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Four distinctive new Neotropical species of *Coniceromyia* Borgmeier (Diptera: Phoridae) with patterned-wings

GIAR-ANN KUNG
Entomology Section, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, California 90007, USA. E-mail: gkung@nhm.org

Abstract

Four new species of patterned-wing *Coniceromyia* are described: *C. browni*, *C. sakaii*, and *C. valdesi* from Colombia, and *C. hoggi* from Costa Rica.

Key words: Diptera, Phoridae, *Coniceromyia*, Neotropical, taxonomy

Introduction

The genus *Coniceromyia* Borgmeier, 1923 is comprised of 50 New World species, including the four new species described herein. Although this is a large genus, there is virtually no life history information for the group. Within *Coniceromyia*, there are several species with wings that are patterned, defined as the presence of pigment and/or setae on the wing membrane forming distinctive patterns or markings. The setae that comprise a wing patterning are clearly differentiated from the usual wing setation, being either elongate, or short and densely arranged.

The role of wing patterns in *Coniceromyia* is unknown. There is no consensus among researchers working on other groups of flies as to the purpose of patterned-wings, although it has been suggested that mimicry of predators (Greene *et al*. 1987) is a possible option. It is unclear what role patterned-wings have in courtship and sexual success, although one study found that there was no affect on mating success (Sivinksi & Pereira 2005). More studies are needed to understand patterned-wings.

The reason for the distinctive coloration on the foretibia, found in *Coniceromyia aurantia* Kung & Brown, 2000, *C. browni* **n.sp.**, and *C. leucomacula* Kung & Brown, 2000 is also not understood. Eberhard (2002) studied drosophilids with contrasting white apical foretarsomeres, and suggested that the coloration may be used for both aggressive and courtship behavior.

The role of the modification of foretarsomere 1 has not been studied.

The patterned-wing species of *Coniceromyia* have been reviewed by Kung & Brown (2000a; 2000b) but further new ones have been identified and are described below.

Materials and methods

Most specimens were collected into 70% ethanol, critical point dried with hexamethyldisilizane (Brown 1993), and mounted on pins. Specimens were bar-coded, with the data stored at the Entomology Section of the Natural History Museum of Los Angeles County, with the catalog numbers for holotypes given in brackets. Color images of specimens are deposited in Morphbank (www.morphbank.net).

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Body length is measured from the anterior of the head to the posterior of abdominal segment 6.

The frontal ratio is the height divided by the width of the frons. Tarsal ratio is length/width of the tarsal segment.

The genitalia of *Coniceromyia* species are more diverse than we originally thought (Kung & Brown 2000a). The structure of the left surstylus and hypandrial lobe, in particular, varies among species. One distinctive trait, perhaps of the entire genus, is the placement of the cerci, which are rotated from being left and right, to one cercus being dorsal, and the other ventral.

Specimens are deposited in the following institutions:

IAVH	Instituto Alexander von Humboldt, Villa de Leyva, Colombia
INBC	Instituto Nacional de Bioversidad, Heredia, Costa Rica
LACM	Entomology Section, Natural History Museum of Los Angeles County, Los Angeles, California, USA

Taxonomy

Coniceromyia browni new species

(Figs. 1, 5–6, 13, 23; Morphbank images 477856, 477857, 477860)

Recognition. This species is most easily recognized by its laterally flattened forefemur and foretibia, anterior orange ring on basal two-thirds of forefemur, and distinctive setation of foretibia. *C. browni* is also distinguished by its minimal patterning of the wing, restricted to darkening of the membrane along M_1 and M_2, and sometimes along CuA_1.

This species keys to couplet 5 in the 2000 key to patterned-wing *Coniceromyia* males (Kung & Brown 2000a). Forelegs of *C. browni* are mostly dark brown, whereas forelegs of *C. aurantia* Kung & Brown are yellow. In addition, the basal orange macula on the anterior face of forefemur of the two species differ, with that of *C. browni* appearing as an orange ring encircling a dark central area, and the macula of *C. aurantia* lacking a darkened center, instead being solid orange. A small apical seta is present, as well as a complete posteroventral row of setae on foretibia of *C. browni*, whereas the posteroventral row of setae on foretibia of *C. aurantia* is present only in the apical half.

Description. Body length 2.48–2.52 mm, mean 2.51 mm. Frons and flagellomere 1 dark brown. Frontal height 0.96–1.0 frontal width, mean frontal ratio 0.98. Flagellomere 1 pyriform. Palpus yellow. Scutum and scutellum light brown. Pleuron yellow. Anepisternal setae present. Forefemur thickening with narrow, flattened medial posterolateral face, while laterally flattened and broadened; dark brown, except for large, orange, oval macula on basal two-thirds of anterior face, in addition to small yellow posterobasal patch. Orange patch appears as orange ring, with center of ring covered in fine yellow setae and thicker, longer dark setae (refer to Morphbank image number 477856). Foretibia laterally flattened, dilated; with uneven posteroventral row of eight to nine long, thick setae and posterodorsal row of three long, thick setae. Posterior of foretibia brown, anterior dark brown. Tarsomere 1 of foreleg with long, narrow excavation along length of tarsomere 1 (Fig. 1). Excavation with small, short basal seta and setose, narrow anteroapical projection. Foretarsomeres slightly tapered apically. In one specimen, tarsal ratio 3.8:1.5:1.33:1.75:2.00. Mid- and hind legs yellow. Hind femur with tiny, blunt, posterior setae on basal one-half; setae arranged broadly basally, gradually tapering apically to a single row (Figs. 5–6). Hind tibia with two anterior to anterodorsal setae; one in basal two-fifths, one at apical one-fifth. Apical one-third of hind tibia broad, with orange posterodorsal setae. Costa not thickened (Fig. 13). Wing vein R_{2+3} entirely absent. Membrane along veins M_1 and M_2 darkened by pigment; CuA_1 with or without pigment. Veins M_1 and M_2 diverge apically. Vein CuA_1 slightly thinner than M_1 and M_2; CuA_1 and M_2 relatively parallel. Costa length 0.38–0.40 wing length; mean 0.39.

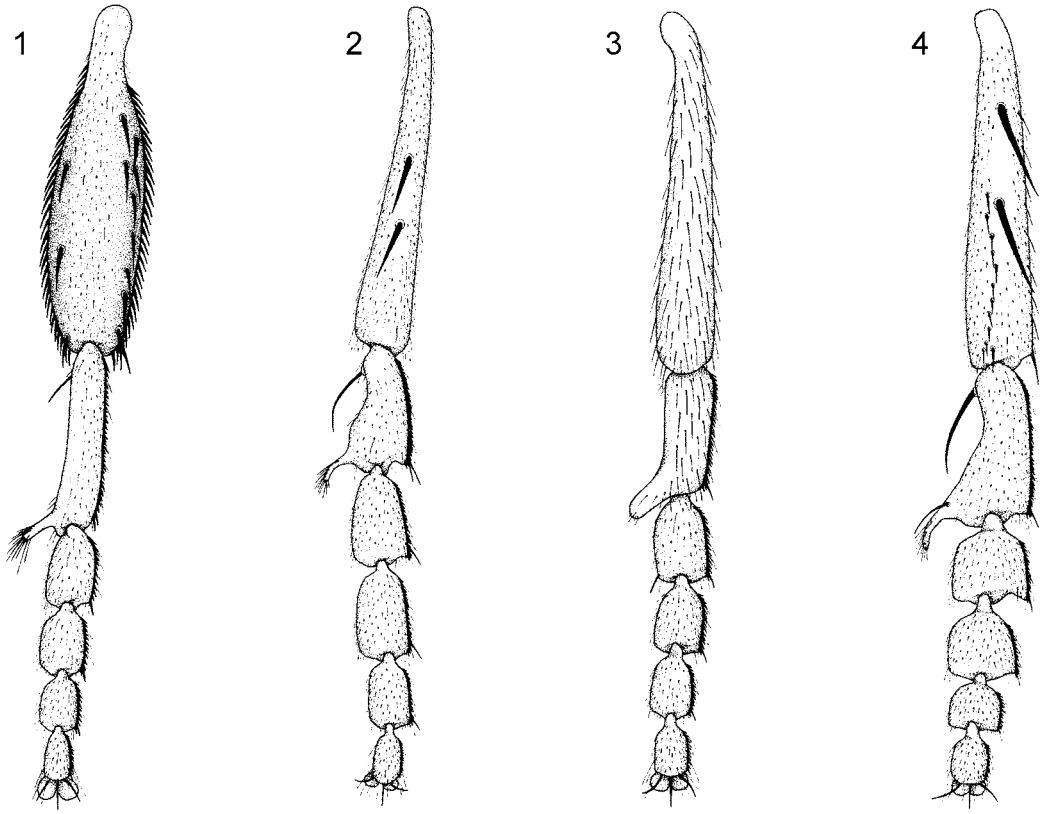
Halter white. Abdominal tergites dark brown, tergites 2–5 lighter anteromedially. Venter of abdomen white. Left surstylus of genitalia broad, ventrally directed, rounded apically, with approximately 23 long setae (Fig. 23). Left hypandrial lobe tapered apically, to pointed apex.

Distribution. Colombia.

Derivation of species name. This species is named for my mentor and friend, Brian V. Brown.

Holotype. ♂. COLOMBIA: Amazonas, PNN Amacayacu, Matamata, 3.82°S, 70.26°W, 25.viii–3.ix.2000, 150 m, D. Chota, Malaise trap, CAP-2240 [LACM ENT 185128] (IAVH).

Paratypes. COLOMBIA: Amazonas, PNN Amacayacu, Matamata, 3.68°S, 70.25°W, 1♂, 25.viii–3.ix.2001, 150 m, D. Chota, Malaise trap, CAP-2242; PNN Amacayacu, Matamata, 3.82°S, 70.26°W, 1♂, 15.x–5.xi.2001, A. Parente, Malaise trap, CAP-2762 (IAVH, LACM).



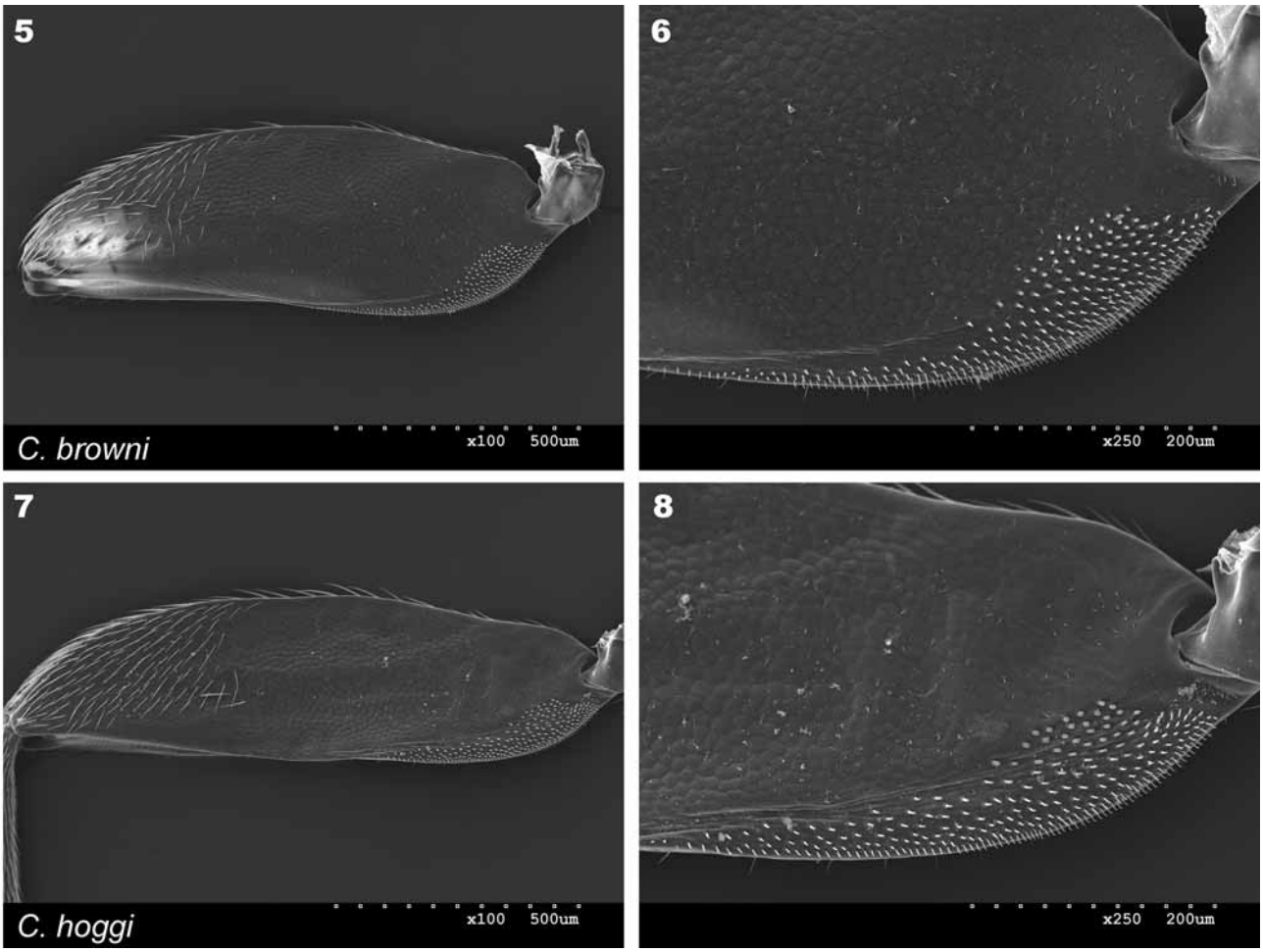
FIGURES 1–4. Foretibiae and foretarsi, dorsal view. **1.** *Coniceromyia browni* new species (foretibia in posterior view). **2.** *C. hoggi* new species. **3.** *C. sakaii* new species. **4.** *C. valdesi* new species.

Coniceromyia hoggi new species

(Figs. 2, 7–8, 14, 24; Morphbank images 477861, 477862, 477864)

Recognition. *C. hoggi* is most easily recognized by its distinctive wing pattern, with the darkening at the apex of the radial cells, apical one-half of membrane anterior to M_2, apical one-fifth of membrane between M_2 and CuA_1, and the presence of a lighter brown elongate macula between CuA_1 and A_1+CuA_2.

C. hoggi keys to couplet 6 in the key to patterned-wing species (Kung & Brown 2000a). Unlike *C. blomae* Peterson & Arntfield, the darkening of the wing of *C. hoggi* does extend to the apical margin and the darkening is much less extensive. Wing vein M_1 is not thickened in *C. hoggi*, and veins M_1 and M_2 are not divergent in apical two-thirds, distinguishing this species from *C. apicalis* Kung & Brown, in addition to the different wing patterns.



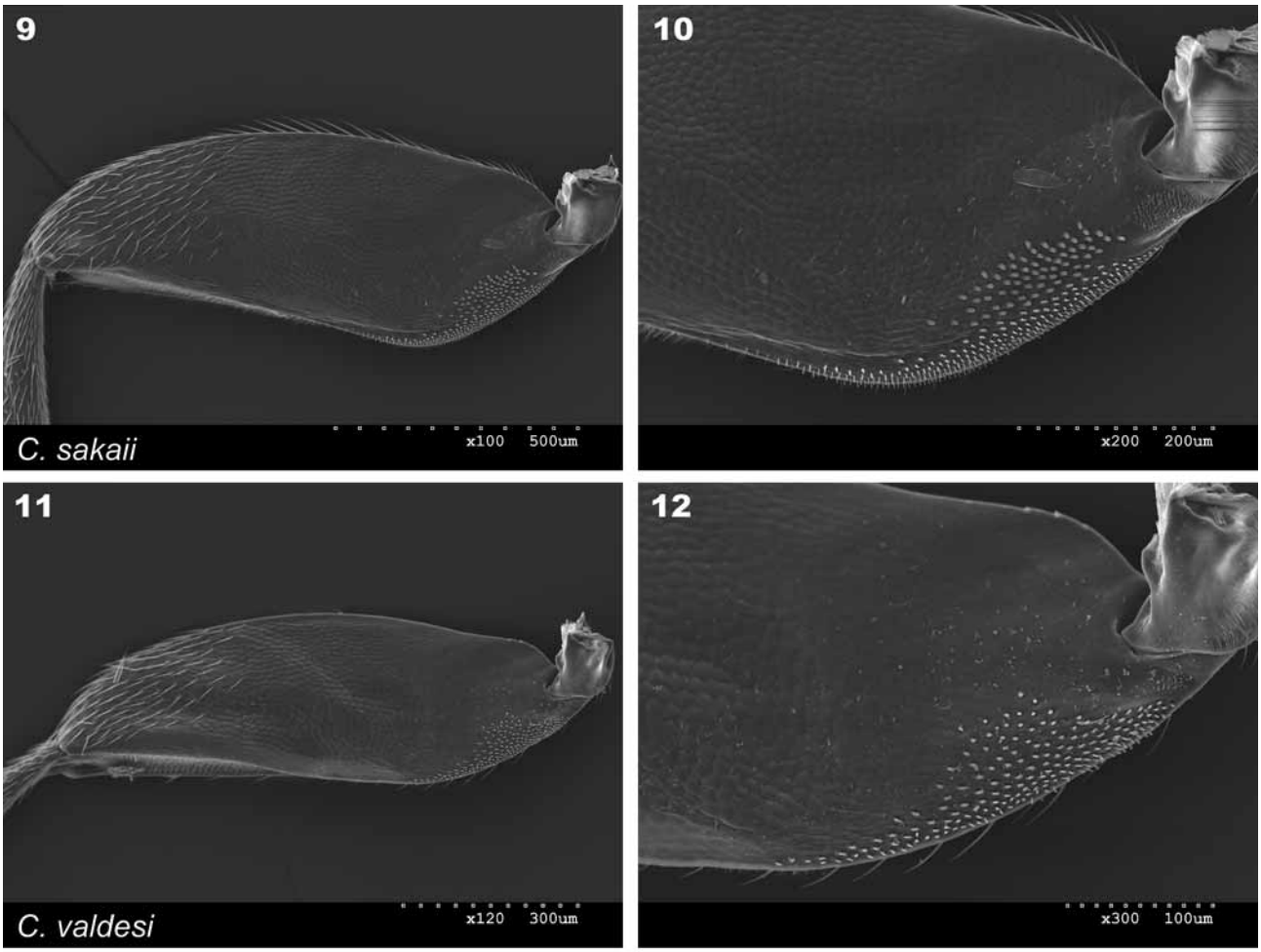
FIGURES 5–8. Scanning electron micrographs, hind femora, posterior view, low magnification and high magnification. **5–6.** *Coniceromyia browni* new species. **7–8.** *C. hoggi* new species.

Description. Body length 2.56 mm. Frons dark brown. Frontal height 1.17 frontal width. Flagellomere 1 brown, pyriform. Palpus light brown. Scutum, scutellum, and pleuron brown. Anepisternal setae present. Legs mostly yellow, except mid- and hind coxae light brown. Foretibia with 2 anterodorsal setae. Foretarsomere 1 anteriorly excavate, with long basal seta, and long, thin, setose anteroapical projection (Fig. 2). Foretarsus slender, with tarsomeres approximately twice as long as wide. Tarsal ratio 2.33:2.00:2.00:2.00:1.50. Posterior face of hind femur with narrow band of tiny, blunt posterior setae on basal half; setae arranged broadly basally, tapering apically (Figs. 7–8). Hind tibia with one long dorsal seta. Costa not thickened (Fig. 14). Wing vein R_{2+3} absent. Wing with extreme apex of costal cell and apical two-fifths of cell r_1 darkened by pigment. Apical one-half of wing membrane between anterior margin and M_2 darkened, apical one-fifth of membrane between M_2 and CuA_1 darkened. Wing veins M_1 and M_2 parallel in basal two-fifths, sinuous and divergent apically. CuA_1 relatively straight. M_2 and CuA_1 more widely-spaced than M_1 and M_2; CuA_1 and M_2 parallel in basal two-thirds, M_2 rounded anteriorly in apical one-half. Costa length 0.43 wing length. Halter white. Abdominal tergites dark brown, pruinose. Venter of abdomen brown. Left surstylus of genitalia broad, turned ventrally at apex (Fig. 24). Left hypandrial lobe with rounded pointed apex.

Distribution. Costa Rica.

Derivation of species name. This species is named posthumously for my mentor and friend, Norman D. Hogg.

Holotype. ♂. COSTA RICA: Limón, R.B. Hitoy Cerere, Sendero Espavel, 560m, 11.iii–1.iv.2003, B. Gamboa, E. Rojas, W. Arana, Malaise trap #9, L_S_401200_569800 #73475 [INB0003777857] (INBC).



FIGURES 9–12. Scanning electron micrographs, hind femora, posterior view, low magnification and high magnification. **9–10.** *Coniceromyia sakaii* new species. **11–12.** *C. valdesi* new species.

***Coniceromyia sakaii* new species**
(Figs. 3, 9–10, 15, 17–18, 25; Morphbank images 477865, 477866, 477867)

Recognition. This species is easily distinguished by the long, ventral setae on the wing, in addition to thickened costa and sinuous CuA_1 wing vein. Foretarsomere 1 of *C. sakaii* lacks a basal seta and has a broad anteroapical process.

C. sakaii keys to couplet 6 in the Kung & Brown key (2000a). This species differs from *C. hoggi*, *C. blomae* and *C. apicalis* by the lack of darkening of the wing membrane, and by the presence of long, ventral setae on the wing.

Description. Body length 2.20–2.68 mm, mean 2.35 mm. Frons dark brown, subshiny. Frontal height 0.91–1.05 frontal width, mean frontal ratio 0.99. Flagellomere 1 orange, elongate pyriform. Palpus yellow. Scutum and scutellum yellow. Pleuron yellow. Anepisternal setae present. Legs yellow. Differentiated anterior to anterodorsal setae on foretibia present or absent. If present, 3–10 setae present, arranged in a straight or uneven row. Foretarsomere 1 with anterior excavation (Fig. 3). Excavation without basal seta, with broad, laterally flattened anteroapical process. Foretarsus tapering apically; in one specimen, tarsal ratio 3.00:1.80:1.60:1.50:2.00. Posterior face of hind femur with small, blunt peglike setae on basal two-fifths, arranged in a broad oval basally, and tapering apically along ventral margin (Figs. 9–10). Hind tibia with 2 dorsal to near-dorsal setae in basal half. Wing short, broad, with costa thickening apically, apex greater than

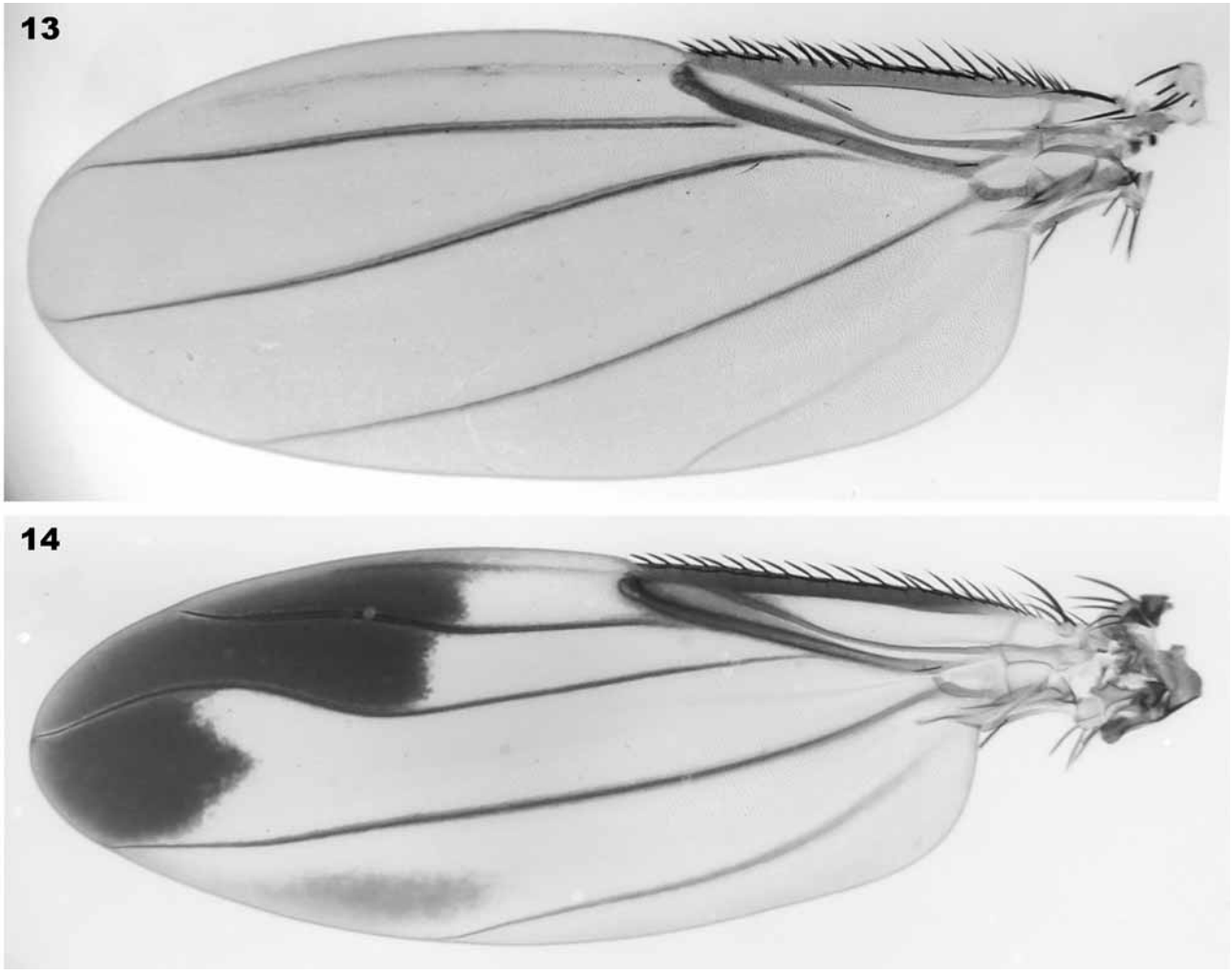
twice thickness of basal half (Figs. 15, 17). Venter of wing membrane between veins M_1 and A_1+CuA_2 covered in long, thin setae (Figs. 15, 17–18). Wing vein R_{2+3} entirely absent. Wing veins M_1 and M_2 relatively parallel. CuA_1 sinuous, bent anteriorly near median. A_1+CuA_2 faintly present. Costal length 0.59–0.62 wing length, mean 0.61. Halter white. Abdominal tergite 1 yellow. Tergites 2–6 mostly yellow to light brown, laterally brown to dark brown. Venter of abdomen white. Left surstylus of genitalia broad (Fig. 25). Left hypandrial lobe greatly expanded apically, triangular.

Distribution. Colombia.

Derivation of species name. This species is named for my mentor and friend, Walter H. Sakai.

Holotype. ♂. COLOMBIA: Vichada, PNN El Tuparro, Cerro Tomas, 5.35°N, 67.85°W, 140 m, 21–31.i. 2001, W. Villalba, Malaise trap, CAP-1381 [LACM ENT 238756] (IAVH).

Paratypes. COLOMBIA: Vichada, PNN El Tuparro, Bosque Sabana, 5.35°N, 67.85°W, 100 m, 4♂, 5–14.i. 2001, W. Villalba, Malaise trap, CAP-1381; PNN El Tuparro, Cerro Tomas, 5.35°N, 67.85°W, 140 m, 21–31.i. 2001, W. Villalba, Malaise trap, CAP-1381; PNN El Tuparro, Rio Tomo, 5.35°N, 67.85°W, 250 m, 1♂, 1–12.v. 2001, I. Gil, Malaise trap, CAP-1797 (IAVH, LACM).



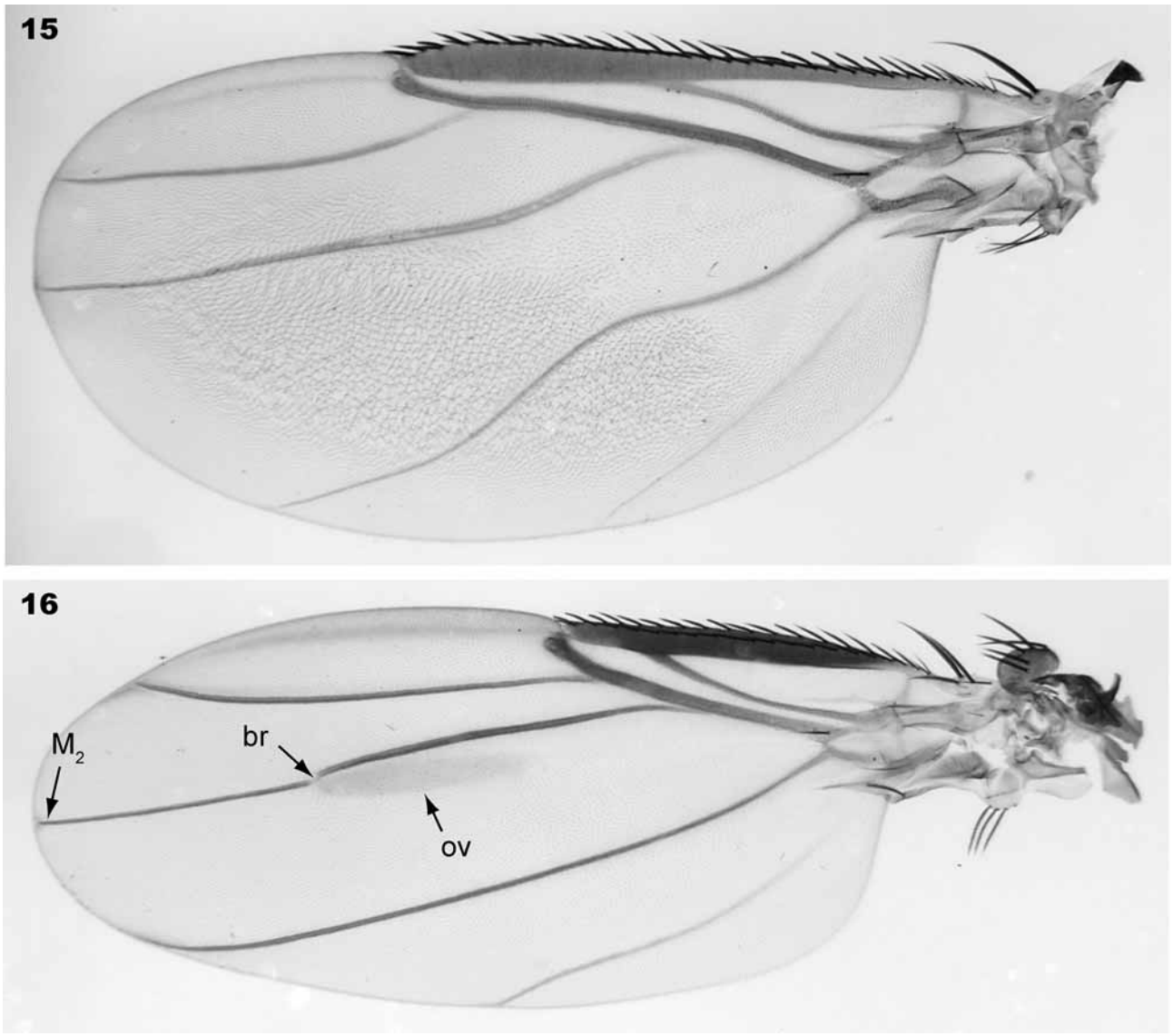
FIGURES 13–14. Photographs, wings, dorsal view. **13.** *Coniceromyia browni* new species. **14.** *C. hoggi* new species.

***Coniceromyia valdesi* new species**

(Figs. 4, 11–12, 16, 19–22, 26; Morphbank images 477868, 477869, 477870)

Recognition. *C. valdesi* is most easily differentiated from other patterned-wing *Coniceromyia* by the break or

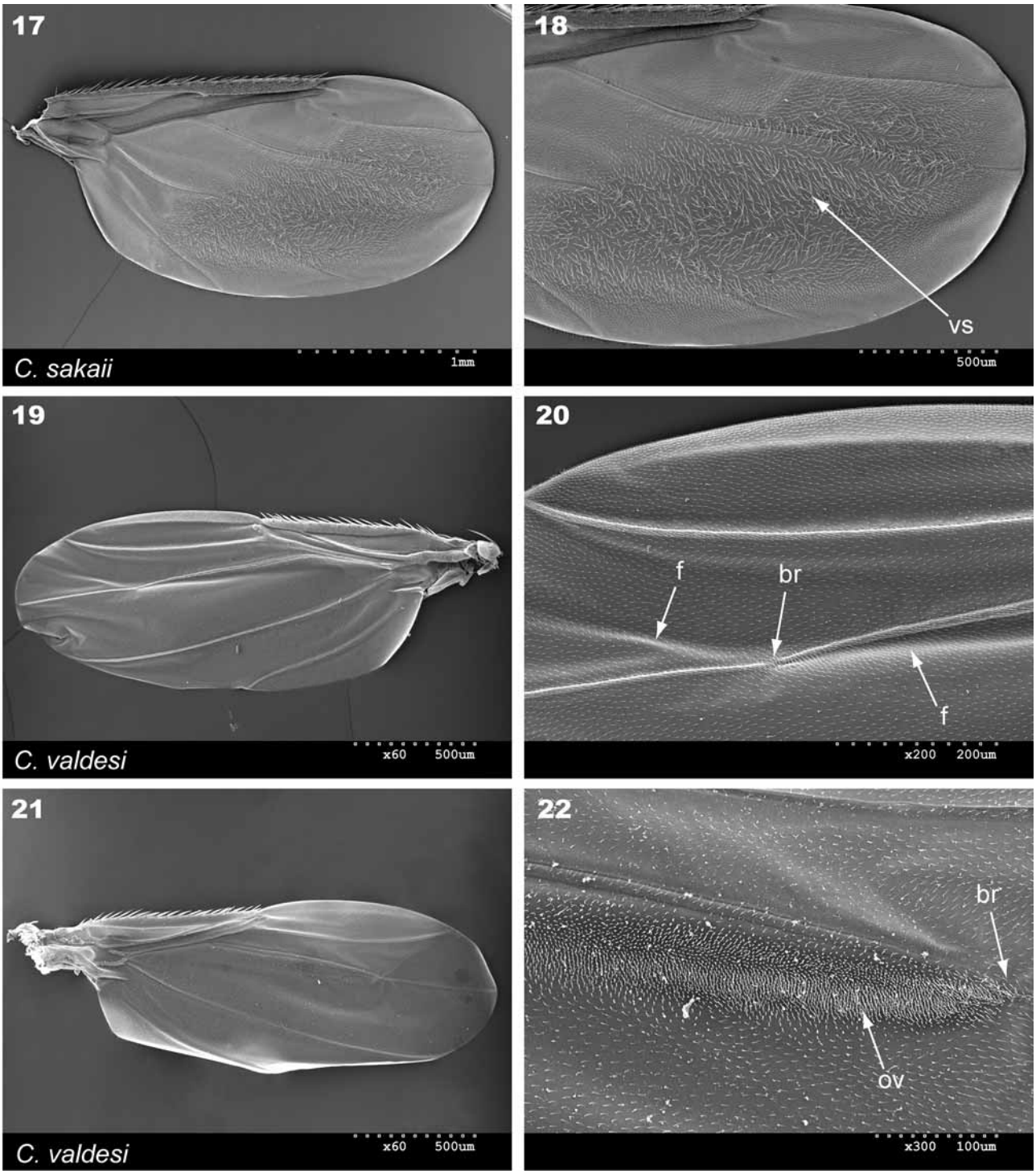
weakening in wing vein M_2. The oval arrangement of ventral setae and lack of darkened pigment on the wing further distinguish this species from others.



FIGURES 15–16. Photographs, wings, dorsal view. **15.** *Coniceromyia sakaii* new species. **16.** *C. valdesi* new species. (Abbreviations: br=break or weakening of M_2; ov=oval patch of setae.)

C. valdesi keys near couplet 12 in the Kung & Brown key (2000a). The wing patterning of *C. valdesi* is not due to darkening of the membrane, but rather to short, dense setae arranged in an oval, and the break or weakening in vein M_2. *C. valdesi* lacks three striae on the wing, differentiating it from *C. striativena* Borgmeier. The lack of darkening on the wing membrane between the anterior margin and M_1 prevent the second lead in the couplet from being followed.

Description. Body length 1.88–2.16 mm, mean 2.05 mm. Frons dark brown. Frontal height 1.05–1.13 frontal width, mean frontal ratio 1.08. Flagellomere 1 brown, pyriform. Palpus light brown. Scutum, scutellum, and pleuron dark brown to brown. Anepisternal setae absent. Legs mostly brown, femora darker than tibiae and tarsi. Foretibia with 2 dorsal to anterodorsal setae. Foretarsomere 1 broadened apically, with anterior excavation, covered in short, dense, orange setae; with long, anterobasal seta, seta approximately three-quarters length of foretarsomere 1; with narrow anteroapical process (Fig. 4). Foretarsus tapered apically. Tarsomeres 2–4 of foreleg about as long as wide. In one specimen, tarsal ratio of foretarsus 2.17:1.00:1.00:1.00:1.00. Basal one-third of posterior face of hind femur with triangular, ventral group of



FIGURES 17–22. Scanning electron micrographs, wings, low magnification and high magnification. **17–18.** *Coniceromyia sakaii* new species, ventral view. **19–20.** *C. valdesi* new species, dorsal view. **21–22.** *C. valdesi* new species, ventral view. (Abbreviations: br=break or weakening of M_2; f=fold in wing membrane; ov=oval patch of setae; vs=ventral setae.)

small, blunt peglike setae; arrangement of peglike setae tapered towards ventral margin (Figs. 11–12). Hind tibia with one dorsal seta in basal half. Costa slightly thickened (Fig. 16). Wing vein R_{2+3} entirely absent. Wing membrane with fold visible across vein M_2; posterior to M_2 basally, anterior to M_2 apically (Figs. 19–20). Venter of wing membrane with elongate oval arrangement of short, dense setae posterior to M_2 (Figs. 16, 21–22). Wing veins M_1 and M_2 parallel basally, diverging apically, with M_1 anteriorly directed at apex; M_2

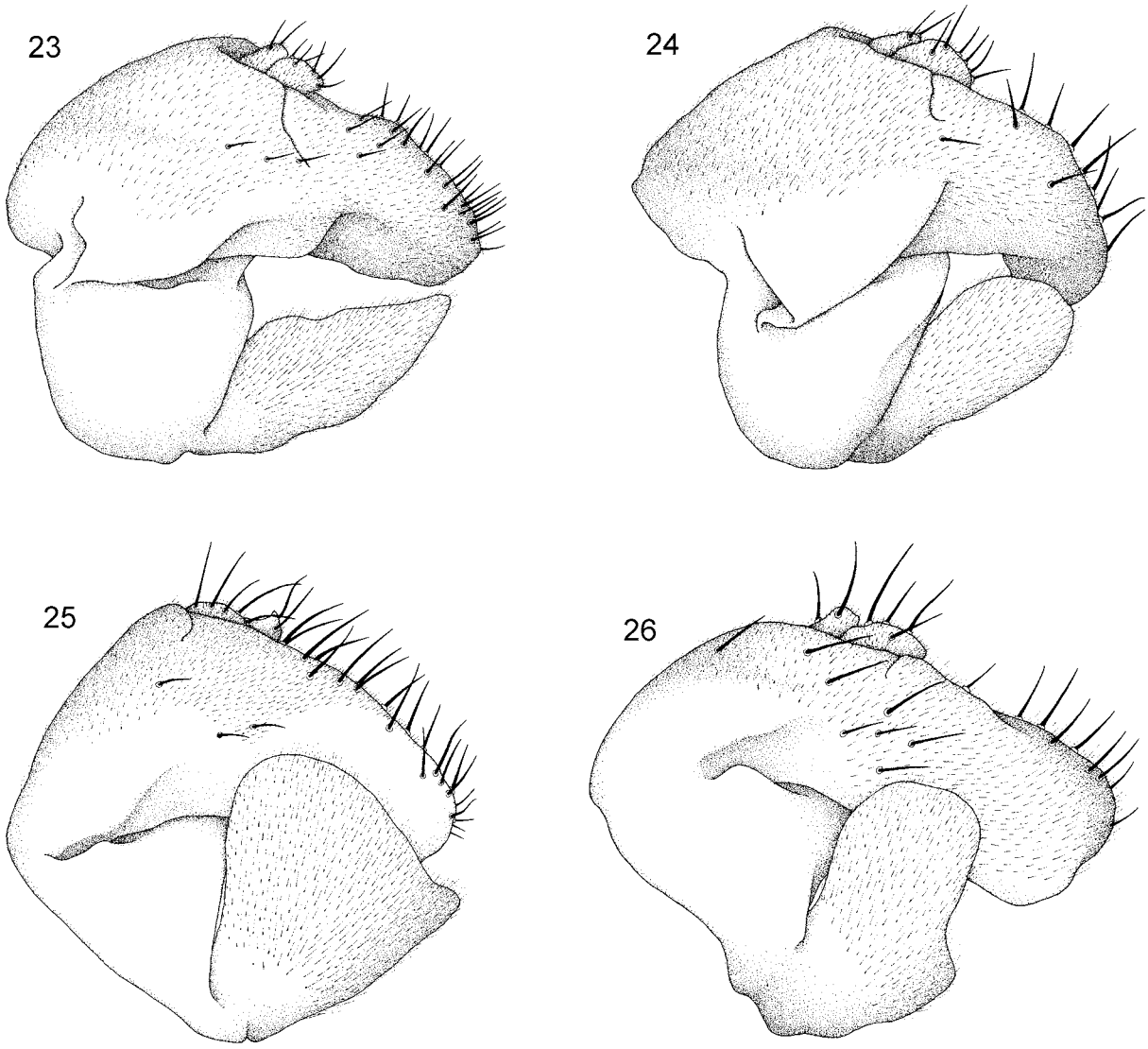
relatively straight. Apical two-fifths of vein M_2 narrowed; M_2 with small break or weakening at narrowing (Figs. 16, 21–22). CuA_1 relatively straight, curved anteriorly at apex. Costa length 0.42–0.46 wing length, mean 0.44. Halter white. Abdominal tergites brown to dark brown. Venter of abdomen brown or gray. Left surstylus of genitalia broad, truncate (Fig. 26). Left hypandrial lobe dorsoapically directed, with large dorsal expansion.

Distribution. Colombia.

Derivation of species name. This species is named for my friend and colleague, Ángel Valdés.

Holotype. ♂. COLOMBIA: Putumayo, PNN La Paya, Cab. Viviano, 0.12°S, 74.93°W, 30.xi–15.xii.2001, 320 m, E. Lozano, Malaise trap, CAP-2794 [LACM ENT 216018] (IAVH).

Paratypes. COLOMBIA: Putumayo, PNN La Paya, Cab. Viviano, 0.12°S, 74.93°W, 4♂, 30.xi–15.xii.2001, 320 m, E. Lozano, Malaise trap, CAP-2794 (IAVH, LACM).



FIGURES 23–26. Genitalia, left lateral view. **23.** *Coniceromyia browni* new species. **24.** *C. hoggi* new species. **25.** *C. sakaii* new species. **26.** *C. valdesi* new species.

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