



## Hidden diversity: the first record of the soldier fly *Heptozus* Lindner, 1949 (Diptera, Stratiomyidae) for Brazil

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### ABSTRACT

*Heptozus* Lindner, with a known distribution in Costa Rica, Ecuador and Panama, is recorded for the first time in Brazil with the occurrence of *Heptozus hansonii* James in the state of Mato Grosso do Sul.

*Heptozus* Lindner, 1949 is a quite distinct genus of Raphiocerinae, characterized by the antenna with an elongated antennal scape and terminal arista-like stylus (Lindner, 1949; James, 1966) (Fig. 1). Two species are currently recognized for the genus, *Heptozus ecuadorianus* Lindner, 1949 (Ecuador) and *Heptozus hansonii* James, 1966 (Costa Rica, Ecuador, Panama) (Woodley, 2001).

Lindner (1949) described *H. ecuadorianus* based on a single male from Ecuador, and the species is mainly characterized by the antennal pedicel as long as the antennal scape; basal portion of the arista-like stylus similar in size and shape to the other flagellomeres; and foretibia dark, almost black. James (1966) described the second species of the genus, *H. hansonii*, based on 28 specimens (26 ♂ and 2 ♀) from Panama and Ecuador. In general, this species is distinguished from *H. ecuadorianus* by the antennal pedicel shorter than the antennal scape, which is never more than 1.5x the length of the antennal pedicel; antennal flagellum with arista-like stylus distinct from the other flagellomeres; and foretibia yellow, like the tibia of the other legs. Although the original description indicates that the foretibia in *H. hansonii* is yellow, it can vary from yellow to brownish, but never black.

The fact that *H. ecuadorianus*, after 75 years, is still known solely and exclusively through the type specimen of the original description,

raises questions about the existence and validity of the two species. Even when describing *H. hansonii*, James (1966) had doubts about the paratype from Ecuador, because in this specimen, the antennal flagellum was absent and the scutellar spines were almost as long as the scutellum. However, James (1966) concluded that the specimen was indeed a specimen of *H. hansonii* based on other differential characters that differed from Lindner's species. Even so, there is the possibility that *Heptozus* is a monotypic genus, but so far there is not enough evidence to confirm this hypothesis and, in this study, both species are treated as valid.

Despite the known distribution of *Heptozus*, restricted to Central America and northwestern South America, it has now been recorded here for the first time in Brazil with the occurrence of *H. hansonii* in the state of Mato Grosso do Sul (Figure 2).

The specimen of *H. hansonii* are housed at the Coleção Entomológica Padre Jesus Santiago Moure (DZUP), Curitiba, Paraná, Brazil. Photographs were taken with digital camera Canon® EOS Rebel® T7. Measurements in mm. Distribution records data were plotted in Google Earth Pro and mapped in QGIS®. The shapefile with South and Central America limits were obtained from NASA Jet Propulsion Laboratory (<https://www.jpl.nasa.gov/images/pia03388-south-america-shaded-relief-and-colored-height>). Data of different labels in material examined are separated by a bar (/) and additional information completing missing/omitted data is enclosed in square brackets ([ ]).

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**Figure 1** Live specimen of *Heptozus hansonii* James from Costa Rica (© Marco de Hass).



**Figure 2** Geographic distribution of *Heptozus hansonii* James.

***Heptozus hansonii* James, 1966**

(Figs. 3–4)

*Heptozus hansonii* James, 1966: 679. HT ♂ [USU]. Panama: Cerro Campana.

**Diagnosis.** According to James (1966), *H. hansonii* James differs from *H. ecuadorianus* Lindner by presenting the following set of characters: (1) the base of the arista-like stylus is not strongly inflated, and the flagellar complex is consequently more widely differentiated from the arista-like stylus; (2) antennal pedicel is slightly shorter than the scape; (3) flagellum black and darker than pedicel; (4) frontal black marking not horseshoe-shaped; (5) fore tibia yellow; (6) scutellar spines shorter than scutellum.

**Distribution.** Brazil (Mato Grosso do Sul), Costa Rica, Ecuador, Panama.

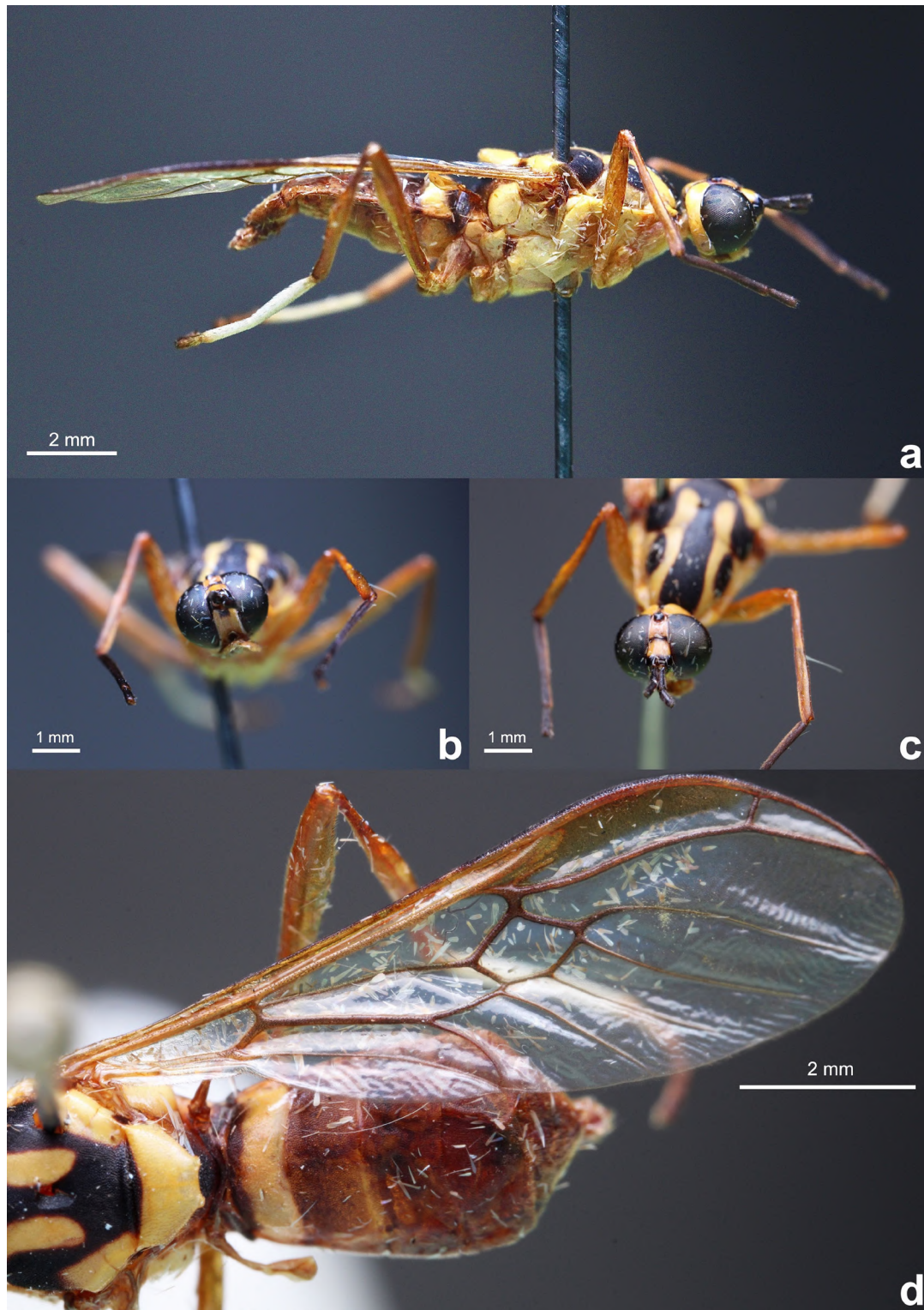
**Material examined.** BRASIL, MT [\*MS - Mato Grosso do Sul instead of MT - Mato Grosso], Dourados, 27-28.xii.1976, J. Lorenzoni col./ DPTO ZOOLOG [Departamento de Zoologia], UF-PARANÁ [Universidade Federal do Paraná] (♂ DZUP-460927). [\*Until 1977, the city of Dourados was part of Mato Grosso (MT), when the state was dismembered, and the southern part of the state became Mato Grosso do Sul (MS). It became a state of the federation in 1979, when it was officially separated from Mato Grosso (IBGE, 2024).

**Comments.** The specimen examined is in a good condition, but some structures have been lost, such as: antennal flagella, scutellar spines, left wing, terminal tarsomeres of the forelegs, and midlegs (Figs. 3–4).

**Discussion.** *Heptozus hansonii* is recorded for the first time in Brazil through a single specimen collected in the municipality of Dourados, state of Mato Grosso do Sul, in the 1970s. Its previously known distribution was restricted to Costa Rica, Panama (Central America) and Ecuador (South America) (Woodley, 2001). In Central America, the species is common at low to middle elevations and possibly has a wider distribution north into tropical lowlands (Woodley, 2009). While for Ecuador, the only known record in the literature is of a male paratype from the original description of the species (James, 1966). Since *H. hansonii* is recorded for Ecuador, it was at least expected that it could have a distribution throughout Andean America (Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela) or even an Amazonian distribution (Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname and Venezuela). So, at least in principle, the species was not expected to be found in the Brazilian Central-West, in a location under the domain of the Cerrado and Atlantic Forest biomes. However, this implies that very little is known about the species, which is also true for the entire subfamily. Recently *Neanalcozerus hortulanus* (Williston, 1900) was recorded



**Figure 3** *Heptozus hansonii* James, dorsal view.



**Figure 4** *Heptozus hansonii* James. a, lateral view; b–c, head, frontal view; d, right wing.

for Nicaragua (Maes and Fachin, 2024), after more than 120 years known exclusively for Mexico. Knowledge about the natural history of the Raphiocerinae is still quite scarce, and aspects of adult biology are usually limited to accidental observations of these insects in the field (McFadden, 1970; Woodley, 2001, 2009; Marshall, 2012; Godoi and Rafael, 2013). According to Woodley (2009) *H. hansonii* is a fairly

common species in Malaise trap samples from low to middle elevations in Central America, but this is not the case in South America, so its taxonomic and ecological information remains limited. Thus, expanding sampling, especially in regions poorly studied, will certainly contribute to understanding the distribution patterns and natural history, both *Heptozus* and the entire subfamily.

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## Conflicts of interest

The authors declare no conflicts of interest.

## Author contribution statement

FSPG Conceptualization, Investigation, Methodology, Writing – original draft and Writing – review & editing. JRPL Conceptualization, Investigation, Methodology, Writing – review & editing. All authors have read and approved the final manuscript.

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