New species and records of *Cheiromyia* Dyte from Brazil and French Guiana (Diptera: Dolichopodidae)

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Abstract

*Cheiromyia carolina* Limeira-de-Oliveira & Brooks sp. nov. and *C. nordestina* Limeira-de-Oliveira & Cumming sp. nov. are described from Brazil, and *C. fuscipennis* Pollet & Brooks sp. nov. is described from the Mitaraka Mountains in southwestern French Guiana. New distribution records are reported for *C. brevitarsis* Brooks, *C. palmaticornis* (Parent) and *C. pennaticornis* (Parent), and a revised key to males of the eight known species of *Cheiromyia* Dyte, 1980 is provided. The female of *C. pennaticornis* is also described for the first time.

Key words: Empidoidea, Dolichopodidae, *Cheiromyia*, Neotropical, Brazil, French Guiana, new species, key

Introduction

The genus *Cheiromyia* Dyte, 1980 is a group of Neotropical Dolichopodinae known to occur from Costa Rica south to Bolivia and the Brazilian Atlantic Forest. Males of the genus are readily distinguished by their striking antler-like antennae (Fig. 1), which possess one or many narrow projections on the outer surface of the enlarged postpedicel. Brooks *et al.* (2010) revised *Cheiromyia* and recognized five species: *C. bicornis* Brooks, *C. brevitarsis* Brooks, *C. laselva* Brooks, *C. palmaticornis* (Parent) and *C. pennaticornis* (Parent). Since then, collecting efforts in northern Brazil and in the Mitaraka Mountains of southwestern French Guiana (Pascal *et al.* 2015; Pollet *et al.* 2015) along with newly discovered museum holdings, have yielded additional specimens of *C. brevitarsis*, *C. palmaticornis* and *C. pennaticornis* (including the first-known females of the latter), as well as material of three undescribed species. The purpose of this study is to describe the new species, record the new distributional data for *C. brevitarsis*, *C. palmaticornis* and *C. pennaticornis* (with description of the female of the latter), and update the key presented in Brooks *et al.* (2010) to include the three additional new species.

Material and methods

Specimens examined in this study are deposited in the Canadian National Collection of Insects, Ottawa, Canada (CNC), the Coleção Zoológica do Maranhão, Caxias, Brazil (CZMA), the Instituto Federal do Triângulo Mineiro, Uberaba, Brazil (IFTM), the Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA), the Muséum national d’Histoire naturelle, Paris, France (MNHN), and the Marc Pollet Collection, Welle, Belgium (MAPC).

Primary type label data are cited verbatim and are listed from the top label downward, with data from each
label placed in quotation marks and separated from data on other labels by a semicolon. Lines on labels are delimited by a vertical line (|) with additional information included in square brackets, i.e., [ ]. Label codes used for specimens from Mitaraka, French Guiana are defined in Pollet et al. (2018).

FIGURES 1–3. Heads of male Cheiromyia in anterior view. 1. Cheiromyia brevitarsis Brooks. 2. Cheiromyia carolina Limeira-de-Oliveira & Brooks sp. nov. 3. Cheiromyia nordestina Limeira-de-Oliveira & Cumming sp. nov.
Morphological terms and male genitalic homologies follow Cumming & Wood (2017) and Brooks et al. (2010). Macrotrichia are referred to as bristles, setae, setulae and hairs depending on relative decreasing size.

Male terminalia dissections were macerated in 85% lactic acid heated in a microwave oven for multiple 20–30 second intervals until muscle tissue dissolved. Following examination each dissection was transferred to a microvial with glycerin and attached to the pin of the associated specimen. Figures showing male hypopygia in lateral view are oriented as they appear on the intact specimen (rotated 180° and lateroflexed to the right) with the morphologically ventral surface of the hypopygium facing up, dorsal surface down, anterior end facing right and posterior end facing left.

Genus Cheiromyia Dyte


Recognition. Males of the genus are readily distinguished by their striking antler-like antennae (Figs 1–8), each bearing one or many projections on the outer surface of the enlarged postpedicel (Figs 1, 4, 6), and by their distinctive hypopygia with ventrally projecting right and left apicoventral epandrial lobes, each bearing a pair of long fine setae (Figs 17, 19, 22, 24). Females are problematic to recognize when not collected with males, and cannot readily be diagnosed from females of Paraclusi Loew. Morphological features shared among all species are given in the full generic redescription provided by Brooks et al. (2010) and are not included in the species descriptions below.

Distribution. Based on the material examined in the revision by Brooks et al. (2010) and new records reported herein, the genus is known to occur from the following countries: Costa Rica, Colombia, Ecuador, Brazil (Acre, Amapá, Amazonas, Ceará, Pará, Piauí, Pernambuco, Maranhão, Minas Gerais, Roraima, São Paulo, Sergipe, Tocantins), Bolivia (La Paz), Guyana, Surinam and French Guiana. Currently the genus has not been recorded from southern South America or from the Pacific side of the Andes Mountains.

Key to species of Cheiromyia (males)

1 Postpedicel with one elongate projection on outer surface (Brooks et al. 2010, fig. 1A); antenna entirely dark brown; face dark brown and narrow; femora infuscate (Brazil: Amazonas) ................................................. C. bicornis Brooks
   - Postpedicel with several projections on outer surface (Figs 1–4, 6, 8); antenna with scape and pedicel pale, postpedicel entirely dark brown, or pale basally; face silvery white or opaque yellow, width various (Figs 1–3; Brooks et al. 2010, figs 2A–C); at leastfore and hind femora mostly pale (fore femur of C. nordestina Limeira-de-Oliveira & Cumming sp. nov. infuscate anteroventrally at mid length) ................................................................. 2
2 Postpedicel elongate subtriangular, gradually tapering to apex (Figs 4–7), outer surface with 5–11 projections ................. 3
   - Postpedicel subovoid basally with abruptly narrowed digitiform apex, outer surface with 3–5 projections (Fig. 8; Brooks et al. 2010, fig. 1B) ........................................................................................................ 5
3 Postpedicel with short, stubby projections (Fig. 6); fore femur with anterior surface pale yellow, lacking denser setulae anteroventrally (Fig. 12); cercus mainly pale on ventral (inner) surface with only posterior and lateral margin infuscate (Fig. 20) (Brazil: Ceará, Maranhão, Piauí and São Paulo) ...................... C. nordestina Limeira-de-Oliveira & Cumming sp. nov.
   - Postpedicel with long projections (Fig. 4; Brooks et al. 2010, fig. 1D); fore femur with anterior surface bright yellow-orange, with denser setulae anteroventrally (Figs 11, 13, 14); cercus more extensively infuscate on ventral (inner) surface (Figs 15, 23) ........................................................................................................ 4
4 Fore femur with infuscate area anteroventrally at mid length, with associated crest of dense elongated setulae below infuscate area (Fig. 11); mid femur brown on anterior and posterior surfaces; postpedicel with 6–7 projections (Fig. 4); face relatively narrow (Fig. 2); apicoventral epandrial lobe short and subtriangular (Fig. 17); hypandrium asymmetrical (Fig. 16); smaller species, wing length about 4.2 mm (Brazil: Maranhão) ...................... C. carolina Limeira-de-Oliveira & Brooks sp. nov.
   - Fore femur without infuscate area anteroventrally, with denser setulae running along most of anteroventral edge (Figs 13, 14); mid femur pale; postpedicel with 9–11 projections (Brooks et al. 2010, fig. 1D); face broad (Brooks et al. 2010, fig. 2A); apicoventral epandrial lobe elongate and curved (Fig. 24); hypandrium more or less symmetrical; larger species, wing length 4.8–5.1 mm (Brooks et al. 2010, fig. 7) (Bolivia, Brazil, French Guiana) .................................................. C. pennaticornis (Parent)
5 Fore leg with tarsomere 2 slightly longer than tarsomere 3; cercus large and triangular with series of long, strong setae along
Descriptions of new species

*Cheiromyia carolina* Limeira-de-Oliveira & Brooks sp. nov.
(Figs 2, 4, 5, 11, 15–17, 28)

**Type material.** HOLOTYPE: ♀, from Parque Nacional Chapada das Mesas, Brazil (Maranhão), labelled: “CZMA| Brasil (MA), Carolina| PARNA Chapada das Mesas| Fazenda Cincorá, 210 m| 07°22’48.8”S/ 47°14’32.0”W”; “CZMA| Varredura 11−14.vi.2013, J.A. Rafael,| F. Limeira-de-Oliveira &| A.A. Santos, cols.”; “HOLOTYPE| Cheiromyia carolina| Limeira-de-Oliveira & Brooks” [red label] (CZMA). PARATYPES: BRAZIL: Maranhão: same data as holotype (1♂, CNC); same data except, Riacho Cancela, 225 m, 07°06’44”S, 47°17’57”W, Malaise, 1−10.viii.2013, J.A. Rafael, F. Limeira-de-Oliveira & T.T.A. Silva (1♂, CNC); same data except, Armadilha Suspensa Lâmina d’água, 20−30.ix.2013 (1♂, CZMA).

**Recognition (male).** This species can be distinguished based on the following combination of characters: postpedicel about 4.5X as long as wide; face narrow (Brooks et al. 2010, fig. 4B); cercus ovoid or subquadrate, with relatively narrow (Fig. 2C) (Ecuador, Brazil, Surinam, French Guiana).

**Description (male).** Body length: 6.1 mm, wing length: 4.2 mm. Head: Eyes uniformly dull red. Upper-most 5–7 postocular setae black, lower 10−11 white, lower-most 2–3 dark brown. Frons subrectangular (wider than high), dark metallic blue-green with violet reflections, silvery white pruinose on lateral margins. Face (Fig. 2) opaque yellow-brown with weak silvery white pruinose on upper part, relatively narrow, narrowest just below middle. Clypeus subrectangular (slightly wider than high), concolorous with face, about 1/4 face height. Palpus brown, ovoid with short black setulae on apical half of outer surface. Proboscis mainly yellowish, anterior surface of each labellar lobe dark brown with close-set row of 2 elongate thickened black setae, with apical third abruptly downturned, each labellar lobe with long thin brown seta preapically and near middle. Antenna (Figs 4, 5) with scape and pedicel pale yellow below and infuscate brown dorsally, postpedicel pale basally with dark apicodorsal margin and apex, inner surface with distinct whitish pruinose; scape obconical, with acute ventral process; pedicel short; postpedicel about 4.5X as long as wide, elongate subtriangular, gradually tapering to apex, outer surface with 6−7 long projections (occasionally bifurcated), arista-like stylus dorsal, well before middle of dorsal margin of postpedicel, basal article elongate but not extending to tip of postpedicel, distal article with long pubescence. Thorax: Scutum predominantly metallic green with violet and blue reflections, anterior half with strong bronze reflections, dark bronze patch above notopleuron immediately posterior to suture. Scutellum concolorous with scutum. Mesopleuron gray pruinose with dark brown background coloration and weak metallic green and bluish reflections. Legs: Mainly pale yellow with black setae, except as noted below. Fore leg: Coxa with anterior surface mainly dark brown with prominent silvery pruinose, lateral surface mainly pale with infuscate and silvery pruinose area at base; femur somewhat laterally compressed with anterior surface bright yellow-orange, with infuscate and silvery pruinose area anteroventrally at mid length, with associated crest of dense elongated setulae below infuscate area (Fig. 11); tibia not swollen; tarsomeres 3–5 with sparse velvety pile
on ventral surface, claws enlarged (relative to other legs). **Mid leg:** Coxa mainly dark brown with silvery pruinosity, pale apically; femur brown on anterior and posterior surfaces; tarsus infuscate from tip of tarsomere 2 onwards. **Hind leg:** Coxa with lateral surface dark brown with silvery pruinosity; tarsus infuscate from middle of tarsomere 2 onwards. **Wing:** Weakly tinted brown, M with weak arc beyond bend (similar to Brooks et al. 2010, fig. 2E). **Abdomen:** Tergites 1–5 brownish black with weak metallic greenish reflections and silvery pruinosity laterally, tergite 5 pale posteroventrally with weaker pruinosity. **Hypopygium** (Figs 15–17): Epandrium dark brown, with apicoventral portion pale, basiventral epandrial seta present on each side at apical 2/3, right and left basiventral epandrial lobe not developed; apicoventral epandrial lobe relatively short, subtriangular, with dark narrow apex, bearing 2 long pale lateral setae. Surstylus: dorsal arm with sac-like medioventral lobe, with short finger-like dorsal process bearing tiny apical seta, apex slightly expanded with small patch of microtrichia medially; ventral arm with sinusoidal apical seta, apex rounded, with subapical process present. Postgonite digitiform. Cercus subovoid, pale on dorsal (outer) surface (Fig. 17), extensively infuscate on ventral (inner) surface (Fig. 15), with one long pale seta apically. Hypandrium (Figs 16, 17) asymmetrical, left side with apical projection bearing well-developed subapical dentiform process, right side with weak subapical process, desclerotized medially. Sperm pump folded back on itself, with simple single fold, opposing surfaces tightly appressed. Phallus with narrow lateral preapical process. Ejaculatory apodeme with ventral curve. **Female:** Unknown.

**FIGURES 4–9.** Antennae of Cheiromyia. 4. Cheiromyia carolina Limeira-de-Oliveira & Brooks sp. nov., male, left antenna, outer surface. 5. Same, inner surface. 6. Cheiromyia nordestina Limeira-de-Oliveira & Cumming sp. nov., male, left antenna, outer surface. 7. Same, inner surface. 8. Cheiromyia fuscipennis Pollet & Brooks sp. nov., male holotype, right antenna, inner surface. 9. Cheiromyia pennicorns (Parent), female, right antenna, inner surface. Abbreviations: ar styl–arista-like stylus; pped–postpedicel.
Distribution. This species is known only from the Brazilian state of Maranhão, where the type series was collected in a gallery forest (Fig. 28) within the Cerrado biome of Chapada das Mesas National Park, along with part of the type series of *C. nordestina* Limeira-de-Oliveira & Cumming sp. nov. and specimens of *C. brevitarsis* Brooks.

Etymology. The specific epithet refers to the Maranhão municipality of Carolina, where the type series was collected.

Remarks. This species appears to be closely related to *C. pennaticornis*, with which it shares similar antennal morphology, as well as several additional putative synapomorphies (see “Remarks” under *C. pennaticornis*).

**Cheiromyia fuscipennis** Pollet & Brooks sp. nov.
(Figs 8, 10, 18, 19, 25)

Type material. HOLOTYPE: ♂, from the Mitaraka Mountains, French Guiana, labelled: “FRENCH GUIANA: Mitaraka,| MIT-A-RBF1, 02°14′11.4″N, 054°27′07.0″W, 306 m, on veg.| along muddy trail, 3.iii.2015,| SW, Marc Pollet”; “(FR-GU/MITARAKA/2015) sample code:MITARAKA/050 (sorted by Marc Pollet, 2015)”; “La Planète Revisitée –| MNHN / PNI Guyane| 2015 - APA-973-1”; “HOLOTYPE| Cheiromyia fuscipennis| Pollet & Brooks” [red label] (MNHN). PARATYPES: FRENCH GUIANA: Mitaraka Mountains: same data as holotype except, MITARAKA/050 (1♀, MNHN); same data as holotype except, MITARAKA/055 (1♀, MAPC); MIT-A-RBF2, 02°14′12.5″N, 054°27′08.1″W, 287 m, on bamboo and banana-like leaves, 27.ii.2015, SW, MITARAKA/019 (1♀, MAPC).

Recognition (male). This species can be distinguished based on the following combination of characters: postpedicel (Fig. 8), about 2.5X as long as wide, subovoid basally with narrow pubescent digitiform apex and 3–4 pubescent digitiform projections on outer surface, entirely dark brown; wing infuscate (Fig. 10); fore tibia not swollen, fore tarsus with tarsomere 2 shorter than 3, fore tarsomeres 3–4 lacking distinct row of erect setae on inner margin; hypandrium with preapical hook-like process on each side (Fig. 18). This species is very similar to *C. brevitarsis* and *C. laselva*, but can be distinguished by its infuscate wing, dark brown postpedicel and distinctive hypandrium.

Description. Male: Body length: 4.6 mm, wing length: 5.0 mm. Head: Eyes uniformly dull red. Upper-most 6–7 postocular setae black, lower 9 setae whitish yellow and lower-most 3 dark brown. Frons subrectangular (wider than high), dark metallic blue-green with violet reflections, lower 2/3 silvery pruinose. Face silvery white, relatively broad, (similar to *C. brevitarsis*, see Fig. 1), narrowest at middle. Clypeus subrectangular (slightly wider than high), concolorous with face, 1/4 face height. Palpus pale, ovoid with short black setulae on apical half of outer surface. Proboscis brownish yellow, anterior surface of each labellar lobe with close-set row of 3 elongate, slightly flattened, brown setae with hook-like apical bend, lateral surface of each labellar lobe with long thin brown seta near middle. Antenna (Fig. 8) with scape and pedicel reddish-yellow, scape slightly infuscate dorsally, postpedicel dark brown, with distinct greyish pruinosity, especially on medial surface; scape obconical, with acute medial and ventral processes; pedicel short; postpedicel about 2.5X as long as wide, subovoid basally with narrow digitiform pubescent apex, outer surface with 3–4 pubescent digitiform projections (1 bifurcate projection on right antenna of holotype), with basal-most projection shorter and stouter; arista-like stylus mid-dorsal, entirely black, 1.5X as long as postpedicel, basal article elongate (0.7X as long as apical article), reaching slightly beyond tip of postpedicel, distal article with long pubescence. Thorax: Scutum metallic green with violet and bronze reflections, dark bronze patch above notopleuron immediately posterior to suture. Scutellum concolorous with scutum. Mesopleuron gray pruinose with dark brown background coloration and weak metallic green to bluish reflections. Legs: Pale yellow with black setae, except as noted below. Fore leg: Coxae with weak silvery pruinose, with weak brownish markings basally and on anterior surface; femur without dense setulae on anteroventral margin (similar to Fig. 12); tibia not swollen; tarsus with pronounced outward bend, tarsomere 1 about equal to tarsomeres 3–4 combined, tarsomere 2 shorter than tarsomere 3, tarsomeres 3–4 lacking distinct row of erect setae on inner margin, tarsomeres 3–5 with sparse velvety pile on ventral surface, claws enlarged and stout (relative to other legs), crossed in holotype. Mid leg: Coxae with lateral surface and outer margin of anterior surface dark with silvery pruinose; tarsus weakly infuscate from tip of tarsomere 1. Hind leg: Coxae with lateral surface brownish with silvery pruinose; tarsus weakly infuscate from tip of tarsomere 1. Wing: Distinctly evenly infuscate (Fig. 10); M with weak arc beyond bend. Abdomen: Tergites 1–5 brownish black with weak metallic greenish reflections and silvery
pruinosity laterally. Hypopygium (Figs 18, 19): Epandrium dark brown, with apicoventral 1/3 pale; basiventral epandrial seta present on each side at apical 2/3, left basiventral epandrial lobe acutely pointed, right basiventral epandrial lobe weakly developed, short with truncate apex; apicoventral epandrial lobe moderately-sized, projecting ventrally, with dark claw-like dorsal (outer) lobe bearing 2 long pale lateral setae and rounded membranous ventral (inner) lobe (left and right apicoventral epandrial lobes largely symmetrical). Surstylus: dorsal arm with small medioventral lobe, with short finger-like dorsal process bearing tiny apical seta, apex slightly expanded with microtrichia medioventrally; ventral arm with stout curved apical seta, apex rounded, with subapical crest present. Postgonite digitiform. Cercus subovoid, mainly pale with narrow dark outer margin, with sparse short pale setae dorsally, and short erect dark setae along posterior margin, with one longer pale seta apically. Hypandrium (Fig. 18) deeply divided medially into pair of lateral lobes, each bearing sclerotized dentiform process. Sperm pump folded back on itself, with simple single fold, opposing surfaces tightly appressed. Phallus widened preapically with large flap-like lateral process, apex narrow. Ejaculatory apodeme with ventral curve. **Female:** Body length: 5.5 mm, wing length: 5.0 mm. Similar to male except as follows: Face and clypeus broader, face parallel-sided. Palpus with 1 strong apical seta. Proboscis lacking close-set row of 3 elongate setae ventrally. Antenna unmodified (similar to Fig. 9), postpedicel lacking projections, small, about as long as wide, rounded triangular with acute apex, mainly dark brown with basal margin pale; aristal stylus straight, 3X as long as first three antennal segments combined, inserted just beyond middle on dorsal margin, basal article short, 1/6X as long as apical article. Fore leg with tarsomere 2 as long as tarsomere 3. Terminalia with tergite 10 brown, divided medially into hemitergites each bearing 5 dark brown, blunt and apically flattened spines.

**Distribution.** *Cheiromyia fuscipennis* Pollet & Brooks sp. nov. is known from the Mitaraka Mountains in southwestern French Guiana, where the type series was collected by sweep netting (Pollet et al., 2018) in non-flooded palm swamps along the Alama River (Fig. 25).

**Etymology.** The species name refers to the dark wings in this species, “fuscus” meaning dark, and “penna” meaning wing.

**Remarks.** This species seems closely related to *C. brevitarsis* and *C. laselva* based on the modified male fore tarsus with tarsomere 2 shorter than 3.

*Cheiromyia nordestina* Limeira-de-Oliveira & Cumming sp. nov. (Figs 3, 6, 7, 12, 20–22, 28–30)

**Type material.** HOLOTYPE: ♀, from Parque Nacional Chapada das Mesas, Brazil (Maranhão), labelled: “CZMA| Brasil, (MA), Carolina| PARNA Chapada das Mesas,| Riacho Sucuruí, 240 m| 07°07′05.6″S/ 47°18′32″W”; “CZMA| Armadilha de Malaise| 20−30.ix.2014, J.A. Rafael,| F. Limeira-de-Oliveira, T.L.| Rocha & G.A. Reis, cols.”; “HOLOTYPE/ Cheiromyia nordestina Limeira-de-Oliveira & Cumming” [red label] (CZMA).

PARATYPES: BRAZIL: Ceará: Ubajara, Parque Nacional de Ubajara, Cachoeira do Cafundó, 3°50′13″S, 40°54′35″W, Armadilha Suspensa, 18−30.xi.2012, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA); same data except, 1−15.i.2013 (1♂, CNC); same data except, 1−14.i.2013, J.A. Rafael, F. Limeira-de-Oliveira (1♂, CZMA); same data except, 15−28.i.2013 (2♂, CZMA; 2♂, INPA; 2♂, CNC); same data except, Malaise, 1−15.xii.2012 (2♂, CZMA); same data except, 16−31.i.2013 (2♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 1−14.i.2013, J.A. Rafael, F. Limeira-de-Oliveira (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 1−15.i.2013 (1♂, INPA; 1♂, CNC); same data except, 15−28.i.2013 (2♂, INPA; 1♂, CNC); same data except, Malaise, 1−15.xii.2012 (2♂, CZMA); same data except, 16−31.i.2013 (2♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 1−14.i.2013, J.A. Rafael, F. Limeira-de-Oliveira (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 15−28.i.2013 (3♂, CZMA; 3♂, INPA; 3♂, CNC).

Pará: Cambridge, 3°50′13″S, 40°54′35″W, Evening flight, 10−15.xi.2012, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 16−31.i.2013 (3♂, CZMA; 3♂, INPA; 3♂, CNC). Piracuruca, Parque Nacional de Sete Cidades, Posto do ICMBio, 3°57′57″S, 41°42′34″W, Malaise, 22−27.i.2013, F. Limeira-de-Oliveira (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 1−14.i.2013, J.A. Rafael, F. Limeira-de-Oliveira (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 15−28.i.2013 (3♂, CZMA; 3♂, INPA; 3♂, CNC). São Paulo: Getulina, 21°49′12″S, 50°3′44″W, sweeping on moist soil, 22.i.2017, R.S. Capellari (2♂, IFTM).

**Recognition (male).** This species can be distinguished based on the following combination of characters: postpedicel about 3.5X as long as wide, elongate subtriangular, gradually tapering to apex, outer surface with 5−6
short stubby projections, with dorsal margin infuscate (Figs 3, 6, 7); face relatively broad (Fig. 3); fore femur pale yellow, not laterally compressed, without dense setulae along anteroventral margin (Fig. 12); apicoventral epandrial lobe projecting ventrally with narrow pointed apex (Fig. 22); hypandrium nearly symmetrical (Fig. 21); cercus pale, not extensively infuscate on ventral (inner) surface (Fig. 20). This species is morphologically very similar to *C. carolina* Limeira-de-Oliveira & Brooks sp. nov. and *C. pennaticornis*, but can be distinguished by the postpedicel with short stubby projections and by the pale yellow fore femur that lacks dense setulae anteroventrally.


**Description (male).** Body length: 5.6–6.8 mm, wing length: 4.2–4.9 mm. **Head:** Eyes uniformly dull red. Upper-most 6–7 postocular setae black, lower 11–13 white, lower-most seta dark brown. Frons subrectangular
(wider than high), dark metallic blue-green with violet reflections, silvery white pruinosity on lateral margins. Face (Fig. 3) opaque yellow-brown with silvery white pruinosity on upper and lateral parts, relatively broad. Clypeus subrectangular (wider than high), concolorous with face, more than 1/4 face height. Palpus yellowish brown, ovoid with short black setulae on apical half of outer surface. Proboscis mainly yellowish, anterior surface of each labellar lobe dark brown with close-set row of 2 elongate thickened black setae with apical third abruptly downturned or curled, each labellar lobe with long thin brown seta preapically and near middle. Antenna (Figs 3, 6, 7) with scape and pedicel pale yellow below and infuscate yellowish brown dorsally, postpedicel pale basally with dark apicodorsal margin and apex, inner surface with distinct whitish pruinosity; scape obconical, with acute ventral process; pedicel short; postpedicel about 3.5X as long as wide, elongate subtriangular, gradually tapering to apex, outer surface with 5–6 short stubby projections (occasionally bifurcated), arista-like stylus dorsal, well before middle of dorsal margin of postpedicel, basal article elongate nearly extending to tip of postpedicel, distal article with long pubescence.

**Thorax:** Scutum metallic blue-green with violet reflections, bronze area above notopleuron (postsutural). Scutellum metallic blue-green with violet reflections. Mesopleuron gray pruinose with dark blue-green background coloration, with metallic reflections. **Legs:** Mainly pale yellow with black setae, except as noted below. **Fore leg:** Femur not laterally compressed, without dense setulae along anteroventral margin (Fig. 12); tibia not swollen; tarsomeres 3–5 with sparse velvety pile on ventral surface, claws slightly enlarged (relative to other legs). **Mid leg:** Coxal with lateral surface brown with silvery pruinosity, mainly pale apically; tarsus infuscate from tarsomere 2 onwards. **Hind leg:** Tarsus infuscate from tarsomere 2 onwards. **Wing:** With slight brownish tint; M with weak arc beyond bend. **Abdomen:** Tergites 1–5 dark metallic green, with silvery pruinosity laterally. **Hypopygium** (Figs 20–22): Epandrium dark brown, with apicoventral 1/3 pale; left basiventral epandrial lobe short and rounded with basiventral epandrial seta on ventral medial surface, right basiventral lobe forming dentiform projection immediately distal to basiventral epandrial seta; apicoventral epandrial lobe projectng ventrally with narrow pointed apex, bearing 2 long lateral setae, medial surface of lobe forming weakly sclerotized rounded process (left and right apicoventral epandrial lobes largely symmetrical). Surstylus: dorsal arm with broad medioventral lobe, with long finger-like dorsal process bearing long apical seta, apex broadly expanded with microtrichia ventrally; ventral arm with sinuous apical seta, apex rounded, with subapical process present. Postgonite digitiform, slightly curved ventrally. Cercus subovoid, pale with dark outer margin, with sparse short pale setae dorsally and short erect pale setae along margin, with one longer pale seta apically. **Remarks.** This species appears closely related to both *C. pennaticornis* and *C. carolina* Limeira-de-Oliveira & Brooks sp. nov., based primarily on a similar male postpedicel that is elongate subtriangular in shape and bears numerous projections along the outer surface.

**Distribution.** This species is widely distributed in northeastern Brazil and occurs in the gallery forests of the Cerrado and the Amazonian forest biomes of Chapada das Mesas National Park (Maranhão) (Fig. 28) and Sete Cidades National Park (Piauí) (Fig. 29) and Ubajara National Park (Ceará) (Fig. 30). This species has also been collected from the southern Brazilian locality of Getulina, São Paulo.

**Etymology.** The specific epithet is based on the Portuguese word for northeastern, in reference to the northeastern distribution of this species within South America.

**Remarks.** This species appears closely related to both *C. pennaticornis* and *C. carolina* Limeira-de-Oliveira & Brooks sp. nov., based primarily on a similar male postpedicel that is elongate subtriangular in shape and bears numerous projections along the outer surface.

**New specimen records and information**

*Cheiromyia brevitarsis* Brooks
(Figs 1, 27–30)

*Cheiromyia brevitarsis* Brooks in Brooks et al., 2010: 48.

**New material examined.** BRAZIL: Amazonas: Manaus, Campus Universitário, ICB [instituto de ciências biológicas], 16–23.vi.1988, M.C. Castilho, E. Bindá, Armadiilha de Shannon, feces (1♀, INPA). **Ceará:** Ubajara,
Limeira-de-Oliveira, T.T.A. Silva (1♂, CZMA; 1♂, INPA); same data except, 15−30.vi.2013, J.A. Rafael, F. Limeira-de-Oliveira (1♂, CZMA; 2♂, INPA), same data except, 5−22.iii.2013, F. Limeira-de-Oliveira, T.T.A. Silva (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, Armadilha Suspensa, 18−30.xi.2012, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA; 1♂, CNC); same data except, 13−26.iv.2013 (1♂, CZMA); same data except, 1−15.i.2013, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA); same data except, 1−10.vii.2013 (1♂, CZMA); same data except, 1−15.vii.2013, J.A. Rafael, F. Limeira-de-Oliveira, T.T.A. Silva (1♂, CZMA; 1♂, INPA); same data except, 15−30.vi.2013, J.A. Rafael, F. Limeira-de-Oliveira, T.T.A. Silva (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, Armadilha Suspensa, 18−30.xi.2012, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA; 1♂, CNC); same data except, 16−31.xii.2012 (1♂, CZMA); same data except, 18−30.xi.2012 (1♂, CZMA); same data except, 15−28.ii.2013 (1♂, CZMA); same data except, 1−15.xi.2012, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 1−14.ii.2013, J.A. Rafael, F. Limeira-de-Oliveira (1♂, CZMA; 2♂, INPA; 1♂, CNC); same data except, 5−22.iii.2013, F. Limeira-de-Oliveira, T.T.A. Silva (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, Armadilha Suspensa, 18−30.xi.2012, F. Limeira-de-Oliveira, J.S. Pinto Júnior (4♂, CZMA; 2♂, INPA; 2♂, CNC); same data except, 16−31.xii.2012 (1♂, CZMA); same data except, 1−14.ii.2013, J.A. Rafael, F. Limeira-de-Oliveira (1♂, CZMA); same data except, 15−28.ii.2013 (1♂, CZMA); same data except, 1−15.xi.2012, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 1−14.ii.2013, J.A. Rafael, F. Limeira-de-Oliveira (1♂, CZMA; 2♂, INPA; 1♂, CNC); same data except, Armadilha Suspensa, 18−30.xi.2012, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 16−31.xii.2012 (1♂, CZMA); same data except, 1−14.ii.2013, J.A. Rafael, F. Limeira-de-Oliveira (1♂, CZMA); same data except, 15−28.ii.2013 (1♂, CZMA); same data except, 10−20.x.2013 (1♂, INPA); same data except, 16−31.xii.2012 (2♂, CZMA); same data except, 1−10.xii.2013 (1♂, CZMA); same data except, 1−15.xii.2012, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 10−20.x.2013 (1♂, INPA); same data except, 15−28.ii.2013 (1♂, CZMA); same data except, 1−15.xi.2012, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 1−14.i.2013, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA); same data except, 30−31.vii.2015, F. Limeira-de-Oliveira, D.M. Limeira, A.K.C. Fernandes & M.J. Rodrigues (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, Varredura (1♂, CZMA; 1♂, CNC); Carolina, PARNA[=Parque Nacional] Chapada das Mesas, Riacho Cancela, 225 m, 7°6′44″S, 47°17′57″W, Malaise, 7−15.vi.2013, J.A. Rafael, F. Limeira-de-Oliveira & T.T.A. Silva (1♂, CZMA; 1♂, INPA); same data except, 11−14.vi.2013, J.A. Rafael, F. Limeira-de-Oliveira, J.T. Câmara & A.A. Santos (1♂, CZMA); same data except, 1−15.vii.2013, J.A. Rafael, F. Limeira-de-Oliveira, T.T.A. Silva (1♂, CZMA; 1♂, CNC); same data except, 15−31.vii.2013 (1♂, CZMA); same data except, 1−10.viii.2013 (1♂, CZMA); same data except, 20−31.viii.2013 (1♂, CZMA); same data except, 1−10.ix.2013 (1♂, CNC); same data except, 10−20.ix.2013 (1♂, INPA); same data except, 1−10.xii.2013 (1♂, CZMA); same data except, 10−20.x.2013 (1♂, CZMA); same data except, 1−10.xii.2013 (1♂, CNC); same data except, 1−10.xii.2013 (1♂, INPA); same data except, 16−31.i.2013, F. Limeira-de-Oliveira, J.S. Pinto Júnior (1♂, CZMA; 1♂, INPA; 1♂, CNC); same data except, 16−31.xii.2012 (1♂, CZMA).
NEW SPECIES AND RECORDS OF CHEIROMYIA

Rafael, F. Limeira-de-Oliveira, T.T.A. Silva, (1♂, CZMA); same data except, Armadilha Suspensa, 16−31.i.2013, F. Limeira-de-Oliveira, J.S. Pinto Júnior (2♂, CZMA); same data except, 15.vi.−3.vii.2013, J.A. Rafael, F. Limeira-de-Oliveira, T.T.A. Silva (1♂, CZMA); same data except, Varredura, 17−19.vii.2013, J.A. Rafael, F. Limeira-de-Oliveira (1♂, CZMA). Tocantins: Palmas, Loteamento Recanto da Ema, 10°4′9″S, 48°24′19″W, Malaise, 19−25.vi.2016, F. Limeira-de-Oliveira (1♂, CZMA).

Distribution. Cheiromyia brevitarsis is known from northern South America, including Colombia, Guyana, French Guiana and Brazil (Amapá, Amazonas, Maranhão, Pará, Roraima, plus the new records from Ceará, Piauí, Pernambuco, Sergipe and Tocantins listed above). Although now the most abundantly collected species in the genus (over 150 specimens listed here and in Brooks et al. 2010), of the 37 sites investigated in the intensive survey of the Mitaraka Mountains of French Guiana, only a single male of this species was taken in a swampy forest near the Sommet-en-Cloche inselberg (Fig. 27) (Pollet et al. 2018). Figures 28−30 show collecting localities in the Brazilian National Parks of Chapada das Mesas (Maranhão), Serra das Confusões (Piauí) and Ubajara (Ceará) where specimens of C. brevitarsis were collected along with specimens of C. carolina Limeira-de-Oliveira & Brooks sp. nov. and C. nordestina Limeira-de-Oliveira & Cumming sp. nov.

Cheiromyia palmaticornis (Parent)


Distribution. Cheiromyia palmaticornis is known from eastern Ecuador, Surinam, French Guiana and Brazil (Amapá, Pará, plus the new record from Amazonas above).

Cheiromyia pennaticornis (Parent)

(Figs 9, 13, 14, 23, 24, 26)


Minas Gerais: Uberaba, IFTM [Instituto Federal do Triângulo Mineiro], 19°39′55″S, 47°57′29″W, yellow pan trap on moist soil, 1−8.xi.2017, R.S. Capellari (1♂, IFTM). FRENCH GUIANA: Mitaraka Mountains: MIT-A-RBF1, 2°14′11.4″N, 54°27′07.0″W, 306 m, on vegetation along muddy trail and in swamp, 6.vii.2015, SW, MITARAKA/074, M. Pollet (1♀, MAPC); MIT-A-RBF2, 2°14′12.5″N, 54°27′8.1″W, 287 m, on bamboo and banana-like leaves, 27.ii.2015, SW, MITARAKA/020, M. Pollet (1♀, MAPC); same data except, 2.iii.2015, SW, MITARAKA/044 (3♀, MAPC); MIT-C-RBF1, 2°14′10.8″N, 54°26′49.5″W, 258 m, on vegetation and in creek, 2.iii.2015, SW, MITARAKA/045, M. Pollet (5♂, 3♀, MAPC); same data except, 27.ii.2015, SW, MITARAKA/017 (7♀, MAPC); same data except, 28.ii.2015, SW, MITARAKA/025 (3♂, 3♀, CNC; 1♂, 4♀, MNHN); same data except, 3.iii.2015, SW, MITARAKA/057 (5♂, MAPC); same data except, 4.iii.2015, SW, MITARAKA/061 (3♂, 2♀, MAPC); same data except, 6.iii.2015, SW, MITARAKA/077 (2♂, MAPC); same data except, 6.iii.2015, SW, MITARAKA/087 (1♂, MAPC); same data except, tropical wet forest (bas fond), 24−27.ii.2015, YPT, MITARAKA/122 (1♂, MAPC); same data except, 24−27.ii.2015, YPT, MITARAKA/122 (1♀, MAPC); MIT-C-RBF2, 2°14′3.4″N, 54°26′53.0″W, 299 m, on vegetation along muddy trail and in swamp, 3.iii.2015, SW, MITARAKA/056 (1♂, MAPC); same data except, 4.iii.2015, SW, MITARAKA/064 (2♂, MAPC); same data except, 6.iii.2015, SW, MITARAKA/064 (2♂, MAPC); same data except, 6.iii.2015, SW,
specimens known for C. pennaticornis have been collected numerous times, with approximately 150 specimens known for C. brevitarsis known), it is expected that further Neotropical collecting efforts will yield additional undescribed species. Only two species concepts and could assist in association of female specimens with conspecific males.

Additional material examined was provided by Brooks et al. 2010, except as follows: Body length: 5.8–6.5 mm, wing length: 5.5–6.0 mm. Head as broad as high. Face slightly broader. Face and clypeus with silvery white pruinosity covering yellowish-brown ground color. Palpus with sparser short, inclined setulae, and one strong black apical seta. Proboscis lacking close-set row of long curly hairs on anterior surface of each labellar lobe. Antenna (Fig. 9) unmodified, postpedicel small, lacking projections, subtriangular with acute apex, 1.4X as long as wide, pale reddish yellow with dark margin; arista-like stylus with basal article about 1/8 as long as apical article. Fore leg with coxa pale on anterior surface; tibia pale; femur pale yellow, with setulae of anteroventral edge not distinctly denser; tarsus without velvety pile ventrally; claws unmodified. Mid leg with tibia pale. Hind leg with tibia pale. Terminalia with tergite 10 brown, divided medially into hemitergites each bearing 5 dark brown spines, spines blunt and somewhat flattened apically.

Distribution. Cheiromyia pennaticornis was previously known from Bolivia (La Paz), Brazil (Acre, Amazonas, Pará) and is here newly recorded from southern Brazil (Uberaba, Minas Gerais) and from swampy forest habitats in the Mitaraka Mountains of French Guiana (Fig. 26).

Remarks. In addition to the characters mentioned in the description of C. pennaticornis provided by Brooks et al. 2010, males also have the fore femur somewhat laterally compressed with the anterior surface bright yellow-orange (Figs 13, 14), in contrast to the pale yellow femoral base color seen in most other species (Fig. 12), and the cercus extensively infuscate on the ventral (inner) surface (Fig. 23). The fore femur (Fig. 11) and cercus (Fig. 15) of C. carolina Limeira-de-Oliveira & Brooks sp. nov. are similarly modified, suggesting a possible sister-group relationship between these species. Males of both species also possess dense setulae on the anteroventral margin of the fore femur (Figs 11, 13, 14), which in C. carolina are longer, more erect and restricted to the middle portion (Fig. 11). In C. pennaticornis these setulae are shorter, more appressed and run along most of the anteroventral edge of the fore femur but vary considerably in density among specimens (Figs 13, 14). Males of C. pennaticornis also exhibit variation in the coloration of the tibiae, which range from entirely pale yellow to almost entirely infuscate. Further variation in C. pennaticornis is observed in the basiventral lobe of the hypopygium, which may be well-developed as in the holotype (Brooks et al. 2010, fig. 7), or reduced with a medial dentiform process immediately distal to the basiventral seta (Fig. 24), as in males from Parque Nacional da Serra do Divisor, Acre, Brazil (see “Additional material examined” in Brooks et al. 2010, page 55).

The recent “La Planète Revisitée” expedition to the Mitaraka Mountains of French Guiana in 2015 (Pascal et al. 2015; Pollet et al. 2015, 2018) yielded a large series of C. pennaticornis (65 specimens), including the first-known associated female specimens (see description above). Specimens of C. pennaticornis were collected in both non-flooded and flooded palm swamps, with darker flooded sites preferred (Fig. 26). Most specimens were collected through visual searches and by sweep netting with only 8 additional specimens captured in yellow pan traps (Pollet et al. 2018).

Discussion

Cheiromyia is known from Central America and the northern half of South America and has not been recorded from the Pacific side of the Andes Mountains. The genus appears to be confined to both low and mid elevation rainforests (800 m or less), including gallery forests. Eight species have now been described with some known from only a few specimens (i.e., C. bicornis, C. carolina Limeira-de-Oliveira & Brooks sp. nov., C. fuscipennis Pollet & Brooks sp. nov., and C. laselva). Given the small number of specimens of Cheiromyia in collections (<300 specimens known), it is expected that further Neotropical collecting efforts will yield additional undescribed species. Only two species have been collected numerous times, with approximately 150 specimens known for C. brevitarsis and 70 specimens known for C. pennaticornis, including those specimens listed in Brooks et al. (2010). Cheiromyia pennaticornis in particular, exhibits more intra-specific variation than the other known species in the genus. This might indicate that the concept of this species includes one or more currently unrecognized cryptic species. Collection of additional fresh specimens that are amenable for COI mitochondrial DNA analyses will allow testing of current species concepts and could assist in association of female specimens with conspecific males.
FIGURES 25–30. Collection localities and habitats of Cheiromyia species in the Mitaraka Mountains of French Guiana and Brazil. 25. Type locality of *C. fuscipennis* Pollet & Brooks sp. nov. in a non-flooded palm swamp along the Alama River (Mitaraka, French Guiana). 26. Collection locality of *C. pennaticornis* (Parent) in a flooded palm swamp (Mitaraka, French Guiana). 27. Collection locality of *C. brevitarsis* Brooks in a swamp near the Sommet-en-Cloche inselberg (Mitaraka, French Guiana). 28. Type locality of *C. carolina* Limeira-de-Oliveira & Brooks sp. nov. and *C. nordestina* Limeira-de-Oliveira & Cumming sp. nov. in a gallery forest in buffer zone of Chapada das Mesas National Park (Maranhão, Brazil); specimens of *C. brevitarsis* Brooks were also collected at this site. 29. Collection locality of *C. nordestina* Limeira-de-Oliveira & Cumming sp. nov. and *C. brevitarsis* Brooks in a relict of Atlantic Forest in Serra das Confusões National Park (Piauí, Brazil). 30. Collection locality of *C. nordestina* Limeira-de-Oliveira & Cumming sp. nov. and *C. brevitarsis* Brooks in a relict of Atlantic Forest, near Cafundó waterfall in Ubajara National Park (Ceará, Brazil).
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References