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First record of the genus *Arisemus* Satchell in Mexico, with description of *Arisemus imeldae* sp. nov. (Diptera: Psychodidae)

Primer registro del género *Arisemus* Satchell para México, con la descripción de *Arisemus imeldae* sp. nov. (Diptera: Psychodidae)

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ABSTRACT

A new species of psychodid moth fly of the genus *Arisemus* from Mexico is described based on male and female characteristics. *Arisemus imeldae* **sp. nov**. is the first species of this genus reported in Mexico. Specimens were collected near Xalapa city, in the center of the state of Veracruz, Mexico. The male presents a nearly symmetrical long aedeagus and short parameres, gonostylus simple with cluster of few sensilla; female hypovalvae with lobes scarcely separated and posterior portion of genital chamber with wide curved rods, characters that distinguish the species from all other previously described.

Key words: Psychodinae, new species, description, morphology, taxonomy.

RESUMEN

Se describe una nueva especie de sicódido del género *Arisemus* de México con base en las características del macho y de la hembra. *Arisemus imeldae* **sp. nov**. es la primera especie de este género registrada para México. Los ejemplares fueron capturados cerca de la ciudad de Xalapa, en el centro del estado de Veracruz, México. El macho presenta el edeago largo y casi simétrico y parámeros cortos, el gonostilo es simple con un parche de pocas sensilas; la hipovalva de la hembra tiene lóbulos escasamente separados y la porción posterior de la cámara genital tiene varillas anchas curvas, características que distinguen esta especie de todas las previamente descritas.

Palabras clave: Psychodinae, nueva especie, descripción, morfología, taxonomía.

Arisemus Satchell, 1955, is a Neotropical genus with 32 described species distributed from Guatemala to Brazil and Peru, and the West Indies, with no records in Mexico (Botosaneanu & Vaillant 1970, Wagner & Joost, 1994, Quate 1996, Wagner & Masteller 1996, Collantes & Martinez-Ortega 1999, Collantes & Baquero 2000, Quate & Brown 2004, Bravo & Araujo 2013). *Arisemus* was originally described as subgenus of *Telmatoscopus* by Satchell (1955), and later elevated to genus by Botossaneanu & Vaillant (1970). Vaillant (1982) proposed the tribe Arisemini for this genus, but later withdrew and included *Arisemus* in the tribe Setomimini (Vaillant 1990). Duckhouse (1987) joined together all genera with expanded anterior gonocoxal condyles in the tribe Maruinini, and this arrangement followed by Quate (1996). Later, Quate & Brown (2004) treated them as tribe Setomimini considering the differences in the larval habitat, and structure of aedeagus of *Maruina* Müller, 1895. Ježek *et al.* (2011) indicated that *Arisemus* and other related genera resemble Mormiini Enderlein, 1937, by wing characteristics, and for this reason stated that Setomimini in the sense of Quate & Brown (2004) may be polyphyletic.

Arisemus is distinguished by the contiguous eyes, eye-bridge with three rows of facets, reduction of the apical flagellomeres and their internodes, ascoids simple, wing with R_5 ending in wing tip, radial and medial forks close to base, male with gonocoxal anterior condyles broad and joined at middle with keel connected to aedeagus, basiphallus large spoon or paddle-shaped, cercopod with one apical retinaculum, and female with bilobed hypovalvae and cercus much longer than wide (Quate & Brown, 2004).

In this work, a description of a new species of *Arisemus* is presented based on male and female morphological characters, corresponding to the first record of this genus in Mexico.

MATERIALS AND METHODS

Study area. Specimens were collected in 2011 in the locality of Chavarillo, in the municipality of Emiliano Zapata, state of Veracruz, Mexico. The collection site in Chavarillo is located at coordinates 19° 25' 26.67" N, -96° 47' 40.53" W, with an altitude of about 884 meters. The climate is semi-hot humid with a mean temperature of 25.2º C and annual rain average of 2,779.1 mm per year, more abundant in summer (39%) (SEFIPLAN 2015).

Collection method. Specimens were collected with CDC miniature UV-light traps (John W. Hock Company, Gainesville, FL) and stored dry.

Specimens preparation and observation. Specimens were cleared, dissected and permanently mounted on slides following the procedure outlined by Ibáñez-Bernal (2005) using Euparal (Bioquip Products) as permanent mounting medium. Specimens were examined using a Nikon Eclipse 50i compound microscope equipped with phase contrast. Drawings were rendered with the aid of a Nikon Y-IDT drawing tube and digitally processed using Corel Photo Paint X3 (Version 13). Measurements were obtained using an ocular micrometer and are given in millimeters. Specimens are deposited in the Psychodidae Collection of Instituto de Ecología, A. C. (INECOL), Xalapa, Veracruz, Mexico (IEXA).

Terminology. Descriptions of the male and female follow Merz & Haenni (2000), except for male terminalia and female postabdomen for which we use the terms used by Curler & Moulton (2012), and Kotrba (2000), respectively.

Arisemus imeldae Ibáñez-Bernal & Suárez-Landa, sp. nov.

(Figures 1- 14)

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Material examined. (1 male, 4 females). Holotype male: Mexico, Veracruz, Municipality of Xalapa, Chavarrillo, Selva Baja, 19° 25' 26.67" N, - 96° 47' 40.53" W, 14-May-2008, Jur. Sanit V, col., CDC UV Light trap; paratypes: 4 females: same data as holotype. All specimens are deposited in the Psychodidae collection of the Instituto de Ecología, A. C. (INECOL), Xalapa, Veracruz, Mexico.

Type locality. México, Veracruz, municipality of Xalapa, Chavarrillo.

Etymology. This species is named in honor to our friend and colleague Dr. Imelda Martínez Morales, researcher of the Instituto de Ecología, A. C. (INECOL), Xalapa, Veracruz. She has devoted her life-work to the study of reproduction of some invertebrates, specially insects.

Male description (Figs. 1-8). Measurements (n = 1): head width 0.37 mm, head length 0.48 mm, wing length 1.87 mm, wing width 0.57 mm.

Head. Pyriform in frontal aspect, vertex triangularly projected, 4 times as long as eye bridge width, with surface regularly covered with setae alveoli and supraocular bristle alveoli absent. Eyes contiguous, eye bridge with three rows of facets. Frontal alveoli patch with lower margin subquadrate and upper margin bilobed far away from inferior margin of eyes. Clypeus with setae alveoli patch rounded in its upper margin (Fig. 1). Antenna with scape very long, cylindrical, about 4.0 times the length of the rounded pedicel, apex of pedicel reaching the level of the labrum apex (Fig. 1); flagellum with 14 flagellomeres; flagellomere 1 the longest, partially fused to flagellomere 2; flagellomeres 2-11 compact, each one with a very short, inconspicuous internode (Figs. 1, 3); flagellomeres 12-13 smaller and spherical, flagellomere 14 pyriform, all clearly separated (Fig. 2). Ascoids not observed in flagellomeres 1-3 and 14; flagellomeres 4-13 each with pair of simple and short digitate ascoids. Palpus long, reaching the apical third of antenna; palpomere proportion: 1.0: 1.2: 1.2: 1.8; palpomere 1 cylindrical, reaching the level of labrum apex; palpomere 2 ovoid; palpomere 3 cylindrical with about four internal setae; palpomere 4 striated (Fig. 1). Mouthparts with inverted V-shaped sclerite (cibarial fork of Vaillant); labella fleshy and broad, with 5-6 setae and no spiniform or tooth-like sensilla (Fig. 4).

Thorax. Anepisternum with a large morular sensory organ that anteriorly reaches the posterior margin of anterior stigma (Fig. 6). Wing as long as 3.0 times its maximum width, lanceolate, with acute apex; wing membrane yellowish, with soft brown spots at the end of all longitudinal veins; costa with two basal nodes; Sc ending free not reaching the level of the origin of R_5 but ending at same level than origin of M_3; Rs pectinate; radial and medial forks complete and at same level, arising basal to apex of CuA_2 (Fig. 5).

Terminalia. Epandrium subquadrate, lightly sclerotized, divided by a transversal enforcement anterior to the large central foramen, posterior margin concave leaving greatly exposed both tergum 10 with rounded posterior margin, and sternum 10 which resembles a tongue with a median sulcus (Fig. 7). Cercopod as long as epandrium, tapering progressively from base to apex, with one spatulate retinaculum at apex (Fig. 7). Subepandrium membranous, wrinkled, with pair of lightly sclerotized rods from foramen toward the base of cercopods (Fig. 7). Gonocoxite simple, subcylindrical with a patch of 4-5 small sensilla on posteromedian corner; gonocoxite anterior condyles very large, rounded, fused at midline and with the aedeagus by a keel; gonocoxites also connected by a sclerotized thin strip ventrally. Gonostylus about as long as gonocoxite, tapered from base to tip, the apical one-fourth slender and S-curved. Aedeagus long, twice the length of epandrium; distiphallus parallel sided reinforced by amorphic sclerotizations at base and also laterally, its apex membranous, verrucous, and pointed; basiphallus very large, anterior portion expanded in two rounded parts and united at midline by a strong sclerotized keel that reaches posteriorly the union of basiphallus with distiphallus , and at the apical portion of basiphallus with a large rounded opening; parameres nearly symmetrical, shorter than gonostylus, strongly sclerotized, with base complex bending and apex tough slightly curved inwards. There is a sclerotized plate with a small rounded posterior projection at middle which has the anterior margin closely to the gonocoxal bridge but clearly separated, that probably corresponds to the hypandrium (Fig. 8).

Female description. (Figs. 10-14). Measurements in mm (n = 4): head length 0.485 ± 0.02 (0.45-0.51); head width 0.37 ± 0.01 (0.36-0.39); wing length 1.87 ± 0.13 (1.75-2.00); wing width 0.615 ± 0.06 (0.56- 0.69). Head (Fig. 9), labella (Fig. 10), antenna (Figs. 9, 11, 12) and

wing (Fig. 13) as figured, similar to male. Palpomere proportions: 1.0: 1.4: 1.4: 2.5.

Postabdomen (Fig. 14). Sternite 8 (subgenital plate) as long as 0.5 its basal width, tapered toward the posterior end, forming a bottle neck to which hypovalvae arise externally and a tongue like sulcate clear plate internally; hypovalvae posteriorly expanded, apicolateral margins rounded as a poorly bilobed structure, basally with a triangular area devoided of microtrichiae. Genital chamber a pair of semispherical structures anteriorly, each with an external reinforced margin and reticulated pattern ventrally; a pair of wide outwards curved rods support the semispherical structures, and each develops posteriorly two lobes from an ample plate, both as a unit resembling a butterfly. Cerci long and slender, tapered from base to end.

Comments. As noted by Collantes & Baquero (2000) and Quate & Brown (2004), and with the only exception of *Arisemus maculosus* Satchell, 1955 from Jamaica, only known by females, species of *Arisemus* can be separated in two groups according to the male gonostylus morphology, those with bifid or trifid gonostylus: *Arisemus atrasetus* (Rapp, 1945) (Guatemala, Nicaragua, Costa Rica, Panama), *A. buzbyae* Wagner & Masteller, 1996 (Puerto Rico), *A. guhli* Wagner & Joost, 1994 (Colombia), *A. hexadactylus* Botosaneanu & Vaillant, 1970 (Cuba), *A. lepidotos* Quate, 1996 (Costa Rica), *A. rubeni* Bravo & Araujo, 2013 (Brazil), *A. stylofurcatus* Collantes & Martínez-Ortega, 1999 (Nicaragua), *A. tetradactylus* Botosaneanu & Vaillant, 1970 (Cuba), *A. triatrapars* Quate & Brown, 2004 (Costa Rica, Panama, Venezuela), and those with simple gonostylus: *Arisemus aenigmaticus* Quate & Brown, 2004 (Costa Rica), *A. ampliscapus* Quate & Brown, 2004 (Venezuela), *A. amydrus* Quate & Brown, 2004 (Costa Rica), *A. barbarus* Quate & Brown, 2004 (Costa Rica), *A. boxi* Satchell, 1955 (West Indies), *A. caceresi* Quate & Brown, 2004 (Peru), *A. confertus* Quate & Brown, 2004 (Bahamas, Puerto Rico), *A. grabhamana* (Dyar,1926) (Jamaica), *A. grandilobus* Quate & Brown, 2004 (Venezuela), *A. maesi* Quate & Brown, 2004 (Nicaragua), *A. mariannae* Wagner & Masteller, 1996 (Puerto Rico), *A. martinezi* Wagner & Joost, 1994 (Colombia), *A. pigmentatus* Quate & Brown, 2004 (Peru), *A. obandoi* Wagner & Joost, 1994 (Colombia), *A. rhamphos* Quate & Brown, 2004 (Venezuela), *A. roessleri* Wagner & Joost, 1994 (Colombia), *A. salazari* Quate, 1996 (Costa Rica), *A. sesquipedalis* Quate & Brown, 2004 (Venezuela), *A. spilotos* Quate, 1996 (Costa Rica), *A. triconnectus* Collantes & Baquero, 2001 (Ecuador), *A. waidei* Wagner & Masteller, 1996 (Puerto Rico), *A. woodi* Quate & Brown, 2004 (Costa Rica), and *Arisemus imeldae* Ibáñez-Bernal & Suárez-Landa, sp. nov.

From this group with simple gonostylus, *Arisemus imeldae* sp. nov. is easily distinguishable because the distiphallus is simple and symmetrical with comparatively short and heavy sclerotized parameres, that seem symmetrical in gross view but are asymmetrical in detail. Also, *A. imeldae* has the antennal scape long, more than 2.5 times the length of pedicel, the apical flagellomeres globular, wing with dark patches at the end of all longitudinal veins except Sc, and vein CuA_2 evenly wide at middle. By these characters, only *A. caceresi* is similar to *A. imeldae* sp. nov., but easily distinguishable because the distiphallus is very short, about as long as gonocoxite, and strongly asymmetrical. Also, *A. imeldae* has a cluster of sensilla in gonostylus, similar to the character state observed in *A. amydrus, A. sesquipedalis* and *A. confertus*, but its cluster is composed of few sensilla, and the aedeagus is nearly symmetrical, whereas in those species the gonostylus has a cluster consisting of more than 25 sensilla and the aedeagus is strongly asymmetrical.

It is not possible to compare females of all species of the genus because some have not been described yet, but from those known, *A. imeldae* differs by the lobes of the hypovalvae which are not strongly differentiated as the posterior margin of the hypovalvae is nearly straight, and the rods are wide, ectally curved, with posterior lobes resembling a butterfly.

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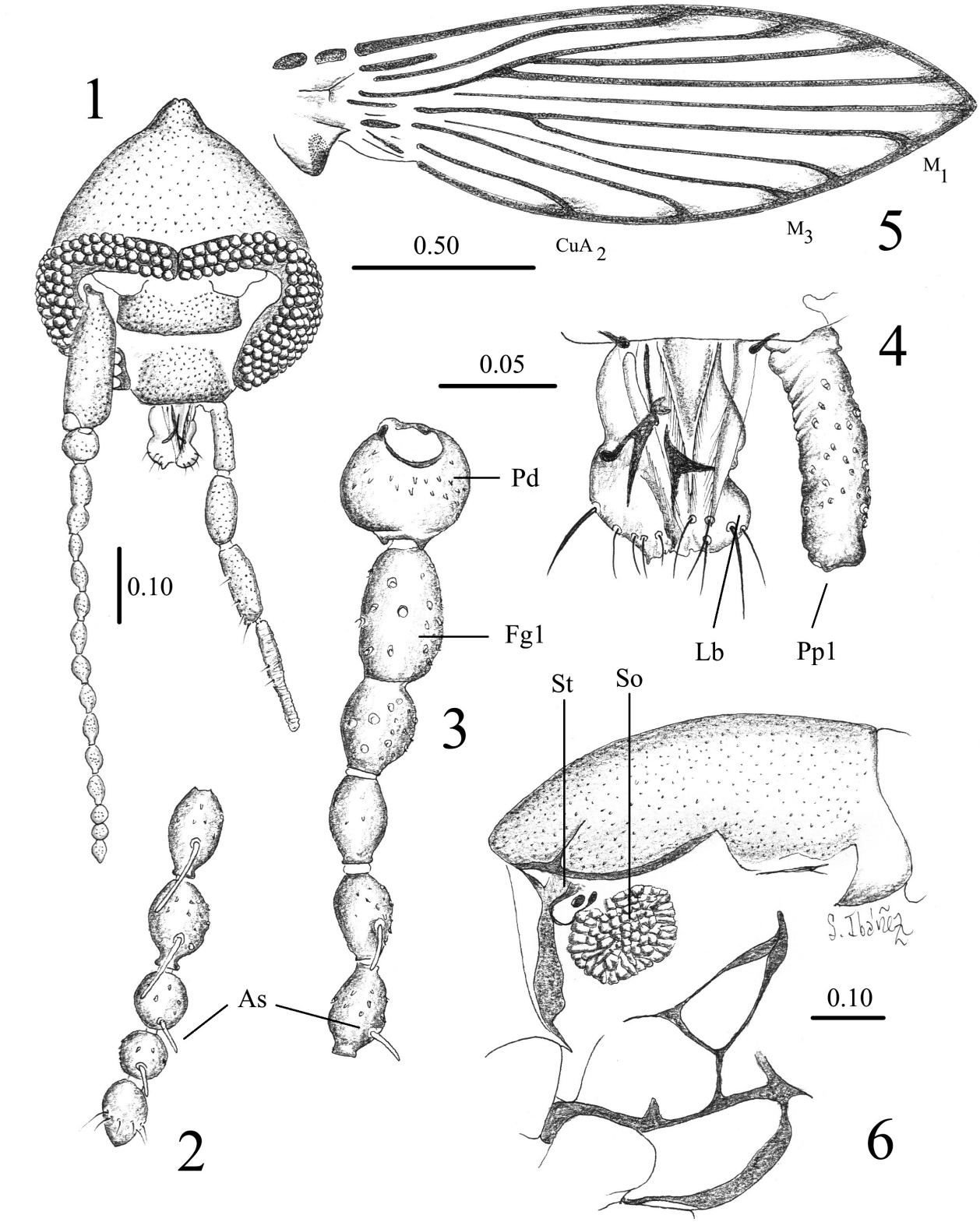
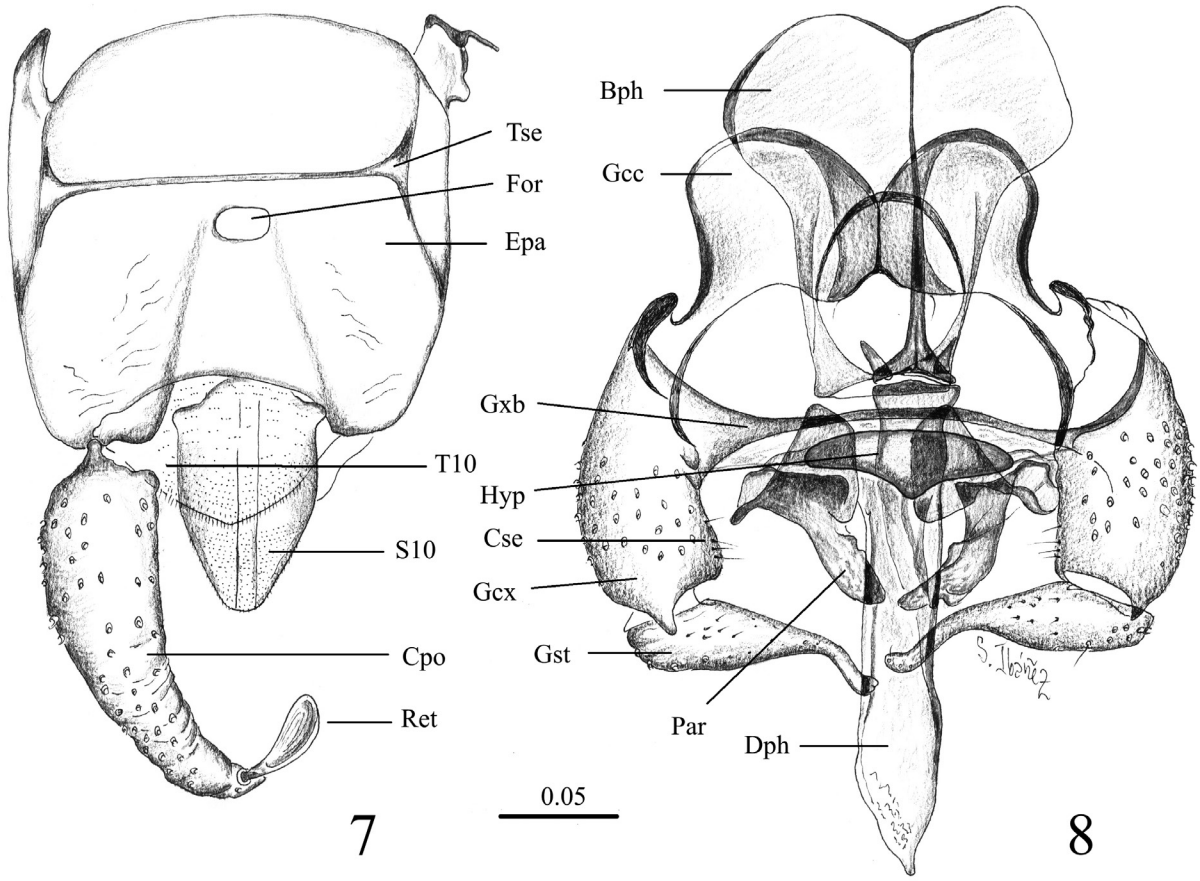
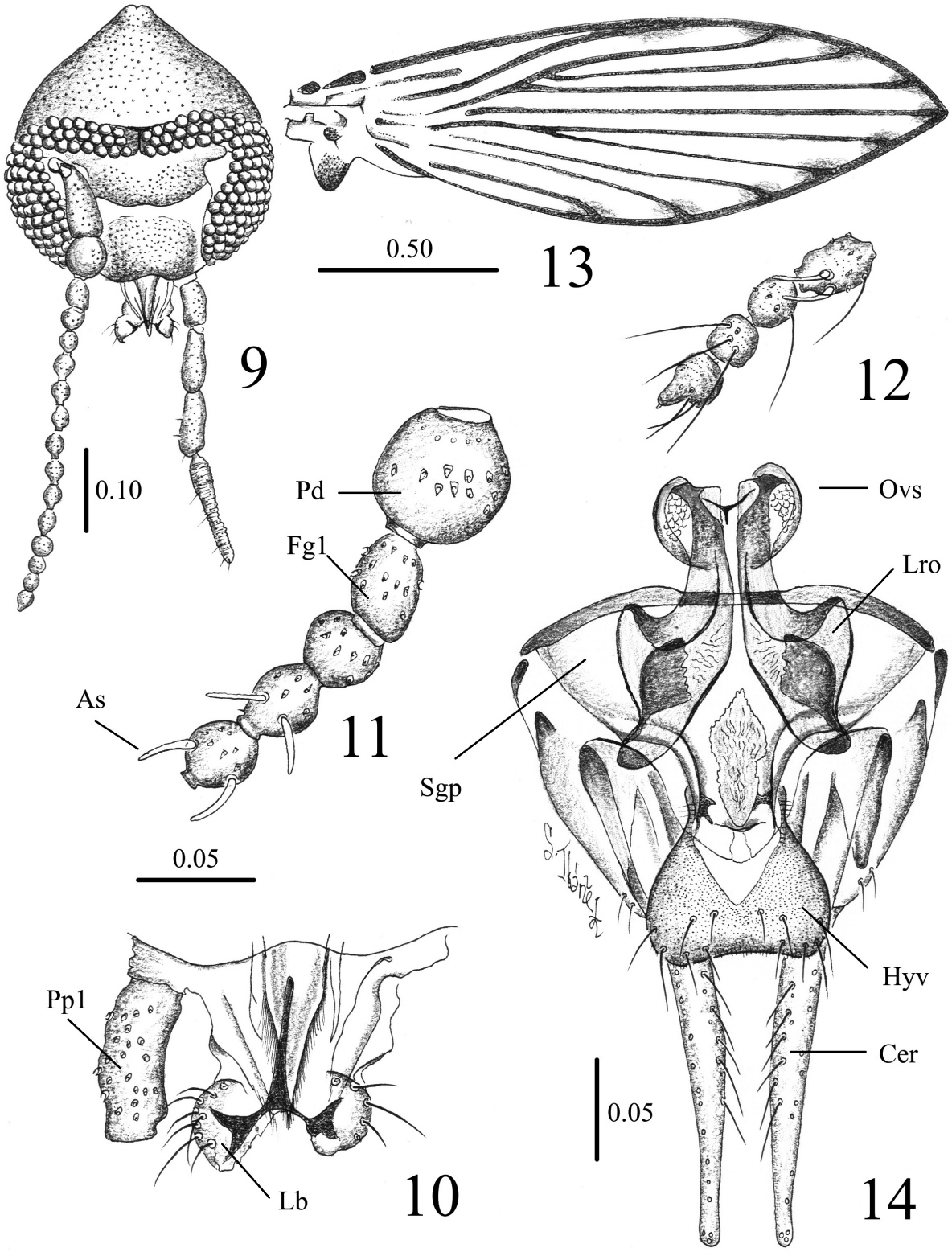


Figures 1-6. Male of *Arisemus imeldae* sp. nov. 1) Head, frontal view (left antenna and right palpus not drawn); 2) Apical flagellomeres of antenna (only one ascoid per flagellemere drawn); 3) Antennal pedicel, and flagellomeres 1-5 (only one ascoid per flagellomere drawn); 4) Mouth parts, showing labella; 5) Wing; 6) Lateral aspect of anterior portion of thorax showing the sensory organ. Scale in millimeters, Figs. 2-4 at same scale. As: ascoid; Fg1: flagellomere 1; Lb: labellum; Pd: pedicel; Pp1: palpomere 1; So: sensory organ; St: stigma.



Figures 7-8. Male terminalia of *Arisemus imeldae* sp. nov. dorso-ventral view; 7) epandrium, cercopod (only one drawn) and apical segments; 8) gonopods and aedeagal complex. Scale in millimeters. Bph: basiphallus; Cpo: cercopodium; Cse: cluster of sensilla; Dph: distiphallus; Epa: epandrium; For: foramen; Gcc: gonocoxite condyle; Gcx: gonocoxite; Gst: gonostylus; Gxb: gonocoxal bridge; Hyp: hypopygium; Par: paramere; Ret: retinaculum; S10: sternum 10 T10: tergum 10; Tse: transverse suture of epandrium.



Figures 9-14. Female of *Arisemus imeldae* sp. nov.; 9) Head, frontal view (left antenna and right palpus not drawn); 10) Mouth parts, showing labella; 11) Antennal pedicel, and flagellomeres 1-4 of antenna (both ascoids by flagellomere drawn); 12) Apical flagellomeres of antenna (both ascoids drawn); 13) Wing; 14) Postabdomen, ventral view. Scale in millimeters, figs. 10-12 at same scale. Cer: cercus; Hyv: hypovalvae; Lro: longitudinal rod; Ovs: oval structures; Sgp: subgenital plate (for other short codes refer to Figs. 1 and 2).