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Three unusually divergent new genera of phorid flies (Diptera: Phoridae) from Costa Rica

GIAR-ANN KUNG & BRIAN V. BROWN
Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA, 90007, USA.
Email: gkung@nhm.org, bbrown@nhm.org

Abstract

Three new genera and species, *Laciniomyia dilata*, *Laishania angustithorax*, and *Tabelliphora teretipenna* are described from female specimens collected in Costa Rica. All are classified in the subfamily Metopininae, amongst which they are among the most structurally unusual forms found in the New World.

Key words: Diptera, Phoridae, new genus, Costa Rica, Neotropical

Introduction

The New World phorid flies are among the most poorly-known in the world. In spite of the lifetime efforts of Thomas Borgmeier (summarized by Borgmeier, 1971), a large fraction of the fauna remains uncollected and undocumented. Recent revisionary work on species-rich groups like *Apocephalus* Coquillett and *Melaloncha* Brues (e.g. Brown, 2002, 2004) has indicated that only 10% of extant Neotropical phorid flies are known.

In material available to us there are numerous taxa that represent potential undescribed genera, but confusion in the classification of the large genus *Megaselia* Rondani makes description of new genera in groups closely related to it problematic. In this paper we describe three new extremely divergent forms that are not closely related to *Megaselia* and that are unlikely to be confused with any other New World phorids.

Methods & Material

Descriptions are written using the structural terms of McAlpine (1981). The frontal ratio is the frontal height divided by the frontal width at midlength. Costal sector ratio is the dis-

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tance between the humeral crossvein and R_1 (=sector 1): distance between R_1 and R_{4+5} (=sector 2). The measurement of costal sector 1 is divided by the value of sector 2.

All specimens were collected in alcohol, then dried using hexamethyldisilazane (Brown, 1993). Barcoded insect labels are placed on all specimens, facing downwards below the locality label; barcode data are quoted for holotypes to facilitate their later recognition. All specimens are housed in the collections of the Natural History Museum of Los Angeles County (LACM), the Costa Rican Instituto Nacional de Biodiversidad (INBC) and the Museo de Insectos, Universidad de Costa Rica (MUCR).

Laciniomyia new genus

Diagnosis. Frons extremely broad, flat; with usual twelve large frontal setae, lacking median furrow. Four supra-antennal setae present. Eye reduced, oval; ocelli present. Flagellomere 1 elongate oval; arista apical. Mouthparts narrow, elongate, labellae reduced. Palpus greatly enlarged, with 30–40 large apical setae. Legs lacking large setae; forefemur with row of 5 long posterior setae; hind femur apically dilated; hind tibia with one longitudinal setal palisade. Wing lacking vein R_{2+3}. Abdominal tergites reduced, tergites 5–6 absent (Fig. 1). Dorsal abdominal glands discharge behind tergite 4. Ovipositor mostly membranous, non-parasitic.

Laciniomyia does not key past couplet 161 in Disney's 1994 key to genera of females. Although *Laciniomyia* is "somewhat dorso-ventrally flattened" as in the first lead, the anterior thoracic spiracle is neither dorsal nor on the side (as stated in the second lead); instead, the anterior thoracic spiracle is placed at the border of the scutum and pleuron, along the dorsolateral edge of the thorax. The enlarged, setose palpi of *Laciniomyia* make it unlikely to be confused with any other New World phorid genus.

We classify this genus in the *Metopina*-group of genera (Brown, 1992; = Metopinini of Disney, 2003).

Laciniomyia dilata new species

Figs 1–2.

Description. Female (male unknown). Body length 1.42 to 1.48 mm. Head dorsoventrally flattened. Ocelli present. Frons brown, with anteromedial apex broadly rounded, not pointed. Frontal ratio 0.88. Median furrow of frons absent. All twelve frontal setae present (one pair each of dorsal and ventral interfrontal setae, dorsal and ventral fronto-orbital setae, inner vertical setae and post-ocellar setae). Dorsal fronto-orbital seta high, located near dorsal margin of eye, just below vertical seta. Ventral fronto-orbital seta near to eye margin. Two pairs of long, ventrally-directed supra-antennal setae present; setae approxi-

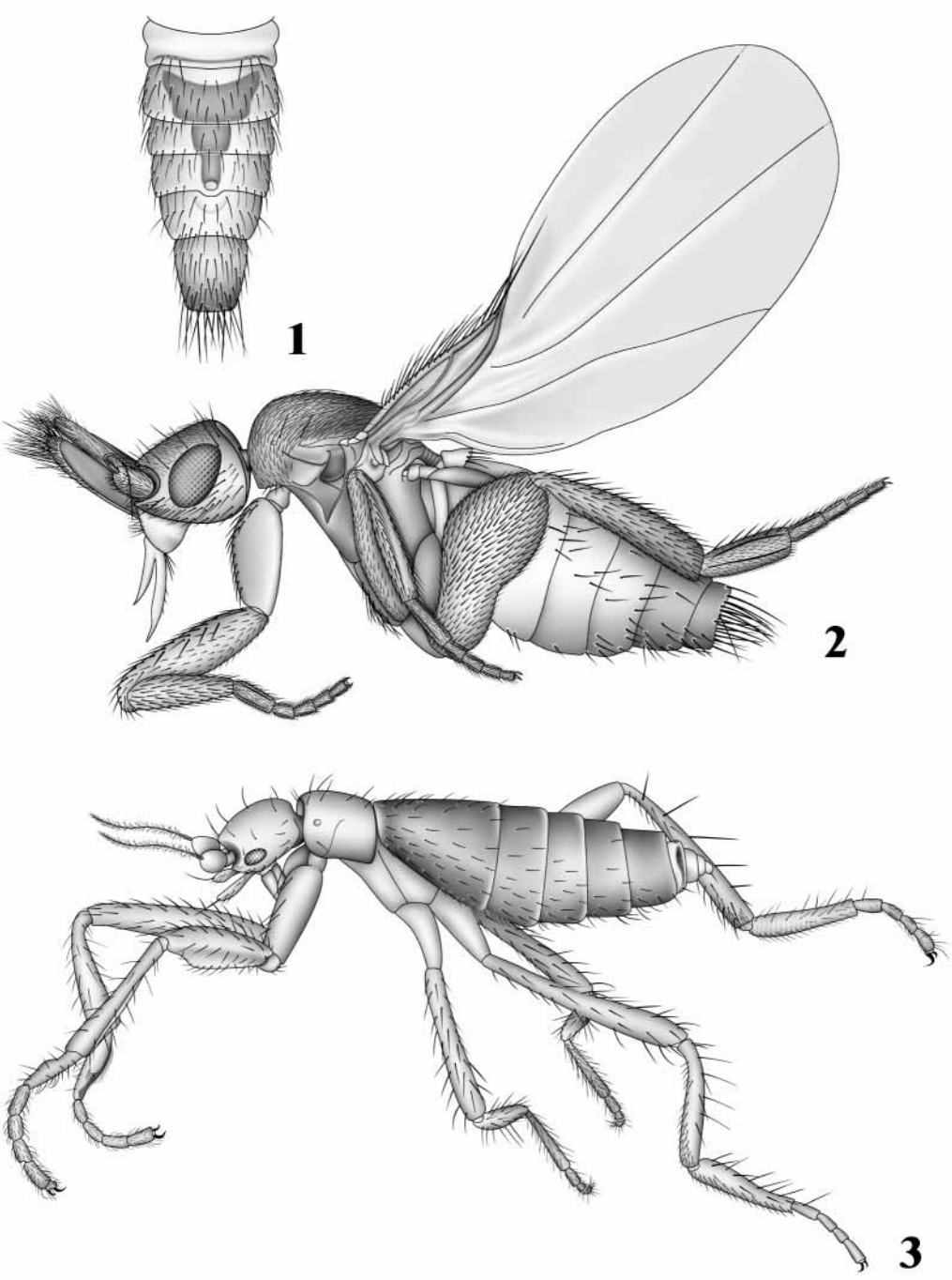
mately 1.5 times length and thickness of ventral interfrontal setae. Eyes oval, reduced, approximately 1.5 times size of flagellomere 1. Flagellomere 1 brown, elongate oval, with long yellow setae. Setae of apical third of flagellomere 1 at least twice as long as that in basal two-thirds. Arista apical, setose. Palpus dark brown, broad, long, approximately 1.3 times length of frons; dorsoventrally flattened, with concave dorsal face, color of concavity lighter than rest of palpus. Apical one-quarter of palpus with brush of approximately 30 to 40 long setae (Fig. 2), length of setae approximately one-half length of palpus. Mouthparts whitish. Clypeus broad. Labrum elongate, thin. Labella elongate, thin, pointed. Oral cavity large, formed by greatly enlarged, protruding postoral expansion. Scutum brown, yellow anteromedially. Scutellum brown. Posterior pair of scutellar setae approximately 1.5 times length and thickness of anterior pair. Notopleural cleft absent. Anepisternum divided, and with longitudinal ridge on anterior portion. Anepisternum without setae. Wing length 1.30 to 1.38 mm. Mean costal length 0.31 wing length. Costal sector ratio 1.0:1. Costal setae long, apicalmost seta nearly as long as costa. R_{2+3} absent. Halter yellow, elongate. Legs mostly yellow, tarsomeres brown. Forefemur with long, slightly thickened, widely spaced, posterodorsal to dorsal setae. Foretibia short, only slightly longer than one-half length of forefemur. Foretarsomeres with long setae, tarsomere 1 with dense, long, ventral setae. Midtibia without differentiated pair of setae; with slightly thickened, longer, anterodorsal to dorsal setae along length. Hind femur apically dilated, expanded; base of femur narrow. Hind tibia with one longitudinal setal palisade. Hind tarsus tapered; tarsomere 1 extremely deep, laterally flattened, twice as deep as tarsomere 2. Dorsum of abdomen with long, thin, sparse setae. Abdominal tergites reduced, brown. Tergite 1 extremely short, narrowed. Tergite 2 same width as tergite 1, slightly tapering apically, not short. Tergite 3 approximately one-third width of tergite 2. Tergite 4 approximately two-thirds width tergite 3. Abdominal segment 4 with posterior gland opening, diameter of which only slightly smaller than width of tergite 4. Abdominal segments 5-6 lacking tergites. Abdominal segments 1–5 whitish to yellow, with long, thin, sparse setae; segment 6 brown with extremely long, sparse setae, setae as long as segment and extending beyond segment. Ovipositor mostly membranous, not parasitic-type.

Geographic distribution. Costa Rica.

Derivation of names. The generic name is from Latin *lacina* for fringe, referring to the apical brush of setae on the palpus. The species name is Latin for dilated, referring to the shape of the hind femur.

Holotype: ♀. COSTA RICA: Guanacaste: Estación Biologica Cacao, 10.93°N, 85.47°W, 10-11.vii.2000, J. Ashe, R. Brooks, Z. Falin, FIT, 1050 m [LACM ENT 068947] (LACM).

PARATYPE: 1♀, same data as holotype (LACM).



FIGURES 1–3. *Laciniomyia dilata* new species. **1.** Abdomen, dorsal. **2.** Body, lateral. **3.** *Laishania angustithorax* new species. Body, lateral.

Laishania new genus

Diagnosis. Entire body with short, sparse setae (Fig. 3). Head elongate, rounded. Median furrow of frons absent. Frontal setae present but reduced in size. Eye reduced; ocelli absent. Flagellomere 1 slightly pointed, arista apical. Mouthparts relatively small, unmodified. Thoracic segmentation greatly reduced; scutellum absent. Legs greatly elongate, without large isolated setae; tibiae lacking setae palisades. Forefemur with triangular ventral expansion at midlength; foretibia apically expanded; foretarsomere 1 basally expanded with long fringe of orange setae. Wing and halter absent. Abdomen with well-developed tergites; ovipositor mostly membranous, non-parasitic.

This distinctive apterous species does not resemble any other New World phorid. It is easily recognized by its overall elongate appearance, extremely long legs, and the presence of thin scattered setae across the body. The long legs indicate a possible cursorial lifestyle, and it is likely that this species is an associate of army ants (Hymenoptera: Formicidae: Ecitonininae).

Laishania does not key out using Disney's 1994 key to genera of females. This species does not fit either lead in couplet 32, so following his note, one must "proceed to couplet 40." Following couplet 40, *Laishania* keys closest to *Puliciphora* in couplet 46, although it lacks the "bristle, sometimes on a distinct papilla, on side of thorax towards rear," which is the second character for *Puliciphora* in that lead. However this genus differs from *Puliciphora* by the larger size, much longer and modified legs (especially the foretibia), the unusual body setation, the shape of the head and thorax, and the structure of abdominal tergite 7.

Dr. R. H. L. Disney, a helpful reviewer of this paper, suggested that *Laishania* should not be considered a new genus, and instead should be placed as an aberrant *Puliciphora*. We disagree with this suggestion. Although Disney has recently made great progress in *Puliciphora* taxonomy, there are still no apomorphic characters available to define the group; thus, recognizing species of *Puliciphora*, especially highly divergent ones, based on anything other than overall similarity, is extremely problematic. Our new genus has a number of differences from described species of *Puliciphora*, summarized above, creating a gap between it and *Puliciphora* that is at least as great as that between other phorid genera. Until much further information is available for *Metopina*-group genera, in the form of currently undescribed males or in molecular characters, there will be considerable uncertainty to generic assignments. We prefer to recognize our distinctive new taxon at the genus level, and not to associate it with a much larger and better-known genus with which it might share little relationship.

***Laishania angustithorax* new species**
Figs. 3–4.

Description. Female (male unknown). Body length 1.98 mm. Head elongate, rounded, lacking differentiated frontal area. Median furrow of frons absent. Twelve frontal setae present, although along dorsal row it is difficult to distinguish between the inner and outer vertical setae. One pair of dorsally-directed supra-antennal setae present. Ocelli absent. Postocular setae absent. In addition to the postocellar setae, there are ten additional setae from the posterior part of the head to the anterior margin of the gena, including two vertical setae. Eyes reduced, slightly smaller in diameter than flagellomere 1. Flagellomere 1 round, apically pointed with apical arista. Palpus thin, yellow, with six setae, apicalmost almost equal in length to palpus. Proboscis relatively small, yellow. Thorax lacking many sutures. A clearly visible, dark, anterior pleural suture (possibly the anterior margin of the anepisternum) extends dorsally, and slightly posteriorly, from forecoxa to posterior to spiracle. Scutum golden brown, with few long, thin scattered setae. Scutellum and notopleural cleft absent. Anepisternum without setae. Katepisternum and meron elongate, approximately twice as long as wide. Wing and halter both absent. Legs extremely long, thin, yellow, with sparse, long, thin setae. Forefemur with broad ventral triangular process at approximately midpoint. Foretibia with broad ventral triangular process in distal two-thirds; narrowed proximally, almost three times as broad distally. Distal one-third of foretibia expanded, with anteroventral patch of dense, fine, orange setae. Tarsomere 1 of foreleg with length approximately three times that of tarsomere 2; proximal one-half dorsoventrally broad, forming a broad triangular process; distal half narrow, with dense, fine, long, orange anteroventral setae. Foretarsomeres otherwise normal; tarsomeres 2–5 subequal, tarsomere 5 approximately 1.5 times longer than wide. Tarsomere 1 of midleg with short, fine, slightly dense patch of orange setae in proximal half. Hind tibia with fine posteroventral orange setae in distal one-fifth. Tarsomere 1 of hind leg narrowed distally, with short, fine, dense orange setae posteroventrally. Tergites brown, matte, with scattered short, thin setae. Tergite 1 extremely short, barely visible. Tergite 5 with anteromedial crescent-shaped flap over gland opening (Fig. 4). Tergite 7 band-shaped, membranous medially. Venter of abdomen whitish, with few scattered thin setae. Ovipositor mostly membranous, not parasitic-type.

Geographic distribution. Costa Rica.

Derivation of names. This genus is named for our friend and scientific illustrator, Lai Shan Mui. The specific name is from the Latin word *angustus* meaning narrow, and thorax, referring to the slender thorax of the species.

Holotype: ♀, COSTA RICA: Alajuela: Peñas Blancas Valley, 10.32°N, 84.76°W, 14.v.1988, E. Cruz, Malaise trap, 700 m [LACM ENT 195810] (LACM).

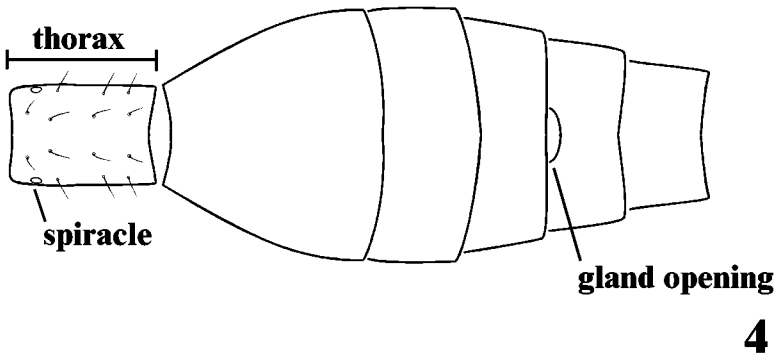


FIGURE 4. *Laishania angustithorax* new species. Thorax and abdomen, dorsal.

Tabelliphora new genus

Diagnosis. Body extremely flat, limuloid. Frons broad, flat, without median furrow. One pair of inner and one pair of outer vertical setae, and one pair of reclinate supra-antennal setae present. Other frontal setae absent. Eye reduced; ocelli present. Flagellomere 1 oval; arista near-apical. Palpus normal, but other mouthparts extremely small. Thorax extremely flattened, shieldlike; anterior spiracle not seen. Legs relatively short, without isolated large setae; mid- and hind tibiae each with one dorsal setal palisade. Wing (Fig. 5) reduced, short, with longitudinal veins only faintly indicated (visible only with phase contrast lighting). Abdominal tergites well developed; segment 7 with small dorsal sclerite; apex of abdomen forming a sclerotized, piercing stylet.

Tabelliphora keys to couplet 161 in Disney's 1994 key to the genera of females. However, the thickened costa and sinuous Rs vein of the wing differentiate *Tabelliphora* from *Platydipteron*. In *Platydipteron*, the costa is not thickened and vein Rs is straight. *Tabelliphora* differs from *Melittophora* by the setation of the scutellum; *Melittophora* has 10 setae on the posterior margin, while *Tabelliphora* has only 4.

In general appearance, *Tabelliphora* is similar to the Afrotropical genus *Euryphora* Schmitz, which is also a small, limuloid phorid with reduced wings and only the supra-antennal setae present on the frons. In *Euryphora*, however, the body is less flattened, the eyes are less reduced, the mid- and hind legs have large isolated setae, and the wing is less reduced.

In the New World fauna, the most similar genera are *Colyeria* Borgmeier & Prado, *Cootiphora* Brown, and *Platydipteron* Borgmeier & Prado, all of which are also limuloid and have a parasitic ovipositor. The frontal setation of *Tabelliphora*, consisting of only the single pair of reclinate supra-antennal setae, serves to distinguish it from all of these others, however.

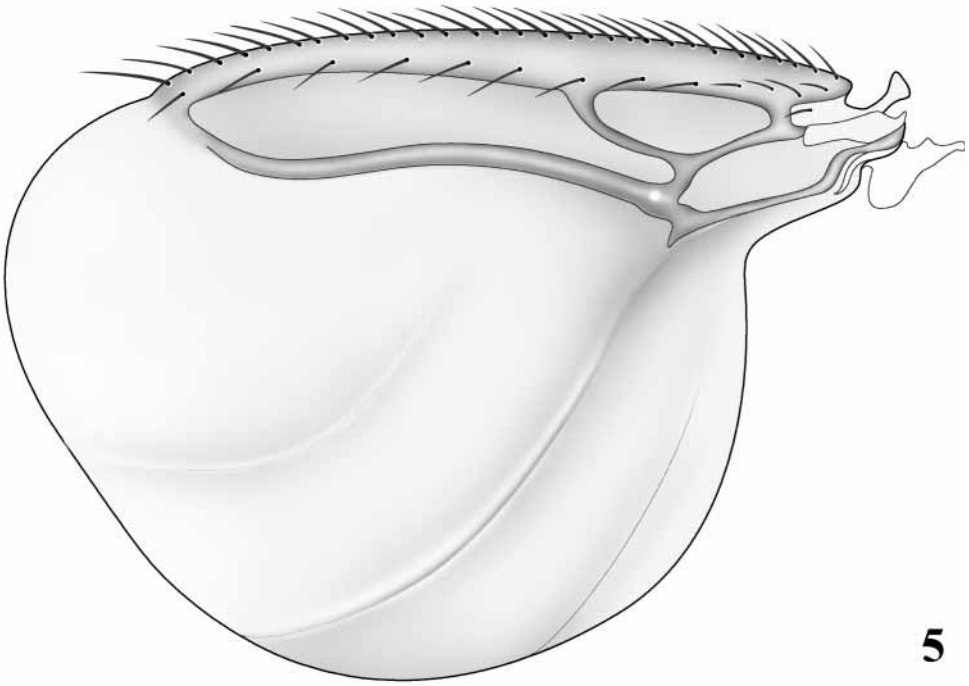
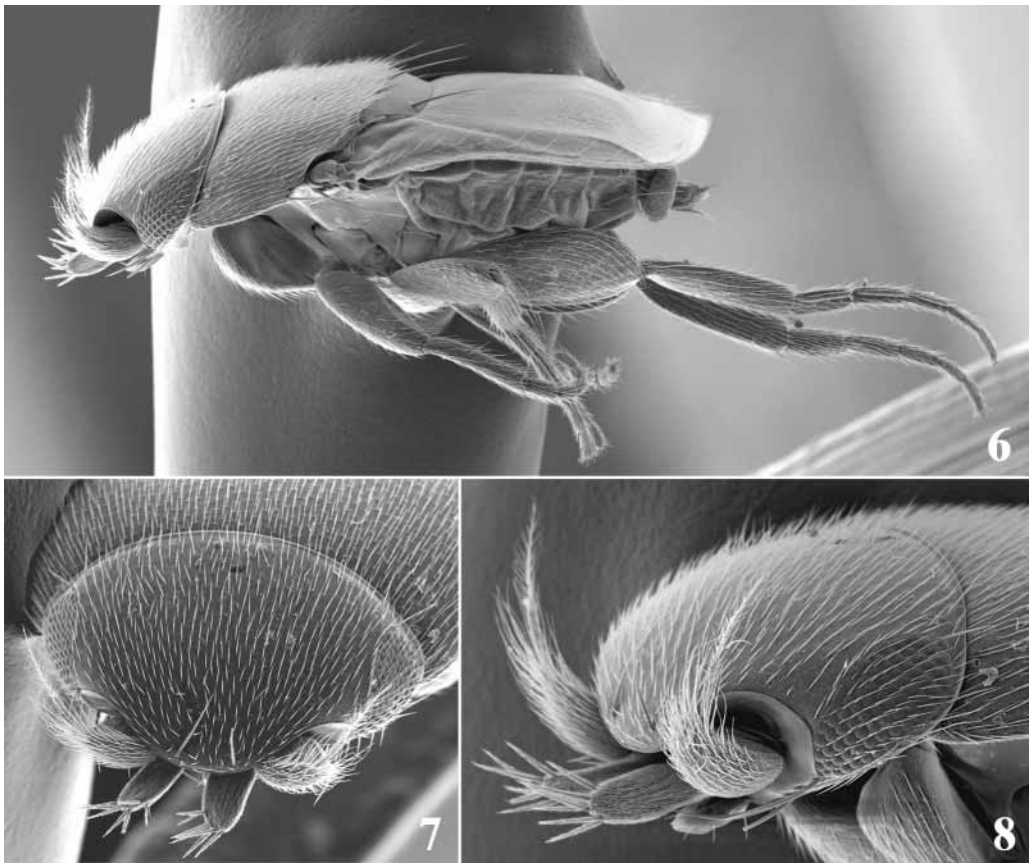


FIGURE 5. *Tabelliphora teretipenna* new species. Wing.

***Tabelliphora teretipenna* new species**
Figs. 5–8.

Description. Female (male unknown). Body length 0.72 to 0.86 mm. Body dorsoventrally-flattened (Fig. 6), oval, broadest at thorax. Head broad, posterior margin convex (Fig. 7). Frons extremely broad. Mean frontal ratio 0.77; range 0.71-0.81. Median furrow of frons absent. Most frontal setae absent, although one pair of long, dorsally-directed supra-antennal setae present. Two vertical, two postocular and three genal setae present. Ocelli present. Eyes reduced. Flagellomere 1 and palpus yellow to light brown. Flagellomere 1 oval, apically-pointed, with near-apical arista and long, whitish apical setae (Fig. 8). Arista densely setose. Palpus dorsoventrally flattened, with six to seven strong, near-apical setae. Dorsum of thorax brown. Scutum covered with long, dense setulae. Four thicker, longer setae present along posterior margin of scutum; lateral pair 0.65 length of medial pair, similar in thickness. Scutellum deep, slightly ventrally directed, with transverse, overlapping rows of short, prostrate setae (not visible without SEM). Posterior pair of scutellar setae approximately 1.5 times length and twice thickness of anterior pair. Pleuron lighter in color than dorsum of thorax; light brown. One long, thick seta present on anepisternum. Halter brown. Wing rounded, R_{2+3} absent (Fig. 5). Mean wing length 0.55 mm; range 0.54 to 0.56 mm. Mean costal length 0.82 wing length; range 0.80 to 0.84. Costal sector ratio 0.47:1. Costa with one row of long, posterodorsal setae, and one row of

shorter, denser, anterior setae. Slight darkening faintly indicating presence of posterior longitudinal veins visible with phase-contrast lighting. Legs light brown; stout, tapered apically. Fore- and midlegs short. Forecoxa broad. Femora broad. Foretibia without differentiated setae or setal palisades. Mid- and hind tibiae each with single dorsal setal palisade. Hind tarsus tapered apically. Dorsum of abdomen brown, similar in color to dorsum of thorax; venter dark brown, blackish. Venter of abdomen with 2 to 3 lateral rows of long setae, just ventral to tergites; also with a few more scattered, long setae ventrally. Tergites 1 to 6 short, broad. Tergite 7 present, relatively unmodified. Apex of abdomen modified to form bilobed, pointed, sclerotized stylet.



FIGURES 6–8. *Tabelliphora teretipenna* new species. **5.** Body, lateral. **6.** Head, dorsal. **7.** Head, lateral.

Geographic distribution. Costa Rica.

Derivation of names. The generic name is from the Latin word *tabella*, for a small board or flat piece of anything on which to write, referring to the small size and flat appearance of this genus. The specific name is a combination of the Latin words *teres* meaning rounded, and *penna* meaning wing.

Holotype. ♀. COSTA RICA: Puntarenas: 24 km W Piedras Blancas, 8.77°N, 83.4°W, ii.1992, P. Hanson, Malaise trap, 200 m [LACM ENT 201564] (LACM).

Paratypes. 5♀, same data as holotype (INBC, LACM, MUCR).

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