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First records of Ropalomeridae
(Diptera, Acalyptratae)
from French Guiana

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Flooded bank of Alama river in the Mitaraka Mountains (French Guiana) (photo Marc Pollet). In médaillon, *Ropalomera clavipes* (Fabricius, 1805), female head in frontal view (photo Rosaly Ale-Rocha).

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First records of Ropalomeridae (Diptera, Acalyptratae) from French Guiana

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KEY WORDS

Distribution,
Brachycera,
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Scyomyzoidea,
South America.

ABSTRACT

The family Ropalomeridae Schiner, 1868 (Diptera, Acalyptratae) is recorded from French Guiana for the first time, with two species, *Ropalomera clavipes* (Fabricius, 1805) and *R. tibialis* Walker, 1852, collected in lowland rainforest in the southwesternmost part of French Guiana (Mitaraka Mountains).

MOTS CLÉS

Distribution,
Brachycera,
Région néotropicale,
Scyomyzoidea,
Amérique du Sud.

RÉSUMÉ

Première signalisation de Ropalomeridae (Diptera, Acalyptratae) de Guyane.

La famille de Ropalomeridae Schiner, 1868 (Diptera, Acalyptratae) est signalée de Guyane pour la première fois, avec deux espèces, *Ropalomera clavipes* (Fabricius, 1805) et *R. tibialis* Walker, 1852, collectées dans les forêts pluviales de plaines du sud-ouest de Guyane (massif du Mitaraka).

INTRODUCTION

Ropalomeridae Schiner, 1868 is a small family of Diptera of mainly Neotropical distribution. Representatives occur from the southern United States of America in the north to Argentina in the south (Steyskal 1967; Ibáñez-Bernal & Hernández-Ortiz 2010). At present, the family comprises 35 species in nine genera: *Acrocephalomyia* Ibáñez-Bernal & Hernández-Ortiz, 2012; *Apophorhynchus* Williston, 1895; *Dactylissa* Fischer, 1932; *Kroeberia* Lindner, 1930; *Lenkokroeberia* Prado, 1966; *Mexicoa* Steyskal, 1947; *Rhytidops* Lindner, 1930; *Ropalomera* Wiedemann, 1824; and *Willistoniella* Mik, 1895 (Prado & Papavero 2009; Alvim & Ale-Rocha 2016).

Ropalomerids are robust medium- to large-sized flies (6–12 mm length), with the upper part of the frons and the vertex deeply concave, eyes prominent, face with tubercle or carina (flat in *Acrocephalomyia*), and legs robust, saber-shaped, with the hind tibia flattened laterally and strongly expanded. The larval stages of Ropalomeridae feed on decaying vegetable matter. Adults can be found perching on the bark of tree trunks feeding on tree exudates or on the ground feeding on decayed fruits (Prado & Papavero 2002). Sepsidae is considered to be the sister group of Ropalomeridae (McAlpine 1989). Together they form a monophyletic group on the basis of the following features: morphology of the face, presence of setae similar to vibrissae, bristles bordering the metathoracic spiracle, absence of vein A₂ and presence of two spermathecae (McAlpine 1989). Recent phylogenies combining morphological and molecular characters have shown divergent results regarding the relation between Ropalomeridae and Sepsidae. A close relationship was confirmed in the analysis of Feng-Yi *et al.* (2008) for DNA sequences from ten genera of Sepsidae with six species from four families of the Sciomyzoidea as the outgroup. This is contradictory to the results of Wiegmann *et al.* (2011), for the entire order Diptera, which indicated that the families Ropalomeridae and Sepsidae are phylogenetically distant from each other.

Ropalomera is the largest genera of the family with 17 species (Ibáñez-Bernal & Hernández-Ortiz 2010, 2012; Kirst & Ale-Rocha 2012). The genus is characterized by the presence of ocellar, postocellar and postpronotal setae, a central tubercle on the face, a plumose arista and 1–3 setae on the upper margin of the metathoracic spiracle. The most recent contribution to the knowledge of the genus is the revision of Kirst & Ale-Rocha (2012), which deals with Amazonian species.

The insect fauna of French Guiana is considered poorly known. Brûlé & Touroult (2014) estimated that 80% still awaits to be discovered and recorded. In order to speed up this disclosure a survey was conducted in the southwestern part of French Guiana in 2015 (Pollet *et al.* 2014, 2015). It yielded some specimens of Ropalomeridae from that part of South America. In the present paper we document the ropalomerid fauna of French Guiana and we report the first records of this family for this part of South America.

MATERIAL AND METHODS

In 2015 the “Our Planet Reviewed” or “La Planète revisitée” Guyane 2014–2015 expedition, also known as the “Mitaraka 2015 survey,” was conducted in French Guiana (Pollet *et al.* 2014, 2018; Pascal *et al.* 2015, Touroult *et al.* 2018) as the 5th edition of a large-scale biodiversity survey undertaken by the Muséum national d’Histoire naturelle (MNHN, Paris) and Pro-Natura International (a non-governmental organization). Basic arthropod taxonomy and species discovery were at the heart of the survey, although forest ecology and biodiversity distribution modelling were also project topics. The expedition was conducted in the Mitaraka Mountains, a largely unknown and uninhabited area in the southwesternmost corner of French Guiana, directly bordering Suriname and Brazil (Pollet *et al.* 2014; Krolow *et al.* 2017). It is part of the Tumuc-Humac mountains chain, extending east in the Amapá state of Brazil and west in southern Suriname. The area consists primarily of tropical lowland rainforest with scattered inselbergs, i.e., isolated hills that stand above the forest plains.

Between 22 February and 27 March 2015, two consecutive equal-sized teams (of about 30 researchers each) explored the area, including more than 10 invertebrate experts. A third, smaller team returned to the site from 12 to 20 August 2015. MP coordinated the processing and dissemination of the collected Diptera and was the only Diptera worker actively involved in the entire survey (Pollet *et al.* 2018). Invertebrates were sampled near the base camp, on the drop zone (an area near the base camp that had been clear-cut entirely to allow helicopters to land) and, in particular, along four trails each of about 3.5 km in length that started from the base camp in four different directions (see Krolow *et al.* 2017; Touroult *et al.* 2018). During the first period (22 February–11 March 2015) more than 21 different collecting methods were applied, with a total of 401 traps operational within a perimeter of 1 km². This array consisted primarily of pan traps (n = 280), Charax butterfly traps (n = 50), square Malaise traps (SLAM, n = 32), Flight Intercept Traps (FIT, n = 13), Butterfly banana traps (n = 12), and also a light trap (see Krolow *et al.* 2017). In the subsequent periods, pan traps were no longer operational. A total of 223 invertebrate samples (often pooled yields of different traps of the same type) were examined, including 94 sweepnet samples. However, none of the latter contained ropalomerid flies as MP focused on Dolichopodidae during his active collecting. A total of five ropalomerid specimens of two different species of the genus *Ropalomera* from Mitaraka were collected by means of the 6 m long Malaise trap (MT), light trap (LT) and pink polytrap automatic light trap (PVP).

All specimens were dried and pinned. The abdomen of each specimen was sectioned at the fifth segment, and the detached postabdomen was soaked in warm 85% lactic acid for about 15 minutes. Subsequently the postabdomen was transferred to an excavated slide containing glycerin, where the terminalia were detached and studied. After examination, the terminalia were stored in a plastic microtube containing glycerin on the same pin as the corresponding mounted specimen.

SYSTEMATICS

Superfamily SCIOMYZOIDEA Macquart, 1846

Family ROPALOMERIDAE Schiner, 1868

Genus *Ropalomera* Wiedemann, 1824*Ropalomera* Wiedemann, 1824: 17.

MORPHOLOGICAL CHARACTERIZATION AND SYSTEMATICS

Species of this genus are recognized by the following features: predominantly brown body coloration, wide and deepened frons, frontal setae weak or absent, ocellar, postocellar, inner and outer vertical and postpronotal setae present, face with well-developed hemispherical tubercle, arista plumose, dorsocentral setae lacking, projection of hypandrial arms (“spinus titillatorius”, “epiphallus”) anchor-shaped, with short or long branches.

Ropalomera is probably a natural group with several derived characters, the most prominent of which are the dorsal projection of the hypandrial arms with lateral branches as an anchor-shaped structure (Kirst & Ale-Rocha 2012) and the bristles inserted on the callus at the dorsal apex of the mid femur. *Ropalomera* can be distinguished from *Apophorhynchus* by the presence of an ocellar seta; from *Rhytidops* and *Wilstoniella* by the central tubercle on the face, while a carina is lacking; from *Kroeberia*, *Lenkokroeberia* and *Dactylissa* by the plumose arista; and from *Mexicoa* by the presence of postpronotal setae, a plumose arista and 1-3 setae on the upper margin of the metathoracic spiracle.

Ropalomera clavipes (Fabricius, 1805)
(Fig. 1A-C, F)

Dictya clavipes Fabricius, 1805: 329.*Ropalomera clavipes* – Wiedemann 1824: 17.*Ropalomera spinosa* Perty, 1833: 189, fig. 14.*Ropalomera nebulosa* Walker, 1857: 225.*Rhopalomera* [sic] *clavipes* – Williston 1895a: 184, 185.

MATERIAL EXAMINED. — **French Guiana.** Mitaraka, La Planète Revisitée Guyane 2015, MNHN-PNI, APA 973-1, MIT-DZ, 02°14'01.8"N, 54°27'01.0"W, 306 m, drop zone, 24.II-10.III.2015, LT, leg. Julien Touroult (FR-GU/Mitaraka/2015) – sample code: MITARAKA/115 (sorted by Marc Pollet, 2015). 1 ♀, MNHN; *idem*, Mitaraka, MIT-E-savane roche 2, 02°13'59.8"N, 54°27'46.5"W, 471 m, open/partially opened areas on savane roche 2, 13-20.VIII.2015, MT(6 m), leg. Pierre-Henri Dalens (FR-GU/Mitaraka/2015) – sample code: MITARAKA/230 (sorted by Marc Pollet, 2015), 2 ♂, 1 ♀, MNHN.

DISTRIBUTION. — Guyana, Suriname, French Guiana (first record), Brazil (Roraima, Amapá, Amazonas, Pará, Rondônia, Maranhão, Piauí, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, São Paulo), Ecuador, Bolivia, Paraguay.

DIAGNOSIS. — Frons (Fig. 1B) yellow or ochreous laterally, darkened centrally on ventral half and on ocellar tubercle, with two spots of silvery pruinosity lateral to ocellar triangle, and fine yellow pilosity;

face brown with one yellow V-shaped spot on ventral half, below facial tubercle; scutum brown with acrostichal and dorsocentral stripes of pale golden pruinosity; pleura lacking horizontal stripe of silvery pruinoscence on anepisternum (present in *R. tibialis*); wing (Fig. 1F) hyaline with brown spots; mid tibia with ventroapical short, wide, spur-shaped process in males; hind tibia with tubercles on dorsal surface; tergites dark brown, with four spots of silvery pruinosity arranged in a checkerboard pattern; postgonites bilobate, phallus lacking lateral projections; dorsal process of hypandrial arms curved, with basal half perpendicular to basal region, apex rounded with short lateral branches.

COMMENTS

Together with *R. nudipes* Frey, 1959 and *R. stictica* Wiedemann, 1830, *R. clavipes* belongs to a species group with distinctly infuscated wings. It differs from *R. stictica* by the size of the wing spots, which are larger in *R. clavipes*, and from *R. nudipes* by the number and sharpness of the spots, which are more distinct and numerous in *R. clavipes*. Furthermore, *R. clavipes* differs by features of the male genitalia as follows: surstylus straight (falciform in *R. nudipes*) and anchor-shaped dorsal process of hypandrial arms with short branches (long branches in *R. nudipes* and *R. stictica*). *Ropalomera clavipes* was revised by Kirst & Ale-Rocha (2012).

Ropalomera tibialis Walker, 1852
(Fig. 1D, E, G)

Ropalomera tibialis Walker, 1852: 375.*Rhopalomera* [sic] *tibialis* – Williston 1895a: 184.*Rhopalomera* [sic] *walkeri* Prado, 1966: 215, 243, 245.

MATERIAL EXAMINED. — **French Guiana.** Mitaraka, La Planète Revisitée Guyane 2015, MNHN-PNI, APA 973-1, different sites near base camp and along trails, tropical moist forest (different sites), 10.III.2015, PVP, leg. Julien Touroult & Eddy Poirier (FR-GU/Mitaraka/2015) – sample code: MITARAKA/222 (sorted by Marc Pollet, 2015), 1 ♂, MNHN.

DISTRIBUTION. — French Guiana (first record), Brazil (Amapá, Amazonas, Mato Grosso, Maranhão, Pará, Rondônia), Bolivia.

DIAGNOSIS. — Frons (Fig. 1E) with fine yellow pilosity, yellow, darkened around ocellar triangle and vertex; face dark brown; scutum brown with acrostichal and dorsocentral stripes of pale yellow or silvery pruinosity; pleura with stripe of silvery pruinosity extended from proepisternum to metathoracic spiracle; wing slightly infuscated with darkened areas along the veins, especially R_{2+3} , R_{4+5} , r-m and M_1 ; fore femur with silvery pruinosity, posterior surface and apical half of posteroventral surface shiny, lacking pruinosity, proximal half of posteroventral surface bare; mid femur with 2-3 preapical seta and 1 dorsoapical, strong and curved spine-like setae; mid tibia ventrally with apical spine-like seta; abdomen with bluish reflections; postgonites bilobate; phallus with spinelike apical projections; dorsal process of hypandrial arms with very long lateral branches.

COMMENTS

Ropalomera tibialis is similar to *R. titillator* Steyskal, 1967. Both species bear a pleural region with a stripe of silvery pruinosity extending from anepisternum to anepimerum. *Ropalomera tibialis* can be distinguished from the latter species by the

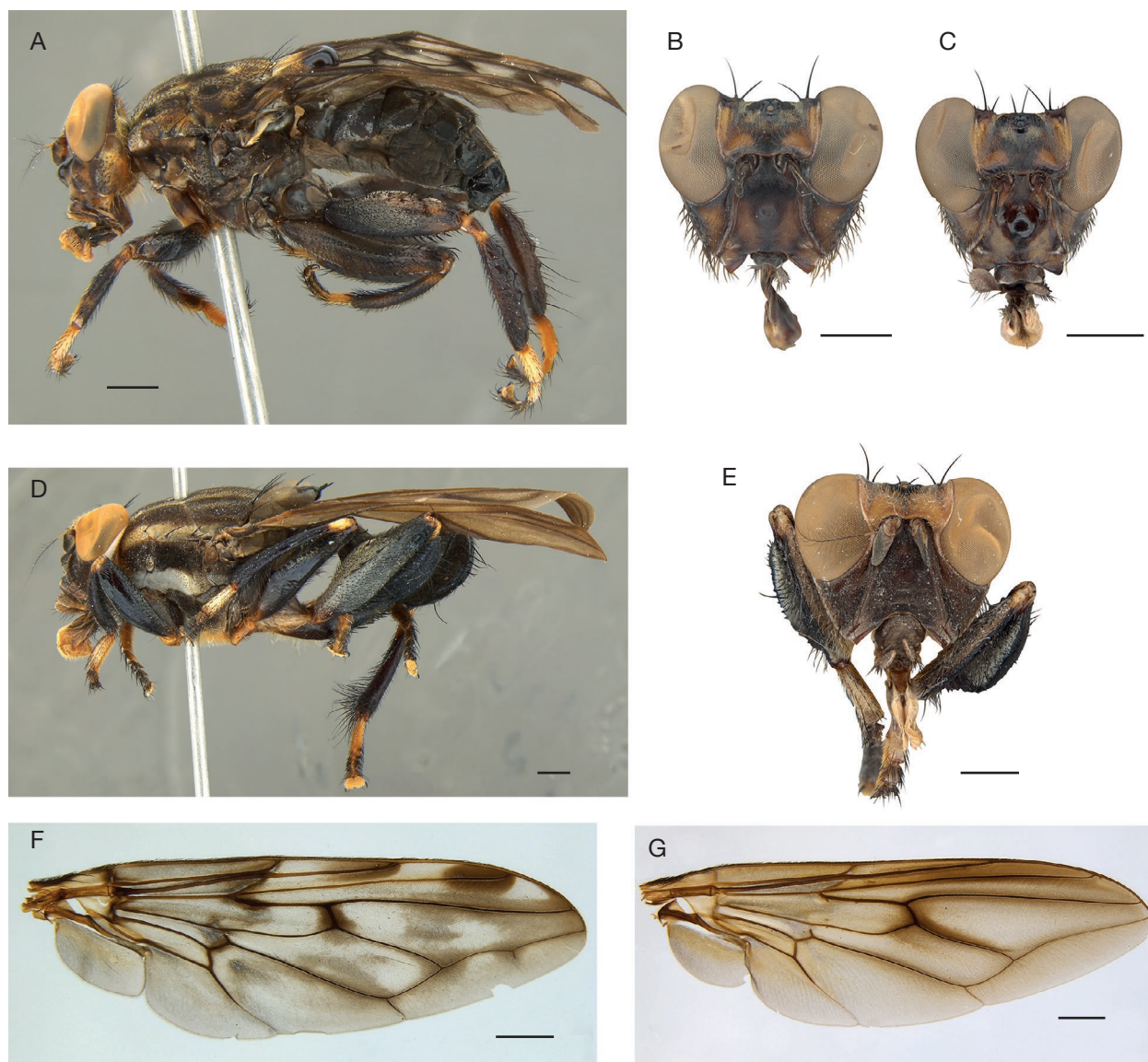


FIG. 1. — **A-C, F**, *Ropalomera clavipes* (Fabricius, 1805): **A**, female, habitus (lateral view); **B**, female, head (anterior view); **C**, male, head (anterior view); **D, E, G**, *Ropalomera tibialis* Walker, 1852, male: **D**, habitus (lateral view); **E**, head (anterior view); **F**, *R. clavipes*, wing; **G**, *R. tibialis*, wing. Scale bars: 1 mm.

presence of a brown scutum and black setae on the anterior surface of the mid femur and the apex of the mid tibia, whereas the scutum of *R. titillator* is reddish brown and the setae on the anterior surface of the mid femur and the apex of the mid tibia are rather red or dark brown. Both species were revised by Kirst & Ale-Rocha (2012).

DISCUSSION

The species found during the Mitaraka survey are widely distributed and quite common in countries bordering French Guiana, especially *Ropalomera clavipes*, which is widely distributed in northern South America. The sample obtained during this survey probably only poorly represented the diversity of Ropalomeridae in French Guiana, considering the high diversity known from northern Brazil (Marques & Ale-Rocha

2004, 2005; Marques-Costa & Ale-Rocha 2005; Kirst & Ale-Rocha 2012; Alvim & Ale-Rocha 2016). Ropalomeridae are most efficiently collected by use of traps containing an attractive agent or natural bait (like decomposing fruit, sugar cane juice, and hydrolyzed protein) (Ale-Rocha 2014). Although we cannot explain why neither the Butterfly banana traps nor the traps baited with chicken hearts produced any Ropalomeridae, we believe that a more intensive use of these types of traps would yield a much more reliable picture of the diversity of this family in this part of South America.

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neotropicais e estudos bioecológicos de espécies amazônicas (Diptera, Opomyzoidea)” Edital Universal n. 457485/2014-0. All specimens were 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 (both French Guiana), 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 (all three France). The survey was realized in collaboration with the Parc amazonien de Guyane and the Société entomologique Antilles-Guyane. MP participated in this expedition as member of the first team (22 February–11 March 2015), supported financially by MNHN and Pro-Natura International. We thank reviewers Jay Abercrombie and Bill Murphy for their suggestions and corrections in the text.

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