

Scientific Note

New records of Proconiini Stål, 1869 (Hemiptera: Cicadellidae: Cicadellinae) for the Pará State, Brazil

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Abstract. We present new records of Proconiini Stål, 1869 (Hemiptera: Cicadellidae: Cicadellinae) for the Pará State, Brazil. Most specimens were collected in canopy of Tapajós National Forest. *Diastostemma cavichioli* Pinto, Mejdalani & Takiya, 2017 is the most abundant species, while *Diastostemma dubium* Young, 1968 and *Acrogonia albertoi* Silva, Cavichioli, Takiya & Mejdalani, 2017 had less than five specimens collected. In addition, maps with geographical distribution of the species here studied are presented.

Keywords: Amazonian region, Belterra, Leafhoppers, Sharpshooters.

Cicadellidae is the largest family of Hemiptera, and their members are known as leafhoppers and sharpshooters, including insects that feed on the xylem, phloem or mesophile of vascular plants (Grazia et al. 2012). The subfamily Cicadellinae Latreille, 1825 comprises two tribes, Cicadellini Latreille, 1825 and Proconiini Stål, 1869 with around 2,400 species distributed worldwide (Wilson et al. 2009). This subfamily is particularly diverse in the Neotropical region (Young 1968), and Proconiini is endemic to American continent (McKamey 2007).

Proconiini have been diagnosed as vectors of *Xylella fastidiosa* Wells et al., 1987 - a bacterium that lives in the xylem, causing diseases to several plants (Marucci et al. 2002) then a lot of genera are important to many agricultural crops (Hickel et al. 2001; Paradell et al. 2012; Azevedo & Lima 2015; Carvalho et al. 2015). Specifically, some species of *Acrogonia* Stål, 1869 are recorded in many regions of Brazil, and many species are potential vectors of *X. fastidiosa* (Gonçalves et al. 2008; Azevedo & Lima 2015; Carvalho et al. 2015; Hidalgo & Molina 2015). Meanwhile, the economic importance of *Diastostemma* Amyot & Serville, 1843 is unknown. Recent studies show the distribution of *Acrogonia* and *Diastostemma* for different regions of Brazil, including the Amazon, and the last record of these two genera for Pará is from *Acrogonia albertoi* Silva, Cavichioli, Takiya & Mejdalani, 2017 (Pinto et al. 2017; Silva et al. 2017; Takiya & Dmitriev 2019).

In this work, we update the geographic distribution of one species of *Acrogonia* and two species of *Diastostemma* (Proconiini) with the inclusion of new records, these two genera were the most abundant Proconiini genera collected in the samples. These new records increase the known country-level diversity of the Neotropical leafhoppers.

The material here used was provided by MS dissertation of Margarida P. de Freitas, with the aim of investigating the vertical stratification of Arctiini (Lepidoptera: Erebiidae: Arctiinae). The collects were carried out in two points of the Tapajós National Forest (FLONA Tapajós) (02°51'23.3" S, 54°57'31.0" W and 03°01'05.6" S, 54°58'10.4" W). The first point is located at km 67 and the second at km 83 of highway BR-163 (Santarém-Cuiabá direction), in the municipality of Belterra, Pará State, Brazil. The vegetation of the studied area is characterized as a terra-firme ombrophilous dense forest with a canopy reaching 40 m high and emergent trees reaching up to 50 m (Henriques et al. 2008).

Four light traps (Pennsylvania) were installed on two metallic

towers of "The Large Scale Biosphere-Atmosphere Research Program in the Amazon" at FLONA Tapajós. They were mounted at the following heights: ground level (understory) and 30 meters high (canopy). The traps remained active for two consecutive days during 12 consecutive months, between December 2012 and November 2013.

A total of two specimens of *Acrogonia* and 14 specimens of *Diastostemma* were collected, all males. The canopy was the strata with the highest number of specimens collected (Tab. 1). In this work, for the first time, *Acrogonia* and *Diastostemma* were collected in the canopy of the Amazonian rain forest. We, therefore, present the second record for *A. albertoi* and the first record for two species of *Diastostemma* to Pará. All examined specimens are deposited in the "Laboratório de Entomologia da Universidade Federal do Oeste do Pará (LABEN)". The new record of these species to Pará it is an addition to the State's fauna, and also shows the importance of collecting in different strata of Amazonian forest that can harbor biodiversity to be discovered. Finally, we present an updated distribution map for the studied species. The map was made on the SimpleMappr website (Shorthouse 2010).

Acrogonia albertoi Silva, Cavichioli, Takiya & Mejdalani, 2017 (Fig. 3A)

Acrogonia Stål, 1869 comprises currently 31 species (Silva et al. 2017), distributed from Mexico to Argentina (Young 1968; McKamey 2007; Dellapé et al. 2011; Silva et al. 2017), of which 17 species were recorded from Brazil (Silva et al. 2017; Takiya et al. 2022). *Acrogonia albertoi* is recorded only for Pará, Serra Norte, located at southeast of the State (Silva et al. 2017). Here, this species is recorded for the first time for Belterra, a region in the west of the State. The specimens were collected in canopy and understory of FLONA Tapajós (Fig. 1, Tab. 1). *Acrogonia albertoi* is recognized by the pair of small preapical bifid processes on aedeagus (Silva et al. 2017).

Examined material. One male "12-13/IV/2013 \ Km 67 B-Sub-bosque \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg"; one male "07-08/VIII/2013 \ Km 83 A-Dossel \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg".

Diastostemma cavichioli Pinto, Mejdalani & Takiya, 2017 (Fig. 3B)

Diastostemma Amyot & Serville, 1843 comprises currently 36 species (Pinto et al. 2017), distributed from Mexico to Argentina (Young 1968; Pinto et al. 2017), of which nine species were recorded from

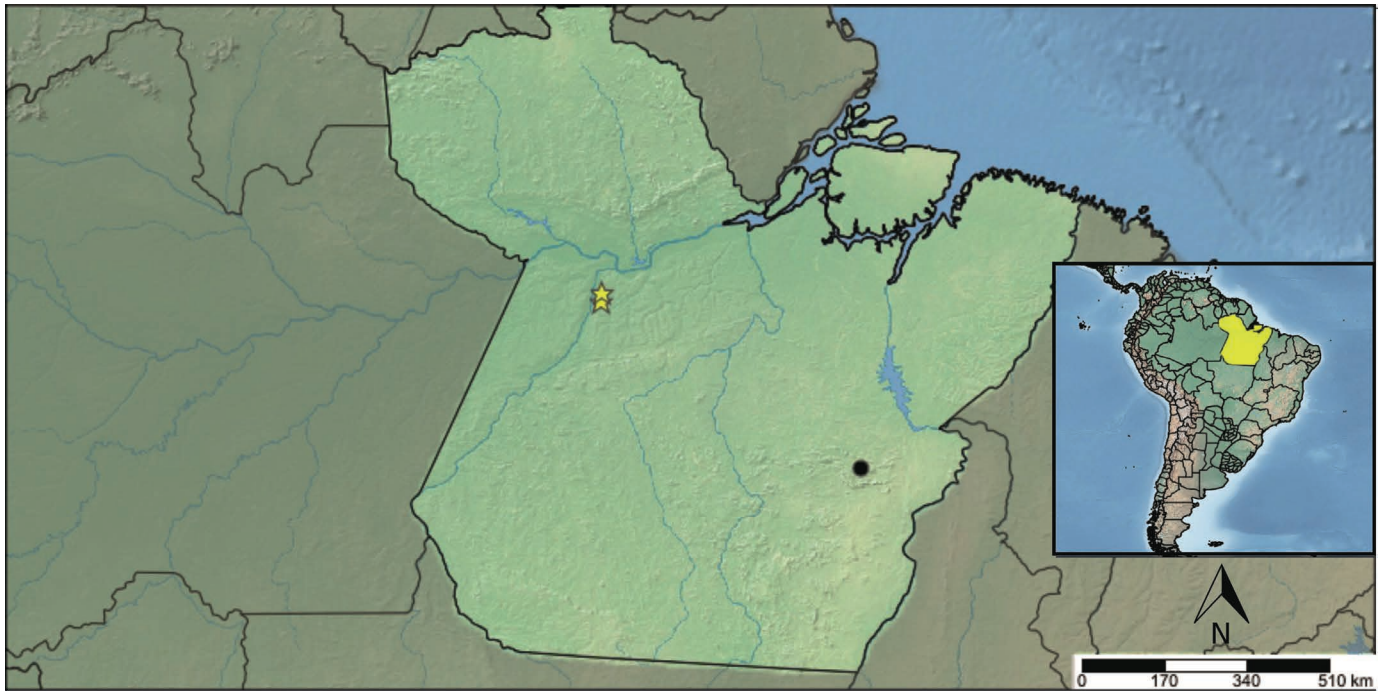


Figure 1. Geographic distribution of *Acrogonia albertoi* Silva, Cavichioli, Takiya & Mejdalani, 2017 (Hemiptera: Cicadellidae) in Brazil. Black circles = previous records; Yellow star = new record; The yellow region indicated on the South American miniature map where the state of Pará.

Brazil (Pinto et al. 2017; Takiya et al. 2022). *Diastostemma cavichioli* is recorded only for Mato Grosso and Rondônia States (Pinto et al. 2017). Here, this species is recorded for the first time from Pará State. The specimens were collected in canopy and understory of FLONA Tapajós (Fig. 2, Tab. 1). Males of *D. cavichioli* can be easily recognized by the large spine-like process at the proximal portion of the basiventral process of aedeagus and biconical shape of the process rami in posterior view (Pinto et al. 2017).

Examined material. One male “14-15/XII/2012 \ Km 67 B-Sub-bosque \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg”; one male “13-14/XII/2012 \ Km 83 A-Dossel \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg”; three males “12-13/I/2013 \ Km 67 A-Dossel \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg”; one male “11-12/IV/2013 \ Km 67 B-Sub-bosque \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg”; one male “09-10/V/2013 \ Km 67 A-Dossel \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg”; one male “08-09/VI/2013 \ Km 83 A-Dossel \ Flona

Tapajós \ Belterra-PA \ FREITAS, M.P. leg”; one male “30-1/X/2013 \ Km 67 A-Dossel \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg”; one male “05-06/XI/2013 \ Km 67 A-Dossel \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg”.

Table 1. Specimens of *Acrogonia albertoi* Silva, Cavichioli, Takiya & Mejdalani, 2017, *Diastostemma cavichioli* Pinto, Mejdalani & Takiya, 2017 and *Diastostemma dubium* Young, 1968 (Hemiptera: Cicadellidae) collected with light trap, during the one year in two points of FLONA Tapajós in the State of Pará, Brazil. A- Refers to collects in canopy; B- Refers to collects in understory; 67 and 83 refers to km location.

Species	67A	67B	83A	83B	Total
<i>Acrogonia albertoi</i>	0	1	1	0	2
<i>Diastostemma cavichioli</i>	6	3	2	0	11
<i>Diastostemma dubium</i>	2	0	1	0	3
Total	8	4	4	0	16

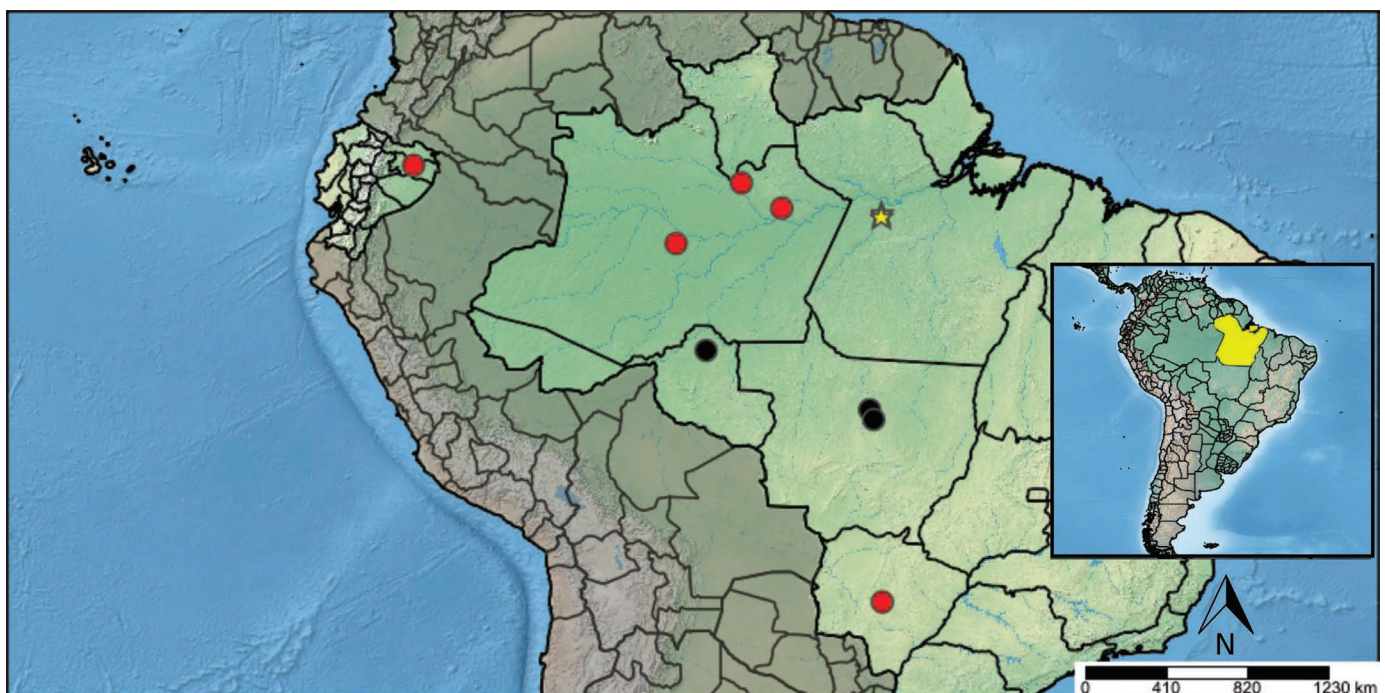


Figure 2. Geographic distribution of *Diastostemma cavichioli* Pinto, Mejdalani & Takiya, 2017 and *Diastostemma dubium* Young, 1968 (Hemiptera: Cicadellidae). Black circles = previous records of *D. cavichioli*; Red circles = previous records of *D. dubium*; Yellow stars = new records; The yellow region indicated on the South American miniature map where the state of Pará.

Diastostemma dubium Young, 1968 (Fig. 3C)

Diastostemma dubium is recorded for Amazonas and Mato Grosso do Sul States in Brazil and for Ecuador (Young 1968; Takiya & Dmitriev 2019). Here, this species is recorded for the first time for the Pará State. The specimens were collected only in canopy of FLONA Tapajós (Fig. 2, Tab. 1). Males of *D. dubium* can be recognized by the aedeagus with basiventral processes exceeding the apex of shaft (Young 1968).

Examined material. One male “11-12/I/2013 \ Km 67 A-Dossel \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg”; one male “12-13/IV/2013 \ Km 83 A-Dossel \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg”; one male “09-10/V/2013 \ Km 67 A-Dossel \ Flona Tapajós \ Belterra-PA \ FREITAS, M.P. leg”.

Note: The material used in the article was preserved in alcohol, which led to discoloration of the specimens and even a decrease in the number of brochosomes.



Figure 3. A-C. Lateral habitus of Proconiini. A. *Acrogonia albertoi* (male); B. *Diastostemma cavichioli* (male); C. *Diastostemma dubium* (male). Scale bar = 1 mm.

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Authors' Contributions

D.L.P.G. sort and identified the material and produced the maps. All authors wrote the manuscript, discussed the results, and contributed to its final version.

Conflict of Interest Statement

The authors declare no conflict of interest.

References

- Azevedo, R. L.; Lima, M. F. (2015) Cigarrinhas dos Citros, Vectors da Bactéria *Xylella fastidiosa* Wells et al.: Pragas Potenciais para a Citricultura Sergipana. *EntomoBrasilis*, 8(1): 01-07. doi: [10.12741/ebrasilis.v8i1.403](https://doi.org/10.12741/ebrasilis.v8i1.403)
- Carvalho, R. A.; Lopes, M. M.; Rodrigues, L. G. N. (2015) Espécies de cigarrinhas em cultivo de café no Município de Santa Teresa, Espírito Santo, Brasil (Hemiptera, Cicadellidae, Cicadellinae). *Papéis Avulsos de Zoologia*, 55(13): 205-210. doi: [10.1590/0031-1049.2015.55.13](https://doi.org/10.1590/0031-1049.2015.55.13)
- Dellapé, G.; Logarzo, G. A.; Virla, E. G.; Paradell, S. L. (2011) New records on the geographical distribution of South American Sharpshooters (Cicadellidae: Cicadellinae: Proconiini) and their potential as vectors of *Xylella fastidiosa*. *Florida Entomologist*, 94(2): 364-366. doi: [10.1653/024.094.0239](https://doi.org/10.1653/024.094.0239)
- Gonçalves, A. M. O.; Molina, R. O.; Nunes, W. M. C.; Zanutto, C. A. (2008) Incidência de *Dilobopterus costalimai* Young e *Acrogonia citrina* Marucci & Cavichioli, em pomares cítricos no noroeste paranaense. *Acta Scientiarum Agronomy*, 30(3): 321-324. doi: [10.4025/actasciagron.v30i3.3502](https://doi.org/10.4025/actasciagron.v30i3.3502)
- Grazia, J.; Cavichioli, R. R.; Wolff, V. R. S.; Fernandes, J. A. M.; Takiya, D. A. (2012) Hemiptera. In: *Os insetos do Brasil: diversidade e taxonomia*. J.A. Rafael; G.A.R. Melo; C. J. B. Carvalho; S. Casari, org. Ribeirão Preto, SP: Editora Holos.
- Henriques, L. M. P.; Wunderle-Jr, J. M.; Oren, D. C.; Willig, M. R. (2008) Efeitos da Exploração Madeireira de Baixo Impacto sobre uma Comunidade de Aves de Sub-bosque na Floresta Nacional do Tapajós, Pará, Brasil. *Acta Amazonica*, 36(2): 267-290. doi: [10.1590/S0044-59672008000200010](https://doi.org/10.1590/S0044-59672008000200010)
- Hickel, E. R.; Ducroquet, J. P. H. J.; Leite-Junior, R. P.; Leite, R. M. V. B. (2001) Fauna de Homoptera: Auchenorrhyncha em Pomares de Ameixeira em Santa Catarina. *Neotropical Entomology*, 30(4): 725-729. doi: [10.1590/S1519-566X2001000400032](https://doi.org/10.1590/S1519-566X2001000400032)
- Hidalgo, M. R.; Molina, R. O. (2015) Avaliação de cigarrinhas vedoras de *Xylella fastidiosa* no período da primavera na cidade de Alto Paraná. *Revista de Saúde e Biologia*, 10(1): 01-05.
- Marucci, R. C.; Cavichioli, R. R.; Zucchi, R. A. (2002) Espécies de cigarrinhas (Hemiptera, Cicadellidae, Cicadellinae) em pomares de citros da região de Bebedouro, SP, com descrição de uma espécie nova de *Acrogonia* Stål. *Revista Brasileira de Entomologia*, 46(2): 149-164. doi: [10.1590/S0085-56262002000200007](https://doi.org/10.1590/S0085-56262002000200007)
- McKamey, S. H. (2007) Taxonomic catalogue of the leafhoppers (Membracoidea). Part 1. Cicadellinae. *Memoirs of the American Entomological Institute*, 78, 1-394
- Paradell, S.L.; Virla, E. G.; Logarzo, G. A.; Dellapé, G. (2012) Proconiini Sharpshooters of Argentina, with notes on its distribution, host plants, and natural enemies. *Journal of Insects Science*, 12(116): 1-17. doi: [10.1673/031.012.11601](https://doi.org/10.1673/031.012.11601)
- Pinto, A. P.; Mejdalani, G.; Takiya, D.M. (2017) Unraveling the White-clothed *Diastostemma* Amyot & Serville: a taxonomic revision of the American sharpshooters of the *D. biterculatum* complex (Hemiptera: Cicadellidae). *Zootaxa*, 4281(1): 135-164. doi: [10.11646/zootaxa.4281.1.14](https://doi.org/10.11646/zootaxa.4281.1.14)
- Shorthouse, D. P. (2010) SimpleMappr, an online tool to produce publication-quality point maps. <https://www.simplemappr.net>. Access on: 15.ix.2019.
- Silva, R. S.; Cavichioli, R. R.; Takiya, D. M.; Mejdalani, G. (2017) Description of eight new *Acrogonia* species from the Amazon region, including peculiar features of the female genitalia (Hemiptera: Cicadellidae: Cicadellinae: Proconiini). *Zootaxa*, 4244(4): 515-534. doi: [10.11646/zootaxa.4244.4.4](https://doi.org/10.11646/zootaxa.4244.4.4)
- Takiya, D. A.; Dmitriev, D. A. (2019) World Auchenorrhyncha Database Cicadellinae database. <http://dmitriev.speciesfile.org/>. Access on: iv.2022.
- Takiya, D. M.; Cavichioli, R. R.; Mejdalani, G.; Felix, M.; Gonçalves, C. C.; Camisão, B. M.; Barbosa, J. F. (2022) Cicadellidae in *Catálogo Taxonômico da Fauna do Brasil*. PNUD. <http://fauna.jbrj.gov.br/fauna/faunadobrasil/5624>. Access on: 01.iv.2022.
- Wilson M. R.; Turner, J. A.; McKamey, S. H. (2009) Sharpshooter Leafhoppers of the World (Hemiptera: Cicadellidae subfamily Cicadellinae). Amgueddfa Cymru – National Museum Wales. <http://naturalhistory.museumwales.ac.uk/Sharpshooters>. Access on: iv.2022.
- Young, D. A. (1968) Taxonomic study of the Cicadellinae (Homoptera: Cicadellidae) pt. 1, Proconiini. *Bulletin of the United States National Museum*, 287. doi: [10.5479/si.03629236.261.1](https://doi.org/10.5479/si.03629236.261.1)