

First record of the *Bephrata* Cameron, 1884 (Hymenoptera, Chalcidoidea, Eurytomidae) from the Brazilian eastern Amazonia, with notes on intraspecific color variation

Antonielson Bezerra SILVA*^{1,3} , Melquisedeque VALENTE^{1,2} , Daniel Alex Chagas BRITO² , Rogério R. SILVA³ 

¹ Universidade Federal do Pará, Programa de Pós-Graduação em Zoologia, Instituto de Ciências Biológicas, 66073-044, Belém - PA, Brazil

² Museu Paraense Emílio Goeldi, Coordenação de Zoologia, Campus de Pesquisas, 66077-830, Belém - PA, Brazil

³ Museu Paraense Emílio Goeldi, Coordenação de Ciências da Terra e Ecologia, Campus de Pesquisas, 66077-830, Belém - PA, Brazil

*Corresponding author: antonielsonbeze@gmail.com

ABSTRACT

The genus *Bephrata* Cameron, 1884 is reported in the Eastern Amazonia region of Brazil for the first time. *Bephrata cultriformis* (Ashmead, 1894) was recorded in Paragominas, Pará state. This finding contributes to the expansion of the known distribution of the species in the Amazonia. Furthermore, color variation in the studied female specimens is reported, thereby providing additional information that contributes to a more comprehensive understanding of the species.

KEYWORDS: Amazon rainforest, *Bephrata cultriformis*, bioindicator, Eurytominae, parasitoid wasps

Primeiro registro de *Bephrata* Cameron, 1884 (Hymenoptera, Chalcidoidea, Eurytomidae) para a Amazônia oriental brasileira, com notas sobre variação de coloração intraespecífica

RESUMO

O gênero *Bephrata* Cameron, é relatado pela primeira vez na região da Amazônia Oriental do Brasil. *Bephrata cultriformis* (Ashmead) foi registrada no município de Paragominas, estado do Pará. Esse achado contribui para a expansão da distribuição conhecida na Amazônia. Além disso, é relatada a variação de coloração nos espécimes femininos estudados, acrescentando assim informações adicionais que contribuem para uma compreensão mais abrangente desta espécie.

PALAVRAS-CHAVE: *Bephrata cultriformis*, bioindicador, Eurytominae, Floresta Amazônica, vespas parasitoides

Bephrata Cameron, 1884, is a basal clade in the subfamily Eurytominae (Chalcidoidea: Eurytomidae). Currently, the genus comprises 22 species worldwide, of which 19 species occur in the Neotropical region. In Brazil, nine species have been recorded across eleven states and four geographic regions: the North (Acre, Amazonas, and Rondônia in Western Amazonia), Northeast (Bahia, Pernambuco, and Rio Grande do Norte), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, and São Paulo), and South (Paraná); notably, it has not been recorded in the Central-West region (Perioto *et al.* 2023; Gates and Hanson 2009; Perioto 2025).

The biology of *Bephrata* species remains to be extensively studied, and the extant evidence suggests that they are egg parasitoids of *Bucratus* Burmeister, *Tettigonia* L., and an

undetermined Pseudophyllinae (all three in Orthoptera: Tettigoniidae) (Herting 1973; De Santis 1989; Gates and Hanson 2009). Some species have been associated with eggs (possibly tettigoniids) found on citrus branches, while others have been collected on orchids (*Cattleya* Lindl., *Laelia* Lindl., Orchidaceae), bromeliads (Bromeliaceae), palm stems (*Chamaedorea* Willd., Arecaceae), and philodendron (*Philodendron* Schott, Araceae) (Lotfalizadeh *et al.* 2007). These records suggest a potential role of *Bephrata* species in the population regulation of their hosts.

Species within the *Bephrata* genus exhibit distinctive external morphological differences (Lotfalizadeh *et al.* 2007; Gates and Hanson 2009). The genus can also be reliably separated from related genera within the Eurytominae subfamily

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(Gates and Hanson 2009). *Bephrata* can be distinguished by the following characteristics: body elongated, scutellum flattened, head in frontal view subcircular, malar space short, and toruli positioned above the lower margin of the eye. Forewings with the stigmal vein almost as long as, or slightly longer than the marginal vein, and forming an acute angle ($\leq 40^\circ$), the postmarginal vein usually exceeds the marginal vein in length (Lotfalizadeh *et al.* 2007; Gates and Hanson 2009).

Intraspecific morphological variation has been documented within Eurytomidae. An example involves *Eurytoma acuta* Bugbee, 1951, *E. calcarea* Bugbee, 1951 e *E. discordans* Bugbee, 1951, which were originally described as distinct species based on difference in scape coloration and shape of the stigmal club and marginal vein (Bugbee 1951). However, more recent and detailed studies have demonstrated that these differences represent variations within a single species and should be synonymized (Zhang *et al.* 2014). In contrast, *Bephrata* has not previously been known to exhibit notable intraspecific variation, particularly in coloration.

The Neotropical species *Bephrata cultriformis* (Ashmead, 1894) has been previously recorded from Ecuador, Costa Rica, Mexico, Peru, and Venezuela, as well as on two windward islands of the Lesser Antilles, Dominica, and Saint Vincent and the Grenadines (Gates and Hanson 2009; Perioto *et al.* 2023). Recently, the species was reported for the first time in a primary Amazon rainforest area in the Brazilian states of Acre and Amazonas, located in the western Amazonia region (Perioto *et al.* 2023; Perioto 2025). *Bephrata cultriformis* is one of the species that lack a distinct sinuous groove on the procoxae. The mesosoma coloration is predominantly black, except for lateral portion of the pronotum, the lateral lobes of the mesoscutum and the axillae (Gates and Hanson 2009, Perioto *et al.* 2023). Here, the first record of *B. cultriformis* in the eastern Amazon, specifically in a post-mining area is documented. This report expands the current knowledge of the species.

The specimens were collected using Malaise traps as part of an entomological survey under the Brazil-Norway Biodiversity Research Consortium (BRC; <https://www.brcbn.com/>). The sampling was conducted in areas under the influence of Hydro Paragominas Mining Company S.A., in the municipality of Paragominas, state of Pará, Brazil (Figure 1).

The specimens were identified by following the taxonomic key for *Bephrata* species occurring in Brazil by Perioto *et al.* (2023). Digital photographs were obtained by affixing a Leica DMC4500 digital camera to a Leica M205A stereomicroscope (Wetzlar®, Germany). The resulting images were then combined using Leica Application Suite V4.10.0 software. The final image processing was performed in Adobe Photoshop. The map and landscape images were generated using the Quantum geographic information system (QGIS 3.40). The collected specimens were properly cataloged and are deposited at the Museu Paraense Emílio Goeldi (MPEG) in Belém, Pará, Brazil.

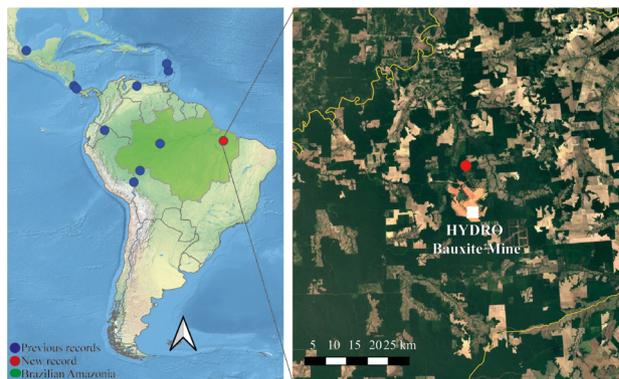


Figure 1. Distribution map of *Bephrata cultriformis* (Ashmead, 1894) (Hymenoptera: Eurytomidae). The new record (red dot) is reported in the municipality of Paragominas, Pará state, in the eastern Amazon region.

Bephrata cultriformis (Ashmead, 1894)

The species can be distinguished by the absence of a sinuous groove on the anterior surface of the procoxa (Figure 2c), the metatibia with a reduced apical spur in the form of a peg (Figure 2d), and the metatarsus with the first tarsomere nearly as long as the combined length of the remaining tarsomeres.

Material examined

BRAZIL, 2 females; PARÁ: Paragominas. HYDRO, Proj. ENTOMO-BRC; Área de Floresta, FL-14; 3°12'56.3"S 47°43'08.9"W; 03-18.VI.2019; Malaise trap; Rogério R. Silva & Equipe col. (MPEG 03056521, MPEG 03056522). 1 female, idem to the previous comment except for: 08-17. II.2020; Rony Almeida & Equipe col. (MPEG 03056520). Material is deposited in the Entomology collection of the Museu Paraense Emílio Goeldi (MPEG), Belém, Pará, Brazil (Dr. Orlando T. Silveira, curator).

The three female specimens of *B. cultriformis* examined in this study were exclusively recorded in the forested area during



Figure 2. *Bephrata cultriformis* (Ashmead, 1894) (Hymenoptera: Eurytomidae), female. **A**—Habitus, lateral view. **B**—Head and mesosoma, dorsal view. **C**—Head, frontal view, and anterior surface of procoxa without sinuous groove. **D**—Metatibia with shorter apical peglike spur.

two distinct years, in June 2019 and February 2020. The females exhibit a distinctive color variation in comparison to other individuals of the same species documented in previous studies (Gates and Hanson 2009; Perioto *et al.* 2023). A small circular black mark is present in the face (Figure 2c) of the Paragominas specimens. This characteristic has not been previously described in studies examining the species (e.g., figure 48, Gates and Hanson 2009, p. 33; figure 13, Perioto *et al.* 2023, p. 7). This subtle variation may be indicative of intraspecific polymorphism, underscoring the necessity for additional research to elucidate the morphological variations within the species.

Although the present study indicates the occurrence of the species in forest areas of the eastern Amazon, the small sample size ($n = 3$) limits more conclusive interpretations about its habitat preferences but suggests a possible association with environments that are more conserved, which may be analogous to the habitat requirements of its tettiogniid host.

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REFERENCES

- Bugbee, R.E. 1951. New and described parasites of the genus *Eurytoma* Illiger from rose galls caused by species of the cynipid genus *Diplolepis* Geoffrey. *Annals of the Entomological Society of America* 44: 213-261.
- De Santis, L. 1989. Catálogo de los Himenopteros Calcidoides (Hymenoptera) al sur de los Estados Unidos, segundo suplemento. *Acta Entomologica Chilena* 15:9-89.
- Gates, M.W.; Hanson, P.E. 2009. A revision of *Bephrata* and *Isosomodes* (Hymenoptera: Eurytomidae). *Journal of Hymenoptera Research* 18: 25-73.
- Herting, B. 1973. Coleoptera to Strepsiptera. A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or prey/enemy. Commonwealth Agricultural Bureaux, Institute of Biological Control 3. 185p.
- Lotfalizadeh, H.; Delvare, G.; Rasplus, J.Y. 2007. Phylogenetic analysis of Eurytominae (Chalcidoidea: Eurytomidae) based on morphological characters. *Zoological Journal of the Linnean Society* 151: 441-510.
- Perioto, N.W. 2025. Eurytomidae. In: Catálogo Taxonômico da Fauna do Brasil. PNUD. Available at <http://fauna.jbrj.gov.br/fauna/faunadobrasil/1042.>>. Accessed on 10 Feb 2025.
- Perioto, N.W.; Fernandes, D.R.; Lara, R.I.; Tavares, M.T.; Rafael, J.A. 2023. Synopsis of the parasitic wasps *Bephrata* (Hymenoptera: Chalcidoidea, Eurytomidae) in Brazil. *Iheringia Série Zoologia* 113: e2023010.
- Zhang, Y.M.; Gates, M.W.; Shorthouse, J.D. 2014. Testing species limits of Eurytomidae (Hymenoptera) associated with galls induced by *Diplolepis* (Hymenoptera: Cynipidae) in Canada using an integrative approach. *The Canadian Entomologist* 146(3): 321-334.

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SILVA, A.B.; VALENTE, M.; BRITO, D.A.C.; SILVA, R.R.: Conceptualization, Data curation, Formal Analysis, Methodology, Investigation, Writing – original draft, Writing – review & editing.



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