1.50 wide); antennae usually 5 but sometimes 4 segmented; distal rostral segment about equal to second hind tarsus; cauda usually with 12–14 (range 10–17) setae; subgenital plate with 18–24 setae posteriorly; on orchids . . . . . *orchidearum* (Westwood)

– Usually small, ovoid insects 1 mm long by 0.70 wide (range 1–1.35 long by 0.70–1.10 wide); antennae usually 4 but sometimes 5 segmented; distal rostral segment two-thirds to three-fourths length of second hind tarsus; cauda usually with 8–10 (range 7–12) setae; subgenital plate with 7–14 setae posteriorly; on palms . . . . . *lataniae* (Boisduval)

Acknowledgments

I am greatly indebted to several persons for the loan of specimens, P. Basilewsky and G. Schmitz, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, for syntypes of *Cerataphis palmae,* and the late D. Hille Ris Lambers, Bennekom, Netherlands and C. F. Smith, North Carolina State University, Raleigh, for syntypes of *Cerataphis variabilis.*

I am grateful to several curators in Brazil, especially H. Reinhart, São Paulo, for searching for syntypes of *Cerataphis brasiliensis,* and C. C. Tao, formerly of the Taiwan Agricultural Institute, Taipei who searched for types of *C. formosana* and attempted to collect the species in Taiwan.

I thank C. F. Smith, Raleigh, J. A. Davidson, University of Maryland, College Park, and S. Nakahara, M. E. Schauff and M. B. Stoetzel, Systematic Entomology Laboratory, PSI, ARS, USDA, Beltsville, Maryland, for reviewing the manuscript, and M. B. Stoetzel for photographing the insects.

Literature Cited

Blackman, R. L. and V. F. Eastop. 1985. Aphids on the world's crops: An identification guide. John Wiley & Sons, New York, 466 pp.

Boisduval, J. 1867. Essai sur l'entomologie horticole. Paris, XVI + 648 pp. (*Coccus*? *lataniae,* pp. 355–357.)

Bondar, G. 1926. Relatorios sobre diversas culturas. Boletim Laboratorio Pathologia Vegetal 3 (1925): 1–97. (Aphidideos Brasileiros, pp. 91–93.)

Eastop, V. F. and D. Hille Ris Lambers. 1976. Survey of the world's aphids. W. Junk, The Hague, 573 pp.

Embleton, A. L. 1903. *Cerataphis lataniae,* a peculiar aphid. Journal of the Linnean Society London Zoology 29: 90–107.

Enobakhare, D. A. 1986. Abundance and variation of a natural population of *Cerataphis palmae* (Ghesquière) (= *variabilis* H.R.L.) (Homoptera: Pemphigidae) on *Raphia hookeri* Mann & Wendl. Insect Science Application 7: 791–794.

——— and E. O. Osisanya. 1986. Studies on the biology of the palm aphid, *Cerataphis palmae* (Ghesquière) (= *Cerataphis variabilis* Hille Ris Lambers) (Homoptera: Pemphigidae) on *Raphia hookeri*—II. Insect Science Application 7: 795–802.

Ghesquière, J. 1934. Hémipteres nuisibles aux végétaux du Congo belge, pp. 3–41. *In* Mayné, R. et J. Ghesquière, eds., Annales Gembloux (Bruxelles) 40th annee. (XVI.—Famille des aleurodides, pp. 29–31.)

———. 1947. Hormaphididae, pp. 175–180; *Aleurocanthus,* pp. 177, 282. *In* Lepesme, P., ed., Les insectes des palmiers. Paul Lechevalier, Paris, 903 pp.

Hempel, A. 1901. A preliminary report on some new Brazilian Hemiptera. Annals and Magazine of Natural History (7)8: 383–391.

Hille Ris Lambers, D. 1933. On the species of *Astegopteryx* Karsh from *Styrax Benzoin* Dryand. Miscellanea Zoologica Sumatrana 76: 1–4.

———. 1953. Notes on aphids from Cocos nucifera. Fiji Department of Agriculture, Agricultural Journal 24(3–4): 93–95.

Holman, J. 1974. Los afidos de Cuba. Instituto Cubano Libro. La Habana, 303 pp.

Moreira, C. 1925. Pulgoes do Brasil. Ministerio Agricultura Industria Commercio, Instituto Biologico Defesa Agricola Boletim 2: 1–35.

Noordam, D. 1991. Hormaphidinae from Java (Homoptera: Aphididae). Zoologische Verhandelingen. National Naturhistorisch Museum, Leiden, 523 pp.

Remaudière, G. and A. Autrique. 1985. Contribution à l'ecologie des aphides Africains. Étude FAO Production Vegetale Protection Plantes 64, 214 pp. (2. Ecologie des aphides du Burundi, pp. 11–75.)

———, J. H. Martin, and V. F. Eastop. 1987. Le statut de *Cerataphis variabilis* Hille Ris Lambers, 1953 (Homoptera, Aphididae). Annales Société Entomologique France (new series) 23(1): 109–110.

Risbec, J. 1942. Observations sur les insectes des plantations en Nouvelle-Caledonie. Paris, 128 pp.

Schouteden, H. 1906. Catalogue de aphides de Belgique. Memoires Societé Entomologie Belgique 12: 189–246.

Stern, D. L., S. Aoki, and D. U. Kurosu. 1995. The

life cycle and natural history of the tropical aphid *Cerataphis fransseni* (Homoptera:Aphididae:Hormaphidinae), with reference to the evolution of host alternation in aphids. Journal of Natural History 29: 231–242.

Takahashi, R. 1924. Aphididae of Formosa, Part 3. Department of Agriculture, Government Research Institute Formosa 10: 1–115.

———. 1931. Aphididae of Formosa. Part 5. Department of Agriculture, Government Research Institute Formosa 53: 1–127.

Theobald, F. V. 1929. The plant lice or Aphididae of Great Britain. Headley Brothers, London, 3: 1–364.

Westwood, J. O. 1879. The fimbricated scale. Gardners Chronicle 12 (new series): 796.

PROC. ENTOMOL. SOC. WASH.
98(3), 1996, pp. 450–464

NEW MOTH FLIES (DIPTERA: PSYCHODIDAE) AND A KEY TO SPECIES FROM PUERTO RICO

R. Wagner and E. C. Masteller

(RW) Limnologische Flußstation Schlitz, des Max-Planck-Instituts für Limnologies, P.O. Box 260, 36105, Schlitz, Germany; (ECM) The Pennsylvania State University at Erie, The Behrend College, Station Road, Erie, PA 16563, U.S.A.

Abstract.—Collections of aquatic insects emerging from tropical rainforest mountain streams in Puerto Rico provided the following new species of Psychodidae (Diptera) which are described, figured, and compared with other Caribbean taxa: ***Trichomyia flinti, T. sattelmairi, T. buchholzi, Arisemus buzbyae, A. mariannae, A. waidei, Philosepedon mauroae, Psychoda puertoricana,*** and ***Psychoda juliae***. The period of emergence is indicated for six of these new species along with the flight period of *Maruina hirta* (Johannsen), and *Quatiella interdicta* (Quate). A key to the identification of these eleven species is included.

Key Words: Diptera, Psychodidae, new species, identification key, Puerto Rico, streams

The psychodids, often referred to as moth flies or sand flies (= Phlebotominae) are poorly known from the Caribbean area even though numerous papers exist (Vaillant and Botosaneanu (1970), Duckhouse (1974a, b), Johannsen (1938), Quate (1959), Satchell, (1955) and Wagner (1983, 1993). Long-term investigations in the tropics using emergence trap to collect adult aquatic insects are almost non-existent. In 1991–92 collections were made periodically on a weekly basis over almost 24 months (Wagner and Masteller 1993). They found only one out of eight species collected had been described. In this paper, nine new species from the El Verde and Bisley sites in Puerto Rico are described, along with detailed information on the flight period of the two known species from Puerto Rico, *Maruina hirta* (Johannsen) and *Quatiella interdicta* (Quate), (Quate 1955, Hogue 1973, Vaillant 1963, 1973, 1983, Wagner and Masteller, 1993).

The site and methods of collection were described in Masteller and Buzby (1993) for collections from Quebrada Prieta located at 390 m elevation at 18°N latitude with an average precipitation of 368 cm per year and stream temperatures ranging from 19° to 24°C. Shrimp are common in the streams; *Atya lanipes* Holthuis the prelevant species. The Quebrada Bisley site is described in Masteller and Flint (1993) and Scatena (1989). The Bisley site was at 270 m with a higher algal biomass and fewer shrimp than Q. Prieta, otherwise the two sites were similar.

Predominant insects in Q. Prieta were mayflies and caddisflies. The psychodids accounted for less than 2% of the Diptera collected. Ceratopogonidae and Chironomidae accounted for 49% and 35% respectively. Methods of preservation and preparation were as described in Wagner (1993).

Types and paratypes have been deposited at the Smithsonian Institution, National Museum of Natural History, Washington, D.C., the Puerto Rico Natural History Mu-

seum in San Jose, Puerto Rico, and in the author's collections.

Key to Male Psychodidae of Puerto Rico

1. Wing with 9 longitudinal veins, i.e. only a single vein between the forks R_{2+3} and M_{1+2}, smaller than 2 mm in size; Subfamily Trichomyiinae, genus *Trichomyia* Haliday (3 spp.) 2
– Wing with 10 longitudinal veins, i.e. two veins between the forks R_{2+3} and M_{1+2}, body size and wing length more than 2 mm; Subfamily Psychodinae 4
2. Palpus 4-segemented, tergite 7 without long black setae, basistyles cylindrical, dististyles shorter than basistyle with blunt tip . . . . . *Trichomyia buchholzi,* n. sp.
– Palpus 3-segmented, tergite 7 with long black setae or dististyles missing 3
3. Male genitalia without dististyles, aedeagus with a pair of sickle-shaped parameres . . . . . *Trichomyia flinti,* n. sp.
– Tergite 7 with 2 or 3 elongate black setae; basistyles each with 2 dorsal appendages, one medial and one distal longer than dististyles, dististyles with 2 sharp tips . . . . . *Trichomyia sattelmairi,* n. sp.
4. Flagellomeres with Y-shaped ascoids, distal segments reduced in size, pale taxa with wings held roof-shaped over the abdomen, male cercopodia with one tenaculum 5
– Distal flagellomeres not reduced in size, ascoids elongate, finger-shaped, wings held horizontally over the abdomen, male cercopida with more than one tenaculum 8
5. Male genitalia symmetric 6
– Male genitalia asymetric 7
6. Male cercopodia with 2 tenacula . . . . . *Philosepedon mauroae,* n. sp.
– Male cercopodia with 1 tenaculum . . . . . *Quatiella interdicta* (Dyar)
7. Basistyle short quadrate, dististyles elongate with single tip, aedeagus with sickle shaped thin paramere . . . *Psychoda puertoricana,* n. sp.
– Basistyles elongate, tip of dististyles bifurcate, aedeagus broad, with a strongly arched thin paramere . . . . . *Psychoda juliae,* n. sp.
8. Wing lanceolate, number of veins reduced . . . . . *Maruina hirta* (Johannsen)
– Wing oval, with 10 longitudinal veins, and dark spots at vein tips of wing margin 9
9. Distal flagellomeres reduced in size 10
– Distal flagellomeres not reduced in size, tips of all veins with small spots, dististyles S-shaped, ventral aedeagus sclerite thin . . . . . *Arisemus waidei,* n. sp.
10. Tips of CuA_1 and CuA_2 with large black spots, sector radii branched into R_2 and R_{3+4}, basistyles fused medially, dististyles straight with bifurcate tip . . . . *Arisemus buzbyae,* n. sp.
– Tip of CuA_1 with a small black spot and CuA_2 with a large black spot, sector radii branched into R_{2+3} and R_4, dististyles straight with blunt tip, both aedeagus sclerites broad . . . . . *Arisemus mariannae,* n. sp.

Psychodidae: Trichomyiinae

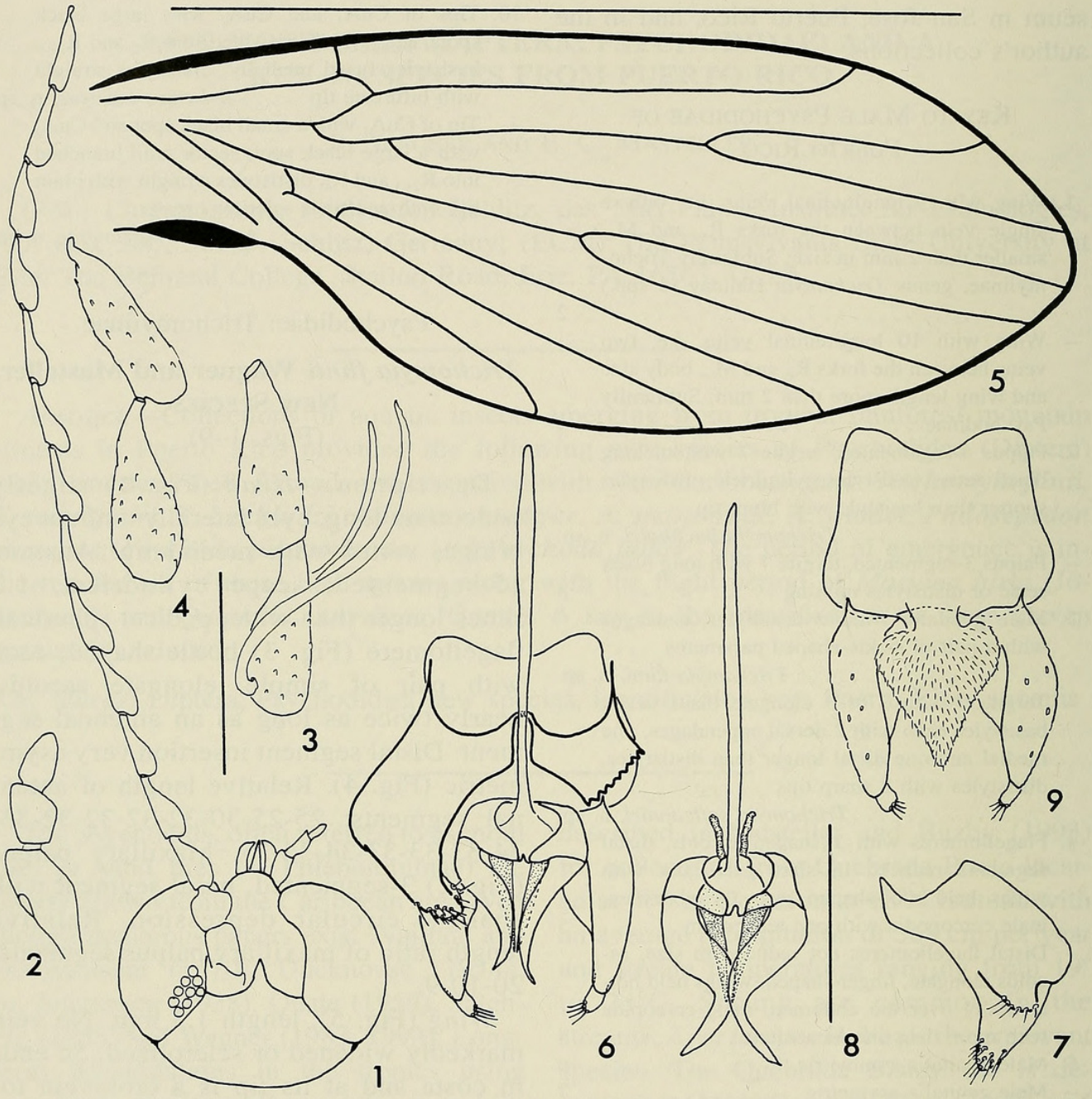
Trichomyia flinti Wagner and Masteller, New Species

(Figs. 1–9)

Description.—*Head* (Fig. 1) slightly wider than long, eyes laterally without eye bridge, vertex with medial tip. Antenna 15-segmented, scape cylindrical, 1.2 times longer than wide, pedicel spherical, flagellomere (Fig. 3) bottle-shaped, each with pair of simple, elongate ascoids, nearly twice as long as an antennal segment. Distal segment insertion very asymmetric (Fig. 4). Relative length of antennal segments: 25-25-30-32-32-32-32-33-34-33-33-33-34-34-35. Maxillary palpus (Fig. 2) 3-segmented, basal segment with shallow circular depression. Relative length ratio of maxillary palpus segments: 20-10-9.

Wing (Fig. 5), length 1.3 mm. No vein markedly widened or sclerotized. Sc ends in costa and at its tip is a crossvein towards R_1. No R-M crossvein. A short crossvein M_{1+2}–M_{3+4}, and a long cubital vein. No veins markedly widened.

Male genitalia (Fig. 6) unusually complicated for this genus. Aedeagus (Fig. 8) situated ventrally, with elongate basal apodeme, and two pairs of distal sclerites, ventral pair of S-shaped and dorsal pair of straight triangular sclerites. At basal end of sclerite, a pair of ducti ejaculatorii opens into distal part of aedeagus. Styles (Fig. 7) markedly bent, situated ventrally, no distinction into basi- and dististyles, or dististyles reduced. Tip blunt, bipartite, covered with several short setae. Basistyles joined medially by thin bridge. Basal



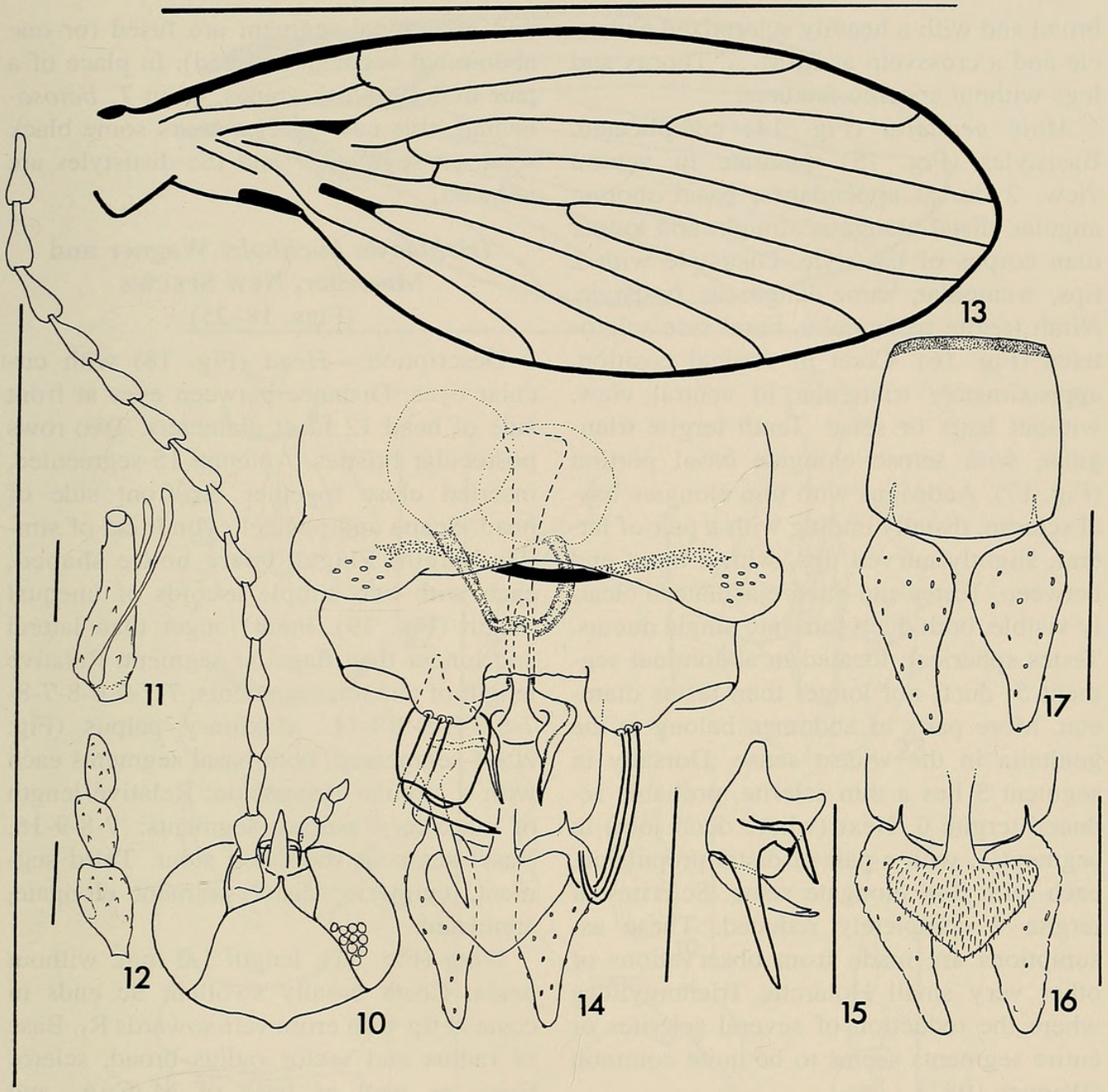
Figs. 1–9. *Trichomyia flinti*. 1, Head. 2, Palpus. 3, Flagellomere with ascoids. 4, Distal flagellomeres. 5, Wing. 6, Genitalia, ventral view. 7, Basistyle, dorsal view. 8, Aedeagus. 9, 9th and 10th tergites and cerci, ventral view. [Scale 1.0 mm (5), other Figs. 0.1 mm]

part of aedeagus apodeme kept in position by U-shaped sclerite. Ninth tergite almost quadrate, 10th tergite elongate, heart shaped and setose (Fig. 9). Cerci in vertical plane, distally with short appendage and 4 distal setae in position where Psychodinae tenacula situated.

Type material.—HOLOTYPE, ♂, **PUERTO RICO,** El Verde, Quebrada Prieta, Malaise trap, 370m NN, 6–10 February 1990 leg. O.S. Flint.

Etymology.—This rare species is dedicated to the collector O. S. Flint, Jr., a renowned caddisfly researcher who first collected this species in a Malaise trap at El Verde, Puerto Rico.

Remarks.—This new species is a member of a species group including the other small *Trichomyia* species of the Caribbean and the Nearctic species, *Trichomyia wirthi* Quate. *Trichomyia flinti* is one of the most apomorphic species of this group, based on the fused styles (or reduced dististyles) and the two pairs of distal aedeagal sclerites,



Figs. 10–17. *Trichomyia sattelmairi.* 10, Head. 11, Flagellomere with ascoids. 12, Palpus. 13, Wing. 14, Genitalia, ventral view. 15, Basistyle, dorsal view. 16, 9th tergite and cerci, dorsal view. 17, 9th and 10th tergites and cerci, ventral view. [Scale 1.0 mm (13), other Figs. 0.1 mm]

which are unique to this entire species group.

Trichomyia satterlmairi Wagner and Masteller, New Species

(Figs. 10–17)

Description.—*Head* (Fig. 10) with large lateral compound eyes, hind margin of eyes rear margin of head. Vertex with thin frontomedial tip. No definite rows of postocular bristles. Antenna 15-segmented: Scape and pedicel approximately cylindrical, flagellomere elongate, bottle shaped each with pair of basally inserted simple ascoids, slightly longer than a segment (Fig. 11). Relative length ratio of antennal segments: 22-19-28-30-30-30-30-30-30-30-30-30-30-31. Maxillary palpus (Fig. 12) 3-segmented, basal segments with circular shallow depression: relative length ratio of maxillary palpus segments: 17-12-12.

Wing (Fig. 13) translucent, length 1.2 mm. Sc ends in costa, a crossvein towards R_1–R_{4+5} simple, basal part of R_1 and M_{3+4}

broad and with a heavily sclerotized peduncle and a crossvein at R_5/M_{1+2}. Thorax and legs without specific features.

Male genitalia (Fig. 14) complicated. Basistyles (Fig. 15) quadrate in ventral view, 2 dorsal appendages, basal shorter, angular, distal elongate, straight and longer than corpus of basistyle. Dististyle with 2 tips, triangular, same length as basistyle. Ninth tergite rectangular, basal side sclerotized (Fig. 16). Cerci in vertical position, approximately triangular in ventral view, without hairs or setae. Tenth tergite triangular, with setose elongate basal portion (Fig. 17). Aedeagus with thin elongate basal sclerite, distally ending with a pair of lateral, slightly curved tips, with a blunt end between. Testes and ducti ejaculatorii clearly visible, both ducti join into single ductus. Testes spherical; located in abdominal segment 5; ducti not longer than testes diameter. More parts of abdomen belong to the genitalia in the widest sense. Dorsally in segment 5 lies a thin sclerite, probably reduced tergite 6. Next (where ducti join) in segment 7, with a pair of distal propulsion, each with 3–4 elongate setae. Sclerites of tergite 8 completely reduced. These assumptions are made from observations of other very small Holarctic Trichomyiidae where the reduction of several sclerites or entire segments seems to be quite common (Wagner 1982).

Type material.—HOLOTYPE, ♂, **PUERTO RICO,** El Verde, Quebrada Prieta, 370 m a.s.l., emergence trap, 24 June 1991. PARATYPES: 7♂-6♀ from same location as holotype; El Verde, Q. Prieta emergence trap, 6♂-2♀.

Etymology.—This species is dedicated to Ernst Sattelmeier, Schlitz, Germany.

Emergence.—This species was less abundant than *T. buchholzi.* Emergence periods were from February–April and June–August.

Remarks.—This new species is a close relative of *T. flinti.* It is most closely related to *Trichomyia botosaneanui* Wagner, from Martinique. In both taxa sclerites of the second abdominal segment are fused (or one abdominal segment reduced). In place of a pair of long black spines, as in *T. botosaneanui,* this new species bears some black setae on segment 7 and the dististyles are reduced.

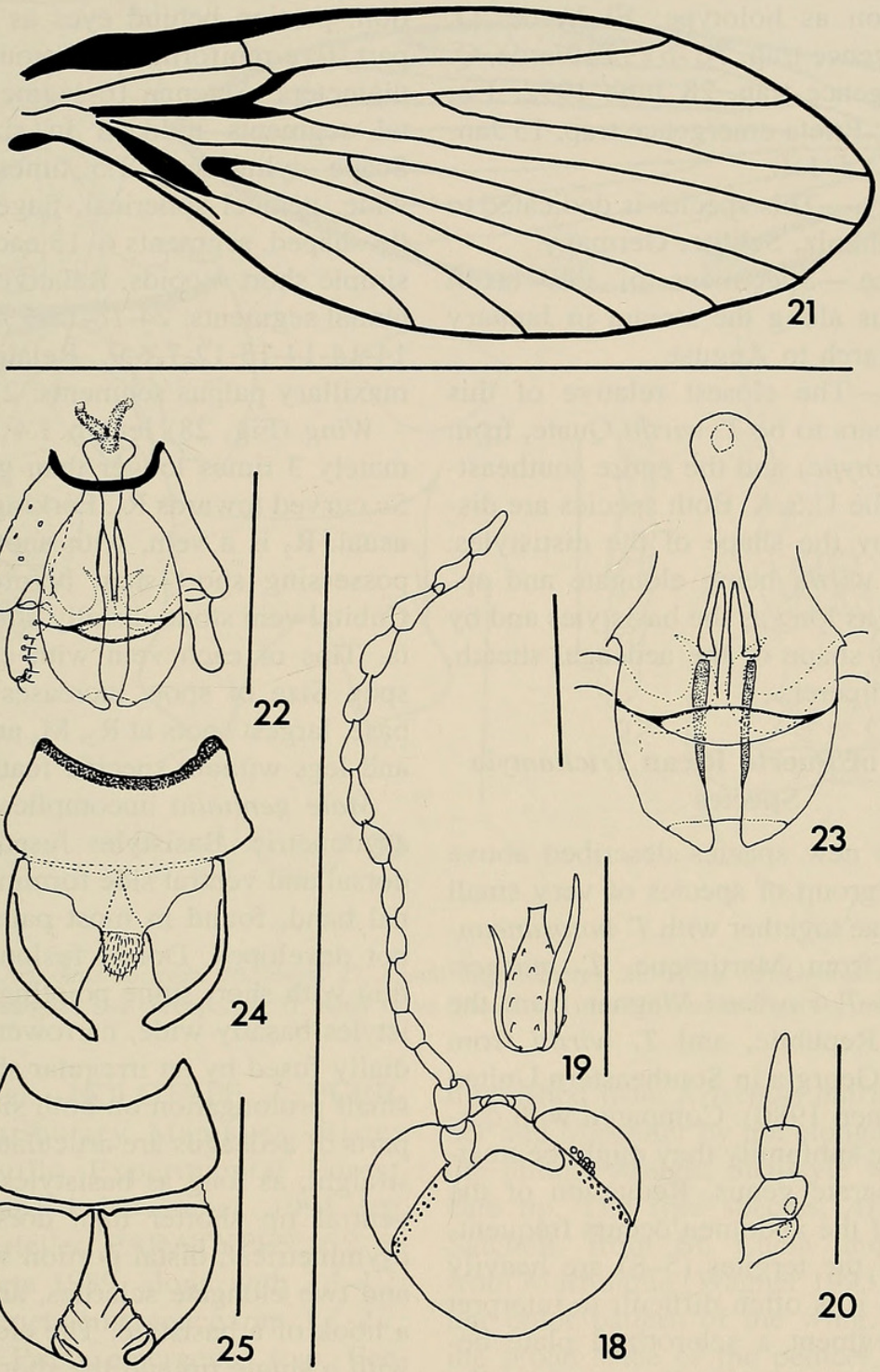
Trichomyia buchholzi Wagner and Masteller, New Species

(Figs. 18–25)

Description.—*Head* (Fig. 18) with circular eyes. Distance between eyes at front side of head 12 facet diameters. Two rows postocular bristles. Antenna 15-segmented, inserted close together on front side of head. Scape and pedicel cylindrical of similar length. Flagellomere bottle shaped, each with two simple ascoids of unequal length (Fig. 19), inner longer than lateral and longer than flagellar segment. Relative length of antennal segments: 7-7-9-6-8-7-8-7-8-8-8-8-8-11. Maxillary palpus (Fig. 20) 4-segmented, both basal segments each with a circular depression. Relative length of maxillary palpus segments: 7-8-9-16. Basal segment short and stout. Third segment, cylindric; distal segment elongate, annulated.

Wing (Fig. 21), length 1.0 mm, without neala. Costa basally swollen, Sc ends in costa at tip with cross vein towards R_1. Base of radius and sector radius broad, sclerotized, as well as base of M_3/CuA_1 and CuA_2.

Male genitalia simple. (Figs. 22–25) Basistyles cylindrical 2.5 times longer than wide. Distally dorsal sides with elongate, hook-shaped inner appendages, almost meeting medially and appear to be in contact with two thin aedeagal sclerites. Dististyles 0.6 times length of basistyles, triangular with blunt tips, slightly bent. Ninth tergite wider than long, rectangular, lateral portions rolled up. Basal margin more strongly sclerotized than distal margin. Tenth tergite slightly sclerotized, distal portion conical, setose. Cerci triangular in dorsal and ventral view, well sclerotized, few setae along inner dorsal margins; rolled up



Figs. 18–25. *Trichomyia buchholzi.* 18, Head. 19, Flagellomere with ascoids. 20, Palpus. 21, Wing. 22, Aedeagus and styles, ventral view. 23, Aedeagus and cross sclerite, ventral view. 24, 9th and 10th tergites and cerci, ventral view. 25, 9th and 10th tergite and cerci, dorsal view. [Scale 1.0 mm (21), other Figs. 0.1 mm]

laterally forming a tube. Aedeagus situated ventral of styles, basal racket with 3 distal prolongations. Lateral sclerite articulated with inner sides of a slightly sclerotized cylindric structure, open ventrally and distally, with single gonoporus. Centrally lies an additional cross sclerite, keeping the lateral portions together. Basal portion of racket with short circular opening, before the two sclerotized sperm ducts join into one; distal portion invisible.

Type material.—HOLOTYPE, ♂, **PUERTO RICO,** El Verde, Quebrada Prieta, 370 m a.s.l., emergence trap, 14 June 1991, ALLOTYPE ♀, same locality as holotype, June 1992. PARATYPES: 3♂-17♀ from

same location as holotype; El Verde, Q. Prieta emergence trap, 7♂-6♀; El Verde, Q. Prieta emergence trap, 28 June 1992, 1♀; El Verde, Q. Prieta emergence trap, 15 January, 1992, 1♂-1♀.

Etymology.—This species is dedicated to Helmut Buchholz, Schlitz, Germany.

Emergence.—Specimens of this taxon are numerous along the stream in January and from March to August.

Remarks.—The closest relative of this species appears to be *T. wirthi* Quate, from Florida (*holotype*) and the entire southeastern part of the U.S.A. Both species are distinguished by the shape of the dististyles, those of *T. wirthi* being elongate and approximately as long as the basistyles and by the different shape of the aedeagal sheath, tergite 9 and cerci.

Relations of Puerto Rican *Trichomyia* Species

The three new species described above belong to a group of species of very small Trichomyiinae together with *T. botosaneanui* Wagner from Martinique, *T. masneri* Wagner and *T. rawlinsi* Wagner from the Dominican Republic, and *T. wirthi* from Florida and Georgia in Southeastern United States (Wagner, 1980). Compared with other taxa of the subfamily they might be treated as a separate genus. Reduction of the distal part of the abdomen occurs frequently. Some of the tergites (5–8) are heavily reduced and it is often difficult to interpret to which segment a sclerotized plate belongs. Even stronger reductions occur in the genitalia, which often are without definite gonostyles. In some taxa elongate sclerites of segment 7 and/or 8 may function as part of the genitalia.

Psychodidae: Psychodinae

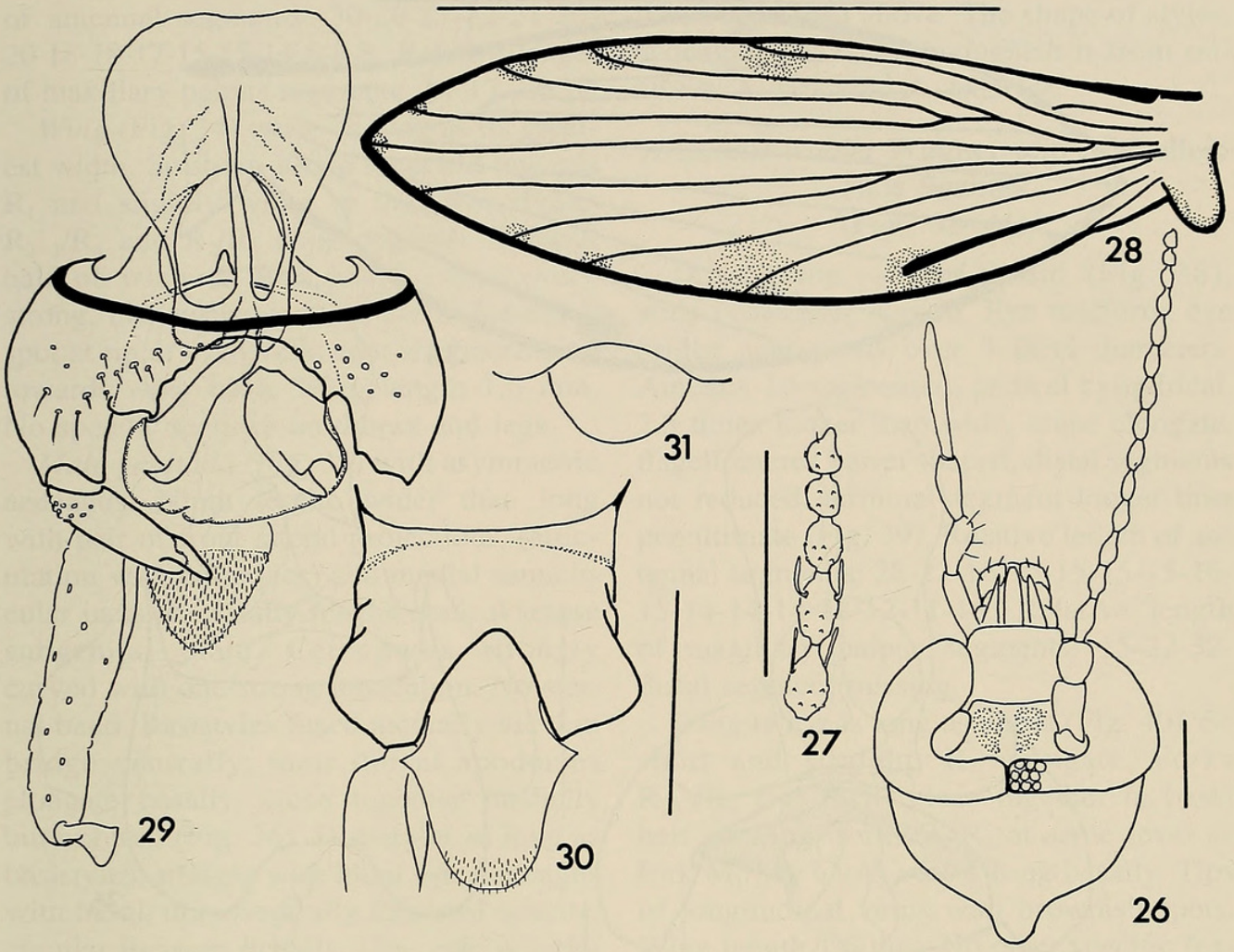
Arisemus buzbyae Wagner and Masteller, New Species

(Figs. 26–31)

Description.—*Head* (Fig. 26) slightly longer than wide with distinct basal projection, portion behind eyes as long as front part. Eye reniform, contiguous over 3 facet diameters. Antenna 16-segmented with distal segments reduced in size (Fig. 27). Scape cylindrical, 1.5 times longer than wide, pedicel spherical, flagellomeres bottle-shaped, segments 6–13 each with pair of simple short ascoids. Relative length of antennal segments: 24-18-18-15-15-15-14-14-14-14-14-13-12-7-6-9. Relative length of maxillary palpus segments: 27-23-30-52.

Wing (Fig. 28) length 1.4 mm, approximately 3 times longer than greatest width. Sc curved towards R_1. Forking $R_2/R_3/R_4$ unusual. R_2 is a vein, with another vein R_{3+4} possessing short stem before fork R_3/R_4. Cubital vein stout, distally not reaching costa. Tips of each vein with circular brown spot. Size of spots increases toward wing base, largest spots at R_2, M_4 and Cu. Thorax and legs without specific features.

Male genitalia uncomplicated, (Fig. 29) asymmetric. Basistyles fused medially on dorsal and ventral side forming a ring. Sternal band, found in most palearctic species not developed. Dorsal fusion of basistyles thin with short spine pointing basally. Basistyles basally wide, narrower distally. Medially fused by an irregular shaped sclerite, small prolongation on both sides, on which parts of aedeagus are articulated. Dististyles straight, as long as basistyles, tip bipartite, ventral tip shorter than dorsal. Aedeagus asymmetrical, distal portion with one short and two elongate sclerites, articulated with a hook of a basistyle. The elongate sclerite with a single tip and the short sclerite with two tips; all covered by a thin sclerotized sheath. Basal part of aedeagus heavily sclerotized, basally semicircular, dorsoventrally flattened sclerite, distal thinner part with an oval opening. A medial thin sclerite lies ventrally connecting basal and distal areas of the sclerite, articulated to distal movable parts of aedeagus. Ninth tergite quadrate, with deep triangular distal incision for 10th tergite and elongate subgenital plate. Cercopodia almost straight, with single large distal tenaculum (Figs. 30, 31).



Figs. 26–31. *Arisemus buzbyae.* 26, Head. 27, Distal flagellomeres. 28, Wing. 29, Genitalia, ventral view. 30, 9th and 10th tergites and cercopodia. 31, Anal valve. [Scale 1.0 mm (28), other Figs. 0.1 mm]

Type material.—HOLOTYPE, ♂, **PUERTO RICO,** tributary Mamayes, Bisley stream, Luquillo Experimental Forest, emergence trap, 4 November, 1991 leg. Buzby & Masteller. PARATYPES: 6♀ El Verde, Q. Prieta 1989, along with 3♂-4♀; El Verde, Q. Prieta emergence trap, 1♂-2♀; El Verde, Q. Prieta emergence trap, February 1992, 7♂.

Emergence.—*Arisemus buzbyae* was rare among the Psychodidae of Quebrada Prieta with adults collected during March and May.

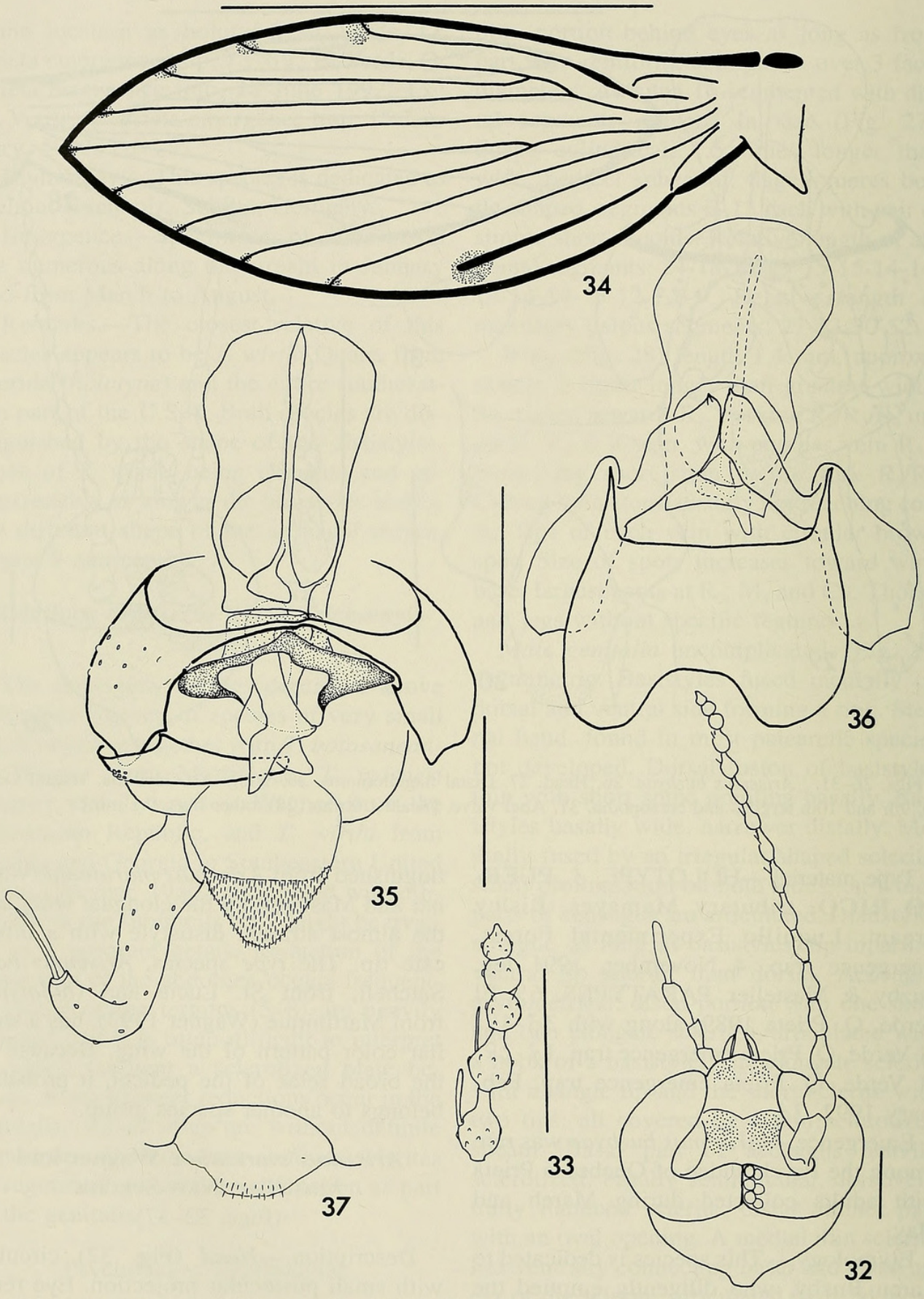
Etymology.—This species is dedicated to Karen Buzby, who diligently emptied the traps for two years while doing research in Puerto Rico.

Remarks.—This new taxon, *Arisemus,* of the Caribbean area is, related to the next taxon and *Arisemus boxi* Satchell. It is distinguished from *Arisemus mariannae* Wagner and Masteller by the elongate wing and the almost straight dististyle with a bifurcate tip. The *type* species, *Arisemus boxi* Satchell, from St. Lucia and (*holotype*) from Martinique (Wagner 1993), has a similar color pattern of the wing. Because of the broad setae of the pedicel, it probably belongs to another species group.

Arisemus mariannae Wagner and Masteller, New Species

(Figs. 32–37)

Description.—*Head* (Fig. 32) circular, with small postocular projection. Eye reniform, contiguous over 3 facet diameters. Antenna 16-segmented, distal 3 segments reduced in size (Fig. 33). Scape cylindrical, 1.5 times longer than wide, scape spherical, flagellomeres bottle shaped. Relative length



Figs. 32–37. *Arisemus mariannae*. 32, Head. 33, Distal flagellomeres. 34, Wing. 35, Genitalia, ventral view. 36, 9th tergite, basistyles with dorsal apodemes and basal aedeagus sclerite. 37, Anal valve. [Scale 1.0 mm (34), other Figs. 0.1 mm]

of antennal segments: 30-20-27-22-21-20-20-18-18-17-15-15-14-8-8-8. Relative length of maxillary palpus segments: 14-17-23-35.

Wing (Fig. 34) twice as long as its greatest width. Sc short, its tip recurved towards R_1 and slightly wider in this area. Forks R_{2+3}/R_4 and R_2/R_3 close together in basal half of wing as fork M_1/M_2. CuA_2 very strong, not reaching costa. Small brownish spot at tip of each vein; spot size increasing towards wing base. Wing length 1.6 mm. No specific features on thorax and legs.

Male genitalia (Fig. 35) with asymmetric aedeagus. Ninth tergite wider than long with pair of front lateral projections, (articulation with basistyles) and medial semicircular incision distally for the conical setose subgenital plate. Cercopodia strongly curved with one strong tenaculum. No sternal band. Basistyles fused medially via thin bridge ventrally, their dorsal apodemes elongate basally, close together medially but unfused (Fig. 36). Dististyles as long as basistyles, straight with blunt tip. Aedeagus with basal, dorsoventrally flattened sclerite, circular incision distally. One side is articulated with distal sclerites of aedeagus. Ventrally, a thin medial, straight sclerite, distally broadened articulated to the distal aedeagal sclerites. Both basal aedeagal sclerites unfused. Ventral sclerite comparatively narrow, with longer and shorter lateral tip, dorsal broader with less pronounced lateral tip. Both sclerites articulate with the basistyles which are surrounded by heavily sclerotized medially open sclerite.

Type material.—HOLOTYPE, ♂, **PUERTO RICO,** tributary Mamayes, Bisley stream, Luquillo Experimental Forest, emergence trap, 2 Feb. 1991 leg. Masteller. PARATYPES: 3♂-3♀ from the same locality, 1989–1992.

Etymology.—The species is dedicated to Marianna Masteller, wife of ECM.

Emergence.—This species was a rare Psychodid in the emergence traps, collected exclusively in January and May.

Remarks: This is another new *Arisemus* taxon of the Caribbean region, related to the taxon described above. The shape of styles, aedeagus and wing distinguish it from relatives, *A. boxi* and *A. buzbyae.*

Arisemus waidei Wagner and Masteller, New Species

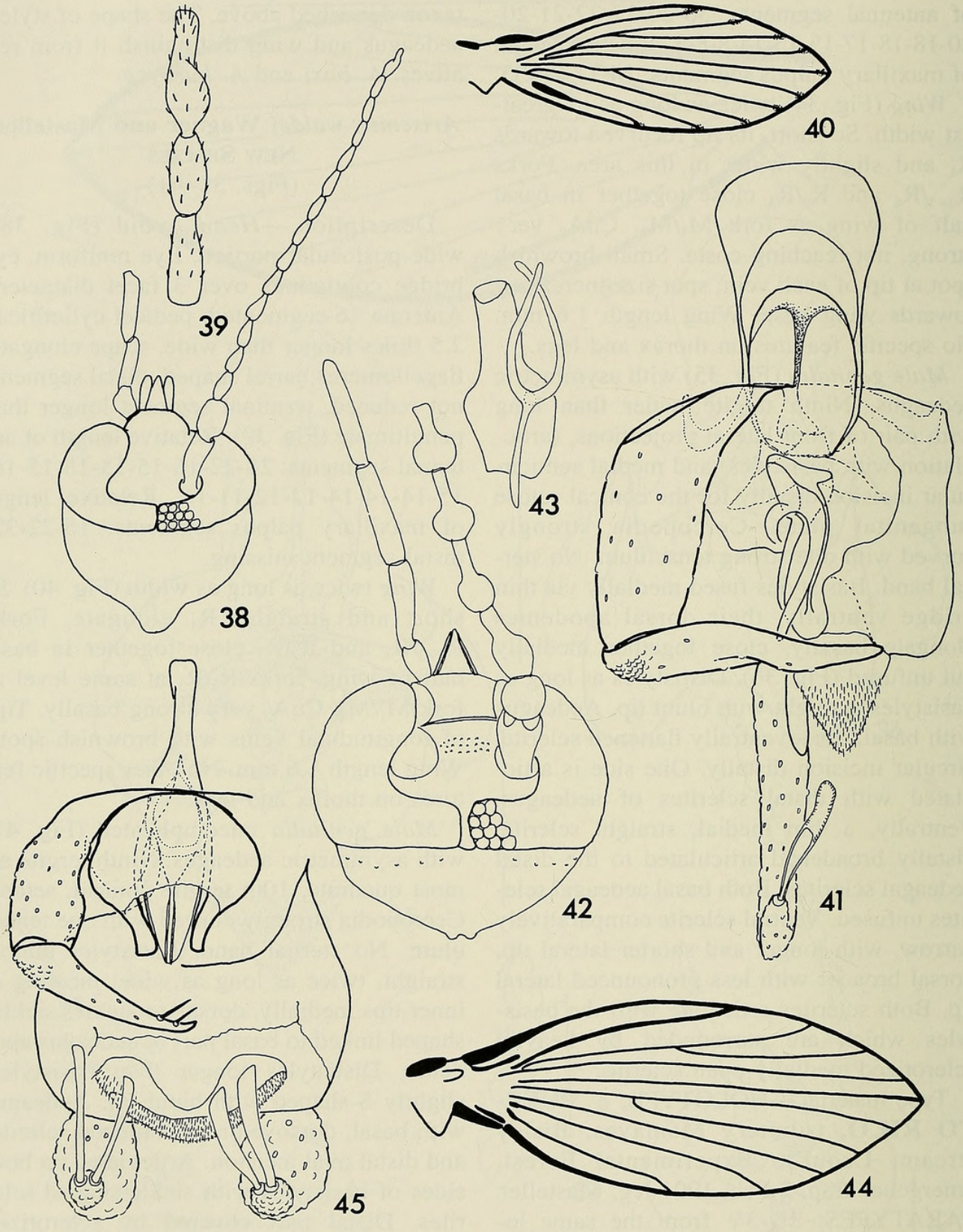
(Figs. 38–41)

Description.—*Head* ovoid (Fig. 38), wide postocular portion. Eye reniform, eye bridge contiguous over 3 facet diameters. Antenna 16-segmented, pedicel cylindrical, 2.5 times longer than wide, scape elongate, flagellomeres barrel shaped, distal segments not reduced, terminal segment longer than penultimate (Fig. 39). Relative length of antennal segments: 28-22-16-15-15-15-15-16-15-14-14-14-12-12-11-16. Relative length of maxillary palpus segments: 15-22-32-distal segment missing.

Wing twice as long as width (Fig. 40). Sc short and straight, R_1 elongate. Forks R_{2+3}/R_4 and R_2/R_3 close together in basal half of wing, forks R_2/R_3 at same level as fork M_1/M_2. CuA_2 very strong basally. Tips of longitudinal veins with brownish spots. Wing length 1.6 mm. No other specific features on thorax and legs.

Male genitalia uncomplicated (Fig. 41) with asymmetric aedeagus. Ninth tergite almost quadrate, 10th tergite conical, setose. Cercopodia strongly curved with one tenaculum. No sternal band. Basistyles almost straight, twice as long as wide; meeting at inner tips medially, dorsal apodemes sickle-shaped linked to basal part of aedeagus apodeme. Dististyles longer than basistyles, slightly S-shaped with blunt tip. Aedeagus with basal, dorsoventrally flattened sclerite, and distal oval incision. Articulated on both sides of basistyles with sickle-shaped sclerites. Distal part covered by sclerotized sheath, with broad, thin sclerite below, tips at almost same level.

Type material.—HOLOTYPE, ♂, **PUERTO RICO,** El Verde, Quebrada Prieta, emergence trap, 2 March, 1992 leg. Buzby & Masteller. PARATYPES: 2♂-4♀ from same locality along with 25♂-25♀; El Verde, Q. Prieta emergence trap, 1989, 1♂; El



Figs. 38–45. *Arisemus waidei.* 38, Head. 39, Distal flagellomeres. 40, Wing. 41, Genitalia, ventral view. *Philosepedon mauroae.* 42, Head. 43, 7th flagellomere. 44, Wing. 45, Genitalia, ventral view.

Verde, Quebrada Sonadora, light trap, 14 February, 1989, 2♀; Bisley, tributary of Mamayes, Luquillo Experimental Forest, 2 April, 1991, 2♀; Cocoa Falls, El Yungue, 7 June, 1991, 1♂.

Etymology.—This species is dedicated to Robert B. Waide, director of the El Verde Field Station, Puerto Rico who has been a strong advocate of our stream research, providing numerous forms of assistance.

Emergence.—Numerous specimens were caught in the emergence traps, with abundance markedly greater from the Bisley stream. Emergence was observed from January–March, and May, August.

Remarks: Relations of *A. waidei* to other taxa remain unclear at this time, due to the different shape of the flagellomeres and the construction of the aedeagus. Its placement in this genus is provisional.

Philosepedon mauroae Wagner and Masteller, New Species
(Figs. 42–45)

Description.—*Head* (Fig. 42) circular, with medium sized postocular portion. Eye reniform, divided by 1 facet diameter, interocular suture thin, slightly bent. Eye with one row of postocular bristles. Antenna with short cylindrical scape, as long as wide, pedicel globular, flagellomeres bottle shaped, each with pair of Y-shaped ascoids (Fig. 43). Relative length of antennal segments: 12-9-15-15-14- distal segments missing. Relative length of maxillary palpus segments: 7-17-21-23.

Wing (Fig. 44) more than twice as long as wide. Sc short and straight. R_1 elongate, stronger than other longitudinal veins. Area of wing membrane in front of and parallel to R_1 opaque. Wing length 2.1 mm. Thorax and legs without specific features.

Male genitalia simple (Fig. 45) with symmetric aedeagus. Ninth tergite almost quadrate, rounded edges, deep basal incision, 10th tergite bilobed, distally setose. Cercopodia strongly curved with two tenacula. No sternal band. Basistyles fused medially at inner tips, slightly bent, twice as long as distal width. Dorsal apodemes sickle-shaped, linked with basal part of aedeagus apodeme. Dististyles longer than basistyles, slightly curved with blunt tip. Two prominent setae near the tip. Aedeagus with racket-shaped apodeme. Two elongate lateral sclerites joined to posteroventral plate, which has two lateral prolongations and deep distal incision. In the incision, the distal portion of inner blade-shaped sclerites of aedeagus are visible.

Type material.—HOLOTYPE, ♂, **PUERTO RICO,** El Verde, Quebrada Prieta, emergence trap, 30 June, 1992 leg. Buzby & Masteller.

Etymology.—This species is dedicated to Mrs. Kathy Mauro, who meticulously typed, proofed manuscripts and offered assistance over the past 10 years.

Emergence.—*Philosepedon mauroae* was quite rare in the emergence traps. We believe its habitat is shells of dead snails residing in the stream.

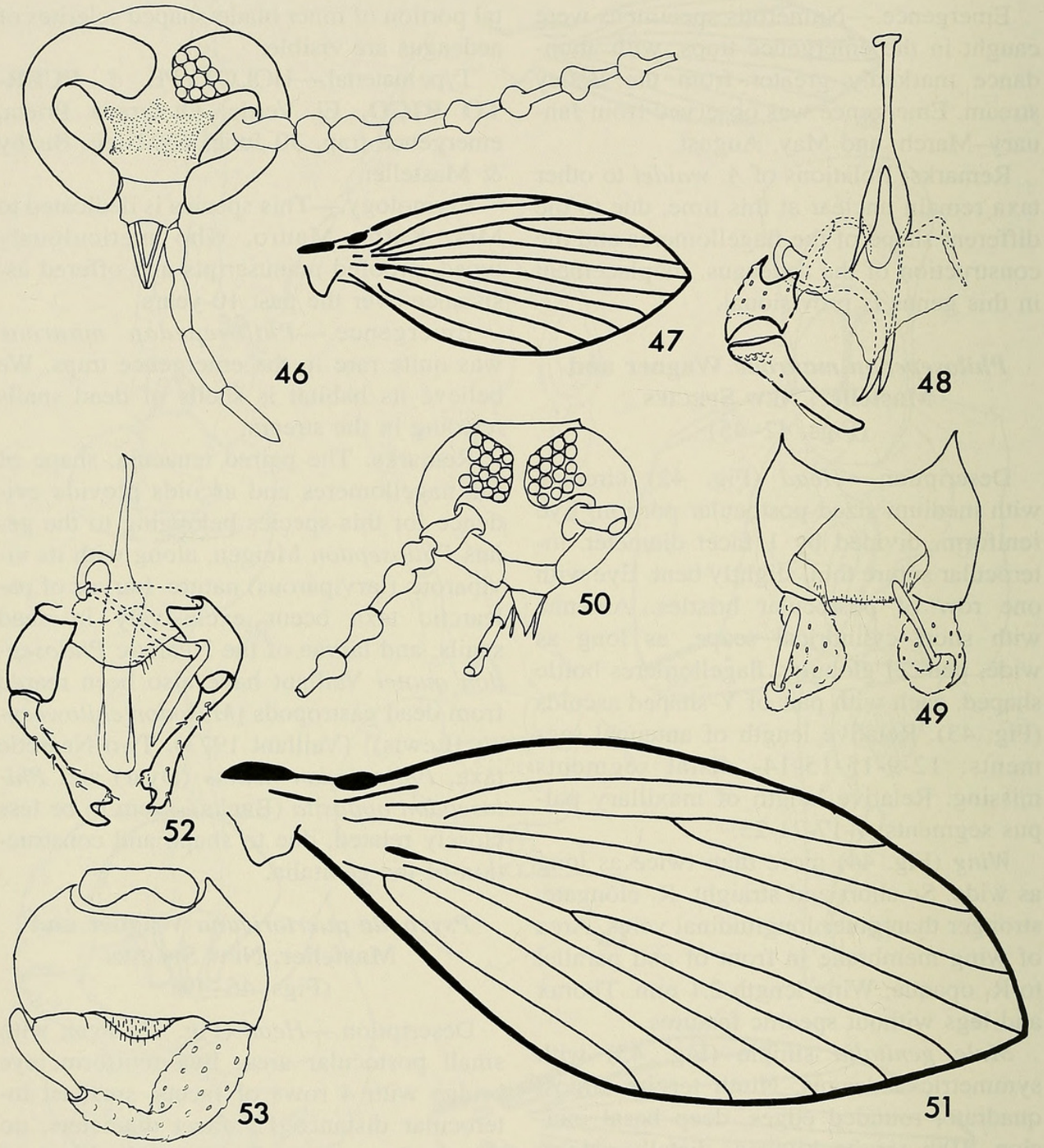
Remarks: The paired tenacula, shape of the flagellomeres and ascoids provide evidence for this species belonging to the genus *Philosepdon* Meigen, along with its viviparous (larviparous) nature. Larvae of palearctic taxa occur exclusively in dead snails, and larvae of the Nearctic *Philosepdon quatei* Vaillant have also been reared from dead gastropods [*Mesodon chiloweensis* (Lewis)] (Vaillant 1973). Two Nearctic taxa, *Philosepdon helicis* (Dyar) and *Philosepdon opposita* (Banks), seem to be less closely related, due to shape and construction of the genitalia.

Psychoda puertoricana Wagner and Masteller, New Species
(Figs. 46–49)

Description.—*Head* (Fig. 46) oval, with small postocular area. Eye reniform, eye bridge with 4 rows of facets, smallest interocular distance 1.5 facet diameters, no interocular suture. Pedicel cylindrical, 2 times longer than wide, 1.5 times longer than globular scape, flagellomeres bottle shaped with Y-shaped ascoids. Relative length, antennal segments: 12-7-12-11-12-12-12-11-, distal segments missing. Relative length maxillary palpus segments: 16-24-26-30.

Wing (Fig. 47) approximately twice as long as width, venation typical for the genus. Wing length 1.6 mm. Thorax and legs without specific features.

Male genitalia uncomplicated (Fig. 48),



Figs. 46–53. *Psychoda puertoricana.* 46, Head. 47, Wing. 48, Styles and aedeagus, ventral view. 49, 9th tergite and cercopodia, ventral view. *Psychoda juliae.* 50, Head. 51, Wing. 52, Styles and aedeagus, ventral view. 53, 9th tergite and cercopodium, ventral view.

asymmetric aedeagus. Ninth tergite rectangular, wider than long, 10th tergite distally setose (Fig. 49). Cercopodia strongly curved with one tenaculum. No sternal band. Basistyle short, almost as long as wide and half length of dististyle, apparently not linked medially, dorsal apodemes linked to basal part of aedeagus apodeme. Dististyles longer than basistyles, straight with blunt tip. Aedeagus with Y-shaped, dorsoventrally flattened basal sclerite, articulated on both sides with dorsal sclerites of basistyles, additionally on one side with sickle-shaped aedeagus sclerite. Distal part of aedeagus covered by slightly sclerotized sheath, with both aedeagus sclerites below,