

# First Record of *Kurzia media* (Birge 1879) (Cladocera: Chydoridae) in Brazil with notes on the holotype

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## ABSTRACT

The genus *Kurzia*, initially described in 1894 by Dybowski and Grochowski, has a worldwide distribution and includes eight species. In Brazil, *Kurzia polyspina* is so far the only species considered valid. Here we report the first record of *Kurzia media* in Brazil, and the second record in South America. The material was collected in a lake in the Amazonian region of the Brazilian state of Maranhão. In addition, we provide some considerations about the taxonomic history of the species and discuss the need for a redescription and the designation of a neotype for *K. media*. With our record, *K. media* now has two known occurrence localities in northern North America and two in tropical South America, with a widely disjunct distribution that needs further elucidation.

**KEYWORDS:** biodiversity, Branchiopoda, Neotropical region, taxonomy, Amazonia

## Primeiro registro de *Kurzia media* (Birge 1879) (Cladocera: Chydoridae) para o Brasil com notas sobre o holótipo

### RESUMO

O gênero *Kurzia*, inicialmente descrito em 1894 por Dybowski e Grochowski, tem distribuição em todos os continentes e inclui oito espécies. No Brasil, *Kurzia polyspina* era anteriormente a única espécie considerada válida. Aqui nós reportamos o primeiro registro de *Kurzia media* para o Brasil e o segundo registro para a América do Sul. O material foi coletado na região amazônica do estado do Maranhão. Adicionalmente fornecemos algumas considerações sobre a história taxonômica da espécie e discutimos a necessidade de uma redescrição e da designação de um neótipo para *K. media*. Com nosso registro, *K. media* agora tem duas localidades de ocorrência conhecidas no norte da América do Norte e duas na América do Sul, com uma distribuição amplamente disjunta que precisa de mais esclarecimentos.

**PALAVRAS-CHAVE:** biodiversidade, Branchiopoda, Região Neotropical, taxonomia, Amazônia

The cladoceran genus *Kurzia* Dybowski & Grochowski, 1894 currently contains eight species, all widely distributed in the world (Kotov et al. 2013). In Brazil, until the present study, only records of *Kurzia polyspina* Hudec (2000) were considered valid (Sousa and Elmoor-Loureiro 2019). *Kurzia polyspina* is widely distributed in Brazil, with records in the north (states of Amazonas, Rondônia and Pará), mid-west (Mato Grosso, Mato Grosso do Sul, Tocantins and Brasília), northeast (Piauí, Pernambuco and Bahia), southeast (Minas Gerais, São Paulo and Rio de Janeiro) and south (Rio Grande do Sul) (Elmoor-Loureiro et al. 2023). There is also a report of *Kurzia longirostris* (Daday 1898) in São Paulo (Sars 1901). However, based on the non-cosmopolitanism paradigm (Frey 1987), which is well

supported by solid evidence of the continental endemism in chydorid cladocerans (e.g., Dumont and Silva-Briano 2000; Sinev 2015, 2020; Sousa et al. 2016; Sinev et al. 2023), we propose that this record should be re-evaluated.

*Kurzia media* (Birge, 1879) has long been assumed to have a Nearctic distribution, reported in the northern part of the United States and Canada (Hudec 2000). However, due to the low number of examined specimens and some differences in post-abdomen denticles in his specimens, Hudec (2000) designated them as *Kurzia* cf. *media*. Elías-Gutiérrez et al. (2008) reported the occurrence of *Kurzia* cf. *media* in Mexico, noting the difficulties in determining this taxon due to the insufficient detail in the species description. More recently,

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Fuentes-Reines et al. (2022) recorded *Kurzia cf. media* in Colombia, so far the only known record of this species in South America.

Here we report the first record of *Kurzia cf. media* in Brazil and the second for South America. We also provide some considerations about the taxonomic history of *K. media* and discuss the need for a redescription and designation of a neotype for this species.

The studied material was collected on January 31, 2023 during a limnological survey in a lake (Lagoa da Brisa) (4°12'42.8"S, 44°48'23.0"W) located in the municipality of Bacabal, Maranhão state, Brazil (Figure 1). The sampled area belongs to the Amazon biome with an average annual temperature of 27.3°C and annual precipitation exceeding 1,000 mm (Catunda and Dias 2019). The area is relatively deforested, and the lake is eutrophic due to the presence of urban waste produced by the surrounding urban area.

Water was collected at 10 sampling points. At each point, 200 liters of water were sampled using a 20-liter bucket and filtered employing a plankton net with a mesh size of 60 µm. The collected material was immediately fixed in 75% ethyl alcohol.

To identify the cladoceran specimens, individuals were placed on temporary microscopy slides with glycerol and analyzed under an optical microscope. A composite slide was used to visualize the cephalic openings (Andrade et al. 2020). Subsequently, the specimens were dissected, and anatomical structures were mounted on semi-permanent slides.

Specimens of *K. cf. media* were identified using taxonomic keys and descriptions in Elmoor-Loureiro (2002), Hudec (2000) and Sousa and Elmoor-Loureiro (2019). Micrographs were captured using a Nikon Eclipse E200 optical microscope coupled with a Moticam 5.0MP digital camera and processed using software combining ZP® and Adobe Photoshop CC®.

In total, 10 specimens from two sampling points were identified as *Kurzia cf. media*. These two points did not differ from the others in habitat characteristics. We have chosen to maintain the *conferatum* status like the previous authors (Hudec 2000; Elías-Gutierrez et al 2008; Fuentes-Reines et al 2022) based on the uncertainties existing in the available descriptions (Birge 1879; Hudec 2000). Three specimens were dissected and mounted on permanent slides. Their average body length was 0.6 mm. The specimens were deposited in the invertebrate collection of Centro de Ciências de Chapadinha at Universidade Federal do Maranhão (CINCCAA), voucher # 0149.

Class Branchiopoda Latreille, 1817

Superorder Cladocera Latreille, 1829

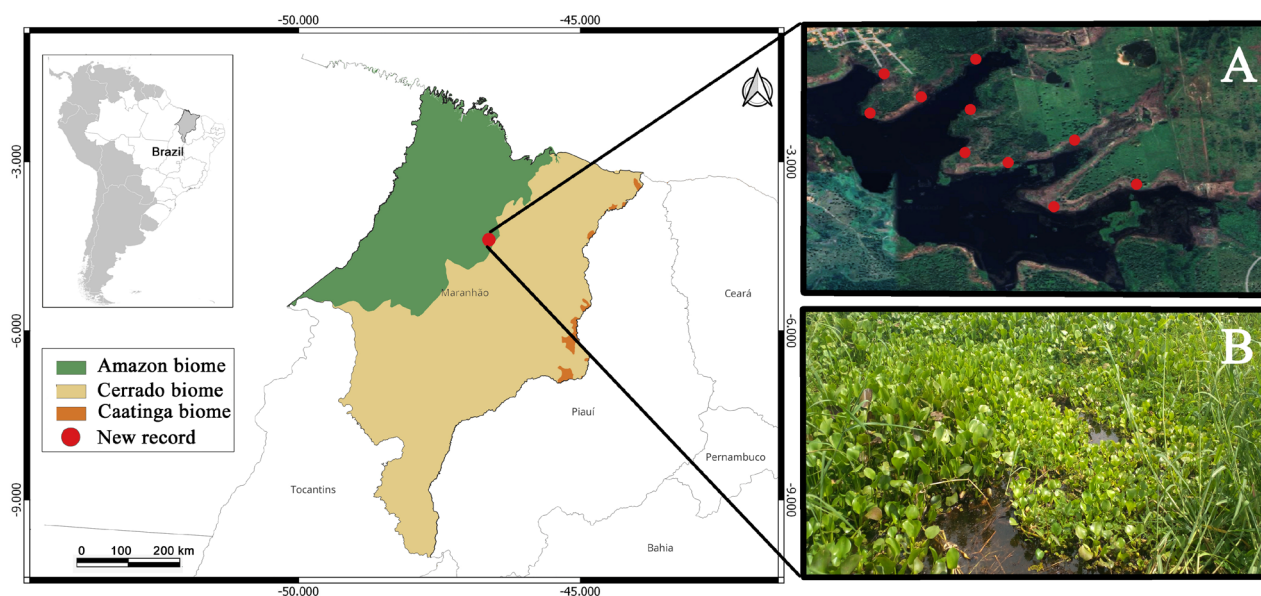
Order Anomopoda Sars, 1865

Family Chydoridae Dybowski and Grochowski, 1894  
*emend.* Frey, 1967

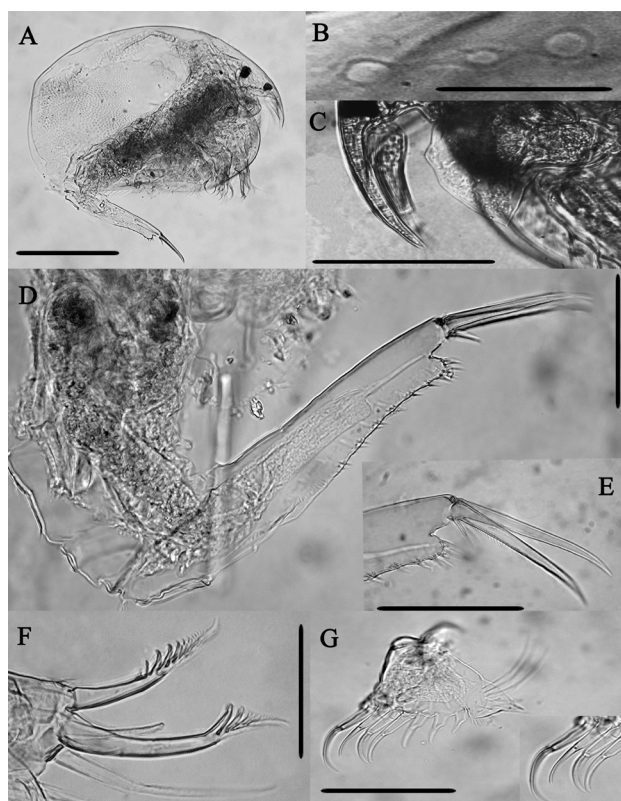
Subfamily Aloninae Dybowski and Grochowski, 1894  
*emend.* Frey, 1967

Genus *Kurzia* Dybowski and Grochowski, 1894

***Kurzia media*** (Birge 1879) (Figure 2)



**Figure 1.** Map of the state of Maranhão, Brazil, showing the location of the site of occurrence of *Kurzia cf. media* (red dot) in the transition zone between the Amazonian biome and Cerrado savanna biome. The inset map shows the location of Maranhão state in Brazil. A – Overview of the collection site, Lagoa da Brisa, in Bacabal, Maranhão. The red dots indicate the sampling points; B – Sampled microhabitat.



**Figure 2.** Images of *Kurzia* cf. *media* collected in Maranhão, Brazil. A – Lateral view of the body; B – Cephalic pores; C – Overview of the labrum and rostrum; D – Post-abdomen; E – Distal corner of the post-abdomen; F – Trunk limb I, inner distal lobe; G – Trunk limb II. Scale bar = 100  $\mu$ m.

**Remarks:** In general, the morphology of the specimens found in Maranhão corresponds to the description of *Kurzia media*, as presented in Hudec (2000) (Figure 2a-d): the body is sub-rectangular, with three unequal interconnected cephalic pores, accompanied by smaller lateral pores; the distance between the smaller pores is greater than the distance between the smaller pores and the posterior margin of the cephalic shield; a short rostrum with antennules almost reaches the rostral tip; the distal corner of the post-abdomen features a lobe with three marginal spicules; the distal corner of the post-abdomen forms a lobe with three denticles (Figure 2d-e); trunk limb II conformed to the genus characteristic (Figure 2g).

In trunk limb I, the two longest setae of the inner distal lobe (IDL) of the analyzed specimens do not appear to have uniform setulation (Figure 2f), as described by Hudec (2000), suggesting a variation in this structure in this Brazilian population, as described in a Mexican population (Elías-Gutiérrez et al. 2008, Fig. 46.6).

*Kurzia media* was described by Birge (1879) from Lake Wingra (Madison, Wisconsin, USA) under the name *Alonopsis media* (Brooks 1966). Smirnov (1971) proposed that specimens from North America could be considered as *Kurzia latissima* (Kurz 1874), described from Bohemia

(Central Europe), due to their morphological similarities. According to Smirnov, the characteristics observed in the *K. media* specimens were not sufficiently distinct to justify a separation into a new species and, consequently, *K. media* should be considered a junior synonym. Despite this, *K. media* is currently considered a valid species (Hudec 2000; Kotov et al. 2013). Nevertheless, the meaning of the morphological variation documented here and in the literature (Hudec 2000; Elías-Gutiérrez et al. 2008) is still not clear. It may represent inter-population variation, but it could also indicate the existence of a complex of cryptic species.

In the context of this study, two considerations are important. The first is relative to the original description of *K. media*, which is relatively simple, accompanied by only one illustration of the post-abdomen (Birge 1879). More recently, Hudec (2000) provided a new description of the species, including more illustrations and more morphological data than the original description, based on material from Pinehurst Lake in Ontario, Canada, which is about 800 km away from the type locality of the species designated by Birge (1879). Yet, despite the improvement it provided, Hudec's description no longer meets the current standards used for the Chydoridae, therefore a new redescription of the species is needed.

The second consideration is related to the material used by Birge (1879) to describe the species. As mentioned before, the material was collected in Wisconsin (USA). According to Neretina et al. (2018), after Birge's death, his private collection (microscopy slides), including the specimens used for the description of *K. media*, were incorporated into the private collection of David G. Frey, professor at the University of Indiana (USA). After Professor Frey's death, the collection was donated to the Smithsonian Institute's National Museum of Natural History. However, after consulting the museum's digital archive, we found no deposited material (including holotype and paratypes) of *K. media*, which was confirmed by the current curator of the invertebrate's collection (Martha Nizinski, pers. comm.). To conduct a proper review of *K. media*, it would be necessary to evaluate new material collected in the type locality to establish a neotype for the species (Winston 1999; Papavero 1994).

Our record of *K. media* in Maranhão reinforces the previous record of the species in Colombia (Fuentes et al. 2022) and suggests that it has an extensive presence in South America, from the Caribbean region of Colombia to the northeastern edge of the Amazon region. This distribution raises questions about the ecological adaptation of the species, considering the great difference between the temperate environments of North America, where *K. media* has been previously recorded, and the tropical regions of South America. The presence of the species in such different environments may indicate remarkable ecological plasticity or adaptability. Although there are extensive surveys of Cladocera

in the United States, the occurrence of *K. media* in tropical regions suggests the need for a reassessment of the factors that influence its distribution, possibly underestimated in previous studies.

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DATA AVAILABILITY: The data that support the findings of this study are available, upon reasonable request, from the corresponding author, Daniel da Silva Andrade.



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