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# FIRST RECORDS OF THE GENERA *Macunahyphes* AND *Microphlebia* (INSECTA: EPHEMEROPTERA) FROM COLOMBIA*

*Lucimar Gomes D*[1] *& Jhon Faber M.*[2]

## Abstract

The knowledge gained about the distribution of Ephemeroptera in Colombia in recent years have contributed to bridge the information gaps in this regard. This work of research recorded the *Macunahyphes* and *Microphlebia* genera for the first time in Colombia. Additionally, the distribution of *Macunahyphes australis* in South America is extended, and there is a first record of this species for the Vaupés Department in the Colombian Amazon Region. These findings update the records of the *Macunahyphes* and *Microphlebia* genera in the neotropical zone.

**Key words:** Leptohyphidae, Leptophlebiidae, Neotropical Region, Amazon, occurrence.

# PRIMEROS REGISTROS DE LOS GÉNEROS *Macunahyphes* Y *Microphlebia* (INSECTA: EPHEMEROPTERA) PARA COLOMBIA

## Resumen

El conocimiento adquirido sobre la distribución de Ephemeroptera en Colombia en los últimos años ha contribuido a cerrar las brechas de información a este respecto. Este trabajo de investigación registró por primera vez en Colombia los géneros *Macunahyphes* y *Microphlebia*. Además, se amplía la distribución de *Macunahyphes australis* en América del Sur, y existe un primer registro de esta especie para el Departamento de Vaupés en la Región Amazónica de Colombia. Estos hallazgos actualizan los registros de los géneros *Macunahyphes* y *Microphlebia* en la zona neotropical.

**Palabras clave:** Leptohyphidae, Leptophlebiidae, Región Neotropical, Amazonas, ocurrencia.

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[1] Facultad de Ciencias Exactas y Naturales, Universidad de Caldas, Manizales, Colombia. Grupo de investigación Bionat: Biodiversidad y Recursos Naturales. lucimar.dias@ucaldas.edu.co ORCID 0000-0001-6480-7688

[2] Grupo de investigación Bionat: Biodiversidad y Recursos Naturales, Universidad de Caldas, Manizales, Colombia. jhon.1711212849@ucaldas.edu.co ORCID 0000-0001-6539-3042

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## Introduction

The *Macunahyphes* genus was proposed by DIAS et al. in 2005, to include the species *Tricorythodes australis* (Banks) based on some remarkable characteristics of nymphs, and the distinctiveness of the adults. According to those researchers, *Macunahyphes* can be distinguished from other genera of Leptohyphidae by this combination of characters, in nymphs: glossae and paraglossae almost completely fused, with a circular outline, and femora with numerous robust serrate setae. The adults can be differentiated by forceps tri-segmented with the first segment distomedially projected, with a penis very wide basally, narrowing toward a subapical constriction and then slightly widening again, and with a ventral projection covered with spines.

Currently, the *Macunahyphes* genus is recorded in Argentina, Brazil, Guyana and Venezuela, with six species: *Ma. araca*, *Ma. australis*, *Ma. eduardoi*, *Ma. incognitus*, *Ma. pemonensis* and *Ma. zagaia*. *Ma. australis* has the widest distribution recorded for Argentina, Brazil and Guyana (BANKS, 1913; DIAS et al., 2005; MOLINERI, 2002; MOLINERI et al., 2011; SOUTO & SALLES, 2016).

Additionally, SAVAGE & PETERS (1983) proposed the genus *Microphlebia* for the species *Mi. surinamensis* and *Mi. pallida,* based on nymphs and male subimagos of Surinam and the Amazonas State of Brazil, respectively. According to these authors, the genus *Microphlebia* can be distinguished from other genera of Leptophlebiidae by a combination of characters; in nymphs, gills on abdominal segments I-VII oval with entire margins and dorsal portion smaller than ventral portion, width of labrum equal to width of clypeus and outer margin of mandibles smoothly curved with few setae medially. The imagos can be differentiated by a tubular penis divided at the base, without appendages. Fork of veins MA and MP of fore wings asymmetrical and costal projection of hind wings well-developed, acute and rounded.

Between the two species of the genus, *Mi. surinamensis* has the widest distribution recorded for Surinam, Venezuela (BELLO, 2000; SAVAGE, 1987) and Brazil (DOS SANTOS-NETO et al, 2008; SHIMANO et al, 2011). (SHIMANO, Y., CARDOSO, M., & JUEN, L. 2018). While *Mi. pallida* is reported only for northern Brazil (SAVAGE & PETERS, 1983).

Despite its wide distribution, the genera have not been recorded in Colombia. We intend to record the genera *Macunahyphes* and *Microphlebia* for this country and broaden the knowledge about it in South America.

## Materials and methods

The specimens were collected in the Cucura and La Ceima streams, in the Mitú municipality, located in the Vaupés Department. Nymphs were collected qualitatively with a manual net and adults with light traps set from 6:00 p.m. to 8:30 p.m. The structures of taxonomic interest were mounted on slides and analyzed by stereomicroscope. For the identification of the specimens, taxonomic keys and original descriptions were used (DIAS et al*.,* 2005; DOMÍNGUEZ et al., 2006; SAVAGE & PETERS, 1983) and the eggs were studied by using the terminology proposed by KOSS & EDMUNDS (1974). The collected material was fixed in alcohol at 96% and deposited in the Colección Entomológica del Programa de Biología de la Universidad de Caldas - CEBUC. Pictures were taken using a Leica M205C stereomicroscope with a Leica MC-170HD camera and some characters and eggs were examined through scanning electron microscopy (SEM), with a QUANTA 250. The samples were not dehydrated, nor were they coated with gold-palladium, on the contrary, they were treated with low vacuum pressure and a working voltage of 11 kV for electron microscopy analyzes. The map of occurrence in South America was done with the software ESRI® ArcMap 10.0, the records published in the literature (BANKS, 1913; BELLO, 2000; DIAS et al*.,* 2005; DOS SANTOS-NETO et al., 2008; MOLINERI, 2002; ORTH, 2000; SAVAGE & PETERS, 1983; SAVAGE, 1987; SHIMANO et al., 2011; SOUTO & SALLES, 2016) and the new records were implemented.

## Results and discussion

The adults collected corresponded to the species *Ma. australis* (Banks) (Fig. 1A), that was recorded from Argentina, Brazil and Guyana (BANKS, 1913; DIAS et al*.,* 2005; MOLINERI, 2002; SOUTO & SALLES, 2016) and now, for the first time, it is documented for Colombia. The characters used in the determination of the species were, mainly, the shape of the penis (Fig. 1B-C) and forceps (Fig. 1D) of the imagos. Additionally, Figures 1E-F show the general aspect of the eggs and details of the reticulated chorionic plates with lateral borders of one elevated side (DIAS et al., 2005).

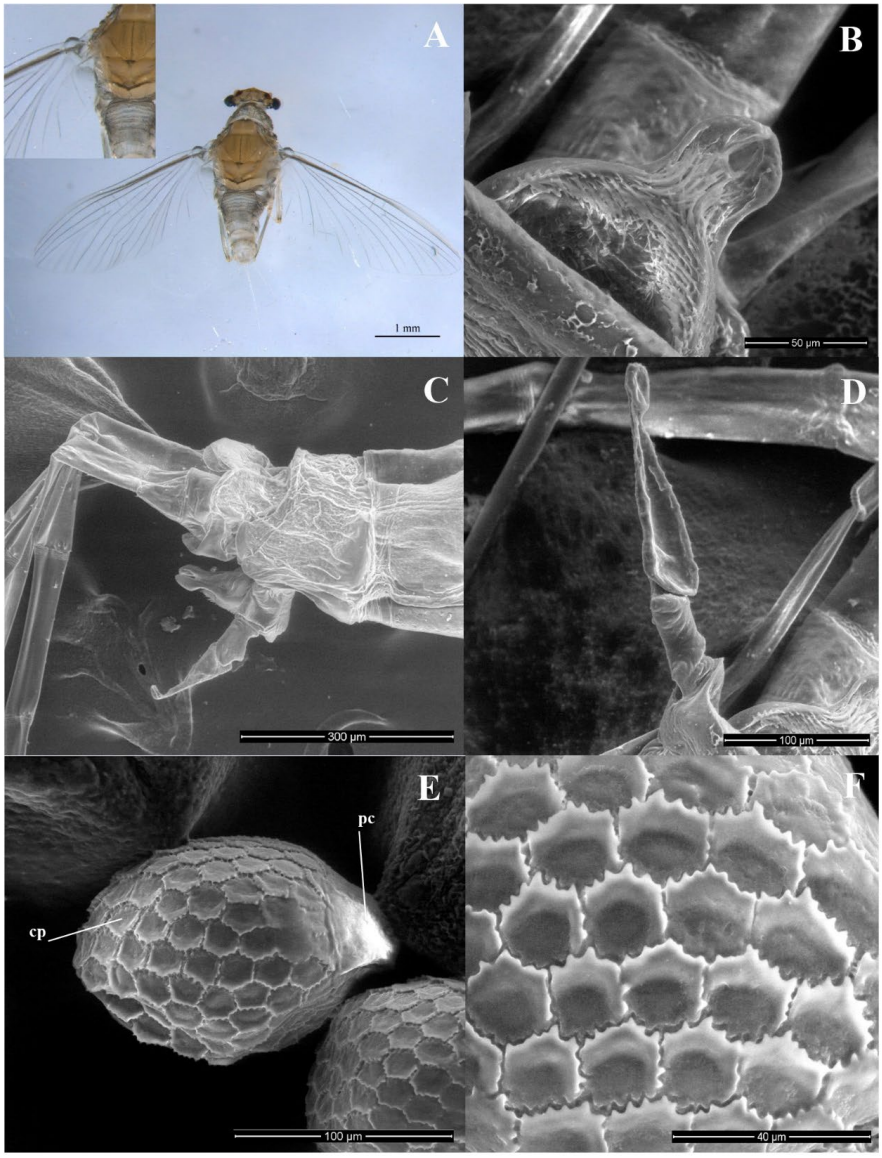


**Figura 1.** *Macunahyphes australis*: A, dorsal view imago (detail of cubito-anal area); B, penis (detail of spines, ventral view); C, penis (lateral view); D, forceps (lateral view); E-F, eggs general view and detail of chorionic plates. cp = chorionic plates; pc = polar cap.

The nymphs collected in turn corresponded to a species of the genus *Microphlebia* (SAVAGE & PETERS, 1983) (Fig. 2A). This genus was originally recorded for Surinam, Venezuela and Brazil (BELLO, 2000; DOS SANTOS-NETO, et al., 2008; SAVAGE & PETERS, 1983; SAVAGE, 1987; SHIMANO et al., 2011) and now, for the first time, this paper records it for Colombia. The characters used in the determination of the genre were, mainly, the shape of the gills (Fig. 2B), color pattern of the legs (Fig. 2C) and shape of the abdominal terguites (Fig. 2D).

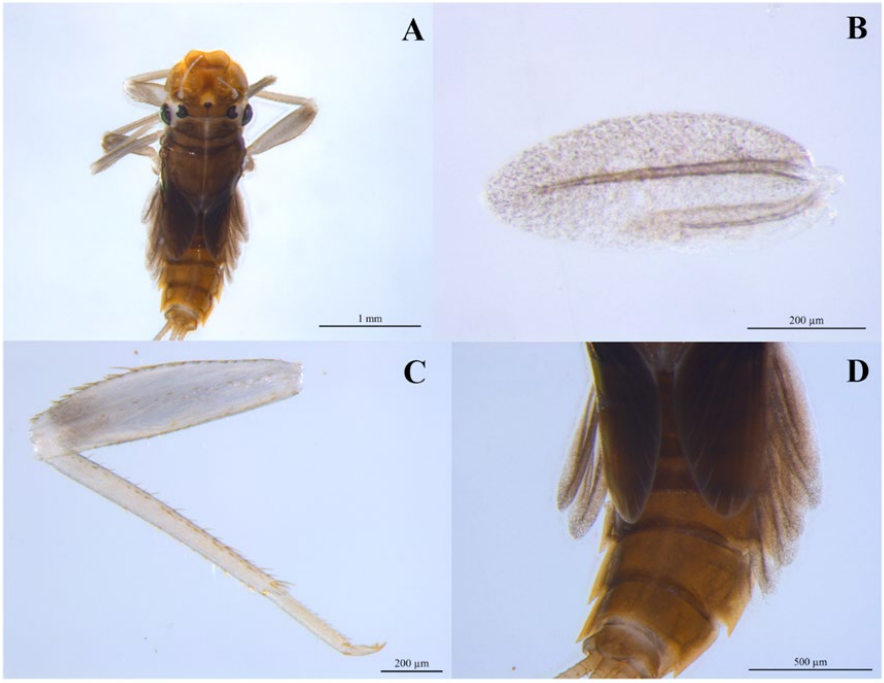


**Figura 2.** *Microphlebia* sp: A, nymph dorsal view; B, gill detail; C, hind leg detail; D, abdominal tergites detail.

This work shows the current distribution of the *Macunahyphes australis* and the genus *Microphlebia* in South America (Fig. 3), with new records for Colombia in the municipality of Mitú, located in the Department of Vaupés.

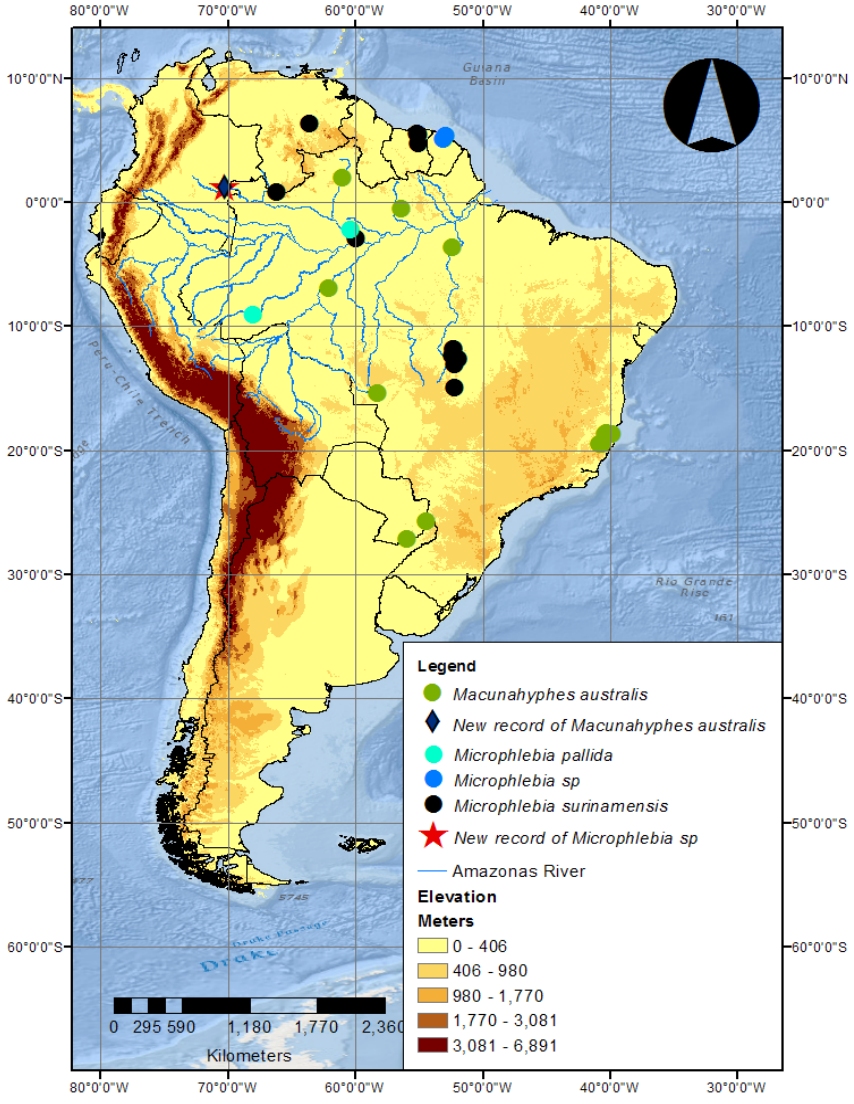


**Figura 3.** Current occurrence of *Macunahyphes australis* and *Microphlebia* genus in South America.

## EXAMINED MATERIAL

*Macunahyphes australis*
20 imagines, Colombia, Vaupés, Mitú, Quebrada Cucura, N1° 15' 7.8258", W70° 14' 1.0248", 3/ii/2018, light trap, col: L. Dias, T. Bacca B. Toro, R. Ceballos.
*Microphlebia* sp
12 nymphs, Colombia, Vaupés, Mitú, stream Cachivera Caño la Ceima, N1° 15' 7.8258" W70° 14' 1.0248", 28/ii/2018, col: L. Dias, B. Toro, T. Bacca & R. Ceballos.

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