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Scientific Note

New records of Teratomyzidae (Diptera, Sphaeroceroidea) for the Brazilian fauna

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Abstract. For the first time, *Teratoptera chilensis* Malloch, 1933 is recorded from Brazil. Additionally, we discuss the geographical distribution of the family.

Keywords: Acalyptratae, Neotropics, circum-Antarctic, Gondwanan.

Teratomyzidae, also known as fern-flies, is a small Acalyptratae family with only 24 described species in the world. Both adults and larvae are associated with ferns, from which their common name is derived (Shuter & McAlpine 1985; McAlpine & Keyzer 1994). The association with ferns seems to be true to all Australian Teratomyzidae taxa (Bayless 2022), but little is known about their habitat in other regions.

The phylogenetic placement of the family among Acalyptratae remains uncertain. Teratomyzidae has traditionally been placed in the superfamily Opomyzoidea, but this classification has been occasionally challenged throughout history (Winkler et al. 2010). The monophyly of Opomyzoidea has not been recovered in recent analyses (e.g. Song et al. 2022; Yuan et al. 2025) and clustered near Heleomyzidae and Anthomyzidae (Wiegmann et al. 2011) or close to Sphaeroceroidea (Bayless et al. 2021) in molecular analyses.

Currently, Teratomyzidae is classified in seven genera (Rodrigues & Gonzales 2022). Among them, *Teratomyza* Malloch, 1933 is the richest and the only with broad distribution, occurring in the Australian region, Indo-Malayan transition zone and Oriental region, with some species extending to the adjacent portion of Palearctic region (McAlpine 2012). Each of the other six Teratomyzidae genera have a single species and restrict geographical distribution, virtually known only from their type locality (Rodrigues et al. 2016). This is evident in the three South American genera: *Camur* McAlpine & Keyzer, 1994, *Stepta* McAlpine & Keyzer, 1994 and *Teratoptera* Malloch, 1933. The first one occurs in southern Brazil, with two records, on the states of Santa Catarina and Paraná (Rodrigues et al. 2016). The other two are known from, southern Chile, from the Chiloé Archipelago, with *Teratoptera* additionally known from Valdivia province. This South American distribution, together with the remaining genera (*Auster* McAlpine & Keyzer, 1994; *Lips* McAlpine & Keyzer, 1994; *Pous* McAlpine & Keyzer, 1994) and the concentration of *Teratomyza* species in the Australian region, often leads to the association of Teratomyzidae flies with a south-temperate distribution (e.g., McAlpine 2012; Fachin et al. 2018).

Here, we include the second genus of Teratomyzidae to the Brazilian fauna and discuss the disjunct distribution of Teratomyzidae, with a recent biogeographical hypothesis on circum-Antarctic taxa.

The specimens studied belongs to the Coleção Zoológica da Universidade Federal de Mato Grosso do Sul (ZUFMS), and Museu de Zoologia da Universidade São Paulo, São Paulo, Brazil (MZUSP). Terminology follows Cumming & Wood (2017) and Bayless (2022). The labels are transcribed *ipsis literis*. Label order is indicated in parentheses, i.e. "(1): …; (2): …". Each line of the label is separated by "/".

Photographs were taken software Zen 2.3 based on a Zeiss Discovery 20 stereomicroscope coupled to a camera Axiocam 305 color at the Laboratório de Sistemática e Biologia de Formigas (Feitosa Lab) of the Universidade Federal do Paraná (UFPR), Curitiba, Brazil. Images were post-processed with Photoshop v22.0 and CombineZP v1.0.

The map was produced in QGis 3.40. and Google Earth Pro 7.3.6.9345. The shapefile for the present time was provided by geoBoundaries (Runfola et al. 2020) and the shapefile of past time was Cao et al. (2017). We transform the projection from the Mercator Projection System (ESRI: 3976) to South Pole Lambert Azimuthal Equal Area (ESRI: 102020).

Teratomyzidae of Brazil

Key for the Brazilian genera of Teratomyzidae

1. Head, in lateral view, longer than high; vein R_{4+5} sinuose at the apex; two dorsocentral setae (Fig. 1) ....*Camur* McAlpine & Keyser, 1994.

- Head, in lateral view, ovoid (Fig. 6); vein R_{4+5} straight (Fig. 5); three dorsocentral setae (Fig. 5). ....*Teratoptera* Malloch, 1933.

Camur willii McAlpine & Keyzer, 1994 (Figs. 1–2)

Material*:* 1 #f (ZUFMS): (1): BRAZIL Paraná. Palmas / Refúgio de Vida Silvestre dos Campos de Palmas / 21.X.2013, 1100 m, Malaise trap / A.C. Pereira col..

Distribution. Brazil (Santa Catarina: Nova Teutônia – Type locality; Paraná: Palmas) (Fig. 2).

Teratoptera chilensis Malloch, 1933 (Figs. 2, 5–7)

Material*:* 2 #f (MZUSP): (1): Brasilien / Nova Teutônia / 27°11'B 52°23'L / Fritz Plaumann / X.19671 / 300–500M; (2): Teratoptera / det. Bayles 18. *Missing parts.* One female specimen without head. The other female specimen without both wings.

Distribution*:* Chile (Ancud – Type locality); **New record**: Brazil (Santa Catarina: Nova Teutônia) (Fig. 2).

Comments*.* Both specimens agree with the redescription proposed by McAlpine & Keyzer (1994), except for the character "thorax without pleural stripe or other markings". The Brazilian specimens have the anepisternum, anepimeron, and katatergite dark brown, with the other sclerites yellowish (Figs. 6–7). This may represent intraspecific variation or attributable to the age of the specimen pinning and/or preservation conditions.

We chose not to dissect the specimens. This is because they are two female specimens, and the original description (Malloch 1933) and the subsequent revision (McAlpine & Keyzer 1994) did not propose enough characters to allow comparison between the specimens in this study and the others mentioned above.

Figure 1. *Camur willii* McAlpine & Keyzer, 1994 (Diptera, Sphaeroceroidea, Teratomyzidae). Habitus, lateral view.

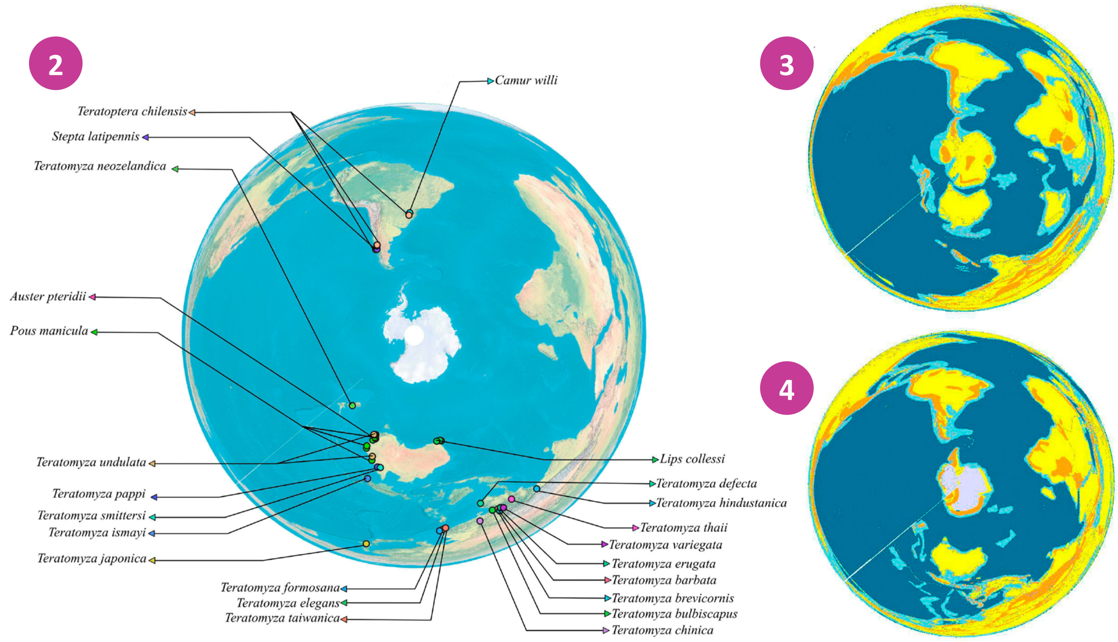
The disjunct distribution of Teratomyzidae is noteworthy. The family exhibits a circum-Antarctic pattern, with at least eight species recorded in the Oriental region, about 21 species in Australasia, and three genera in South America (Fig. 2) (Rodrigues et al. 2016).

In South America, two genera are monotypic and were long believed to be restricted to the Andean region along the Chilean coast. *Stepta*, represented by *Stepta latipennis* McAlpine & Keyzer, 1994, is confined to Chiloé Province, while *Teratoptera*, represented by *T. chilensis*, was thought to occur only in Chiloé (Rodrigues et al. 2016; Rodrigues & Gonzales 2022). The present study records *T. chilensis* from Brazil for the first time (Fig. 2).

The third genus, *Camur*, is restricted to Brazil. The only known species, *C. willii*, occurs in southern Brazil at Palmas (Paraná State) and Nova Teutônia (Santa Catarina State) (Rodrigues et al. 2016; Freitas-Silva 2025). These areas are associated with temperate environments of the Atlantic Rainforest and Araucaria Forest (*Araucaria angustifolia* (Bertol.) Kuntze) (da Silva & Silvestre 2004; ICMBio 2021).

A Gondwanan origin has been assumed for many groups with circum-Antarctic distributions, with the breakup of Gondwana beginning in the Jurassic, 165–150 million years ago (Amorim et al. 2009). Wiegmann et al. (2011) estimated that Teratomyzidae diversified after the Cretaceous, about 60–50 million years ago. This suggests that the origin of the family postdates the breakup of Gondwana.

Until two decades ago, such disjunct distributions-between Australasia and southern South America-were typically explained either by transoceanic dispersal or by vicariance following the Gondwanan breakup (Fachin et al. 2018). More recently, however, a new hypothesis has been proposed, invoking a land connection between Australia, Antarctica, and South America during the Late Eocene, about 20–30 million years ago (Figs. 3–4) (Amorim et al. 2009; Almeida et al. 2012; Haseyama et al. 2015; Fachin et al. 2018).



Figures 2–4. South Pole-Centered Geographic Projection Map. 2: Present day map with distribution of Teratomyzidae species; 3: 53 MYA map; 4: 6 MYA map.

Figures 5–7. *Teratoptera chilensis* Malloch, 1933 (Diptera, Sphaeroceroidea, Teratomyzidae). 5: habitus lateral, headless specimen; 6: habitus lateral, wingless specimen; 7: head, dorsal view, wingless specimen.

Therefore, the biogeography of Teratomyzidae offers a valuable model for understanding past land connections between Australia, Antarctica, and South America, as well as the distribution of temperate South American species.

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Authors' Contributions

JPVR: Writing – original draft, Conceptualization, Investigation; LR: Writing – original draft, Conceptualization, Investigation; CJBC: Resources, Project administration, Writing – review & editing.

Conflict of Interest Statement

The authors declare no conflict of interest.

Ethical Approval

Not applicable.

Data Availability

The data supporting this study are available in the study itself, and additional information can be requested from the corresponding author if needed.

Generative AI Statement

No generative AI was used for writing or producing the data for this study.

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