens, which I consider to be conspecific with *T. gracilis*, from southern Brazil, including Nova Friburgo, and adjacent Argentina and Paraguay. Mosely's (1936) records of this species from Guatemala and Panama should correctly refer to *T. flintorum* (see above) and his record of it from Chile probably refers to *T. chilensis*, *T. jaffueli*, or *T. nigripennis*. Also, the wing venation figured by Mosely (1936, Fig. 1) and indicated by him to be that of *T. gracilis* is actually closer to the venation of *T. misionensis* Holzenthal, n. sp. He did not state if this illustration was of the type. It seems certain, though, that he had a mixed series before him. Likewise, Ulmer's illustrations (Ulmer 1905, Fig. 23-25) of the genitalia and wings, also indicated by him to be of *T. gracilis*, are difficult to associate with any known species; in fact, his figure of the forewing is suggestive of *T. ultimus* Holzenthal, n. sp., whereas that of the hindwing is suggestive of *T. chilensis*.

In view of the prior confusion of the identities of *T. gracilis* and *T. flintorum* and of the partial sympatry of the former species with *T. misionensis* Holzenthal, n. sp., and *T. ultimus* Holzenthal, n. sp., a neotype of *T. gracilis* is designated below to ensure taxonomic stability.

Triplectides gracilis can be separated from *T. flintorum* by the characters given in the diagnosis of the latter species. It is sympatric with *T. misionensis* Holzenthal, n. sp. in the western part of its range (Argentina: Misiones), where males of the two species may be confused. In *T. gracilis*, hindwing fork I is sessile or has a very short petiole (Fig. 11B), in *T. misionensis* it is distinctly petiolate. Also, the apical portion of the forewing discal cell is broader and, consequently, *r-m* is shorter in *T. misionensis* than in *T. gracilis* (Fig. 17 and 11A, respectively). The apical portion of the mesal lobe of each inferior appendage in the male genitalia of *T. misionensis* (Fig. 15C) is much narrower than it is in *T. gracilis* (Fig. 9C), and in the former species there is a small, basomesal, sclerotized point on this lobe. In some individuals of *T. gracilis* the mesal lobes are narrower than those shown in Fig. 9C, but they never attain the very narrow condition found in *T. misionensis*. Very reliable characters for separating the two species are found in the female genitalia. In *T. gracilis* the appendages of segment X are elongate and slender (Fig. 10A), in *T. misionensis* they are short, broad, and each bears a distinct, short, rounded, ventral projection (Fig. 16A). *Triplectides gracilis* females possess short, blunt sensilla-bearing processes, these are absent in *T. misionensis* (Fig. 10). Finally, *T. misionensis* females have elongate, vertical patches of long setae on abdominal pleura IX (Fig. 16); these setae are completely lacking in *T. gracilis*.

Triplectides gracilis is sympatric with *T. ultimus* Holzenthal, n. sp. in the eastern part of its range (at least Itatiaia, Rio de Janeiro, Brazil), but

the two species are readily distinguished by the markedly different shapes of the mesal lobes of the inferior appendages of the male and the appendages of segment X in the females.

The name *Tetracentron ramulorum* was used by Müller for *Triplectides* immatures occurring in Santa Catarina, Brazil, and was made available, unfortunately, when his notes and letters were published in 1921. His species is almost certainly the same as the common and widespread southeastern Brazilian species *T. gracilis* and is here considered a synonym of that species, **New Synonym**.

Male. Brown; forewing with large, irregular patches of whitish hairs arranged in rough chevron pattern. Forewing R_{4+5} between *s* and *r-m* about equal in length to *r-m* (Fig. 11A); hindwing fork I sessile or with very short petiole (Fig. 11B). Length of forewing 12-15 mm. Spurs 2-2-4. Genitalia as in Fig. 9. Mesal lobe of each inferior appendage slightly sinuate in ventral view, apex rounded.

Female. Color, size, structure similar to those of male. Genitalia as in Fig. 10. Appendages of segment X elongate, slender. Sensilla-bearing processes short, rounded.

Neotype. Male, BRAZIL: Rio de Janeiro, 950 m, Nova Friburgo, municipal water supply, 24-IV-1977, C. M. & O. S. Flint, Jr. (MZSP).

Material Examined. ARGENTINA: Misiones: Arroyo Coati, 15 km E San José, 18-19-XI-1973, O. S. Flint, Jr., 2 ♂♂, 2 ♀♀ (NMNH); Arroyo Liso, 8 km W Gral. Guemes, 19-XI-1973, O. S. Flint, Jr., 1 ♀ (NMNH); Arroyo Piray Guazú, N San Pedro, 22-XI-1973, O. S. Flint, Jr., 2 ♂♂, 1 ♀ (UMSP); Arroyo Piray Mini, W Dos Hermanas, 22-XI-1973, O. S. Flint, Jr., 6 ♂♂, 3 ♀♀ (NMNH); Arroyo Saura, 9 km N L. N. Alem, 20-XI-1973, O. S. Flint, Jr., 3 ♂♂, 4 ♀♀ (CLEM, NMNH); BRAZIL: Espirito Santo, Faz. Sta. Clara, 15 km SE Sta. Teresa, 460 m, 22-IV-1977, C. M. & O. S. Flint, Jr., 2 ♂♂, 1 ♀♀ (NMNH); Minas Gerais: Serra do Cipó, km 110, 5-X-1975, C. G. Froehlich, 2 ♂♂, 1 ♀ (MZSP); Rio de Janeiro: Est. Biol. Boraceia, Rib. Venerando, 850 m, 3-IV-1977, C. M. & O. S. Flint, Jr., 9 ♂♂ (NMNH); Itatiaia, Registro Pass, 1,700 m, 18-X-1985, Scott E. Miller, 2 ♂♂, 1 ♀ (NMNH); Km 54, 26 km E Nova Friburgo, 25-IV-1977, C. M. & O. S. Flint, Jr., 1 ♂, 1 ♀ (NMNH); same, except 19-IV-1977, 3 ♂♂ (NMNH); Nova Friburgo, municipal water supply, 950 m, 24-IV-1977, C. M. & O. S. Flint, Jr., 9 ♂♂, 1 ♀ (NMNH); same, except 20-IV-1977, 1 ♂ (NMNH); Parque Nac. Ti-juca, Represa Dos Ciganos, 7-IV-1977, C. M. & O. S. Flint, Jr., 2 ♂♂, 1 ♀ (NMNH); Km 17, 18 km S Teresopolis, 18-19-IV-1977, C. M. & O. S. Flint, Jr., 1 ♂ (NMNH); Santa Catarina: Blumenau, Reserva Spitzkopf, 4-XIII-1975, Exp. Dept. Zool. Univ. São Paulo, 2 ♂♂ (MZSP); Nova Teutonia, 27°11'S, 52°23'W, 16-XI-1932, F. Plaumann, 1 ♂ (NMNH); same, except X-1964, 1 ♂ (NMNH); São Paulo: Est. Biol. Paranapiacaba, 17-IX-1963, 2 ♂♂ (MZSP); PARAGUAY: Amambay: 2 km S Cerro Corá, 28-XI-1973, O. S. Flint, Jr., 1 ♂ (NMNH); Itapua: Pirapó, 28-31-XII-1971, L. E. Peña G., 1 ♂ (NMNH);

San Pedro: Arroyo Tapicuay, San Estanislao, 27-XI-1973, O. S. Flint, Jr., 1 ♀ (NMNH); Paraguari: Ybycuí (10 km E) in Ybycuí National Park, 12-24-IV-1980, P. J. Spangler, 1 ♀ (NMNH).

Distribution. ARGENTINA (Misiones); BRAZIL (Espírito Santo, Minas Gerais, Rio de Janeiro, Santa Catarina, São Paulo); PARAGUAY (Amambay, Itapua, Paraguari, San Pedro).

Triplectides jaffueli Navás

Fig. 1, 2, and 12-14

Triplectides jaffueli Navás 1918a: 9, Fig. 14 a and b, male (L. Navás Insect Collection, Museo de Zoología, Parque de la Ciudadela, Barcelona); Mosely 1936: 126; Schmid 1950: 352, Fig. 90-92, male; 1955: 136, Pl. 3, Fig. 14; Flint 1967: 60; 1974b: 90.

Triplectides monotona Navás 1918b: 225; Mosely 1936: 126; Schmid 1950: 359, as synonym of *jaffueli*.

Triplectides robustus Schmid 1955: 136, Pl. 3, Fig. 15, male, female. **New Synonym.**

I have not seen the type of this species, but its genitalia were figured very adequately by Schmid (1950, Fig. 90-92). Navás's figures accompanying the original description are inaccurate. I have compared the male holotype of *T. robustus* Schmid (1955) (NMNH) with a large series of males from many localities in Chile, including from near the type localities of *robustus* and *jaffueli*, and find them to be identical and to agree with Schmid's 1950 figures of the holotype of *jaffueli*. I am therefore synonymizing *T. robustus* Schmid, 1955 with *T. jaffueli* Navás, 1918a, **New Synonym.** The larva and pupa of this species were described under the generic diagnosis given above.

The male genitalia of *T. jaffueli* are very similar to those of the sympatric species *T. nigripennis* Mosely. The wing venation of the two species is virtually identical, but they can be readily distinguished by the shapes of abdominal segments X, the mesal lobes of the inferior appendages, and the second articles of the inferior appendages of the males. In *T. jaffueli* segment X (Fig. 12 A and B) is narrower apically in both dorsal and lateral views than in *T. nigripennis* (Fig. 25 A and B) and the apicomeral excision is shallower and wider in *T. jaffueli* than it is in *T. nigripennis*. The mesal edges of the mesal lobes of the inferior appendages of *T. jaffueli* lie parallel to each other for most of their lengths (Fig. 12C), whereas in *T. nigripennis* they diverge gradually from each other throughout their entire lengths (Fig. 25C). Finally, the second article of each inferior appendage in *T. jaffueli* is very long, parallel sided, nearly straight, and only slightly directed mesally at its apex (Fig. 12C); in *T. nigripennis* this structure is relatively shorter, tapered, and stouter and its apex is strongly directed mesally and sharply pointed (Fig. 25C). Females

are easily separated based on the shapes of the appendages of segment X and valves and by the presence of sensilla-bearing processes in *T. jaffueli* only (Fig. 13 and 26).

Male. Brown; forewing brown, covered with small, irregular patches of cream-colored hairs and with larger patch at arculus. Forewing discal cell broad apically, crossvein *s* curved, crossvein *r-m* very short (Fig. 14A); hindwing fork I present (Fig. 14B). Length of forewing up to 18 mm. Spurs 2-2-4. Genitalia as in Fig. 12. Segment IX narrow, parallel sided. Segment X in lateral view broadest sub-basally, abruptly narrowed to apex; in dorsal view narrow in middle, apex with shallow, V-shaped mesal excision. Mesal lobes of inferior appendages with mesal edges straight, paralleling each other for most of their lengths, apices curved laterally. Second article of each inferior appendage long, nearly straight, parallel sided, apex slightly curved mesally and pointed. Phallic apparatus with tubular phallic shield, phallic shield strips connected laterally with segment IX, phallosomal sclerite large.

Female. Color, size, structure similar to those of male. Genitalia as in Fig. 13A. Appendages of segment X and valves roughly triangular; sensilla-bearing processes present.

Material Examined. 336 ♂♂ and ♀♀ (NMNH).

Distribution. ARGENTINA (Chubut, Neuquén, Río Negro); CHILE (Arauco, Bío-Bío, Cautín, Chiloé, Concepción, Coquimbo, Llanquihue, Malleco, Maule, Ñuble, O'Higgins, Osorno, Santiago, Valdivia, Valparaíso).

Triplectides misionensis Holzenthal, n. sp.

Fig. 15-17

This species is similar to *T. gracilis* but can be distinguished from it by several characters discussed under the diagnosis of that species.

Male. Light brown; forewing uniformly light brown. Forewing discal cell broad apically, i.e., *r-m* short (Fig. 17); hindwing fork I distinctly petiolate. Length of forewing 12-14 mm. Spurs 2-2-4. Genitalia as in Fig. 15. Mesal lobe of each inferior appendage broad basally with small, sclerotized, basomesal point; apical portion very narrow, divergent, slightly sinuate, apex acute.

Female. Color, size, structure similar to those of male. Genitalia as in Fig. 16. Pleura IX with vertical patch of long setae. Appendages of segment X roughly triangular, each with short, rounded, basoventral projection. Sensilla-bearing processes absent.

Type Material. *Holotype:* Male, ARGENTINA: Misiones: Arroyo Piray Guazú, N San Pedro, 22-XI-1973, O. S. Flint, Jr. (NMNH). *Paratypes:* Same data as holotype, 5 ♂♂, 20 ♀♀ (CLEM, MBR, MLP, NMNH, UMSP); same, except Arroyo Piray Mini, W Dos Hermanas, 23-XI-1973, O. S. Flint, Jr., 6 ♀♀ (NMNH).

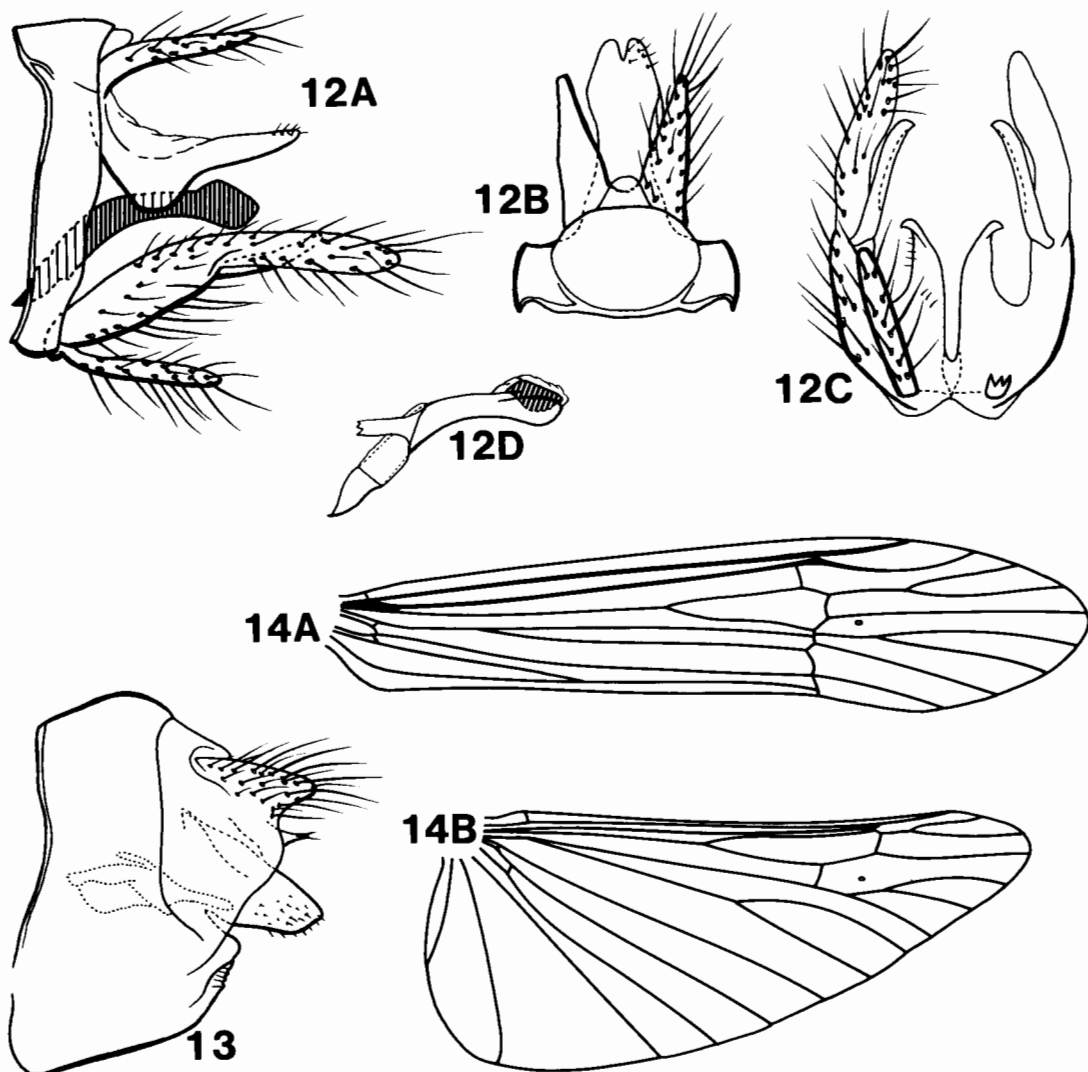


Fig. 12-14. *Triplectides jaffueli* Navás. (12 A-D) Male genitalia. (13) Female genitalia, lateral view. (14) Male wings: A, forewing; B, hindwing.

Etymology. Named for the type locality.

Distribution. ARGENTINA (Misiones).

***Triplectides neblinus* Holzenthal, n. sp.**

Fig. 18 and 19

This species, from the base of Cerro de la Neblina, Venezuela, differs from all other Latin American *Triplectides* species in the very broad, rounded character of the preanal appendages of the male genitalia.

Male. Light brown; forewing light brown with scattered white and golden patches of hairs, patch of dark brown hairs at bases of R and discal cell. Spurs 0-2-3, all spurs small. Apex of forewing discal cell well-separated from apex of thyridial cell (i.e.,

crossvein *r-m* long, about two-thirds length of straight *s*) (Fig. 19A); hind wing fork I present (Fig. 19B). Length of forewing 9-10 mm. Genitalia as in Fig. 18. Segment IX posteriorly produced mid-laterally and dorsally. Segment X long, about equal in length to inferior appendages, parallel-sided in both dorsal and lateral views, with apicomasal excision extending basally about two-fifths length of segment. Preanal appendages distinctive, each short, broad, rounded, spatulate, curved ventrally. Inferior appendages each with short apicodorsal lobe; mesal lobes each broad basally, lateral edge straight, mesal edge obtusely angled, apex sharply pointed, curved laterally. Phallic apparatus with phallobase reduced to thin, ventral trough; phallic membranes prominent, phallosclerite narrow in lateral view.

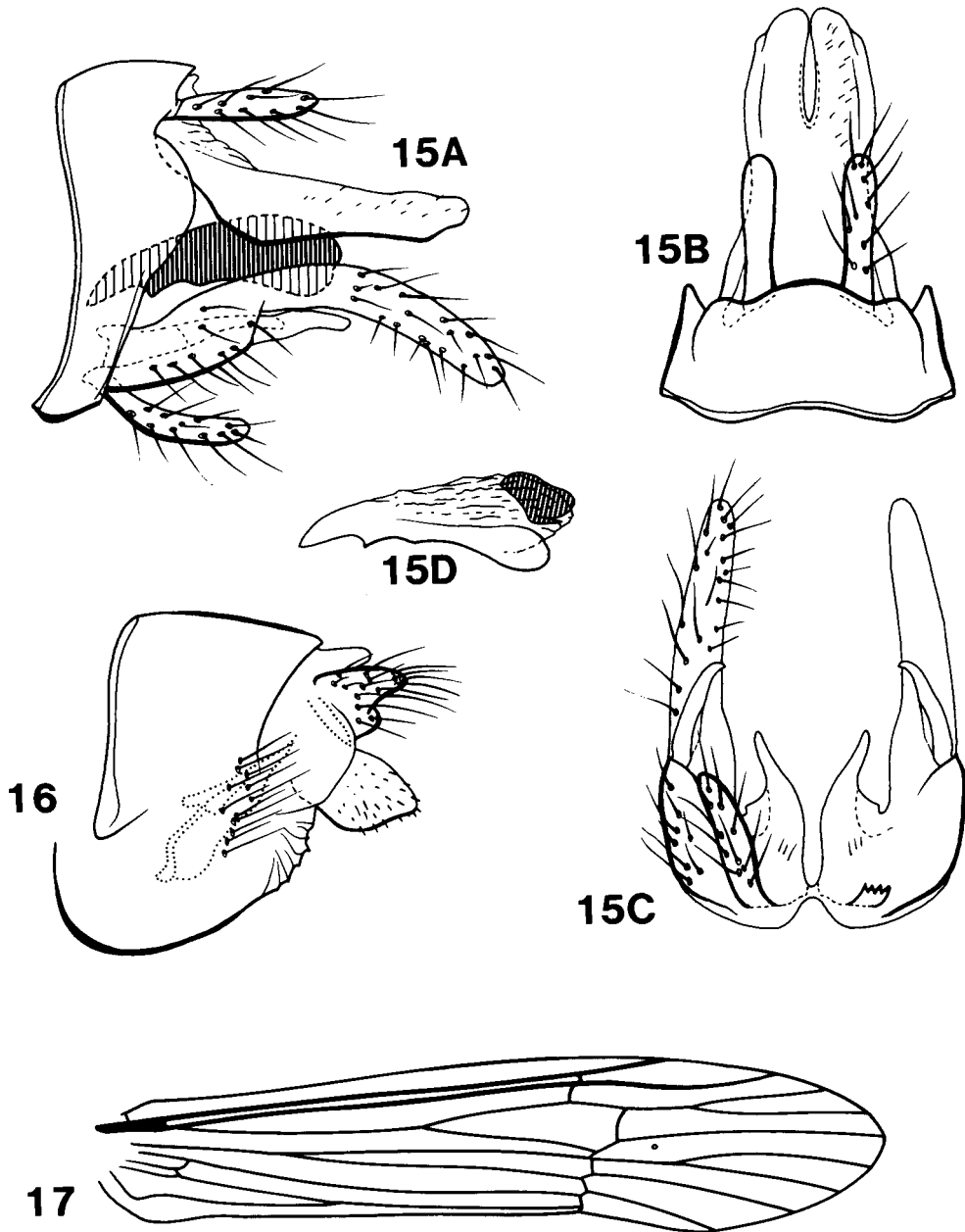


Fig. 15-17. *Triplectides misionensis* Holzenthal, n. sp. (15 A-D) Male genitalia. (16) Female genitalia, lateral view. (17) Male forewing.

Female. Unknown.

Type Material. *Holotype*: Male, VENEZUELA: Territorio Federal Amazonas: Basecamp, 0°51'N, 66°10'W, Cerro de la Neblina, 140 m, 20-24-III-1984, O. Flint and J. Louton (NMNH). *Paratype*: Same data as holotype, except 13-15-III-1984, 1 ♂ (pinned, right wings on slide) (UCV).

Etymology. Named for the type locality, Cerro de la Neblina, the "Mountain of the Mists," in southern Venezuela.

Distribution. Known only from the type locality.

***Triplectides neotropicus* Holzenthal, n. sp.**

Fig. 20 and 21

The male of this species differs from other Neotropical species in the genus by the very broad apical region of the forewing discal cell and by the somewhat capitate apices of the mesal lobes of the inferior appendages.

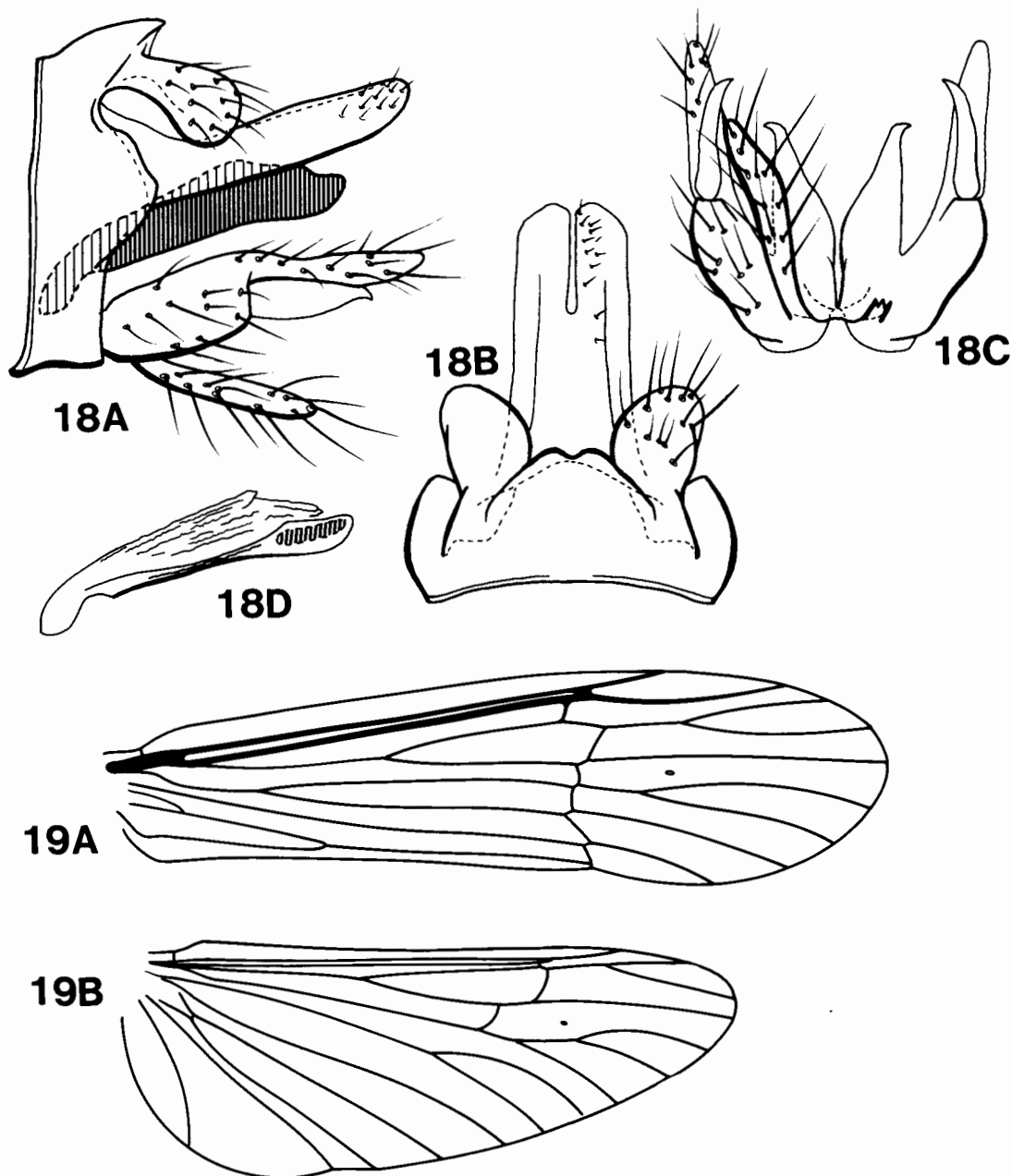


Fig. 18 and 19. *Triplectides neblinus* Holzenthal, n. sp. (18 A-D) Male genitalia. (19) Male wings: A, forewing; B, hindwing.

Male. Brown; forewing dark brown, covered with numerous, small, irregular patches of cream-colored hairs, these patches coalescing to form irregular, narrow, transverse bands on apical one-fifth of wing. Forewing discal cell very broad apically, crossvein *r-m* very short, crossvein *s* sinuate (Fig. 21); hindwing fork I with very short petiole. Length of forewing 12-14 mm. Spurs 2-2-4. Genitalia as in Fig. 20. Segment IX narrow, parallel sided, ter-

gum IX produced posteriorly. Segment X with deep, apicomeral excision extending anteriorly to about half length of segment. Mesal lobe of each inferior appendage roughly triangular, broadest basally, narrowest subapically, apex somewhat capitate.

Female. Unknown.

Type Material. *Holotype:* Male, VENEZUELA: Territorio Federal Amazonas: Camp IV, 0°58'N, 65°57'W, Cerro de la Neblina, 760 m, 15-18-III-

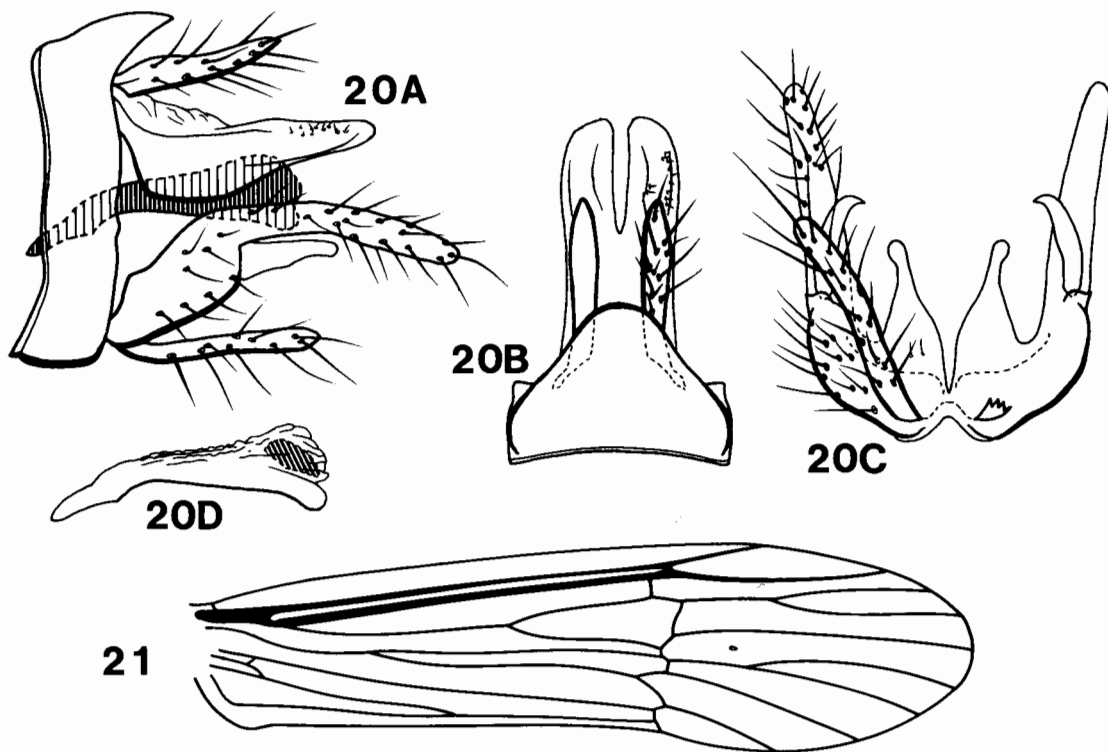


Fig. 20 and 21. *Triplectides neotropicus* Holzenthal, n. sp. (20 A-D) Male genitalia. (21) Male forewing.

1984, O. S. Flint, Jr. (NMNH). *Paratypes*: Same data as holotype, 36 ♂♂ (CLEM, NMNH, UCV, UMSP); same, except Basecamp, 140 m, near Rio Baria, 0°50'N, 66°10'W, 20-II-1985, P. J. & P. M. Spangler, R. Faitoute, W. Steiner, 1 ♂ (NMNH).

Etymology. Named for the Neotropical biogeographic region.

Distribution. VENEZUELA (Territorio Federal Amazonas, vicinity of Cerro de la Neblina).

***Triplectides nevadus* Holzenthal, n. sp.**

Fig. 22 and 23

The strongly hooked apices of the mesal lobes of the male inferior appendages render this species distinct from its Neotropical congeners. Its wing venation is virtually the same as in *T. eglerti* and *T. neblinus*.

Male. Light brown; forewings very light brown in holotype and male paratypes from Venezuela (in which hindwings are white), darker brown in female paratype and male paratypes from Peru; both color morphs with scattered patches of golden-brown hairs and with patches of dark brown hairs at bases of R and M. Wing venation as in Fig. 19. Length of forewing 11-12 mm. Spurs 0-2-2 or 0-2-3. Genitalia as in Fig. 22. Segment IX posteriorly produced midlaterally and dorsally. Segment X with apicomeral excision extending anteriorly to about half length of segment. Mesal lobe of each inferior appendage broad for most of its length,

mesal margin nearly straight, lateral margin sinuate, apex strongly hooked laterally, pointed. Second article of each inferior appendage stout, apex pointed, directed mesally.

Female. Color, size, structure similar to those of male. Genitalia as in Fig. 23. Appendages of segment X small, conical; valves large, nearly semi-circular; without sensilla-bearing processes.

Type Material. *Holotype*: Male, VENEZUELA: Territorio Federal Amazonas: 2 km E San Carlos de Río Negro, 5-11-III-1984, O. Flint and J. Louton (NMNH). *Paratypes*: Same data as holotype, 5 ♂♂, 1 ♀ (CLEM, NMNH, UCV); PERU: Loreto: Callicebus Res. Station Mishana, Río Nanay, 25 km SW Iquitos, 120 m, 10-17-1-1980, J. Heppner, 4 ♂♂, 4 ♀♀ (NMNH, UMSP); VENEZUELA: Territorio Federal Amazonas, Río Negro, 7-13-XI-1982, A. Chacón, F. Yepez, 1 ♂ (UCV).

Etymology. From the Spanish word *nevada* meaning "snowfall," in reference to the appearance of the white color morph of the species when in flight.

Distribution. PERU (Loreto); VENEZUELA (Territorio Federal Amazonas).

***Triplectides nigripennis* Mosely**

Fig. 25 and 26

Triplectides nigripennis Mosely 1936: 97, Fig. 11-14, male, female (BMNH); Flint 1967: 61; 1974: 90.

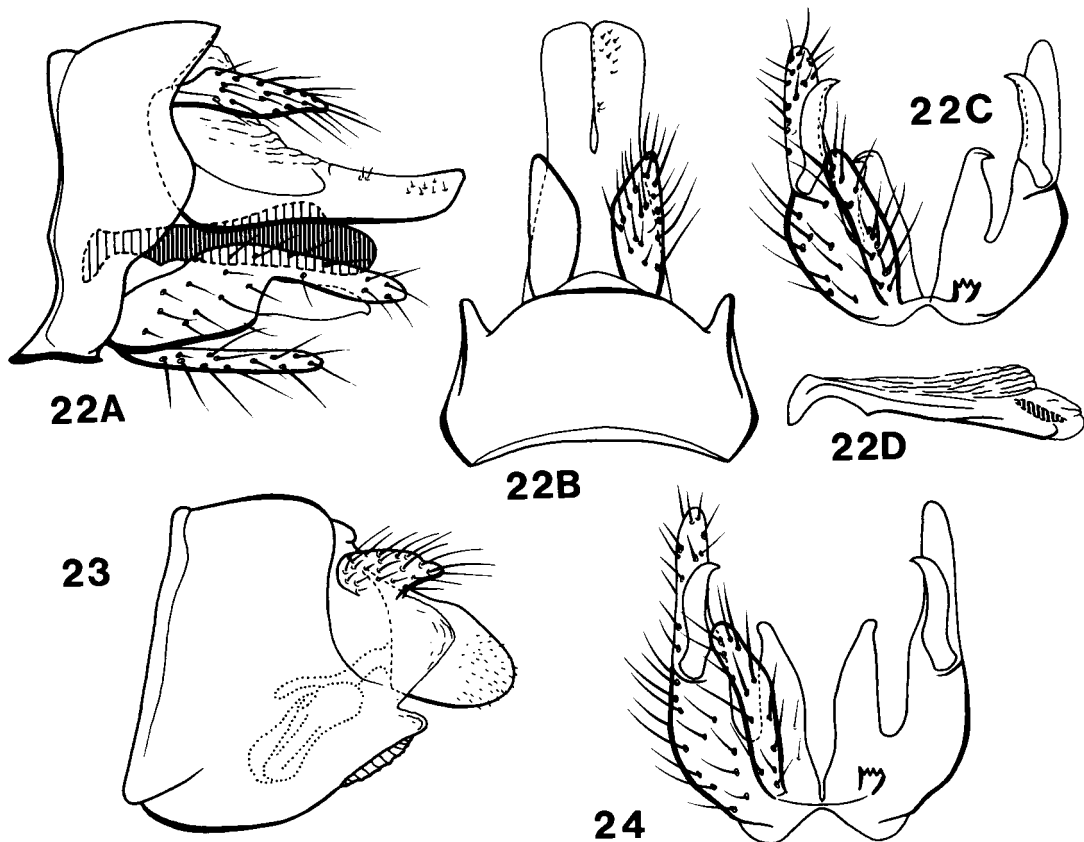


Fig. 22-24. *Triplectides nevadus* Holzenthal, n. sp. (22 A-D) Male genitalia. (23) Female genitalia, lateral view. (24) *Triplectides egleri* Sattler, male genitalia inferior appendages only, ventral view.

Triplectides multipunctatus Schmid 1955: 136, Pl. 3, Fig. 13, male, female. **New Synonym.**

I have compared the male holotypes of the two Chilean species *T. nigripennis* Mosely, 1936 and *T. multipunctatus* Schmid, 1955 (NMNH), and have found them to be identical in both venational and genitalic features. *Triplectides nigripennis* is very similar to *T. jaffueli*; characters useful in separating the two species can be found in the diagnosis of latter.

Male. Color, venation as in *T. jaffueli*. Length of forewing up to 16 mm. Spurs 2-2-4. Genitalia as in Fig. 25. Segment IX narrow, parallel-sided, tergum IX not particularly produced posteriorly. Segment X in lateral view widest sub-basally, gradually narrowing to apex; apex rounded in dorsal view, with narrow mesal excision. Mesal lobes of inferior appendages with their mesal faces smooth, curved, gradually diverging apically from each other; each with apex narrow in ventral view, flat in lateral view, with lateral faces slightly excavated. Second article of each inferior appendage stout, apex sharply pointed, directed mesally. Phallic apparatus as in *T. jaffueli*.

Female. Color, size, structure similar to those of male. Genitalia as in Fig. 26. Appendages of seg-

ment X short, thumb-shaped. Valves broad, pentagonal.

Material Examined. 170 ♂♂ and ♀♀ (NMNH).

Distribution. ARGENTINA (Neuquén); CHILE (Arauco, Cautín, Chiloé, Concepción, Curicó, Llanquihue, Malleco, Maule, Nuble, Osorno, Santiago, Talca, Temuco, Valdivia).

***Triplectides tepui* Holzenthal, n. sp.**

Fig. 27-29

This species is easily recognized by the short, triangular, striate mesal lobes of the inferior appendages of the male.

Male. Dark brown; forewing with small, scattered, irregular patches of whitish hairs, with larger, distinct patches at arcus and stigma; patch of dark brown hairs at base of M. Forewing crossvein *s* slightly curved, forming major apical edge of discal cell (i.e., portion of R_{4+5} between *s* and *r-m* very short); crossvein *r-m* very short (Fig. 29); hindwing fork I present, petiolate. Length of forewing 12-16 mm. Spurs 2-2-4. Genitalia as in Fig. 27. Segment IX narrow, tergum IX slightly produced posteriorly. Segment X with apicomeral corners acute when viewed dorsally; V-shaped, api-

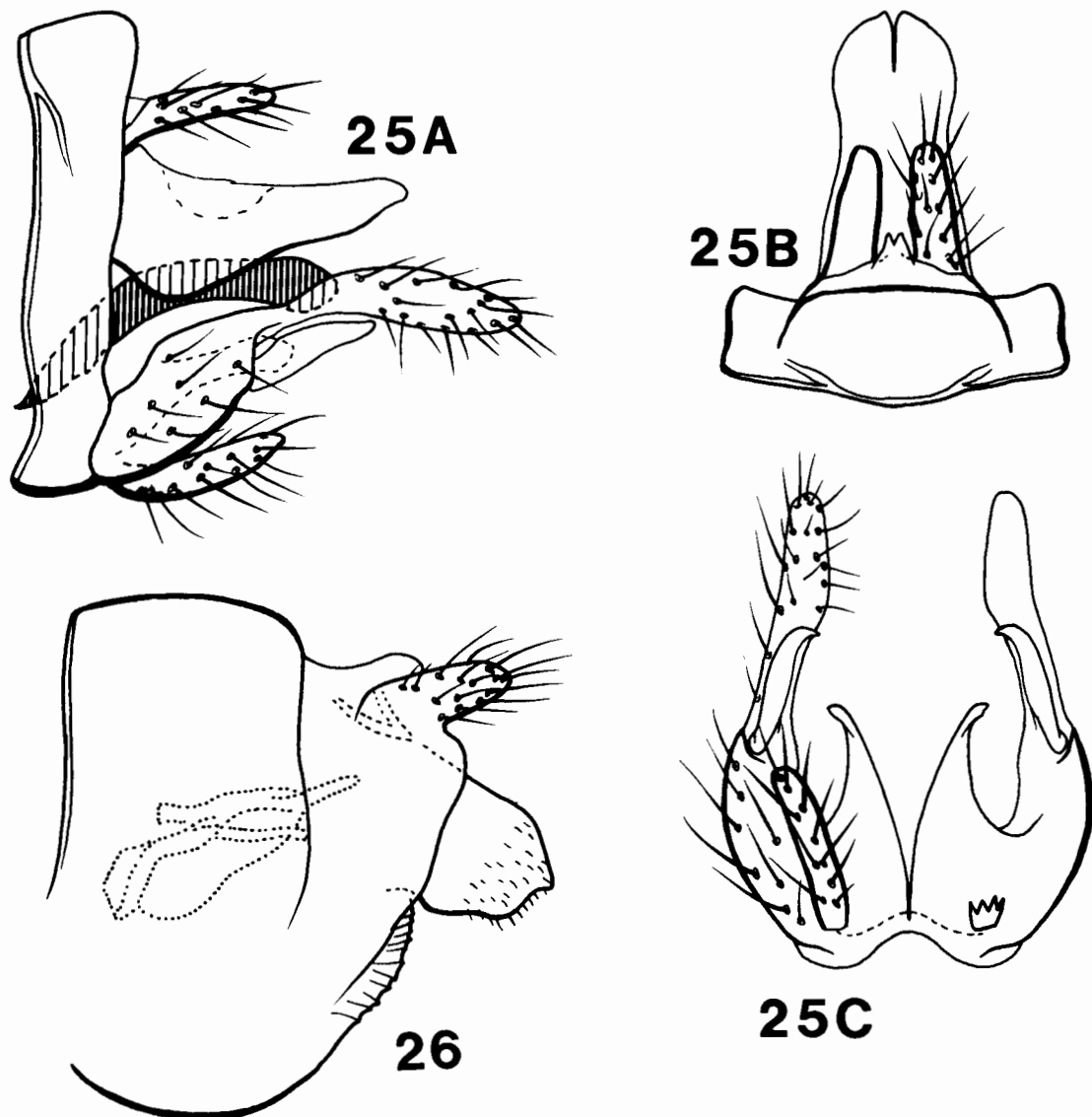


Fig. 25 and 26. *Triplectides nigripennis* Mosely. (25 A-C) Male genitalia. (26) Female genitalia, lateral view.

comesal excision extending anteriorly one-third length of segment; with dorsolateral setose ridges. Inferior appendages each with apicodorsal lobe short; mesal lobe short, triangular in ventral view, with longitudinal striae. Second article of each inferior appendage widest basally, with small, apical, mesally directed point, mesal edge with small, crescentic excavation at midlength. Phallic apparatus with curved, tubular phallobase and small apicodorsal, membranous lobe; phallotremal sclerite with prominent lateral flanges and small narrow, sharply-pointed, axial process (Fig. 27E).

Female. Color, size, structure similar to those of male. Genitalia as in Fig. 28. Appendages of seg-

ment X broad, thumb-shaped. With very small sensilla-bearing processes.

Type Material. *Holotype*: Male, VENEZUELA: Territorio Federal Amazonas: Camp II, 0°49'N, 65°59'W, Cerro de la Neblina, 2,100 m, 16-18-III-1984, J. A. Louton (NMNH). *Paratypes*: Same data as holotype, 28 ♂♂, 1 ♀ (CLEM, NMNH, UCV, UMSP); same, except Camp II, 0°49'41"N, 65°58'56"W, 2,085 m, 15-22-II-1984, T. McCabe, 1 ♀ (NMNH); same, except Camp III, 0°56'10"N, 66°3'53"W, 1,820 m, 15-17-II-1984, D. Davis, 1 ♂ (NMNH); same, except Camp V, 0°49'N, 66°0'W, 1,250 m, 23-24-III-1984, O. S. Flint, Jr., 3 ♂♂ (NMNH); same data as holotype, except 30-II-1985,

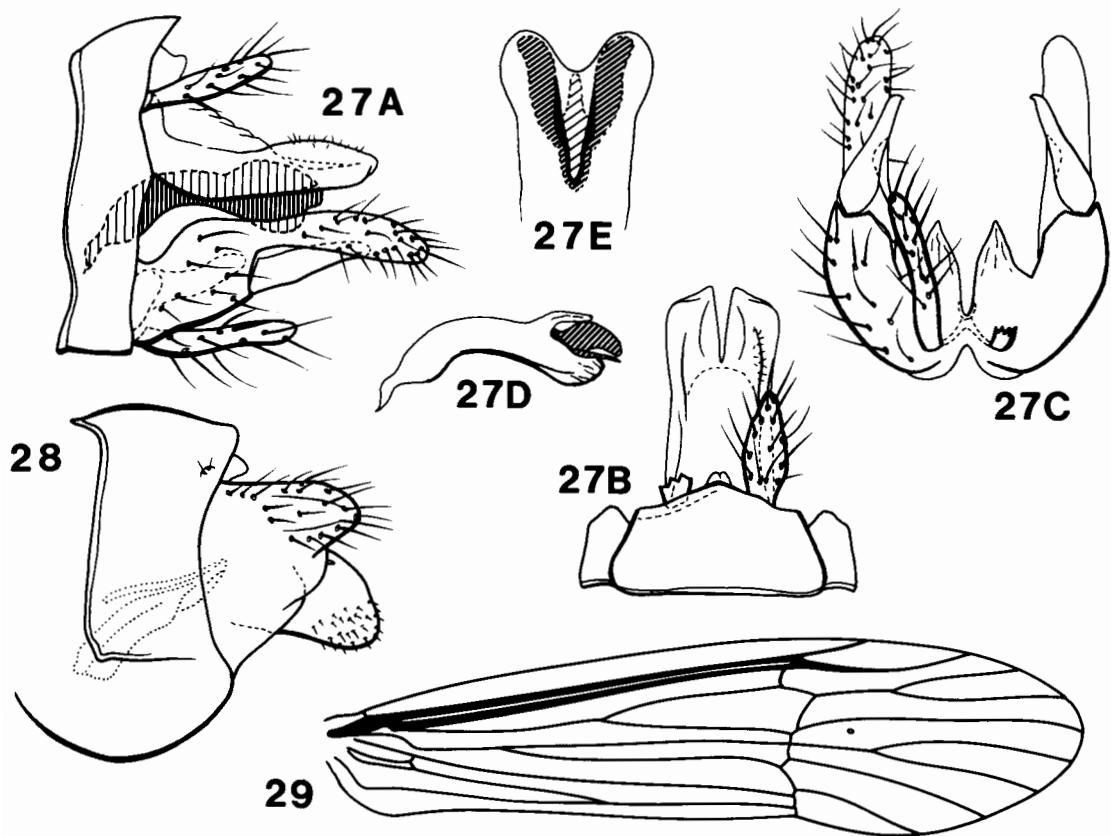


Fig. 27-29. *Triplectides tepui* Holzenthal, n. sp. (27 A-E) Male genitalia. (28) Female genitalia, lateral view. (29) Male forewing.

W. E. Steiner, 1 ♂, 1 ♀ (NMNH); Bolivar: Río Teu-
 nenen, 24 mi N Kavanayen ca. 1,600 m, 13-VIII-
 1970, R. E. Dietz, IV, 1 ♂ (NMNH).

Etymology. Named for the type locality, Cerro
 de la Neblina, one of many table-top mountains or
 "tepuis" in southern Venezuela, northern Brazil,
 and Guyana.

Distribution. VENEZUELA (Bolivar, Territorio
 Federal Amazonas).

***Triplectides ultimus* Holzenthal, n. sp.**
 Fig. 30-32

This species differs from its Neotropical con-
 geners in the shape of the mesal lobes of the inferior
 appendages.

Male. Brown; forewing with scattered patches
 of white and brown hairs arranged in rough chevron
 pattern. Forewing crossvein *s* long, slightly
 curved (i.e., apex of thyridial cell broad); crossvein
r-m very short (Fig. 32A); hindwing fork I with
 very short petiole (Fig. 32B). Length of forewing
 21 mm. Spurs 2-2-4. Genitalia as in Fig. 30. Seg-
 ment IX narrow, tergum IX produced posteriorly,
 with bifurcate membranous process. Segment X

narrow in lateral view with narrow apicomeral ex-
 cision extending anteriorly one-half length of seg-
 ment. Inferior appendages each with long slender
 apicodorsal and basoventral lobes; mesal lobe short,
 roughly triangular in ventral view, bearing two
 lateral points. Phallic apparatus long, slender, with
 small phallosclerite.

Female. Color, structure similar to those of male.
 Length of forewing 22 mm. Genitalia as in Fig.
 31. Appendages of segment X acute. With very
 small sensilla-bearing processes.

Holotype. Male, BRAZIL: Rio de Janeiro, Ita-
 tiaia, 2,300 m, 18-X-1985, Scott E. Miller (MZSP)
 (pinned, right wings on slide). **Paratypes:** Same
 data as holotype, 2 ♀♀ (NMNH).

Etymology. From the Latin *ultimus*, farthest,
 last.

Distribution. Known only from the type locality.

**Key to Males of Neotropical
Triplectides Species**

1. Spurs 0-2-2 or 0-2-3 2
- Spurs 2-2-4 or 2-2-3 3
2. Preanal appendages very broad, rounded

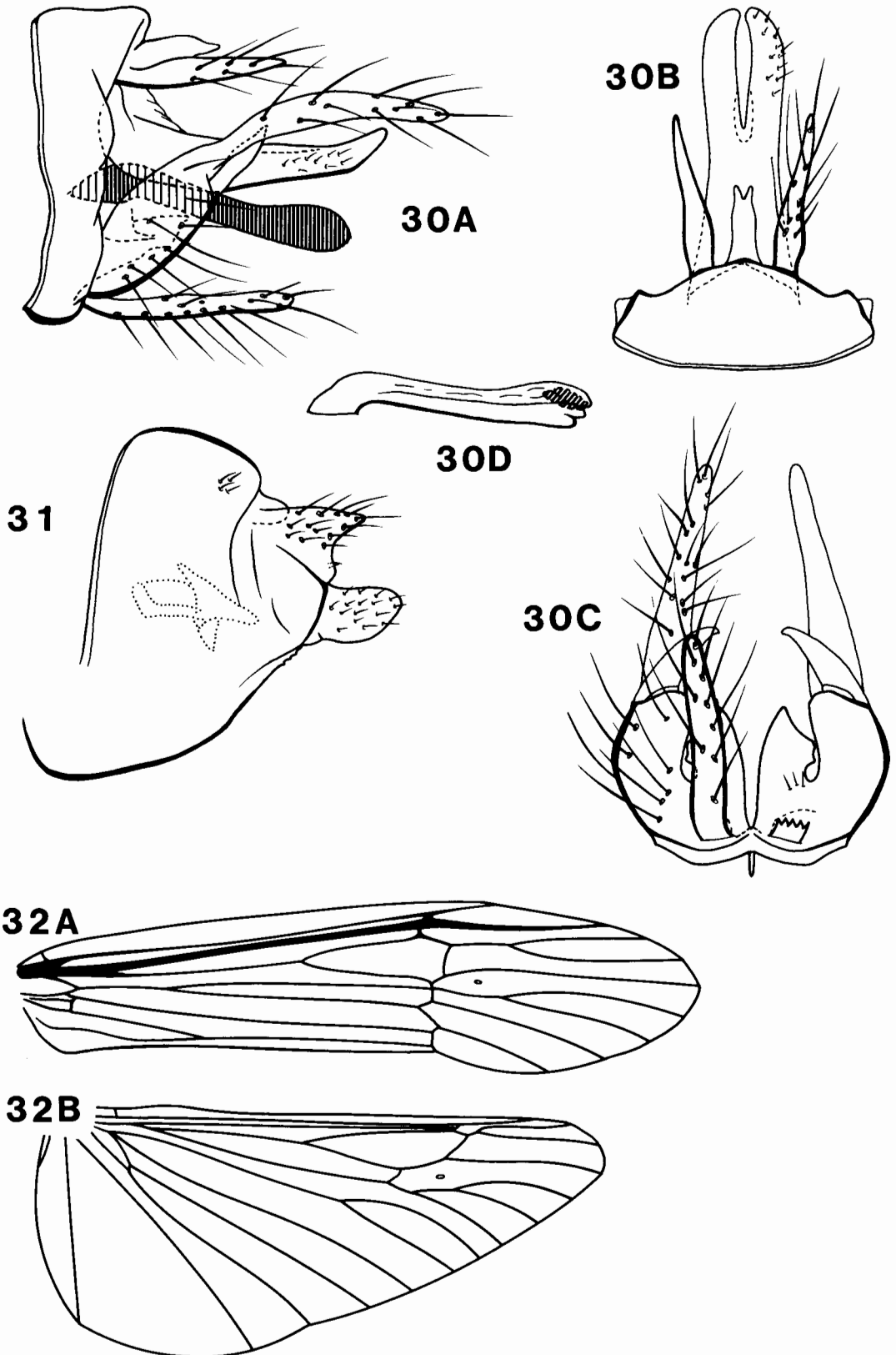


Fig. 30-32. *Triplectides ultimus* Holzenthal, n. sp. (30 A-D) Male genitalia. (31) Female genitalia, lateral view. (32) Male wings: A, forewing; B, hindwing.

- (Fig. 18 A and B) *T. neblinus*, Holzenthal, n. sp.
- Preanal appendages digitate (Fig. 22 A and B) *T. nevadus* Holzenthal, n. sp.
- 3. Mesal lobe of inferior appendage short, triangular (Fig. 27C and 30C) or very reduced (Fig. 3C); Patagonian Chile and Argentina ... *T. chilensis* Holzenthal, n. sp.
- Mesal lobe of inferior appendage long, digitate, extending posteriorly beyond base of 2nd article (Fig. 6C, 9C, 12C, 15C, 20C, 24, and 25C) 6
- 4. Mesal lobe of inferior appendage very reduced (Fig. 3C); Patagonian Chile and Argentina ... *T. chilensis* Holzenthal, n. sp.
- Mesal lobe of inferior appendage short, triangular 5
- 5. Mesal lobe of inferior appendage with two lateral points (Fig. 30C); southeastern Brazil *T. ultimus* Holzenthal, n. sp.
- Mesal lobe of inferior appendage with longitudinal striae (Fig. 27C); southern Venezuela *T. tepui* Holzenthal, n. sp.
- 6. Spurs 2-2-3 *T. egleri* Sattler
- Spurs 2-2-4 7
- 7. Mesal lobe of inferior appendage with apex acute, pointed (Fig. 12C, 15C, and 25C) 8
- Mesal lobe of inferior appendage with apex obtuse, rounded (Fig. 6C, 9C, and 20C) 10
- 8. Mesal lobe of inferior appendage with small, basomesal point (Fig. 15C); Misiones Prov., Argentina ... *T. misiones* Holzenthal, n. sp.
- Mesal lobe of inferior appendage without small, basomesal point (Fig. 12C and 25C); Patagonian Chile and Argentina 9
- 9. Mesal lobes of inferior appendages lying parallel to each other most of their lengths; 2nd article of inferior appendage very long, parallel-sided, nearly straight, apex slightly directed mesally (Fig. 12C) *T. jaffueli* Navás
- Mesal lobes of inferior appendages diverging throughout entire lengths; 2nd article of inferior appendage shorter, stouter, strongly directed mesally, apex sharply pointed (Fig. 25C) *T. nigripennis* Mosely
- 10. Apex of discal cell very broad (Fig. 21); apex of mesal lobe of inferior appendage capitate (Fig. 20C) *T. neotropicus* Holzenthal, n. sp.
- Apex of discal cell narrower (Fig. 8 and 11A); apex of mesal lobe rounded, but not capitate 11
- 11. Hindwing fork I sessile or with very short petiole (Fig. 11B); mesal lobe of inferior appendage narrow, sinuate (Fig. 9C); southeastern Brazil to western Argentina and Paraguay ... *T. gracilis* (Burmeister)
- Hindwing fork I with distinct petiole; mesal lobe of inferior appendage straight,

slightly tapered (Fig. 6C); Colombia and Ecuador north through Central America to southern Mexico *T. flintorum* Holzenthal, n. sp.

Discussion

The classification of the 69 species of *Triplectides sensu lato*, including the 12 Neotropical species, is currently under study by J. C. Morse, Clemson University. The phylogenetic relationships among the Neotropical species as well as the monophyletic nature of the genus in the Neotropics are equivocal (Morse, personal communication). The resolution of these phylogenetic problems is beyond the scope of this paper.

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References Cited

Botosaneanu, L. & O. S. Flint, Jr. 1982. On some Trichoptera from northern Venezuela and Ecuador (Insecta). *Beaufortia* 32: 13-26.

Bueno-Soria, J. & O. S. Flint, Jr. 1978. Catálogo sistemático de los Tricópteros de México (Insecta: Trichoptera), con algunos registros de norte, centro y sudamérica. *An. Inst. Biol. Univ. Nac. Auton. Mex. Ser. Zool.* 49(1): 189-218.

Burmeister, H. 1839. *Handbuch der entomologie* 2(2): 757-1050.

Fischer, F. C. J. 1965. *Trichopterorum catalogus*, vol. VI. *Nederl. Entomol. Ver.*, Amsterdam.

1972. *Trichopterorum catalogus*, vol. XIV. *Nederl. Entomol. Ver.*, Amsterdam.

Flint, O. S., Jr. 1967. Studies of Neotropical caddis flies, II: Trichoptera collected by Prof. Dr. J. Illies in the Chilean Subregion. *Beitr. Neotrop. Fauna* 5: 45-68.

- 1974a.** Studies of Neotropical caddisflies, XV: the Trichoptera of Surinam. Stud. Fauna Suriname and other Guyanas 55: 1-151.
- 1974b.** Checklist of the Trichoptera, or caddisflies, of Chile. Rev. Chil. Entomol. 8: 83-93.
- Holzenthall, R. W. 1985.** Studies in Neotropical Leptoceridae (Trichoptera), IV: a revision of *Brachysetodes* Schmid. Trans. Am. Entomol. Soc. 111: 407-440.
- 1986.** Studies in Neotropical Leptoceridae (Trichoptera), VI: Immature stages of *Hudsonema flaminii* (Navás) and the evolution and historical biogeography of Hudsonemini (Triplectidinae). Proc. Entomol. Soc. Wash. 88: 268-279.
- Kolenati, F. A. 1859.** Genera et species Trichopterorum, pars altera. Nouv. Mem. Soc. Imp. Nat. Moscow 11: 141-296.
- Marlier, G. 1964.** Trichoptères de l'Amazonie recueillis par le Professeur H. Sioli. Mem. Inst. R. Sci. Nat. Belg. 76: 1-167.
- Morse, J. C. 1975.** A phylogeny and revision of the caddisfly genus *Ceraclea* (Trichoptera, Leptoceridae). Contrib. Am. Entomol. Inst. 11: 1-97.
- 1981.** A phylogeny and classification of the family group taxa of Leptoceridae (Trichoptera), pp. 257-264. In G. P. Moretti [ed.], Proceedings of the 3rd International Symposium on Trichoptera. Junk, The Hague.
- Morse, J. C. & R. W. Holzenthall. 1987.** Higher classification of Triplectidinae (Trichoptera: Leptoceridae), pp. 139-144. In M. Bournard & H. Tachet [eds.], Proceedings of the 5th International Symposium on Trichoptera. Junk, The Hague.
- Morse, J. C. & A. Neboiss. 1982.** *Triplectides* of Australia (Insecta: Trichoptera: Leptoceridae). Mem. Nat. Mus. Victoria 43: 61-98.
- Mosely, M. E. 1936.** A revision of the Triplectidinae, a subfamily of the Leptoceridae (Trichoptera). Trans. R. Entomol. Soc. London 85: 91-129.
- Müller, F. 1879a.** Über Phryganiden (letters to his brother). Zool. Anz. 2: 38-40, 180-182, 283-284, 405-407.
- 1879b.** Notes on the cases of some South Brazilian Trichoptera. Trans. Entomol. Soc. London 4: 131-144.
- 1880a.** Sobre as casas construidas pelas larver de insectos Trichopteros da Provincia de Santa Catarina. Arch. Mus. Nac. Rio Janeiro 3 (for 1878): 99-134, 210-214, Pl. 8-11.
- 1880b.** Über die von den Trichopterenlarven der Provinz Santa Catharina verfertigten Gehäuse. Z. Wiss. Zool. 35: 47-87.
- 1888.** Die Eier de Haarflüger. Entomol. Nachr. 14: 259-261.
- 1921.** Briefe und noch nicht veröffentlichte Abhandlungen aus dem Nachlass 1854-1897. In A. Möller, Fritz Müller, Werke, Briefe und Leben. Gustav Fischer, Jena.
- Navás, L. 1916.** Neuroptera Nova Americana. Mem. Pontif. Acc. n. Lincei (2)2: 59-69, 78-80.
- 1918a.** Insecta nova. Series III. Mem. Pontif. Acc. n. Lincei (2)4: 1-11.
- 1918b.** Insectos Chilenos. Boll. Soc. Arag. Cienc. Nat. 17: 212-230.
- 1926.** Insectos Neotrópicos, 2a serie. Rev. Chilena Hist. Nat. 30: 326-336.
- 1932.** Décadas de insectos nuevos. Década 20. Broteria (Cienc. Nat.) 1: 62-85.
- Roback, S. S. 1966.** The Trichoptera larvae and pupae, Chapter XI, pp. 235-303. In R. Patrick et al., The Catherwood Foundation Peruvian Amazon Expedition: limnological and systematic studies. Monographs of the Academy of Natural Sciences of Philadelphia 14: 1-495.
- Sattler, W. 1963.** Eine neue Triplectides-Art (Leptoceridae, Trichoptera) aus dem brasilianischen Amazonasgebiet, ihre Metamorphosestadien und Bemerkungen zu ihrer Biologie. Beitr. Neotrop. Fauna 3: 20-33.
- Schmid, F. 1950.** Les Trichoptères de la collection Navás. Eos 25: 305-426.
- 1955.** Contribution a la connaissance des Trichoptères neotropicaux. Mem. Soc. Vaud. Sci. Nat. 11: 117-160, Pl. 1-7.
- Ulmer, G. 1905.** Zur kenntniss aussereuropäischer Trichopteren. Stettin Entomol. Z. 66: 3-119.
- 1907.** Trichoptera. In P. Wytsman [ed.], Genera Insectorum 60: 1-259.
- Wiggins, G. B. 1977.** Larvae of the North American caddisfly genera (Trichoptera). University of Toronto Press, Toronto.

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