

A new record of *Kisakiellus aweti* Sousa & Elmoor-Loureiro, 2018 (Cladocera, Chydoridae) from the Amazon region

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ABSTRACT

Kisakiellus aweti Sousa and Elmoor-Loureiro, 2018 (Cladocera, Chydoridae) was described from first-order streams in Upper Xingu River basin. Here, we report a new occurrence of this species from Araguari river, Amapá, Brazil, extending its distribution range for more than 1,500 km in Amazon Hydrogeographic Region.

KEY WORDS

Chydorinae, Amapá, Araguari river, UHE Cachoeira Caldeirão

In recent years, research on Cladocera in Brazil has been increased with description of new species, report of new occurrence records, regional checklists, and lists of species from previously unsurveyed areas (e.g., Santos-Wisniewski *et al.*, 2001; 2011; Lopes *et al.*, 2006; Serafim Jr *et al.*, 2006; Kotov and Elmoor-Loureiro, 2008; Sousa *et al.*, 2009; 2016; 2017; Güntzel *et al.*, 2010; Sinev and Elmoor-Loureiro, 2010; Gazulha *et al.* 2011; Rocha *et al.*, 2011; Soares and Elmoor-Loureiro, 2011; Van Damme *et al.*, 2011; Sousa and Elmoor-Loureiro, 2013; 2018a; 2018b; Elmoor-Loureiro, 2014; Farias *et al.*, 2017; Zanata *et al.*, 2017). These works have been filling gaps in the knowledge about Brazilian Cladocera biodiversity and distribution, although this task is still incomplete.

Among the new taxa described, some Chydoridae species are notably interesting because of the specificity of their habitat or habitus. *Alona elisae* Sousa, Elmoor-Loureiro and Santos, 2016, for example, was found in a single

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rock pool in the state of Goiás, although numerous samples of *Alona intermedia*-like were investigated (Sousa *et al.*, 2016). *Ephemeroporus quasimodo* Elmoor-Loureiro, 2014 is exclusive to ultraoligotrophic ponds from Central Brazil. *Monospilus macroerosus* Sousa, Elmoor-Loureiro and Panarelli, 2017 was found exclusively in the wet leaf litter on the hydromorphic soil in a gallery forest. Nonetheless, the most impressive of these new taxa is *Kisakiellus aweti* Sousa and Elmoor-Loureiro, 2018 whose unique morphology seems to

be related to resistance against water flow. So far, *K. aweti* was known only from the type locality, that is, two first order streams located in Upper Xingu river basin, state of Mato Grosso, Brazil. The present study aims to report a new record of *K. aweti* from the Amazon Hydrographic Region.

A single specimen of *K. aweti* was found in a plankton sample taken from Araguari river, state of Amapá, Brazil (Fig. 1), in November 2014, during monitoring of the area of influence of the hydroelectric dam of

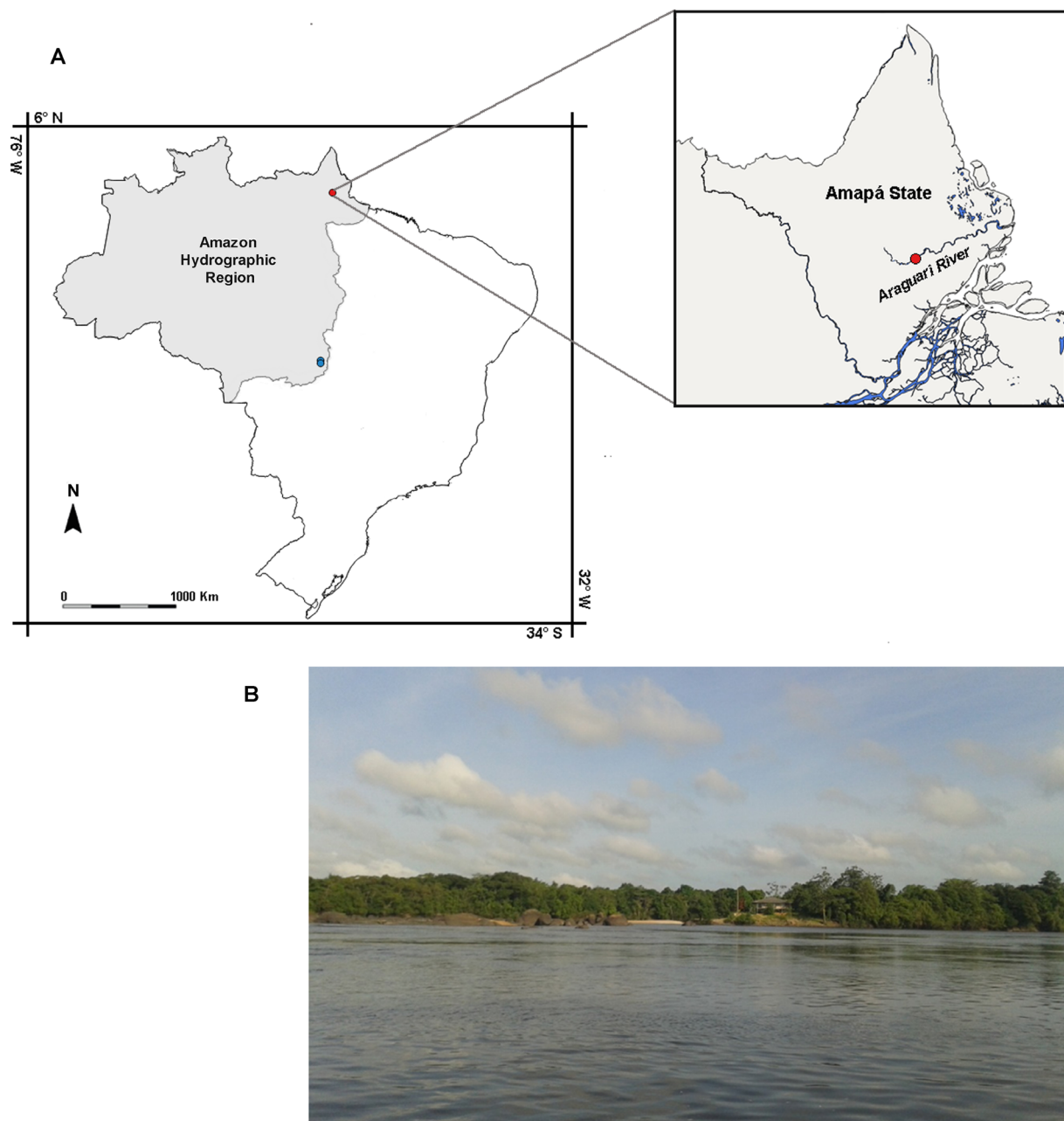


Figure 1. Occurrence of *Kisakiellus aweti* in Brazil. A, Previous (blue) and the present (red) records in Brazil; B, general aspect of the site where the specimen was collected, Araguari river.

Cachoeira Caldeirão, at that time still in construction. For sampling, a plankton net 60 μm mesh size was used. The specimen is deposited in Elmoor-Loureiro collection under access number EL02974.

The site from where the sample was taken ($0^{\circ}43'0.57''\text{N}51^{\circ}25'18.37''\text{W}$) was about 350 m wide and located near to Porto Grande and upper to the dam, having forested margins and with presence of *Eichornia azurea* (Sw.) Kunth and *Montrichardia arborescens* (L.) Schott. According to Cunha *et al.* (2011), from the spring to the district of Porto Grande, Araguari river flows over a high declivity (0.50%), presenting high velocities. At the sampling site, the river was very shallow (*ca.* 2 m deep) and characterized by rapid currents, few aquatic macrophytes on the banks, nutrient-poor and neutral water (pH = 7.06), high water temperature (29.7°C), low dissolved oxygen (3.93 mg/L) and electrical conductivity (22.55 $\mu\text{s}/\text{cm}$). The average flow for the river in November was 200 m^3/s . The low depth observed is typical for the Araguari river basin in November, the period when the minimum water flow occurs (Cunha *et al.*, 2014).

Kisakiellus aweti was initially found in first-order streams, and it is considered a benthic species, with morphological specializations that seem to be related to resistance against water flow (Sousa and Elmoor-Loureiro, 2018b). The present specimen was found in a plankton sample, but it is believed to be an accidental occurrence, due to low water depth and rapid current observed during the sampling. These river conditions should have displaced and suspended the specimen to the water column. Chydoridae specimens, as part of the bottom-dwelling meiofauna, always undergoes being dislodged from its habitat and were accidentally resuspended in the water column due to water turbulence (Viroux, 2002; Perbiche-Neves and Nogueira, 2010).

The specimen (Fig. 2) presented the general characteristics described for *K. aweti* by Sousa and Elmoor-Loureiro (2018b): body elongated and relatively low in lateral view, with a shallow depression between the articulation of the valves and the headshield (Fig. 2A). The ventral margin has wide flanges in its anterior portion (Fig. 2B). The posterior

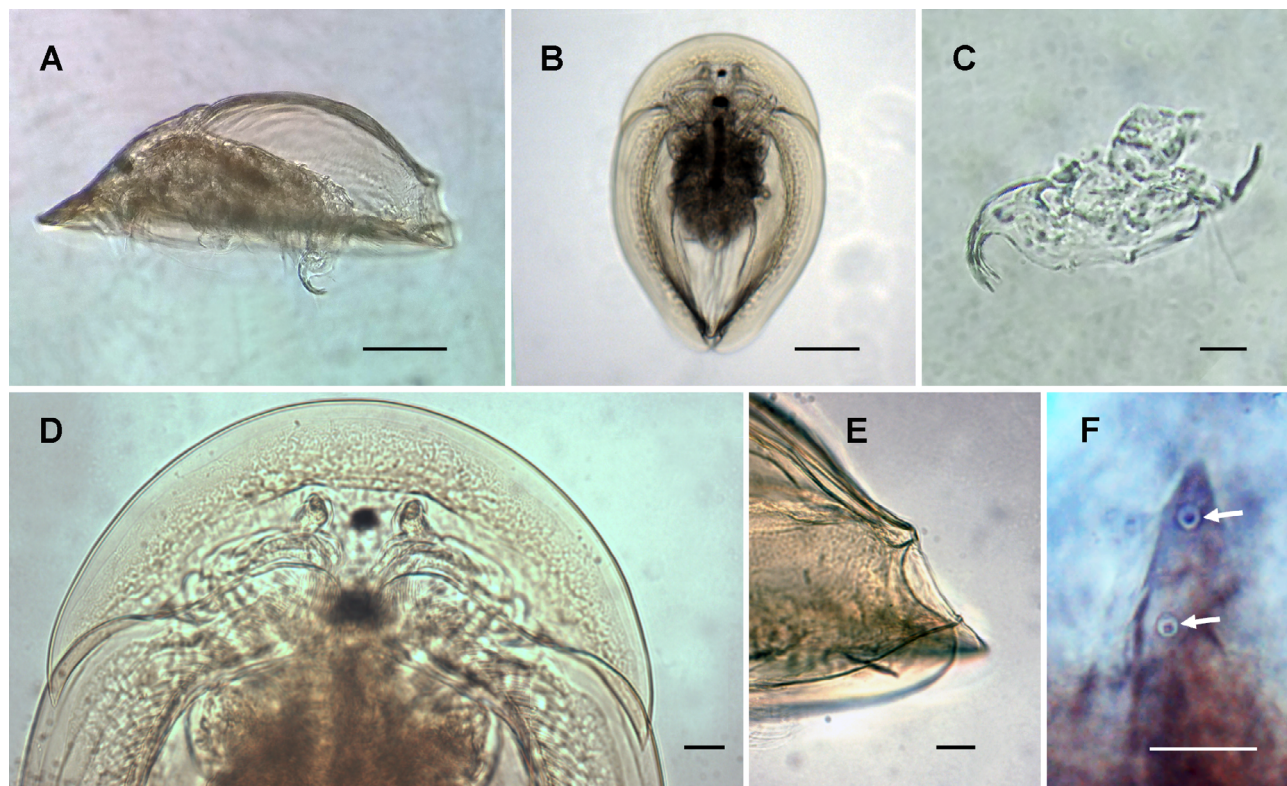


Figure 2. *Kisakiellus aweti* from the Araguari River, state of Amapá, Brazil. A, habitus; B, ventral view; C, postabdomen; D, head in ventral view, evidencing the fornices projected backwards; E, posterior margin of the carapace; F, head pores (arrows). Scale bars: A,B = 100 μm ; C–F = 20 μm .

margin is strongly concave, naked, with posterodorsal angle as a short and obtuse projection (Fig. 2E). In dorsal and ventral views, the body is broadly oval and exhibits a flap that surrounds the entire valves (Fig. 2B). Headshield with a broad, rounded anterior margin; fornices projected backwards (Fig. 2D), with two isolated main head pores (Fig. 2F); lateral pores absent. Postabdomen (Fig. 2C) relatively short, not laterally compressed; ventral margin strongly arched; preanal margin relatively long, anal and postanal margins armed with setulae. Postabdominal claw curved, longer than the postanal and anal margins; ventral margin covered by spines. Basal spines absent.

Besides the characteristics indicated above, the specimen also possess other features presented in the original description, such as: the labral keel elongated, not developed, its apex armed with long setulae; sensory seta on the antennule thick and curved; antennal formula (exo/endo) of spines 001/101 and setae 013/003; first limb ODL (Outer Distal lobe) bearing a short and thick seta armed with spine, first seta on the exopodite of the fifth limb long plumose and posteriorly inserted.

This new record extends the known geographical distribution of *K. aweti* in more than 1,500 km, but, so far, its occurrence is restricted to the oriental part of the Amazon Hydrographic Region (Fig. 1). Nevertheless, this restriction could be considered circumstantial, once the knowledge about the cladoceran distribution in the Amazon region is still scarce and this taxon was established very recently being, in consequence, even little known. So, *K. aweti* is expected to possess a wider distribution.

REFERENCES

- Cunha, A.C.; Brito, D.C.; Cunha, H.F.A. and Schulz, H.E. 2011. Dam effect on stream reaeration evaluated with the Qual2kw model: Case study of the Araguari River, Amazon Region, Amapá State/Brazil. p. 150–174. In: C. Bilibio, O. Hensel and J.F. Selbach (eds), Sustainable water management in the tropics and subtropics - and case studies in Brazil, Vol. 2., Jaguarão/RS, Fundação Universidade Federal do Pampa, UNIKASSEL, PGCult-UFMA.
- Cunha, A.C.; Vilhena, J.E.S.; Santos, E.S.; Saraiva, J.M.B.; Kuhn, P.A.F.; Brito, D.C.; Souza, E.B.; Rocha, E.P.; Cunha, H.F.A.; Brito, A.U.; Brasil Júnior, A.C.P.; Paca, V.H.M. and Santos, V.C.J. 2014. Evento extremo de chuva-vazão na bacia hidrográfica do Rio Araguari, Amapá, Brasil. *Revista Brasileira de Meteorologia*, 29: 95–110.
- Elmoor-Loureiro, L.M.A. 2014. *Ephemeroporus quasimodo* sp. nov. (Crustacea: Cladocera: Chydoridae), a new species from the Brazilian Cerrado. *Zootaxa*, 3821: 88–100.
- Farias, D.S.; Elmoor-Loureiro, L.M.A. and Branco, C.W.C. 2017. First record of *Moina dumonti* Kotov, Elías-Gutiérrez & Granado-Ramírez, 2005 (Branchiopoda: Anomopoda) in Brazil. *Check List*, 13: 2144.
- Gazulha, V.; Montú, M.D.; Marques, M. and Bonecker, C.C. 2011. Effects of natural banks of free-floating plants on zooplankton community in a shallow subtropical lake in Southern Brazil. *Brazilian Archives of Biology and Technology*, 54: 745–754.
- Güntzel, A.M.; Panarelli, E.A.; Silva, W.M. and Roche, K.F. 2010. Influence of connectivity on Cladocera diversity in oxbow lakes in the Taquari River floodplain (MS, Brazil). *Acta Limnologica Brasiliensia*, 22: 93–101.
- Kotov, A.A. and Elmoor-Loureiro, L.M.A. 2008. Revision of *Ilyocryptus* Sars, 1862 (Cladocera: Ilyocryptidae) of Brazil with description of two new subspecies. *Zootaxa*, 1962: 49–64.
- Lopes, P.M.; Elmoor-Loureiro, L.M.A. and Bozelli, R.L. 2006. First record of *Dunhevedia colombiensis* Stingelin, 1913 (Cladocera, Anomopoda, Chydoridae) from Brazil. *Brazilian Journal of Biology*, 66: 1141–1142.
- Perbiche-Neves, G. and Nogueira, M.G. 2010. Multi-dimensional effects on Cladoceran (Crustacea, Anomopoda) assemblages in two cascade reservoirs in Southeast Brazil. *Lakes and Reservoirs: Research and Management*, 15: 139–152.
- Rocha, O.; Santos-Wisniewski, M.J. and Matsumura-Tundisi, T. 2011. Checklist de Cladocera de água doce do Estado de São Paulo. *Biota Neotropica*, 11: 1–22.
- Santos-Wisniewski, M.J.; Matsumura-Tundisi, T.; Negreiros, N.F.; Silva, L.C.; Santos, R.M. and Rocha, O. 2011. O estado atual do conhecimento da diversidade dos Cladocera (Crustacea, Branchiopoda) nas águas doces do estado de Minas Gerais. *Biota Neotropica*, 11: 287–301.
- Santos-Wisniewski, M.J.; Rocha, O. and Matsumura-Tundisi, T. 2001. First record of *Alona setigera* Brehm (Cladocera, Chydoridae) in the Neotropical region. *Brazilian Journal of Biology*, 61: 701–702.
- Serafim-Júnior, M.; Neves, G.P.; Brito, L. and Ghidini, A.R. 2006. Zooplâncton do Rio Itajaí-Açu a jusante da cidade de Blumenau, Santa Catarina, Brasil. *Estudos de Biologia*, 28: 41–50.
- Sinev, A.Y. and Elmoor-Loureiro, L.M.A. 2010. Three new species of chydorid cladocerans of subfamily Aloninae (Branchiopoda: Anomopoda: Chydoridae) from Brazil. *Zootaxa*, 2390: 1–25.
- Soares, C.E.A. and Elmoor-Loureiro, L.M.A. 2011. Uma atualização da lista de Cladocera Cladocera (Crustacea, Branchiopoda) do Estado de Pernambuco, Brasil. *Biota neotropica*, 11: 409–414.
- Sousa, F.D.R. and Elmoor-Loureiro, L.M.A. 2013. Cladocerans (Crustacea: Anomopoda and Ctenopoda) of the Sempre Vivas National Park, Espinhaço Range, Minas Gerais, Brazil. *Check List*, 9: 4–8.
- Sousa, F.D.R. and Elmoor-Loureiro, L.M.A. 2018a. Populations of *Flavalona setigera* (Brehm, 1931) in Brazil belong to a new species: *Flavalona asymmetrica* (Cladocera: Chydoridae: Aloninae). *Nauplius*, 26: e2018003.

- Sousa, F.D.R. and Elmoor-Loureiro L.M.A. 2018b. Cladocera from the Upper Xingu River Basin with the description of a new genus of the Chydoridae (Crustacea: Branchiopoda: Anomopoda). *Zootaxa*, 4418: 545–561.
- Sousa, F.D.R.; Elmoor-Loureiro, L.M.A. and Gomes e Souza, M.B. 2009. A contribution to the fauna of Cladocera (Branchiopoda) from Ceará state, Brazil. *Nauplius*, 17: 101–105.
- Sousa, F.D.R.; Elmoor-Loureiro, L.M.A. and Panarelli, E.A. 2017. The Amazing diversity of the genus *Monospilus* Sars, 1862 (Crustacea: Branchiopoda: Aloninae) in South America. *Zootaxa*, 4242: 467–492.
- Sousa, F.D.R.; Elmoor-Loureiro, L.M.A. and Santos, S. 2016. New findings of Hexalona-branch representatives in Brazil, with a description of *Prenda* gen. nov. (Crustacea: Anomopoda: Aloninae). *Journal of Natural History*, 50: 2727–2768.
- Van Damme, K.; Sinev, A.Y. and Dumont, H.J. 2011. Separation of *Anthalona* gen. n. from *Alona* Baird, 1843 (Branchiopoda: Cladocera: Anomopoda): morphology and evolution of scraping stenothermic Alonine. *Zootaxa*, 2875: 1–64.
- Viroux, L. 2002. Seasonal and longitudinal aspects of microcrustacean (Cladocera, Copepoda) dynamics in a lowland river. *Journal of Plankton Research*, 24: 281–292.
- Zanata, L.H.; Güntzel, A.M.; Rodrigues, T.A.R.; Soares, M.P. and Silva, W.M. 2017. Checklist de Cladocera (Crustacea, Branchiopoda) do Estado de Mato Grosso do Sul, Brasil. *Iheringia, Série Zoologia*, 107 (supl.): e2017113.