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NEW CRANE FLIES (DIPTERA: TIPULIDAE, LIMONIIDAE) FROM DOMINICAN AND MEXICAN AMBER

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Abstract.—Four new species of crane flies (Diptera, Limoniidae) are described from Dominican amber: ***Geranomyia euchara, Elephantomyia grata, Epiphragma aurora,*** and ***Styringomyia optiva***. Additionally two Limoniidae belonging to the genera *Epiphragma* Osten Sacken 1859 and *Toxorhina* Loew 1851 and one Tipulidae of the genus *Brachypremna* Osten Sacken 1886, still unknown from Dominican amber, are characterized. Two new species are described from Mexican amber (Oligocene/Miocene): ***Trentepohlia mexicana*** and ***Trentepohlia immemorata***.

Key Words: Dominican amber, Mexican amber, Tipulidae, Limoniidae, fossil craneflies

Fossil crane flies from Dominican amber have been investigated little and from Mexican amber are unknown (Evenhuis 1994; Krzeminski 1992, 1996; Podenas and Poinar 1999). In the present study, seven species of crane flies (Diptera: Tipulidae, Limoniidae) are characterized from Dominican amber. Four of these are described as new species in the genera *Geranomyia* Haliday 1833, *Elephantomyia* Osten Sacken 1859, *Epiphragma* Osten Sacken 1859, and *Styringomyia* Loew 1845, and three are assigned to the genera *Brachypremna* Osten Sacken 1886, *Epiphragma* Osten Sacken 1859, and *Toxorhina* Loew 1851. Specimens of the latter three genera, which were previously unknown in Dominican amber, are discussed with many characters featured, but the absence of certain diagnostic characters prohibits a comparison with recent species. Two new species in the same piece of Mexican amber are described in the genus *Trentepohlia* Bigot 1854.

MATERIALS AND METHODS

The Dominican amber specimens are believed to have originated from mines in the Cordillera Septentrional of the Dominican Republic. These mines are in the El Mamey Formation (Upper Eocene), which is a shale-sandstone interspersed with a conglomerate of well-rounded pebbles (Eberle et al. 1980). The exact age of the amber is unknown, with estimates based on foraminifera indicating a range of 15–20 million years (Iturralde-Vincent and MacPhee 1996) and with coccoliths a range reaching 30–45 million years (Cepek 1990). The Mexican amber specimens originated from amber mines in the State of Chiapas in southern Mexico. The amber occurs in the Balumtun sandstone, Mazantic shale and La Quinta formations ranging from the Lower Miocene to the Upper Oligocene (22–26 mya) (Poinar 1992).

In the following descriptions, terminology of genitalia and wing venation follows

that presented in the "Manual of Nearctic Diptera" (McAlpine 1981). All specimens originated from the Poinar amber collection maintained at Oregon State University, Corvallis, Oregon. Accession numbers pertaining to these specimens are presented under the section "material examined."

Abbreviations used in the drawings are: air=air bubble; arc=arculus; dm=discal cell; fl=flagellum; gon=gonocoxite; g=gonostylus; i g=inner gonostyle; in a=inner arm of gonostyle; int a -intermediate arm of gonostyle; m-cu=medial-cubital cross vein; og=outer gonostyle; p=penis; pm=paramere; ped=pedicel; R_1=first branch of radius vein; RS=radial sector; rst=rostrum; Sc_1=first subcostal vein; scp=scape; st 9=ninth sternite; tg 9=ninth tergite. We have used the r cross vein here to represent a cross vein connecting R_1 with R_2 or one of the other radial sector veins.

TIPULIDAE

Subfamily Dolichopezinae

Brachypremna Osten Sacken 1886

Species of this genus have long, slender legs with the tarsi almost as long as the femora and tibiae combined, and hind tibiae spurred but the fore and middle tibiae apparently spurless. They are characterized by the most developed neck of all crane flies (Savchenko 1983). The male genitalia are inverted, a rare situation among Tipulidae. The larvae are covered with dense pubescence (Rogers 1949). Recent species have a tropical distribution except for one species which occurs in the southern and eastern Nearctic (Alexander and Byers 1981). Other fossil *Brachypremna* are restricted to the study by Krzeminski (1996) since *B. eocenica* Meunier 1906 was transferred to the genus *Tipula* (Evenhuis 1994).

Brachypremna sp.
(Fig. 1)

A single poorly preserved female with the tip of the ovipositor missing. Body length approximately 11.5 mm. Wing length 12.5 mm. Head and dorsum of thorax covered with reddish oxidative dust from the fossilization process; antennae not visible. Haltere 1.8 mm long. Wing (Fig. 1) long and narrow, totally clear except for brownish stigma; veins light brown. Venation: Sc_1 long, extending almost to the tip of R_{1+2}; tip of R_{1+2} perpendicular to the remainder of the vein; Rs strongly arcuated at origin; deflection of R_{4+5} distinct; petiole of cell m_1 shorter than cell itself; r-m short but present; m-cu immediately beyond the fork of M; vein A_2 very short. Femur II: 11.3 mm, III: 10.7 mm long.

Examined material.—♀, D-7-39D, Dominican amber.

Discussion.—This specimen is probably undescribed, but the inability to see many characters makes a comparison with recent *Brachypremna* impossible. It is clearly different from the fossil species described by Krzeminski (1996) from the same deposits.

LIMONIIDAE

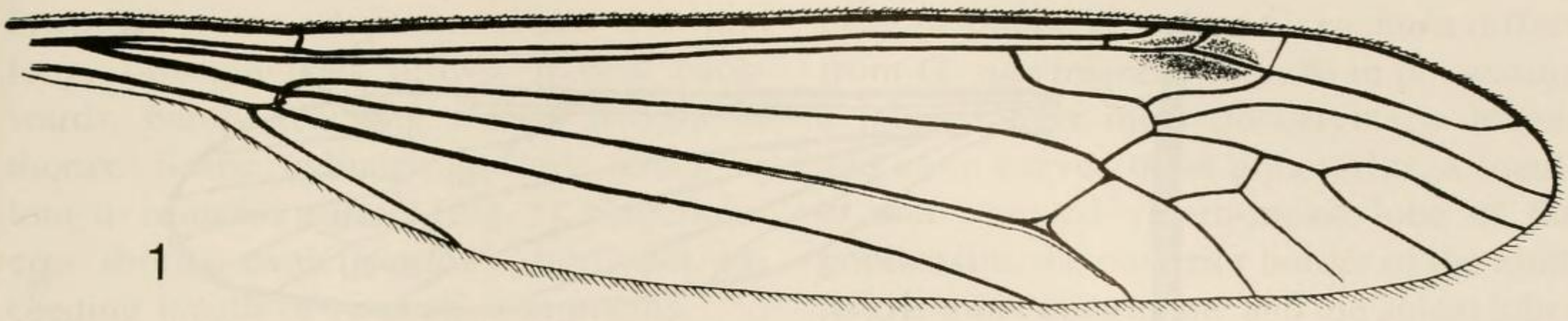
Subfamily Limoniinae

Geranomyia Haliday 1833

The very large and complex genus *Geranomyia* has its center of distribution in the Neotropical Region. Many species are widely distributed while others seem to be rather local (Alexander 1921). The snout (rostrum) in *Geranomyia* is very long, while the sucking mouthparts are drawn out still further. Adults feed on nectar of composite flowers (*Eupatorium, Solidago, Aster, Silphium, Rudbeckia, Verbesina, Cacalia,* etc.) (Knab 1910). The larvae live under water (even salt water), feeding on algae, diatoms, etc.; sometimes they make silken cases (Oldroyd 1966). No representatives have been described from any amber source (Evenhuis 1994).

Geranomyia euchara **Podenas and Poinar, new species**
(Figs. 2–7)

Diagnosis.—General coloration brown; body with only very sparse, short, brownish



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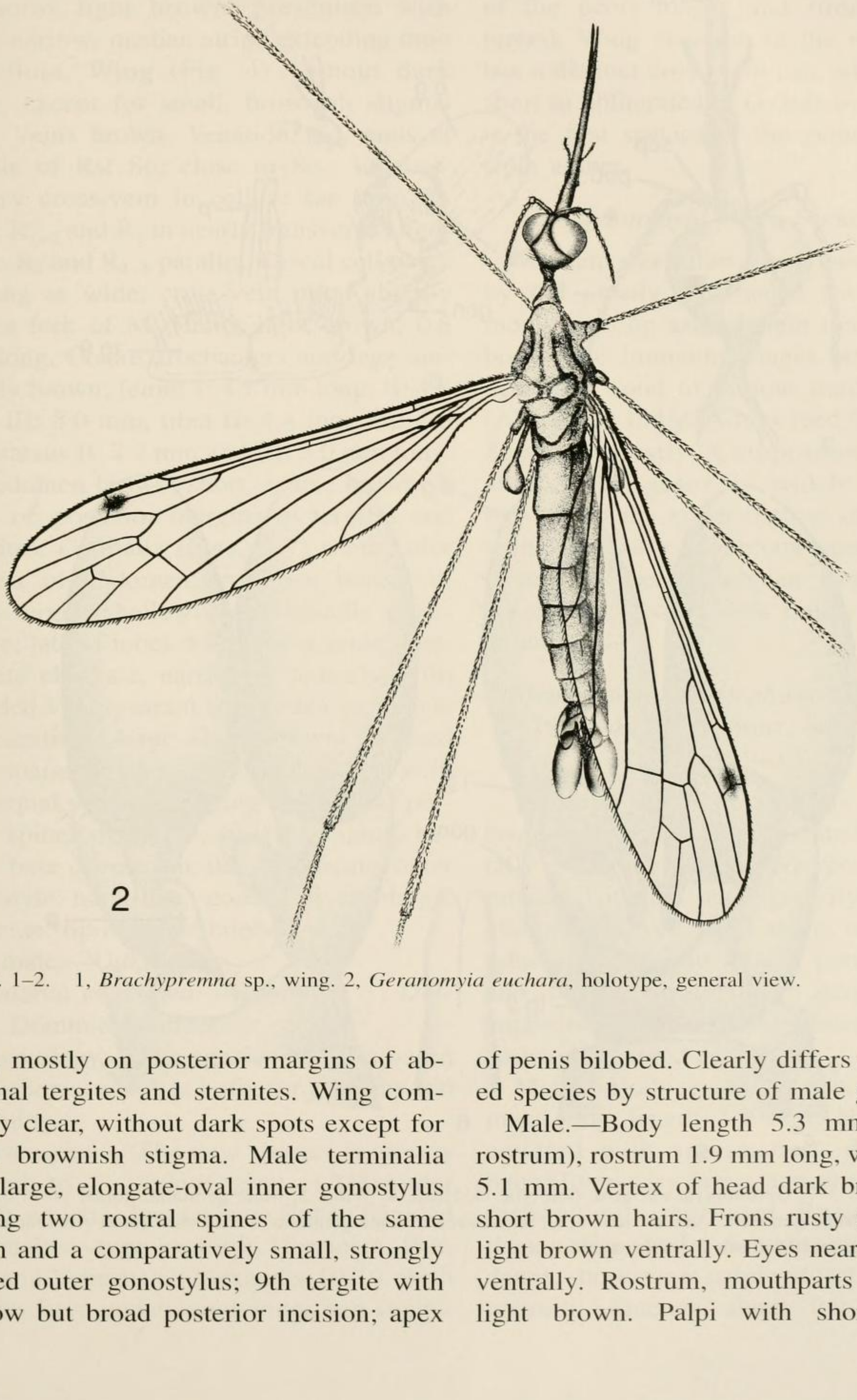

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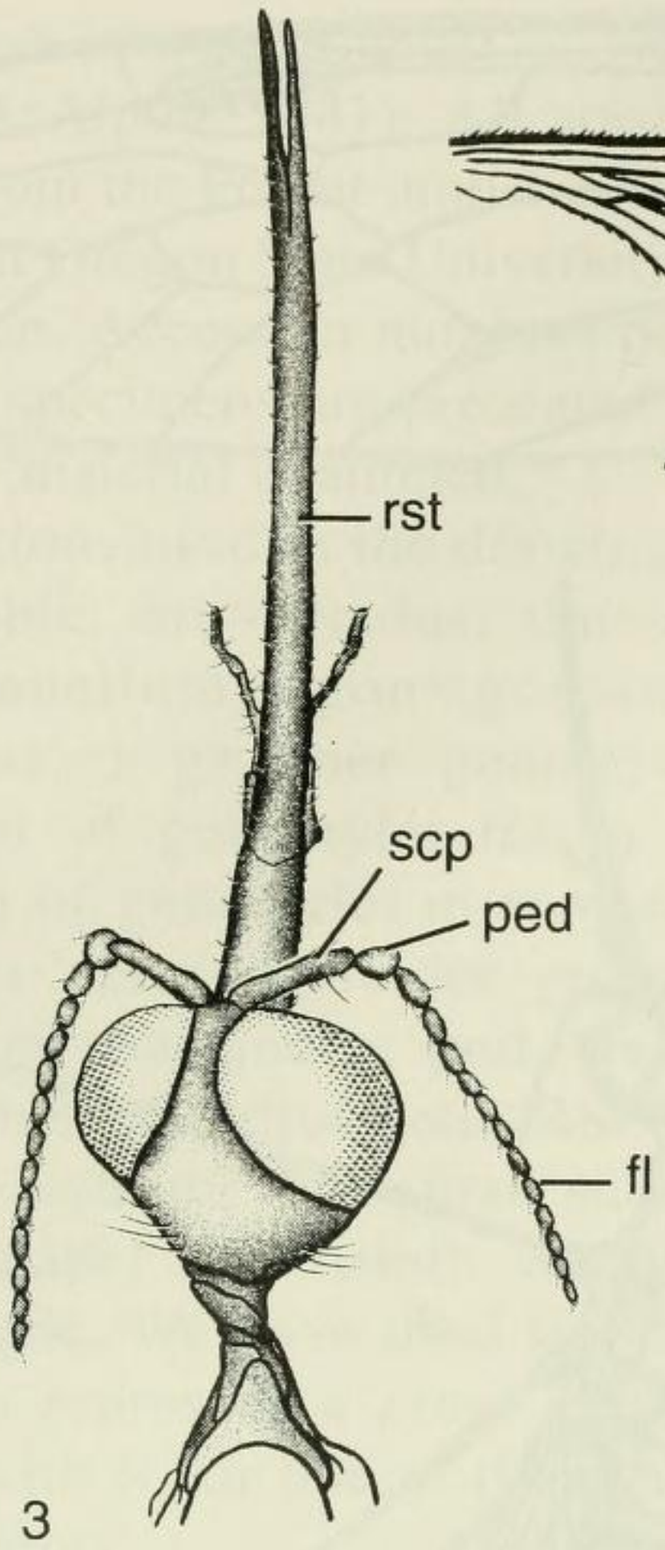
Figs. 1–2. 1, *Brachypremna* sp., wing. 2, *Geranomyia euchara*, holotype, general view.

hairs, mostly on posterior margins of abdominal tergites and sternites. Wing completely clear, without dark spots except for small brownish stigma. Male terminalia with large, elongate-oval inner gonostylus bearing two rostral spines of the same length and a comparatively small, strongly hooked outer gonostylus; 9th tergite with shallow but broad posterior incision; apex of penis bilobed. Clearly differs from related species by structure of male genitalia.

Male.—Body length 5.3 mm (without rostrum), rostrum 1.9 mm long, wing length 5.1 mm. Vertex of head dark brown, with short brown hairs. Frons rusty dorsally to light brown ventrally. Eyes nearly meeting ventrally. Rostrum, mouthparts and palpi light brown. Palpi with short, sparse,



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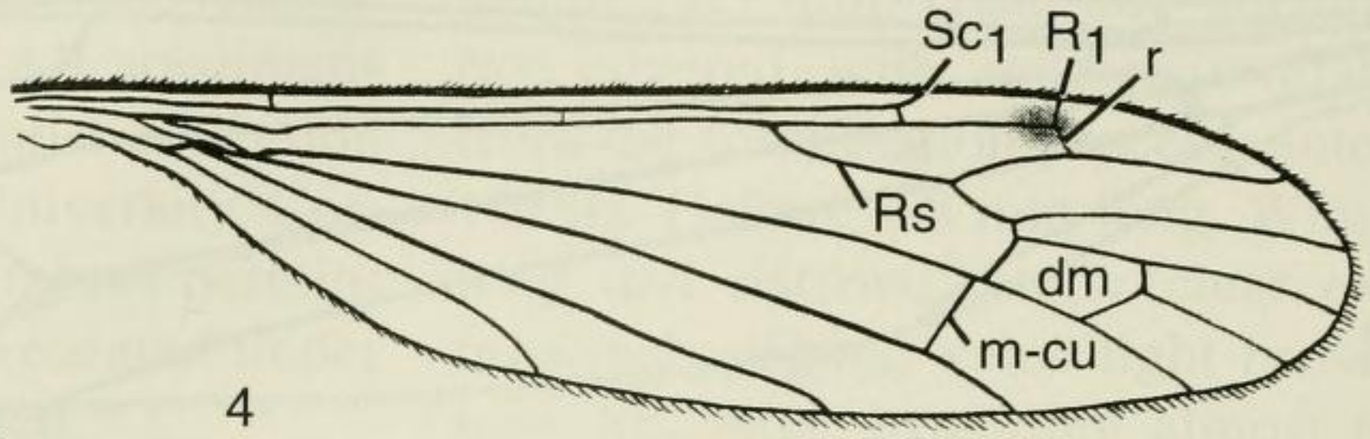

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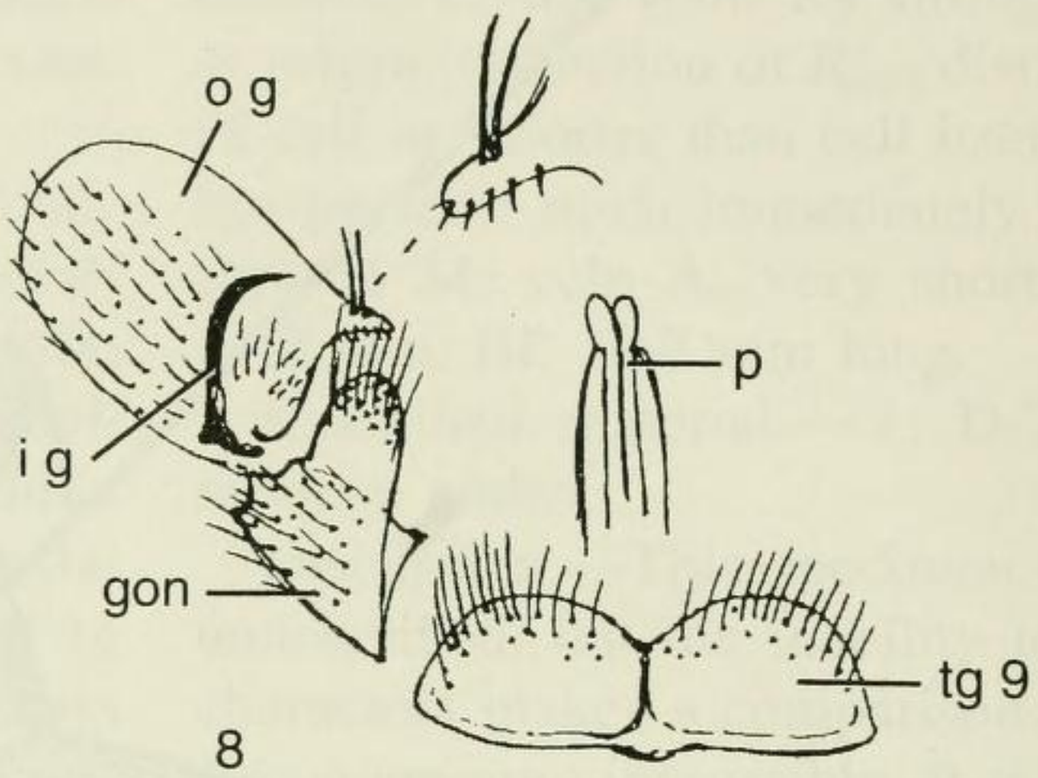

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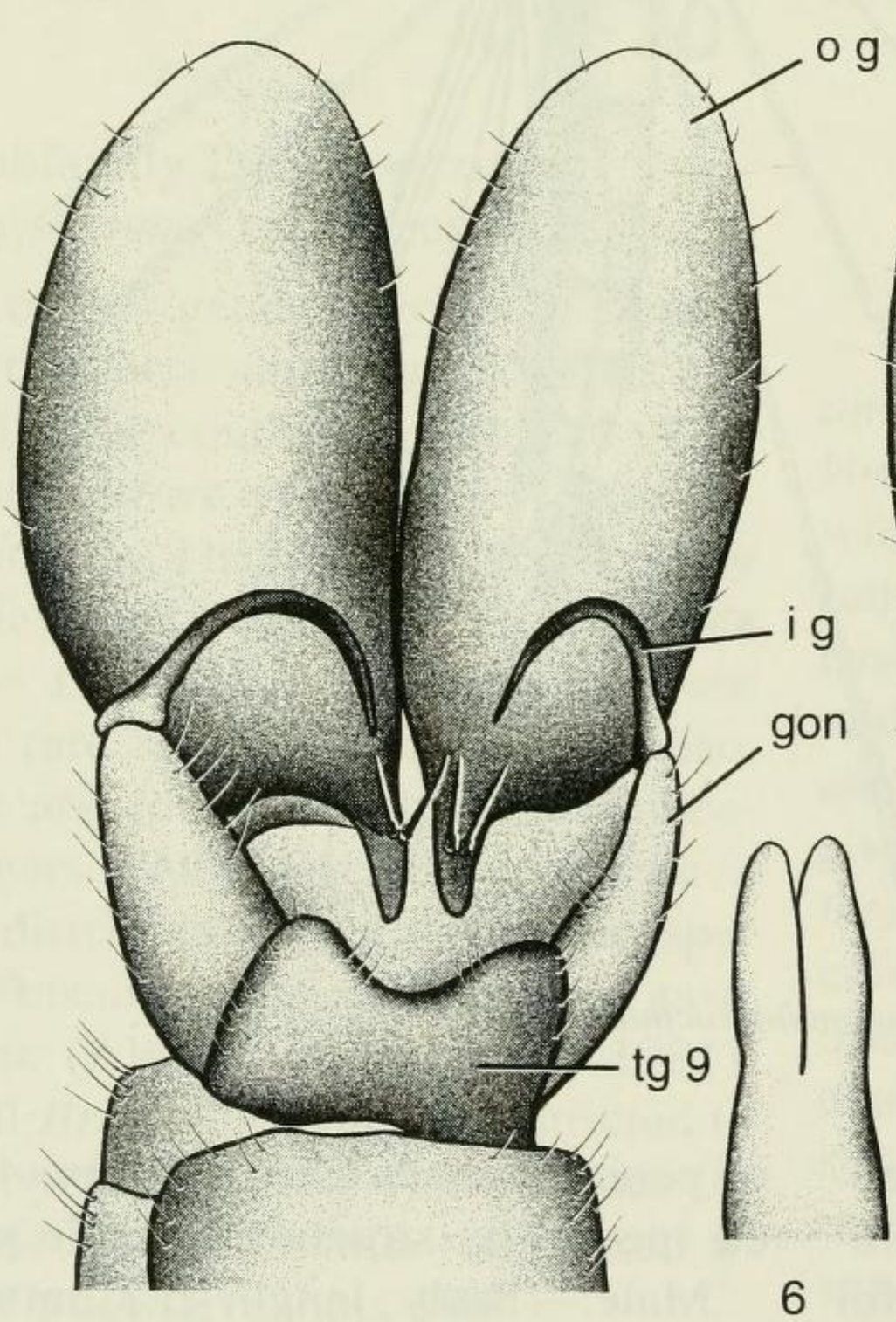

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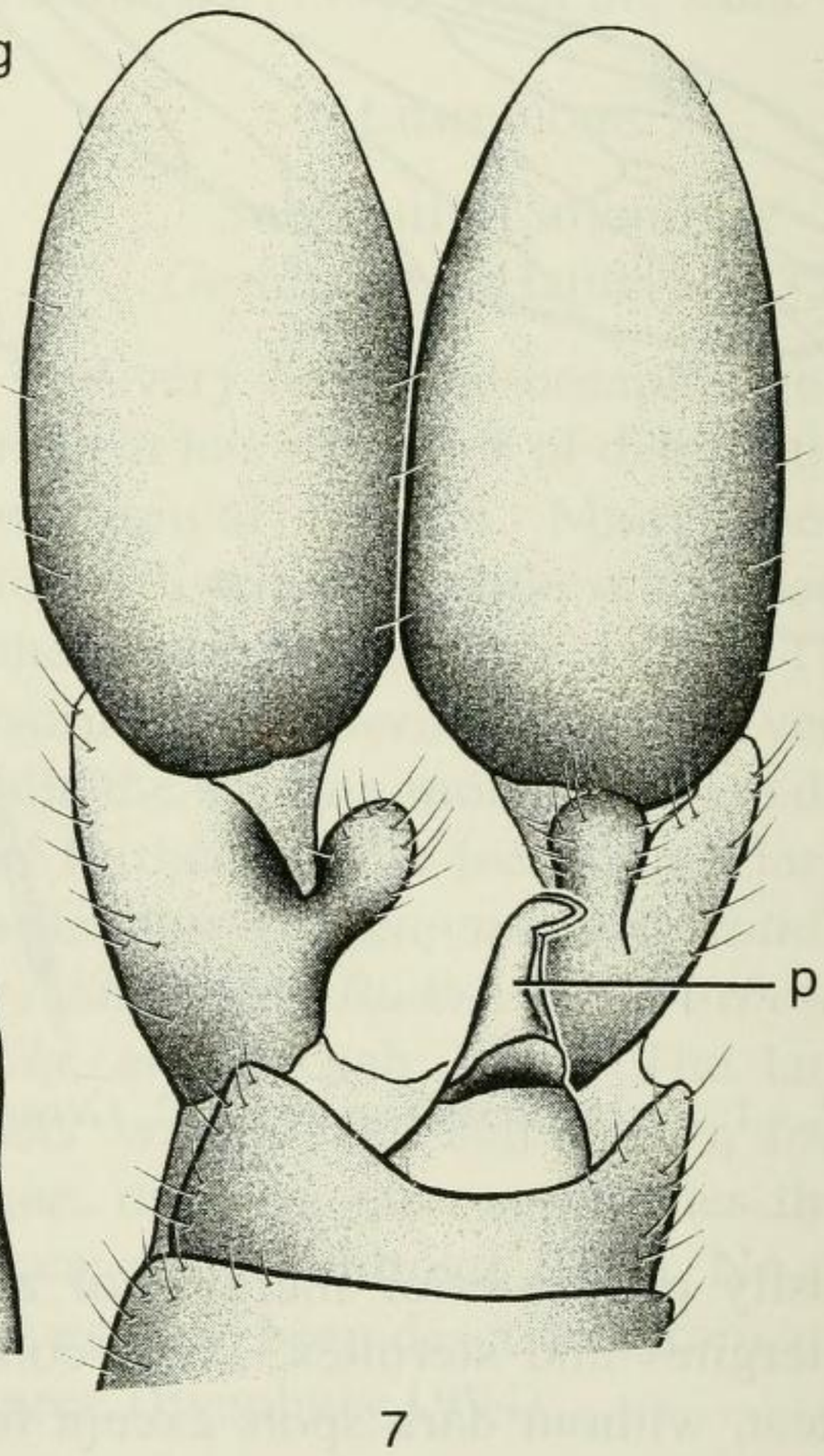

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Figs. 3–8. 3–7, *Geranomyia euchara,* holotype. 3, Head. 4, Wing. 5, Male genitalia, dorsal view. 6, Tip of aedeagus. 7, Male genitalia, ventral view. 8, *G. subvirescens*, male genitalia, dorsal view (after Alexander 1970). (See Materials and Methods for abbreviations.)

brownish setae. Antenna short, 1.1 mm long, 14-segmented, brown, if bent backwards, barely reaching frontal margin of thorax. Scape cylindrical, three times as long as rounded pedicel (Fig. 3). Flagellomeres shortly oval. Verticils short, not exceeding length of respective segments.

Thorax light brown; prescutum with dark, narrow, median stripe extending onto scutellum. Wing (Fig. 4) without dark spots, except for small, brownish stigmal area. Veins brown. Venation: Sc_1 ends at middle of Rs; Sc_2 close to Sc_1; supernumerary cross-vein in cell sc far from Rs base; R_{1+2} and R_2 in nearly transverse alignment; R_3 and R_{4+5} parallel. Discal cell twice as long as wide; cross-vein m-cu slightly before fork of M. Halter light brown, 0.8 mm long. Coxae, trochanters and legs uniformly brown; femur I: 4.1 mm long, II: 4.8 mm, III: 5.0 mm, tibia II: 4.4 mm, III: 4.6 mm, tarsus II: 2.7 mm and III: 3.0 mm long.

Abdomen brown; short, sparse brownish hairs on posterior margins of tergites and sternites. Genitalia (Figs. 5–7) same color as rest of abdomen; posterior border of ninth tergite shallowly and broadly emarginate, lateral lobes with sparse setae; gonocoxite elongate, narrowing apically, with rounded ventro-mesal lobe; inner gonostyle comparatively large, elongate-oval, covered with sparse, short setae, rostral portion with two equal spines emerging from basal portion; spines divergent, situated slightly beyond base of rostrum, their tips acute; outer gonostyle hook-like, comparatively large, tip acute; tip of penis bilobed.

Female.—Unknown.

Material examined.—Holotype: ♂, D-7-39B, Dominican amber.

Etymology.—The species name is based on *eucharis,* which is Latin for gracious and charming.

Discussion.—The new species is closely related to *G. subvirescens* (Alexander 1930), which is known from Cuba (Trinidad Mountains—type locality), Dominica, Panama and Venezuela (Alexander 1970). Both species have unpatterned wings and similar male genitalia. However *G. euchara* differs from *G. subvirescens* (Fig. 8) in possessing a much longer inner gonostylus, a longer and more curved outer gonostylus, a smaller and rounded ventro-mesal lobe of the gonocoxite, the posterior border of the ninth tergite more emarginate and the apical lobes of the penis longer and strongly downturned. Wing venation of the new species has a distinct cross-vein r-m, which is very short to obliterated in *G. subvirescens.* This is the first species of the genus described from amber.

Elephantomyia Osten Sacken 1859

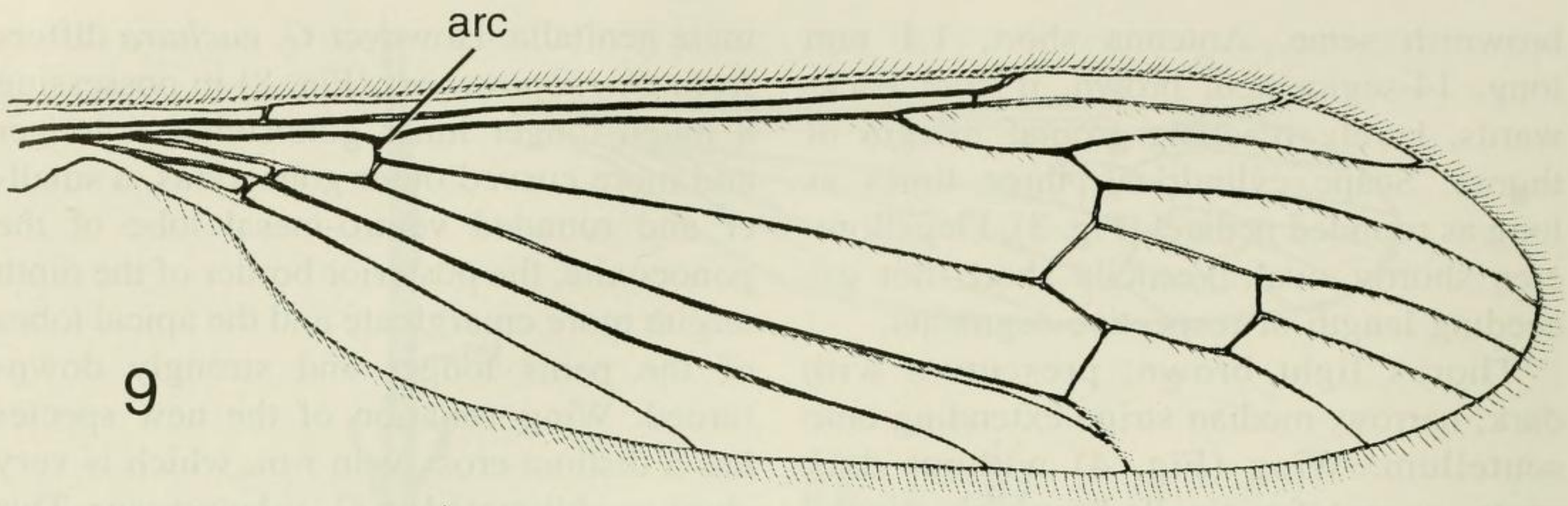
Medium sized flies, distinguished chiefly by the greatly lengthened rostrum, commonly as long as or longer than the entire body. The immature stages occur in wet, decaying wood of various hardwood trees (Alexander 1948). Adults feed from tubular flowers, mostly Compositae (Oldroyd 1966). The genus is widely distributed throughout the major regions of the world, with especially numerous species in the Neotropics and Ethiopian Regions. Four species are known from Baltic amber (Evenhuis 1994).

Elephantomyia (Elephantomyia) grata **Podenas and Poinar, new species**

(Figs. 9–10)

Diagnosis.—General body coloration brown. Antennae 15-segmented. Wings totally clear without any dark spots. Male terminalia with the outer gonostylus slender, glabrous, curved, bifid at tip; inner gonostylus elongate with apical portion slender and turned inwards; 9th tergite deeply emarginate. Differs from related species in structure of male genitalia.

Male.—Body length 3.0 mm, rostrum 3.3 mm, wing length 3.5 mm. Head brown, covered with sparse,short, dark brown hairs. Eyes very large, anterior vertex correspondingly narrowed. Rostrum longer than entire body, brown, covered with dense, short setae; palpi reduced, at apex of rostrum. Antenna about 0.9 mm long,



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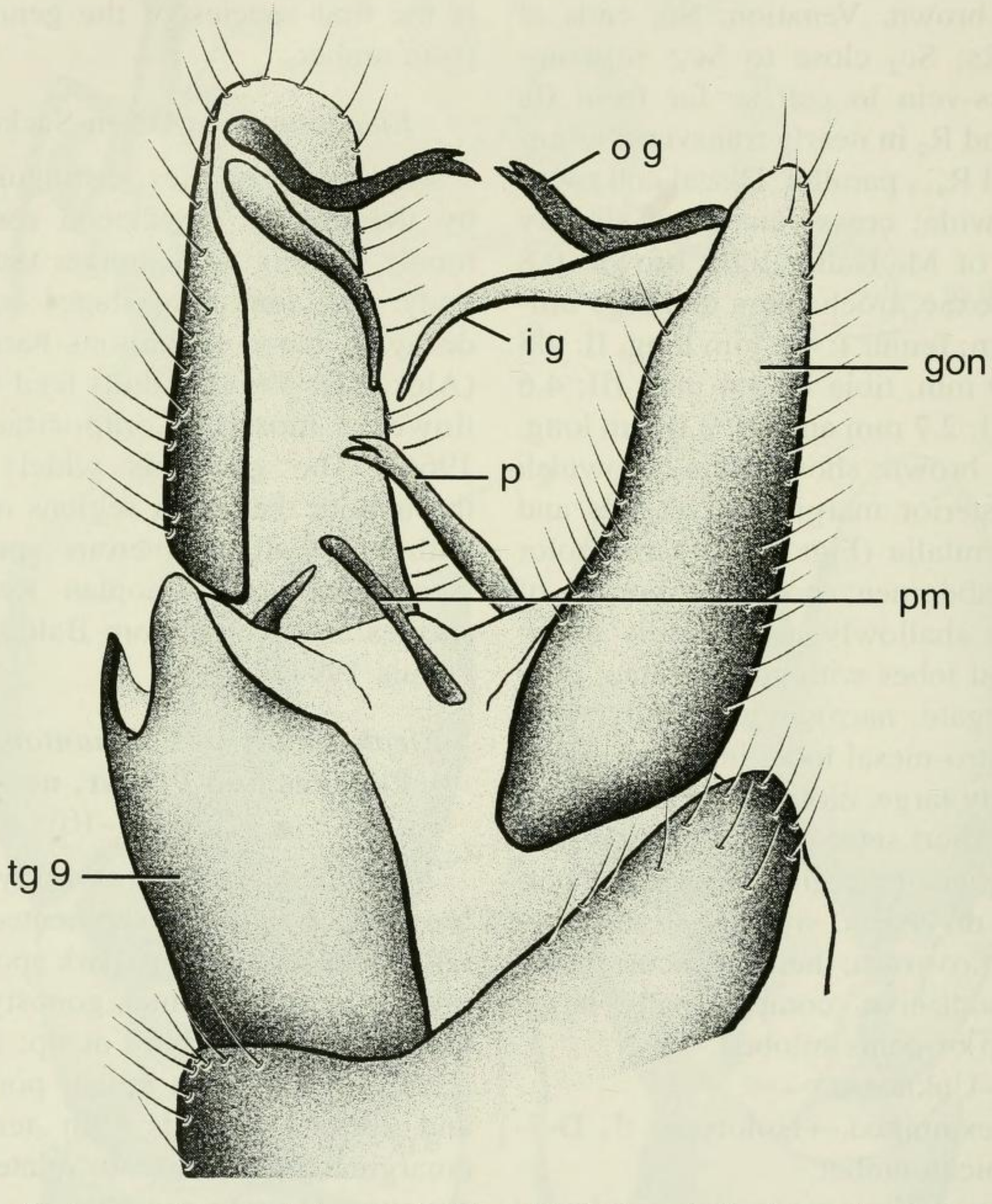

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Figs. 9–10. *Elephantomyia grata,* holotype. 9, Wing. 10, Male genitalia, latero-dorsal view. (See Materials and Methods for abbreviations.)

brown, 15-segmented; scape cylindrical, pedicel oval; both segments approximately equal in length, dark brown; basal two flagellar segments united into fusion-segment; succeeding segments cylindrical, with comparatively short verticils reaching 1.5 length of respective segment.

Dorsum of thorax brownish with dark brown median line, covered with sparse, brown hairs. Pleura with darker brown

spots. Wing (Fig. 9) clear without dark spots. Veins light brown, with comparatively abundant setae. Venation: Sc_1 ends at level of two- thirds of Rs, Sc_2 near its tip, at level of about one-third length of Rs; Rs short; R_2 absent; R_4 and R_5 slightly diverging; r-m connecting with R_5; discal cell large, twice as long as wide; cross-vein m-cu clearly beyond the fork of M; anterior arculus preserved. Halter light brown, 0.7 mm long. Legs light brown; tibial spurs very small; both forelegs missing in holotype; femur II: 3.9 mm long, III: 4.0 mm; tibia II and III: 4.6 mm long, tarsus II: 4.6 mm long.

Abdomen with dark brown tergites and sternites, with light intersegmental membranes; hairs brownish. Male genitalia (Fig. 10) with gonocoxite elongated and simple; outer gonostylus slender, glabrous, curved, bifid at tip; outer tooth smaller than inner; inner gonostylus longer, its outer one-third narrowed and turned inward; ninth tergite comparatively large, deeply emarginate. Penis simple, comparatively short, rod-like, with bifid apex. Paramere rod-like.

Female.—Unknown.

Material examined.—Holotype: ♂, D-7-39C, Dominican amber.

Etymology.—The species name is based on *gratus,* which is Latin for pleasing.

Discussion.—The new species does not resemble any of the recent local species. It clearly differs from the latter by its very small size, long rostrum and specific structure of the male genitalia, somewhat resembling those of *E. krivosheinae* Savchenko 1976 of the Palaearctic Region (Savchenko et al. 1992). The new species clearly differs from this species by the ninth tergite, which has a deep posterior emargination, a rather unusual structure among all *Elephantomyia.*

Subfamily Hexatominae

Epiphragma Osten Sacken 1859

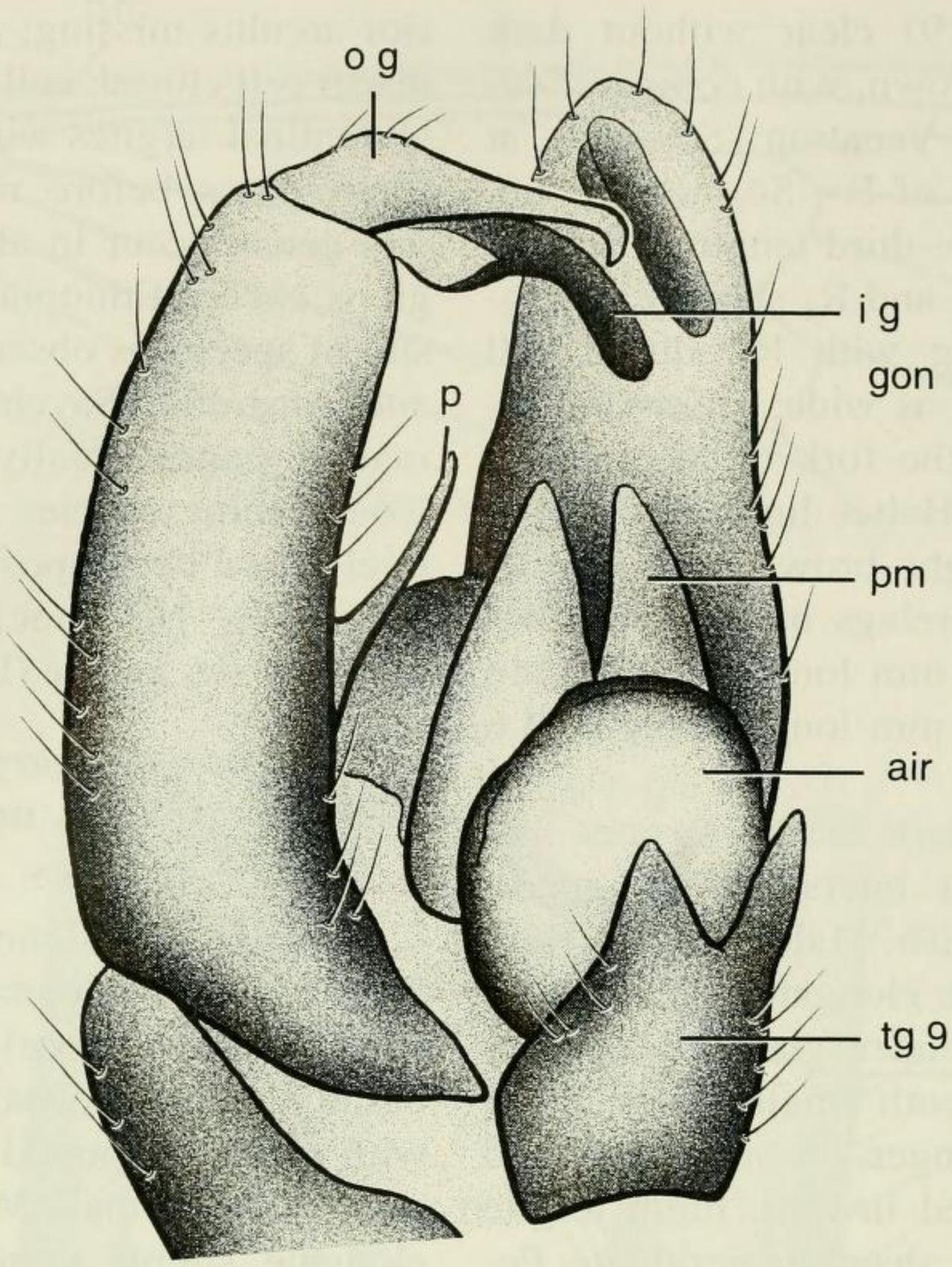
Species belonging to this genus have a yellowish-brown to brown body and darkly patterned wings. Additional characters are: costal cell with additional cross-vein, anterior arculus missing; *Rs* angulate at origin, discal cell closed, cell m_1 with short petiole; abdominal tergites with a pair of transverse impressions before midlength. Species of this genus occur in all zoogeographical regions except Ethiopian. The greatest diversity of species is observed in the Neotropics and Australia (Savchenko 1989). The immature stages usually occur in wet rotting wood; some species develop in comparatively hard decomposing wood (Krivosheina 1969). No species were previously known from amber (Evenhuis 1994).

Epiphragma aurora Podenas and Poinar, new species

(Figs. 11–12)

Diagnosis.—General body coloration dark brown. Antennae 16-segmented, flagellum conspicuously bicolored, reddish basally, brown distally. Wings yellowish with a brown-spotted pattern. Femora with two blackish rings. Male hypopygium with elongate simple gonocoxite; outer gonostyle slender, flattened at base and with slender distal part, apex curved inwards, tip acute; inner gonostyle longer than outer, flattened at base, tip obtuse; ninth tergite with two posterior triangular lobes separated by V-shaped notch. Differs from related species by structure of male genitalia and wing pattern.

Male.—Body length 6.3 mm, wing length 6.4 mm. Head dark brown, covered with sparse black hairs. Eyes broadly separated. Rostrum blackish, palpi blackish with lightened apical segment. Antenna 1.6 mm long, 16-segmented. Basal segments blackish; scape cylindrical, pedicel pear-shaped, half as long as scape. Two basal flagellar segments united into an elongate oval fusion-segment, about same length as pedicel. Flagellar segments cylindrical, increasing in length distally. Fusion-segment reddish, rest of flagellum brownish. Ventral verticils about as long as respective segments, dorsal verticils on median segments reaching 1.5 times length of respective segments.



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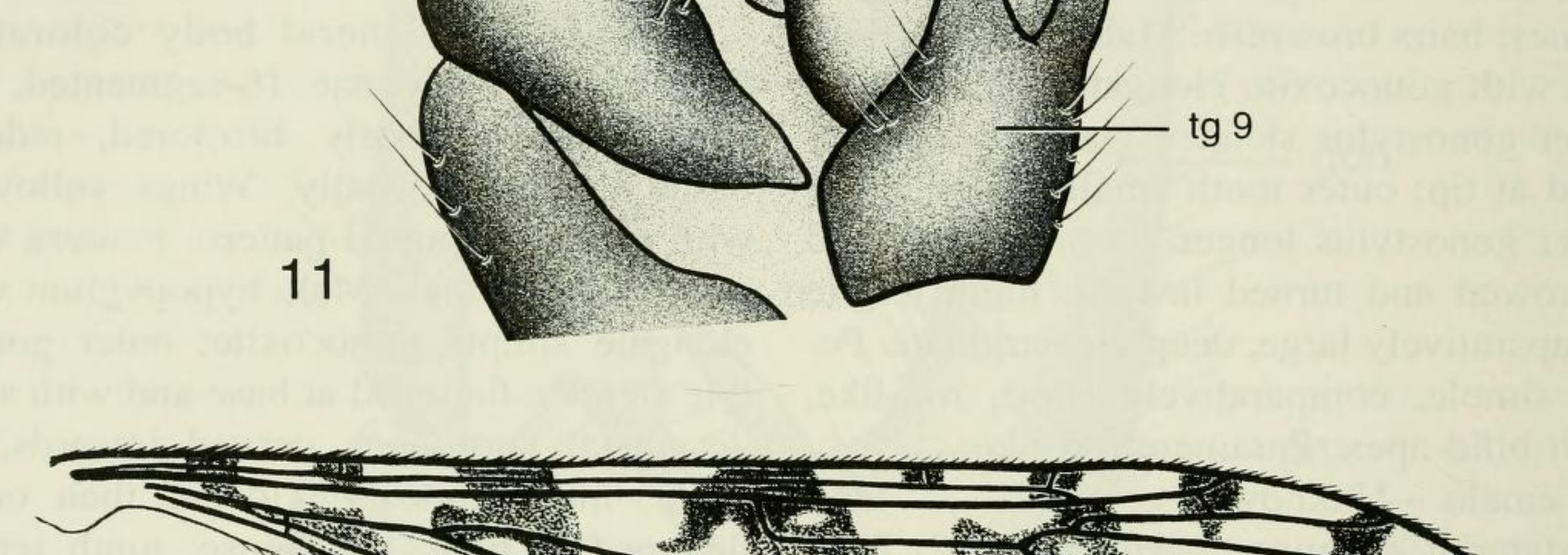

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Figs. 11–13. 11–12, *Epiphragma aurora*, holotype. 11, Male genitalia, dorso-lateral view. 12, Wing. 13, *Epiphragma* sp., fragment of wing. (See Materials and Methods for abbreviations.)

Dorsum of thorax uniformly brown, covered with sparse brown hairs. Mediotergite with narrow, dark, median longitudinal line. Pleura with dark brown spots. Wing (Fig. 12) yellowish with an abundant brown-spotted pattern; ocellate pattern virtually lacking, represented only by one circle at origin of Rs and incomplete circle at arculus; other major areas brown along cord and outer end of discal cell, marginal spots at ends of all longitudinal veins, in costal and second anal cells. Spots uniformly brown, without darker margin; slightly darker in costal area. Veins light brown, darker in patterned areas, covered with sparse brownish setae. Venation: Sc_1 ends slightly before level of beginning of R_{2+3}, Sc_2 ends slightly beyond tip of Sc_1; additional cross-vein in costal cell beyond level of half Rs; Rs long, angulate at origin; R_3 and R_4 slightly diverging; R_4 and R_5 parallel; discal cell elongate, more than twice as long as wide; cell M_1 slightly shorter than it's petiole; cross-vein m-cu clearly beyond the fork of M; anterior arculus lacking. Stem of haltere with whitish base and brownish distal part; knob with brownish base and reddish apex. Halter 1.1 mm long. Coxae and trochanters brown; femora with two blackish rings in distal part, apices light brown; tibiae brown; femur I: 4.7 mm long, II: 4.0 mm long, III: 4.6 mm; tibia I: 4.3 mm long. Legs covered with dense dark brown hairs.

Abdomen with dark brown rings at bases of segments 2–7; posterior half of segments reddish-brown. Hairs covering tergites and sternites sparse, dark brown. Male genitalia (Fig. 11) with elongate, simple gonocoxite; outer gonostyle slender, flattened at base and with slender distal part, apex curved inwards, tip acute; inner gonostyle longer than outer, flattened at base, slightly bent inwards, tip obtuse; ninth tergite with two posterior triangular lobes, separated by V-shaped notch; parameres wide, triangular plates; penis simple, rod-like.

Female.—Unknown.

Material examined.—Holotype: ♂, D-7-39A, Dominican amber.

Etymology.—The species name is based on *aurora,* Latin for dawn.

Discussion.—The new species, the first representative of the genus from amber, is unique, resembling recent *Epiphragma* only in some details. The most characteristic structures are the comparatively broad parameres of the male genitalia, forming wide, triangular plates. The wing pattern is closest to that of *E. sappho* Alexander 1943 described from a single female from Peru. However, *E. aurora* differs from it by the absence of small wing dots.

Epiphragma sp.

Only one poorly preserved female was found. The head and tip of the ovipositor are missing, but body length is approximately 12.0 mm. The wing apex is also missing, but an approximate wing length is 9.3 mm. The posterior wing margin is strongly folded, but the costal and distal parts of the wing (Fig. 13) show a totally different wing pattern and venation from the previously described species (Fig. 12). The wing pattern is partially ocellate, with a complete circle having it's center on the base of cell m_1, another circle on the distal portion of the discal cell and a third, incomplete circle at the point of *Rs* branching. There is probably no circle on the base of *Rs.* Five dark spots, except on the stigma, occur in the costal cell. Femora with two broad dark brown circles in distal half.

Material examined.—♀, D-7-39I, Dominican amber.

Discussion.—This specimen is the second species of the genus from amber, but the absence of many characters prohibits us from comparing it with recent *Epiphragma.*

Subfamily Eriopterinae

Styringomyia Loew 1845

These flies have a rounded head with a short rostrum, 16-segmented antennae, characteristic wing venation (both veins Sc and R_1 very short, ending at or before mid-length of wing; R_2 and R_3 absent), abdominal segments two to seven twice as long as

wide, male genitalia inverted 180 degrees-the tergite thus being ventral in position-the sternite dorsal, gonostyle a single complex structure, usually with a long slender outer arm and two or three usually flattened and variously ornamented inner arms. Immature stages develop in rotting material and adults sometimes form swarms (Alexander 1972). Of the 159 recent species, virtually all are Paleotropical with only a few Neotropical species. *S. dominicana* Podenas and Poinar (1999) is the only species previously described from Dominican amber; *S. gracilis* Loew 1850, is the only species known from Baltic amber.

Styringomyia optiva Podenas and Poinar, new species

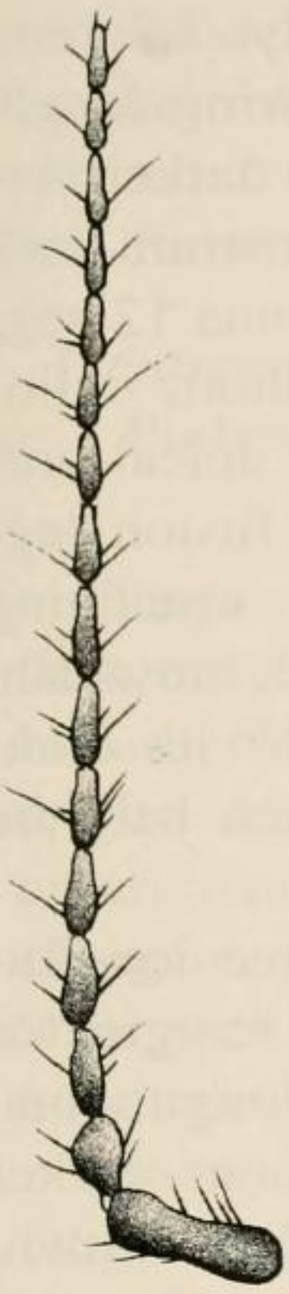
(Figs. 14–17)

Diagnosis.—General body coloration light brown. Antennae 16-segmented, also light brown. Wings totally clear. Abdomen elongate, longer than wings. Male hypopygium very characteristic: ninth tergite with apex shallowly emarginate, with elongate lobes on lateral margins; ninth sternite elongate posteriorly; gonocoxite short, with small apical tubercle on sternal side and blackened rod-like structure on tergal side; gonostyle single, outer apical lobe long and narrow, with long setae; inner armature of style consisting of two elongated structures; intermedite arm flattened with an outward-pointing tip forming right angle with longitudinal axis of style; inner arm with basal part broader than apical, slightly sinuous, apical part forming angle with basal part, tip acute; differs from related species by structure of male genitalia.

Male.—Body length 6.9 mm; wing length 4.0 mm; head grayish; rostrum short, light brown; palpi brown, covered with short (about half length of respective segment) brown setae. Antenna (Fig. 14) 16-segmented, 1.2 mm long; scape three times as long as wide; pedicel pear-shaped, half as long as scape; basal segments of both brownish; flagellar segments elongated, with slightly broader bases, apical segments nearly cylindrical; verticils about as long as the respective segments; apical segment nearly as long as preceding segment; flagellum whitish brown.

Dorsal part of thorax grayish brown, with indication of three darker longitudinal stripes; setae sparse, brownish; prothorax large; pleura light brown with longitudinal brown stripe. Coxae and trochanters grayish brown. Rest of all legs of holotype missing. Wing clear, without stigma. Venation typical for genus (Fig. 15): Sc short; Sc_1 ending just beyond Rs base, Sc_2 near tip of Sc_1; R very short, not reaching middle of wing; radial sector (Rs) with only two branches; discal cell long and narrow, cell m_1 shortly petiolated, cross-vein m-cu clearly beyond the base of discal cell, anal veins divergent. Halter grayish brown, 0.7 mm long.

Abdomen light brown; abdominal segments elongate; tergites with brown posterior margin and narrow, transverse, whitish sutures interrupted in central part, approximately in the middle of segment; sternites uniformly light brown; abdominal segments covered with short yellowish hairs, more dense on lateral margins of segments. Male hypopygium (Fig. 16) light brown; ninth tergite (Fig. 17) a depressed, flattened plate, posterior border broadly extended, apex very shallowly emarginate to produce angulated lobes, lateral margins with elongate hairy lobes; ninth sternite elongate posteriorly, bluntly pointed; gonocoxite short, having small apical tubercle on sternal side and blackened rod-like structure with slightly thickened apical part on tergal side (this appendage similar to same structure in *S. saboroskyi* Alexander 1972, interpreted by Alexander (1972) as part of gonocoxite or basistyle); gonostyle single, outer apical lobe long and narrow, with long setae, longest apical one curved inward; inner armature of style consisting of two elongated structures (sometimes interpreted as median and inner gonostyles (Alexander 1947a)), intermediate arm flattened with outward-pointing tip, forming a right angle with lon-



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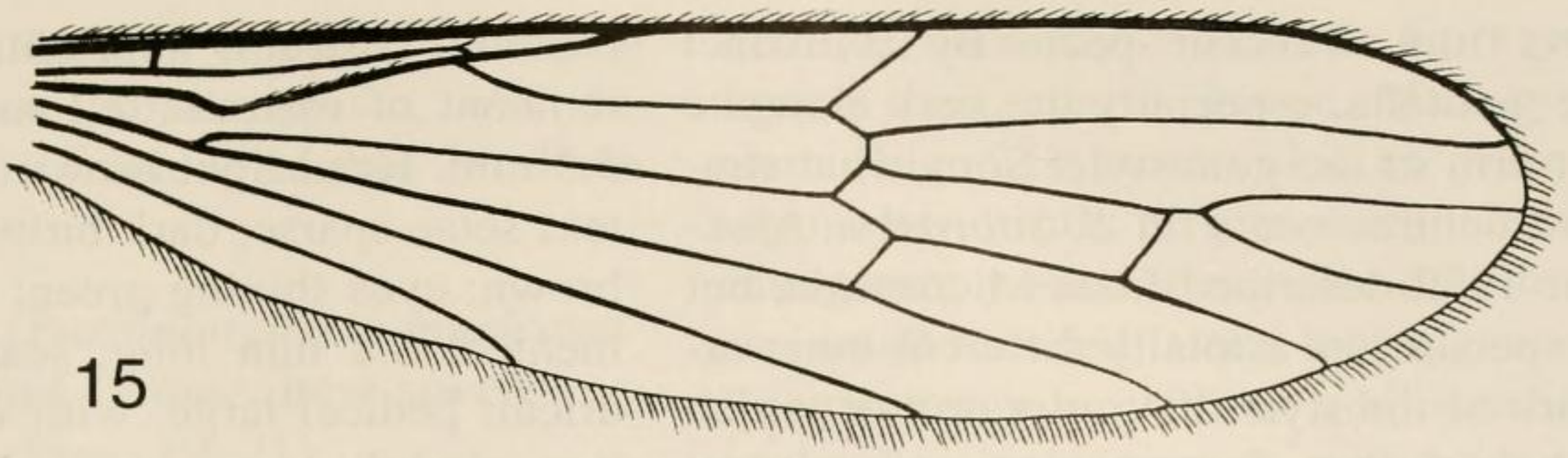

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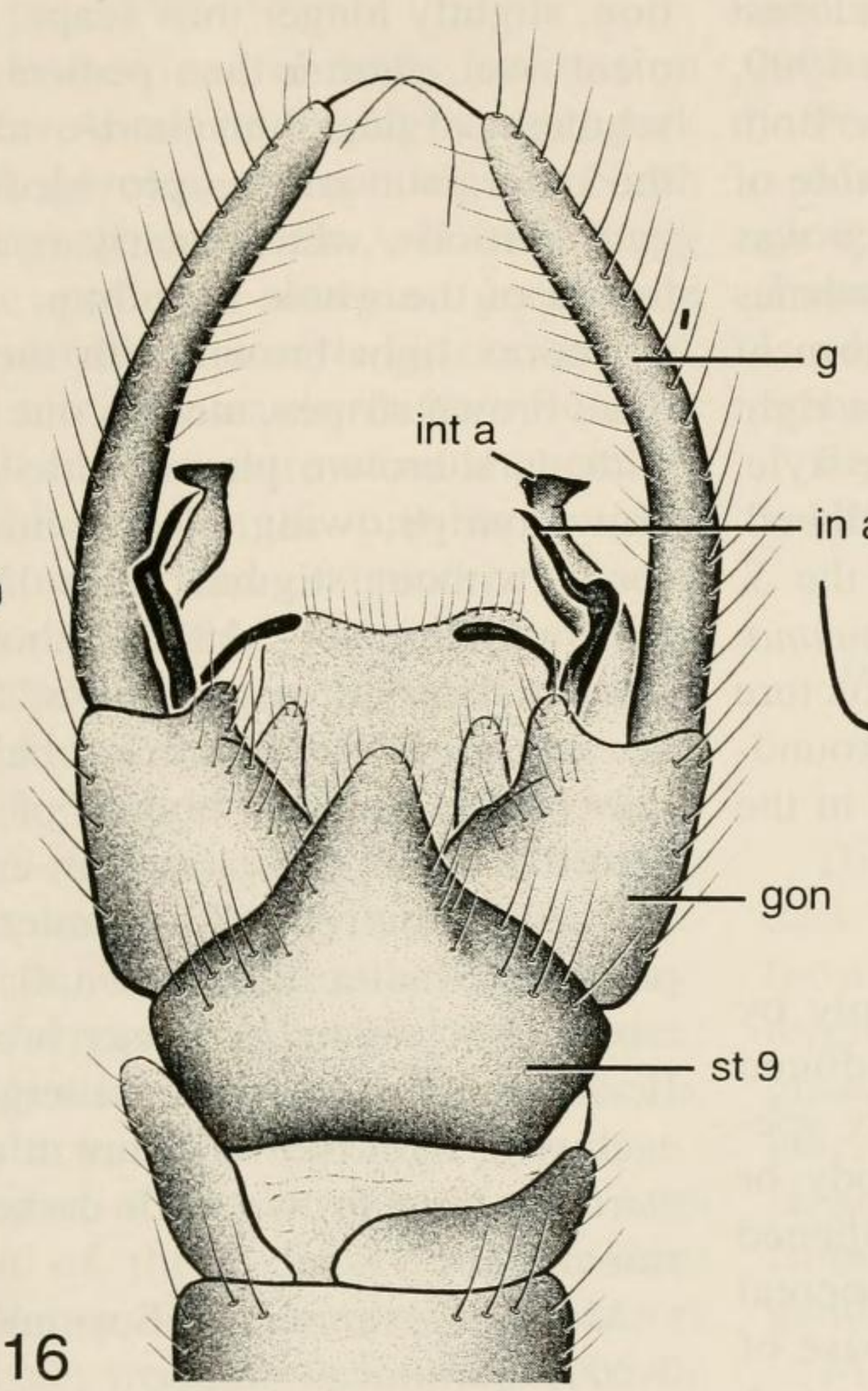

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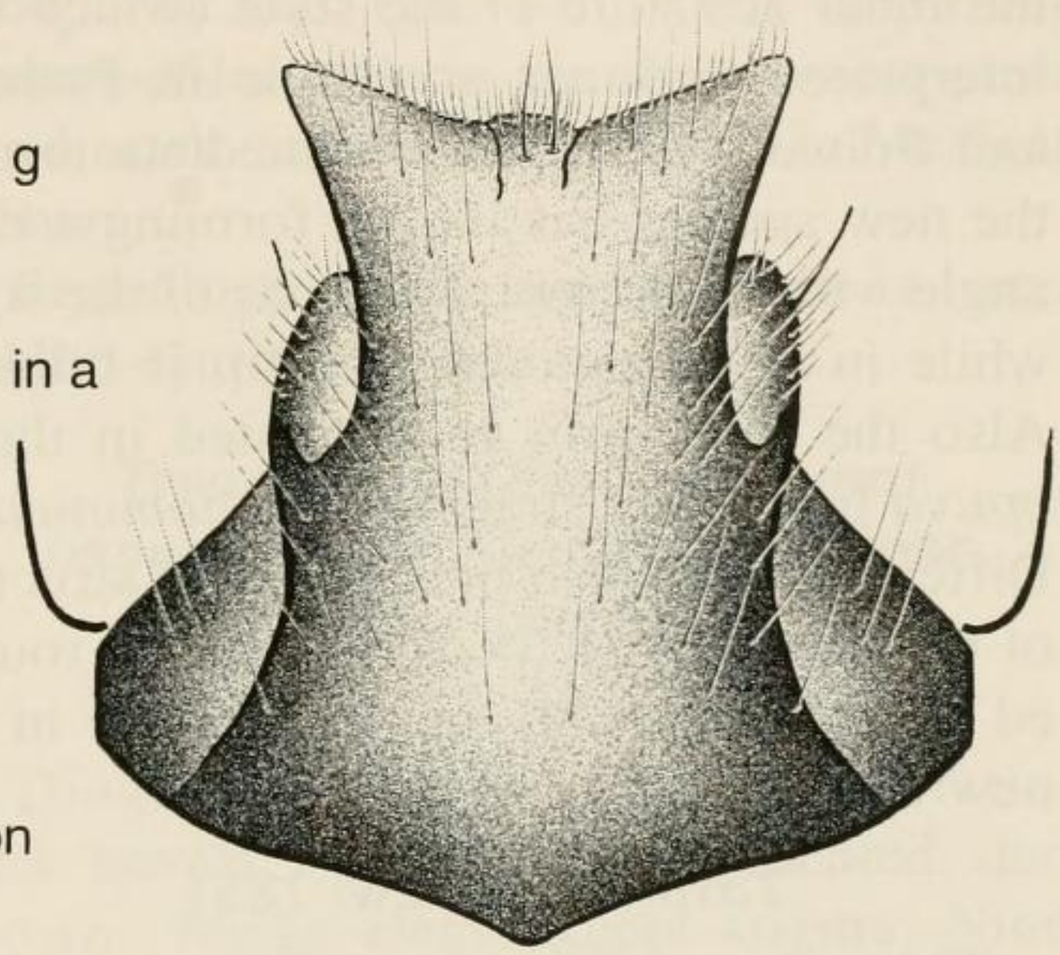

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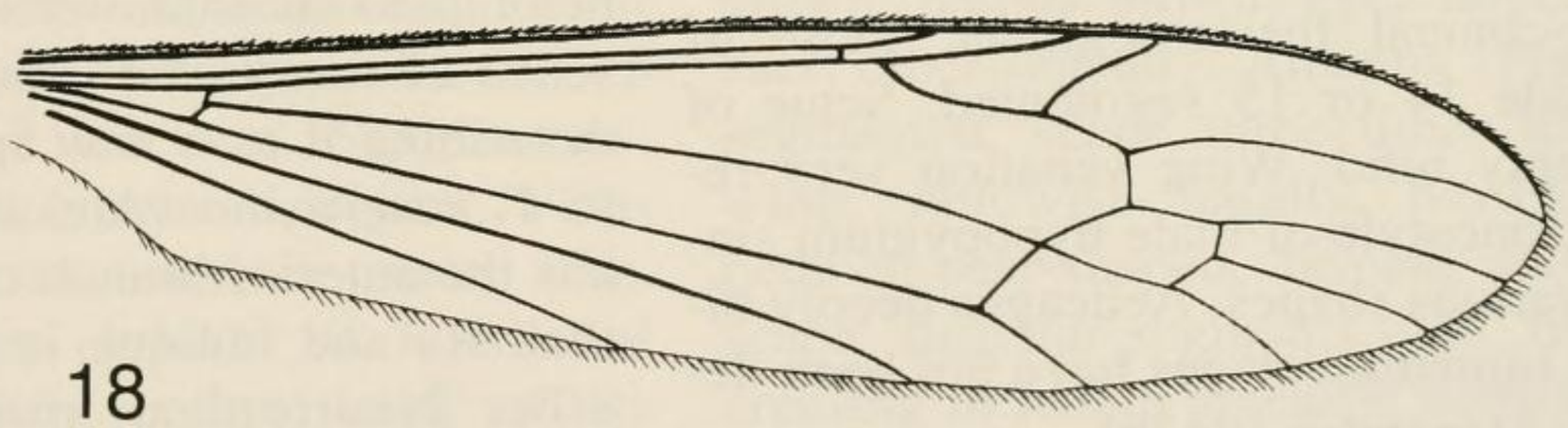

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Figs. 14–18. 14–17, *Styringomyia optiva,* holotype. 14, Antenna. 15, Wing. 16, Male genitalia, ventral view. 17, 9th tergite of male genitalia. 18, *Toxorhina* sp., wing. (See Materials and Methods for abbreviations.)

gitudinal axis of style; inner arm with basal part broader than apical, slightly sinuous, apical part forming angle with basal part, slender, tip acute.

Female.—Unknown.

Material examined.—Holotype: ♂, D-7-39H, Dominican amber.

Etymology.—The species name is based on optivus, Latin for endeavor.

Discussion.—The new species clearly

differs from all recent species by its distinct male genitalia, especially the very elongate outer arm of the gonostyle. Somewhat similar structures occur in *S. sabroskyi* Alexander 1972 described from Micronesia, but that species has a totally different inner armature of the style, the outer arm of which is much shorter. *S. optiva* sp. n. is closest to *S. dominicana* Podenas and Poinar 1999, also described from Dominican amber. Both species can be separated by the structure of the inner armature of the style (which was interpreted as inner gonostyle in Podenas and Poinar 1999); the intermediate arm of the new species has the tip forming a right angle with the longitudinal axis of the style, while in *S. dominicana,* the tip is bilobed. Also the inner arm is angulated in the *S. optiva* but nearly straight in *S. dominicana.* Differences are also present in the structure of the ninth tergite (posterior margin rounded in *S. dominicana* and emarginate in the new species).

Toxorhina Loew, 1851

This genus is characterized not only by the elongate rostrum, bearing reduced mouthparts at the tip, which in many species exceeds in length the entire body or wing, but also by the greatly lengthened cervical region, with the anterior mesonotal prescutum jutting forward over the base of the neck. Male antennae 12-segmented, with several basal segments united into a truncate-conical fusion-segment, those of the female 14 or 15 segmented. Setae of legs deeply bifid. Wing venation very reduced. Gonostyle of male hypopygium single, of various shapes. Aedeagus deeply bifid. The immature stages have not been described (Alexander 1947b).

The subgenus *Ceratocheilus* contains few strictly tropical American species. There are relatively few species in the Ethiopian and Oriental Regions, but more in the Australian Region.

Toxorhina (Ceratocheilus) sp.

One specimen was found with missing genitalia and tip of rostrum. Body length (without rostrum) approximately, 7.3 mm, remnant of rostrum, 3.1 mm, wing length 5.5 mm. Head light brown with darker vertex; setae sparse, dark brown; rostrum dark brown; eyes shining green; antenna 12-segmented, 0.8 mm long; scape short, cylindrical; pedicel large, with wide apical portion, slightly longer than scape; fusion-segment oval, shorter than pedicel; remaining segments of flagellum short-oval, brownish, the outer four articles provided with elongate verticils, which nearly reach half the length of the whole flagellum.

Thorax light brown with three longitudinal brown stripes, median one marginated with dark brown; pleura with longitudinal brown stripe; wing clear, without darker spots, without stigma; veins light brown; wing venation (Fig. 18): Sc short, Sc_1 ending just beyond origin of Rs, Sc_2 a short distance from the tip of Sc_1, before the origin of Rs; anterior branch of Rs shorter than Rs; discal cell closed; m-cu at fork of M; anal veins divergent; anterior arculus preserved; halter light brown, 0.7 mm long; coxae, trochanters and legs brown; femur II: 4.9 mm long; abdominal tergites brown, each with light brown suture at mid-length; sternites light brown with darkened posterior margin.

Material examined.—Sex unknown- D-7-207, Dominican amber.

Discussion.—This specimen probably belongs to an unknown species, but the absence of many characters prohibit us from describing it as a new species. It is related to *T. americana* (Alexander 1913), which has the anterior branch of Rs a little longer than Rs and oblique in position, while in other Neotropical species the anterior branch of Rs is much longer than Rs and extends generally parallel to the posterior branch.

Trentepohlia Bigot, 1854

Wings with veins Cu_1 and 1st A fused for a distance. Crane flies of this genus are all tropical. One species, belonging to the typical subgenus, occurs in Baltic amber

(Alexander 1931), and another, belonging to the subgenus *Paramongoma,* was described from Dominican amber (Podenas and Poinar 1999).

Trentepohlia (Paramongoma) mexicana Podenas and Poinar, new species

(Figs. 19–21)

Diagnosis.—General body coloration dark brown. Antennae 16-segmented, dark brown. Wings clear except stigma. Ninth tergite of male genitalia with shallowly emarginate posterior margin; gonocoxite elongate, simple; gonostyle single, narrow, with apex turned inwards. Differs from related species by structure of male genitalia.

Male.—Body length 6.0 mm, wing length 4.8 mm. Head of holotype is seen only from ventral side; rostrum short, light brown; palpi brown; eyes large, meeting ventrally. Antenna (Fig. 20) 16-segmented, 1.3 mm long; scape three times as long as wide, dark brown; pedicel with slightly widened apical portion, only slightly shorter than scape, brown; flagellar segments cylindrical, decreasing in length toward apex; verticils shorter than respective segments; flagellum brown with darkened apex.

Dorsal part of thorax dark brown, with indication of three darker longitudinal stripes; pleura light brown with darker spots. Coxae, trochanters and legs brown; tips of femora, tibiae and tarsi starting from middle of third segment darkened. Femur II: 8.3 mm long, III: 7.4 mm; tibia III: 7.5 mm; tarsus III: 4.7 mm long. Wing narrow, clear, with small, brownish stigma. Veins brown. Venation as usual in genus (Fig. 19): Sc long, Sc_1 at level of middle of R_{2+3+4}, Sc_2 slightly before level of Rs branching; Rs very slightly curved, nearly straight; discal cell narrow, three times as long as wide; cross-vein m-cu proximal to base of discal cell; tip of CuA_2 not reaching tip of A_1. Halter dark brown with lightened base of stem, 0.6 mm long.

Abdominal tergites dark brown; basal sternites brown, sternites 6th to 9th dark brown; lateral margins of both tergites and sternites narrowly whitened; hairs on abdomen short, sparse, brown. Male hypopygium (Fig. 21) same color as preceeding segments; ninth tergite with shallowly emarginate posterior margin, thus forming two small rounded lateral lobes; gonocoxite elongate, simple, without additional lobes; gonostyle single, narrow, with apex turned inward.

Female.—Unknown.

Material examined.—Holotype: ♂ on angiosperm leaf (the following described *Trentepohlia* male in the same amber piece is adjacent to the leaf), D-7-212, Mexican amber.

Etymology.—The species name is based on the country of origin, Mexico.

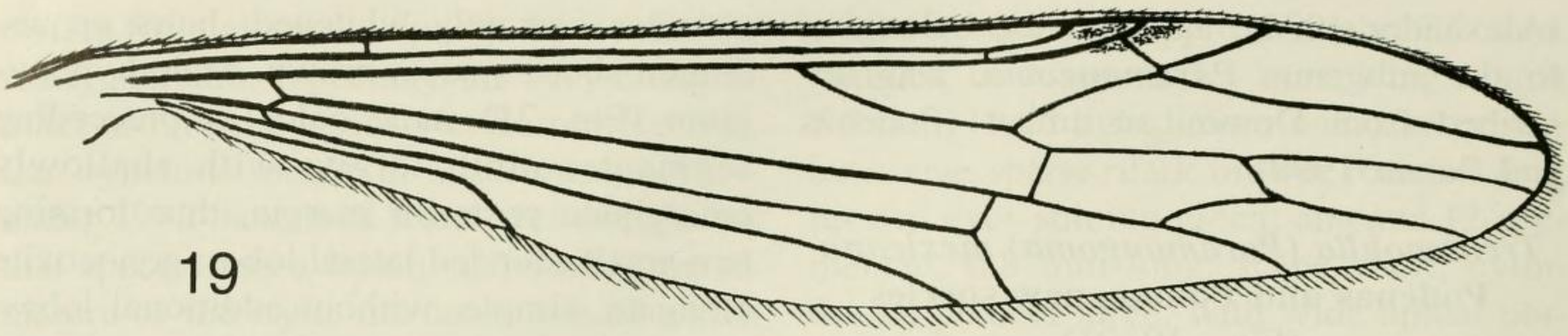
Trentepohlia (Paramongoma) immemorata Podenas and Poinar, new species

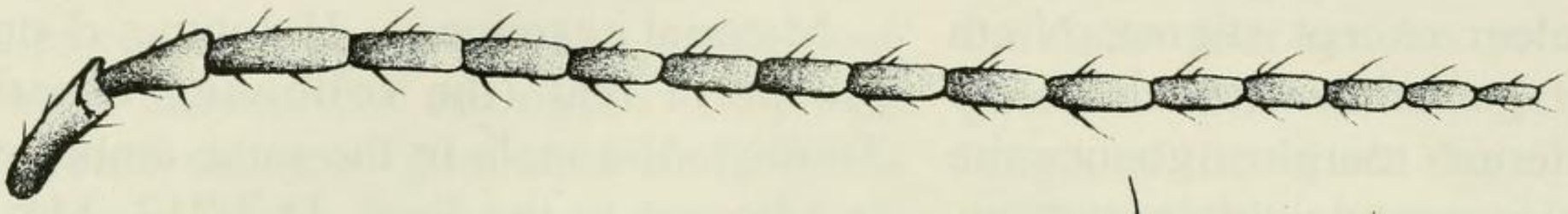
(Figs. 22–24)

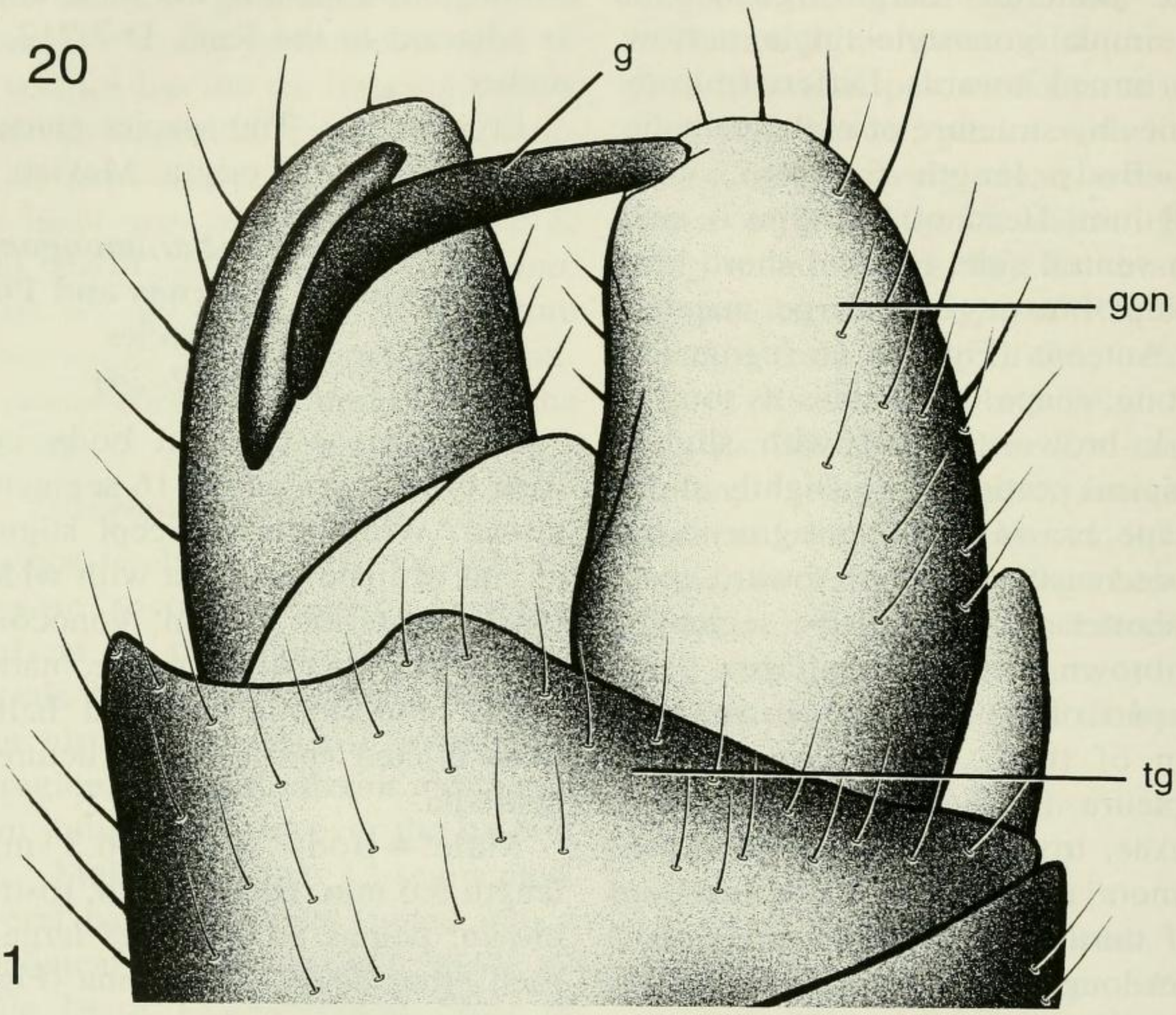
Diagnosis.—General body coloration dark brown. Antennae 16-segmented, dark brown. Wings clear except stigma. Ninth tergite of male genitalia with widely emarginate posterior margin; gonocoxite elongate, oval; gonostyle single, narrow, with large, blunt tooth on basal half. Differs from related species by structure of male genitalia.

Male.—Body length 6.3 mm, wing length 5.6 mm. Head brown; rostrum short, brown; palpus brown; eyes large, meeting each other dorsally. Antenna (Fig. 23) 16-segmented; scape three times as long as wide, yellowish basally, brown distally; pedicel pear-shaped, brown, shorter than scape; flagellar segments oval, brown, decreasing in length apically; verticils shorter than respective segments.

Dorsal part of thorax castaneous brown, with indication of median longitudinal stripe; post-sutural parts of scutum and scutellum dark brown; pleura light brown with darker spots. Coxae and trochanters brown; femora dark brown, tibiae and tarsi brown. Femur II: 8.0 mm, tibia II: 7.3 mm long. Wing clear with small brownish stigma.







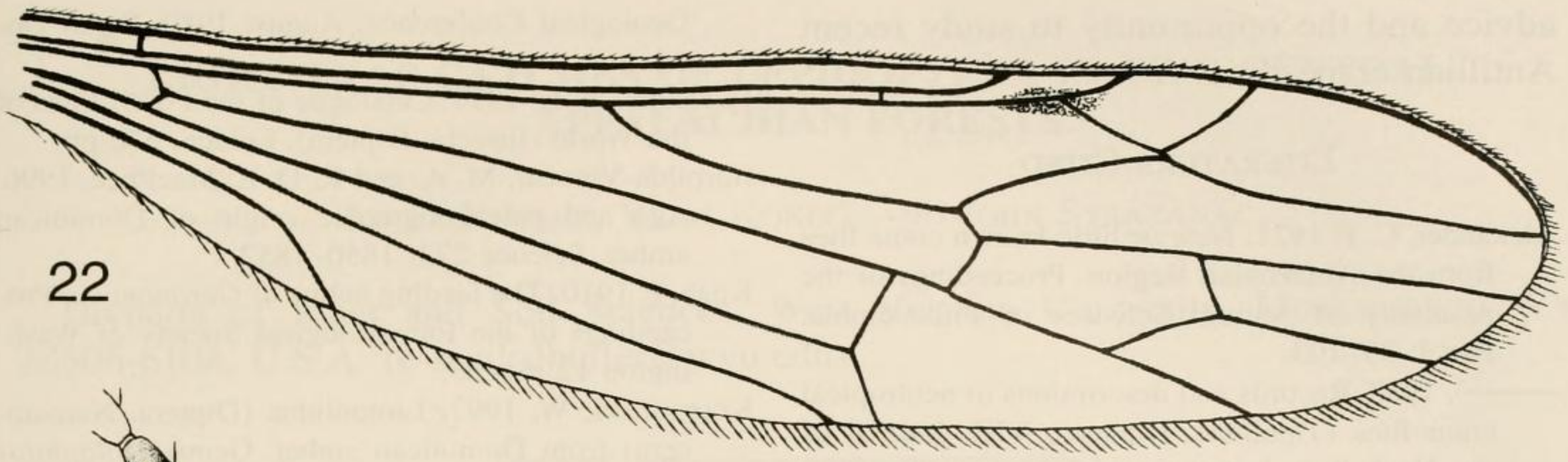
Figs. 19–21. *Trentepohlia mexicana,* holotype. 19, Wing. 20, Antenna. 21, Male genitalia, dorso-lateral view. (See Materials and Methods for abbreviations.)

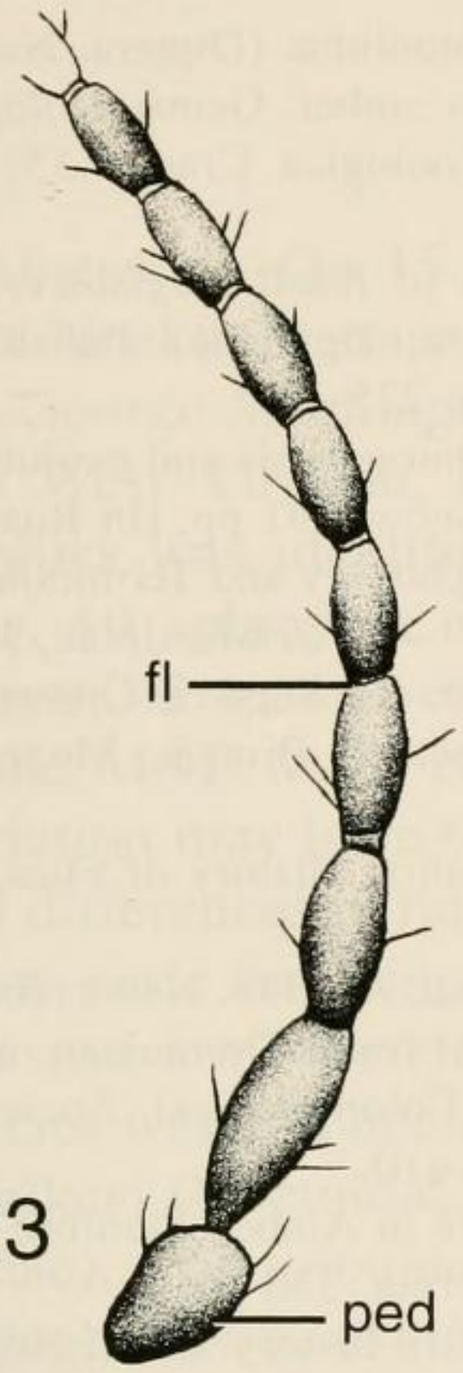
Veins brown. Venation typical for genus (Fig. 22): Sc long, Sc_1 at level of one fifth of R_{2+3+4}, Sc_2 at the level of three-fourths of Rs length; Rs long, very slightly bent, nearly straight; discal cell widened, approximately three times as long as wide; crossvein m-cu before base of discal cell. Stem of halter whitish basally, brownish distally, knob dark brown; halter 0.7 mm long.

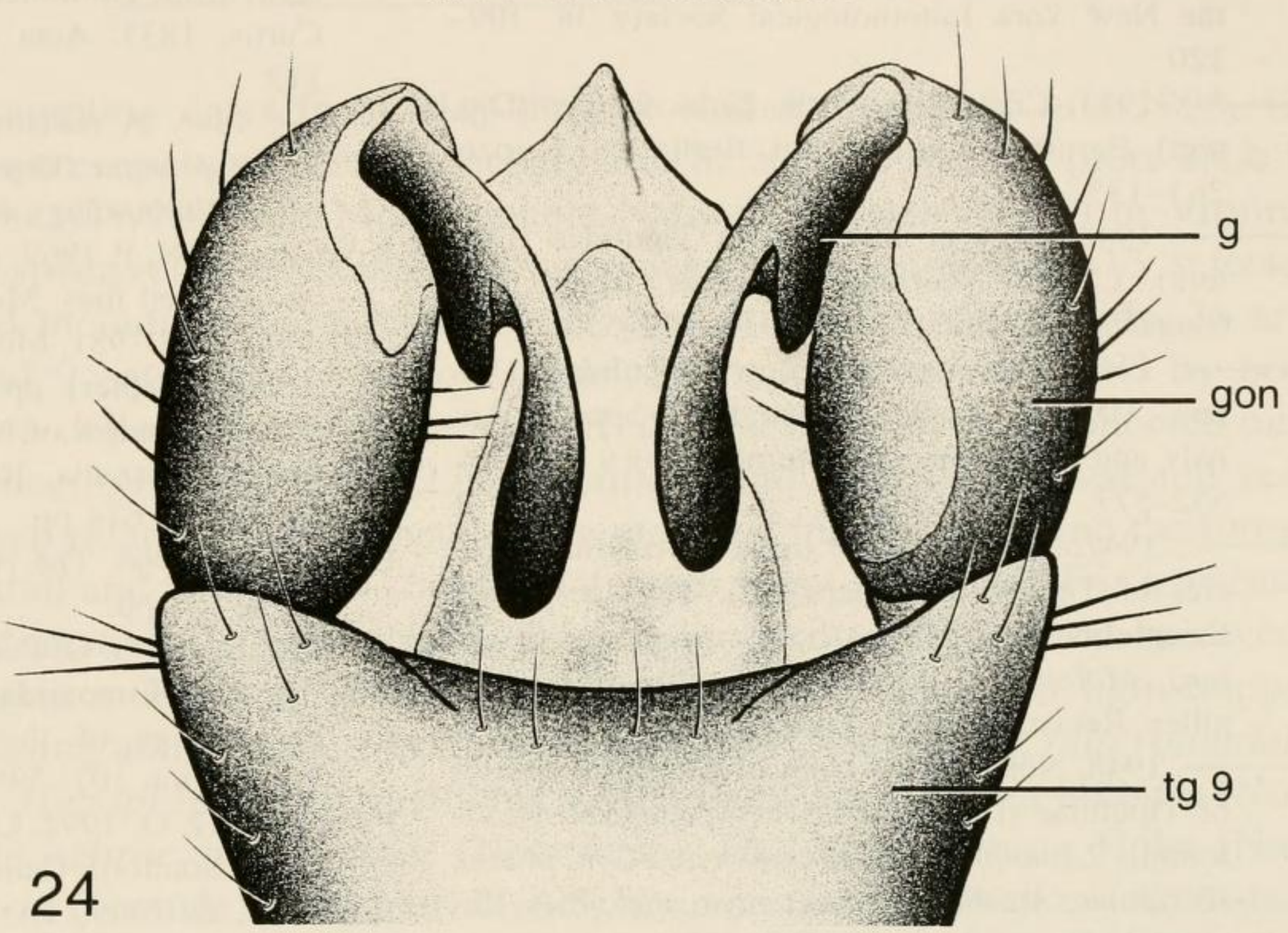
Abdominal tergites dark brown; hairs on abdomen short, sparse, brown. Male hypopygium (Fig. 24) same color as rest of abdomen; ninth tergite with widely emarginate posterior margin; gonocoxite oval, simple, without additional lobes; gonostyle single, narrow, with large blunt tooth on basal half.

Female.—Unknown.

Material examined.—Holotype: ♂ adjacent to angiosperm leaf (male of *Trente-*







Figs. 22–24. *Trentepohlia immemorata,* holotype. 22, Wing. 23, 2–10 antennal segments. 24, Male genitalia, dorsal view. (See Materials and Methods for abbreviations.)

pohlia mexicana sp. n. in the same amber piece is on the leaf), D-7–212, Mexican amber.

Etymology.—The species name is based on *immemoratus,* Latin for immemorial.

Discussion.—Both new species of *Trentepohlia* Bigot 1854 are closely related, differing mostly in the structure of male genitalia, wing venation and antennae. The major difference is seen in the male gonostyle: it is not toothed in *T. mexicana,* but has a large tooth on the basal half in *T. immemorata*. Also the flagellomeres of *T. mexicana* are cylindrical and the pedicel is elongate, while the flagellomeres of *T. immemorata* are oval and the pedicel short and pear-shaped; vein Rs is also shorter in *T. mexicana*. Closely related to both new species and especially to *T. immemorata* is *T. agri* Podenas and Poinar (1999), a comparatively abundant species in Dominican amber. The latter species differs from both Mexican amber species by a very short vein Rs, elongate-oval flagellomeres, longer gonocoxites and a smaller tooth on the basal half of the gonostyle.

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NEW CRANE FLIES (DIPTERA: TIPULIDAE, LIMONIIDAE) FROM DOMINICAN AND MEXICAN AMBER

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Abstract. — Four new species of crane flies (Diptera, Limoniidae) are described from Dominican amber: Geranomyia euchara, Elephantomyia grata, Epiphragma aurora, and Styringomyia optiva. Additionally two Limoniidae belonging to the genera Epiphragma Osten Sacken 1859 and Toxorhina Loew 1851 and one Tipulidae of the genus Brachypremna Osten Sacken 1886, still unknown from Dominican amber, are characterized. Two new species are described from Mexican amber (Oligocene/Miocene): Trentepohlia mexicana and Trentepohlia immemorata .

Key Words: Dominican amber, Mexican amber, Tipulidae, Limoniidae, fossil crane-flies

Fossil crane flies from Dominican amber have been investigated little and from Mexican amber are unknown (Evenhuis 1994: Krzeminski 1992, 1996; Podenas and Poinar 1999). In the present study, seven species of crane flies (Diptera: Tipulidae, Limonidae) are characterized from Dominican amber. Four of these are described as new species in the genera Geranomyia Haliday 1833, Elephantomyia Osten Sacken 1859, Epiphragma Osten Sacken 1859, and Styringomyia Loew 1845, and three are assigned to the genera Brachypremna Osten Sacken 1886, Epiphragma Osten Sacken 1859, and Toxorhina Loew 1851. Specimens of the latter three genera, which were previously unknown in Dominican amber, are discussed with many characters featured, but the absence of certain diagnostic characters prohibits a comparison with recent species. Two new species in the same piece of Mexican amber are described in the genus Trentepohlia Bigot 1854.

Materials and Methods

The Dominican amber specimens are believed to have originated from mines in the

Cordillera Septentrional of the Dominican Republic. These mines are in the El Mamey Formation (Upper Eocene), which is a shale-sandstone interspersed with a conglomerate of well-rounded pebbles (Eberle et al. 1980). The exact age of the amber is unknown, with estimates based on foraminifera indicating a range of 15-20 million years (Iturralde-Vincent and MacPhee 1996) and with coccoliths a range reaching 30-45 million years (Cepek 1990). The Mexican amber specimens originated from amber mines in the State of Chiapas in southern Mexico. The amber occurs in the Balumtun sandstone, Mazantic shale and La Quinta formations ranging from the Lower Miocene to the Upper Oligocene (22-26 mya) (Poinar 1992).

In the following descriptions, terminology of genitalia and wing venation follows

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that presented in the "Manual of Nearctic Diptera" (McAlpine 1981). All specimens originated from the Poinar amber collection maintained at Oregon State University, Corvallis, Oregon. Accession numbers pertaining to these specimens are presented under the section "material examined."

Abbreviations used in the drawings are: air=air bubble; arc = arculus; dm = discal cell; fl = flagellum; gon = gonocoxite; g = gonostylus; i g = inner gonostyle; in a = inner arm of gonostyle; int a -intermediate arm of gonostyle; m-cu = medial-cubital cross vein; og = outer gonostyle; p = penis; pm = paramere; ped = pedicel; R,=first branch of radius vein; RS = radial sector; rst = rostrum; Sci=first subcostal vein; scp = scape; st 9 = ninth sternite; tg 9 = ninth tergite. We have used the r cross vein here to represent a cross vein connecting R, with R 2 or one of the other radial sector veins.

Tipulidae

Subfamily Dolichopezinae

Brachypremna Osten Sacken 1886

Species of this genus have long, slender legs with the tarsi almost as long as the femora and tibiae combined, and hind tibiae spurred but the fore and middle tibiae apparently spurless. They are characterized by the most developed neck of all crane flies (Savchenko 1983). The male genitalia are inverted, a rare situation among Tipulidae. The larvae are covered with dense pubescence (Rogers 1949). Recent species have a tropical distribution except for one species which occurs in the southern and eastern Nearctic (Alexander and Byers 1981). Other fossil Brachypremna are restricted to the study by Krzeminski (1996) since B. eocenica Meunier 1906 was transferred to the genus Tipula (Evenhuis 1994).

Brachypremna sp.
(Fig. 1)

A single poorly preserved female with the tip of the ovipositor missing. Body length approximately 11.5 mm. Wing

length 12.5 mm. Head and dorsum of thorax covered with reddish oxidative dust

from the fossilization process; antennae not visible. Haltere 1.8 mm long. Wing (Fig. 1) long and narrow, totally clear except for brownish stigma; veins light brown. Venation: Sc, long, extending almost to the tip of R, +2 ; tip of R 1+2 perpendicular to the remainder of the vein; Rs strongly arcuated at origin; deflection of R 4+5 distinct; petiole of cell m, shorter than cell itself; r-m short but present; m-cu immediately beyond the fork of M; vein A 2 very short. Femur II: 11.3 mm. III: 10.7 mm long.

Examined material. — 9, D-7-39D, Dominican amber.

Discussion. — This specimen is probably undescribed, but the inability to see many characters makes a comparison with recent Brachypremna impossible. It is clearly different from the fossil species described by Krzeminski (1996) from the same deposits.

Limoniidae

Subfamily Limoniinae

Geranomyia Haliday 1833

The very large and complex genus Ger-

anomyia has its center of distribution in the Neotropical Region. Many species are widely distributed while others seem to be rather local (Alexander 1921). The snout (rostrum) in Geranomyia is very long, while the sucking mouthparts are drawn out still further. Adults feed on nectar of composite flowers {Eupatorium, Solidago, Aster, Silphium, Rudbeckia, Verhesina, Cacalia, etc.) (Knab 1910). The larvae live under water (even salt water), feeding on algae, diatoms, etc.; sometimes they make silken cases (Oldroyd 1966). No representatives have been described from any amber source (Evenhuis 1994).

Geranomyia euchara Podenas and Poinar, new species

(Figs. 2-7)

Diagnosis. — General coloration brown; body with only very sparse, short, brownish

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Figs. 1-2. 1. Brachypremna sp., wing. 2, Geranomyia enchant, holotype, general view.

hairs, mostly on posterior margins of abdominal tergites and sternites. Wing completely clear, without dark spots except for small brownish stigma. Male terminalia with large, elongate-oval inner gonostylus bearing two rostral spines of the same length and a comparatively small, strongly hooked outer gonostylus; 9th tergite with shallow but broad posterior incision; apex

of penis bilobed. Clearly differs from related species by structure of male genitalia.

Male. — Body length 5.3 mm (without rostrum), rostrum 1.9 mm long, wing length 5.1 mm. Vertex of head dark brown, with short brown hairs. Frons rusty dorsally to light brown ventrally. Eyes nearly meeting ventrally. Rostrum, mouthparts and palpi light brown. Palpi with short, sparse.

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Figs. 3-8. 3-7, Geranomyia euchara, holotype. 3, Head. 4, Wing. 5, Male genitalia, dorsal view. 6, Tip of aedeagus. 7, Male genitalia, ventral view. 8, G. subvirescens, male genitalia, dorsal view (after Alexander 1970). (See Materials and Methods for abbreviations.)

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brownish setae. Antenna short, 1.1 mm long, 14-segmented, brown, if bent backwards, barely reaching frontal margin of thorax. Scape cylindrical, three times as long as rounded pedicel (Fig. 3). Flagellomeres shortly oval. Verticils short, not exceeding length of respective segments.

Thorax light brown; prescutum with

dark, narrow, median stripe extending onto scutellum. Wing (Fig. 4) without dark spots, except for small, brownish stigmal area. Veins brown. Venation: Sc, ends at middle of Rs; Sc 2 close to Sc,; supernumerary cross-vein in cell sc far from Rs base; R, + 2 ar, d R2 m nearly transverse alignment; R 3 and R 4+3 parallel. Discal cell twice as long as wide; cross-vein m-cu slightly before fork of M. Halter light brown, 0.8 mm long. Coxae, trochanters and legs uniformly brown; femur I: 4. 1 mm long, II: 4.8 mm, III: 5.0 mm, tibia II: 4.4 mm, III: 4.6 mm, tarsus II: 2.7 mm and III: 3.0 mm long.

Abdomen brown; short, sparse brownish hairs on posterior margins of tergites and sternites. Genitalia (Figs. 5-7) same color as rest of abdomen; posterior border of ninth tergite shallowly and broadly emarginate, lateral lobes with sparse setae; gonocoxite elongate, narrowing apically, with rounded ventro-mesal lobe; inner gonostyle comparatively large, elongate-oval, covered with sparse, short setae, rostral portion with two equal spines emerging from basal portion; spines divergent, situated slightly beyond base of rostrum, their tips acute; outer

gonostyle hook-like, comparatively large, tip acute; tip of penis bilobed.

Female. — Unknown.

Material examined. — Holotype: 8, D-7-39B, Dominican amber.

Etymology. — The species name is based on eucharis, which is Latin for gracious and charming.

Discussion. — The new species is closely related to G. subvirescens (Alexander 1930), which is known from Cuba (Trinidad Mountains — type locality), Dominica, Panama and Venezuela (Alexander 1970). Both species have unpatterned wings and similar

male genitalia. However G. euchara differs from G. subvirescens (Fig. 8) in possessing a much longer inner gonostylus, a longer and more curved outer gonostylus, a smaller and rounded ventro-mesal lobe of the gonocoxite, the posterior border of the ninth tergite more emarginate and the apical lobes of the penis longer and strongly downturned. Wing venation of the new species has a distinct cross-vein r-m, which is very

short to obliterated in G. subvirescens. This is the first species of the genus described from amber.

Elephantomyio Osten Sacken 1859

Medium sized flies, distinguished chiefly by the greatly lengthened rostrum, commonly as long as or longer than the entire body. The immature stages occur in wet, decaying wood of various hardwood trees (Alexander 1948). Adults feed from tubular flowers, mostly Compositae (Oldroyd 1966). The genus is widely distributed throughout the major regions of the world, with especially numerous species in the Neotropics and Ethiopian Regions. Four species are known from Baltic amber (Evenhuis 1994).

Elephantomyia (Elephantomyio) grata Podenas and Poinar, new species

(Figs. 9-10)

Diagnosis. — General body coloration brown. Antennae 15-segmented. Wings totally clear without any dark spots. Male ter-

minalia with the outer gonostylus slender, glabrous, curved, bifid at tip; inner gonostylus elongate with apical portion slender and turned inwards; 9th tergite deeply emarginate. Differs from related species in structure of male genitalia.

Male. — Body length 3.0 mm, rostrum 3.3 mm, wing length 3.5 mm. Head brown, covered with sparse, short, dark brown hairs. Eyes very large, anterior vertex correspondingly narrowed. Rostrum longer than entire body, brown, covered with dense, short setae; palpi reduced, at apex of rostrum. Antenna about 0.9 mm long.

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Figs. 9-10. Elephantomyia grata, holotype. 9, Wing. 10, Male genitalia, latero-dorsal view. (See Materials and Methods for abbreviations.)

brown, 15-segmented; scape cylindrical, paratively short verticils reaching 1.5 length

pedicel oval; both segments approximately of respective segment.

equal in length, dark brown; basal two fla- Dorsum of thorax brownish with dark

gellar segments united into fusion-segment; brown median line, covered with sparse,

succeeding segments cylindrical, with com- brown hairs. Pleura with darker brown

[Begin Page: Page 869]

spots. Wing (Fig. 9) clear without dark spots. Veins light brown, with comparatively abundant setae. Venation: Sc, ends at level of two- thirds of Rs, Sc 2 near its tip, at level of about one-third length of Rs; Rs short; R 2 absent; R 4 and R s slightly diverging; r-m connecting with R s ; discal cell large, twice as long as wide; cross-vein m-cu clearly beyond the fork of M; anterior arculus preserved. Halter light brown, 0.7 mm long. Legs light brown; tibial spurs

very small; both forelegs missing in holotype; femur II: 3.9 mm long, III: 4.0 mm; tibia II and III: 4.6 mm long, tarsus II: 4.6 mm long.

Abdomen with dark brown tergites and sternites, with light intersegmental membranes; hairs brownish. Male genitalia (Fig. 10) with gonocoxite elongated and simple; outer gonostylus slender, glabrous, curved, bifid at tip; outer tooth smaller than inner; inner gonostylus longer, its outer one-third narrowed and turned inward; ninth tergite comparatively large, deeply emarginate. Penis simple, comparatively short, rod-like, with bifid apex. Paramere rod-like.

Female. — Unknown.

Material examined. — Holotype: 6\ D-7-39C, Dominican amber.

Etymology. — The species name is based on gratus, which is Latin for pleasing.

Discussion. — The new species does not resemble any of the recent local species. It clearly differs from the latter by its very small size, long rostrum and specific struc-

ture of the male genitalia, somewhat resembling those of E. krivosheinae Savchenko 1976 of the Palaearctic Region (Savchenko et al. 1992). The new species clearly differs from this species by the ninth tergite, which has a deep posterior emargination, a rather unusual structure among all Elephantomyia.

Subfamily Hexatominae

Epiphragma Osten Sacken 1859

Species belonging to this genus have a yellowish-brown to brown body and darkly patterned wings. Additional characters are: costal cell with additional cross-vein, anterior arculus missing; Rs angulate at origin, discal cell closed, cell m, with short petiole; abdominal tergites with a pair of transverse impressions before midlength. Species of this genus occur in all zoogeographical regions except Ethiopian. The greatest diversity of species is observed in the Neotropics and Australia (Savchenko 1989). The immature stages usually occur in wet rotting wood; some species develop in comparatively hard decomposing wood (Krivosheina 1969). No species were previously

known from amber (Evenhuis 1994).

Epiphragma aurora Podenas and Poinar, new species

(Figs. 11-12)

Diagnosis. — General body coloration dark brown. Antennae 16-segmented, flagellum conspicuously bicolored, reddish basally, brown distally. Wings yellowish with a brown-spotted pattern. Femora with two blackish rings. Male hypopygium with elongate simple gonocoxite; outer gonostyle slender, flattened at base and with slender distal part, apex curved inwards, tip acute; inner gonostyle longer than outer, flattened at base, tip obtuse; ninth tergite with two posterior triangular lobes separated by V-shaped notch. Differs from related species by structure of male genitalia and wing pattern.

Male. — Body length 6.3 mm, wing length 6.4 mm. Head dark brown, covered with sparse black hairs. Eyes broadly separated. Rostrum blackish, palpi blackish with lightened apical segment. Antenna 1 .6 mm long, 16-segmented. Basal segments

blackish; scape cylindrical, pedicel pear-shaped, half as long as scape. Two basal flagellar segments united into an elongate oval fusion-segment, about same length as pedicel. Flagellar segments cylindrical, increasing in length distally. Fusion-segment reddish, rest of flagellum brownish. Ventral verticils about as long as respective segments, dorsal verticils on median segments reaching 1 .5 times length of respective segments.

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Figs. 11-13. 11-12, Epiphragma aurora, holotype. 11, Male genitalia, dorso-lateral view. 12, Wing. 13, Epiphragma sp., fragment of wing. (See Materials and Methods for abbreviations.)

[Begin Page: Page 871]

Dorsum of thorax uniformly brown, covered with sparse brown hairs. Mediotergite with narrow, dark, median longitudinal line. Pleura with dark brown spots. Wing (Fig. 12) yellowish with an abundant brown-spotted pattern; ocellate pattern virtually lacking, represented only by one circle at origin of Rs and incomplete circle at arculus; other major areas brown along cord and outer end of discal cell, marginal spots at ends of all longitudinal veins, in costal and second anal cells. Spots uniformly brown, without darker margin; slightly darker in costal area. Veins light brown, darker in patterned areas, covered with sparse brownish setae. Venation: Sc, ends slightly before level of beginning of R 2+ 3, Sc 2 ends slightly beyond tip of Sc,; additional cross-vein in costal cell beyond level of half Rs; Rs long, angulate at origin; R 3 and R 4 slightly diverging; R 4 and R 5 parallel; discal cell elongate, more than twice as long as wide; cell M, slightly shorter than it's petiole; cross-vein m-cu clearly beyond the fork of M;

anterior arculus lacking. Stem of haltere with whitish base and brownish distal part; knob with brownish base and reddish apex. Halter 1 . 1 mm long. Coxae and trochanters brown; femora with two blackish rings in distal part, apices light brown; tibiae brown; femur I: 4.7 mm long, II: 4.0 mm long, III: 4.6 mm; tibia I: 4.3 mm long. Legs covered with dense dark brown hairs.

Abdomen with dark brown rings at bases of segments 2-7; posterior half of segments reddish-brown. Hairs covering tergites and sternites sparse, dark brown. Male genitalia (Fig. 1 1) with elongate, simple gonocoxite; outer gonostyle slender, flattened at base and with slender distal part, apex curved inwards, tip acute; inner gonostyle longer than outer, flattened at base, slightly bent inwards, tip obtuse; ninth tergite with two posterior triangular lobes, separated by V-shaped notch; parameres wide, triangular plates; penis simple, rod-like.

Female. — Unknown.

Material examined. — Holotype: 6, D-7-39A, Dominican amber.

Etymology. — The species name is based on aurora, Latin for dawn.

Discussion. — The new species, the first representative of the genus from amber, is unique, resembling recent Epiphragma only in some details. The most characteristic structures are the comparatively broad parameres of the male genitalia, forming wide, triangular plates. The wing pattern is closest to that of E. sappho Alexander 1943 described from a single female from Peru. However, E. aurora differs from it by the absence of small wing dots.

Epiphragma sp.

Only one poorly preserved female was found. The head and tip of the ovipositor are missing, but body length is approximately 12.0 mm. The wing apex is also missing, but an approximate wing length is 9.3 mm. The posterior wing margin is strongly folded, but the costal and distal parts of the wing (Fig. 13) show a totally different wing pattern and venation from the previously described species (Fig. 12). The wing pattern is partially ocellate, with

a complete circle having it's center on the base of cell m,, another circle on the distal portion of the discal cell and a third, incomplete circle at the point of Rs branching. There is probably no circle on the base of Rs. Five dark spots, except on the stigma, occur in the costal cell. Femora with two broad dark brown circles in distal half.

Material examined. — 9, D-7-39I, Dominican amber.

Discussion. — This specimen is the second species of the genus from amber, but the absence of many characters prohibits us from comparing it with recent Epiphragma.

Subfamily Eriopterinae

Styringomyia Loew 1845

These flies have a rounded head with a short rostrum, 16-segmented antennae, characteristic wing venation (both veins Sc and R, very short, ending at or before mid-length of wing; R 2 and R 3 absent), abdominal segments two to seven twice as long as

wide, male genitalia inverted 180 degrees- the tergite thus being ventral in position- the sternite dorsal, gonostyle a single complex structure, usually with a long slender outer arm and two or three usually flattened and variously ornamented inner arms. Immature stages develop in rotting material and adults sometimes form swarms (Alexander 1972). Of the 159 recent species, virtually all are Paleotropical with only a few Neotropical species. S. dominicana Podenas and Poinar (1999) is the only species previously described from Dominican amber; S. gracilis Loew 1850, is the only species known from Baltic amber.

Styringomyia optiva Podenas and Poinar, new species

(Figs. 14-17)

Diagnosis. — General body coloration

light brown. Antennae 16-segmented, also light brown. Wings totally clear. Abdomen elongate, longer than wings. Male hypopygium very characteristic: ninth tergite with apex shallowly emarginate, with elongate lobes on lateral margins; ninth sternite elongate posteriorly; gonocoxite short, with small apical tubercle on sternal side and blackened rod-like structure on tergal side; gonostyle single, outer apical lobe long and narrow, with long setae; inner armature of style consisting of two elongated structures; intermedite arm flattened with an outward-pointing tip forming right angle with longitudinal axis of style; inner arm with basal part broader than apical, slightly sinuous, apical part forming angle with basal part, tip acute; differs from related species by structure of male genitalia.

Male. — Body length 6.9 mm; wing length 4.0 mm; head grayish; rostrum short, light brown; palpi brown, covered with short (about half length of respective segment) brown setae. Antenna (Fig. 14) 16-segmented, 1.2 mm long; scape three times as long as wide; pedicel pear-shaped, half as long as scape; basal segments of both brownish; flagellar segments elongated,

with slightly broader bases, apical segments nearly cylindrical; verticils about as long as the respective segments; apical segment nearly as long as preceding segment; flagellum whitish brown.

Dorsal part of thorax grayish brown, with indication of three darker longitudinal stripes; setae sparse, brownish; prothorax large; pleura light brown with longitudinal brown stripe. Coxae and trochanters grayish brown. Rest of all legs of holotype missing. Wing clear, without stigma. Venation typical for genus (Fig. 15): Sc short; Sc, ending just beyond Rs base, Sc 2 near tip of Sc,; R very short, not reaching middle of wing; radial sector (Rs) with only two branches; discal cell long and narrow, cell m, shortly petiolated, cross-vein m-cu clearly beyond the base of discal cell, anal veins divergent. Halter grayish brown, 0.7 mm long.

Abdomen light brown; abdominal segments elongate; tergites with brown posterior margin and narrow, transverse, whitish sutures interrupted in central part, approximately in the middle of segment; sternites

uniformly light brown; abdominal segments covered with short yellowish hairs, more dense on lateral margins of segments. Male hypopygium (Fig. 16) light brown; ninth tergite (Fig. 17) a depressed, flattened plate, posterior border broadly extended, apex very shallowly emarginate to produce angulated lobes, lateral margins with elongate hairy lobes; ninth sternite elongate posteriorly, bluntly pointed; gonocoxite short, having small apical tubercle on sternal side and blackened rod-like structure with slightly thickened apical part on tergal side (this appendage similar to same structure in S. sabroskyi Alexander 1972, interpreted by Alexander (1972) as part of gonocoxite or basistyle); gonostyle single, outer apical lobe long and narrow, with long setae, longest apical one curved inward; inner armature of style consisting of two elongated structures (sometimes interpreted as median and inner gonostyles (Alexander 1947a)), intermediate arm flattened with outward-pointing tip, forming a right angle with lon-

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Figs. 14-18. 14-17, Styringomyia optiva, holotype. 14, Antenna. 15. Wing. 16. Male genitalia, ventral view. 17, 9th tergite of male genitalia. 18. Toxorhina sp., wing. (See Materials and Methods for abbreviations.)

gitudinal axis of style; inner arm with basal Material examined. — Holotype: 6\ D-7-

part broader than apical, slightly sinuous, 39H, Dominican amber,

apical part forming angle with basal part, Etymology. — The species name is based

slender, tip acute. on optivus, Latin for endeavor.

Female. — Unknown. Discussion. — The new species clearly

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differs from all recent species by its distinct male genitalia, especially the very elongate outer arm of the gonostyle. Somewhat similar structures occur in S. sabroskyi Alex-

ander 1972 described from Micronesia, but that species has a totally different inner armature of the style, the outer arm of which is much shorter. S. optiva sp. n. is closest to S. dominicana Podenas and Poinar 1999, also described from Dominican amber. Both species can be separated by the structure of the inner armature of the style (which was interpreted as inner gonostyle in Podenas and Poinar 1999); the intermediate arm of the new species has the tip forming a right angle with the longitudinal axis of the style, while in S. dominicana, the tip is bilobed. Also the inner arm is angulated in the S. optiva but nearly straight in S. dominicana. Differences are also present in the structure of the ninth tergite (posterior margin rounded in S. dominicana and emarginate in the new species).

Toxorhina Loew, 1851

This genus is characterized not only by the elongate rostrum, bearing reduced mouthparts at the tip, which in many species exceeds in length the entire body or wing, but also by the greatly lengthened cervical region, with the anterior mesonotal prescutum jutting forward over the base of

the neck. Male antennae 12-segmented, with several basal segments united into a truncate-conical fusion-segment, those of the female 14 or 15 segmented. Setae of legs deeply bifid. Wing venation very reduced. Gonostyle of male hypopygium single, of various shapes. Aedeagus deeply bifid. The immature stages have not been described (Alexander 1947b).

The subgenus Ceratocheilus contains few strictly tropical American species. There are relatively few species in the Ethiopian and Oriental Regions, but more in the Australian Region.

Toxorhina (Ceratocheilus) sp.

One specimen was found with missing genitalia and tip of rostrum. Body length

(without rostrum) approximately, 7.3 mm, remnant of rostrum, 3.1 mm, wing length 5.5 mm. Head light brown with darker vertex; setae sparse, dark brown; rostrum dark brown; eyes shining green; antenna 12-segmented, 0.8 mm long; scape short, cylindrical; pedicel large, with wide apical portion, slightly longer than scape; fusion-seg-

ment oval, shorter than pedicel; remaining segments of fiagellum short-oval, brownish, the outer four articles provided with elongate verticils, which nearly reach half the length of the whole fiagellum.

Thorax light brown with three longitudinal brown stripes, median one marginated with dark brown; pleura with longitudinal brown stripe; wing clear, without darker spots, without stigma; veins light brown; wing venation (Fig. 18): Sc short, Sc, ending just beyond origin of Rs, Sc 2 a short distance from the tip of Sc,, before the origin of Rs; anterior branch of Rs shorter than Rs; discal cell closed; m-cu at fork of M; anal veins divergent; anterior arculus preserved; halter light brown, 0.7 mm long; coxae, trochanters and legs brown; femur II: 4.9 mm long; abdominal tergites brown, each with light brown suture at mid-length; sternites light brown with darkened posterior margin.

Material examined. — Sex unknown- D-7-207, Dominican amber.

Discussion. — This specimen probably

belongs to an unknown species, but the absence of many characters prohibit us from describing it as a new species. It is related to T. americana (Alexander 1913), which has the anterior branch of Rs a little longer than Rs and oblique in position, while in other Neotropical species the anterior branch of Rs is much longer than Rs and extends generally parallel to the posterior branch.

Trentepohlia Bigot, 1854

Wings with veins Cu, and 1st A fused for a distance. Crane flies of this genus are all tropical. One species, belonging to the typical subgenus, occurs in Baltic amber

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(Alexander 1931), and another, belonging to the subgenus Paramongoma, was described from Dominican amber (Podenas

and Poinar 1999).

Trentepohlia (Paramongoma) mexicana
Podenas and Poinar, new species

(Figs. 19-21)

Diagnosis. — General body coloration dark brown. Antennae 16-segmented, dark brown. Wings clear except stigma. Ninth tergite of male genitalia with shallowly emarginate posterior margin; gonocoxite elongate, simple; gonostyle single, narrow, with apex turned inwards. Differs from related species by structure of male genitalia.

Male. — Body length 6.0 mm, wing length 4.8 mm. Head of holotype is seen only from ventral side; rostrum short, light brown; palpi brown; eyes large, meeting ventrally. Antenna (Fig. 20) 16-segmented, 1 .3 mm long; scape three times as long as wide, dark brown; pedicel with slightly widened apical portion, only slightly shorter than scape, brown; flagellar segments cylindrical, decreasing in length toward apex; verticils shorter than respective segments; flagellum brown with darkened apex.

Dorsal part of thorax dark brown, with indication of three darker longitudinal stripes; pleura light brown with darker spots. Coxae, trochanters and legs brown; tips of femora, tibiae and tarsi starting from middle of third segment darkened. Femur II: 8.3 mm long. III: 7.4 mm; tibia III: 7.5 mm; tarsus III: 4.7 mm long. Wing narrow, clear, with small, brownish stigma. Veins brown. Venation as usual in genus (Fig. 19): Sc long, Sc, at level of middle of R-2+3+4* Sc : slightly before level of Rs branching; Rs very slightly curved, nearly straight; discal cell narrow, three times as long as wide; cross-vein m-cu proximal to base of discal cell; tip of CuA 2 not reaching tip of A,. Halter dark brown with lightened base of stem, 0.6 mm long.

Abdominal tergites dark brown; basal sternites brown, sternites 6th to 9th dark brown; lateral margins of both tergites and

sternites narrowly whitened; hairs on abdomen short, sparse, brown. Male hypopygium (Fig. 21) same color as preceeding segments; ninth tergite with shallowly emarginate posterior margin, thus forming

two small rounded lateral lobes; gonocoxite elongate, simple, without additional lobes; gonostyle single, narrow, with apex turned inward.

Female. — Unknown.

Material examined. — Holotype: 8 on angiosperm leaf (the following described Trentepohlia male in the same amber piece is adjacent to the leaf), D-7-212, Mexican amber.

Etymology. — The species name is based on the country of origin, Mexico.

Trentepohlia (Paramongoma)

immemorata Podenas and Poinar,

new species

(Figs. 22-24)

Diagnosis. — General body coloration dark brown. Antennae 16-segmented, dark brown. Wings clear except stigma. Ninth tergite of male genitalia with widely emarginate posterior margin; gonocoxite elon-

gate, oval; gonostyle single, narrow, with large, blunt tooth on basal half. Differs from related species by structure of male genitalia.

Male. — Body length 6.3 mm, wing length 5.6 mm. Head brown; rostrum short, brown; palpus brown; eyes large, meeting each other dorsally. Antenna (Fig. 23) 16-segmented; scape three times as long as wide, yellowish basally, brown distally; pedicel pear-shaped, brown, shorter than scape; flagellar segments oval, brown, decreasing in length apically; verticils shorter than respective segments.

Dorsal part of thorax castaneous brown, with indication of median longitudinal stripe; post-sutural parts of scutum and scutellum dark brown; pleura light brown with darker spots. Coxae and trochanters brown; femora dark brown, tibiae and tarsi brown. Femur II: 8.0 mm, tibia II: 7.3 mm long. Wing clear with small brownish stigma.

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Figs. 19-21. Trentepohlia mexicana, holotype. 19, Wing. 20, Antenna. 21, Male genitalia, dorso-lateral view. (See Materials and Methods for abbreviations.)

Veins brown. Venation typical for genus (Fig. 22): Sc long, Sc, at level of one fifth of R.2+3+4, Sc 2 at the level of three-fourths of Rs length; Rs long, very slightly bent, nearly straight; discal cell widened, approximately three times as long as wide; crossvein m-cu before base of discal cell. Stem of halter whitish basally, brownish distally, knob dark brown; halter 0.7 mm long. Abdominal tergites dark brown; hairs on

abdomen short, sparse, brown. Male hypopygium (Fig. 24) same color as rest of abdomen; ninth tergite with widely emarginate posterior margin; gonocoxite oval, simple, without additional lobes; gonostyle single, narrow, with large blunt tooth on basal half.

Female. — Unknown.

Material examined. — Holotype: 6 adjacent to angiosperm leaf (male of Trentepohlia mexicana sp. n. in the same amber piece is on the leaf), D-7-212, Mexican amber.

Figs. 22-24. Trentepohlia immemorata, holotype. 22, Wing. 23, 2-10 antennal segments. 24, Male genitali dorsal view. (See Materials and Methods for abbreviations.)

Etymology. — The species name is based on immemoratus, Latin for immemorial.

Discussion. — Both new species of Trentepohlia Bigot 1854 are closely related, differing mostly in the structure of male genitalia, wing venation and antennae. The major difference is seen in the male gonostyle: it is not toothed in T. mexicana, but has a

large tooth on the basal half in T. immemorata. Also the flagellomeres of T. mexicana are cylindrical and the pedicel is elongate, while the flagellomeres of T. immemorata are oval and the pedicel short and pear-shaped; vein Rs is also shorter in T. mexicana. Closely related to both new species and especially to T. immemorata is T. agri Podenas and Poinar (1999), a comparatively abundant species in Dominican amber. The latter species differs from both Mexican amber species by a very short vein Rs, elongate-oval flagellomeres, longer gonocoxites and a smaller tooth on the basal half of the gonostyle.

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