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Brakemyia, a New Neotropical Jackal Fly Genus of Milichiidae (Insecta: Diptera) Associated with Carton Ant Nest

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Brakemyia metallica gen. et sp. nov. (Diptera, Milichiidae) is described and illustrated based on male and female specimens reared from carton nests of the ant *Azteca* aff. *chartifex* Forel (Formicidae: Dolichoderinae). The new genus is widely distributed in the Brazilian Amazon, and it can be readily distinguished from the other Neotropical genera by the broadened lunule, which extends well posterior of the antennae, and the hypandrial complex parallel to epandrium.

Key words: Milichiinae, Jackal flies, Neotropical region, Dolichoderinae, Azteca ant

BACKGROUND

Milichiidae, also known as jackal flies or freeloader flies, is a relatively small family of acalyptratae flies composed of 20 genera and more than 430 small (1 to 5 mm in length) described species (Papp 2016; Swann 2016) occurring on all continents except Antarctica (Brake 2000). In the last published phylogenetic systematic study on Milichiidae, Brake (2000) divided the family into three subfamilies: Milichiinae, Madizinae, and Phyllomyzinae, but this classification has not been followed by Swann (2010 2016), since Madizinae and Phyllomyzinae do not seem to be monophyletic.

Milichiids are usually black or brown, occasionally yellow or orange. Male specimens of various genera, mainly from the subfamily Milichiinae, have their head, thorax and/or abdomen partially or completely covered with remarkable silvery microtomentosity (Brake 2000; Swann 2016; Swann and Sinclair 2021).

The natural history of most milichiid species remains unknown (Brake 2000; Swann 2010; Swann and Sinclair 2021). Adults of some genera feed on sugary substances, such as nectar from flower and extrafloral nectaries and honeydew produced by Hemiptera, including that accumulated on leaves (Brake 2000; FSCF personal observation). They are referred to as jackal flies since many genera are kleptoparasites of predaceous invertebrates, such as spiders and insects (Asilidae, Carabidae, Reduviidae, Odonata, and Mantodea) (Brake 2000; Marshall 2019; Swann 2016; Swann and Sinclair 2021). Kleptoparasitic milichiids feed on the prey of other invertebrates while they are still being consumed or on the remains of food present in the predators' mouthparts. Several species are myrmecophilous, although this association is poorly understood. Adults of select *Milichia* Meigen force the ants to give food to them via trophallaxis or anal secretion (Brake 2000; Wild and Brake 2009).

The trophic biology of milichiid larvae is remarkably diverse, but this aspect remains poorly documented for most species. Known milichiid larvae can be saprophagous or coprophagous. They are usually found in manure, decomposing plant material, bird's

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nests, or mammalian burrows (Hicks 1959 1962 1971; Hulley 1983; Brake 2000; Swann 2010; Levesque-Beaudin et al. 2020; Swann and Sinclair 2021). Detritivorous larvae play a role in decomposition in these environments, and, consequently, in the process of organic matter and nutrient cycle. Larvae and pupae of some species have been collected from vertebrate carcasses and human corpses, and they have forensic importance (Giordani et al. 2018; Kumara et al. 2010). Milichiid larvae have also been associated with ant nests, and some others have been reared from nests of solitary and social bees (Brake 2000; Swann 2010; Swann and Sinclair 2021). Species of at least four genera occur only in caves, where adults and larvae feed on bat guano (Brake 2000; Swann 2010).

Milichiidae are morphologically and biologically diverse and abundant in many types of environments. However, they remain poorly studied in the Neotropical region, where only 124 species have been recorded so far from 13 genera (Swann 2016). It is a consensus among researchers that this number is underestimated, as many species remain undescribed (Brake 2000 2009; Swann 2010 2016). An example of the high diversity of Milichiidae was shown in two recent surveys of the dipteran fauna in the Amazon region. Amorim et al. (2022) carried out a study on insect stratification in an Amazonian Forest canopy (state of Amazonas). These authors confirmed the presence of 37 milichiid morphospecies in eight genera. Riccardi et al. (2022) reported the presence of 23 morphospecies in five genera in a study on dipteran fauna from the state of Roraima, northern Brazil. In addition, six undescribed genera are known from this region (Swann 2010 2016), and many others are expected from undersampled and potentially diverse locations, such as the Brazilian Amazon.

This paper describes and illustrates a new genus and a new species of Milichiidae whose larva inhabit carton nests of the ant *Azteca* aff. *chartifex* Forel (Formicidae: Dolichoderinae) throughout the Amazon region.

MATERIALS AND METHODS

Specimens were obtained from the two main Brazilian Amazon entomological collections: INPA, *Instituto Nacional de Pesquisas da Amazônia*, Manaus, Amazonas, Brazil (Curator: Dr. Márcio Luiz de Oliveira); and MPEG, *Museu Paraense Emílio Goeldi*, Belém, Pará, Brazil (Curator: Dr. Orlando Tobias Silveira). In addition, we carried out field work to obtain additional specimens and data on natural history. As this species was observed flying around carton nests of *Azteca* aff. *chartifex* Forel (Formicidae: Dolichoderinae) (Fig. 1A), pieces of nests were collected and maintained in an "emergence box" until the emergence of adult flies. The emergence box consisted of a cardboard box (48 × 33 × 54.5 cm) with a small, rounded aperture in the upper portion. A funnel made from a plastic 2-liter soft drink bottle neck was glued in the aperture. A small elongate plastic bag was placed and tied with a rubber band in the funnel neck, functioning as a collector bag (Fig. 1B).

Specimens were killed by freezing, glued to pinned card triangles, dried in an oven at 40°C for 3 days and deposited into the entomological collections of INPA and MPEG. Male and female terminalia

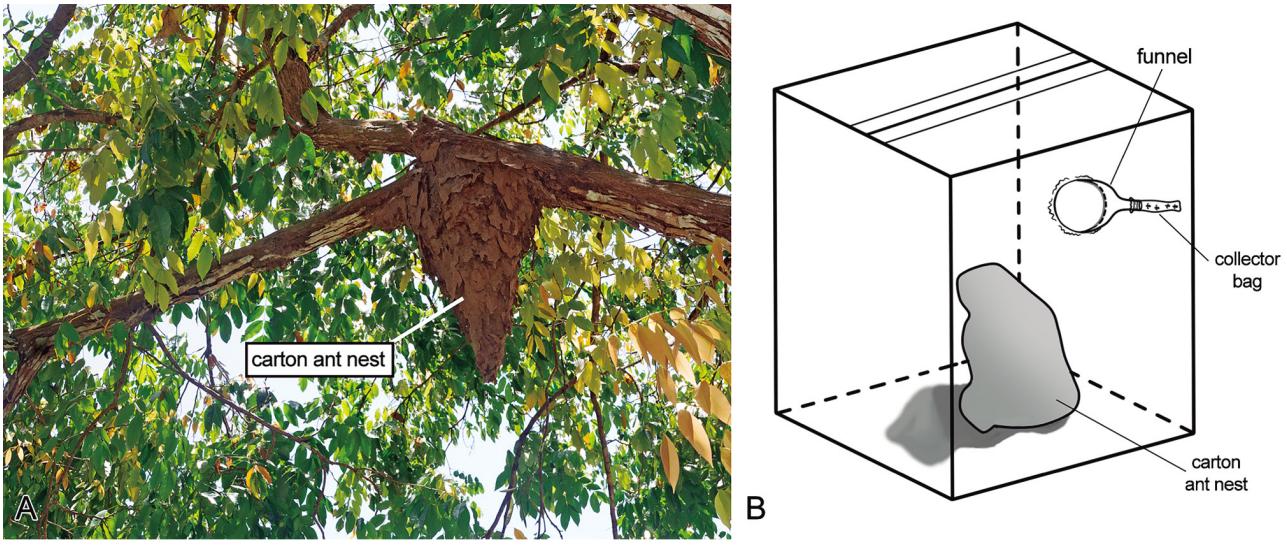

Fig. 1. A: Carton nest of *Azteca* aff. *chartifex* Forel (Formicidae: Dolichoderinae). B: Emerging box.

were prepared and studied by removing the abdomens from specimens with entomological pins. Then, they were soaked in 10% KOH (Potassium hydroxide) solution at ambient temperature for a period of 12 to 24 h; neutralized with 5% acetic acid; followed by a dehydration series of 80%, 96%, and 100% ethanol. They were dissected and mounted for study in non-permanent slides with glycerin. After study, the dissected abdomens were transferred to plastic micro-vials with glycerol and pinned with their corresponding specimens. Illustrations were made with a drawing tube attached to a compound light microscope Leica DM 1000.

Specimens were photographed with a DFC425 digital camera attached to a Leica M205 stereomicroscope at different depths, then z-stacked with the Leica Application Suite V4.4 software. Scanning electron micrograph (SEM) images were produced with a MIRA3 TESCAN in the MPEG from structures dissected from dried specimens, mounted with double-sided sticky tape on metallic stubs, and sputter-coated with a gold palladium alloy. Photographs were slightly cleaned and retouched with Adobe Photoshop® 2020, and drawings were vectorized with Adobe Illustrator® 1.1.

Terminology follows Cumming and Wood (2017), except for chaetotaxy and genitalia that follow Brake (2000). The generic classification follows Swann (2010). A map with data points was created with Simplemappr (Shorthouse 2010). Label data of type specimens are presented in verbatim quotation with individual lines separated by a forward slash (/) and individual labels separated by a double forward slash (//). Additional information is given in square brackets ([]).

RESULTS

TAXONOMY

Diptera Linnaeus, 1758
Milichiidae Schiner, 1862
Milichiinae Schiner, 1862

Brakemyia gen. nov.

(Figs. 2–5)
urn:lsid:zoobank.org:act:77D09CF4-6868-41CD-843F-F1B26F9EF262

Type species: *Brakemyia metallica* sp. nov., by present designation. Gender: feminine.

Diagnosis: Small (1.8–2.2 mm) and stout flies (Fig. 2A). Lunule broadened, extending well posterior of the antennae to the vicinity of the orbital plate (Figs. 2E–F, 3C). Interfrontal setae absent. Vibrissal angle present (Fig. 2B). Gena reduced, about 0.1 times as high as eye (Fig. 2B). Anepimeron bare. Vein C extending to vein M_1, after the wing apex (Fig. 3A). Surstylus not fused with epandrium (Fig. 4B). Hypandrium higher than epandrium (Fig. 4B). Hypandrial complex parallel to epandrium (Fig. 4B).

Etymology: The new genus is named after the German dipterist, Dr. Irina Brake, in recognition of her contribution to milichiid systematics, adding the Greek feminine word *myia*, meaning fly.

Distribution: *Brakemyia* gen. nov. is known from the Brazilian Amazon (states of Amazonas, Maranhão, Pará, and Roraima).

Remarks: *Brakemyia* gen. nov. runs to Undescribed Genus B in the last published key to the Neotropical genera of Milichiidae by Swann (2010). We were not able to examine these specimens, but according to the information and illustrations provided by Swann (2010), the specimens described in the present paper may belong to this genus as well.

The systematics of Neotropical Milichiidae is complex and challenging: keys and taxonomic revisions are not available for species identifications; many species descriptions are more than 60 years old and are sufficiently vague that species-level identifications are extremely difficult and would necessitate examination of types. Added to this, most genera are paraphyletic, and many others remain undescribed (Swann 2010).

Despite the complications mentioned above, *Brakemyia* gen. nov. can be easily distinguished from other Neotropical genera in having lunule broadened, extending well posterior of the antennae, and hypandrial complex parallel to epandrium. In all milichiid genera, whose males are described, the hypandrial complex is perpendicular to epandrium (see plates 13, 14 and 16 of male terminalia in Brake (2000)).

The new genus is placed into Milichiinae (*sensu* Brake 2000) based on vibrissal angle obsolescence, and vibrissa above lower margin of eye. The presence of strong anepisternal bristles may indicate a possible relationship between *Brakemyia* gen. nov., *Eusiphona* Coquillett, 1897, *Pholeomyia* Bilimek, 1867, *Pseudomilichia* Becker, 1907, and an undescribed genus (Undescribed Genus A, *sensu* Swann (2010)) (Swann 2010).

Brakemyia metallica, gen. et sp. nov.

(Figs. 2–6)
urn:lsid:zoobank.org:act:CCD44732-DCF7-4C54-803F-7DDD77325C41

Type material: *Holotype*: ♂ (MPEG) labelled: Belém, PA [= Pará], Brasil [= Brazil] / Campus MPEG

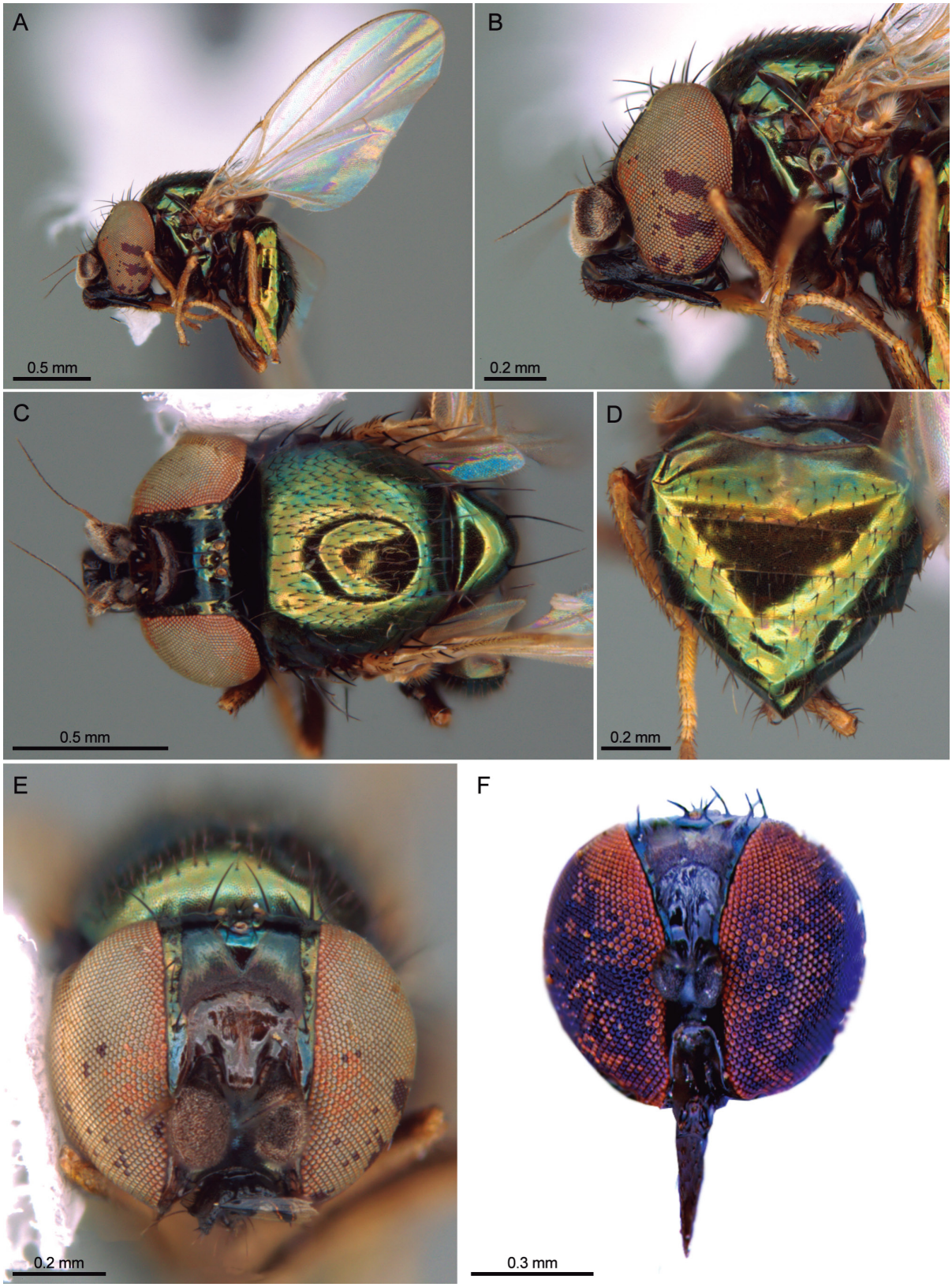

Fig. 2. *Brakemyia metallica*, gen. et sp. nov. A–E: Female, from Amazonas state. F: Male (holotype), from Pará state. A: Habitus, lateral view. B: Head and thorax, lateral view. C: Head and thorax, dorsal view (the dented mesonotum was an accidental artefact from handling or the drying process). D: Abdomen, dorsal view. E: Head, anterior view. F: Head, anterior view.

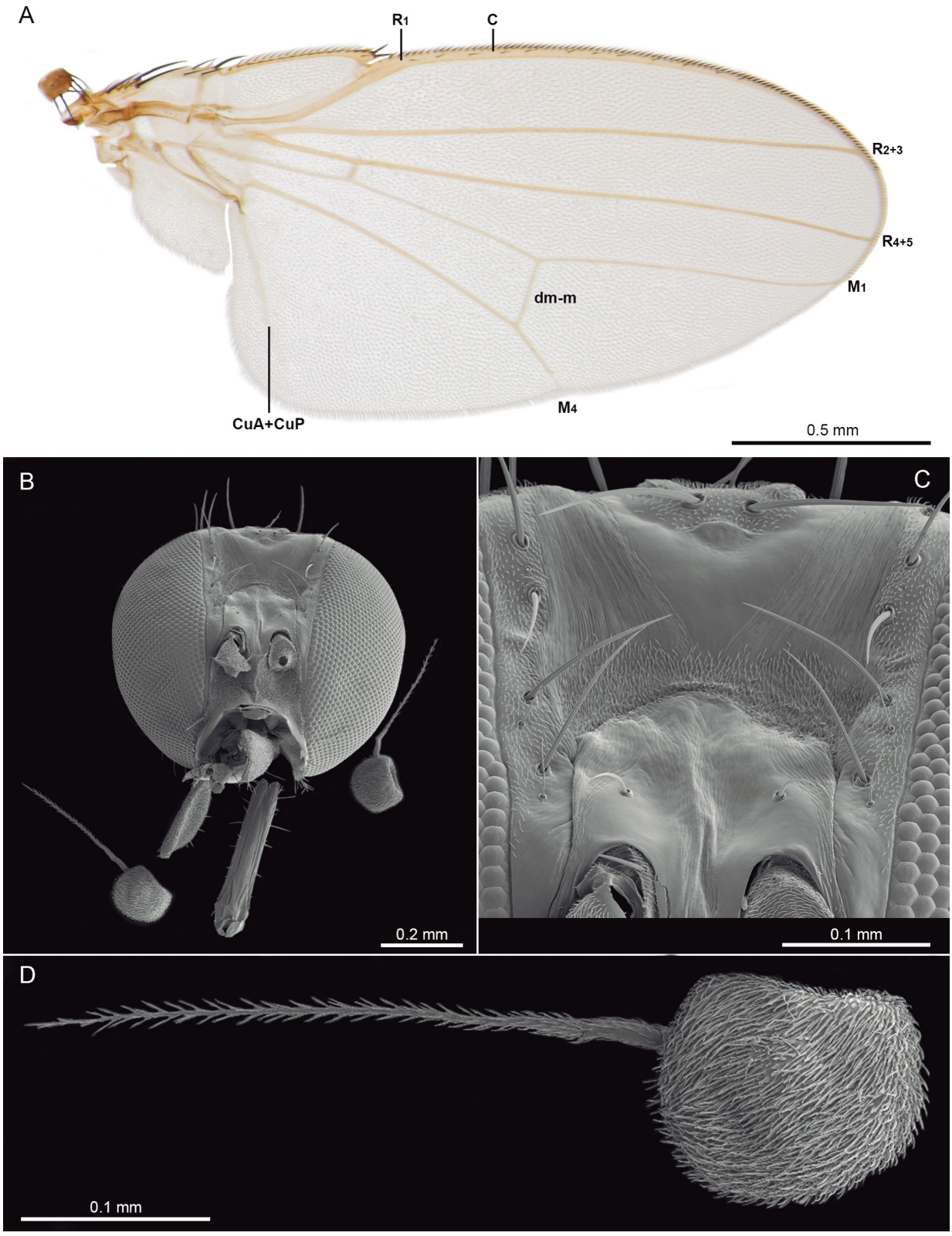

Fig. 3. *Brakemyia metallica*, gen. et sp. nov., female from Amazonas state. A: Wing, posterior view. B: Head, anterior view. C: Postfrons, anterior view. D: First flagellomere, lateral view. Abbreviations: C = Costal vein; CuA+CuP anterior branch of cubital vein + posterior branch of cubital vein; dm-m = discal medial crossvein; M_1 = first branch of media; M_4 = fourth branch of media; R_1 = anterior branch of radius; R_{2+3} = second branch of radius; R_{4+5} = third branch of radius.

[Research Campus of Museu Paraense Emilío Goeldi, 1°27'04.34"S 48°26'40.77"W] / mata secundária [= secondary forest] / F.S. Carvalho-Filho & R.R. Barbosa [collectors] / II.2021 [printed on rectangular white label] // Criado de ninho de *Azteca* [= reared from *Azteca* nest] [printed on rectangular white label] // Holotype / Brakemyia / metallica [handwritten on red label]. Holotype in good condition with abdomen and terminalia cleared and preserved in glycerin in a microvial pinned beneath the specimen. *Paratypes*. Same data as holotype (1 ♂ and 3 ♀ ♀, MPEG; 4 ♀ ♀, INPA); same data, except: 22.IX.2005, Sobre ninho de *Azteca* [= on *Azteca* nest], F.S. Carvalho-Filho [collector] (1 ♀, MPEG); same data, except: II.2005, F.S. Carvalho-Filho [collector] (2 ♀ ♀, MPEG).

Additional examined material: BRAZIL, Amazonas, Manaus, Res. Ducke [= Ducke Reserve], XI.2003, OL1- 700 mts Vermelho, Arm. Suspensa 20 mts [= suspended trap at a height of 20 meters], A. Henriques et. al. Leg. [collector] (1 ♀, INPA); Amazonas, Rio [= River], Nhamundá, Cuipiranga, 01°53'58"S 57°02'59"W, 22 m, 20–23.v.2008, J.A. Rafael e eq. [collectors], Arm. suspensa lâmina d′água [= suspended trap above water surface] (1 ♀, INPA); Amazonas, S. Izabel B. Negro, Maturacá, 11–18.x.1980, Arm Malaise [= Malaise trap], J.A. Rafael [collector] (2 ♀ ♀, INPA); Amazonas, Maturacá, 13.x.1990, J.A. Rafael & J. Vidal [collectors], Arm. Malaise [= Malaise trap] (1 ♀, INPA); Manaus, R. Ducke [= Ducke Reserve], 17.iv.1990, J. Vidal, Arm. Malaise [= Malaise trap] (1 ♀, INPA). Amazonas, Maués, Rio [= river], Abacaxis, Flona [= national forest] Pau Rosa, 05°15'09"S; 58°41'52"W, 27–29.v.2008, J.A. Rafael e equipe [collectors], Malaise (1 ♀, INPA); Manaus, C. UNIV [= Federal University of Amazonas], 26.V.1982, J.A. Rafael [collector], AR [trap]: Malaise (1 ♀, INPA); Maranhão, Lago [= Lake] Verde, 20.iv.1981, W. Overal [collector] (1 ♀, INPA); Pará, Serra Norte, MANGANÊS, 9–12.IX.1985, Armadilha Suspensa, 2 m [= suspended trap at a height of 2 meters] (1 ♀, MPEG); Pará, Novo Repartimento, Vicinal 8, 04°26'42"S 49°54'25", 28.xi.2001, Arm. Malaise [= Malaise trap], J.A. Rafael & J. Vidal Leg. [collectors] (1 ♀, MPEG); Pará, Melgaço, ECFPn [= Ferreira Penna Scientific Station], Flona Caxiuanã [= National Forest of Caxiuanã], próximo alojamento [= near to accommodation], 18.III.2017, F.S. Carvalho Filho [collector], Sobre ninho de *Azteca* [= on *Azteca* nest] (1 ♀, MPEG); same data, except: Trilha do Esecaflor [= Esecaflor trail], IV.2017, R. Paterson [collector], Sobre ninho de *Azteca* [= on *Azteca* nest] (1 ♀, MPEG); Roraima, Caracaraí, P. N. Viruá, 1°29'23.3°N 61°00'08.7°S 19.iv.2015, arm. Malaise [= Malaise trap], J.A. Rafael, R. A. Heleodoro, D. M. M. Mendes, D. W. Marques & C. Maldaner [collectors] (9 ♀ ♀, INPA); same data, except: 1°29'23°N 61°00'12°S, 19.iv.2015, J.A. Rafael [= collectors], Malaise (3 ♀ ♀, INPA); same data, except: 1°27'16"N 60°59'3"W, 1–15.xii.2016, Malaise grande, J.A. Rafael & R. Boldrini [= collectors] – Rede BIA (7 ♀ ♀, INPA); same data, except: 1°29'23"N 61°00'12"W, 19.iv.2015, J.A. Rafael [collectors], Malaise [trap] (1 ♀, INPA).

Description: Body length: 1.8 mm (male), 1.8–2.2 mm (female). Wing: 1.7 mm (male), 1.7–2.2 mm (female).

Coloration and vestiture (Figs. 2, 3): Ocellar triangle dark brown, with metallic green sheen. Frontal vitta shining black. Fronto-orbital plate dark brown, with metallic green sheen. Lunule and parafacial shining black. Gena dark brown. Antenna black, flagellomere 1 covered with dense whitish microtomentum. Palpus black with whitish microtomentum. Proboscis dark brown. Occiput black. Thorax metallic green. Coxae, trochanters, femora and all tarsomere 5 dark brown; tibiae and tarsomeres 1–4 light brown to yellow, with black setae. Wing hyaline; veins yellowish; halter dark brown, knob with metallic green sheen. Abdomen with tergites and sternites metallic green; male terminalia and ovipositor dark brown.

Head (Figs. 2A–C, 2E–F, 3B–C): Rounded in profile. Vertex nearly straight. Ocellar triangle well-developed, extended beyond ocelli. Male frons trapezoidal, narrowest at lower half, base of antenna 0.14 times width of head and at vertex 0.42 times. Female frons almost quadrate, with almost parallel sides, base of antenna 0.40 times the width of the head and at vertex 0.42 times. Orbital and frontal plates forming one plate. Frontal vitta striated, with lower half covered with microtrichia. Lunule rugose, broadened, extending dorsally well posterior of the antennae and near the orbital plate, and ventrally extended as quadrate flat plate between antennae. Ptilinal fissure located close to ocellar triangle. Face short, concave, covered with whitish microtomentum. Gena short, about 0.1 times as high as eye. Eye oblong in lateral view, 1.4 times as high as long. Antenna short; scape almost inconspicuous, with short setae at apex; pedicel short, with one long prominent seta dorsally; flagellomere 1 rounded, globose, covered with dense whitish microtomentum, longer than scape and pedicel combined; arista long, 2-segmented, about 2.5 times longer than flagellomere 1, second segment micropubescent. Vibrissal angle sharp, mouth margin more or less protruding; vibrissa thick. Palpus laterally flattened, spatulate, about 1/3 of eye height. Proboscis geniculate, about 1.5 times longer than eye height. Chaetotaxy: frons with 1 medio-reclinate upper orbital seta; 1 reclinate middle orbital seta, 1 lower proclinate orbital seta, and 2 medioclinate frontal

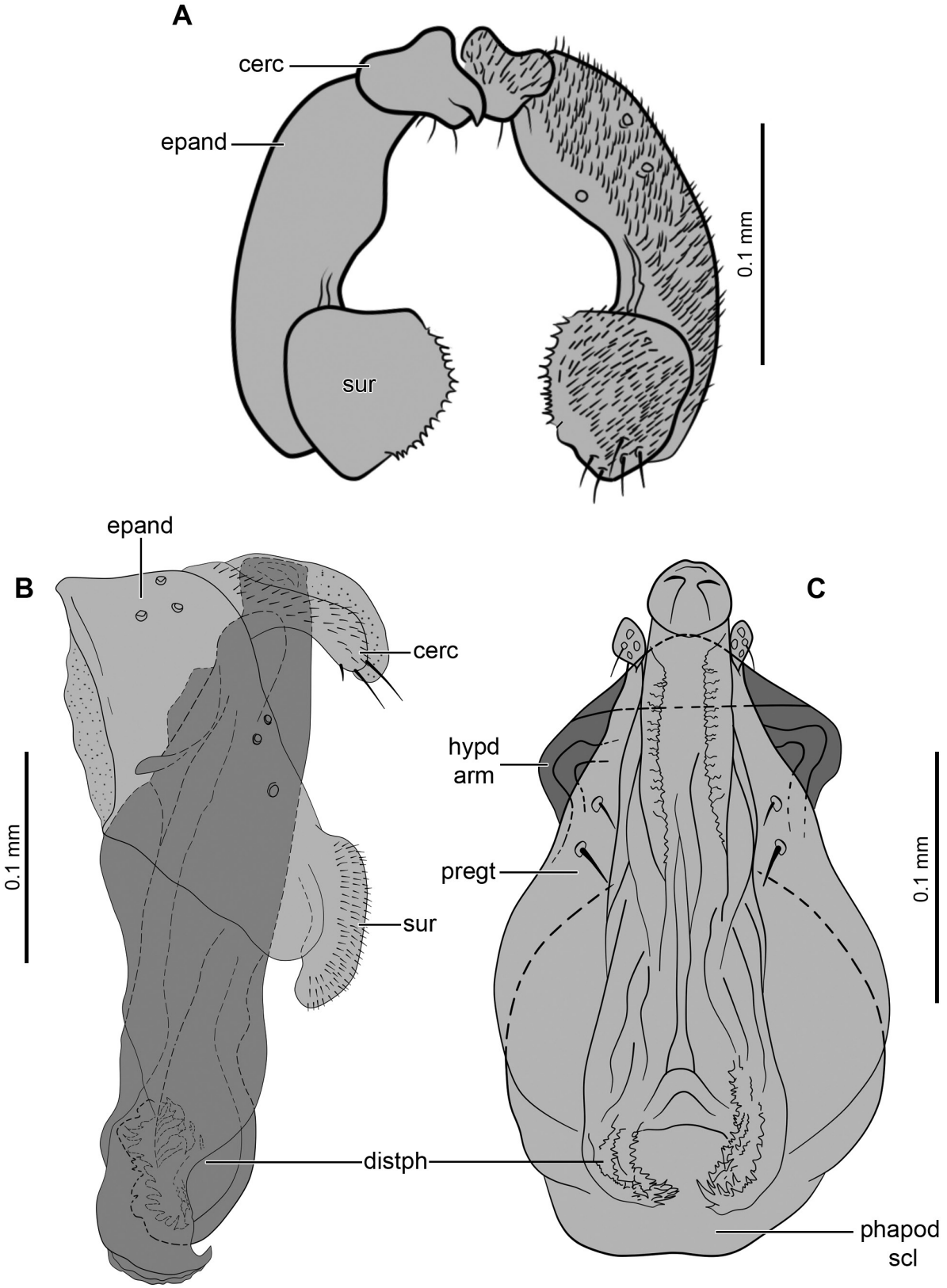

Fig. 4. *Brakemyia metallica*, gen. et sp. nov., male (holotype). A: Genitalia, ventral view. B: Genitalia, lateral view. C: Hypandrial complex, ventral view. Abbreviations: cerc = cercus; epand = epandrium; hypd arm = hypandrial arm; distph = distiphallus; phapod scl = phallapodeme sclerite; pregt = pregonite; sur = surstylus.

setae; 1 latero-reclinate medial vertical seta; 1 lateral vertical seta convergent; 1 ocellar seta divergent, well-developed; 1 postocellar seta convergent; interfrontal setulae absent; lunule with one pair of setulae placed close to lateral margin; postocular setae short, increasing in length towards gena; palpus with apical 1/2 of ventral and apical edges with short and stout setae; prementum and labellum with few long and slender setae.

Thorax (Fig. 2B–C): Mesonotum homogeneous covered with vestiture of short black setae. Chaetotaxy: 1 well-developed prescutellar seta; 2 postsutural dorsocentral seta (anterior smaller); 3 postalar setae; 1 supralar setae; 1 presutural seta; 1 postpronotal seta; 2 notopleural setae; 2 anepisternal setae at posterior margin; 2 katepisternal setae at upper margin; 2 scutellar setae, 1 laterally close to the base and 1 apically.

Legs: Fore femur with a row of long posteroventral setae, about as long as width of femur; mid femur with antero- and posteroventral rows of long setae, the posteroventral row longer than width of femur, ventral surface flattened and bare; hind femur with anteroventral row of long setae at apical 1/3, ventral and posterior surfaces bare, ventral surface flattened; mid tibia with 1 long apicoventral seta, about as long as 1/4 of tibia.

Wing (Fig. 3A): Hyaline; costal vein with setulae extending a little beyond R_{2+3}, and with posterior surface of second section of costal vein with short and sparse setae, ending before the third section of costal; R_{2+3} nearly straight; R_{4+5} and M_1 slightly converging at tip; cell br ending at level of subcostal break; cell dm long, ending at apical 6/10 of wing; dm-m as long as M_4; CuA+CuP long, slightly diverging from the margin of anal lobe, present as a fold in membrane, and ending before wing margin.

Abdomen (Fig. 2D): Broadened. Tergites and sternites homogeneously covered with short black setae.

Male genitalia (Fig. 4): Dark brown. Bent under ventral side of abdomen. Epandrium higher than wide, narrowed, covered with many setulae, and with few setae mainly on posterior half. Cercus elongate and thin in lateral view, slightly arched; triangular in posterior view, with apex incised in midline, covered with many setulae. Surstylus broadened and rounded;

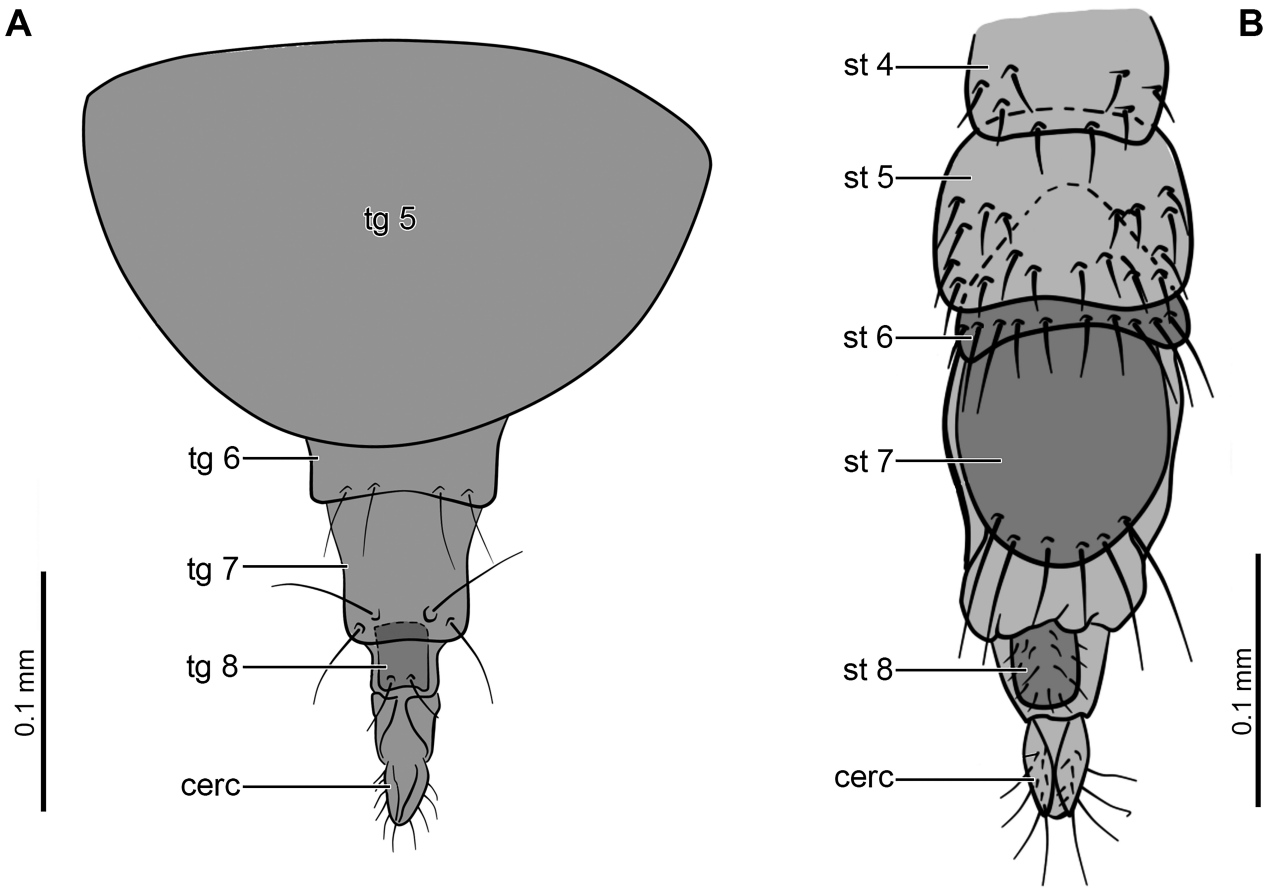

Fig. 5. *Brakemyia metallica*, gen. et sp. nov., female, ovipositor (paratype). A: Dorsal view. B: Ventral view. Abbreviations: cerc = cercus; st = sternite; tg = tergite.

apical margin bearing minute denticles, covered with many setulae, and some small setae on ventral half; fused with epandrium. Hypandrium well developed, higher than long, and higher and parallel to epandrium. Phallapodemic sclerite fused with base of pregonites and with hypandrium. Pregonite elongate and narrowed; clubbed distally, with two developed setae at middle, and tiny setae on clubbed apical portion. Distiphallus membranous, well developed and widened distally, with bilobed distal portion bearing some minute membranous spine-like projections.

Female ovipositor (Fig. 5): Telescoped. Tergite 6 not modified, broadened and quadrangular, with two pairs of fine setae on posterior margin. Tergite 7 broadened and rectangular, with two fine setae on each posterolateral corner of the distal half. Tergite 8 short and quadrangular, with two setae on posterior margin. Supranal plate divided into two lateral plates. Sternite 6 broadened and triangular, with a row of thick setae on posterior margin. Sternite 7 broadened and rounded, with three pairs of long and thick setae on the posterior margin. Sternite 8 short and quadrangular, covered with many setulae. Cercus short and elongate, with many fine setulae.

Etymology: The new species is named from the Latin epithet "*metallicus*" referring to its remarkable metallic green sheen of body.

Distribution: NEOTROPICAL—Brazil (states of Amazonas, Maranhão, Pará and Roraima) (Fig. 6). The ant species (*Azteca* aff. *chartifex*), with which *B. metallica* sp. nov. is associated, is distributed from Costa Rica to southern Brazil (Longino 2007). Therefore, *B. metallica* sp. nov. may have a wider distribution.

Remarks: *Brakemyia metallica* sp. nov. can be easily distinguished from other Neotropical milichiid species in having body with metallic green sheen. Male specimens from different genera (*Milichia*, *Milichiella* Giglio-Tos and *Pholeomyia* Bilimek) have bands of silvery microtomentum on abdomen and/or thorax (Brake 2000; Swann 2010; Swann and Sinclair 2021) and some species are shining black, but they never have metallic sheen, as observed in *B. metallica* sp. nov.

Natural history and geographical distribution of *Brakemyia* gen. nov.

Adults of *B. mettalica* sp. nov. emerged from carton nests of *Azteca* aff. *chartifex*, and females have been frequently observed alighting on the carton walls of ant nests. Hence, larvae must inhabit ant nests, but we do not know the kind of association between the fly larvae and the ants. We hypothesize that they are saprophagous, feeding on the microorganisms (*e.g.*, fungi and algae) that grow on the ant nest walls, like other species of milichiids whose biology is known (Brake 2000; Swann 2010; Swann and Sinclair 2021).

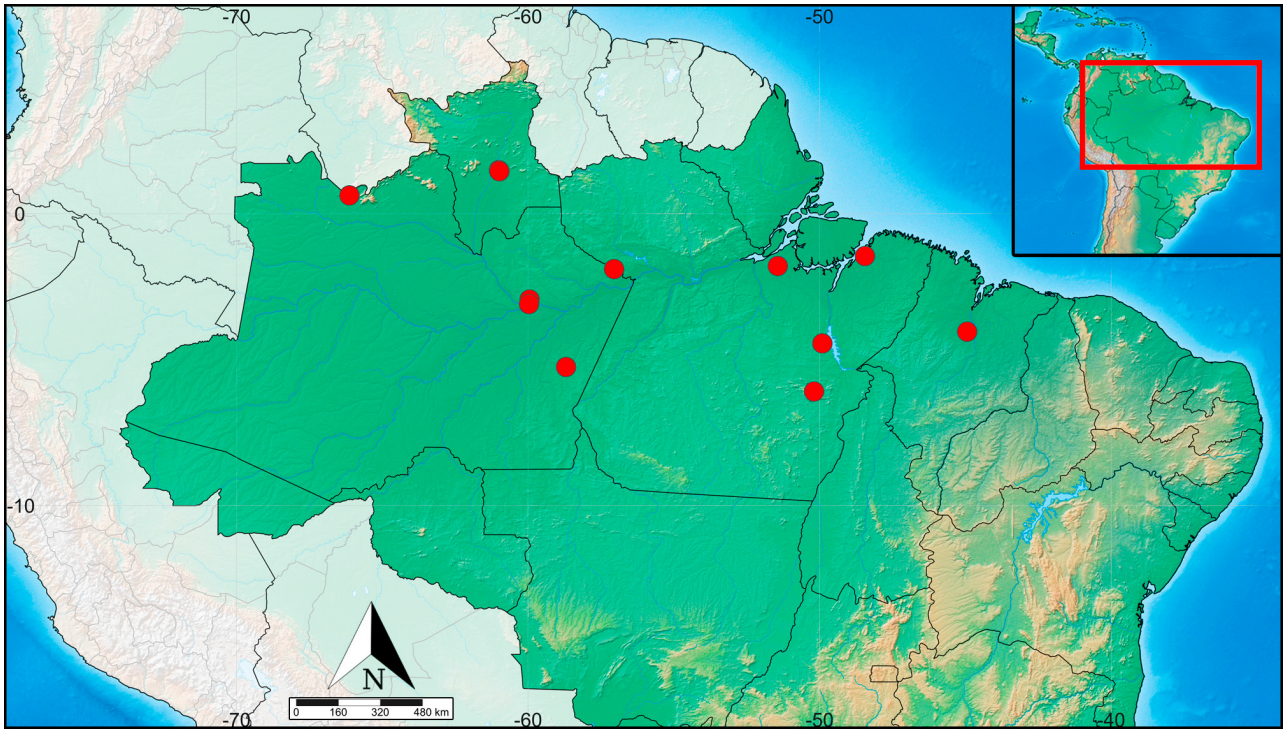

Fig. 6. Distribution map of known occurrence of *Brakemyia metallica*, gen. et sp. nov.

Specimens of Undescribed Genus B, which possibly belong to *Brakemyia* gen. nov., were also associated with carton nests of *Azteca* in Trinidad and Tobago, as well as another undescribed Neotropical genus (Undescribed Genus D) from Guyana (Swann 2010). The genera *Costalima* Sabrosky and Undescribed Genus C (Swann 2010) were associated with species of *Azteca* that live in hollow internodes of pumpwood tree (*Cecropia* spp.) (Swann 2010). However, a phylogenetic hypothesis including the mentioned genera is necessary to assess if this behavior evolved more than once in milichiids, or if it is a synapomorphy of a clade. We did not observe adult specimens of *B. metallica* sp. nov. interacting with the ants, as some species of the genus *Milichia* (Brake 2000; Wild and Brake 2009). When detected by ants, *B. metallica* sp. nov. usually flew away.

Swann (2010) mentioned the existence of at least three undescribed species of Undescribed Genus B, which possibly belongs to *Brakemyia* gen. nov., from Central and South America. One of these species was collected from an *Azteca* ant nest using a black light in Trinidad and Tobago, and we assume it is probably conspecific with *B. metallica* sp. nov. The second species is known from sampling pollinators of *Aristolochia pilosa* (Aristolochiaceae) and canopy fogging in Panama. The third species is known from light trapping in Colombia, indicating a possible attraction to light in at least two of the three species of the genus. However, it is necessary to examine the male terminalia to confirm whether they are distinct species or not. Species of *Azteca* that produce large pendant carton nests belong to the *Azteca trigona* group (which includes *A. chartifex*) and *Azteca aurita* group, which occurs in wet and dry tropical forests from Panama southward through tropical South America (Longino 2007). Therefore, it is expected that *Brakemyia* gen. nov. species have a similar distribution.

Many species of flies, mainly from the families Milichiidae and Phoridae, have been reared from *Azteca* carton nest (Brown 2010; Swann 2010; Pérez-Lachaud et al. 2017). Recently, a new species of the genus *Neoscutops* Malloch (Periscelididae) was described based on specimens reared from an *Azteca* carton nest, representing the first piece of information about this genus' larval natural history (Carvalho-Filho et al. 2022). As ant carton nests remain understudied for flies, it is expected that new species will be discovered as more studies are conducted on the fauna associated with that habitat.

Milichiids are abundant in mass collections, such as those of Malaise traps, but they are usually overlooked (Swann 2010). This is the case of female specimens of *B. metallica* sp. nov. that are relatively common in the two main entomological collections from the Brazilian Amazon (see MATERIALS AND METHODS). They were collected mainly with Malaise and suspended traps installed in open and urbanized places, as well as in pristine forest through the Amazon region (Fig. 6) where carton nests of *Azteca* are abundant. On the other hand, male specimens are rarely collected, and the two examined specimens were reared from an ant nest maintained in the laboratory (Fig. 1B). This may reflect reproductive behavior, with males remaining inside or near the ant nests, while mated females actively search for oviposition sites, making them more liable to interception as observed in other dipteran families (Bickel 2009). This may be the same case for the Undescribed Genus D, which is known only from females collected from *Azteca* nest in Guyana (Swann 2010).

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