



New species and new records
of leaf-miner flies (Diptera, Agromyzidae)
from rainforest and inselberg
at Mitaraka (French Guiana)

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View: hill top site along trail C, 24 February 2015 (photo: Marc Pollet). In medallion: *Phytobia corona* Boucher, n. sp., holotype ♂.

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New species and new records of leaf-miner flies (Diptera, Agromyzidae) from rainforest and inselberg at Mitaraka (French Guiana)

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ABSTRACT

The Agromyzidae Fallén, 1823 fauna of French Guiana has never been previously studied and only five well known and economically important species had been reported from this region. A recent expedition to the Mitaraka massif, a largely unexplored region of French Guiana, has resulted in a remarkable diversity of Agromyzidae. This study provides the first results of the taxonomic treatment of these agromyzids with the description of eight new species: *Agromyza mitarakensis* Boucher, n. sp., *Calycomyza inselbergensis* Boucher, n. sp., *Cerodontha pseudonigrihalterata* Boucher, n. sp., *Liriomyza touroulti* Boucher, n. sp., *Nemorimyza thanatos* Boucher, n. sp., *Phytobia corona* Boucher, n. sp., *Phytobia dalensi* Boucher, n. sp., *Phytobia pluviasilvae* Boucher, n. sp., and the first record of two Neotropical species previously unreported from French Guiana: *Calycomyza grenadensis* Zlobin, 1996 and *Phytoliriomyza jurgensi* Spencer, 1983. Diagnoses and systematic notes are provided for each species together with photographs of habitus and male genitalia. The agromyzid fauna of French Guiana now includes 15 described species.

KEY WORDS

Agromyzidae,
Diptera,
Neotropical,
French Guiana,
new records,
new species.

RÉSUMÉ

Nouvelles espèces et nouvelles signalisations de mouches mineuses (Diptera, Agromyzidae) de la forêt tropicale et de l'inselberg de Mitaraka (Guyane).

La faune des Agromyzidae Fallén, 1823 de Guyane n'a jamais été étudiée auparavant et seules cinq espèces bien connues et économiquement importantes ont été signalées dans cette région. Une expédition récente au massif du Mitaraka, une région largement inexplorée de la Guyane, a abouti à une diversité remarquable d'Agromyzidae. Cette étude fournit les premiers résultats du traitement taxonomique de ces Agromyzidae avec la description de huit nouvelles espèces : *Agromyza mitarakensis* Boucher, n. sp., *Calycomyza inselbergensis* Boucher, n. sp., *Cerodontha pseudonigrihalterata* Boucher, n. sp., *Liriomyza touroulti* Boucher, n. sp., *Nemorimyza thanatos* Boucher, n. sp., *Phytobia corona* Boucher, n. sp., *Phytobia dalensi* Boucher, n. sp., *Phytobia pluviasilvae* Boucher, n. sp. et la première signalisation de deux espèces néotropicales précédemment inconnues en Guyane : *Calycomyza grenadensis* Zlobin, 1996 et *Phytoliriomyza jurgensi* Spencer, 1983. Des diagnostics et des notes systématiques sont fournis pour chaque espèce ainsi que des photographies des habitus et des genitalia mâles. La faune des Agromyzidae de Guyane compte aujourd'hui 15 espèces décrites.

MOTS CLÉS
Agromyzidae,
diptères,
néotropical,
Guyane,
signalisations nouvelles,
espèces nouvelles.

INTRODUCTION

Describing the world's biodiversity remains a critical priority, especially in the tropics where we know only a fraction of the diversity. Larger organisms like mammals and birds are relatively well known but smaller organisms like insects make up the bulk of the unknown species (Stork 2018). The expedition to the Mitaraka massif in southwestern French Guiana (Touroult *et al.* 2018) was part of the “Our planet Reviewed” (“La Planète Revisitée”) program led by the Muséum national d’Histoire naturelle (France) and Pro-Natura International. This large-scale biodiversity initiative has a primary objective to accelerate the discovery and description of new species (Muséum national d’Histoire naturelle 2016; Touroult *et al.* 2018). The Mitaraka expedition considerably contributed to the disclosure of a yet unknown invertebrate fauna with e.g., the description of 20 new Diptera species so far, from various families (Touroult *et al.* 2021): Chloropidae Rondani, 1856 (one species) (Riccardi 2020); Dolichopodidae Latreille, 1809 (seven species) (Runyon & Pollet 2018; Brooks *et al.* 2018); Keroplatidae Rondani, 1856 (three species) (Blagoderov & Pollet 2020); Muscidae Latreille, 1802 (one species) (Gomes & Carvalho 2018); Pipunculidae (one species) (Marques *et al.* 2019); Psychodidae Newman, 1834 (two species) (Curler 2020); Sciomyzidae Fallén, 1820 (one species) (Mortelmans & Pollet 2018); Sepsidae Walker, 1833 (one species) (Silva & Pollet 2020), and Tipulidae Latreille, 1802 (three species) (Mederos & Pollet 2019).

The Agromyzidae Fallén, 1823 is a family of phytophagous flies found throughout the world with 3200 species described (von Tschirnhaus & Groll 2024). Within the Neotropical region, 520 species are documented, including those newly described in this article. Prior to this expedition, very little was known about the agromyzid fauna of French Guiana with only five species reported, namely *Calycomyza lantanae* (Frick, 1956), *Liriomyza huidobrensis* (Blanchard, 1926), *Liriomyza trifolii* (Burgess, 1880), *Liriomyza sativae* Blanchard, 1938 and *Nemorimyza maculosa* (Malloch, 1913) (Ryckewaert & Rhino 2017; Anonymous 2018; Martinez & Étienne 2002; Ryckewaert 2003). The brief expedition of the Mitaraka massif resulted in a surprisingly diverse fauna with 50 additional morphospecies in 10 genera (Boucher & Pollet 2021).

The Mitaraka massif is a particularly interesting site for Agromyzidae. It is situated in an undisturbed rainforest environment on the Guiana Shield in southwestern French Guiana where no agromyzids have ever been collected. It is part of the protected Guiana Amazonian Park, which is adjacent to the Amazon rainforest of the Tumucumaque National Park of Brazil, also with an unknown agromyzid fauna. This whole area, combined with Suriname to the west (also completely unexplored), represents a huge gap in our knowledge of Neotropical Agromyzidae. The Mitaraka landscape consists of lowland tropical rainforest with riverine systems and scattered rocky outcrops, known as inselbergs (from German Insel, “island,” and Berg, “mountain”) (Touroult *et al.* 2018). Inselbergs have a characteristic patchy vegetation separated by bare rock, called “savane-

roche” (“rock savanna”) in French Guiana (Sarhou *et al.* 2003). These inselbergs offer an exposed xeric environment with extreme climatic variation to its inhabitants (Szarzynski 2000), which contrasts with the humid environment of the surrounding rainforests of Mitaraka. Due to their isolated nature, inselbergs are known for their unique flora and fauna (Mares & Seine 2000; Porembski 2007). The agromyzid fauna of inselbergs (of French Guiana or elsewhere in the world) remained completely unknown until now. Interestingly, most of the Agromyzidae at the Mitaraka massif were collected from a minor inselberg (471 m) (further information about site topography can be found in Pollet *et al.* 2018) with only a few species from the lowland rainforest (Boucher & Pollet 2021).

The main objective of the present study is to provide a systematic treatment of the Agromyzidae (all genera except *Melanagromyza* Hendel, 1920 and *Ophiomyia* Braschnikov, 1897 which will be treated separately) collected during the Mitaraka expedition, to describe the new species in the genera *Agromyza* Fallén, 1810, *Calycomyza* Hendel, 1931, *Cerodontha* Rondani, 1861, *Liriomyza* Mik, 1894, *Nemorimyza* Frey, 1946 and *Phytobia* Lioy, 1864, and to record new distributional data for two known Neotropical species.

MATERIAL AND METHODS

Specimens examined were collected in French Guiana as part of the Mitaraka expedition and were identified and reported as morphospecies prior to this study (Boucher & Pollet 2021). Male genitalia were examined by removing the abdomen of the specimen and clearing it in 85% lactic acid heated in a microwave oven during 2-3 intervals of 30 seconds each, separated by a cooling period, or cleared outside the microwave (later in the project) following the procedures outlined in Boucher (2019). The abdomen of each specimen was subsequently transferred to glycerin solution for dissection and examination, and finally stored in a microvial pinned below the corresponding specimen. Morphological terminology follows Cumming & Wood (2017), except for the orbital and frontal setae which are here referred to as *ors* and *ori*. Other abbreviations are as follows: *dc*: dorsocentral setae (numbered starting posteriorly); 3 + 1 *dc* indicates the presence of three dorsocentral setae located posterior to the transverse suture (postsutural) and one dorsocentral seta located anterior to the suture (presutural); *prsc*: prescutellar seta; *MT*: Malaise trap. Distribution of species is based on published data and on specimens examined. Digital images of specimens were taken with a luminera infinity camera 1 mounted on a stereo microscope Leica MZ 12.5 or a compound microscope Leica DMLB. Image stacking was performed using Combine ZP software. All images, unless stated otherwise, were taken by the first author.

A few Mitaraka specimens used in the study were previously barcoded for a complementary DNA barcoding project (Boucher & Savage 2022), with GenBank accession numbers provided under the corresponding species.

Type specimens will ultimately be deposited at the Muséum national d'Histoire naturelle, Paris, France (MNHN), and the Lyman Entomological Museum, Québec, Canada (LEMQ).

SYSTEMATIC TREATMENT

Order DIPTERA Linnaeus, 1758
Family AGROMYZIDAE Fallén, 1823
Genus *Agromyza* Fallén, 1810

Agromyza Fallén, 1810: 21.

TYPE SPECIES. — *Agromyza nigripes* Meigen, 1830.

REMARKS

This genus is easily recognized by the presence of a stridulatory organ, in the form of a band of chitinized scales on the side of the abdomen along the margin of the fused tergites 1 and 2. The adults are usually completely black with white or yellow halter (except for the Neotropical species *A. fusca* Spencer, 1963 with black halter and *A. insolens* Spencer, 1963 with brownish halter), usually have three or more pairs of dc (a few species with only two well-developed postsutural dc and a third small one). *Agromyza megaepistoma* Sasakawa, 2005 from Ecuador has only two postsutural dc with rarely a third small one) and well-developed prsc. A single male specimen of *Agromyza* was collected on the Mitaraka massif (Boucher & Pollet 2021) and represents a new species that is described below.

Agromyza mitarakensis Boucher, n. sp.
(Fig. 1)

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TYPE MATERIAL. — **Holotype**. Guyane • ♂; Mitaraka, sampling site: MIT-E-savane roche 2; 02°13'59.8"N, 54°27'46.5"W; 471 m; open/partially opened areas; 13-20.VIII.2015; MT (6 m); Pierre-Henri Dalens leg.; sample code: MITARAKA/230, sorted by M. Pollet; MNHN.

ETYMOLOGY. — The specific name refers to the type locality.

DIAGNOSIS. — This species differs from other Neotropical species of *Agromyza* by the strongly angulate gena, greyish calypter with brown fringe, dirty yellow halter, small epistoma, yellowish antennae, long acrostichal setulae, two well-developed postsutural dc, and the arista with short, but distinct pubescence.

DISTRIBUTION. — French Guiana.

HOST PLANTS. — Unknown.

DESCRIPTION

Male

Orbital plate not projecting in front of eye in profile; frons width including orbital plates 0.25 mm at midpoint; orbital plate 0.25 × width of frons at midpoint; two reclinate ors and two slightly weaker inclinate ori; orbital setulae sparse,

short and reclinate, in one row; first flagellomere small with short white pubescence; arista long with distinct pubescence; gena angulate, deeper at rear (Fig. 1A), at midpoint about 0.1 × maximum eye height; clypeus with upper margin rounded (Fig. 1B); small epistoma present (Fig. 1B); only two well-developed postsutural dc located posterior to supra-alar, with possibly one much smaller postsutural anterior dc on one side only; prsc well-developed; acrostichal setulae long and numerous, in about 8-9 rows; mid tibia with two posterolateral setae; wing length approximately 1.95 mm (wing bent); last section of M_4 0.6 × length of penultimate section.

Colour

Frons and orbital plate pale brown, upper frons blackish at level of ocelli; scape and pedicel pale brown, first flagellomere yellowish; face and palpus brown; gena brown with yellowish spot at rear; clypeus brown, subshining; mesonotum and scutellum shiny brown; side of thorax (all pleura) brown; legs brown; calypter and fringe brown; halter yellow apically, with stalk and base of knob brownish; abdomen yellowish brown.

Male genitalia

Phallus (Fig. 1D, E) symmetrical, with distiphallus short and broad; hypandrium pointed at apex; ejaculatory apodeme with narrow blade (Fig. 1C).

REMARKS

This new species has a characteristic ejaculatory apodeme with a narrow blade as seen for *A. simillima* Spencer, 1963 from Brazil (Spencer 1963). The two species also share only two well-developed dc. The phallus of *A. simillima* has never been illustrated. Pictures of the phallus (on permanent mount) and habitus of the holotype specimen of *A. simillima* (Fig. 2), provided by the Natural History Museum, London (NHM), confirm that the two species are different. The distiphallus of *A. simillima* is much narrower and elongate (Fig. 2A). Furthermore, the arista of *A. simillima* is described as conspicuously plumose (Spencer 1963), which is not the case in *A. mitarakensis* Boucher, n. sp. The head of the holotype of *A. simillima* is glued to a cardboard point separated from the rest of the specimen, but the aristae are missing (Fig. 2C). The phallus of *A. mitarakensis* Boucher, n. sp. is similar to that of *A. animata* Spencer, 1973 from Costa Rica (Spencer 1973a), but the latter species has three well-developed dc and darker antennae. The ejaculatory apodeme of *A. animata* has not been described nor illustrated yet. *Agromyza mitarakensis* Boucher, n. sp. was listed as morphospecies *Agromyza* Mit-1 in Boucher & Pollet (2021).

Genus *Calycomyza* Hendel, 1931

Calycomyza Hendel, 1931: 65.

TYPE SPECIES. — *Agromyza artemisiae* Kaltenback, 1856.

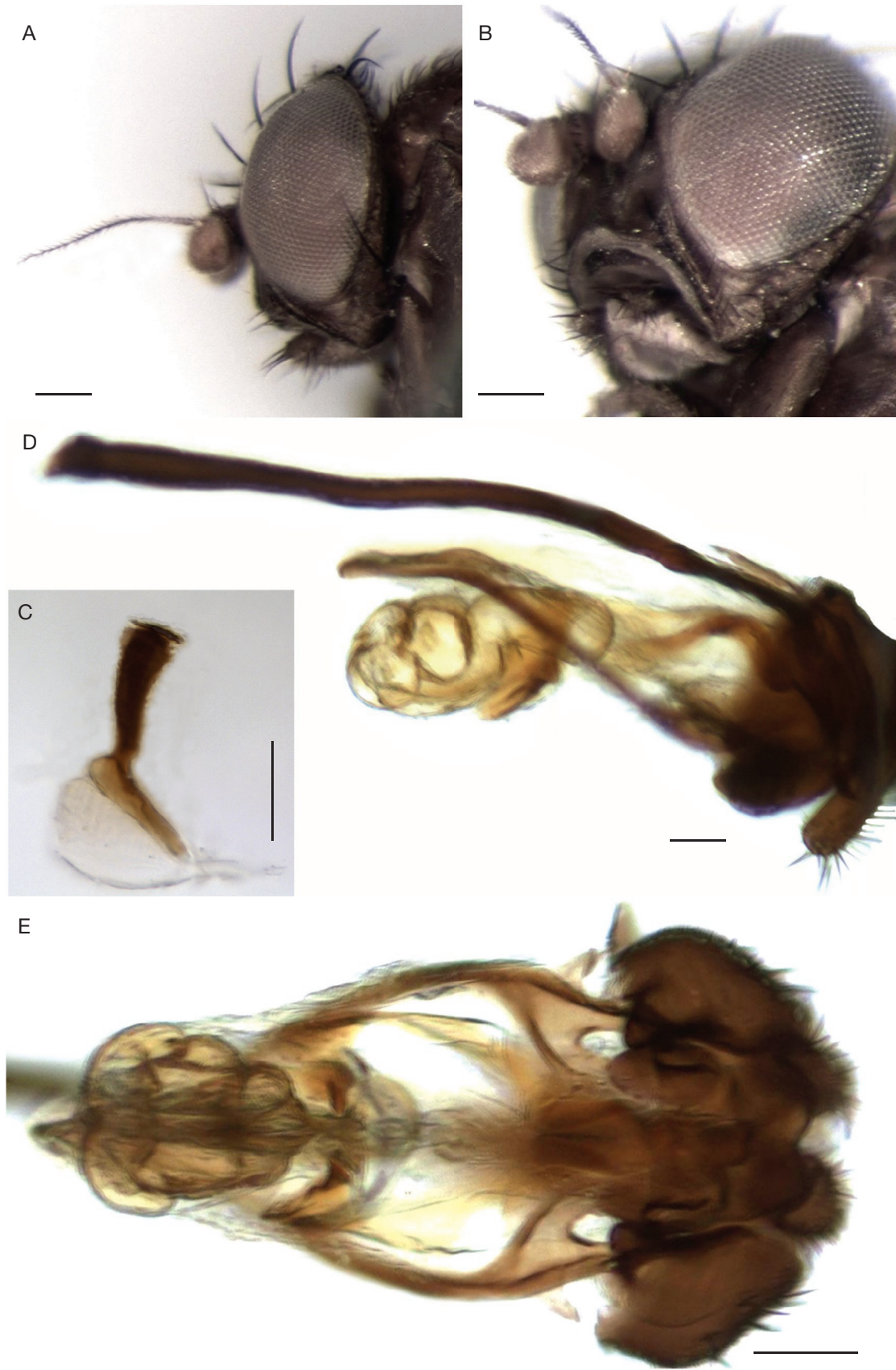


FIG. 1. — *Agromyza mitarakensis* Boucher, n. sp., holotype ♂: **A**, head, lateral; **B**, head antero-lateral showing clypeus; **C**, ejaculatory apodeme; **D**, phallus, lateral view; **E**, phallus, ventral view. Scale bars: A, B, 0.1 mm; C, D, E, 0.05 mm.

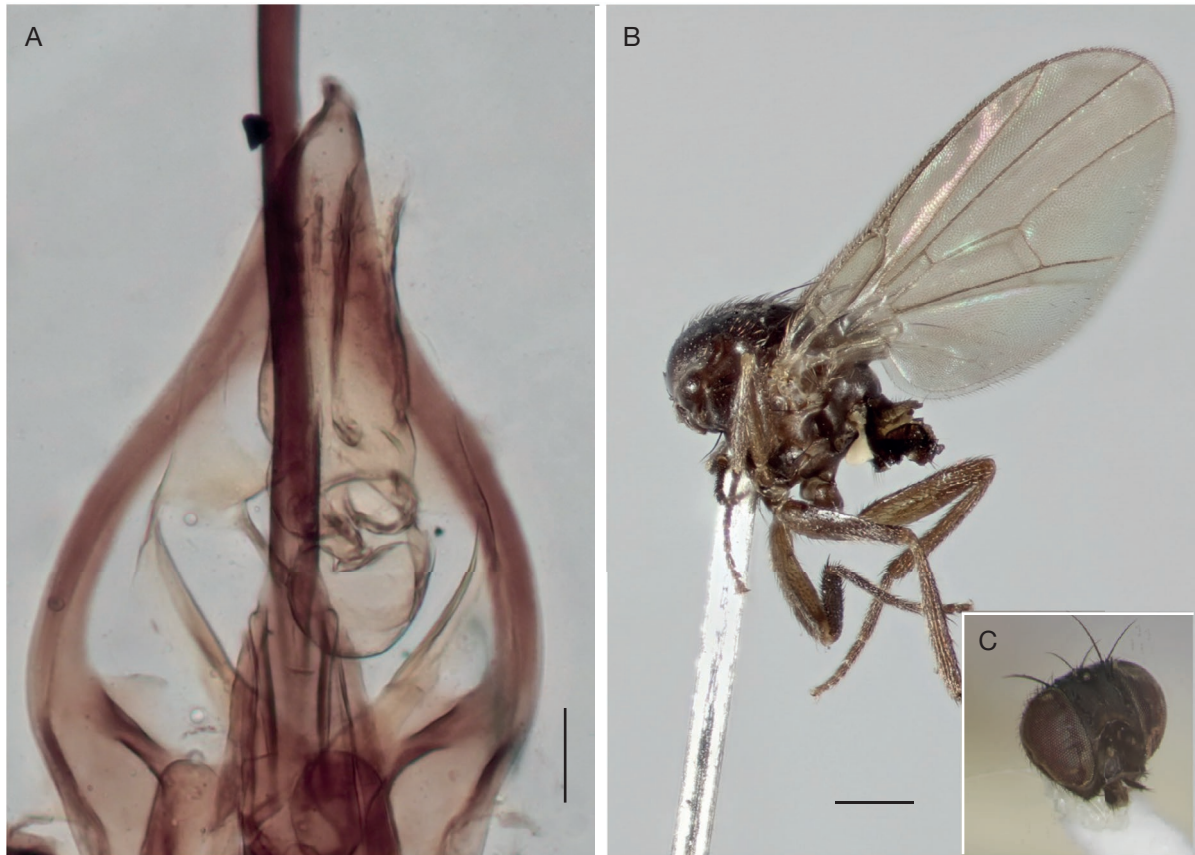


FIG. 2. — *Agromyza simillima* Spencer, holotype ♂: **A**, phallus ventral view; **B**, habitus lateral view (head missing); **C**, head. Scale bars: A, 0.05 mm; B, 0.5 mm. Photos: Nigel Wyatt.

REMARKS

Most species of *Calycomyza* are characterized externally by a yellow frons, dark antennae, yellow notopleuron, dark scutellum, pale yellowish halter and the presence of only two postsutural dc. However, exceptions exist, such as: *C. meridiana* (Hendel, 1923), a widespread neotropical species, with yellow third antennal segment; *C. devia* Spencer, 1973 from Venezuela and Costa Rica with a brownish frons and darker notopleural areas; *C. compositana* Spencer, 1973, *C. illustris* Spencer, 1973, *C. steviae* Spencer, 1973, *C. parilis* Spencer, 1973 and *C. palmaris* Spencer, 1973, all from Venezuela, have 3 + 1 dc. The latter two species also feature a brown halter. A distinctive characteristic of the genus is the male genitalia with the epandrium and surstyli having a patch of short strong spines. Seven specimens of *Calycomyza* were collected on the Mitaraka massif, representing four species (Boucher & Pollet 2021). Two of them were represented by females only (Boucher & Pollet 2021) and their identity could not yet be confirmed. These two species are characterized by the presence of 3 + 1 dc (two weaker anterior ones). Of the other two species, one represents *C. grenadensis* Zlobin, 1996 (morphospecies *Calycomyza* Mit-1 *sensu* Boucher & Pollet 2021), which was previously known from Grenada (Zlobin 1996a) (see below), and the other (morphospecies *Calycomyza* Mit-2 *sensu* Boucher & Pollet 2021) represents

a new species, which is described below. Only one species, *Calycomyza lantanae* (Frick, 1956) was previously recorded from French Guiana (Anonymous 2018).

Calycomyza grenadensis Zlobin, 1996 (Fig. 3)

Calycomyza grenadensis Zlobin, 1996a: 153. — Martinez & Étienne 2002: 29.

MATERIAL EXAMINED. — **Guyane** • 1 ♂, 1 ♀; Mitaraka, sampling site: MIT-E-savane roche 2; 02°13'59.8"N, 54°27'46.5"W; 471 m; open/partially opened areas; 13-20.VIII.2015; MT (6 m); Pierre-Henri Dalens leg.; sample code: MITARAKA/230, sorted by M. Pollet; MNHN.

DIAGNOSIS. — The distinctive characteristics of this species include the long strongly chitinized projection of the hind ventral lobe of the phallus (Zlobin 1996a), prominent in the Mitaraka specimen (Fig. 3C, arrow), the shape of the distiphallus with two well-sclerotized sclerites broadly separated at the base (Fig. 3D) and the shape of the ejaculatory apodeme with the blade only 2.3 × larger (at its widest point) than the stalk at midpoint (Fig. 3B).

DISTRIBUTION. — Grenada, French Guiana (new record).

HOST. — Unknown.

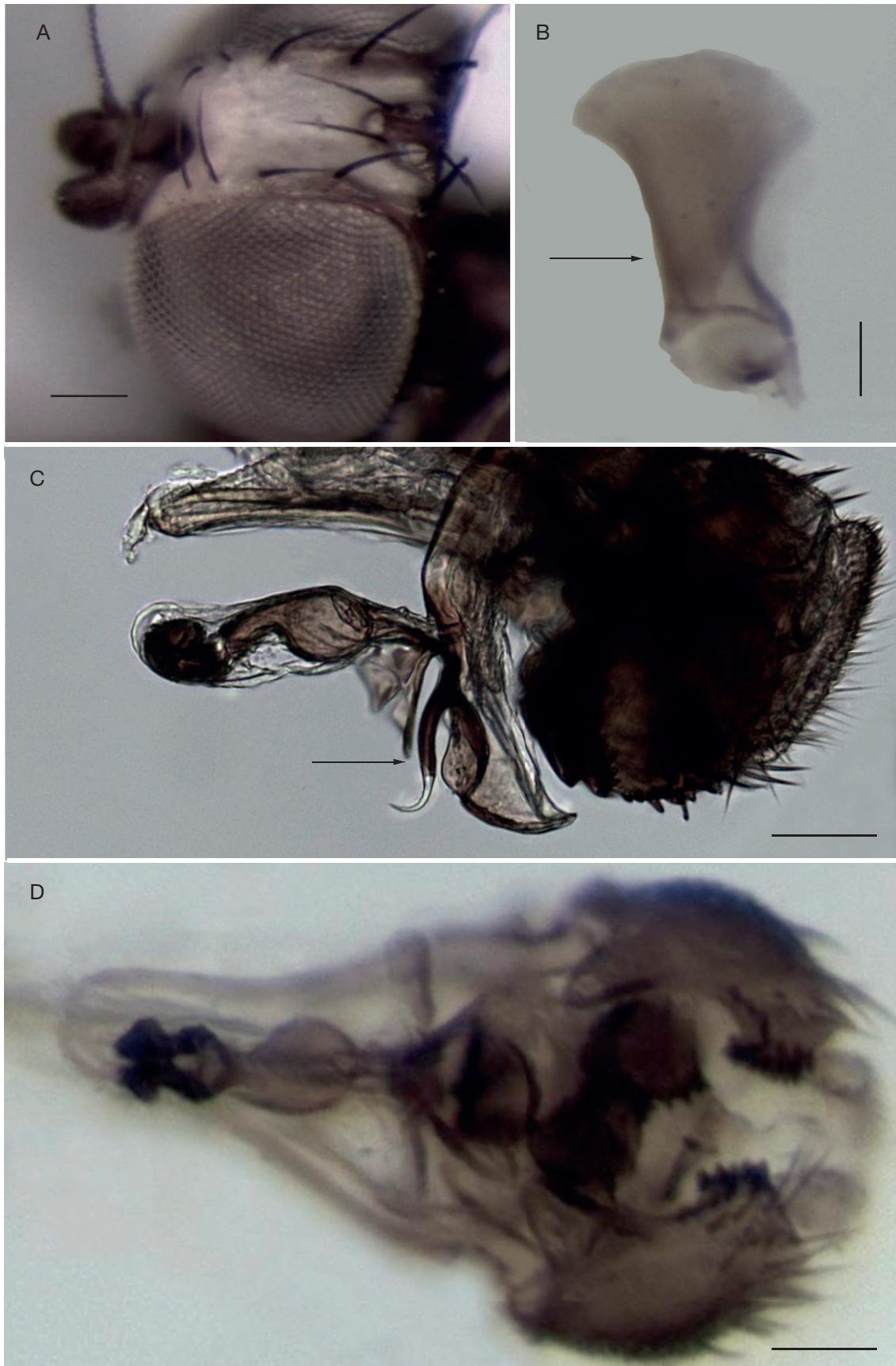


FIG. 3. — *Calycomyza grenadensis* Zlobin, 1996: **A**, head, dorso-lateral view; **B**, ejaculatory apodeme; **C**, phallus, lateral view; **D**, phallus, ventral view. Scale bars: A, 0.1 mm; B, C, D, 0.05 mm.

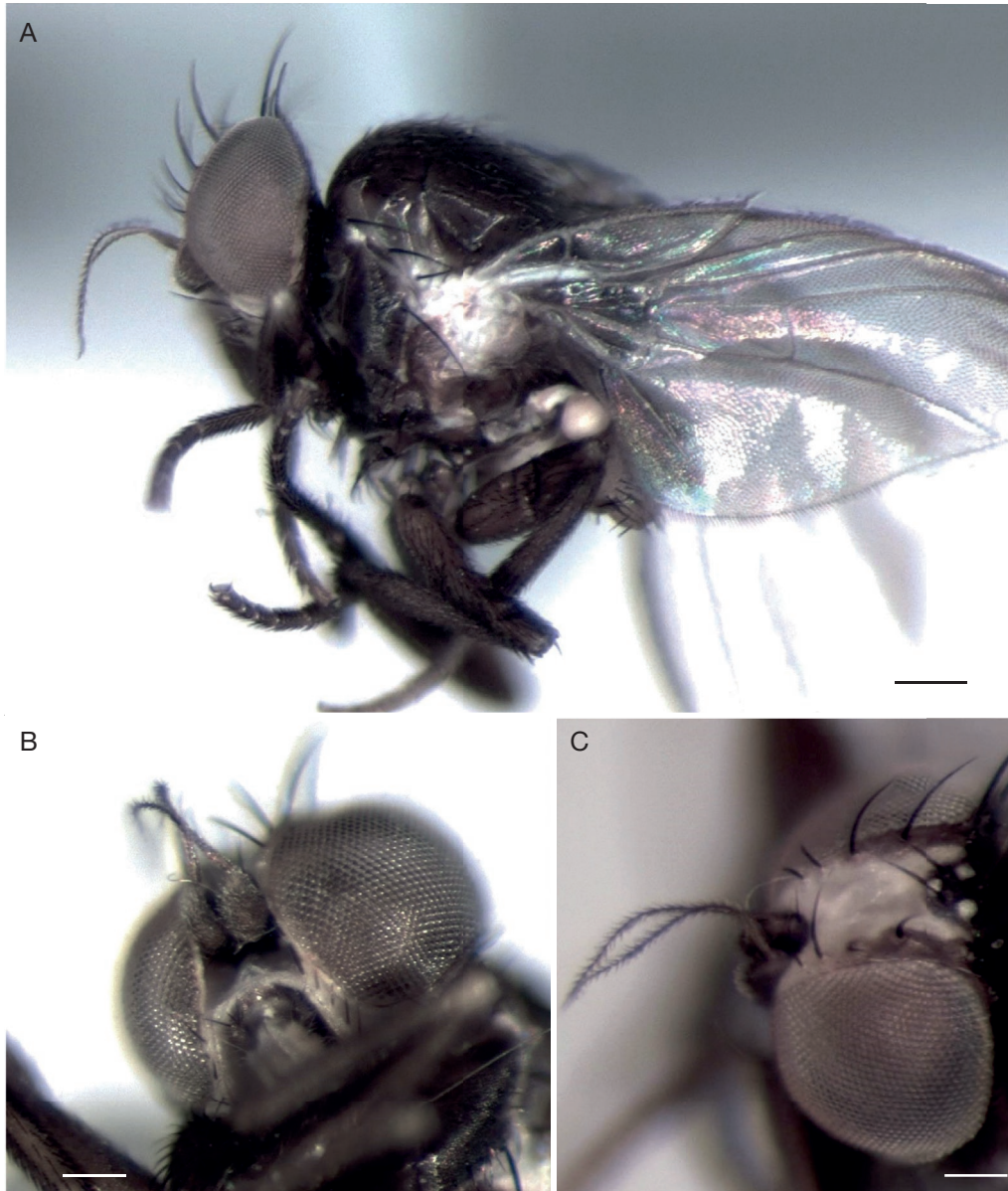


FIG. 4. — *Calycomyza inselbergensis* Boucher, n. sp., holotype ♂: **A**, habitus, lateral view; **B**, head, anterior view; **C**, head, dorsolateral view. Scale bars: A, 0.2 mm; B, C, 0.1 mm.

REMARKS

There are slight differences between the Mitaraka specimens and the original description of the species. They include the orbital plate darkened to upper ors only, continuing faintly on lateral margin to lower ors in male (Fig. 1A) (darkened to lower ors in original description) and the face darkened at base of antennae (face yellow in original description). Other characteristics worth mentioning, but not part of the original description, are the presence of three postsutural dc, including two well-developed and a much shorter anterior dc; and the mid tibia with three short lateral setae. Until now, this species was only known from the type material from Grenada. This species was previously identified as morphospecies *Calycomyza* Mit-1 in Boucher & Pollet (2021).

Calycomyza inselbergensis Boucher, n. sp. (Figs 4; 5)

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TYPE MATERIAL. — **Holotype**. Guyane • ♂; Mitaraka, sampling site: MIT-E-savane roche 2; 02°13'59.8"N, 54°27'46.5"W; 471 m; open / partially opened areas; 13-20.VIII.2015; MT (6 m); Pierre-Henri Dalens leg.; sample code: MITARAKA/230 sorted by M. Pollet; MNHN.

ETYMOLOGY. — The specific name refers to the habitat (inselberg) of the type specimen.

DIAGNOSIS. — This species differs from other Neotropical species of *Calycomyza* by the following features: halter and notopleuron pale brown; calypter and fringe brown; orbital plate brown to lower ors;

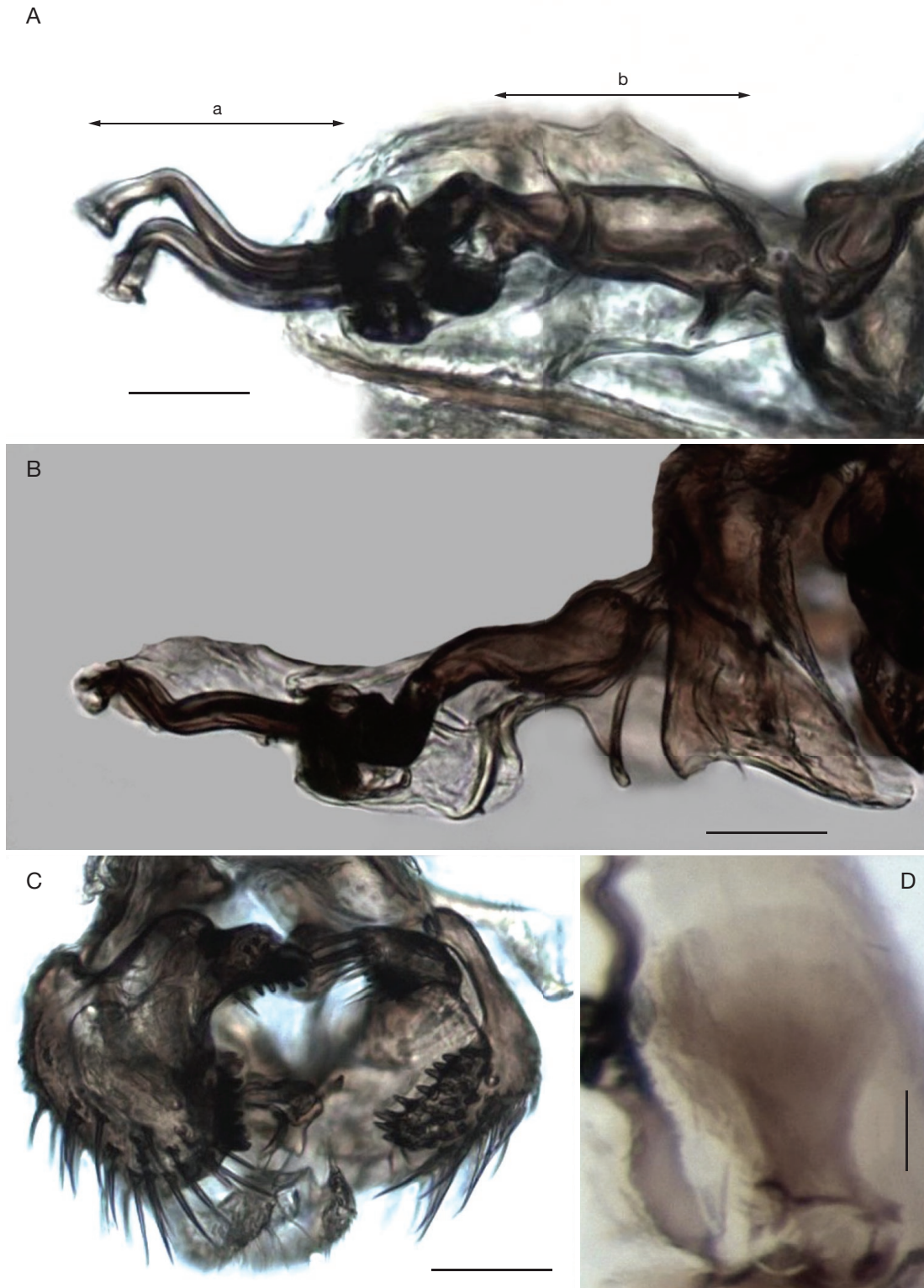


FIG. 5. — *Calycomyza inselbergensis* Boucher, n. sp., holotype ♂: **A**, phallus, lateroventral view: **arrow a**, referring to the length of distal tubules anterior to the ring-like sclerite; **arrow b**, referring to the length of mesophallus; **B**, phallus, lateral view; **C**, epandrium, latero-ventral view; **D**, ejaculatory apodeme. Scale bars: 0.05 mm.

postpronotum and anepisternum almost completely brown; male genitalia with a very large ring-like sclerite at the base of distiphallus.

DISTRIBUTION. — French Guiana.

HOST PLANTS. — Possibly Verbenaceae (see Remarks).

DESCRIPTION

Male

Orbital plate not projecting in front of eye in profile; frons narrow, width including orbital plates 0.22 mm at midpoint;

two reclinate ors and two weaker inclinate ori; orbital setulae sparse, short and reclinate, in one row; first flagellomere small, rounded apically with short white pubescence; arista long with distinct pubescence (Fig. 4A, C); gena at midpoint about $0.1 \times$ eye height; clypeus narrow with anterior margin rounded (Fig. 4B); small triangular epistoma present (Fig. 4B); two well-developed postsutural dc distant from each other, and one weaker third postsutural dc (on right side only); prsc absent; acrostichal setulae in about 7-8 rows; mid tibia with two approximate posterolateral setae; wing length approximately 1.7 mm (wing bent) with last section of M_4 $1.6 \times$ penultimate section.

Colour

Frons yellow; upper orbital plate brown to lower ors (Fig. 4C); antenna brown; face apparently partly pale brown (partly hidden by the antennae); palpus brown; clypeus dull brown, paler brown centrally; mesonotum and scutellum shiny brown; postpronotum brown except for narrowly yellow hind corner; notopleuron brownish (Fig. 4A), slightly paler, yellowish ventrally; anepisternum, katapisternum and anepimeron brown; legs brown except for narrowly yellow fore knee; calypter and fringe brown; halter slightly darkened, pale brown (Fig. 4A).

Male genitalia

Distiphallus in the shape of two long tubules with apical section bent to almost 90° and basal section surrounded by a large ring-like sclerite that extends far beyond the width of the tubules in ventral and lateral view (Fig. 5A, B); length of distal tubules anterior to the ring-like sclerite 0.1 mm (Fig. 5A, arrow a), equal to the length of mesophallus (Fig. 5A, arrow b); epandrium with numerous short internal spines (Fig. 5C); surstyli with short spines and a few (4-5) long setae on upper margin (Fig. 5C); hypandrium narrow and slightly constricted near midpoint; ejaculatory apodeme large with wide blade (Fig. 5D).

REMARKS

The male genitalia of this new species are most similar to those of *C. verbenivora* Spencer, 1963, which feeds on various plants in the family Verbenaceae. The type specimen of the latter species from Venezuela, illustrated in Spencer (1963), apparently has the lower tubule broken off (see comment in Spencer 1973b: 49), but the upper tubule is complete, and it is distinctly longer than the mesophallus, quite different from *C. inselbergensis* Boucher, n. sp. Another difference is the ring-like sclerite at the base of the distiphallus which is distinctly wider in *C. inselbergensis* Boucher, n. sp. Additional illustrations of the phallus of *C. verbenivora* from Argentina (Valladares 1981) and Peru (Korytkowsky 2014) more closely resemble the phallus of *C. inselbergensis* Boucher, n. sp. (except for the size of the ring-like sclerite), but *C. verbenivora* shows significant external differences that are diagnostic: calypter yellow with fringe partially to completely yellow; arista virtually bare; orbital plate bright yellow; and notopleuron, posterior half of postpronotum and upper posterior corner of anepis-

ternum bright yellow. Externally *C. inselbergensis* Boucher, n. sp. is most similar to *C. verbenae* (Hering, 1951), a species known from southern United States and Brazil (Spencer 1963; Esposito 1994), but the male genitalia of the two species are distinct. *Calycomyza verbenae* is separated externally from *C. verbenivora* by the darker, distinctly black calypteral fringe and black face (Spencer 1963). Like *C. verbenivora*, *C. verbenae* feeds on species of *Verbena* L. and other plants in the family Verbenaceae (Benavent-Corai *et al.* 2005). This species was initially listed as morphospecies *Calycomyza* Mit-2 in Boucher & Pollet (2021), along with an additional female specimen. After reconsideration, the female specimen is not included here as a paratype due to uncertain conspecificity. The female differs from the male by its yellow halter, yellow face, mid tibial setae that are further apart, and a shiny brown clypeus.

Genus *Cerodontha* Rondani, 1861

Cerodontha Rondani, 1861: 10.

TYPE SPECIES. — *Chlorops denticornis* Panzer, 1806

REMARKS

The genus *Cerodontha* is classified into seven subgenera (*Butomomyza* Nowakowski, 1967, *Cerodontha*, *Dizygomyza* Hendel, 1920, *Icteromyza* Hendel, 1931, *Phytagromyza* Hendel, 1920, *Poemyza* Hendel, 1931, and *Xenophytomyza* Frey, 1946). All subgenera have been recorded in the Neotropical region, except for *Phytagromyza*, which is exclusively Holarctic. The species are quite variable externally, but the male genitalia is characteristic with a well-developed mesophallus and long tubular distiphallus. In addition, all species in the genus *Cerodontha* have in common an L-shape sclerite inside the epandrium (the subepandrial sclerite or “Langfortsatz” of previous authors). A single specimen of *Cerodontha* was collected on the Mitaraka massif and belongs to the subgenus *Dizygomyza*. This subgenus is characterized by a large lunule and typically an enlarged first flagellomere in the male, although there are a few exceptions, including the new species described below.

Cerodontha (Dizygomyza) pseudonigrihalterata Boucher, n. sp. (Fig. 6)

urn:lsid:zoobank.org:act:D8EB99BF-D8FE-442C-B9D8-16B4C8A5E4A2

TYPE MATERIAL. — **Holotype.** Guyane • ♂; Mitaraka, sampling site: MIT-E-savane roche 2; $02^\circ 13' 59.8''$ N, $54^\circ 27' 46.5''$ W; 471 m; open/partially opened areas; 13-20.VIII.2015; MT (6 m); Pierre-Henri Dalens leg.; sample code: MITARAKA/230, sorted by M. Pollet; MNHN.

ETYMOLOGY. — The specific name is derived from the Greek word “Pseudo” meaning false and refers to the similarity of this species to *Cerodontha (Dizygomyza) nigrihalterata* Boucher, 2005.

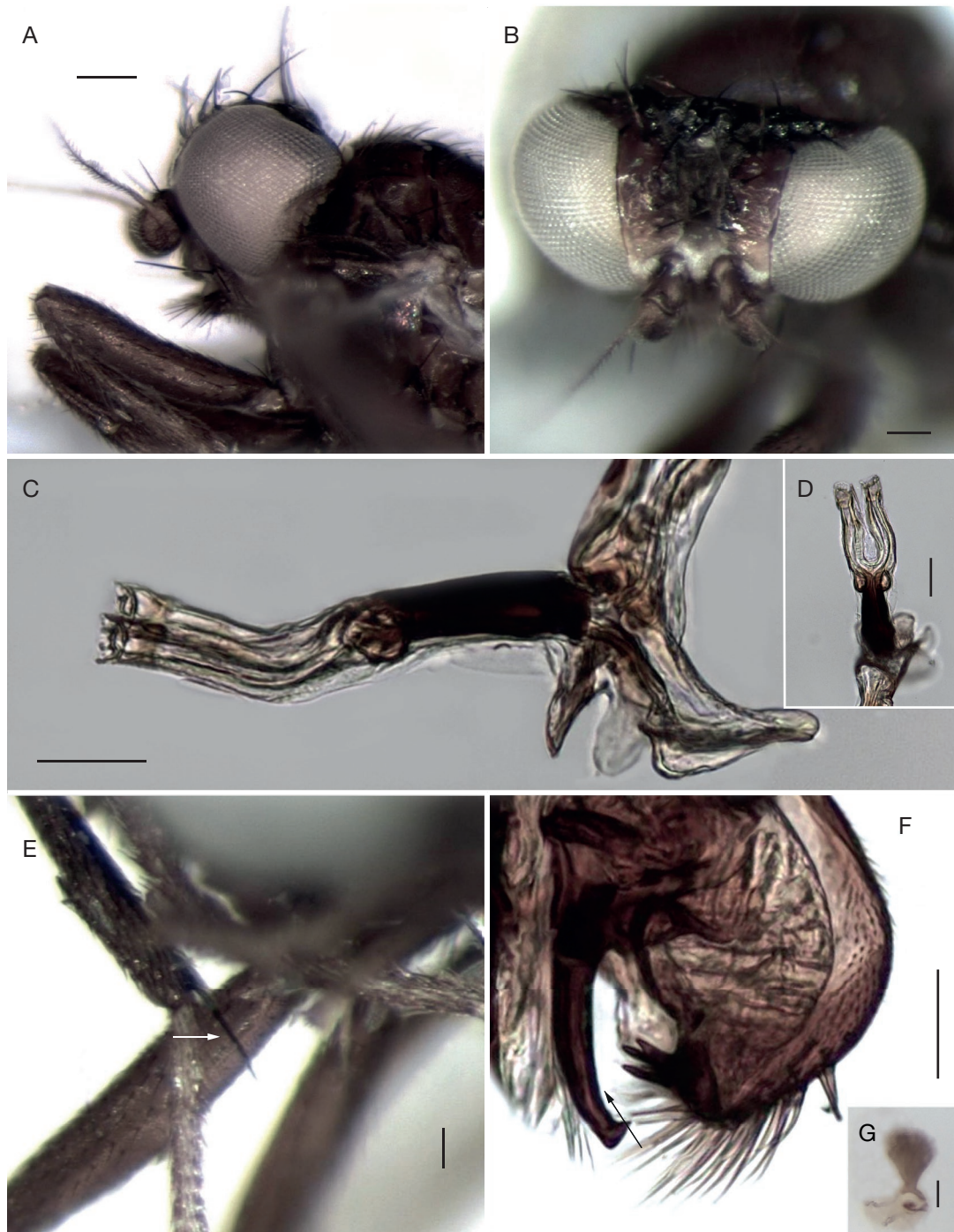


FIG. 6. — *Cerodontha pseudonigrilaterata* Boucher, n. sp., holotype ♂: **A**, head, lateral view; **B**, head dorsal view; **C**, phallus, lateral view; **D**, phallus ventral view; **E**, mid tibial apical seta; **F**, subepandrial sclerite (Langfortsatz) (arrow); **G**, ejaculatory apodeme. Scale bars: A, B, 0.1 mm; C, D, E, F, 0.05 mm.

DIAGNOSIS. — This species can be differentiated from all other *Cerodontha* (*Dizygomyza*) species by the combination of the following characters: knob of halter completely brown, only one ors, wing infuscated in cell R_1 and R_{2+3} , only 2 dc, male with first flagellomere small, patch of reclinate orbital setulae at level of ori; frons not projecting in front of eye in profile.

DISTRIBUTION. — French Guiana.

HOST. — Unknown.

DESCRIPTION

Male

Orbital plate not projecting in front of eye in profile (Fig. 6A); orbital plate broad, $0.37 \times$ width of frons at midpoint and only slightly widening anteriorly; width of frons including orbital plates 0.30 mm at midpoint; eye seemingly bare, at most with a few scattered hairs; lunule broad, partly covered by large orbital plate (Fig. 6B); lunule and anterior orbital plate with a patch of silvery pubescence (Fig. 6B) especially

in posterodorsal view; orbital plate and ocellar triangle shining; frons with black microtomentum; one reclinate ors and three ori (anterior two inclinate and upper ori latero-clinate on one side); orbital setulae reclinate, numerous, forming a patch at level of ori; first flagellomere small (Fig. 6A), rounded apically with short white pubescence, longer posteriorly; arista long (0.5 mm) with long pubescence (Fig. 6A); small raised keel present between antennae; gena at midpoint about $0.16 \times$ of maximum eye height; clypeus medium width with upper margin rounded, slightly projecting and distinctly visible in lateral view; palpus with 7-9 long hairs apically (Fig. 6A); two postsutural dc; prsc absent; acrostichal setulae in 7-8 rows; mid tibia with one long apical seta of approximately 0.15 mm (Fig. 6E); wing length approximately 1.9 mm (wing bent); last section of M_4 approximately $0.7 \times$ length of penultimate section; wing conspicuously infuscated in cell R_1 and R_{2+3} .

Colour

Body completely brown, except for orbital plate yellowish anteriorly (Fig. 6B) and base of first flagellomere and base of arista yellowish; halter with knob completely brown, stalk paler; legs brown, with tarsi at most slightly paler; calypter yellow, fringe short and pale brown.

Male genitalia

Distiphallus in the form of two tubules, almost equal in length as mesophallus and with a short, square, terminal process (Fig. 6C, D); hypandrium broad and rounded; epandrium with apical long hairs (Fig. 6F); surstylus with five spines (only three visible in Fig. 6F); subepandrial sclerite ("Langfortsatz") narrow, elongate (Figs 6F); anal projection of epandrium prominent, longer than wide; ejaculatory apodeme with short stalk (Fig. 6G).

REMARKS

This species is most similar to the Costa Rican *C. (Diz.) nigrihalterata* Boucher, 2005 (Fig. 7). An attempt was made to have both species barcoded, which ultimately failed (Boucher & Savage 2022). Externally the two species have a few important similarities including the presence of only one ors and three ori, dark knob of halter, wing infuscated in cell R_1 and R_{2+3} , lunule and anterior orbital plate with silvery pubescence and mid tibia with a strong apical spine. The phallus of both species is also similar. The holotype of *C. nigrihalterata* illustrated in Boucher (2005) has the distal tubules of the phallus divergent, but it is parallel-sided (as seen in *C. (Diz.) pseudonigrihalterata* Boucher, n. sp.) in a paratype shown in Fig. 7C, D. *Cerodontha (Diz.) nigrihalterata* differs from the new species described here by having a projecting frons (Fig. 7A), the palpus with normal setae, the first flagellomere slightly enlarged in the male (Fig. 7B), tarsal segments paler yellow, mesonotum with three postsutural dc, the ejaculatory apodeme with a long and narrow stalk (Fig. 7E, paratype (slightly different from ejaculatory apodeme in holotype illustrated in Boucher 2005)) and apex of distal tubule more contiguous with

tubule, not appearing as a separate sclerite. However, the unique characteristics that these species share make them distinct within the genus *Cerodontha*, suggesting a close evolutionary relationship.

Genus *Japanagromyza* Sasakawa, 1958 (Fig. 8)

Japanagromyza Sasakawa, 1958: 140.

TYPE SPECIES. — *Agromyza duchesneae* Sasakawa, 1954.

REMARKS

A total of 12 female specimens belonging to the genus *Japanagromyza* were collected on the Mitaraka massif, representing four morphospecies (Boucher & Pollet 2021) (Fig. 8A-D). All these species have a metallic sheen characteristic of the genus. However, most of the Mitaraka *Japanagromyza* species (*Japanagromyza* MIT-2; *J. Mit-3* and *J. Mit-4*) lack the prsc normally present in this genus. Out of the 35 species of *Japanagromyza* recorded in the Neotropical region, (treating *J. iridescens* (Frost, 1936) and *J. inaequalis* (Malloch, 1914) as two distinct species [Spencer & Stegmaier 1973]), only five species (*J. aldrichi* (Frick, 1952); *J. lonchocarpi* Boucher, 2006; *J. polygoni* Spencer, 1973; *J. desmodivora* Spencer, 1966 and *J. tingomariensis* Sasakawa, 1992) lack these setae. Unfortunately, without male specimens the identification of the Mitaraka specimens could not be confirmed.

Genus *Liriomyza* Mik, 1894

Liriomyza Mik, 1894: 284.

TYPE SPECIES. — *Liriomyza urophorina* Mik, 1894.

REMARKS

This is a very speciose genus, difficult to identify due to high morphological homogeneity across the species (both externally and in the male genitalia) and the lack of decisive diagnostic features. Most species are very small (often between 1.5-2.5 mm in wing length), usually yellow (frons, part of pleura and scutellum, sometimes legs) and black (mesonotum, part of pleura) in colour, with only some exceptions. For example, *L. nigra* Spencer, 1984 from Colombia has a dark frons and dark scutellum. Most *Liriomyza* males have a characteristic feature: the stridulatory organ present on the lateral membranous portion of the abdomen. This structure is sometimes pale and difficult to see and may be secondarily lost in a few species. A total of 15 specimens of *Liriomyza* were collected on the Mitaraka massif, representing three species. Two (*Liriomyza* Mit-2 and *Liriomyza* Mit-3) were represented by female specimens only (Boucher & Pollet 2021: table 2), and their identity remains doubtful. These two species have two or three posterolateral setae on the

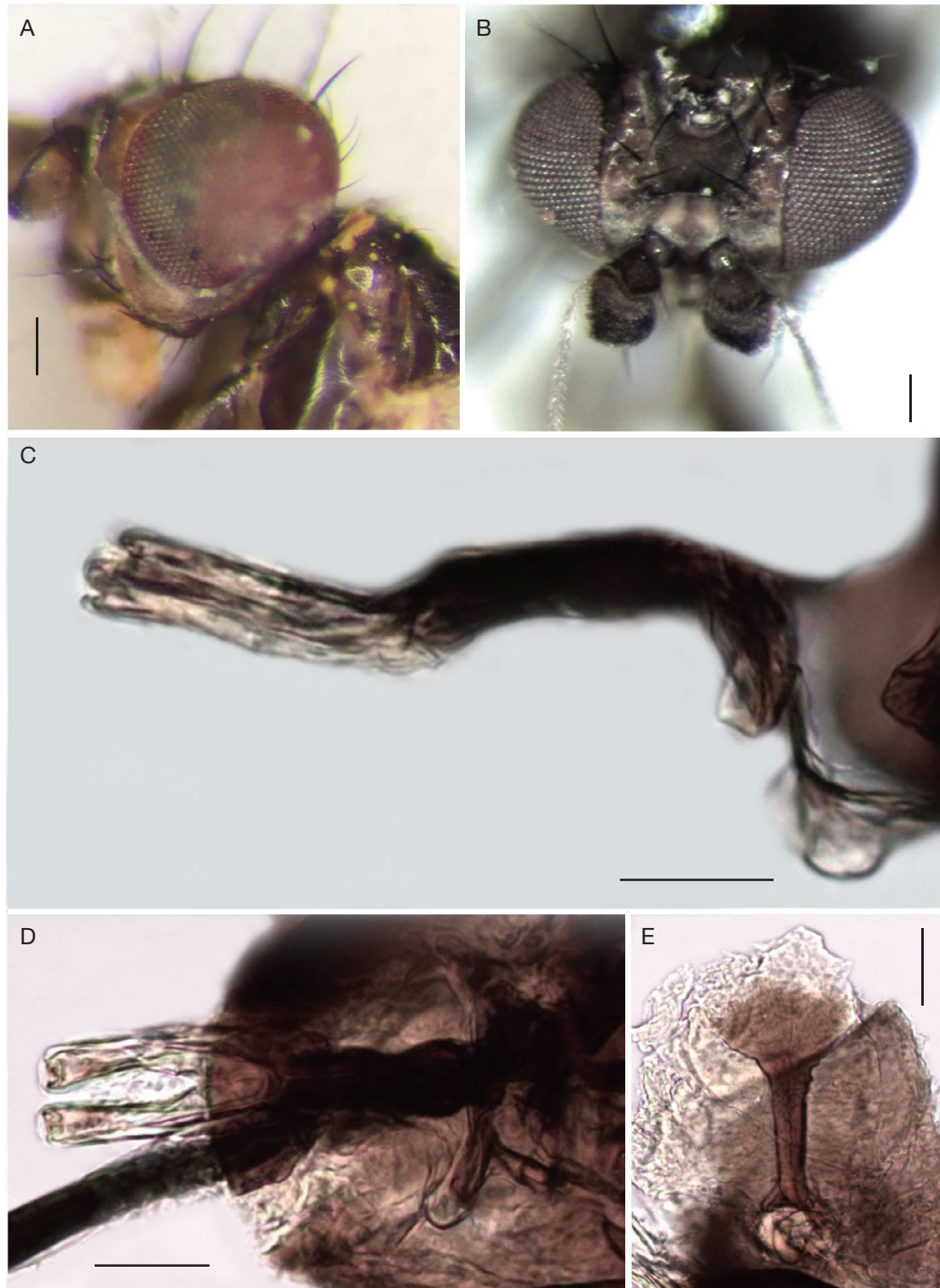


FIG. 7. — *Cerodontha nigrihalterata* Boucher, 2005: **A**, head, lateral view; **B**, head dorsal view; **C**, phallus, lateral view; **D**, phallus, ventral view; **E**, ejaculatory apodeme. Scale bars: A, B, 0.1 mm; C, D, E, 0.05 mm.

mid tibia, a character rarely seen in Neotropical *Liriomyza* species. The other species (*Liriomyza* Mit-1) represented by nine females and three males represents a new species described below. Three *Liriomyza* species were previously

known from French Guiana. These are widespread and well-known pest species: *Liriomyza huidobrensis* (Blanchard, 1926), *Liriomyza trifolii* (Burgess, 1880) and *Liriomyza sativae* Blanchard, 1938.



FIG. 8. — *Japanagromyza* Sasakawa, 1958 morphospecies of Mitaraka, body lateral views: **A**, *Japanagromyza* Mit-1; **B**, *Japanagromyza* Mit-2; **C**, *Japanagromyza* Mit-3, with inset showing arista with long pubescence; **D**, *Japanagromyza* Mit-4, with inset showing subcostal vein joining with R1 and distal margin of R1 expanded near junction with costa, a characteristic of the subfamily Agromyzinae. Scale bars: 0.5 mm, except insets 0.2 mm

Liriomyza touroulti Boucher, n. sp.
(Fig 9)

[urn:lsid:zoobank.org:act:6DB60EB7-4210-4CF4-84A6-37E8F4F2BFBD](https://zoobank.org/act:6DB60EB7-4210-4CF4-84A6-37E8F4F2BFBD)

TYPE MATERIAL. — **Holotype.** Guyane • ♂; Mitaraka, sampling site: MIT-E-savane roche 2; 02°13'59.8"N, 54°27'46.5"W; 471 m; open/partially opened areas; 13-20.VIII.2015; MT (6 m); Pierre-Henri Dalens leg.; sample code: MITARAKA/230, sorted by M. Pollet; MNHN.

Paratypes. Guyane • 1 ♂, 6 ♀; same as for holotype; MNHN • 1 ♂, 2 ♀; same as for holotype; LEMQ.

ETYMOLOGY. — The species name is a patronym in honour of Julien Touroult, the PI of the entomological component of the “Our Planet Reviewed” Mitaraka survey.

DIAGNOSIS. — This species differs from other Neotropical species of *Liriomyza* by the combination of the following character states: orbital plate and frons completely yellow; inner vertical bristle and outer vertical bristle on yellow background; thorax subshining black with yellow patch at hind corner; femora yellow, tibia and tarsi slightly darker (especially of mid and hind leg); clypeus pale brown; wing length (male) of 1.5 mm; male genitalia with the distiphallus only slightly longer than the mesophallus.

DISTRIBUTION. — French Guiana.

HOST. — Unknown.

DESCRIPTION

Orbital plate not projecting in front of eye in profile; frons including orbital plates narrow, approximately 0.15 mm at

midpoint; eye bare; lunule small; two well-developed reclinate ors and two well-developed inclinate ori (anterior one at most only slightly shorter than posterior ori); orbital setulae sparse, short and reclinate, in one row; first flagellomere small, covered with short but dense white pubescence (Fig. 9A); arista with distinct pubescence; gena slightly deeper at rear end (Fig. 9A), at midpoint about $0.16 \times$ maximum eye height; clypeus with upper margin rounded; small epistoma present; $3 + 1$ dc; prsc well-developed; acrostichal setulae long, arranged in about 4-5 rows; mid tibia without posterolateral setae; wing length (male, female) 1.5 mm; last section of M_4 0.6 times length of penultimate section. Stridulatory organ present.

Colour

Head yellow, except for slight greyish infuscation on the orbital plate; pleura yellow except for mostly brown katepisternum and anepisternum with a small brown patch; mesonotum shiny brown with small yellow patch at hind corner; legs yellow, tibiae and tarsi slightly darker (pale brown); calypter yellow, fringe short and pale brown.

Male genitalia

Phallus small: length of distiphallus combined with mesophallus measuring approximately 0.08 mm; distiphallus (Fig. 9B, arrow a) approximately $1.5 \times$ as long as mesophallus (Fig. 9B, arrow b) and approximately $1.6 \times$ as long as wide (at largest point, Fig. 9B, arrow c); distal end of phallus somewhat claw-like in lateral view (Fig. 9C); ejaculatory apodeme with long, narrow stalk: width of blade at largest point, about $5 \times$ as wide as stalk at midpoint (Fig. 9D); epandrium and surstylus each with one spine (Fig. 9E); spine of surstylus located near midpoint.

REMARKS

Externally, this new species is most similar to *L. sativae* Blanchard, 1938, a species widely distributed in the Neotropical region (and elsewhere), and also recorded from French Guiana (EPPO 2022; Martinez & Étienne 2002; Ryckewaert 2003). These two species can be separated from each other by the male genitalia: in *L. sativae*, the mesophallus is much shorter than the distiphallus and the ejaculatory apodeme has a shorter stalk and wider blade. Also, the spine on the surstylus is subapical (see Lonsdale 2021). In lateral view, the phallus of *L. touroulti* Boucher, n. sp. is similar to that of *L. geniculata* Sasakawa, 1992 from Venezuela (Sasakawa 1992a), but it is quite different in ventral view. Furthermore, the surstylus has two apical spines. Short DNA sequences (356 bp) were obtained from two female paratypes of *L. touroulti* Boucher, n. sp., with the following GenBank accession numbers: OK623731 and OK623719 (Boucher & Savage 2022).

Genus *Nemorimyza* Frey, 1946

Nemorimyza Frey, 1946: 42.

TYPE OF GENUS. — *Agromyza posticata* Meigen, 1830.

REMARKS

Nemorimyza, a small genus consisting of five species (excluding the new species described below and excluding *N. xizangensis* Chen & Wang, 2008 from China, which was transferred to *Phytobia* (von Tschirnhaus 2023), is predominantly found in the Neotropical region, although it is not exclusively limited to this area. The genus is characterized by a small, often silvery, or greyish dusted lunule; body almost completely black with halter at least partially black (except for male *N. posticata* (Meigen, 1830) with abdomen conspicuously yellow posteriorly, halter white and fore knee narrowly yellow). Most species have $3 + 1$ dc, except *N. posticata* with $3 + 0$ dc (sometimes with an additional smaller pair close to suture). Some species have a well-developed posterolateral seta on the fore tibia. The male genitalia are characterized by a subepandrial sclerite that is broadly fused with each other, with numerous microscopic spines centrally and a pair of strong spine-like processes, directed ventrally (Zlobin 1996b). However, these features are located within the epandrium and can be difficult to observe without damaging surrounding structures. One *Nemorimyza* species, *N. maculosa* (Malloch, 1913), has previously been reported from French Guiana (Anonymous 2018; Martinez & Étienne 2002; Ryckewaert 2003). A total of five specimens were collected on the Mitaraka massif, representing at least two species (Boucher & Pollet 2021; Boucher & Savage 2022). One of them (identified as morphospecies *Nemorimyza* Mit-2 in Boucher & Pollet 2021) is known from two female specimens only. *Nemorimyza* Mit-1 and *Nemorimyza* Mit-2 can only be differentiated by subtle external differences, but DNA barcoding of two female specimens supported the assignment to two different species (Boucher & Savage 2022). In Boucher & Savage 2022 (Table 5), *Nemorimyza* Mit-2 and an extra specimen from Guanacaste, Costa Rica, gathered by D. Janzen and W. Hallwachs, were initially grouped together under the same BIN (Barcode Index Number) (BOLD:ADB9391). However, due to the discovery of a new sequence from Costa Rica (PLGCS231-20) that exhibited closer similarity to sequence JCCCY4402-16, *Nemorimyza* Mit-2 has now been relocated to a different BIN (BOLD:AEN9883), and the formal description will be delayed until a male becomes available (possibly from the BioAlfa project at Guanacaste, Costa Rica (Janzen & Hallwachs 2019)). *Nemorimyza* Mit-1 is described below based on a single male specimen. The status of two female specimens identified as *Nemorimyza* Mit-1, in Boucher & Pollet 2021 (including one barcoded specimen (Boucher & Savage 2022) is currently uncertain and may represent a third species. Additional studies will be necessary to confirm their status.

Nemorimyza thanatos Boucher, n. sp.
(Figs 10; 11)

urn:lsid:zoobank.org:act:4A8C7A60-CBD9-4F32-8BD9-0B1DB9000264

TYPE MATERIAL. — **Holotype**. Guyane • ♂; Mitaraka, sampling site: MIT-E-savane roche 2; $02^{\circ}13'59.8''N$, $54^{\circ}27'46.5''W$; 471 m; open/partially opened areas; 13-20.VIII.2015; MT (6 m); Pierre-Henri

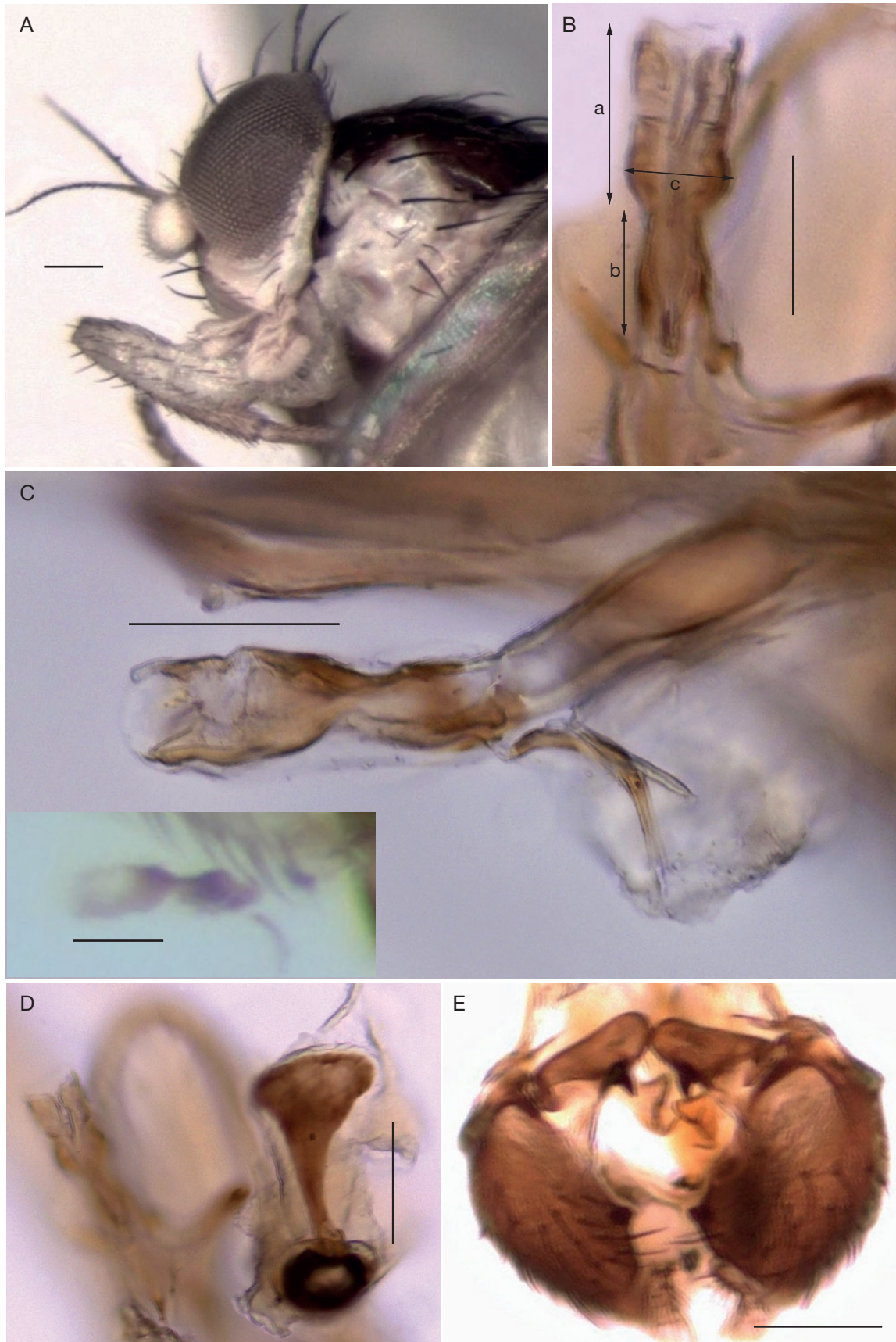


FIG. 9. — *Liriomyza touroulti* Boucher, n. sp., holotype ♂, except: **A**, paratype ♂: **A**, head in lateral view; **B**, phallus, ventral view; **C**, phallus, lateral view, inset at lower magnification; **D**, ejaculatory apodeme (with phallus in background); **E**, epandrium with surstyli. Scale bars: A, 0.1 mm; B-E, 0.05 mm except.

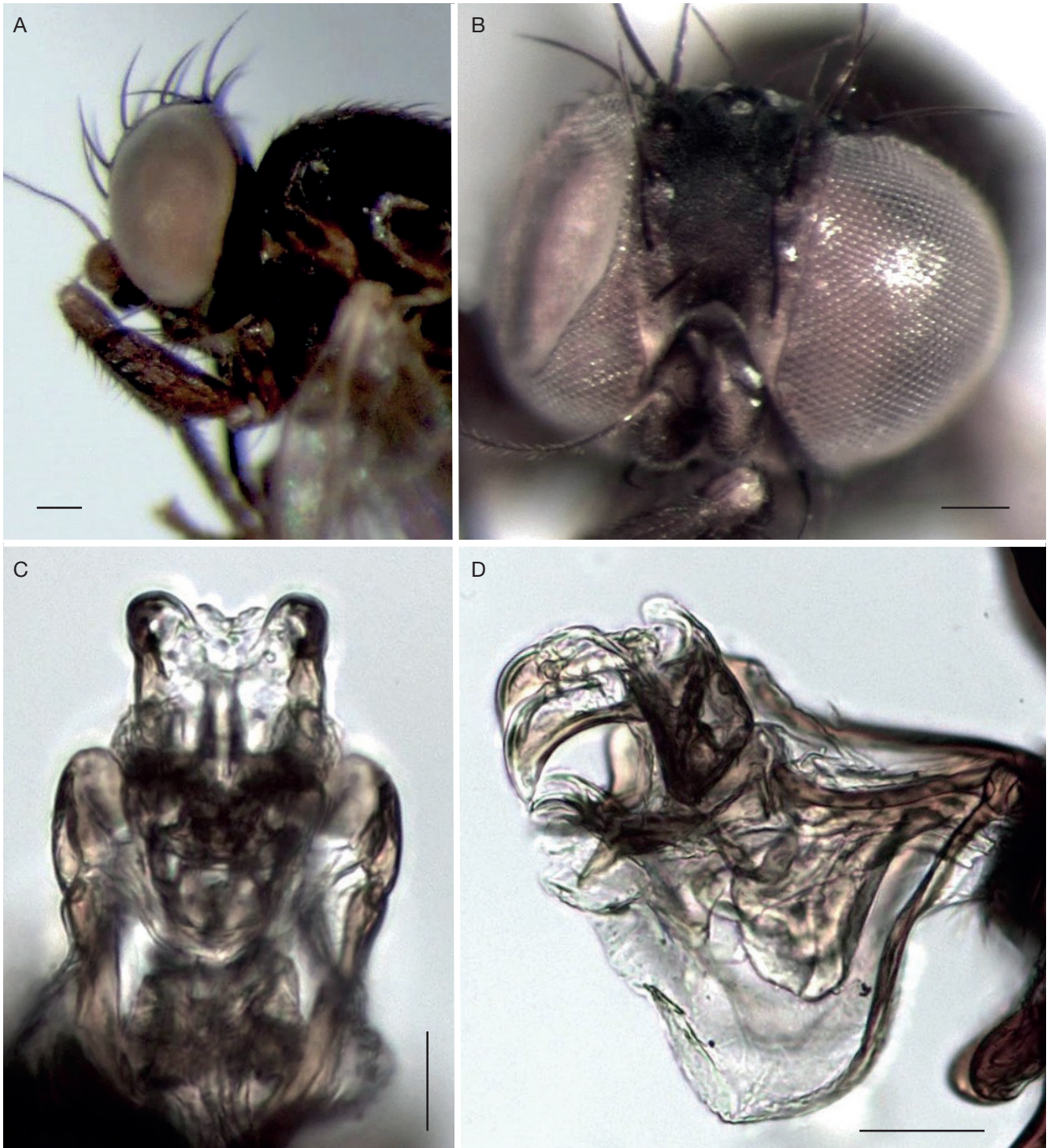


FIG. 10. — *Nemorimyza thanatos* Boucher, n. sp., holotype ♂: **A**, head, lateral view; **B**, head anterodorsal view; **C**, phallus ventral view; **D**, phallus anterolateral view. Scale bars: A, B, 0.1 mm; C, D, 0.05 mm.

Dalens leg.; sample code: MITARAKA/230, sorted by M. Pollet; MNHN.

ETYMOLOGY. — The specific name comes from the Greek “thanatos” which is the personification of Death (better known as the Grim Reaper), referring to the dark coloured body of the species, hooked apical structures of the distiphallus and the large scythe-like projections of the phallus in lateral view.

DIAGNOSIS. — This species can be differentiated from all other species of *Nemorimyza* by the combination of the following characters: gena narrow; knob of halter completely brown; 3 + 0 dc including only two well-developed dc; wing length 1.65 mm; fore tibia without posterolateral seta and anterior orbital plate yellow.

DISTRIBUTION. — French Guiana.

HOST. — Unknown.

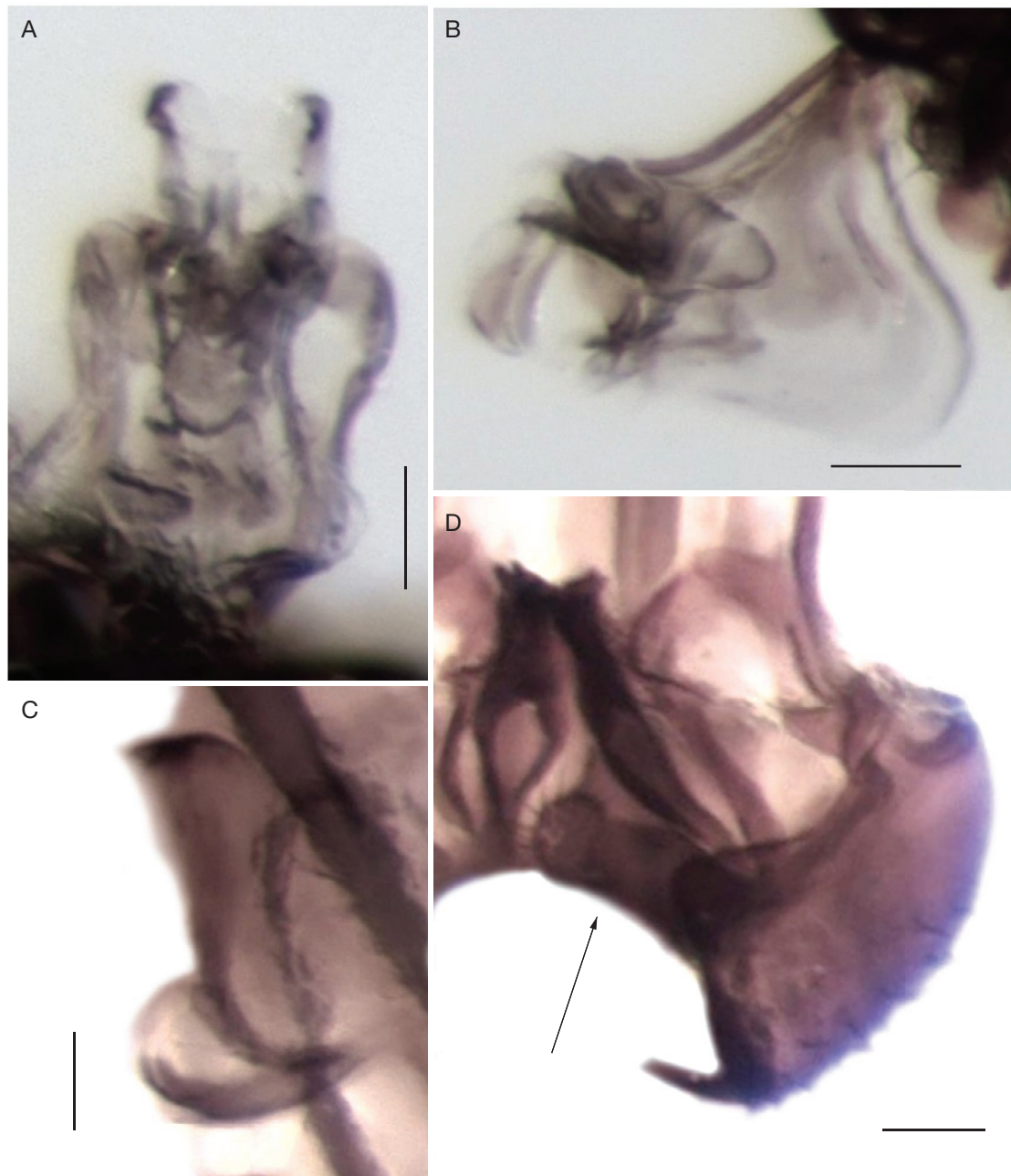


FIG. 11. — *Nemorimyza thanatos* Boucher, n. sp., holotype ♂: **A**, phallus ventral view, low resolution; **B**, phallus anterolateral view, low resolution; **C**, ejaculatory apodeme; **D**, epandrium, surstylus (arrow) and postgonites. Scale bars: 0.05 mm.

DESCRIPTION

Male

Orbital plate not projecting in front of eye in profile (Fig. 10A); frons narrow, width including orbital plates 0.22 mm at midpoint; orbital plate 0.20 × width of frons at midpoint; lunule small with silvery pubescence; frons and orbital plate mat; two reclinate ors and two ori (both reclinate on one side; anterior ori inclinate on other side); orbital setulae reclinate, in one distinct row; first flagellomere small, rounded apically with short white pubescence;

arista long (0.48 mm) with short pubescence; gena at midpoint about 0.1 × maximum eye height; clypeus narrow with upper margin rounded; palpus with three long apical bristles. 3 + 0 dc with only two well-developed dc, anterior postsutural dc about half the size of 2nd dc; prsc present; acrostichal setulae arranged in about seven rows; mid tibia with two lateral setae, and one long and 3-4 smaller apical setae; fore tibia without posterolateral seta; wing length 1.65 mm; last section of M_4 approximately 0.8 × length of penultimate section.

Colour

Frons mat black with reddish-brown undertone anteriorly; orbital plate brown posteriorly and yellow anteriorly (anterior to lower ori) (Fig. 10B); antenna brown; base of arista yellow; thorax brown with notopleuron and part of postpronotum paler brown; halter with knob completely brown; legs brown; calypter yellow or pale greyish with black margin and fringe; abdomen brown, with tip of abdomen and epandrium paler brownish.

Male genitalia

Phallus with two short, hooked apical processes, visible in ventral view (Figs 10C; 11A), in addition to two large scythe-like projections visible in lateral view (Figs 10D; 11B); hypandrium with narrow arms; ejaculatory apodeme with narrow blade, only slightly expanding distally (Fig. 11C); surstylus elongated and extended ventrally (Fig. 11D); epandrium with a spine posteroventrally (Fig. 11D).

REMARK

Nemorimyza thanatos Boucher, n. sp. is most similar to *N. ranchograndensis* (Spencer, 1973) but the latter species is larger (up to 3.0 mm in wing length), has 3 + 1 well-developed dc, longer orbital setae and a seta on the fore tibia (Spencer 1973b; Sasakawa 1992b); . An attempt to barcode the specimen was unsuccessful, resulting in the retrieval of only a short sequence of 156 bp.

Genus *Phytobia* Lioy, 1864

Phytobia Lioy, 1864: 1313.

TYPE SPECIES. — *Agromyza errans* Meigen, 1830.

REMARKS

Phytobia species are generally dark coloured in the Nearctic and Palearctic region, but many species have contrasting yellow coloration in the Neotropical region. Most *Phytobia* have 3 + 1 well-developed dc, a wing with vein R_{4+5} ending closer to the wing tip than M_{1+2} or both veins equidistant from wing tip. The frons is usually dark, sometimes paler (reddish), and the lunule is often silvery. The male genitalia usually have a broadly rounded hypandrium, and the surstyli are usually broad, lobate. A few species do not share this combination of characters and were included in a separate group, the *Phytobia unica* group (Boucher 2010), discussed below. Five specimens of *Phytobia* were collected in Mitaraka, each representing a separate species. Among them, *Phytobia* Mit-2 and *Phytobia* Mit-3 are known from female specimens only (Boucher & Pollet 2021), and their identities could not be confirmed. The other species, *Phytobia* Mit-1, *Phytobia* Mit-4 and *Phytobia* Mit-5 (Boucher & Pollet 2021) represent new species and are described below. Two of these new species (*P. dalensi* Boucher, n. sp. and *P. corona* Boucher, n. sp.) are part of the *Phytobia unica* group, along with four other previously known Neotropical species: *P. unica* Spencer, 1973, *P. mentula* Sasakawa, 1992, *P. pipinna* Sasakawa, 1992

and *P. guatemalensis* Sasakawa, 2005. This species group is characterized by the presence of only two well-developed postsutural dc, in addition to a very small third one in some species, a phallus ending in paired tubules, a well-defined cylindrical mesophallus, a narrow and elongate hypandrium, a C-shaped surstylus covered with short spines, and narrowly connected to the posteroventral margin of the epandrium. Also, the wing venation of the *P. unica* group is very similar to that of the subfamily Agromyzinae Fallén, 1823, with the subcostal vein joining R_1 before reaching the costa (also occurs in other *Phytobia*) and the distal margin of R_1 that is expanded near the junction.

Phytobia corona Boucher, n. sp.

(Figs 12; 13)

urn:lsid:zoobank.org:act:9E680B5E-336B-4E09-90EA-101D54BAB2A7

TYPE MATERIAL. — **Holotype.** Guyane • ♂; Mitaraka, sampling site: MIT-E-savane roche 2; 02°13'59.8"N, 54°27'46.5"W; 471 m; open/partially opened areas; 13-20.VIII.2015; MT (6 m); Pierre-Henri Dalens leg.; sample code: MITARAKA/230, sorted by M. Pollet; MNHN.

ETYMOLOGY. — The specific name is derived from the Latin “corona” (crown), referring to the spinose ring-like sclerite on the distiphallus.

DIAGNOSIS. — This species can be distinguished by its bicolorous frons (black posteriorly and orange anteriorly), and the male genitalia, especially the long distiphallus with a spinose sclerite located a little before midpoint.

DISTRIBUTION. — French Guiana.

HOST. — Unknown.

DESCRIPTION

Male

Orbital plate not projecting in front of eye in profile; orbital plate $0.14 \times$ width of frons at midpoint; frons width including orbital plates 0.32 mm at midpoint; lunule small; ocellar triangle extended anteriorly to level of anterior ors; two reclinate ors and two ori: upper ori reclinate and lower ori inclinate; orbital setulae reclinate, in one row; first flagellomere small, rounded apically with short pubescence; arista with long pubescence; gena extremely narrow, at midpoint about $0.03 \times$ maximum eye height (Fig. 12B); clypeus narrow, with upper margin rounded; epistoma absent (Fig. 12D); 3 + 0 dc, with only two posterior ones well-developed, and anterior postsutural dc about $0.30 \times$ length of second dc; prsc present; acrostichal setulae numerous, in about 8-9 rows; mid tibia with two posterolateral setae; wing length 2.3 mm; last section of M_4 approximately $0.7 \times$ length of penultimate section; vein R_{4+5} ending close to wing tip; distal margin of R_1 expanded near junction (Fig. 12A).

Colour

Similar to *P. dalensi* Boucher, n. sp. described below, with following differences: frons mat, bicolorous: black posteriorly at level of ocellar triangle and orange anteriorly

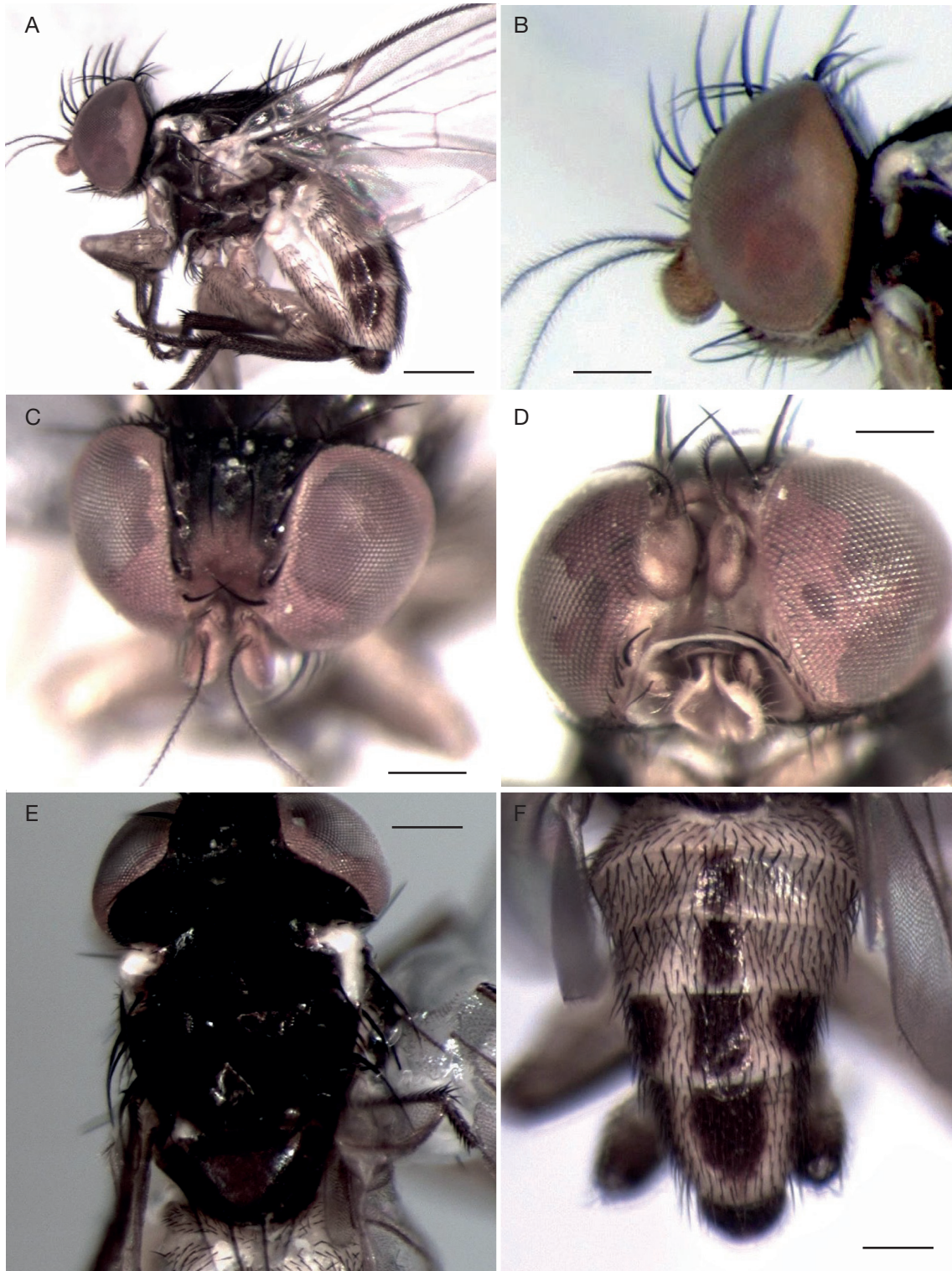


FIG. 12. — *Phytobia corona* Boucher, n. sp., holotype ♂: **A**, body, lateral; **B**, head, lateral view; **C**, head dorsal view; **D**, head, anterior view; **E**, mesonotum, dorsal view; **F**, abdomen, dorsal view. Scale bars: 0.2 mm except A, 0.5 mm.

(Fig. 12C); orbital plate brownish black to level of upper ori, yellowish below; clypeus black; face yellowish brown; antennae yellow, first flagellomere infuscated with brown (Fig. 12B, D); palpus yellow; mesonotum shiny brown except for posterolateral corner with distinct yellow patch

(Fig. 12E, visible on one side due to the collapse of the mesonotum); calypter and calypteral margin yellow; fringe brown; abdomen yellow with dark brown spots medially on tergites 3-6 in addition to lateral brown spots on tergites 5-6 (Fig. 12F).

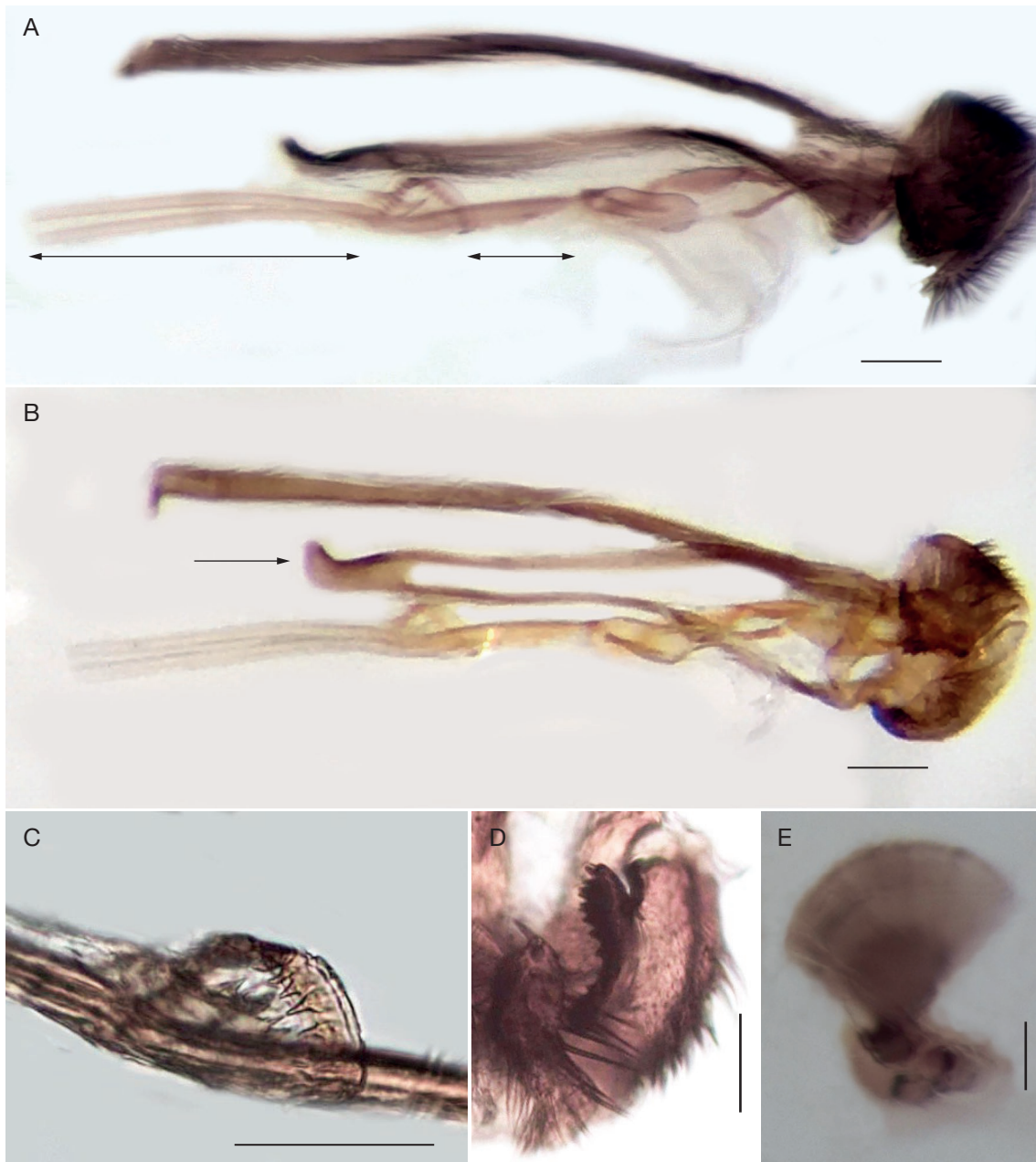


FIG. 13. — *Phytobia corona* Boucher, n. sp., holotype ♂: **A**, male genitalia in lateral view (apex of distiphallus apparently missing); **B**, same, in lateroventral view. Arrow pointing distal end of hypandrium; **C**, close-up of ring-like sclerite with teeth; **D**, epandrium with surstylus, right side; **E**, ejaculatory apodeme. Scale bars: A, B, C, 0.1 mm; D, E, 0.05 mm.

Male genitalia

Distiphallus separated into two long tubules, which are longer than the hypandrium and phallapodeme (Fig. 13A, B) (distiphallus possibly longer than illustrated considering that the distal end appears truncated in the holotype); tubules straight, without distinct curvature; phallus with a ring-like sclerite armed with teeth (Fig. 13A-C); ring-like sclerite located slightly below midpoint (Fig. 13A); distal end of phallus (distal to ring-like sclerite) measuring 0.4 mm (possibly longer, see comment above); distal end of phallus (distal to sclerite) about 3 × longer than basal part (arrows, Fig. 13A); mesophallus short, oval, somewhat bean-shaped (Fig. 13A);

hypandrium narrow, constricted near midpoint, with distal end bent (Fig. 13B, arrow); ejaculatory apodeme with very short stalk and medium-sized blade (Fig. 13E); surstylus, typical of the *Phytobia unica* group (see above) with multiple spines (Fig. 13D).

REMARKS

This species belongs to the *Phytobia unica*-group (Boucher 2010) and is morphologically most similar to *P. guatemalensis* Sasakawa, 2005 due to its bicolorous frons and the characteristic spinose sclerite on the distiphallus. It differs from *P. guatemalensis* by the small yellow patch on the posterolateral

corner of the mesonotum (Fig. 12E) (mesonotum described as entirely black in *P. guatemalensis*), the presence of two posterolateral setae on the mid tibia (only one in *P. guatemalensis* according to original description) and the longer distiphallus with the spinose sclerite located slightly before the midpoint of the distiphallus. The phallus of *P. guatemalensis* is shorter and the spinose sclerite is located near the end of distiphallus. This species was listed as morphospecies *Phytobia* Mit-5 in Boucher & Pollet (2021).

Phytobia dalensi Boucher, n. sp.
(Figs 14; 15)

urn:lsid:zoobank.org:act:71404E3D-F260-4C95-BD87-57AF6FDEA619

TYPE MATERIAL. — **Holotype.** Guyane • ♂; Mitaraka, sampling site: MIT-E-savane roche 2; 02°13'59.8"N, 54°27'46.5"W; 471 m; open/partially opened areas; 13-20.VIII.2015; MT (6 m); Pierre-Henri Dalens leg.; sample code: MITARAKA/230, sorted by M. Pollet; MNHN.

ETYMOLOGY. — The species name is a patronym in honour of Pierre-Henri Dalens, president of the Société entomologique Antilles-Guyane (SEAG) who participated to phases two and three of the expedition and collected most of the Agromyzidae of Mitaraka with a 6 m long Malaise trap on one of the savane roches.

DIAGNOSIS. — This species differs from all other Neotropical species of *Phytobia* by the combination of the following characters: wing hyaline; 3 + 0 dc with anterior postsutural dc strongly reduced; frons yellowish brown; anepisternum completely brown; mesonotum mostly black, with posterolateral corner narrowly yellow; femora yellow, with mid and hind femur narrowly brown apically; abdomen mostly yellow with black spots centrally and laterally on hind tergites; male distiphallus consisting of two tubules that are approximately 1.5 × length of mesophallus.

DISTRIBUTION. — French Guiana.

HOST. — Unknown.

DESCRIPTION

Male

Orbital plate not projecting in front of eye in profile; frons width including orbital plates 0.35 mm at midpoint; orbital plate 0.2 × width of frons at midpoint; lunule small, collapsed inside; ocellar triangle extended anteriorly to level of anterior ors; two reclinate ors and two ori: upper ori reclinate or latero-clinate and lower ori inclinate (Fig. 14B); orbital setulae reclinate, in one row, except for 1-2 extra setulae; first flagellomere small, rounded apically with short pubescence; arista long with distinct pubescence; gena narrow, at midpoint about 0.05 × maximum eye height (Fig. 14B); clypeus medium width, with upper margin rounded; small epistoma present (Fig. 14D); 3 + 0 dc with only two posterior ones well-developed (Fig. 14F), anterior postsutural dc reduced, about 0.33 × length of second dc; prsc present; acrostichal setulae numerous, in about 8-9 rows; mid tibia with two posterolateral setae; wing length approximately 2.2 mm (wing slightly bent); last section

of M_4 0.6 × length of penultimate section; vein R_{4+5} ending close to wing tip; distal margin of R_1 expanded near junction (Fig. 14E).

Colour

Frons mat, yellowish-brown (Fig. 14C); orbital plate and ocellar triangle subshining, darker brown except for orbital plate yellowish at level of ori and below; antennae yellowish, first flagellomere slightly infuscated with brown (Figs 14B, D); clypeus and palp yellowish brown; face yellowish (Fig. 14D); mesonotum shiny brown, with the posterolateral corner possibly narrowly yellow (difficult to see due to the collapsed thorax) (Fig. 14F); scutellum brown; postpronotum yellow with small brown spot; notopleuron yellow; other pleura completely brown; fore leg including coxa and trochanter yellow, tarsi slightly darker yellowish brown; mid and hind femora yellow with apex narrowly brown (Fig. 14A); mid coxa brownish; mid and hind tibia and tarsi brown; halter yellow; calypter and margin yellow; fringe brown. Abdomen yellow with dark brown spots medially on tergites 3-6 in addition to lateral brown spots on tergites 5-6 similar to *P. corona* Boucher, n. sp. (Fig. 12F).

Male genitalia

Distiphallus (Fig. 15B, arrow a) separated into two tubules (Fig. 15A) that are approximately 1.5 × longer than mesophallus (Fig. 15B, arrow b); hypandrium without distal apodeme, conspicuously constricted near midpoint (Fig. 15C); surstylus, typical of the *Phytobia unica* group (see above), with multiple spines (Fig. 15D); ejaculatory apodeme with short stalk and medium size blade (Fig. 15E).

REMARKS

This new species belongs to the *Phytobia unica* group (Boucher 2010) and is externally most similar to *P. mentula* Sasakawa, 1992 described from Peru (Sasakawa 1992a). The male phallus of these two species, however, is distinctly different. *Phytobia dalensi* Boucher, n. sp., was previously identified as morphospecies *Phytobia* Mit-4 in Boucher & Pollet (2021).

Phytobia pluviasilvae Boucher, n. sp.
(Figs 16; 17)

urn:lsid:zoobank.org:act:729A6EFF-6882-42BA-835A-4544F923F80F

TYPE MATERIAL. — **Holotype.** Guyane • ♂; Mitaraka, near site MIT-A-RBF1, river; 25.III.2015; MT (6 m); leg. Julien Touroult & Eddy Poirier (FR-GU/Mitaraka/2015); sample code: MITARAKA/189, sorted by Marc Pollet, 2015; MNHN.

ETYMOLOGY. — This species (from sample 189) was collected from a 6 m Malaise trap installed in tropical lowland rainforest over the Alama River (Boucher & Pollet 2021). The specific name is referring to the habitat of the type specimen ("pluvia" for rain; "silva" for forest).

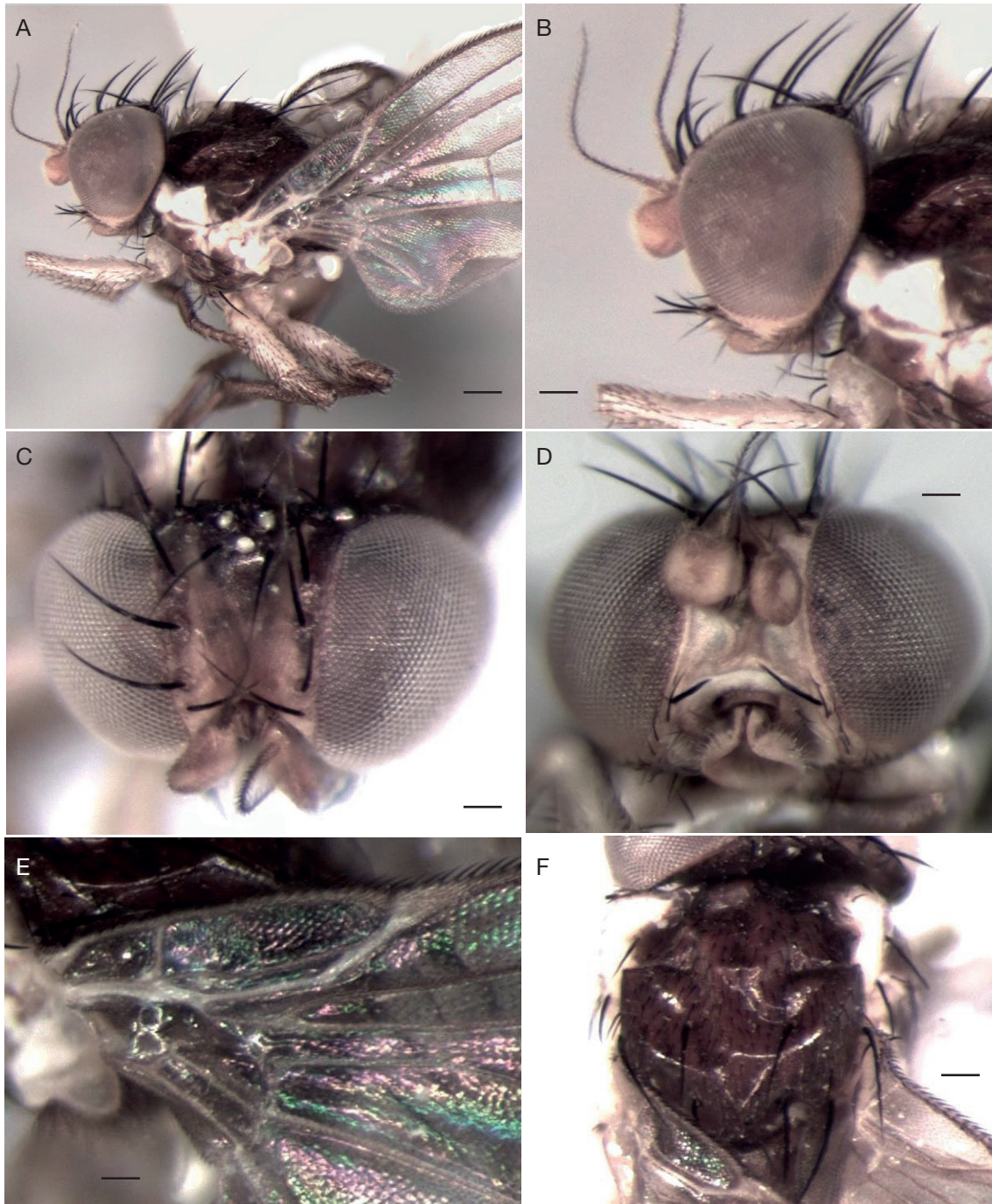


FIG. 14. — *Phytobia dalensi* Boucher, n. sp., holotype ♂: **A**, body, lateral; **B**, head, lateral view; **C**, head, dorsal view; **D**, head anterior view; **E**, basal section of wing; **F**, mesonotum, dorsal view. Scale bars: A, 0.2 mm; B-F, 0.1 mm.

DIAGNOSIS. — This species differs from all other Neotropical species of *Phytobia* by the combination of the following characters: wing hyaline; presutural dc present; abdomen largely yellow; legs all brown; scutellum and prescutellar area yellow; anepisternum mostly brown, with a narrow yellow border dorsally; male phallus with two very long and coiled tubules.

DISTRIBUTION. — French Guiana.

HOST. — Unknown.

DESCRIPTION

Male

Orbital plate not projecting in front of eye in profile; frons width including orbital plates 0.38 mm at midpoint; frons becoming narrower anteriorly; orbital plate 0.17 × width of frons at midpoint; lunule small, wide and low, with silvery pubescence (Fig. 16B); frons and orbital plate mat; ocellar triangle small, not extending beyond anterior ocellus; two (three on one side) reclinate ors and two inclinate ori; orbital

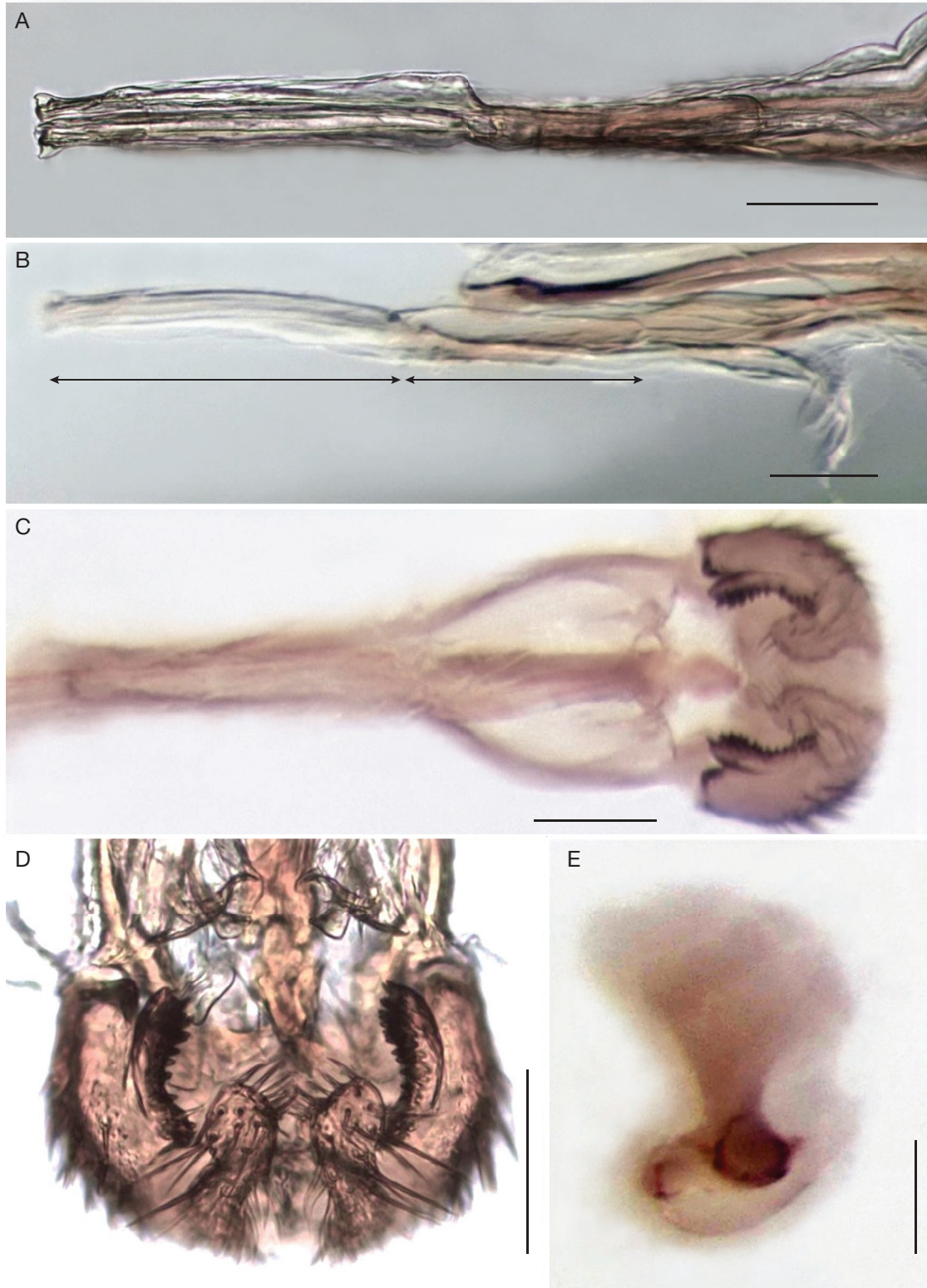


FIG. 15. — *Phytobia dalensi* Boucher, n. sp., holotype ♂: **A**, phallus in ventral view; **B**, phallus in lateral view (a, distiphallus; b, mesophallus); **C**, hypandrium and epandrium; **D**, epandrium with surstyli; **E**, ejaculatory apodeme. Scale bars: A-D, 0.1 mm; E, 0.05 mm.

setulae reclinate, in one row; first flagellomere small, rounded apically with short white pubescence; arista long with short pubescence; gena narrow, at midpoint about $0.04 \times$ maximum eye height; clypeus narrow, widely open with upper

margin rounded; small epistoma present (Fig. 16D); 4+1 dc with only two posterior ones well-developed, all other dc less than half the size of posterior ones; prsc absent; acrostichal setulae numerous, in about 9-10 rows; fore femur with a row

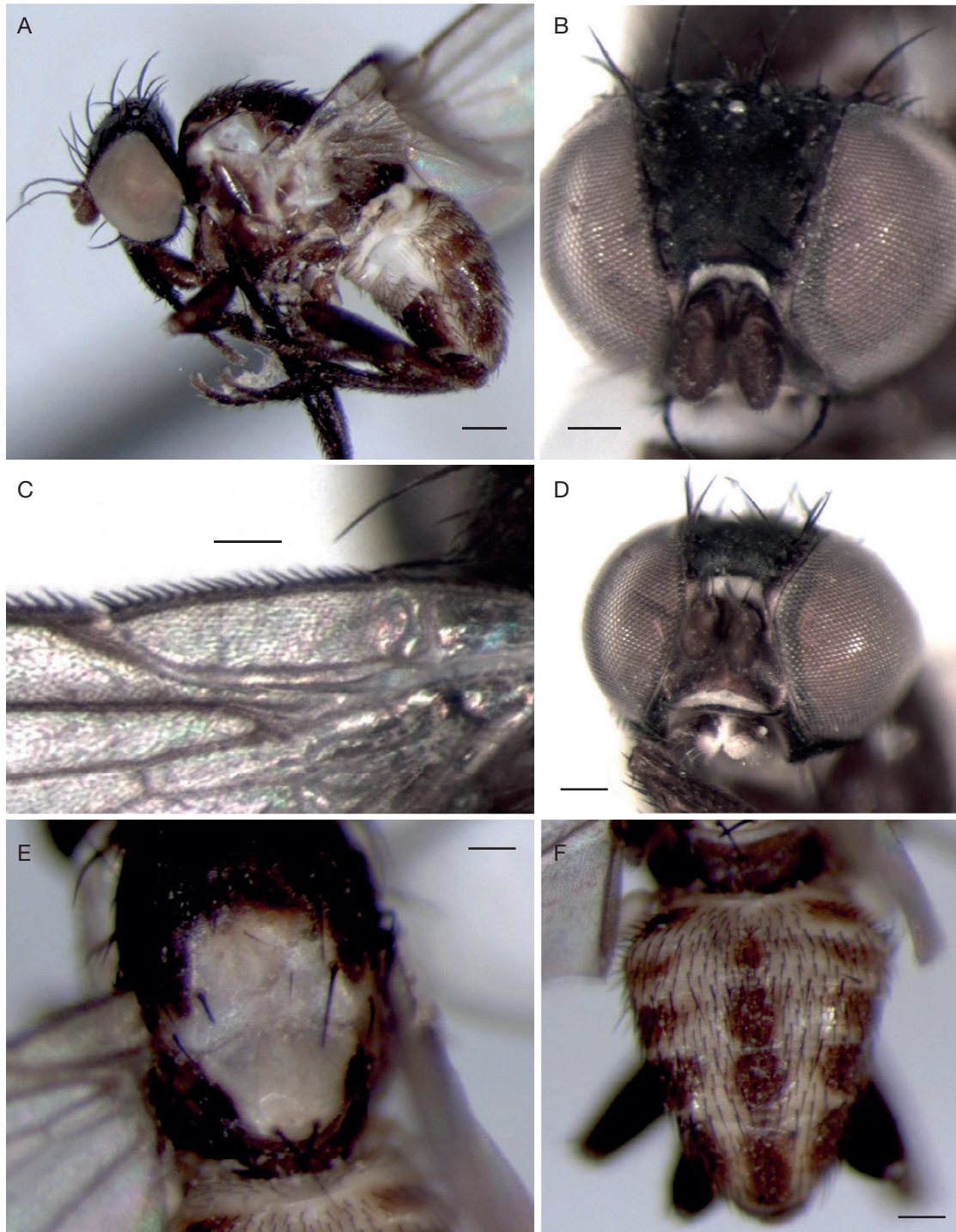


FIG. 16. — *Phytobia pluviasilvae* Boucher, n. sp., holotype ♂: **A**, body, lateral; **B**, head, dorsal view, showing frons; **C**, wing; **D**, head, anterior view; **E**, mesonotum, posterodorsal view; **F**, abdomen, dorsal view. Scale bars: A, 0.2 mm; B-F, 0.1 mm.

of three long ventrolateral setae in addition to a few shorter ones; mid tibia with two posterolateral setae; wing length 2.28 mm in male; last section of M_4 approximately 0.83 times length of penultimate; vein R_{4+5} ending very close to wing tip; subcostal vein extending to costa independently from R_1 and distal margin of R_1 straight, not expanded near junction (Fig. 16C).

Colour

Frons mat black with small reddish spot near lunule; orbital plate mat brown with small yellow patch anteriorly (Fig. 16B); antennae brown; clypeus dark brown, subshining; palpus and face brown. Mesonotum brown except for largely yellow prescutellar area and yellow scutellum (Fig. 16E); brown area of mesonotum separated into two bands laterally (Fig. 16E);

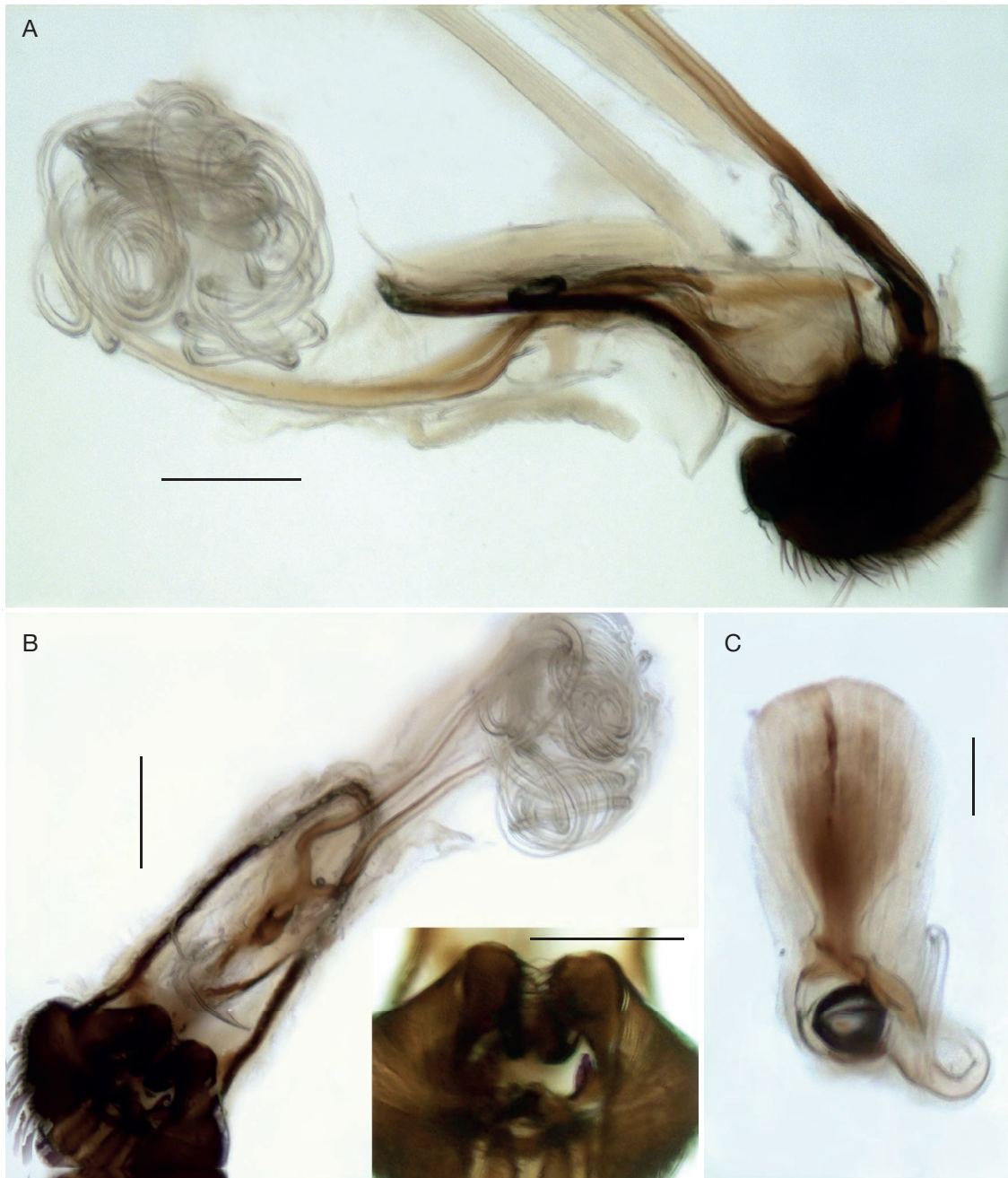


FIG. 17. — *Phytobia pluviasilvae* Boucher, n. sp., holotype ♂: **A**, male genitalia with phallus in lateral view; **B**, male genitalia showing hypandrium, phallus, and surstyli (inset) in ventral view; **C**, ejaculatory apodeme. Scale bars: A, B, 0.1 mm; C, 0.05 mm.

postpronotum yellow with large brown spot centrally (Fig. 16A); notopleuron yellow; anepisternum mostly brown except for narrowly yellow area dorsally; all other pleura brown; legs brown (Fig. 16A); halter yellow; calypter, margin and fringe brown. All abdominal tergites yellow with brown spots medially and laterally (Fig. 16F).

Male genitalia

Phallus divided into two very long and coiled tubules (Fig. 17A, B); hypandrium narrow, U-shaped and without apodeme (Fig. 17B); postgonites well-developed; surstylus

(Fig. 17B, inset) with a few long hairs and separated from epandrium by suture; ejaculatory apodeme with small blade (Fig. 17C).

REMARKS

Although the narrow, elongated hypandrium is unusual for this genus (broadly rounded in most *Phytobia*) and the phallus of this species is most similar to some Neotropical species of *Japanagromyza*, this new species belongs to the genus *Phytobia* on the basis of wing venation, the shape of the surstyli, the presence of 4 + 1 dc, and the presence of postgonites. This

species was identified as morphospecies *Phytobia* Mit-1 in Boucher & Pollet (2021).

Genus *Phytoliriomyza* Hendel, 1931

Phytoliriomyza Hendel, 1931: 203 (as subgenus of *Liriomyza*).

TYPE SPECIES OF SUBGENUS. — *Agromyza perpusilla* Meigen, 1830.

REMARKS

This genus was originally erected for species having proclinate orbital setulae (in addition to other characters) which easily separate this genus from other similar agromyzid genera, especially *Liriomyza*. But the concept of the genus has evolved, now encompassing also species with upright or reclinate orbital setulae and some without orbital setulae. The colour is also variable with some species having the mesonotum and scutellum dark (typically greyish), while others feature a yellow scutellum and sometimes pre-scutellar area, like several *Liriomyza* species. However, unlike *Liriomyza*, male *Phytoliriomyza* do not possess a stridulatory organ. Most *Phytoliriomyza* have only three orbital bristles including two ors and one ori (some species, e.g., *P. grandis* (Spencer, 1963) from Brazil have two ors and three ori). The halter is often slightly darkened apically or completely brown and the male genitalia is usually distinctive with conspicuous spines on the surstyli and on the inner margin of epandrium. Only two specimens were collected on the Mitaraka massif (Boucher & Pollet 2021) which proved to belong to *Phytoliriomyza jurgensi* Spencer, 1983 originally described from Costa Rica (Spencer 1983) and later found to occur in Guadeloupe and St-Christopher (Étienne & Martinez 2003a, b).

Phytoliriomyza jurgensi Spencer, 1983 (Fig. 18)

Phytoliriomyza jurgensi Spencer, 1983: 63. — Martinez & Étienne 2002: 20. — Étienne & Martinez 2003a: 261; b: 95.

MATERIAL EXAMINED. — **Guyane** • 1 ♂, 1 ♀; Mitaraka, sampling site: MIT-E-savane roche 2; 02°13'59.8"N, 54°27'46.5"W; 471 m; open/partially opened areas; 13-20.VIII.2015; MT (6 m); Pierre-Henri Dalens leg.; sample code: MITARAKA/230, sorted by M. Pollet; MNHN.

DIAGNOSIS. — This species can be recognized by its small size (1.2-1.4 mm), yellow frons, yellow anepisternum and notopleuron, sparse acrostichal setulae in two rows, and a first flagellomere with long pubescence.

DISTRIBUTION. — Costa Rica, Guadeloupe, St-Christopher, French Guiana (new record).

HOST. — Unknown.

REMARKS

According to the original description (Spencer 1983), *P. jurgensi* has the first flagellomere and palpus black, and the tibiae and tarsi brownish black. In contrast to this, the Mitaraka specimens are paler, with the first flagellomere and palp yellowish brown in the male and brown in the female, and the tibiae and tarsi dark yellow. The Mitaraka specimens are also slightly smaller with a wing length of 1.2 mm in the male and 1.4 mm in the female (1.4 mm in male in original description) and they have 3+2 dc (Fig. 18B) (3+1 dc in original description). Externally, *P. jurgensi* is most similar to *P. scotica* Spencer, 1962 (Neotropical records are available under *P. pilosella* Spencer, 1973 now recognized as a junior synonym of *P. scotica* (synonymy by von Tschirnhaus 2023)). However, *P. jurgensi* can be distinguished from *P. scotica* by a yellow frons (part of frons slightly darker in *P. scotica*), a brown or black palpus (yellow in *P. scotica*), and a yellowish to greyish scutellum (brown in *P. scotica*). Both species have extremely small and weakly sclerotized genitalia, but the distiphallus of *P. jurgensi* has a cup-shaped or funnel-shaped distal end (Fig. 18C) and the tubules have a darker and more sclerotized medial section (Fig. 18D). In *P. scotica*, the phallus has one pair of very long, coiled tubules.

lowish brown in the male and brown in the female, and the tibiae and tarsi dark yellow. The Mitaraka specimens are also slightly smaller with a wing length of 1.2 mm in the male and 1.4 mm in the female (1.4 mm in male in original description) and they have 3+2 dc (Fig. 18B) (3+1 dc in original description). Externally, *P. jurgensi* is most similar to *P. scotica* Spencer, 1962 (Neotropical records are available under *P. pilosella* Spencer, 1973 now recognized as a junior synonym of *P. scotica* (synonymy by von Tschirnhaus 2023)). However, *P. jurgensi* can be distinguished from *P. scotica* by a yellow frons (part of frons slightly darker in *P. scotica*), a brown or black palpus (yellow in *P. scotica*), and a yellowish to greyish scutellum (brown in *P. scotica*). Both species have extremely small and weakly sclerotized genitalia, but the distiphallus of *P. jurgensi* has a cup-shaped or funnel-shaped distal end (Fig. 18C) and the tubules have a darker and more sclerotized medial section (Fig. 18D). In *P. scotica*, the phallus has one pair of very long, coiled tubules.

DISCUSSION

This study as part of a large-scale biodiversity program known as “Our planet Reviewed” contributed significantly to the main objective of this program (the discovery of new species) by adding eight new species of Agromyzidae to the list of 20 Diptera species already discovered and previously described for the region (Touroult *et al.* 2021). It also offered an important contribution to our knowledge of the Agromyzidae of French Guiana with only five species previously reported. This fauna now includes 15 species: *Agromyza mitarakensis* Boucher n. sp., *Calycomyza grenadensis* Zlobin, 1996, *Calycomyza inselbergensis* Boucher, n. sp., *Calycomyza lantanae* (Frick, 1956), *Cerodontha pseudonigrihalterata* Boucher, n. sp., *Liriomyza huidobrensis* (Blanchard, 1926), *Liriomyza sativae* Blanchard, 1938 *Liriomyza touroulti* Boucher, n. sp., *Liriomyza trifolii* (Burgess, 1880), *Nemorimyza thanatos* Boucher, n. sp., *Nemorimyza maculosa* (Malloch, 1913), *Phytobia corona* Boucher, n. sp., *Phytobia dalensi* Boucher, n. sp., *Phytobia pluviasilvae* Boucher, n. sp., and *Phytoliriomyza jurgensi* Spencer, 1983.

Most of the agromyzid species that were previously recorded in French Guiana (*L. huidobrensis*, *L. sativae*, *L. trifolii* and *N. maculosa*) are best known for the damage they cause to various crops and ornamental plants (Spencer 1973c). These economically important species were reported from Cayenne (CABI 2021), the capital city of French Guiana. Due to their ability to feed on a wide variety of commercial plants, these species are found in many different regions of the world. For example, *L. huidobrensis*, is highly polyphagous, feeding on hundreds of plant species in 49 families (CABI 2021; Weintraub *et al.* 2017), but until the 1980s, its distribution was restricted to Central and South America. This species has now spread over more than 40 countries around the world, mainly due to commercial shipments of flowers and cultivated food crops (CABI 2021; Weintraub *et al.* 2017). Among the other previously recorded French Guiana agromyzids, *Nemorimyza maculosa* has a more limited, but also expanding distribution.

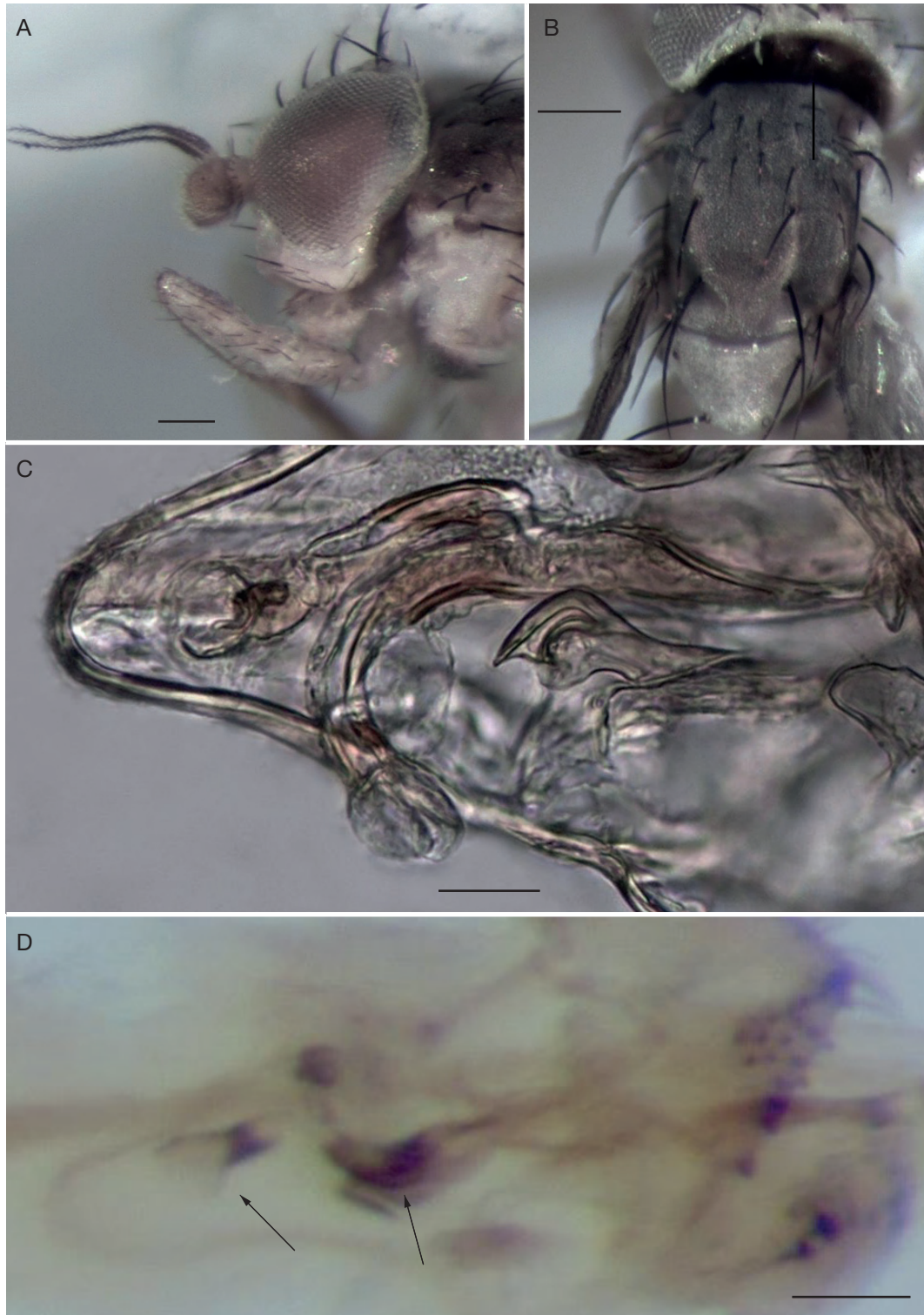


FIG. 18. — *Phytoliriomyza jurgensi* Spencer, 1983: **A**, head, lateral view; **B**, mesonotum and scutellum, dorsal view; **C**, phallus, ventral view. **D**, phallus and epantrium, lateroventral view. Arrows pointing funnel-shaped distal end of tubule and darker region of tubule. Scale bars: A, B, 0.1 mm; C, D, 0.05 mm.

This species feeds on several genera in the family Asteraceae, including crop plants such as *Lactuca* (lettuce) and ornamental plants such as *Chrysanthemum*, *Aster* and *Dahlia* (Spencer 1973c). Initially limited to the new world, this species has recently been documented in Spain, Portugal and the Canary

Islands (CABI 2021; Černý *et al.* 2018). These economically important species were not collected at Mitaraka, situated in the southwesternmost corner of French Guiana, on the opposite extreme side of Cayenne, (Fig. 1, in Boucher & Pollet 2021), where a seemingly pristine environment exists.

The Agromyzidae so far identified from the Mitaraka massif are represented by previously known Neotropical species (*C. grenadensis* and *P. jurgensi*) with limited distributional data and by new species, currently known only from Mitaraka. Although French Guiana is believed to have few real endemic insect species due to the lack of barriers with neighbouring countries (Brûlé & Touroult 2014), recent findings suggest that the Mitaraka region may represent a center of endemism for many insect species, including those specifically associated with inselbergs (Touroult *et al.* 2021). Inselbergs are characterized by a distinct plant community, including rare or even endemic species in French Guiana (Sarhou et al. 2003; Vlasáková & Gustafsson 2011), and sometimes with an associated unique insect fauna (Vlasáková *et al.* 2008; Touroult & Dalens 2015). Although it is too early to discuss the distribution patterns of the newly described agromyzid species, some may prove to be endemic to the region, or more specifically to the inselbergs of the Mitaraka massif. None of the species so far identified from Mitaraka correspond to the known Brazilian agromyzid fauna. Brazil, a country adjacent to French Guiana, is the best studied region in the Neotropics, with approximately 115 agromyzid species recorded. Although most of these species are known from the southern and southeastern part of the country (Monteiro *et al.* 2019), some were recently reported from the Brazilian Amazon, in the state of Pará, but south of the Amazon River, e.g. *Calycomyza ipomoensis* Esposito (Esposito 1994), *Liriomyza valladaresae* Carvalho-Filho (Carvalho-Filho *et al.* 2016), and many additional species (Monteiro *et al.* 2015, 2019). A little further south, in the state of Mato Grosso and Rondônia, 14 new *Phytobia* species were recently described (Sousa & Couri 2017), although none corresponds to the Mitaraka *Phytobia* species. The agromyzid fauna of inselbergs has never been studied in Brazil, leaving a significant knowledge gap in our understanding of the diversity and distribution of these flies in such unique habitats.

Among the newly described *Phytobia* species, two of them are part of the *Phytobia unica* group: *P. corona* Boucher, n. sp. and *P. dalensi* Boucher, n. sp. These are similar to some atypical, partially yellow coloured *Japanagromyza* species (subfamily Agromyzinae), namely *J. maculata* (Spencer, 1973) and *J. spadix* (Spencer, 1973), that were originally described in a new genus, *Geratomyza* Spencer, 1973 (Spencer & Stegmaier 1973), but synonymized with *Japanagromyza* a few years later (Spencer 1984). Boucher (2010) erected a species group (*Japanagromyza maculata* group) to accommodate these species in a key to Central American Agromyzidae, along with the *Phytobia unica* group, both keying in the same couplet but differentiated by the simple versus paired tubules of the phallus. Further studies will be necessary to confirm the systematic position of the species included into these two species groups (so far endemic to the Neotropical region) and to consider the resurrection of the genus *Geratomyza* Spencer, 1973. These two new species of *Phytobia* described here are therefore of special importance for future research.

The other *Phytobia* species, *P. pluviasilvae* Boucher, n. sp., is the only newly described species collected from the rainforest habitat in Mitaraka. This species is unusual in having an extra-long and coiled phallus and a long and thin hypandrium, two

characters not shared by other Neotropical congeneric species. Many additional new species in the genus *Melanagromyza* Hendel, 1920 and *Ophiomyia* Braschnikov, 1897, the two most diverse genera of Agromyzidae collected on the Mitaraka massif (Boucher & Pollet 2021), still await to be described.

This preliminary list of Agromyzidae species collected during the “Our planet reviewed” Mitaraka massif expedition provides an important starting point for the future study of French Guiana Agromyzidae, and more broadly, that of tropical rainforests and inselbergs in the Neotropics. The remote locality and difficulty of access of the Mitaraka massif will make a future expedition to that area unlikely in the short term. Unfortunately, in many years from now, the Agromyzidae fauna may change dramatically, as climate change has already had its effect on the rainforest landscape and the plant community present on the inselbergs (Fonty *et al.* 2009; Amigo 2020).

Acknowledgements

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