

“OUR PLANET REVIEWED” 2015

LARGE-SCALE BIOTIC SURVEY IN MITARAKA, FRENCH GUIANA

Edited by Julien TOUROULT



Souzalopesmyia Albuquerque, 1951
(Diptera: Muscidae): new species
from South America with an updated
phylogeny based on morphological evidence

Lucas R. P. GOMES &
Claudio J. B. de CARVALHO



DIRECTEUR DE LA PUBLICATION : Bruno David
Président du Muséum national d'Histoire naturelle

RÉDACTRICE EN CHEF / *EDITOR-IN-CHIEF*: Laure Desutter-Grandcolas

ASSISTANTS DE RÉDACTION / *ASSISTANT EDITORS*: Anne Mabilie (zoosyst@mnhn.fr), Emmanuel Côté

MISE EN PAGE / *PAGE LAYOUT*: Anne Mabilie

COMITÉ SCIENTIFIQUE / *SCIENTIFIC BOARD*:

James Carpenter (AMNH, New York, États-Unis)
Maria Marta Cigliano (Museo de La Plata, La Plata, Argentine)
Henrik Enghoff (NHMD, Copenhague, Danemark)
Rafael Marquez (CSIC, Madrid, Espagne)
Peter Ng (University of Singapore)
Norman I. Platnick (AMNH, New York, États-Unis)
Jean-Yves Rasplus (INRA, Montferrier-sur-Lez, France)
Jean-François Silvain (IRD, Gif-sur-Yvette, France)
Wanda M. Weiner (Polish Academy of Sciences, Cracovie, Pologne)
John Wenzel (The Ohio State University, Columbus, États-Unis)

COUVERTURE / *COVER*:

Inselberg in the Mitaraka massif in French Guiana (photo: Mathias Fernandez). In medallion: head, anterior view of *Souzalopesmyia polleti* n. sp.

Zoosystema est indexé dans / *Zoosystema is indexed in*:

- Science Citation Index Expanded (SciSearch®)
- ISI Alerting Services®
- Current Contents® / Agriculture, Biology, and Environmental Sciences®
- Scopus®

Zoosystema est distribué en version électronique par / *Zoosystema is distributed electronically by*:

- BioOne® (<http://www.bioone.org>)

Les articles ainsi que les nouveautés nomenclaturales publiés dans *Zoosystema* sont référencés par /
Articles and nomenclatural novelties published in Zoosystema are referenced by:

- ZooBank® (<http://zoobank.org>)

Zoosystema est une revue en flux continu publiée par les Publications scientifiques du Muséum, Paris / *Zoosystema is a fast track journal published by the Museum Science Press, Paris*

Les Publications scientifiques du Muséum publient aussi / *The Museum Science Press also publish*:
Adansonia, Anthropozoologica, European Journal of Taxonomy, Geodiversitas, Naturae.

Diffusion – Publications scientifiques Muséum national d'Histoire naturelle
CP 41 – 57 rue Cuvier F-75231 Paris cedex 05 (France)
Tél.: 33 (0)1 40 79 48 05 / Fax: 33 (0)1 40 79 38 40
diff.pub@mnhn.fr / <http://sciencepress.mnhn.fr>

© Publications scientifiques du Muséum national d'Histoire naturelle, Paris, 2018
ISSN (imprimé / *print*): 1280-9551 / ISSN (électronique / *electronic*): 1638-9387

PHOTOCOPIES:

Les Publications scientifiques du Muséum adhèrent au Centre Français d'Exploitation du Droit de Copie (CFC), 20 rue des Grands Augustins, 75006 Paris. Le CFC est membre de l'*International Federation of Reproduction Rights Organisations (IFRRO)*. Aux États-Unis d'Amérique, contacter le *Copyright Clearance Center*, 27 Congress Street, Salem, Massachusetts 01970.

PHOTOCOPIES:

The Publications scientifiques du Muséum adhere to the Centre Français d'Exploitation du Droit de Copie (CFC), 20 rue des Grands Augustins, 75006 Paris. The CFC is a member of International Federation of Reproduction Rights Organisations (IFRRO). In USA, contact the Copyright Clearance Center, 27 Congress Street, Salem, Massachusetts 01970.

***Souzalopesmyia* Albuquerque, 1951 (Diptera: Muscidae): new species from South America with an updated phylogeny based on morphological evidence**

Lucas R. P. GOMES

Department of Zoology, Universidade Federal do Paraná,
C.P. 19020, Curitiba 81531-980, Paraná (Brazil)
lucaspergos@gmail.com

Claudio J. B. de CARVALHO

Department of Zoology, Universidade Federal do Paraná,
C.P. 19020, Curitiba 81531-980, Paraná (Brazil)
cjbcarva@ufpr.br (corresponding author)

Submitted on 15 November 2017 | Accepted on 15 March 2018 | Published on 11 December 2018

urn:lsid:zoobank.org:pub:ACCB223-57C4-49D0-880C-0DCAEF68EF99

Gomes L. R. P. & de Carvalho C. J. B. 2018. — *Souzalopesmyia* Albuquerque, 1951 (Diptera: Muscidae): new species from South America with an updated phylogeny based on morphological evidence, in Touroult J. (ed.), "Our Planet Reviewed" 2015 large-scale biotic survey in Mitaraka, French Guiana. *Zoosystema* 40 (25): 539–546. <https://doi.org/10.5252/zoosystema2018v40a25>. <http://zoosystema.com/40/25>

ABSTRACT

The species of the South American genus *Souzalopesmyia* Albuquerque, 1951 (Diptera: Muscidae) are very similar externally, but can be distinguished by characters of the terminalia of the males. We describe *Souzalopesmyia polleti* n. sp. from French Guiana and provide diagnostic images for it. The new species can be distinguished from all other species of the genus by the following combination of characters: male with two long pairs of frontal setae; one weak proepisternal seta, about $\frac{3}{4}$ length of upper anepisternal setae; upper postpronotal setae longer than half length of lower one; cercal plate with margins of the posterior incision divergent; sternite 5 with posterior depression and phallapodeme enlarged on distal region. An updated phylogenetic analysis based on morphological evidence, yielded a single most parsimonious tree (*S. amazonica* Albuquerque, 1951 + (*S. carioca* Albuquerque, 1951 + (*S. paraensis* de Carvalho, 1999 + *S. polleti* n. sp.) + (*S. singularis* (Stein, 1919) + *S. sulina* de Carvalho, 1999))). A new record of *Souzalopesmyia paraensis* from Peru, maps of the species' distribution, an updated distribution of *S. singularis* and an updated identification key are also presented.

KEY WORDS

Morphological analysis,
French Guiana,
Neotropical Region,
Peru,
new record,
new species.

RÉSUMÉ

Souzalopesmyia (Diptera: Muscidae) d'Amérique du Sud: nouvelle espèce avec phylogénie basée sur des caractères morphologiques.

Les espèces du genre sud-américain *Souzalopesmyia* Albuquerque, 1951 (Diptera: Muscidae) sont très semblables extérieurement, mais elles peuvent être séparées par les caractères des terminalia des mâles. Nous décrivons *Souzalopesmyia polleti* n. sp. de Guyane et en donnons des figures diagnostiques. La nouvelle espèce se distingue des autres espèces du genre par la combinaison suivante de caractères: mâle avec deux longues paires de soies frontales; une soie proépisternale faible, longue comme environ les $\frac{3}{4}$ de la longueur des soies anépisternales supérieures; soies postpronotales supérieures plus longues que la demi-longueur des soies inférieures; marges de l'incision postérieure de la plaque cercale divergentes; sternite 5 avec une dépression postérieure et phallapodeme élargi dans la région distale. Une nouvelle analyse phylogénétique basée sur les données morphologiques donne un seul arbre plus parcimonieux (*S. amazonica* Albuquerque, 1951 + (*S. carioca* Albuquerque, 1951 + (*S. paraensis* de Carvalho, 1999 + *S. polleti* n. sp.) + (*S. singularis* (Stein, 1919) + *S. sulina* de Carvalho, 1999))). Nous proposons également une signalisation nouvelle pour *Souzalopesmyia paraensis* du Pérou, des cartes sur la répartition des espèces, une révision de la distribution de *S. singularis* et une clé d'identification révisée.

MOTS CLÉS

Analyse morphologique,
Guyane,
région néotropicale,
Pérou,
signalisation nouvelle,
espèce nouvelle.

INTRODUCTION

Souzalopesmyia Albuquerque, 1951 (Diptera, Muscidae) is a small monophyletic Neotropical genus with five known species, occurring in Bolivia, Brazil, Paraguay and Peru (Löwenberg-Neto & de Carvalho 2013). The monophyly of the genus is based on the elongated head shape (lateral view), the absence of ocellar setae and the overall yellowish coloration (de Carvalho 1999).

Albuquerque (1951) proposed the genus and described two new species (*S. amazonica* Albuquerque, 1951 and *S. carioca* Albuquerque, 1951). Two decades later, Pont (1972) relocated *Mydaea singularis* Stein, 1911 to *Souzalopesmyia*. De Carvalho (1999) revised the genus and performed cladistic and biogeographic analyses of the included species. He also provided an identification key, described two new species (*S. paraensis* de Carvalho, 1999 and *S. sulina* de Carvalho, 1999), diagnosed and re-described *S. amazonica*, *S. carioca* and *S. singularis*, and including images of the male and female terminalia.

In this paper we describe a new species, *Souzalopesmyia polleti* n. sp. from French Guiana. An updated phylogenetic analysis based on morphological evidence, an updated identification key and a map of the species' distribution are also provided.

MATERIAL AND METHODS

The new species was collected during the "Our Planet Reviewed" Guyane-2015 expedition in the Mitaraka range, in the core area of the French Guiana Amazonian Park, organized by the Muséum national d'Histoire naturelle (MNHN) and Pro-Natura International. For more information on this survey, see Pollet *et al.* (2014), Krolow *et al.* (2017), Touroult *et al.* (2018). The specimens were deposited in two collections: MNHN and Padre Jesus Santiago Moure collection (DZUP), at Universidade Federal do Paraná.

For examination of the male and female terminalia, the abdomen was removed from a dry specimen and was placed in cold potassium hydroxide (KOH) 10% for 24 hours to soften and clarify the parts. The abdomen was then transferred to acetic acid, and finally to glycerin. The postabdominal structures were separated from the rest of the abdomen. Examination and illustration of the structures were done using a microscope and a stereomicroscope with a camera lucida attached to it. Dissected terminalia were placed in glycerin, inside microvials, pinned beneath the respective specimens. The terminology in the descriptions follows Cumming & Wood (2009). Images were stacked using an auto-montage setup acquired by the Taxonline project (UFPR – <http://www.taxonline.bio.br>). The distribution map was produced using the software QuantumGIS (available in: <http://www.qgis.org/en/site/>).

We performed an analysis using morphological characters to determine the phylogenetic position of the new species. The outgroups *Dolichophaonia trigona* (Shannon & Del Ponte, 1926), *Helina praecipua* (Walker, 1853) and *Phaonia praesuturalis* (Stein, 1904) were chosen based on the phylogeny of de Carvalho (1989). Eleven new morphological character states (characters 14–24) were added to the matrix of de Carvalho (1999). From original matrix of de Carvalho (1999), the character 9 was removed to provide a better resolution of the outgroup taxa. The matrix consisted of nine species (three in outgroup) and 24 morphological character states. Additional character states were added to character 1 (two frontal setae on female) and character 3 (inner vertical setae convergent). The remaining characters and character states were not modified [see Appendix].

The characters were coded as either binary or multistate and were treated as unordered (Table 1). Information that was not available was coded as a question mark (?). A cladistics analysis using parsimony was performed with TNT (Tree analysis using New Technology), version 1.5 (Goloboff & Catalano 2016). Cladograms were produced using heuristic search with

TABLE 1. — Data matrix of 24 characters used in the cladistics analysis of *Souzalopesmyia* Albuquerque, 1951 species. Note: 0, 1 and 2, character states; ?, missing data; —, not applicable. See Appendix 1 for characters and character states.

	1												2											
	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4
<i>Helina praecipua</i> (Walker, 1853)	0	—	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>Phaonia praesuturalis</i> (Stein, 1904)	0	—	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1
<i>Dolichophaonia trigona</i> (Shannon & Del Ponte, 1926)	0	—	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	0	0	0	0	1	0	1
<i>Souzalopesmyia amazonica</i> Albuquerque, 1951	1	—	2	1	0	0	1	1	0	0	1	1	1	?	?	?	?	1	1	0	1	1	1	1
<i>Souzalopesmyia carioca</i> Albuquerque, 1951	2	0	1	0	0	1	0	1	0	0	1	1	0	0	0	1	1	0	1	1	1	1	1	1
<i>Souzalopesmyia paraensis</i> de Carvalho, 1999	1	0	2	0	1	1	0	1	1	0	1	1	0	0	0	1	1	0	1	1	1	1	1	2
<i>Souzalopesmyia singularis</i> (Stein, 1911)	1	0	2	0	1	1	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	2
<i>Souzalopesmyia sulina</i> de Carvalho, 1999	?	1	2	0	1	1	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	2
<i>Souzalopesmyia polleti</i> n. sp.	1	0	2	0	1	1	0	1	0	0	1	1	1	0	0	1	1	1	1	1	1	1	1	2

the command implicit enumeration to search for the most parsimonious cladogram. The parameters used were on default mode. Fast character optimization and tree edition were performed using WinClada version 1.00.08 (Nixon 2002).

ABBREVIATIONS

dm-cu discal medial-cubital crossvein;
M medial vein;
R₄₊₅ branch 4 and 5 of radius.

Institutions

DZUP Padre Jesus Santiago Moure collection at Universidade Federal do Paraná (Curitiba);
MNHN Muséum national d'Histoire naturelle (Paris);
NMNH National Museum of Natural History (Washington).

RESULTS

Order DIPTERA Linnaeus, 1758
Family MUSCIDAE Latreille, 1802

Genus *Souzalopesmyia* Albuquerque, 1951

TYPE SPECIES. — *Souzalopesmyia carioca* Albuquerque, 1951 by original designation.

Souzalopesmyia polleti n. sp.
(Figs 1; 2)

urn:lsid:zoobank.org:act:95C3C83E-1F2D-45B1-A592-816115815740

MATERIAL EXAMINED. — **Holotype.** ♂: First label: “(FR-GU) Guyane Française, Mitaraka, MIT-DZ, 02°14'01.8"N, 54°27'01.0"W, 306 m, tropical most forest (different sites) nr DZ, 6.iii.2015-10.iii.2015, FIT, leg. Julien Touroult & Eddy Poirier (FR-GU/Mitaraka/2015) – sample code: MITARAKA/198 (sorted by Marc Pollet, 2015)”. Second label: “La Planète Revisitée Guyane 2015, MNHN PNI, APA 973-1”. Third label: “*Souzalopesmyia polleti* n. sp. Gomes & de Carvalho det. 2017”. Fourth label: “HOLOTYPE” (red). Deposited at MNHN, MNHN-ED-ED-10612.

Paratypes. 3 females. 1 ♀: First label: “(FR-GU) Guyane Française, Mitaraka, MIT-C-RBF2, 02°14'03.4"N, 54°26'53.0"W, 299 m, on vegetation along muddy trail and in swamp, 11.iii.2015, SW, leg. Marc Pollet (FR-GU/Mitaraka/2015) - sample code: MITARAKA/106 (sorted by Marc Pollet, 2015)”. Second label: “La Planète Revisitée Guyane 2015, MNHN PNI, APA 973-1”. Third label: “*Souzalopesmyia*

polleti n. sp. Gomes & de Carvalho det. 2017”. Fourth label: “PARATYPE” (green). Deposited at MNHN, MNHN-ED-ED-10613. 1 ♀: First label: “(FR-GU) Guyane Française, Mitaraka, MIT-C-RBF1, 02°14'10.8"N, 54°26'49.5"W, 258 m, tropical wet forest (bas fond), 24.ii.2015-27.ii.2015, BPT, leg. Marc Pollet (FR-GU/Mitaraka/2015) - sample code: MITARAKA/124 (sorted by Marc Pollet, 2015)”. Second label: “La Planète Revisitée Guyane 2015, MNHN PNI, APA 973-1”. Third label: “*Souzalopesmyia polleti* n. sp. Gomes & de Carvalho det. 2017”. Fourth label: “PARATYPE” (green). Deposited at MNHN, MNHN-ED-ED-10614. 1 ♀: First label: “(FR-GU) Guyane Française, Mitaraka, MIT-A-RBF1, 02°14'11.4"N, 54°27'07.0"W, 306 m, tropical wet forest (bas fond), 27.ii.2015-4.iii.2015, YPT, leg. Marc Pollet (FR-GU/Mitaraka/2015) - sample code: MITARAKA/146 (sorted by Marc Pollet, 2015)”. Second label: “La Planète Revisitée Guyane 2015, MNHN PNI, APA 973-1”. Third label: “*Souzalopesmyia polleti* n. sp. Gomes & de Carvalho det. 2017”. Fourth label: “PARATYPE” (green). Deposited at DZUP (DZUP 245598).

ETYMOLOGY. — Name in apposition. The specific epithet is in honor of Dr Marc Pollet (Research Institute for Nature and Forest – INBO, Brussels, Belgium), who collected and sent us the specimens herein described.

DIAGNOSIS. — Three long pairs of frontal setae. Proepisternal seta weak, about ¾ length of upper anepisternal setae. Upper postpronotal setae longer than half length of lower one. Sternite 5 concave on posterior margin. Cercal plate with margins of the posterior incision divergent. Phallapodeme enlarged on distal region.

DISTRIBUTION. — French Guiana.

DESCRIPTION

Male

Measurements. Body length: 7.5 mm. Wing length: 7.0 mm.

General coloration. Yellow. Ocellar triangle dark. Wings yellowish, veins light brown. Frons, fronto-orbital plate, antenna, pedicel, thorax, calypters, halter and legs yellow. Abdomen yellow with dorsal dark brown stripe on tergite 3, 4 and 5.

Head. Dichoptic, eyes separated by space measuring about one sixth of head width at vertex and covered sparse short and white setulae. Ocellar setae absent. Inner vertical seta strong and parallel. Three long pairs of frontal setae. Antenna long reaching epistome, postpedicel about six times longer than pedicel. Arista plumose. Palpus slender. Gena narrow on lowest eye margin, about same length of pedicel. Facial ridge setulose. Vibrissa long and strong. Postoculars as a single row of incomplete black setulae, reaching only basal half of eyes. (Fig. 1A, B).



FIG. 1. — *Souzalopesmyia polleti* n. sp.: **A-D**, ♂ holotype: head, anterior view (**A**); head, lateral view (**B**); lateral view (**C**); dorsal view (**D**); **E-H**, ♀ paratype: head, anterior view (**E**); head lateral view (**F**); lateral view (**G**); dorsal view (**H**). Scale bars: 1.0 mm.

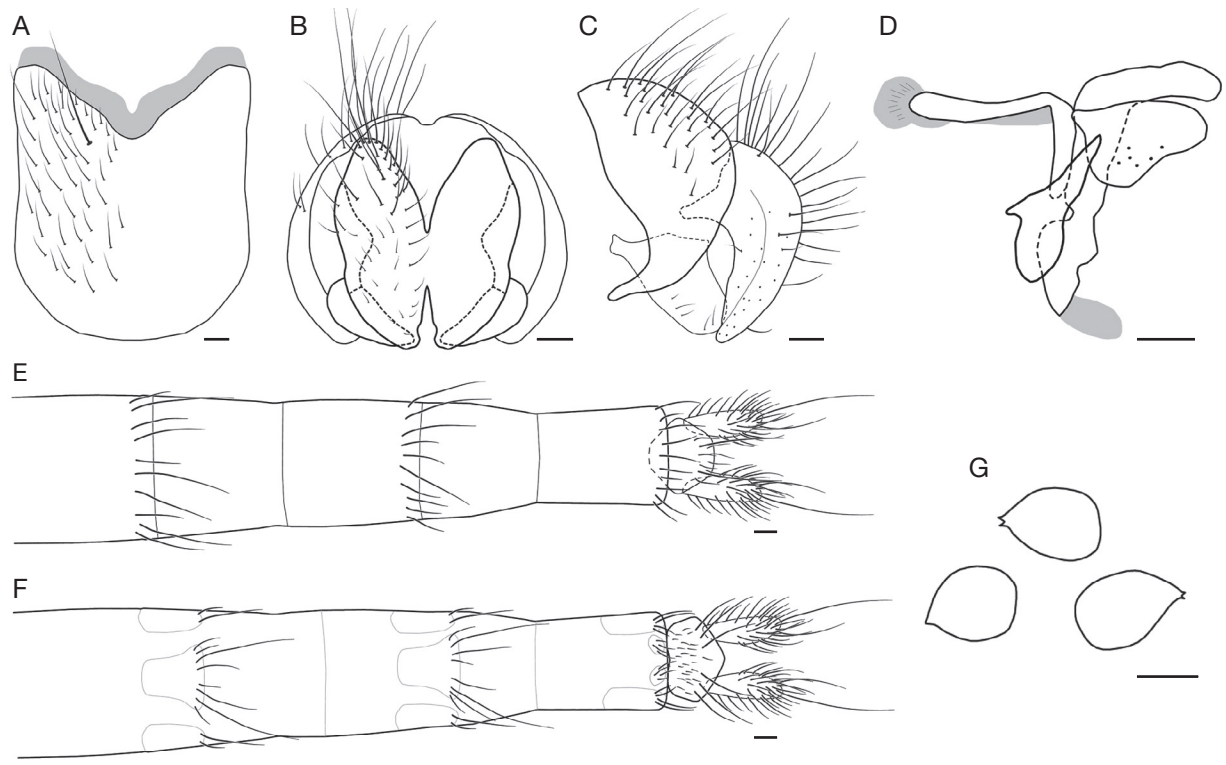


FIG. 2. — *Souzalopesmyia polleti* n. sp.: **A-D**, ♂: sternite 5, dorsal view (**A**); epandrium, cercal plate and surstyli, dorsal view (**B**); epandrium, cercal plate and surstyli, lateral view (**C**); hypandrium and associated structures, lateral view (**D**); **E-H**, ♀: ovipositor, dorsal view (**E**); ovipositor, ventral view (**F**); spermatheca (**G**). Scale bars: 0.5 mm.

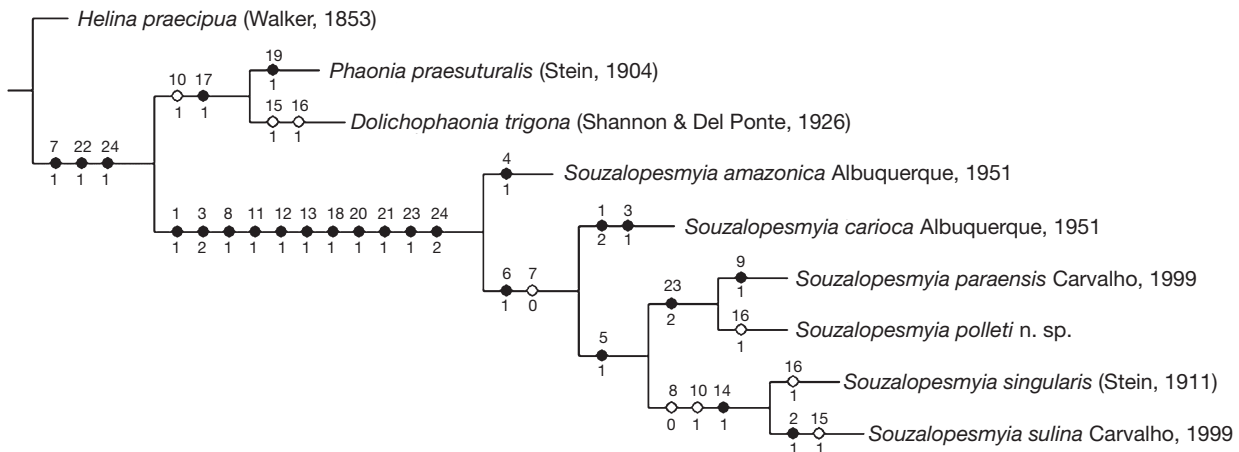


FIG. 3. — Most parsimonious phylogenetic hypothesis obtained from the analysis of a morphological data set of the six species of *Souzalopesmyia* and the three outgroups species (*Helina praecipua* (Walker, 1853), *Phaonia praesuturalis* (Stein, 1904) and *Dolichophaonia trigona* (Shannon & Del Ponte, 1926)). All characters were given the same weight and treated as unordered. Tree length: 34, consistency index: 0.82, retention index: 0.84. Filled circles represent unique transformation, and empty circles represent homoplastic character state transformation under fast optimization. Characters and character states: see Appendix.

Thorax. Prosternum bare. Dorsocentral setae 1 + 3. Intra-alars 1 + 2. Prealar absent. Acrostichals not distinct from ground setulae, except one postsutural acrostichal seta strong, half length of dorsocentral. Upper postpronotal setae longer than half length of lower one. One proepisternal seta weak, about $\frac{3}{4}$ length of upper anepisternal setae and one proepimeral seta strong, twice length of proepisternal. Notopleuron with two setae of almost the same length. Six anepisternal setae. Katepisternals 1 + 2 posterior twice length of anterior. Posterior spiracle small, triangular, with yellow cilia on its margin. Scutellum with two strong pairs of setae, one apical and one basal, both longer than length of scutellum; and a subbasal and preapical pair of setae half length of basal pair. (Fig. 1C, D).

Legs. Fore femur with a complete row of dorsal, posterodorsal and posteroventral setae. Fore tibia with one posterodorsal submedian setae. Fore tarsomere 1 with one ventral seta. Mid femur with three posteroventral setae on basal half and preapical setae on anterior, posterior and posterodorsal surfaces. Mid tibia with three posterior setae. Hind femur with strong preapical anteroventral seta, longer than femoral width and a row of anterodorsal setae; preapical setae on anterodorsal, dorsal and posterodorsal surfaces. Hind tibia with one anterodorsal and four anteroventral setae on apical half.

Wing. Veins bare, except costal; crossvein dm-cu straight; M slightly curved forward apically. Both calypters yellow, lower calypter glossiform.

Abdomen. Sternite 1 bare. General coloration yellow, with a narrow, slight, dark brown stripe on tergites 3, 4 and 5. Tergite 4 and 5 with two strong apical setae (Fig. 1H). Sternite 5 concave on posterior margin (Fig. 2A).

Terminalia. Cercal plate with margins of the posterior incision divergent in dorsal view; inner and external surfaces with setae (Fig. 2B); surstylus with few setae (Fig. 2C). Phallic complex with phallapodeme enlarged on distal region; epiphallus and postgonite subequal in length (Fig. 2D).

Female

Body. Body length: 7.5–8.0 mm. Wing length: 6.5–7.0 mm. Similar to male, differing as follows: eyes separated by space measuring about one third of head width at vertex. 3–4 pairs of strong frontal setae, one cruciate, one reclinate convergent and 1–2 reclinate divergent. Postocular setae forming a complete single row of black setae, from top of head to vibrissa (Fig. 1E–H). Four anepisternal setae. Sternites 6 and 7 quadrangular, sharpened on anterior region. Hypoproct trapezoid. Epiproct hexagonal. Cercus longer than hypoproct, with setae on inner and outer surfaces. Three round spermathecae (Fig. 2E–G).

REMARKS

This species is similar to *S. paraensis*, but *S. polleti* n. sp. can be distinguished by upper postpronotal setae that are longer than half-length of lower one; male sternite 5 concave on posterior margin; cercal plate with margins of the posterior incision divergent in dorsal view; inner and external surfaces with setae; distal region of phallapodeme enlarged.

Souzalopesmyia paraensis de Carvalho, 1999

Souzalopesmyia paraensis de Carvalho, 1999: 127.

MATERIAL ANALYZED. — Peru. Madre de Dios: 1 ♂, CICRA, trail 2.267 m, –12.58104, –70.10645, Malaise trap, 12–25.I.2014, J. Caballero leg. (NMNH).

UPDATED KEY TO *SOUZALOPESMYIA* ALBUQUERQUE, 1951 SPECIES (MODIFIED FROM DE CARVALHO 1999)

1. Inner vertical setae divergent; crossvein dm-cu oblique, weakly curved. Female: 2 frontal setae [Brazil] *S. carioca* Albuquerque, 1951
 — Inner vertical setae parallel; crossvein dm-cu oblique, almost straight. Female: 3 frontal setae 2
2. Dorsocentral setae 2 + 3. Male: postocular row of setulae incomplete, not reaching epistome, setulae black. Female: some acrostichals presuturals stronger than ground setulae [Brazil] *S. amazonica* Albuquerque, 1951
 — Dorsocentral setae 1 + 3. Male: postocular row of setulae complete; setulae black and yellow, the latter beginning after basal half of eye. Female: acrostichals presuturals undifferentiated from the ground setulae 3
3. Proepisternal seta weak, about $\frac{3}{4}$ length of the upper anepisternal seta. Male: cercal plate with margins of the posterior incision divergent 4
 — Proepisternal setae strong, similar to the upper anepisternal seta. Male: cercal plate with posterior parallel incision margins 5
4. Upper postpronotal setae shorter than half length of lower one (Fig. 1G). Male: sternite 5 concave on posterior margin (Fig. 2A) [French Guiana] *S. polleti* n. sp.
 — Upper postpronotal setae longer than half length of lower one. Male: sternite 5 not concave on posterior margin [Brazil, Peru] *S. paraensis* de Carvalho, 1999
5. Posterior katepisternal seta strong, about two times the length of the anterior one. Male: frontal setae both cruciate [Bolivia, Peru] *S. singularis* (Stein, 1911)
 — Posterior katepisternal seta very strong, about three times the length of the anterior one. Male: lower frontal setae cruciate, upper reclinate [Paraguay] *S. sulina* de Carvalho, 1999

DISTRIBUTION. — Brazil (Tocantins, Maranhão and Pará) (Löwenberg-Neto & de Carvalho 2013). New record to Peru (Madre de Dios).

PHYLOGENETIC ANALYSES

The analysis estimated a most parsimonious topology with 34 steps, consistency index 0.82, retention index 0.84 (Fig. 3). The results are entirely congruent with the relationships found by de Carvalho (1999).

DISCUSSION

CLADISTIC ANALYSIS

Souzalopesmyia is a monophyletic group, supported by the following 10 synapomorphic characters: females with three frontal setae; inner vertical setae parallel; proepisternal seta weak, less than length of upper anepisternal seta; head elongated; ocellar setae absent; ground color yellow; prealar setae absent; male dichoptic; antenna reaching epistome; upper posterior katepisternal setae twice longer than anterior seta and veins R_{4+5} and M convergent.

Souzalopesmyia amazonica is the sister group of all other species of genus, and *S. carioca* is the sister group of ((*S. paraensis* + *S. polleti* n. sp.) + (*S. singularis* + *S. sulina*)).

DISTRIBUTION OF *SOUZALOPESMYIA*

We changed the *S. singularis* distribution presented by Löwenberg-Neto & de Carvalho (2013); a specimen from Guaraqueçaba (Paraná, Brazil) has been re-identified as *Souzalopesmyia* sp., since we were not able to confirm the identity of the female specimen. *Souzalopesmyia* is found in Bolivia, Brazil, French Guiana, Paraguay and Peru (Fig. 4). *Souzalopesmyia polleti* n. sp. is the first record of the genus from French Guiana.



FIG. 4. — Geographical distribution of the species of *Souzalopesmyia* Albuquerque, 1951 from South America, with phylogenetic tree superimposed. Symbols: ●, *S. sulina* de Carvalho, 1999; ●, *S. carioca* Albuquerque, 1951; ●, *S. singularis* (Stein, 1911); ●, *Souzalopesmyia polleti* n. sp.; ●, *S. paraensis* de Carvalho, 1999; ●, *S. amazonica* Albuquerque, 1951; ○, *Souzalopesmyia* sp.

The pattern of distribution of *Souzalopesmyia* species (Fig. 4) is congruent with what was found by de Carvalho (1999). This pattern could indicate that *Souzalopesmyia* is one of the most basal lineages of Phaoniinae in the Neotropics if we considerate that this distribution pattern was formed by an older vicariant Cretaceous event (Amorim & Pires 1996; de Carvalho 1999). However, Amorim (2009) concluded that this event occurred during the Cenozoic. The clade *Souzalopesmyia polleti* n. sp. + *S. paraensis* could be the result of a single dispersal event (de Carvalho 1999). *Souzalopesmyia paraensis* has the widest area of distribution of the genus (Fig. 4).

Acknowledgements

All material of the new species was collected during the “Our Planet Reviewed” Guyane-2015 expedition in the Mitaraka range, in the core area of the French Guiana Amazonian Park, organized by the MNHN and Pro-Natura international. The expedition was funded by the European Regional Development Fund (ERDF), the Conseil régional de Guyane, the Conseil général de Guyane, the Direction de l’Environnement, de l’Aménagement et du Logement and by the Ministère de l’Éducation nationale, de l’Enseignement supérieur et de la Recherche. It was conducted in collaboration with the Parc amazonien de Guyane and the Société entomologique Antilles-Guyane. We thank Marc Pollet (Research Institute for Nature and Forest – INBO; Royal Belgian Institute for Natural Sciences – RBINS; and University of Ghent – UGent, all Belgium) for the loan of material from French Guiana. Marc participated to this expedition as member of the first team (22 February–11 March 2015), hereby supported financially by MNHN and Pro-Natura international. We thank Allen Norrbom (NMNH), for the loan of material from Peru. We also thank Taxonline – Rede Paranaense de Coleções Biológicas for the photographs of specimens. The Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) provided a scholarship and grant (processes number 130644/2016–1, LRPg and 309873/2016–9, CJB). We thank anonymous referees for valuable suggestions.

REFERENCES

- ALBUQUERQUE D. O. 1951. — Sobre um gênero e duas espécies novas de “Phaoninae” Neotropical (Diptera, Muscidae). *Revista Brasileira de Biologia* 11: 53–57.
- AMORIM D. S. 2009. — Neotropical Diptera diversity: richness, patterns, and perspectives, in PAPE T., BICKEL D., MEIER R. (eds), *Diptera Diversity: Status, Challenges and Tools*. New York, Koninklijke Brill: 71–97.
- AMORIM D. S. & PIRES M. R. S. 1996. — Neotropical biogeography and a method for maximum biodiversity estimation, in BICUDO C. E. M. & MENEZES N. A. (eds), *Biodiversity in Brazil, a first approach*. São Paulo, CNPq: 183–219.
- CUMMING J. M. & WOOD D. M. 2009. — Adult morphology and terminology, in BROWN B. V., BORKENT A., CUMMING J. M., WOOD D. M., WOODLEY N. E., ZUMBADO M. A. (eds), *Manual of Central American Diptera*. Volume 1. NRC Research Press, Ontario: 9–50.
- DE CARVALHO C. J. B. 1989. — Classificação de Muscidae (Diptera): uma proposta através da análise cladística. *Revista Brasileira de Zoologia* 6: 627–648. <https://doi.org/10.1590/S0101-81751989000400009>
- DE CARVALHO C. J. B. 1999. — Revision, Cladistics and Biogeography of the Neotropical genus *Souzalopesmyia* Albuquerque (Diptera: Muscidae). *Proceedings of the Entomological Society of Washington* 101: 123–137.
- GOLOBOFF P. A. & CATALANO S. A. 2016. — TNT version 1.5, including a full implementation of phylogenetic morphometrics, *Cladistics* 32: 221–238. <https://doi.org/10.1111/cla.12160>
- KROLOW T. K., HENRIQUES A. L. & POLLET M. 2017. — The Tabanidae of the Mitaraka expedition, with an updated check list of French Guiana (Diptera). *ZooKeys* 684: 85–118. <https://doi.org/10.3897/zookeys.684.13197>
- LÖWENBERG-NETO P. & DE CARVALHO C. J. B. 2013. — Muscidae (Insecta: Diptera) of Latin America and the Caribbean: geographic distribution and check-list by country. *Zootaxa* 3650: 1–147. <https://doi.org/10.11646/zootaxa.3650.1.1>
- NIXON K. C. 2002. — WinClada version 1.00.08. Published by the author, Ithaca.
- POLLET M., PASCAL O. & TOUROULT J. 2014. — Flies from French Guiana: a unique opportunity. *Fly Times* 53: 3–6.
- PONT A. C. 1972. — Family Muscidae, in *A Catalogue of the Diptera of the Americas South of the United States*. Museu de Zoologia, Universidade de São Paulo, vol. 97: 1–111.
- TOUROULT J., POLLET M. & PASCAL O. 2018. — Overview of Mitaraka survey: research frame, study site and field protocols, in TOUROULT J. (ed.), “Our Planet Reviewed” 2015 large-scale biotic survey in Mitaraka, French Guiana. *Zoosystema* 40 (13): 327–365. <https://doi.org/10.5252/zoosystema2018v40a13>. <http://zoosystema.com/40/13>

Submitted on 15 November 2017;
accepted on 15 March 2018;
published on 11 December 2018.

APPENDIX

Appendix 1. — Characters and character states used in the cladistic analysis of *Souzalopesmyia* species (modified from de Carvalho 1999).

1. Number of frontal setae in female: (0) four or more; (1) three; (2) two.
2. Number of frontal setae cruciate in male: (0) two; (1) one.
3. Inner vertical setae: (0) convergent; (1) divergent; (2) parallel.
4. Postocular setae row in male: (0) complete and distinct, whole row of setulae reaching epistome; (1) incomplete, row of setulae reaching only to basal half of eyes.
5. Coloration of postocular setulae row in male: (0) whole black; (1) composed of black and yellow setulae.
6. Number of dorsocentral presutural setae: (0) two; (1) one.
7. Acrostichal female presutural: (0) not distinct from the ground setulae; (1) distinct from the ground setulae.
8. Proepisternal seta: (0) strong, similar in length to the upper anepisternal setae; (1) weak, less than the length of upper anepisternal.
9. Sternite 5 shape: (0) concave on posterior margin; (1) not concave on posterior margin.
10. Cercal plate: (0) round outline; (1) square outline.
11. Head appearance: (0) not elongate; (1) elongate.
12. Ocellar setae: (0) present; (1) absent.
13. General ground color of the flies: (0) not yellow; (1) yellow.
14. Apex of cercal plate, lateral view: (0) enlarged; (1) thin.
15. Length of postgonite and epiphallus: (0) same length; (1) epiphallus longer than postgonite.
16. Distal region of phallapodeme: (0) same thickness of the base; (1) enlarged, about twice thickness of the base.
17. Calcar on posterodorsal surface of hind tibia: (0) present; (1) absent.
18. Pre-alar seta: (0) present; (1) absent.
19. Rs ciliation: (0) absent; (1) present.
20. Male eyes: (0) holoptic; (1) dichoptic.
21. Antenna: (0) not reaching epistome; (1) reaching epistome.
22. Katepisternal setae conformation: (0) 2+2; (1) 1+2.
23. Upper posterior katepisternal setae: (0) about one third longer of anterior seta; (1) two times longer the anterior seta; (2) three times longer the anterior seta.
24. Conformation of vein R_{4+5} and M: (0) divergent; (1) parallels; (2) convergent.