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Newly discovered males and new records of the uncommon Neotropical genera *Eutabanus* Kröber and *Myiotabanus* Lutz (Diptera: Tabanidae)

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Abstract

The males of *Eutabanus pictus* Kröber, *Myiotabanus amazonicus* Rafael & Ferreira, collected in Amazonas, Brazil, and *Myiotabanus muscoideus* (Hine), collected in Chiapas, Mexico, a new country record, are described. Species of both genera are small horse flies with sarcophagid-like coloration. Diagnoses, illustrations and terminalia characters are presented for males, and illustrations and comments for females. The first key to males for *Eutabanus* and *Myiotabanus* is presented.

Key words: horse flies, Diachlorini, taxonomy, terminalia, Neotropical region, Amazon region

Introduction

The diversity of horse flies (Diptera: Tabanidae) is primarily described based on the haematophagous female stage, since it is most often encountered by collectors, either attracted to humans or other vertebrates. Adult males visit flowers, if they feed at all. Males are poorly represented in collections and mostly unknown. The scarcity of males is likely due to temporally limited availability of nectar, flight preference for higher strata of forests, or waiting for females in restricted areas, e.g. landmarking (Wilkerson *et al.* 1985; Krolow *et al.* 2010). There are no reliable collecting methods for male horse flies, though they sometimes are captured in malaise or light traps or while seeking nectar. Species level descriptive taxonomy of Tabanidae has thus relied on females. Some recent works have emphasized the description of the Neotropical males (Gorayeb *et al.* 1982—various taxa; Godoi & Rafael 2007—*Leucotabanus* Lutz, 1913; Krolow & Henriques 2008—*Chlorotabanus* Lutz, 1913; Krolow *et al.* 2010—various taxa). Finding the males of seldom collected taxa such as *Eutabanus* and *Myiotabanus* is serendipitous.

Eutabanus was proposed by Kröber 1930, as a monotypic genus for *E. pictus* Kröber. Since then no new species have been described and the male was previously unknown. The morphologically distinctive female has been thoroughly described and analyzed, including characters from the terminalia, by Fairchild (1961) and illustrated by Coscarón and Papavero (1993). The larval biology of *Eutabanus* is unknown.

Myiotabanus, most recently revised by Rafael and Ferreira (2004), was proposed by Lutz (Lutz & Nunez-Tovar 1928, reprinted in 1955) for *M. sarcophagoides*. There are four known species: *M. amazonicus* Rafael & Ferreira, 2004, *M. barrettoi* Fairchild, 1969, *M. muscoideus* (Hine, 1907), and *M. sarcophagoides* Lutz, 1928. The male of *M. barrettoi* was described by Coscarón (1975), the male of *M. sarcophagoides* remains unknown, and the males of *M. amazonicus* and *M. muscoideus* are described here. The pupae of *M. amazonicus* and larvae and pupae of *M. barrettoi* respectively have been described by Rafael & Ferreira (2004) and Coscarón *et al.* (1996). The greenish larvae of *M. amazonicus* were found in open water along the roots of water lettuce *Pistia stratiotes* L. (Araceae) in Manaus, Amazonas, Brazil (Rafael & Ferreira, 2004). The larval food source and origin of the unusual coloration are unclear (Rafael & Ferreira 2004).

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Though widespread from Mexico to Argentina, specimens of the genera *Eutabanus* and *Myiotabanus* are rarely collected and poorly represented in entomological collections. Both genera are placed in Diachlorini and appear to mimic sarcophagid or other calyptrate flies in color and shape. *Eutabanus* and *Myiotabanus* can be distinguished from all other Neotropical Diachlorini by the absence of macrosetae on the basicosta, predominantly unsclerotized labella, striped thorax, small to medium size, frontal callus clavate or ridge-like, antennal flagellum with three free flagellomeres, and wing predominantly hyaline. *Eutabanus* can easily be distinguished from *Myiotabanus*, and all other horse flies, by the presence of an acute anterior projection on the notopleural lobe (Figure 1D). There are isolated unrelated species of less convincing calyptrate-mimicking Tabaninae in the Neotropics, such as *Stypommisa marucci* (Fairchild, 1942), *Philipotabanus* (*Mimotabanus*) *porteri* Fairchild, 1975 and *Philipotabanus* (*M.*) *plenus* (Hine, 1907), but these can be distinguished from *Eutabanus* and *Myiotabanus* by the presence of macrosetae on the basicosta and unsclerotized labella.

Material and methods

The material studied for *E. pictus* from Brazil and *M. amazonicus* is deposited in the Invertebrates Collection of Instituto Nacional de Pesquisas da Amazônia (INPA). The material studied for the male *M. muscoideus* was borrowed from Cornell University Insect Collection, CUIC, Ithaca, NY, USA (J. Liebherr); and the females *M. muscoideus* were borrowed from the Florida State Collection of Arthropods, FSCA, University of Florida, Gainesville, FL, USA (G. Steck, B. Sutton) and University of California at Berkeley Essig Museum of Entomology, EMEC (C. Barr, P. Oboyski). Specimens for Figs. 1 and 2 were examined and digitally photographed through a stereomicroscope LEICA M205C with a coupled camera (model LEICA DFC295), followed by image processing using the software Leica Application Suite LAS V3.6, Fig 3 A–G with LEICA Z16APO, stacked with Automontage Pro, Fig. 3 H–K with a Canon EOS 7D, and stacked with CombineZ, all images were further processed in Adobe Photoshop CS3 and Adobe Illustrator CS3.

Terminology follows Cumming and Wood (2009) and Burger (2009) for external characters; Sinclair *et al.* (1993) for terminalia characters; and Cumming (1992) for dissections.

Taxonomy

Eutabanus pictus Kröber, 1930

(Fig. 1. A–H male, I–O female)

Refs. Kröber, 1934: 260 (cat.); Fairchild, 1956: 26, 1961: 440, 1967: 331, 1971: 58 (cat.); Moucha, 1976: 208 (cat.); Fairchild & Burger, 1994: 90 (cat.); Coscarón & Papavero, 2009: 92 (cat.).

Diagnosis: Mimetic of Sarcophagidae (Diptera), body predominantly black with some white pilosity; scutum black with two slender stripes with white pruinescence; notopleural lobe with an acute anterior projection; wing hyaline with an abbreviated irregular discal band; abdomen black with narrow posterior band with white pruinescence and pilosity.

Male. Body (Fig. 1A) length (without antenna) 10.7–11.0 mm, wing length 8.2–8.5 mm. Head: Holoptic eyes (Fig. 1B), bare and dark gray or brown (dried specimens), largest ommatidia occupying upper 2/3 and smallest ommatidia lower 1/3, but without accentuated demarcation; ocellar tubercle not prominent, with black pilosity; frontal triangle black; subcallus with white pruinescence, without pilosity; gena and parafacial with white pruinescence and pilosity; face with white pruinescence laterally and dark brown in middle. Palpus prorrect, black with black pilosity and sparse white pilosity. Antenna (Fig. 1C) dark; scape and pedicel black with black pilosity; flagellum dark brown, basal plate (first flagellomere) with acute dorsal projection; antennal flagellum with three free flagellomeres distal to basal flagellomere complex. Proboscis unsclerotized with theca and labellum black.

Thorax: Scutum black with sparse black pilosity and two narrow longitudinal stripes of white pruinescence; notopleural lobe (Fig. 1D) with acute anterior projection, black with black pilosity, except for white pruinescence at base; postalar callus and scutellum both with anterior half black and posterior half white, with black and white pilosity mixed. Pleuron and sternum dark brown with largest area covered by white pruinescence and black and white pilosity. Legs dark brown to almost black, with black pilosity, except for coxae with gray pruinescence; fore and mid tibiae somewhat inflated; hind tibia flattened and fringed. Wing hyaline, except for base to middle of cells

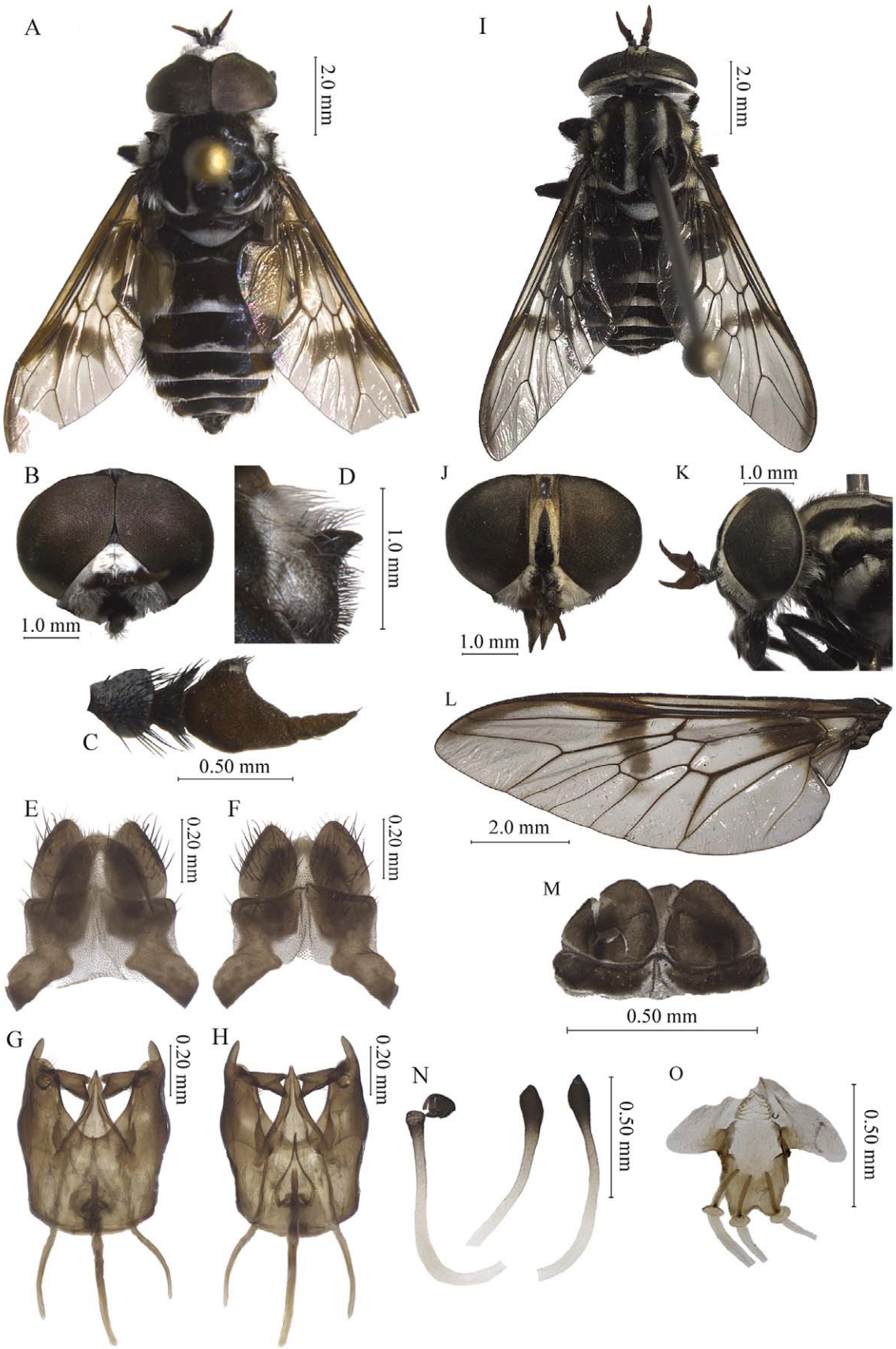

FIGURE 1. *Eutabanus pictus* (A–H ♂; I–O ♀): A, I, body (dorsal view); B, J, head (anterior view); C, antenna (lateral view); D, notopleural lobe (dorsal view); E, F, epandrium, cercus and hypoproct (ventral and dorsal views respectively); G, H, hypandrium, gonocoxite, gonostylus and aedeagus (ventral and dorsal views respectively); K, head (lateral view); L, wing (dorsal view); M, tergite 10, cercus and hypoproct (dorsal view); N, spermatheca; O, genital fork and spermathecal ducts (dorsal view).

br and bm, costal margin, and brown abbreviated irregular band from pterostigma to discal cell; basicosta without macrosetae; pterostigma dark brown to black; appendix at fork of R_{4+5} absent.

Abdomen (Fig. 1A): Tergites predominantly black; tergites 1–2 with posterior transversal band and lateral margins with white pruinescence and pilosity; tergites 3–7 with narrow posterior transversal band with white pruinescence, enlarged in middle and laterals. Sternite 1 light brown with central spot of white pruinescence; sternite 2 light brown with white pruinescence; sternites 3–6 light brown with posterior transversal band of white pruinescence, and lateral spots of black pruinescence; sternite 7 dark with slight white pruinescence.

Terminalia: Epandrium, cercus and hypoproct as in figures 1E–F. Epandrium divided into two parts joined medially by membrane, broad at posterior region (almost together) and further narrowed from middle to anterior regions (disjointed); anterior region glabrous, with sparse pilosity on posterior region. Cercus rounded with apex slightly pointed, covered with long pilosity. Hypoproct (dorsal view) covered by cerci, only with apex visible. Hypandrium, gonocoxite, gonostylus and aedeagus as in figures 1G–H. Hypandrium + gonocoxite robust, longer than wide, with anterior margin truncated, slightly rounded in lateral corners. Hypandrium with circular depression anteriorly. Gonocoxite tubular, narrowed posteriorly, with long expansion at apex. Aedeagus long, pointed, slightly longer than gonocoxal apodeme. Gonostylus enlarged at apex with V-shaped depression.

Examined material: BRAZIL, Amazonas: Manaus, Hotel Ariaú, 02.vii.2010, lençol iluminado, col. F.F. Xavier Filho (1♂, 1♀); Idem, Maués, Rio Abacaxis (Campina Pacamiri), 04°35’49’’S; 58°13’14’’W, 30–31.v.2008, Arm. Suspensa dossel mata, col. J.A. Rafael e equipe (1♀); Idem, Rio Jaú, 01°52’34’’S; 61°35’15’’W, 29.vii–08.viii.2001, Arm. Suspensa lâmina d’água, col. A.L. Henriques & J. Vidal (1♀). PERU, Loreto Pr., nr. Jct. Rio Marañón & Ucayali, 73.5°W 4.8°S, 6–20.viii.1994, Flight trap, col. P. Skelley, *Eutabanus pictus* Kröber ♂ *det* J.F. Burger, 1994 (1♂).

Comments: The male of *E. pictus* is very similar to the female (Fig. 1I, L), except for narrow and less prominent dark stripes of pruinescence on the scutum, and the sexually dimorphic characters of the holoptic eyes and prorrect palpi in males. However, both sexes share two characters for easy recognition: notopleural lobe with an acute projection, and antennal stylus reduced with only three flagellomeres.

Coscarón and Papavero (1993: 106, fig. 70A) documented the notopleural lobe of the female as prominently rectangular, using only one specimen without locality information. However, the females observed here (Fig. 1I, K), and by Fairchild (1961) and Henriques and Gorayeb (1993) have described the notopleural lobe as specified above in the male (Figs. 1A, D). Some characters of the terminalia documented by Coscarón and Papavero (1993: 106, fig. 70D) disagree with those observed here, mainly including the spermatheca (Fig. 1N) and the length of spermathecal ducts (Fig. 1O), although the genital fork (Fig. 1O) is very similar. Tergite 10, cercus and hypoproct of female are illustrated for the first time here (Fig. 1M).

Myiotabanus amazonicus Rafael & Ferreira, 2004

(Fig. 2. A–G male, H–K female)

Refs. Rafael & Ferreira, 2004: 326, figs. 1–3, 11–13 (rev.); Coscarón & Papavero, 2009: 97 (cat.).

Diagnosis: Mimetic of Sarcophagidae; scutum with black and white stripes, medial black stripe widest. Antennal flagellomere dark brown. Labellum partially sclerotized. Abdomen with posterior bands of light triangles. Wing predominantly hyaline.

Male. Body (Fig. 2A) length (without antennae) 10.1 mm, wing length 8.6 mm. Head: Holoptic eyes (Fig. 2B), glabrous, dark-reddish (dried specimen), largest ommatidia occupy the upper 2/3 and the smallest ommatidia the lower 1/3, with a clear demarcation at height of frontal triangle; ocellar tubercle not prominent; frontal triangle with whitish pruinescence; subcallus with white pruinescence, without pilosity; gena, parafacials and face with white pruinescence and pilosity. Palpus prorrect, yellowish-brown with white pilosity and some sparse black pilosity. Antenna (Fig. 2C); scape with white pruinescence and black and white pilosity; pedicel dark brown to almost black with black pilosity; flagellum dark brown, basal plate with slight dorsal projection; antennal flagellum with three free flagellomeres distal to basal flagellomere complex. Proboscis partially sclerotized; theca unsclerotized; labellum with black sclerotized plates.

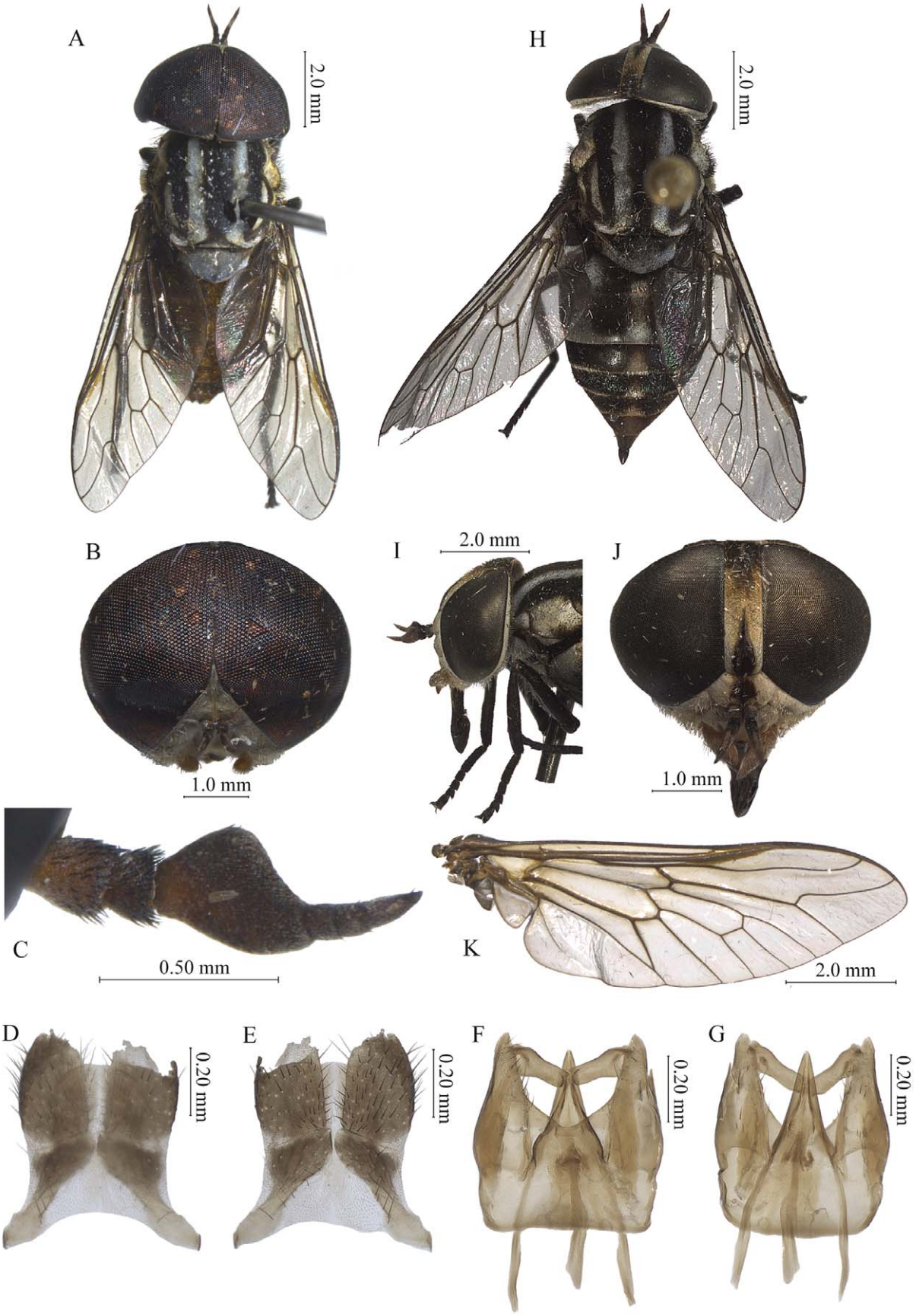

FIGURE 2. *Myiotabanus amazonicus* (A–G ♂; H–K ♀): A, H, body (dorsal view); B, J, head (anterior view); C, antenna (lateral view); D, E, epandrium, cercus and hypoproct (ventral and dorsal views respectively); F, G, hypandrium, gonocoxite, gonostylus and aedeagus (ventral and dorsal views respectively); I, head (lateral view); K, wing (dorsal view).

Thorax. Scutum with blackish pruinescence, covered with black pilosity, except for two longitudinal stripes and lateral margins (including notopleural lobes) whitish with predominantly black pilosity and sparse yellowish pilosity. Scutellum with whitish pruinescence and black pilosity. Pleuron with whitish pruinescence, pilosity mostly yellowish-white, except for anepisternum and katepisternum with tuft of black pilosity. Legs slender, coxae with pruinescence and pilosity concolorous with pleuron. Trochanters, femora, tibiae and tarsi blackish with black pilosity. Wing hyaline, except for costal, subcostal, marginal, 1° submarginal, 1° basal, 2° basal, anal and discal cells slightly infuscate in a few specimens; dark brown veins; basicosta without macrosetae; pterostigma brown; appendix at fork of R_{4+5} absent.

Abdomen: Segments (tergites and sternites) brown with slightly whitish pruinescence, covered with black pilosity and sparse yellowish pilosity; seemingly with pattern of bands and row of triangles identical to female (Fig. 2H),

Terminalia: Epandrium, cercus and hypoproct as in figures 2D–E. Epandrium slender, divided into two parts, broad posteriorly (touching cercus) and further narrowed from second third to anterior regions (entirely disjointed); anterior region glabrous, with sparse pilosity in middle to posterior regions. Cercus elongated (subequal to epandrium) with apex rounded, covered with pilosity. Hypoproct (dorsal view) shorter than cercus, entirely covered by cerci; rounded and almost entirely translucent (ventral view). Hypandrium, gonocoxite, gonostylus and aedeagus as in figures 2F–G. Hypandrium + gonocoxite very robust, little longer than wide, anterior margin truncated. Aedeagus long, pointed, little shorter than gonocoxal apodeme. Gonostylus enlarged at base, further narrowed then parallel-sided distally, with small lateral notch apically.

Examined material: BRAZIL, Amazonas: Coari, 04°13’S; 63°13’W, vi.2007, na luz, col. G. Lourido (4♂); Idem, Carauari, 05°05’31’’S; 67°10’03’’W, vii.2005, [armadilha] suspensa na praia, col. A.L. Henriques & F.F. Xavier-Filho (2♀).

Comments: The male is very similar to the female (Fig. 2H), mainly in the color of the thorax and wing (Fig. 2K). The abdomen is similar although the abdomens of all males observed are in poor condition. The scutellar pruinescence is different, covering the whole structure in the male and only the edge in the female. Abdomen differs in color and shape, the female has a strongly narrowed apex (like an ovipositor, Fig. 2H). The male terminalia is very close to *M. barrettoi* (see Coscarón 1975), without significant differences.

Myiotabanus muscoideus (Hine, 1907)

(Fig. 3. A–G male, H–J female)

Refs.—Kröber, 1934: 312 (cat.; *Tabanus* (*Tabanus*)); Fairchild, 1971: 51 (cat.); Philip, 1971: 285; Fairchild & Burger, 1994: 81 (cat.); Rafael & Ferreira, 2004: 329, figs. 7–8; Coscarón & Papavero, 2009: 97 (cat.).
muscoides Moucha, 1976: 193 (cat.), error.

Diagnosis: Mimetic of Sarcophagidae; scutum with black and white stripes, dorsocentral white stripes widest. Antennal flagellomere yellow brown. Labellum partially sclerotized. Abdomen with posterior bands of light triangles. Wing predominantly hyaline.

Male. Body (Fig. 3A) length (without antennae) 8.1. mm, wing length 7.3 mm. Head: Holoptic eyes (Fig. 3B), glabrous, dark-reddish (dried specimen), largest ommatidia occupy upper 2/3 and smallest ommatidia the lower 1/3, with clear demarcation at limit on the height of frontal triangle; ocellar tubercle not prominent; frontal triangle with whitish pruinescence; subcallus with white pruinescence, without pilosity; gena, parafacial and face with white pruinescence and pilosity. Palpus prorrect, yellow with white pilosity and fewer than 5 black setulae. Antenna (Fig. 3C); scape with white pruinescence and black and white pilosity, black pilosity denser dorsally; pedicel yellow-brown with yellow and black pilosity; flagellum yellow-brown, basal plate with slight dorsal projection; antennal flagellum with three free flagellomeres distal to basal flagellomere complex. Proboscis partially sclerotized; theca unsclerotized; labellum with brown sclerotized plates.

Thorax. Scutum with brownish and white pruinescence, with white pilosity, except for two longitudinal stripes and lateral margins (including notopleural lobes) whitish with predominantly black pilosity and sparse yellowish pilosity, median dark scutal stripe narrower than dorsocentral white stripes. Scutellum with whitish pruinescence and white pilosity, less dense around margins. Pleuron with whitish pruinescence, pilosity mostly yellowish-white, except anepisternum and katepisternum with tuft of black pilosity. Legs slender, coxae with pruinescence and

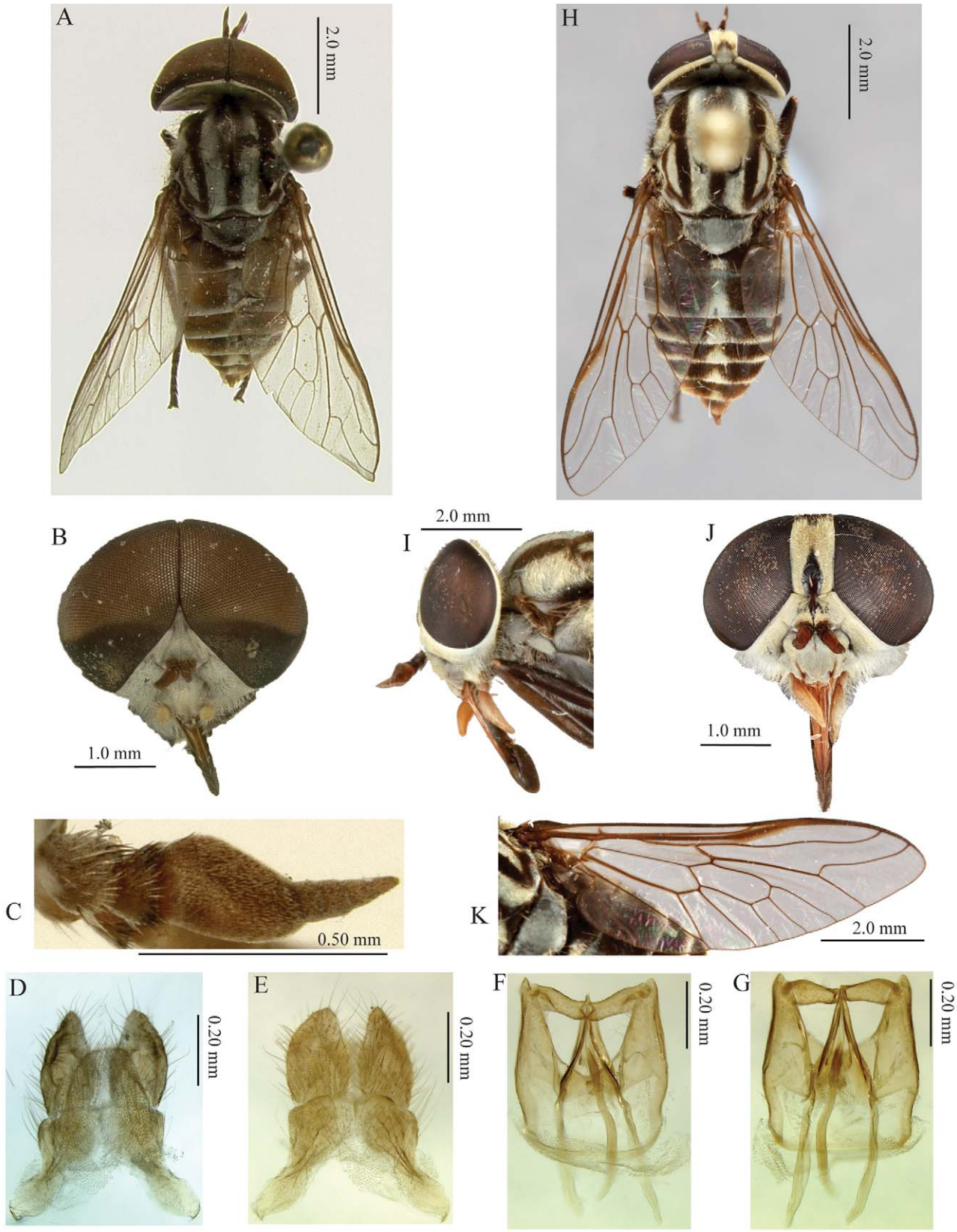

FIGURE 3. *Myiotabanus muscoideus* (A–G ♂; H–K ♀): A, H, body (dorsal view); B, J, head (anterior view); C, antenna (lateral view); D, E, epandrium, cercus and hypoproct (ventral and dorsal views respectively); F, G, hypandrium, gonocoxite, gonostylus and aedeagus (ventral and dorsal views respectively); I, head (lateral view); K, wing (dorsal view).

pilosity concolorous with pleuron. Trochanters, femora, tibiae and tarsi brown with black pilosity, white pilosity proximally on femura. Wing hyaline, except costal, subcostal, and marginal, cells slightly infuscated in a few specimens; veins dark brown; basicosta without macrosetae; pterostigma brown; appendix at fork of R_{4+5} absent.

Abdomen: Segments (tergites and sternites) brown with slightly whitish pruinescence, covered with black pilosity and sparse yellowish pilosity; seemingly with pattern of bands and row of triangles identical to female (Fig. 3H); tergites 2–3 with parallel-sided median white stripe, tergites 4–7 with median white triangle.

Terminalia: Epandrium, cercus and hypoproct as figure 3D–E. Epandrium slender, divided into two parts, broad posteriorly (touching cercus) and further narrowed from second third to anterior region (entirely disjointed); anterior region glabrous, with sparse pilosity in middle to posterior regions. Cercus elongated (subequal to epandrium) with apex rounded, covered with pilosity. Hypoproct (dorsal view) shorter than cercus, entirely covered by cerci; rounded and almost entirely translucent (ventral view). Hypandrium, gonocoxite, gonostylus and aedeagus as figure 3F–G. Hypandrium + gonocoxite very robust, little longer than wide, anterior margin truncated. Aedeagus long, pointed, little shorter than gonocoxal apodeme. Gonostylus enlarged at base, further narrowed then parallel-sided distally, with deep central v-shaped depression at apex.

Examined material: MEXICO, Chiapas: Revolutión, 9mi SE Buena Vista, 16°50'N; 92°00'W ME 23.iii.1953, col. R. C. Bechtel & E. I. Schlinger *Stenotabanus muscoideus* (Hine, 1907) *det* L.L. Pechuman, 1958; Letter G. B. Fairchild L. L. Pechuman 3.ii.1958, 4.iii.1958, 14.i.1959 (1♂); Jalisco: Est. Biologia Chamela 19°30'N 105°20'W 100m, 24.vii.1990, Col. Chemsak, (1♀); GUATEMALA, Petén Santa Elena, near Reserva Priv. Ixpanpajul, 16°54'N; 89°50'W 250m, 9.vi.2007, Col. Monzón & Camposeco (1♀).

Comments: The male is very similar to the female (fig. 3H), mainly by the color of the thorax and wing (fig. 3K). The abdomen differs primarily in shape as the female has a strongly narrowed apex (like an ovipositor, fig. 3H). The male terminalia differs from *M. amazonicus* and *M. barrettoi* only in the shape of the apex of the gonostylus. The male from Chiapas, Mexico, represents a new country record for *Myiotabanus* and a northward expansion of the known range of *Myiotabanus muscoideus*, previously known only from Guatemala and Costa Rica.

Identification

Key to males of calyptrate-mimicking Neotropical Diachlorini lacking macrosetae on the basicosta (*Eutabanus* and *Myiotabanus*)*

1. Acute anterior projection of notopleural lobe present, wing with discrete transversal band from pterostigma to discal cell, labellum unsclerotized, gonostylus enlarged distally . . . . . *Eutabanus pictus*
- Acute anterior projection of notopleural lobe absent, wing mostly hyaline, without discrete transversal band from pterostigma to discal cell, labellum with sclerotized plates, gonostylus parallel-sided to slightly tapered distally 2
2. Median dark scutal stripe narrower than or as wide as dorsocentral white stripes, gonostylus with deep central v-shaped depression at apex, Costa Rica, Guatemala, Mexico. . . . . *Myiotabanus muscoideus*
- Median dark scutal stripe wider than dorsocentral white stripes, gonostylus with small lateral notch at apex, Brazil, Northern Argentina, Paraguay, Bolivia. 3
3. Antennal flagellomeres brown, length >10 mm excluding antennae, North-Central Brazil . . . . . *Myiotabanus amazonicus*
- Antennal flagellomeres yellow, length < 7 mm excluding antennae, South-central Brazil, Northern Argentina, Paraguay, Bolivia . . . . . *Myiotabanus barrettoi*

* The male of *M. sarcophagoides* from Venezuela is unknown, and is not included in this key. It might be identified because its range excludes the known distributions of other *Myiotabanus.*

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