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The Sepsidae of the Mitaraka expedition, French Guiana (Diptera)

Vera C. SILVA & Marc POLLET



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View of Sommet en Cloche in the Mitaraka massif (photo: Maurice Leponce). In medallion: *Archisepsis diversiformis* (Ozerov, 1993), male, habitus, lateral view (photo: Sepsidnet 2013).

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The Sepsidae of the Mitaraka expedition, French Guiana (Diptera)

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ABSTRACT

This paper documents on the sepsid fauna (Diptera: Sepsidae) encountered during the Mitaraka 2015 expedition. These are the first published records of Sepsidae Walker, 1833 from French Guiana. During this survey, six genera with 11 species were recorded from French Guiana for the first time: *Archiseptis armata* (Schiner, 1868), *Archiseptis diversiformis* (Ozerov, 1993), *Archiseptis peruana* (Ozerov, 1994), *Meropliosepsis sexsetosa* Duda, 1926, *Microsepsis armillata* (Melander & Spuler, 1917), *Microsepsis furcata* (Melander & Spuler, 1917), *Microsepsis mitis* (Curran, 1927), *Palaeosepsioides erythromyrmus* (Silva, 1991), *Palaeosepsioides mitarakensis* Silva, n. sp., described herein, *Palaeosepsis* Duda, 1926 and *Pseudopalaeosepsis* Ozerov, 1992. The actual state of Sepsidae taxonomy, based mostly on the male fore femur morphology and genitalic characters, has led to a case where sometimes females cannot be properly assigned to a specific taxon – this was the case here for most of the *Microsepsis* Silva, 1993 females which corresponded to 25% of the collected specimens, one female assigned to *Palaeosepsis dentata* (Becker, 1919)/*dentatiformis* (Duda, 1926), and two females at present identified as *Pseudopalaeosepsis* sp. A checklist of Sepsidae of French Guiana is provided also including doubtful and unidentified female specimens.

KEY WORDS

Neotropical region,
Amazon basin,
biodiversity,
distribution,
black scavenger flies,
new records,
new species.

RÉSUMÉ

Les Sepsidae de l'expédition Mitaraka en Guyane (Diptera).

Cet article documente la faune des sepsides (Diptera: Sepsidae) trouvée lors de l'expédition Mitaraka 2015. Ce sont les premières signalisations publiées de Sepsidae Walker, 1833 en Guyane. Au cours de cette expédition, six genres et 11 espèces ont été signalés pour la première fois de Guyane : *Archiseptis armata* (Schiner, 1868), *Archiseptis diversiformis* (Ozerov, 1993), *Archiseptis peruana* (Ozerov, 1994), *Meroplioseptis sexsetosa* Duda, 1926, *Microseptis armillata* (Melander & Spuler, 1917), *Microseptis furcata* (Melander & Spuler, 1917), *Microseptis mitis* (Curran, 1927), *Palaeoseptioides erythromyrmus* (Silva, 1991), *Palaeoseptioides mitarakensis* Silva, n. sp., décrite ici, *Palaeoseptis* Duda 1926 et *Pseudopalaeoseptis* Ozerov, 1992. Comme la taxonomie actuelle des Sepsidae est basée principalement sur la morphologie du fémur antérieur et les caractères génitaux des mâles, les femelles ne peuvent parfois pas être correctement attribuées à un taxon spécifique – ce fut le cas ici pour la plupart des femelles de *Microseptis* Silva, 1993 qui correspondaient à 25% des spécimens collectés, une femelle a d'autre part été déterminée *Palaeoseptis dentata* (Becker, 1919)/*dentatiformis* (Duda, 1926) et deux femelles identifiées *Pseudopalaeoseptis* sp. Une liste commentée des Sepsidae de Guyane est fournie, comprenant les femelles identifiées de manière douteuse ou non identifiées.

MOTS CLÉS
Région néotropicale,
bassin amazonien,
biodiversité,
distribution,
Sepsides,
signalisations nouvelles,
espèce nouvelle.

INTRODUCTION

Sepsidae Walker, 1833 are a small family of acalyptrate Diptera. Most members have an ant-like appearance, due to a basal constriction of the abdomen; they are small to medium-sized (body length 2-7 mm), with hyaline wings, which feature a dark spot near the tip in some species. The larvae are closely associated with various decaying organic materials, but occur most frequently on mammalian faeces (Silva 2016).

The family is well represented in all biogeographic regions, with 361 valid species in 38 valid genera (Ozerov 2005; Iwasa 2008; Ozerov & Iwasa 2008; Ang *et al.* 2008, 2017; Ozerov & Krivosheina 2011, 2012, 2014; Ozerov 2012, 2014, 2018a, b; Iwasa & Thinh 2012). Silva (2010) presented a key to the Neotropical genera and a synopsis of the fauna of Central America. At present, the Neotropical region includes 45 described valid species in 10 genera (Silva 2016). There are no published records of Sepsidae from French Guiana and only 13 species in five genera are reported from the neighbouring countries of Guyana and Brazil (states of Amapá and Pará) (Ozerov 2005). Because many species are morphologically very similar which might mask subtle differences between species, the revision of current species concepts in combination with molecular analyses might well reveal a much higher species richness and more distinct ecological preferences.

During the 2015 expedition in southwestern French Guiana, invertebrates including Diptera were collected with a wide array of methods. The Museum national d'Histoire naturelle, Paris and the NGO Pro-Natura International selected French Guiana as study area for this expedition because the knowledge on the arthropod fauna of this French overseas department was still very fragmentary (Brûlé & Touroult 2014; Pascal *et al.* 2015; Touroult *et al.* 2018). The objective of the present paper is to document on the sepsid fauna encountered during the above-mentioned survey, to present a checklist of Sepsidae of French Guiana and to describe a new species of *Palaeoseptioides* Ozerov, 1992 discovered during the expedition.

MATERIAL AND METHODS

French Guiana is a French overseas department of about 85 000 km² located on the eastern Guiana Shield. It is bordered to the east and south by Brazil and to the west by Suriname. The climate is equatorial, characterized by a mean annual temperature of 26°C and annual rainfall varying from 2000 mm in the south and west to 4000 mm in the northeast. The rainy season usually lasts from May till August and the main dry season from December till January, with a smaller one in April (Guitet *et al.* 2014).

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 fifth edition of a large-scale biodiversity survey undertaken by the Museum national d'Histoire naturelle, Paris and the NGO Pro-Natura international (both in France). 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 mountain chain, extending east in Amapá region (Brazil) and west in southern Suriname. The area consists primarily of tropical lowland rain forest with scattered inselbergs, i.e., isolated hills that stand above the forest plains. The rain forest itself consists of numerous small hills of about 300-400 m a.s.l., separated by small to larger streams or palm swamps.

Between 22 February and 27 March 2015, two consecutive equal-sized teams (of about 30 researchers) explored the area, including more than 10 invertebrate experts. A third smaller team returned to the site from 12 to 20 August 2015. The second author (MP) was coordinator of the collected Diptera, and was also the only Diptera worker actively involved in

TABLE 1. — Overview of sampling methods that yielded Sepsidae Walker, 1833 during the Mitaraka 2015 survey. Abbreviations: **BT**, baited trap (wine or banana); **FIT**, flight intercept trap; **MT (6 m)**, 6 m long Malaise trap; **SLAM**, square Malaise trap; **SW**, sweep net; **BPT**, blue pan trap; **WPT**, white pan trap; **YPT**, yellow pan trap.

Collecting methods*	BT	FIT	MT (6 m)	SLAM	SW	BPT	WPT	YPT
Total no. of samples	2	8	5	30	94	24	16	22
No. of samples with Sepsidae	1	7	3	5	1	2	6	11
Sepsidae	–	–	–	–	–	–	–	–
<i>Archiseopsis armata</i> (Shiner, 1868)	–	7	4	–	–	–	–	–
<i>Archiseopsis diversiformis</i> (Ozerov, 1993)	–	8	–	–	–	–	–	–
<i>Archiseopsis peruana</i> (Ozerov, 1994)	–	–	–	–	–	–	–	1
<i>Meroplioseopsis sexsetosa</i> Duda, 1926	–	9	–	1	–	–	4	3
<i>Microseopsis armillata</i> (Melander & Spuler, 1917)	4	5	1	2	–	2	3	15
<i>Microseopsis furcata</i> (Melander & Spuler, 1917)	–	6	1	1	–	–	–	–
<i>Microseopsis mitis</i> (Curran, 1927)	–	2	–	1	–	–	–	–
<i>Palaeosepsioides erythromyrmus</i> (Silva, 1991)	–	6	–	–	–	–	–	–
<i>Palaeosepsioides mitarakensis</i> Silva, n. sp.	–	–	–	–	1	–	–	–
<i>Palaeoseopsis dentata</i> (Becker, 1919)/ <i>dentatiformis</i> (Duda, 1926)	–	1	–	–	–	–	–	–
<i>Pseudopalaeoseopsis</i> sp.	–	2	–	–	–	–	–	–
<i>Microseopsis</i> sp.	1	8	1	2	–	1	5	13
No. species	1	9	3	4	1	1	2	3
No. specimens	5	54	7	7	1	3	12	32

this survey. Invertebrate sampling was carried out 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 of about 3.5 km that started from the base camp in four different directions (see Krolow *et al.* 2017; Pollet *et al.* 2018; Touroult *et al.* 2018). During the first period (22 February–11 March 2015) over 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) and Butterfly banana traps (n = 12), but also a light trap. 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, only one of the latter contained sepsid flies as MP focused mainly on Dolichopodidae Latreille, 1809 during his active collecting.

Non-pan trap samples were sorted to insect orders and families at the SEAG offices (<http://insectafgseag.myspecies.info/fr>), while pan trap samples were treated similarly at MP's home lab. The biological sampling benefited from the access and benefit sharing agreement “APA973-1”, which is included in each sample label. Dipteran subsamples (mostly per family) were subsequently disseminated among experts worldwide (see Pollet *et al.* 2018; Touroult *et al.* 2018), in the case of Sepsidae to the first author (VCS). The identification of the sepsid species was conducted using taxonomical reviews and identification keys (Ozerov 1993, 1994, 2004; Silva 1993, 2010), original descriptions (Silva 1991; Ozerov 1992), and via direct comparison to reliably identified species in collections of the Museu de Zoologia de São Paulo, São Paulo (MZUSP). All collected material was stored in 70% alcohol, while the holotype of the new species was dried using HMDS (Brown 2016). All specimens collected during the Mitaraka

2015 survey are deposited in the Muséum national d'Histoire naturelle, Paris (MNHN). Illustrations were made using a Leica MZ stereomicroscope, equipped with a Leica DC 500 camera. Stacking of the photos was performed with Helicon Focus 6.0 software, later edited with Photoshop CC 2018.

There are no published distribution records of Sepsidae from French Guiana. All records from the Mitaraka 2015 survey are included in the checklist. Each of these records has the following format (if all information was available): no. males/no. females; [Mitaraka in first record only], sampling site code; latitude, longitude; altitude; sampling site description; collecting date or period; collecting method; name of collector(s); survey code; sample code; specimen depository. All listed Mitaraka species are first records for French Guiana.

The morphological terminology follows Silva (2010) and Cumming & Wood (2017).

ABBREVIATIONS

Collecting devices

BT	baited trap (wine or banana);
FIT	flight intercept trap;
MT (6 m)	6 m long Malaise trap;
SLAM	square Malaise trap;
SW	sweep net;
BPT	blue pan trap;
WPT	white pan trap;
YPT	yellow pan trap.

Institutions

MNHN	Muséum national d'Histoire naturelle, Paris;
MZUSP	Museu de Zoologia de São Paulo, São Paulo.

RESULTS

A total of 121 sepsid specimens of 11 species and six genera were collected during the Mitaraka 2015 survey (see Table 1). A second list of species found in neighbouring countries, like

Guyana, Suriname and Brazil (states of Amapá and Pará) as based on literature data (mainly Ozerov 2005) is also provided (see Table 2). During the Mitaraka 2015 survey, the largest number of species and specimens was encountered in FIT's. These numbers were about two and nearly eight times higher than those of SLAM traps respectively, though the latter method produced nearly four times as many samples. Other trap types collected four species at most. Yellow pan traps yielded considerably larger sepsid numbers as compared to white and blue traps, but the species richness was indifferently poor in all pan trap types. Nine species were encountered near the drop zone where 46% of the specimens were collected, whereas trail A and C provided only 3 and 6 species respectively. No Sepsidae were collected on the investigated inselbergs and the two species *Archiseopsis armata* (Shiner, 1868), *Microseopsis armillata* (Melander & Spuler, 1917), that were gathered on one of the rocky outcrops ('savane roche 2') also occurred within the canopied rain forest habitats. *Microseopsis* sp. and *Microseopsis armillata* proved to be most widely spread, being collected in seven and six of the 37 different sampling sites respectively.

Considering the actual state of Sepsidae taxonomy, based mostly on the male fore femur morphology and genitalic characters, sometimes females cannot be properly assigned to a specific taxon – this was the case here for most of the *Microseopsis* Silva, 1993 females, one female assigned to *Palaeoseopsis dentata* (Becker, 1919)/*dentatiformis* (Duda, 1926), and two females at present identified as *Pseudopalaeoseopsis* sp.

A new species of *Palaeosepsioides* Ozerov, 1992, *Palaeosepsioides mitarakensis* Silva, n. sp., was discovered during the survey and is described herein.

CHECKLIST OF SEPSIDAE OF FRENCH GUIANA

Family SEPSIDAE Walker, 1833
Subfamily SEPSINAE Walker, 1833
Genus *Archiseopsis* Silva, 1993

Archiseopsis armata (Schiner, 1868)
(Fig. 1A)

Sepsis armata Schiner, 1868: 261.

MATERIAL EXAMINED. — **French Guiana** • 1 ♂, 1 ♀; Mitaraka, near MIT-A-RBF1, river; 25.III.2015; MT (6 m); Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/189; MNHN • 2 ♀; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (different sites) near DZ; 6-10.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/198; MNHN • 4 ♀; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m; tropical moist forest (plateau-slope – cleared); 1.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/219; MNHN • 1 ♀; different sites near base camp and along trails, tropical moist forest (different sites "sous bois"); 7.III.2015; FIT; FR-GU/Mitaraka/2015; sample code MITARAKA/224; MNHN • 2 ♂; 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); Pierre-Henri Dalens leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/230; MNHN.

UPDATED DISTRIBUTION. — Argentina (Salta), Belize, Bolivia, Brazil (Bahia, Espírito Santo, Goiás, Mato Grosso, Minas Gerais, Pará, Paraná, Pernambuco, Rio de Janeiro, Roraima, Santa Catarina, São Paulo), Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, French Guiana, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico (Hidalgo, Michoacán, Querétaro), Nicaragua, Panama, Paraguay, Peru, Uruguay, USA (Puerto Rico), Venezuela.

REMARK

New to French Guiana.

Archiseopsis diversiformis (Ozerov, 1993)
(Fig. 1B)

Palaeoseopsis diversiformis Ozerov, 1993: 65.

MATERIAL EXAMINED. — **French Guiana** • 1 ♀; Mitaraka, different sites near base camp and along trails, tropical moist forest (different sites); 10-14.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/192; MNHN • 1 ♂, 6 ♀; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (plateau-slope – cleared); 6.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/220; MNHN.

UPDATED DISTRIBUTION. — Argentina (Salta, Tucumán), Brazil (Mato Grosso), Costa Rica, Ecuador, French Guiana, Jamaica, Mexico (Jalisco), Panama, Peru, Venezuela.

REMARKS

The record of this species from Puntarenas, Argentina, by Ozerov (2005) is considered an error. A locality with the name Punta Arenas is known from Chile (province Magallanes) and one called Puntarenas (province Puntarenas) from Costa Rica, but not from Argentina. As no Sepsidae have been recorded from Chile thus far, and as the species is already known from Costa Rica, it is believed that Ozerov's locality refers to Puntarenas in the latter country.

New to French Guiana.

Archiseopsis peruana (Ozerov, 1994)

Phalacrosepsis peruana Ozerov, 1994: 92.

MATERIAL EXAMINED. — **French Guiana** • 1 ♀; Mitaraka: MIT-C-RBF1; 02°14'10.8"N, 54°26'49.5"W; 258 m a.s.l.; tropical wet forest (bas fond); 27.II-8.III.2015; YPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/133; MNHN.

UPDATED DISTRIBUTION. — Peru, French Guiana.

REMARK

New to French Guiana.

Genus *Meropliosepsis* Duda, 1926

Meropliosepsis sexsetosa Duda, 1926
(Fig. 1C)

Meropliosepsis sexsetosa Duda, 1926a: 28.

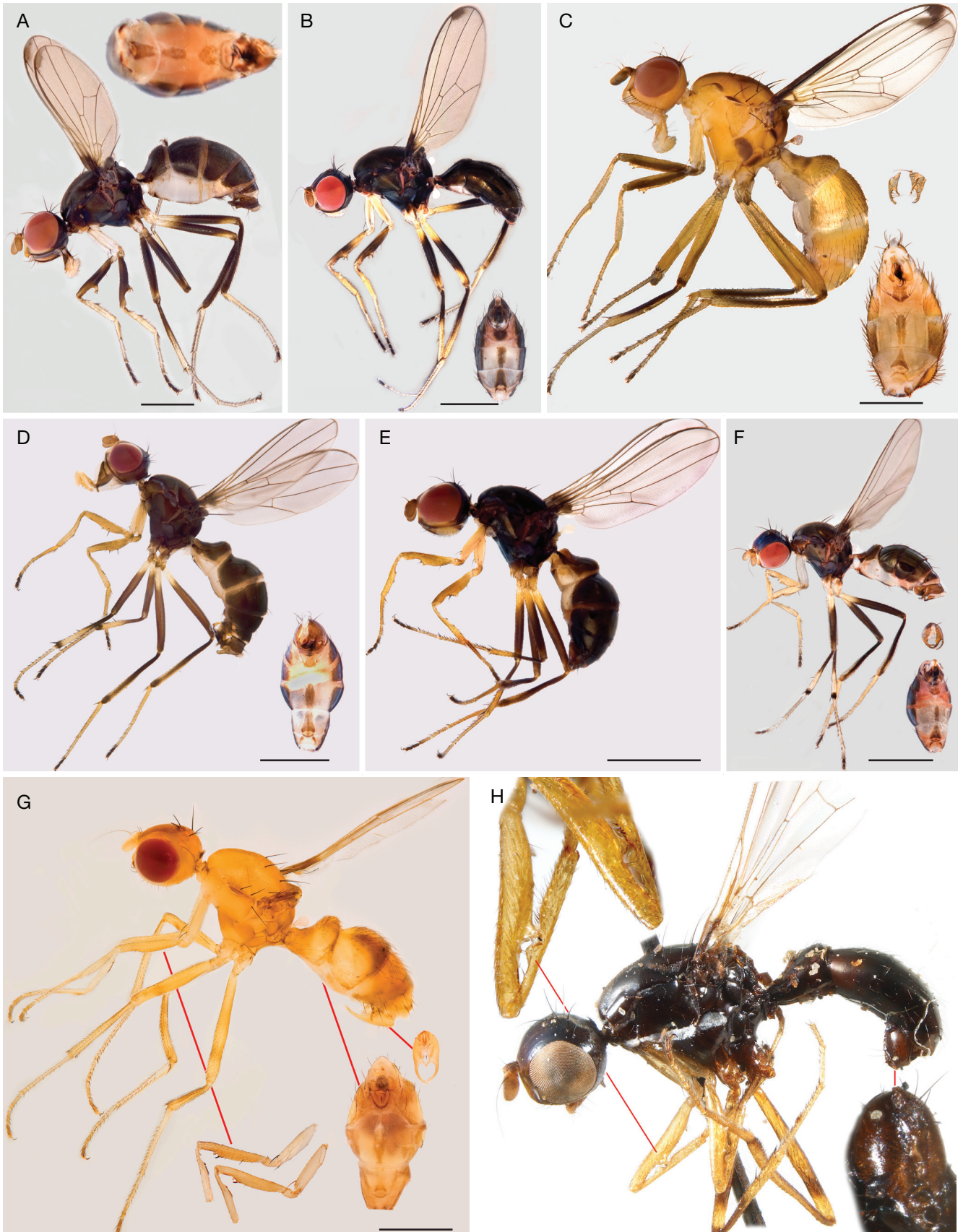


FIG. 1. — **A**, *Archiseptis armata* (Schiner, 1868); **B**, *Archiseptis diversiformis* (Ozerov, 1993); **C**, *Meroplioseptis sexsetosa* Duda, 1926; **D**, *Microseptis armillata* (Melander & Spuler, 1917); **E**, *Microseptis furcata* (Melander & Spuler, 1917); **F**, *Microseptis mitis* (Curran, 1927); **G**, *Palaeoseptioides erythromyrmus* (Silva, 1991); **H**, *Palaeoseptis dentata* (Becker, 1919). Scale bars: 1 mm. All pictures are retrieved from Sepsidnet 2013.

MATERIAL EXAMINED. — **French Guiana** • 2 ♀; Mitaraka: MIT-C-SL (MIT08); 02°14'07.7"N, 54°26'41.5"W; 373 m a.s.l.; tropical moist forest (slope); 2-8.III.2015; YPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/130; MNHN • 2 ♂; MIT-C-SL (MIT08); 02°14'07.7"N, 54°26'41.5"W; 373 m a.s.l.; tropical moist forest (slope); 2.III.2015-8.III.2015; WPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/131; MNHN • 1 ♀; MIT-A-TOP; 02°14'19.8"N, 54°27'11.3"W; 361 m a.s.l.; tropical moist forest (plateau); 3-8.III.2015; YPT; Marc Pollet leg.; FR-GU/Mitaraka/2015, sample code MITARAKA/151; MNHN • 1 ♀; MIT-A-TOP; 02°14'19.8"N, 54°27'11.3"W; 361 m a.s.l.; tropical moist forest (plateau); 3-8.III.2015; WPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/152; MNHN • 1 ♀; MIT-A-SL; 02°14'17.8"N, 54°27'08.2"W; 352 m a.s.l.; tropical moist forest (slope); 3-8.III.2015; WPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/155; MNHN • 1 ♀; different sites near base camp and along trails, tropical moist forest (different sites), 1.III.2015-6.III.2015; SLAM; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/195; MNHN • 1 ♂, 3 ♀; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (different sites) near DZ; 6-10.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/198; MNHN • 2 ♀; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; 6.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/216; MNHN • 2 ♀; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (plateau-slope – cleared); 6.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/220; MNHN • 1 ♀; different sites near base camp and along trails, tropical moist forest (different sites “sous bois”); 7.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/224; MNHN.

UPDATED DISTRIBUTION. — Bolivia, Brazil (Mato Grosso, Mato Grosso do Sul, Rio de Janeiro), Costa Rica, Dominican Republic, Ecuador, French Guiana, Guyana, Panama, Peru, Venezuela.

REMARK

New to French Guiana.

Genus *Microsepsis* Silva, 1993

Microsepsis armillata (Melander & Spuler, 1917)
(Fig. 1D)

Sepsis armillata Melander & Spuler, 1917: 18.

MATERIAL EXAMINED. — **French Guiana** • 1 ♂; Mitaraka, MIT-A-RBF2; 02°14'12.5"N, 54°27'08.1"W; 287 m a.s.l.; tropical wet forest (bas fond); 4-10.III.2015; BPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/149; MNHN • 1 ♂; MIT-A-RBF1; 02°14'11.4"N, 54°27'07.0"W; 306 m a.s.l.; tropical wet forest (bas fond); 4-8.III.2015; YPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/157; MNHN • 2 ♂; MIT-DZ1; 02°14'01.4"N, 54°27'00.2"W; 304 m a.s.l.; tropical moist forest (plateau-slope); 26.II-2.III.2015; YPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/160; MNHN • 1 ♂; MIT-DZ1; 02°14'01.4"N, 54°27'00.2"W; 304 m a.s.l.; tropical moist forest (plateau-slope); 26.II-2.III.2015; WPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/161; MNHN • 1 ♂; MIT-DZ2; 02°14'02.6"N, 54°27'01.7"W; 296 m a.s.l.; tropical moist forest (plateau-slope); 26.II-2.III.2015; YPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/163; MNHN • 2 ♂; MIT-DZ2; 02°14'02.6"N, 54°27'01.7"W; 296 m a.s.l.; tropical moist forest (plateau-slope); 26.II-2.III.2015; WPT; Marc Pollet leg.;

FR-GU/Mitaraka/2015; sample code MITARAKA/164; MNHN • 2 ♂; MIT-DZ1; 02°14'01.4"N, 54°27'00.2"W; 304 m a.s.l.; tropical moist forest (plateau-slope); 2-8.III.2015; YPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/166; MNHN • 9 ♂; MIT-DZ2; 02°14'02.6"N, 54°27'01.7"W; 296 m a.s.l.; tropical moist forest (plateau-slope); 2-10.III.2015; YPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/170; MNHN • 1 ♂; MIT-A-RBF2; 02°14'12.5"N, 54°27'08.1"W; 287 m a.s.l.; tropical wet forest (bas fond); 27.II-4.III.2015; BPT; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/182; MNHN • 1 ♂; MIT-A-RBF2; 02°14'12.5"N, 54°27'08.1"W; 287 m a.s.l.; tropical wet forest (bas fond); 10-14.III.2015; SLAM; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/202; MNHN • 4 ♂; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; 17-20.III.2015; BT; Yves Braet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/215; MNHN • 3 ♂; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; 6.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/216; MNHN • 1 ♂; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (plateau-slope-cleared); 1.III.2015; SLAM; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/218; MNHN • 3 ♂; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (plateau-slope-cleared); 1.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/219; MNHN • 1 ♂; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (plateau-slope-cleared); 6.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/220; MNHN • 1 ♂; MIT-E-savane roche 2; 02°13'59.8"N, 54°27'46.5"W; 471 m a.s.l.; open/partially opened areas on savane roche 2; 13-20.VIII.2015, MT (6 m), Pierre-Henri Dalens leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/230; MNHN.

UPDATED DISTRIBUTION. — Argentina (Tucumán), Bahamas, Brazil (Amapá, Bahia, Espírito Santo, Minas Gerais, Pará, Paraná, Pernambuco, Rio de Janeiro, Roraima, Santa Catarina, São Paulo), Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico (Hidalgo, Michoacán, Veracruz), Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, UK (Virgin Is), USA (Puerto Rico), Venezuela.

REMARK

New to French Guiana.

Microsepsis furcata (Melander & Spuler, 1917)
(Fig. 1E)

Sepsis furcata Melander & Spuler, 1917: 19.

MATERIAL EXAMINED. — **French Guiana** • 1 ♂; Mitaraka, near MIT-A-RBF1, river; 1-7.III.2015; MT (6 m); Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code: MITARAKA/186; MNHN • 1 ♂; different sites near base camp and along trails, tropical moist forest (different sites); 1-6.III.2015; SLAM; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/195; MNHN • 1 ♂; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (different sites) near DZ; 6-10.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/198; MNHN • 2 ♂; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; 6.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/216; MNHN • 2 ♀; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (plateau-slope-cleared); 6.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/220;

MNHN • 1 ♂; different sites near base camp and along trails, tropical moist forest (different sites “sous bois”); 7.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/224; MNHN.

UPDATED DISTRIBUTION. — Argentina (Tucumán), Belize, Bolivia, Brazil (Amapá, Bahia, Mato Grosso, Pará, Rio de Janeiro, Roraima, Santa Catarina, São Paulo), Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, French Guiana, Grenada, Guatemala, Guyana, Honduras, Jamaica, Mexico (Campeche, Chiapas, Guerrero), Nicaragua, Panama, Paraguay, Peru, Saint Vincent and the Grenadines, USA (Puerto Rico), Venezuela.

REMARK

New to French Guiana.

Microsepsis mitis (Curran, 1927)
(Fig. 1F)

Sepsis mitis Curran, 1927: 1.

MATERIAL EXAMINED. — **French Guiana** • 1 ♂; Mitaraka: MIT-DZ1; 02°14'01.4"N, 54°27'00.2"W; 304 m a.s.l.; tropical moist forest (plateau-slope); 1-8.III.2015; SLAM; Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/169; MNHN • 2 ♂ MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (plateau-slope – cleared); 1.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/219; MNHN.

UPDATED DISTRIBUTION. — Argentina, Belize, Bolivia, Brazil (Rio de Janeiro, Roraima), Colombia, Costa Rica, Dominican Republic, Ecuador, French Guiana, Guatemala, Honduras, Mexico (Chiapas), Nicaragua, Panama, Venezuela.

REMARK

New to French Guiana.

Genus *Palaeosepsoides* Ozerov, 1992

DIAGNOSIS. — This genus is distinguished by the following features: absence of a well-developed fronto-orbital seta; abdomen polished and shiny, with a strong constriction after tergite 1+2; absence of a postmetacoxal bridge; vein CuA + CuP longer than cell cuA (length); and male terminalia symmetrical.

Palaeosepsoides erythromyrmus (Silva, 1991)
(Fig. 1G)

Palaeosepsis erythromyrmus Silva, 1991: 370.

MATERIAL EXAMINED. — **French Guiana** • 1 ♂, 2 ♀; Mitaraka, MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (different sites) near DZ; 6-10.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/198; MNHN • 1 ♀; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; 6.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/216; MNHN • 2 ♀; MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (plateau-slope – cleared); 6.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/220; MNHN.

UPDATED DISTRIBUTION. — Brazil (Amapá, Pará, Rondônia, Roraima), French Guiana, Venezuela.

REMARKS

The record of this species from Rio de Janeiro listed by Ozerov (2005) is considered erroneous. Silva (1991) recorded the species from Roraima, a record that was not cited by Ozerov (2005), but not from Rio de Janeiro. Obviously, Ozerov (2005) mixed up both Brazilian provinces.

New to French Guiana.

Palaeosepsoides mitarakensis Silva, n. sp.
(Fig. 2)

[urn:lsid:zoobank.org:act:D6C5A55A-56C0-4AB7-82A1-7574B1B8B0A4](https://doi.org/10.21203/rs.3.rs-1000000/v1)

TYPE MATERIAL. — **Holotype**. **French Guiana** • ♂; Mitaraka, MITA-RBF1; 02°14'11.4"N, 54°27'07.0"W; 306 m a.s.l.; on vegetation along muddy trail and in swamp; 6.III.2015, sweep net, Marc Pollet leg.; FR-GU/Mitaraka/2015; sample code: MITARAKA/074 (sorted by Marc Pollet, 2015); MNHN.

DIAGNOSIS. — This species is distinguished by a hyaline, spotless wing, the abdominal sternite 4 without long apical lateral lobes, and the male fore femur with two short and strong setae near middle.

ETYMOLOGY. — Named after the type locality of the species, i.e., the Mitaraka Mountains in the southwest of French Guiana.

DESCRIPTION

Male

Measurements. Length of body 2.1 mm. Length of wing 2.3 mm.

Color. Frons blackish brown in posterior third and yellowish brown in anterior two thirds; face and gena whitish yellow. Postcranium with occiput blackish brown and postgena yellowish brown; thorax and abdomen brownish yellow, medial postsutural scutum posterior to the anterior dorso-central seta and scutellum brownish. Legs yellow in the following parts: all coxae, anterior part of fore femur, fore tibia, apical two thirds of mid tibia, and all tarsi. Mid and hind femora brown, with basal part yellowish. Basal third of mid and hind tibiae blackish brown, and apical third of hind tibia brown. Wing without dark spot near apex. Basal costal cell, membrane area posterior to stem vein completely, and costal cell in basal half, blackish.

Pruinescence. Frons shiny. Face and gena subshiny. Postcranium thinly greyish pruinose, shiny only along eye. Scutum slightly golden pruinose. Proepisternum (except for greyish pruinose ventral margin), anepisternum and anepimeron shiny. Katepisternum shiny, but with a large greyish pruinose dorsal stripe. Proepimeron, katepimeron, meron and metepisternum thinly greyish pruinose. Metepimeron shiny. Katatergite and anatergite greyish pruinose. Mediotergite shiny. Scutellum greyish pruinose. Abdomen shiny.

Head (Fig. 2B). Somewhat flattened dorsoventrally; eye round. First flagellomere elongate ovoid in lateral view, approximately 1.5 times as long as wide, blunt apically. Arista bare. Chaetotaxy: ocellar setae long, postocellar setae latero-clinate, inner and outer vertical setae present; fronto-orbital seta absent; one pair of vibrissae present; occipital sclerite with several setulae; postgena without a seta near lower margin.

Thorax (Fig. 2A, C). Postpronotal lobe and scutum with scattered setulae. Chaetotaxy: one postpronotal, two notopleural, and one supra-alar setae, postalar seta absent, and dorsocentral setae arranged 0 + 2. Anepisternum in posterior half with scattered setulae and with a long seta near posterior margin. Scutellum with well-developed apical setae; basal setae short. Postmetacoxal bridge absent (metapleura separated from each other).

Legs (Fig. 2A, D). Fore coxa long and simple, with one dorsal seta apically. Fore femur and tibia as in Fig. 2D. Mid coxa with a row of setulae in upper half. Mid femur with two strong anterior setae in center. Mid tibia with one strong ventral, one preapical anterodorsal, one apical posteroventral and one anteroventral setae. Hind femur without major setae. Hind tibia without osmeterium, and with one apicodorsal seta.

Wing (Fig. 2E). Hyaline, with only basal costal cell, costal cell and base of wing dark brown. Basal medial and basal radial cells separate. Anal vein long. Alula entirely covered with microtrichia, narrow. Upper calypter with setulae on margin. Halter white.

Abdomen (Fig. 2A). Strongly constricted after sytergite 1 + 2. Tergites 2-5 each with longer marginal setae. Apical margins of sternites 3 and 4 with longer setae; sternite 4 not modified (Fig. 2F).

Female
Unknown.

NOTE

The abdomen of the holotype was not dissected because the male specimen is unique, and the species is adequately defined by external characters. As the abdomen was not bended under the body it was possible to identify some of the features (see further).

REMARKS

Based on the current knowledge of Neotropical sepsids, and using the key of Silva (2010), this male specimen collected in the Mitaraka survey keyed out to *Palaeosepsis* Ozerov, 1992. It did not match, though, two of the characters of the generic concept as defined by Ozerov (1992): “absence of hairs on the upper calypter margin” (the specimen shows long setulae on the upper calypter margin) and “the abdominal sternite 4 extremely long, with long lateral lobes, considerably longer than abdominal sternite 5” (our specimen

shows only long setae on the posterior margin of tergite 4). However, its abdomen features a strong constriction after tergite 1 + 2 and lacks a postmetacoxal bridge. It certainly does not belong to *Meropliosepsis* Duda, 1926, *Meroplius* Rondani, 1874 or *Themira* Robineau-Desvoidy, 1830 due to the absence of a well-developed fronto-orbital seta; nor can it be assigned to *Microsepsis* Silva, 1993 as the male terminalia are symmetrical and the CuA + CuP vein is longer than the length of the cell cua. It does not belong to *Archisepsis* Silva, 1993 or *Pseudopalaeosepsis* Ozerov, 1992 either because it shows an elevation in the posterior margin of the sytergite 1 + 2 and the abdominal tergites are polished and shiny, with short setae. And finally, it does not fit into *Lateosepsis* Ozerov, 2004 nor *Palaeosepsis* Duda, 1926 because it does not have a postmetacoxal bridge. As a result, it seems most appropriate to assign it to *Palaeosepsis* and to adjust the definition of the genus in anticipation of more material to be collected in order to carry out a phylogenetic analysis of the sepsid genera that include this taxon.

Genus *Palaeosepsis* Duda, 1926

Palaeosepsis dentata (Becker, 1919) (Fig. 1H)/
dentatiformis (Duda, 1926)

Sepsis dentata Becker, 1919: 207.

Sepsis dentatiformis Duda, 1926a: 46.

MATERIAL EXAMINED. — **French Guiana** • 1 ♀; Mitaraka: MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (different sites) near DZ; 6-10.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/198; MNHN.

UPDATED DISTRIBUTION OF *PALAEOSEPSIS DENTATA*. — Argentina (Tucumán), Bolivia, Brazil (Minas Gerais, Rio de Janeiro, Santa Catarina, São Paulo), Colombia, Costa Rica, Ecuador, French Guiana, Honduras, Panama, Peru, Venezuela.

DISTRIBUTION OF *PALAEOSEPSIS DENTATIFORMIS*. — Costa Rica, Ecuador, Venezuela.

REMARKS

Both species, *P. dentata* and *P. dentatiformis*, were not recorded from French Guiana before, which renders this the first record of this genus for this part of South America, awaiting the discovery of male specimens that will allow an unequivocal species identification. This specimen has the dorsocentral setae arranged 0 + 2 (no presutural versus two postsutural dorsocentral setae), which excludes *P. punctulata* Ozerov, 2004 (with dorsocentral setae arranged 0 + 1). The wing is not spotted at apex, which renders it either *P. dentata* or *P. dentatiformis* (both feature a wing without an apical spot). To differentiate between the two species, it is necessary to check male features.

New to French Guiana.



FIG. 2. — *Palaeosepsioides mitarakensis* Silva, n. sp., male holotype: **A**, habitus, lateral view; **B**, head, lateral view; **C**, habitus, dorsal view; **D**, left fore leg, posterior view; **E**, wing; **F**, posterior part of abdomen, ventral view. Scale bars: 0,5 mm, except Fig. 2A, 2,5 mm.

TABLE 2. — List of Sepsidae Walker, 1833 known from neighbouring regions, currently not recorded from French Guiana but expected to occur there.

No. Species	Countries
1 <i>Archiseopsis discolor</i> (Bigot, 1857)	Guyana, Suriname, Brazil (Amapá, Pará)
2 <i>Archiseopsis ecalcarata</i> (Thomson, 1869)	Guyana, Brazil (Amapá, Pará)
3 <i>Archiseopsis excavata</i> (Duda, 1926)	Guyana, Brazil (Amapá, Pará)
4 <i>Archiseopsis hirsutissima</i> Silva, 1993	Brazil (Amapá, Pará)
5 <i>Archiseopsis priapus</i> Silva, 1993	Brazil (Pará)
6 <i>Archiseopsis pusio</i> (Schiner, 1868)	Guyana, Brazil (Pará)
7 <i>Pseudopalaeosepsis mirifica</i> Silva, 1993	Brazil (Pará)
8 <i>Pseudopalaeosepsis muricata</i> Silva, 1993	Brazil (Pará)

Genus *Pseudopalaeosepsis* Ozerov, 1992

Pseudopalaeosepsis Ozerov, 1992: 83.

Pseudopalaeosepsis sp.

MATERIAL EXAMINED. — French Guiana • 2 ♀; Mitaraka: MIT-DZ; 02°14'01.8"N, 54°27'01.0"W; 306 m a.s.l.; tropical moist forest (different sites) near DZ; 6-10.III.2015; FIT; Julien Touroult & Eddy Poirier leg.; FR-GU/Mitaraka/2015; sample code MITARAKA/198; MNHN.

REMARKS

This genus encompasses three described species, two of which (*P. mirifica* (Silva 1993), and *P. muricata* (Silva, 1993)) are reported from Brazil. The other species, *P. nigricoxa* Ozerov, 1992 is known from Costa Rica, Ecuador, and Panama. The genus is recorded for the first time from French Guiana, but as in *Palaeosepsis*, male specimens are needed to come to a reliable identification.

New to French Guiana.

DISCUSSION

The distribution records of Ozerov (2005) were analyzed in order to find out how many more species can be expected in French Guiana. Because there are no strong geographic barriers between French Guiana and its neighbouring regions (Suriname and Brazilian states of Amapá and Pará), it is estimated that an additional eight species have a high probability of being discovered in French Guiana in the future (Table 2). All these species have records from Brazil (four sp.), Guyana and Brazil (three sp.), or from Guyana, Suriname and Brazil (one sp.). One inventory of a four hectare tropical cloud forest in Costa Rica for one year yielded 15 species of Sepsidae (Brown *et al.* 2018). It was sampled continuously with two Malaise traps, and in addition, the survey undertook concomitant sampling with a variety of trapping methods for three full days every month including light traps, emergence traps over a wide array of terrestrial and aquatic substrates, baiting with various attractants

(fruit, carrion, human and pig dung), yellow pan traps, a flight intercept trap, and a canopy Malaise trap (Borkent & Brown 2015). Taking into account the species from neighbouring countries that currently seem to be lacking in French Guiana (Table 2), the use of additional collecting methods might well increase this French Department's species list to about 20.

Considering the biology of sepsids, the best collecting method are traps, baited with mammalian faeces; cattle dung is the standard bait used (Pont & Meier 2002). In our study, FIT's were most productive in terms of both species (nine of 11 species) and specimens (over 2/3 of all specimens), though, over 1/4 of the specimens were retrieved from the yellow pan traps. An optimal sampling for Sepsidae in this kind of area would be by sweeping or hand-netting over substrates attractive to adults as well as the use of passive trapping devices like FIT's and Malaise trap types, together with traps baited with fresh mammalian dung. Sampling sites should be visited regularly during the day, during consecutive days, until no more sepsids are attracted to the baited traps. It is also important to install those traps in a diversity of microhabitats (e.g. shady versus open, sunny sites) in order to sample species that prefer either of these habitats.

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