

## New distributional record of *Corydalus diasi* Navás, 1915 (Megaloptera: Corydalidae) in the Cerrado, Brazil

### Novo registro de distribuição de *Corydalus diasi* Navás, 1915 (Megaloptera: Corydalidae) no Cerrado, Brasil

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#### Abstract

In this study, we record *Corydalus diasi* Navás, 1915 (Megaloptera: Corydalidae) in the Central-West Brazilian for the first time, based on specimens collected from a recently discovered population in the state of Mato Grosso do Sul. Specimens were obtained in December 2024 at Santa Virgínia Stream – Cascata do Cobre, Ponta Porã municipality, using active and passive light-trap techniques. Located in a regenerating Cerrado forest with Atlantic Forest influence, it presents rapids and waterfalls that support aquatic biodiversity. This record expands the known distribution of *C. diasi*, highlighting the importance of continued sampling and taxonomic research in underexplored regions of Brazil.

**Keywords:** Aquatic insects, Neotropics, New record

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## Resumo

Neste estudo, registramos *Corydalus diasi* Navás, 1915 (Megaloptera: Corydalidae), no centro-oeste brasileiro pela primeira vez, com base em espécimes coletados em uma população recentemente descoberta no estado de Mato Grosso do Sul. Os espécimes foram obtidos em dezembro de 2024 no Riacho Santa Virgínia – Cascata do Cobre, município de Ponta Porã, utilizando técnicas de armadilha luminosa ativa e passiva. Localizada em uma floresta de Cerrado em regeneração com influência da Mata Atlântica, a área apresenta corredeiras e cachoeiras que sustentam a biodiversidade aquática. Este registro amplia a distribuição conhecida de *C. diasi*, destacando a importância da continuidade da amostragem e da pesquisa taxonômica em regiões pouco exploradas do Brasil.

**Palavras-chave:** Insetos Aquáticos, Região Neotropical, Novo Registro

Despite advances in biodiversity inventories, several species and geographic regions remain under-sampled, intensifying Linnean and Wallacean shortfalls. These gaps limit our understanding of fundamental aspects of biodiversity, including taxonomy, ecology, and biogeography (Hortal et al., 2015; Oliveira et al., 2016; Diniz-Filho et al., 2023).

This issue is particularly evident among aquatic insects, which inhabit a wide range of environments. Under-sampling and neglect in research directly affect biodiversity and pose serious challenges to the conservation of aquatic ecosystems. The order Megaloptera exemplifies this reality, as it is one of the least diverse orders of holometabolous insects, with just about 428 species sorted into 48 genera within two families, Corydalidae and Sialidae (Martins et al., 2022).

The family Corydalidae contains species from the genus *Corydalus* Latreille, 1802 (dobsonflies), the most speciose taxon of Megaloptera in the Neotropics, with 37 reported species (Contreras-Ramos, 1998; Martins et al., 2022). Brazil stands out as the richest country in megalopteran species in the Neotropical region, with 25 extant species and two extinct ones (Jepson and Heads, 2016; Martins et al., 2022). *Corydalus diasi* Navás, 1915 is arguably the most widely distributed megalopteran species known in Brazil, with records in the northeast, midwest, southeast and south Brazil (See Constancio and Martins, 2024; Cidade Martins et al., 2025; Farias et al., 2025). However, despite this, deficits in Wallacean and Linnean shortfalls still prevail, that is, a lack of knowledge about their distribution and

taxonomy in Neotropical Megaloptera (Justi and Pinto, 2025).

Despite their ecological importance and potential as bioindicators, Megaloptera are still understudied in several Brazilian states. This knowledge gap hinders a comprehensive understanding of their distribution and ecological roles across different biomes. In this context, documenting the presence of these insects is essential for biodiversity conservation and for advancing research in freshwater systems.

Although there are no confirmed records of Megaloptera in Mato Grosso do Sul, Navás (1928) mentioned a specimen of *Corydalus armatus* Hagen, 1861 from <<Corumbá, Mato Grosso>>. However, this record is questionable, since the species is Andean (Contreras-Ramos, 1998). Nearly a century after that mention, this study provides the first reliable record of Megaloptera—*Corydalus diasi* Navás, 1915—in the state of Mato Grosso do Sul, expanding its known geographic distribution and contributing to the knowledge of aquatic insects in an area of the Cerrado biome influenced by the Atlantic Forest.

**Collections.** The specimens examined are deposited in the Entomological Collection Padre Jesus Santiago Moure, Departamento de Zoologia, Setor de Ciências Biológicas, Universidade Federal do Paraná, Curitiba, PR, Brazil (DZUP—<https://doi.org/10.15468/ukqvdu>). These specimens were preserved in ethanol (80%).

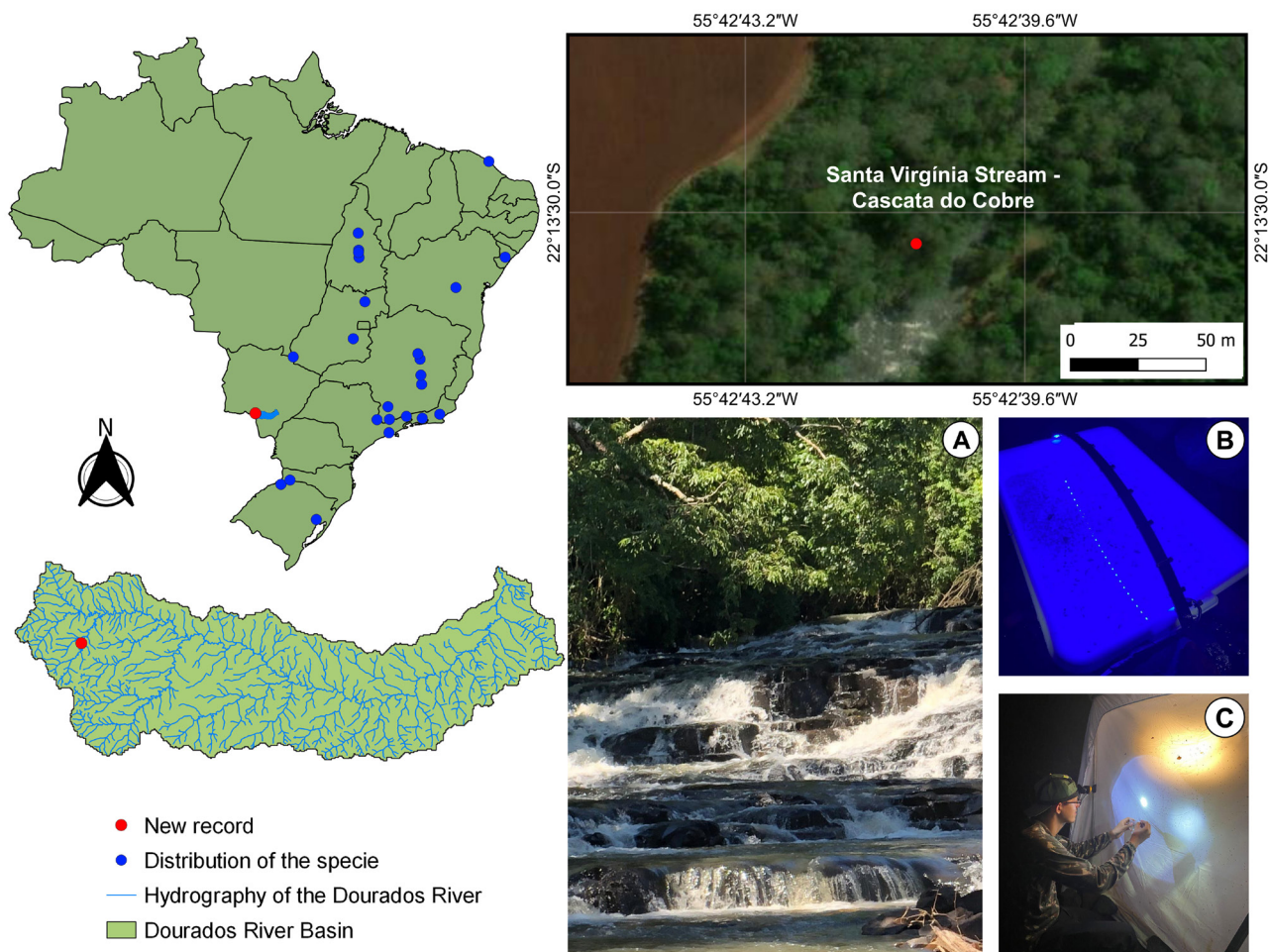
The specimens were sampled on December 17, 2024, at the Santa Virgínia Stream – Cascata do

Cobre, municipality of Ponta Porã, Mato Grosso do Sul, Brazil, 22° 13' 30.4" S, 55° 42' 41.0" W (Fig. 1). Specimens were collected using a variety of combined light-trap techniques, ranging from passive collection using a tray containing an alcohol solution and a blue light (Fig. 1B), to active collection using a standard illuminated white sheet placed along the stream bank to intercept flight (Fig. 1C).

**General procedures and terminology.** The homology and terminology for male genitalia were based in Aspöck and Apöck (2008) as adopted by Liu et al. (2016). Wing venation nomenclature follows Breitzkreuz et al. (2017). The available diagnostic characters listed in the original descriptions and

redescriptions (Navás, 1915; Contreras-Ramos, 1998) were critically analyzed and compared with examined specimens.

Specimens were photographed or digitized through various techniques, with focus-stacked images produced using Helicon Remote and Helicon Focus. All images were subsequently processed using dedicated image-editing software. The map was produced using the freeware QGIS 3.32.0 with the biogeographical regionalization of the Neotropical region and accompanying shapefiles from National Water and Sanitation Agency (ANA) and the Geoapplied platform - Spatial Data on River Basins.



**Figure 1.** Map of the sampled area of *Corydalus diasii* Navás, 1915, A. Santa Virgínia Stream – Cascata do Cobre; B. Tray containing alcohol solution and blue light; C. White illuminated sheet to intercept flights.

## *Corydalus diasi* Navás, 1915 (Figures 1, 2a—f)

**Diagnosis.** (Adapted from Contreras-Ramos 1998). The body pattern is quite similar to that of *Corydalus australis* Contreras-Ramos, 1998 and *Corydalus affinis* Burmeister, 1839. The antennae are filiform, ranging from light brown to dark brown, with the last flagellomeres infusate. Male have elongated mandibles with reduced preapical teeth (Fig. 2b). Female have short mandibles with three well-developed preapical teeth. The basal (posterior) side of the first preapical tooth is concave; the first two teeth are smaller than the third. In addition, the first preapical tooth bears an internal basal projection (Fig. 2c). The forewings contain a pale brown membrane with dark brown longitudinal veins and strongly marked black transverse veins, with subtle white spots within the cells distributed throughout the wing. The ectoproct is elongated, measuring approximately 1.5 times the length of the ninth tergite. Its base is wider, gradually narrowing to 1/3 of its length, being wider than the apex (Fig. 2d). This morphology differs from *C. australis*, whose ectoproct is 2/3 wider at the base than at the apex, and from *C. affinis*, which has an ectoproct of uniform width. The sternite 9 may be subquadrate (flattened posterior margin) or subtriangular (poorly developed posterior margin and an incised projection). This characteristic distinguishes it from *C. australis*, which has a strongly triangular sternite. The gonostyle 9 is elongated, ranging from subclavate to subglobose, with a dorsally directed apex, that extends at least half the length of the ectoproct. The gonostyle 10 is moderately sclerotized, rounded-tubular, and oriented toward the center.

**Remarks.** The area surrounding the stream is located in the Cerrado biome, characterized by regenerating secondary forest vegetation and influenced by agricultural activities. The stream has sections with rapids and a concentration of cascade, creating an environment conducive to aquatic biodiversity. This new record expands the known distribution of *C. diasi* from nine Brazilian states. Future investigations, both of unidentified specimens in scientific collections and of samples from little-explored areas, will be essential to fill the gaps and increase knowledge about the distribution of *C. diasi*.

**Material examined.** Brazil, Mato Grosso do Sul, Ponta Porã, Santa Virgínia Stream - Cascata do Cobre (22° 13' 30.4" S, 55° 42' 41.0" W), White illuminated sheet, 17.XII.2024, Éverton Gustavo Miguel Neves, Anderson Ferreira, Pedro Henrique Zucão Espíndola leg. (1 female) [DZUP 516379]; same data but, blue light (1 male and 1 female) [DZUP 516380; DZUP 516381].

**Distribution.** Argentina, Paraguay, Brazil: Bahia, Ceará, Distrito Federal, Espírito Santo, Goiás, Minas Gerais, Rio de Janeiro, Rio Grande do Sul, São Paulo, Sergipe, Tocantins and Mato Grosso do Sul (new record) (Fig.1).

## Acknowledgements

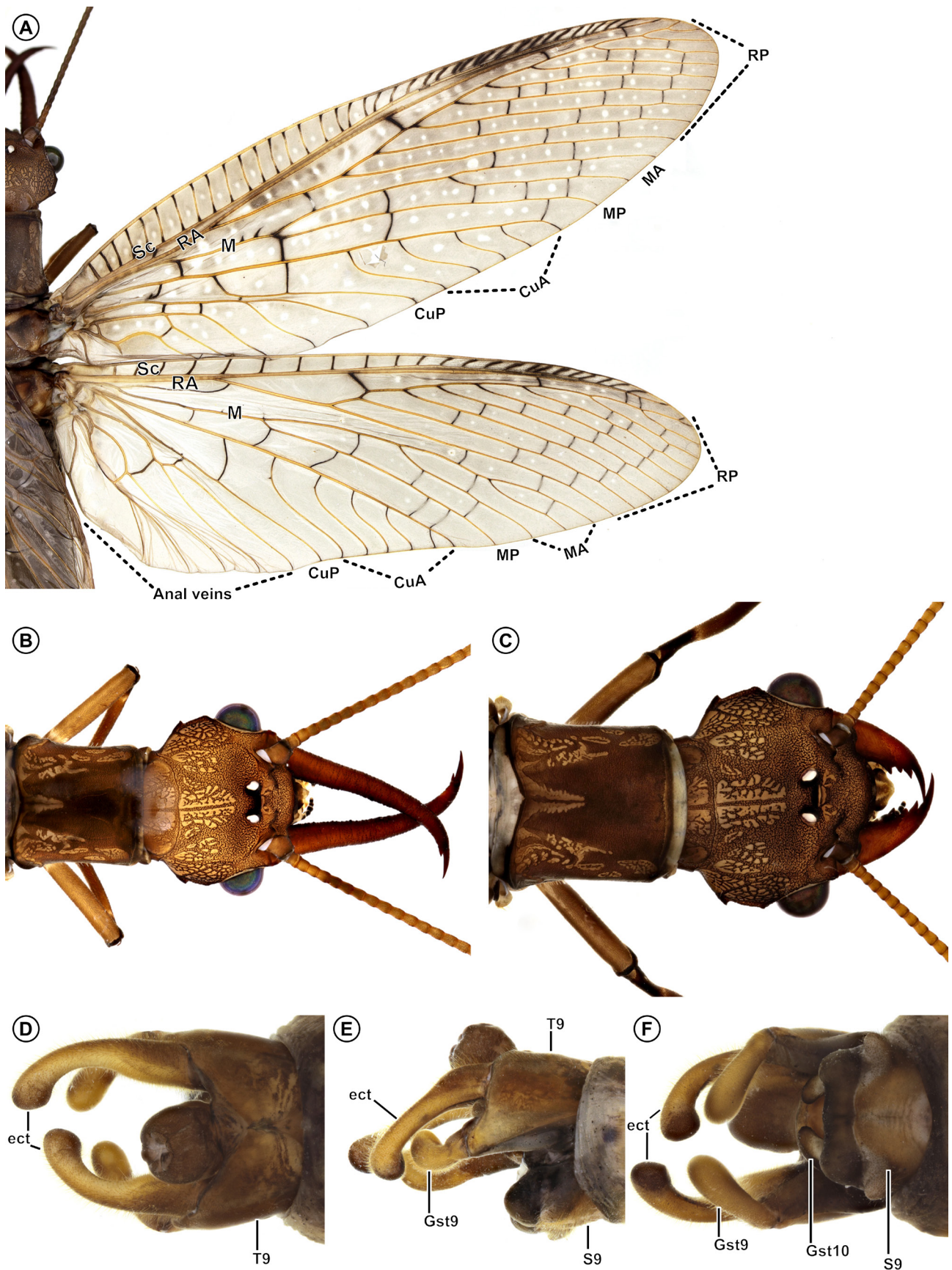
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## Conflicts of interest

The author declares no conflict of interest.

## Author contributions

EGMN, PHZE and AF collected the specimens. KJ identified the specimens, performed measurements, and analyzed the data. EGMN, KJ, PHZE, and AF conceived the study, compiled and organized the data, drafted the manuscript, and reviewed and approved the final version.



**Figure 2.** *Corydalus diasi* Navás, 1915 from the Ponta Porã municipality, State Mato Grosso do Sul, Brazil. A. wings of the male (DZUP 516380); B. head and prothorax in dorsal view of the male; C. head and prothorax in dorsal view of the female (DZUP 516379); D—F. terminalia in dorsal (D), in lateral (E) and in ventral (F) views of male. Gonocoxito = Gcx; Gonostyle = Gst; Gonapophysis = Gph; Sternite = S; Tergite = T. (Photos KJ in 2025).

## References

- Aspöck, U., & Aspöck, H. (2008) Phylogenetic Relevance of the Genital Sclerites of Neuropterida (Insecta: Holometabola). *Systematic Entomology*, 33, 97–127. <https://doi.org/10.1111/j.1365-3113.2007.00396.x>
- Breitkreuz, L. C. Winterton, S. L., & Engel, M. S. (2017) Wing tracheation in Chrysopidae and other Neuropterida (Insecta): A resolution of the confusion about vein fusion. *American Museum Novitates*, 3890, 1–44. <https://doi.org/10.1206/3890.1>
- Cidade Martins, M. D., da Silva Santos, E., & Duarte Alencar, C. E. R. (2025). Unveiling the wings: New South American records for *Corydalus diasi* Navás, 1915 (Megaloptera: Corydalidae). *Revista Chilena De Entomología*, 51(3). <https://doi.org/10.35249/rche.51.3.25.12>
- Contreras-Ramos, A. (1998) Systematics of the dobsonfly genus *Corydalus* (Megaloptera, Corydalidae). Thomas Say Publications in Entomology: Monographs. Entomological Society of America, Lanham, Maryland, USA, 360 pp. <https://doi.org/10.4182/KKIO9247.1998.243>
- Diniz-Filho, J. F.; Jardim, L.; Guedes, J. J.; Meyer, L.; Stropp, J.; Frateles, L. E., et al. (2023) Macroecological links between the Linnean, Wallacean, and Darwinian shortfalls. *Frontiers of Biogeography*, 15, e59566. <https://doi.org/10.21425/F5FBG59566>
- Farias, A. B. S., Santos, S. A. dos, Barão, K. R., Demetrio, G. R., Hamada, N., & Santos, J. C. (2025). The First record of Megaloptera (Insecta: Neuropterida) from Sergipe state, Brazil. *Entomological Communications*, 7, ec07005. <https://doi.org/10.37486/2675-1305.ec07005>
- Hortal, J., Bello, F., Diniz-Filho, J. A. F., Lewinsohn, T. M., Lobo, J. M., Ladle, R. J. (2015) Seven Shortfalls that Beset Large-Scale Knowledge of Biodiversity. *Annual Review of Ecology, Evolution and Systematics*, 46, 523–49. <https://doi.org/10.1146/annurev-ecolsys-112414-054400>
- Jepson, J. E. & Heads, S.W. (2016) Fossil Megaloptera (Insecta: Neuropterida) from the Lower Cretaceous Crato Formation of Brazil. *Zootaxa*, 4098 (1), 134–144. <https://doi.org/10.11646/zootaxa.4098.1.5>
- Justi, K. & Pinto, Â. P. (2025). How many species of alderflies are in southern Brazil? On the taxonomy of *Ilyobius* Enderlein, 1910 and the names *Protosialis nubila*, *P. brasiliensis*, and *P. hauseri* (Megaloptera: Sialidae). *Revista Brasileira De Entomologia*, 69(4), e20250042. <https://doi.org/10.1590/1806-9665-RBENT-2025-0042>
- Liu, X., LÜ, Y., Aspöck, H., Yang, D., Aspöck, U. (2016) Homology of the genital sclerites of Megaloptera (Insecta: Neuropterida) and their phylogenetic relevance. *Systematic Entomology*, 41, 256–286. <https://doi.org/10.1111/syen.12154>
- Machado Constancio, P. H., & Martins, C. C. (2024). First record of *Corydalus diasi* Navás, 1915 (Megaloptera: Corydalidae) from Rio de Janeiro state, Brazil. *Revista Chilena De Entomología*, 50(1). <https://doi.org/10.35249/rche.50.1.24.07>
- Martins, C. C., Ardila-Camacho, A., Rivera-Gasperín, S. L., Oswald, J. D., Liu, X., Contreras-Ramos, A. (2022) A world checklist of extant and extinct species of Megaloptera (Insecta: Neuropterida). *European Journal of Taxonomy*, 812, 1–93. <https://doi.org/10.5852/ejt.2022.812.1727>
- Navás, L. (1915) Neurópteros sudamericanos. Segunda série. *Brotéria (Zoológica)*, 13, 5–13.
- Navás, L. (1928) Insectos del Museo de Estocolmo. *Revista de la Real Academia de Ciencias exactas físicas y naturales de Madrid*, 24, 28–39.
- Oliveira, U., Paglia, A. P., Brescovit, A. D., Carvalho, C. J. B., Silva, D. P., Rezende, D. T. et al. (2016) The strong influence of collection bias on biodiversity knowledge shortfalls of Brazilian terrestrial biodiversity. *Diversity and Distributions*, 22 (12), 1232–1244. <https://doi.org/10.1111/ddi.12489>.