

## The first record of the family Embolemidae (Hymenoptera: Chrysidoidea) in Réunion, with description of a new species of *Embolemus* Westwood

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### ABSTRACT

A new species, *Embolemus reunionensis* n. sp., is described from Réunion. Changes to the key to the Afrotropical species of the genus *Embolemus* are provided.

KEYWORDS: Aculeata, Chrysidoidea, *Embolemus*, parasitoids, Afrotropical, France, identification key, new species.

### RÉSUMÉ

Une nouvelle espèce, *Embolemus reunionensis*, est décrite de l'Île de la Réunion. La clé des espèces Afrotropicales du genre *Embolemus* est changée.

MOTS-CLÉS: Les hyménoptères, Chrysidoidea, *Embolemus*, parasitoïdes, région Afrotropicale, la France, clé d'identification, espèce nouvelle.

### INTRODUCTION

La Réunion island, as a part of the Malagasy region, is among major biodiversity hotspots in the world (Myers *et al.* 2000), with a particularly high number of endemic arthropods (Legros *et al.* 2020). However, studies of Hymenoptera of Réunion are scarce and demonstrate a rather uneven taxonomic coverage (e.g. Muru *et al.* 2017), with the family Embolemidae being unknown in the island up to now.

The Embolemidae (Hymenoptera: Chrysidoidea) are parasitoids of Hemiptera Auchenorrhyncha (Guglielmino & Bückle 2013; Olmi *et al.* 2014a–c; Varrone & Olmi 2012). They are in fact known to parasitize nymphs of the Achilidae and Cixiidae in a way similar to Dryinidae on other Auchenorrhyncha (Olmi *et al.* 2014c). This small family of Aculeata includes the following seven genera (Perkovsky *et al.*, in press): *Ampulicomorpha* Ashmead, 1893 (extant and fossil; extant species parasitoids of Achilidae nymphs); *Baissobius* Rasnitsyn, 1975 (fossil); *Cretembolemus* Olmi, Rasnitsyn, Brothers & Guglielmino, 2014 (fossil); *Embolemopsis* Olmi, Rasnitsyn & Guglielmino, 2010 (fossil); *Embolemus* Westwood, 1833 (extant and fossil; extant species parasitoids of Cixiidae nymphs); *Ponomarenkoa* Olmi, 2010 (fossil);

*Trogloembolemus* Olmi, Mita & Guglielmino, 2014 (extant). Embolemids are distributed in all zoogeographical regions (Olmi 1996). With 84 described species (64 extant, 20 fossil) (Perkovsky *et al.*, in press), it is one of the smallest and least known families of Chrysidoidea, but comprises a relatively derived lineage, being sister to the speciose and diverse Dryinidae (Brothers 2011).

The Afrotropical species of *Embolemus* were studied mainly by Risbec (1957), Olmi (1996, 1997, 2004a, b, 2006, 2010), Olmi & van Harten (2000, 2006), Azevedo *et al.* (2010), Olmi & Copeland (2011) and Olmi *et al.* (2015, 2016). They listed nine species from the Afrotropical Region, as follows: *Embolemus africanus* (Risbec, 1957), *E. ambrensis* Olmi, 2004, *E. brothersi* Olmi, 2006, *E. burundensis* Olmi in Olmi & Copeland, 2011, *E. capensis* Olmi, 1997, *E. fisheri* Olmi, 2010, *E. gabonensis* Olmi, 2004, *E. harteni* Olmi, 1997, and *E. sanbornei* Olmi, 1997.

Males of *Embolemus* are fully winged and can be captured easily by Malaise traps. On the contrary, the micropterous or brachypterous females can be captured by pitfall traps and in sifted litter, or when they are walking on the ground searching for plants hosting nymphs of Cixiidae on their roots.

In 2015 and 2016 the authors examined a rich collection of Embolemidae collected in Africa. This study resulted in the discovery of a new species of *Embolemus* described herein.

#### MATERIAL AND METHODS

The descriptions follow the terminology used by Olmi (1994, 1996). The measurements reported are relative, except for the total length from the head to the abdominal tip, excluding the antennae and the sting, which is expressed in millimetres. In the description, POL is the distance between the inner edges of the two lateral ocelli, OL is the distance between the inner edges of a lateral ocellus and the median ocellus, OOL is the distance from the outer edge of a lateral ocellus to the compound eye, OPL is the distance from the posterior edge of a lateral ocellus to the occipital carina, and TL is the distance from the posterior edge of an eye to the occipital carina.

The term “disc of metapectal-propodeal complex” is here used in the sense of Kawada *et al.* (2015) and Lanes *et al.* (2020). It corresponds to the term “dorsal surface of propodeum” *sensu* Olmi (1996). The term “propodeal declivity” *sensu* Kawada *et al.* (2015), used here, corresponds to the term “posterior surface of propodeum” *sensu* Olmi (1996). The names of veins and cells of the forewing are here used in the sense of Azevedo *et al.* (2018) and Lanes *et al.* (2020): “stigmal vein”, “first discal cell (1DC)” and “first subdiscal cell (1SDC)” (*sensu* Olmi 1996) are here named respectively “second radial cross & radial sector (2r-rs&Rs, vein)”, “first medial cell (1M)” and “second cubital cell (2Cu)”.

To complete the present paper, the types of all Afrotropical species of *Embolemus* were examined. The material studied in this paper is deposited in the collection of the California Academy of Sciences (San Francisco, USA; CAS).

## TAXONOMY

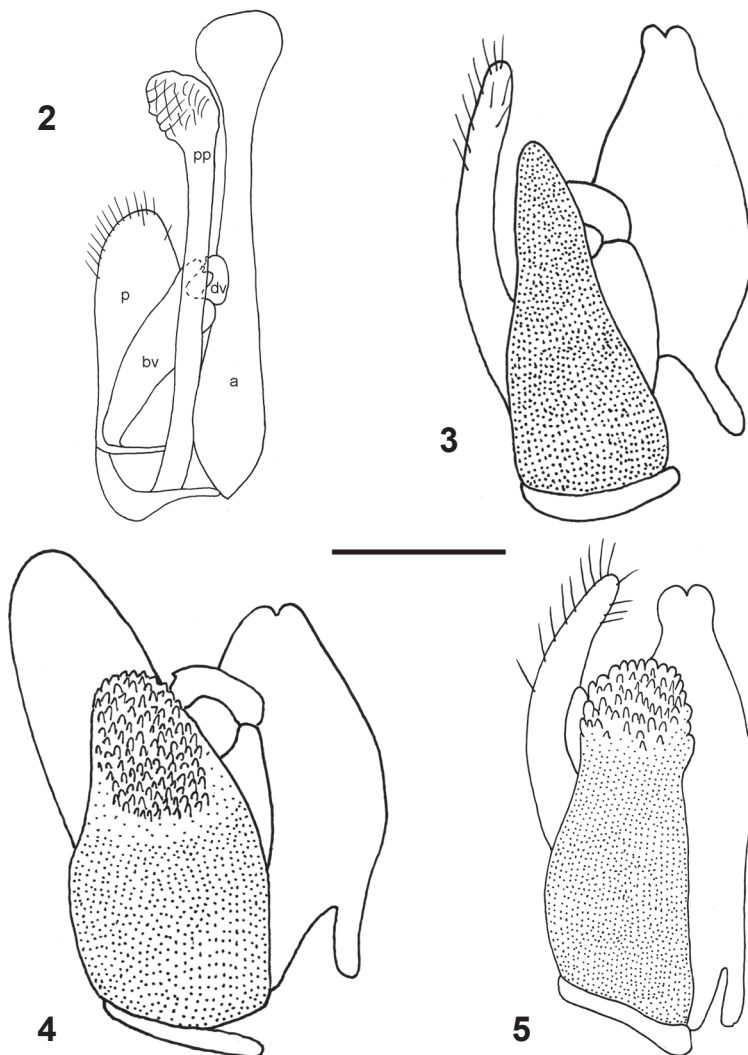
Genus *Embolemus* Westwood, 1833*Embolemus reunionensis* n. sp.

(Figs 1, 2)

**LSID:** urn:lsid:zoobank.org:act:B63AC545-F070-43F4-B568-5FFD56374AD9.**Etymology:** The species is named after La Réunion, where it has been collected.**Diagnosis:** Male of *Embolemus* with scutum unsculptured, metapectal-propodeal complex dull, reticulate rugose; proximal membranous process of paramere very long, about twice as long as paramere (Fig. 2).**Description: Male** (Fig. 1). Fully winged, length 2.3 mm. Head brown; antenna brown testaceous; mesosoma testaceous darkened; metasoma brown; legs testaceous. Antenna filiform; antennomeres in following proportions: 9:2:13:14:13:13:12:12:11:15. Head shiny, convex, unsculptured; occipital carina complete; frontal line absent; ocellar ratio: POL=2, OL=2, OOL=5, OPL=4.5, TL=5; greatest breadth of posterior ocellus about as long as POL. Palpal formula 6/2. Third segment of maxillary palpus slender. Pronotum very short, much shorter than mesoscutum. Mesoscutum, mesoscutellum and metanotum shiny, unsculptured. Notauli incomplete, very shortly visible near anterior margin of mesoscutum. Metapectal-propodeal complex dull, reticulate rugose, without transverse or longitudinal keels. Mesopleuron and metapleuron shiny, unsculptured. Fore wing slightly and completely darkened; distal part of stigmal vein (2r-rs&Rs) longer than proximal part (16:12); 1M and 2Cu cells open, only partly enclosed by pigmented veins. Proximal membranous process of paramere very long, much longer than paramere (Fig. 2). Tibial spurs 1/2/2.**Female.** Unknown.**Fig. 1:** Male holotype of *Embolemus reunionensis* n. sp., habitus in dorsal view. Scale bar = 1.4 mm.

**Holotype:** ♂ Réunion: Grande Chaloupe, 20°55.46'S 55°23.20'E, 580 m, 20–21.v.2007, tropical dry forest, sifted litter, B.L. Fisher *et al.*, BLF17655 (CAS).

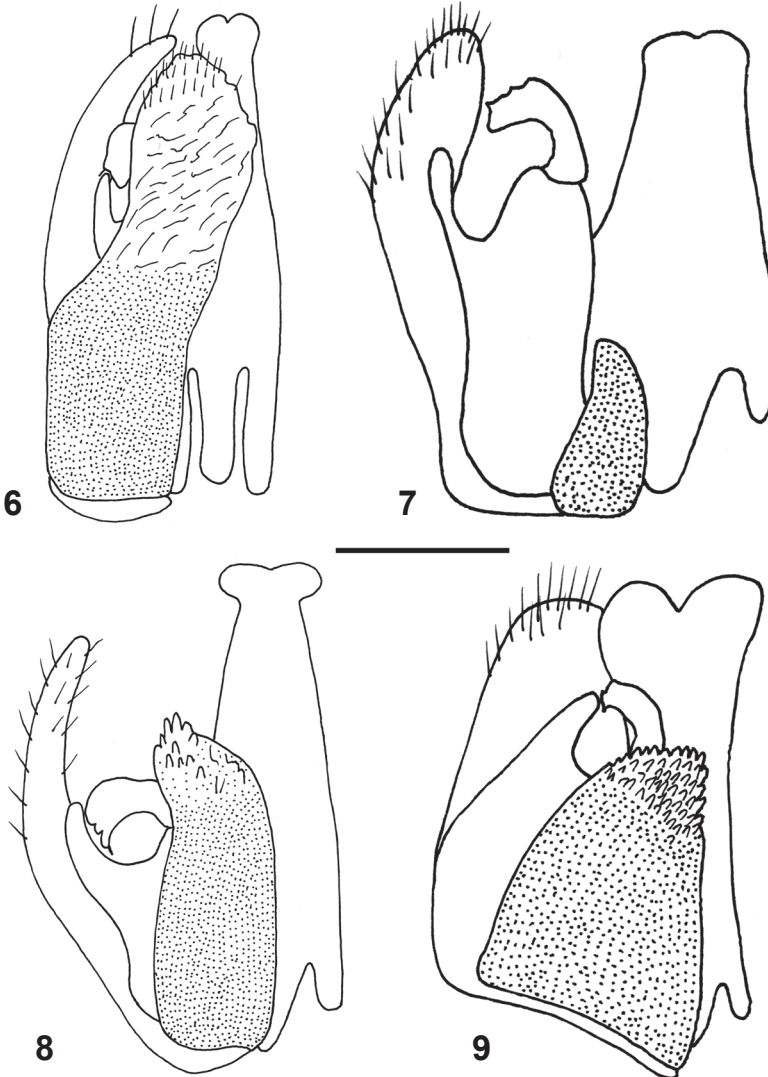
**Hosts:** Unknown.



**Figs 2–5:** Male genitalia of *Embolemus*: (2) *E. reunionensis* n. sp., holotype; (3) *E. africanus* (Risbec), Berenty; (4) *E. ambrensis* Olmi, holotype; (5) *E. brothersi* Olmi, holotype. Abbreviations: a – aedeagus, bv – basivolsella, dv – distivolsella, p – paramere, pp – proximal process of paramere. Scale bar = 0.08 mm for Figs 2, 3 and 5, and 0.09 mm for Fig. 4.

## DISCUSSION

*Embolemus reunionensis* is the only Afrotropical species of *Embolemus* with the proximal membranous process of the paramere much longer than the paramere (Fig. 2). This character is sufficient to separate the new species from the others. The



**Figs 6–9:** Male genitalia of *Embolemus*: (6) *E. burundensis* Olmi, holotype; (7) *E. capensis* Olmi, holotype; (8) *E. harteni* Olmi, holotype; (9) *E. sanbornei* Olmi, holotype. Scale bar = 0.09 mm for Figs 6 and 7, 0.07 mm for Fig. 8, and 0.11 mm for Fig. 9.

males of all other Afrotropical species show a proximal membranous process of the paramere much shorter than the paramere (Figs 3–9). Following the description of the new species, the following new key to the males of the Afrotropical species of *Embolemus* can be presented:

- 1 Proximal membranous process of paramere very long, much longer than paramere (Fig. 2).....*E. reunionensis* n. sp.
- Proximal membranous process of paramere shorter than paramere (Figs 3–9) ..... 2
- 2 Proximal membranous process of paramere with papillae on distal or subdistal extremity (Figs 4, 5, 8, 9)..... 3
- Proximal membranous process of paramere without papillae (Figs 3, 6, 7)..... 6
- 3 Disc of metapectal-propodeal complex dull, more or less reticulate rugose ..... 4
- Disc of metapectal-propodeal complex shiny, unsculptured (except few rugosities near anterior margin), or sculptured by many longitudinal and irregular striae ..... 5
- 4 Mesopleuron and metapleuron shiny, unsculptured; mesoscutum shiny, finely punctate, unsculptured between punctures..... *E. ambrensis*
- Mesopleuron and metapleuron dull, rugose; mesoscutum dull, granulate..... *E. sanbornei*
- 5 Disc of metapectal-propodeal complex shiny, unsculptured (except few rugosities near anterior margin)..... *E. harteni*
- Disc of metapectal-propodeal complex sculptured by many longitudinal and irregular striae ..... *E. brothersi*
- 6 Proximal membranous process of paramere sculptured by many short transverse folds (Fig. 6)..... *E. burundensis*
- Proximal membranous process of paramere with distal margin not sculptured by many short transverse folds (Figs 3, 7) ..... 7
- 7 Proximal membranous process of paramere long with respect to paramere (Fig. 3)..... *E. africanus*
- Proximal membranous process of paramere very short with respect to paramere (Fig. 7)..... *E. capensis*

Following the description of *E. reunionensis*, the known Afrotropical species of *Embolemus* are ten (including two species not included in the above key, because they are known only from females, i.e. about 12 % of the known world species. The knowledge of the Afrotropical species is broadly insufficient. No hosts are known, because of the difficulty of finding parasitized nymphs of Cixiidae feeding on roots in the soil. This also explains the relative rarity of the *Embolemus* species. In addition, the great sexual dimorphism of these species does not allow association of the opposite sexes by using morphological characters. Only rearings or the DNA analysis may solve this problem. However, no researchers have reared them because

of the difficulty in finding parasitized hosts and the rarity of *Embolemus* females. In addition, no researchers are studying *Embolemus* DNA. For the above reasons the knowledge of *Embolemus* species is grossly insufficient throughout the world.

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