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# Occurrence of *Braga cigarra* (Cymothoidae) parasitizing *Galeocharax knerii* (Characidae) from affluents of Jurumirim reservoir, Brazil

Ocorrência de *Braga cigarra* (Cymothoidae) parasitando *Galeocharax knerii* (Characidae) de afluentes da represa de Jurumirim, Brasil

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## Abstract

The occurrence of the cymothoidae *Braga cigarra* is reported parasitizing the oral cavity of freshwater fish *Galeocharax knerii* from Veados, Paranapanema and Taquari Rivers, affluent of the Jurumirim Reservoir, State of Sao Paulo, Brazil is reported. The isopod species were identified based on the multilaminar pleopods, narrow pleon and short pleotelson in females. The overall prevalences of isopods were 31.7%, 7.7% and 5.7%, respectively, in the Paranapanema, Veados and Taquari Rivers. This note contributes to the knowledge of the geographical distribution and fauna of parasite crustaceans known to date in these important ecosystems.

**Keywords:** Freshwater rivers, crustacean parasite, teleost fish, *Braga cigarra*, *Galeocharax knerii*.

## Resumo

Foi registrada a ocorrência do cymothoidae *Braga cigarra* parasitando a cavidade bucal do peixe de água doce *Galeocharax knerii* capturado nos rios Veados, Paranapanema e Taquari, afluentes da represa de Jurumirim, Estado de São Paulo, Brasil. As espécies de isópodos foram identificadas com base nos pleópodos multilaminares, abdômen estreito e pleotelson curto nas fêmeas. As prevalências totais de isópodos foram 31,7%, 7,7% e 5,7%, respectivamente, nos rios Paranapanema, Veados e Taquari. Essa nota contribui com o conhecimento da distribuição geográfica e da fauna de crustáceos parasitas conhecidas até a presente data nesses importantes ecossistemas aquáticos.

**Palavras-chave:** Rios de água doce, crustáceo parasita, peixe teleosteo, *Braga cigarra*, *Galeocharax knerii*.

Brazil has the largest hydrographic network in the world and ranks among the most important countries in terms of freshwater fish diversity (GRAÇA; PAVANELLI, 2007). However, little is known regarding the diversity of neotropical fish parasites (EIRAS et al., 2010).

The study of fish parasites provides important information about their hosts and environment. Fish present a greater number and variety of parasites than any other class of vertebrates, because these organisms have experienced a long period of time in close association with a variety of invertebrate forms with the major parasite groups of neotropical freshwater: Protozoa, Myxozoa, Cestoda, Nematoda, Acanthocephala, arthropods (Copepoda,

Brachyura and Isopoda), Annelida (Hirudinea) and Pentastomida (THATCHER, 2006).

The species of the family Cymothoidae are dorso-ventrally flattened isopod crustaceans found in marine, brackish and freshwater environments (TRILLES, 1994). Most of the fish parasitic isopods are included in the family Cymothoidae (THATCHER, 2006). These isopods are generally found on the body surface, inside gill chambers, oral cavity and may lodge in down scales, forming a cavity in the body (PAVANELLI et al., 1999; LIMA et al., 2005). Probably all the species of Cymothoidae are protandric hermaphrodites, which penetrate the hosts as males and later originate the females in the gills or mouth (EIRAS, 1994). South America has the greatest variety of freshwater cymothoids of the world. At least twenty-seven species and nine genera have been recorded in South America (THATCHER, 2006).

The freshwater fish *Galeocharax knerii*, popularly known as “peixe cadela” in Brazil, is a medium-sized species distributed in

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rivers and lakes in the Neotropical region, especially in the upper Parana River basin (REIS et al., 2003).

The occurrence of *Braga cigarra* (THATCHER et al., 2009) was reported herein, in the oral cavity of *G. knerii* captured in the main tributary of Jurumirim Reservoir, upper Parana River basin, State of Sao Paulo, Brazil.

The Jurumirim dam is the first reservoir in cascade on the Paranapanema River and operates as a reservoir for regulating others further downstream. The reservoir is located between the coordinates 23° 12' 17" S and 49° 13' 19" W. It was built in the late 1950s and began operating in 1962 (HENRY; NOGUEIRA, 1999).

Fish were collected from April 2011 to January 2012 in the following tributaries of Jurumirim Reservoir: Veados River, municipality of Itatinga, State of Sao Paulo, Brazil, 23° 15' 42.4" S and 48° 37' 27.6" W; Paranapanema River, municipality of Angatuba, State of Sao Paulo State, Brazil, 23° 12' 17" S and 49° 13' 19" W; and Taquari River, municipality of Taquarituba, State of Sao Paulo, Brazil, 23° 15' 11.9" S and 49° 12' 34.2" W (Figure 1). The parasites were removed from the oral cavity of the hosts with the aid of forceps and transferred to flasks containing 10% formalin; after 24 hours, they were transferred to alcohol 70%. Adult females were known to show a marsupium on the ventral

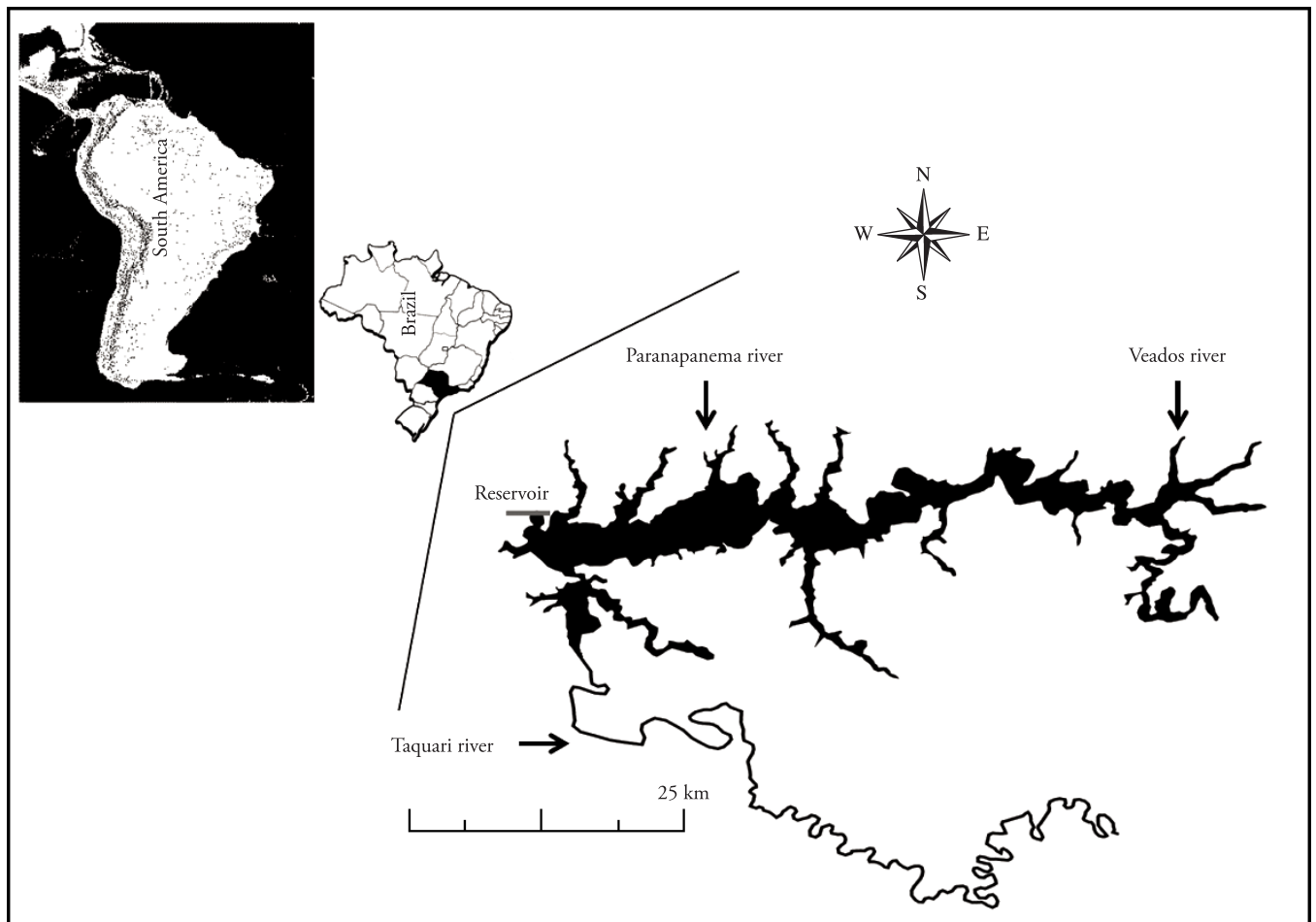
surface. The marsupial cavity was carefully dried to verify the presence of eggs.

In the laboratory, the isopods *B. cigarra* (Figure 2) were identified according to Thatcher et al. (2009). The images were obtained using a computerized image analysis system (LAS, Leica Microsystems, Wetzlar, Germany). Representative specimens of *B. cigarra* were deposited in the Helminthological Collection of the College of Biosciences (CHIBB), at "Universidade Estadual Paulista" – UNESP, Botucatu, State of Sao Paulo, Brazil.

The following amounts of specimens of *G. knerii* were examined: 190 from Paranapanema River, 23 from Veados River, and 17 from Taquari River. Six cymothoids were found in the oral cavity

**Table 1.** Mean and range of standard length ( $L_s$ ) and weight ( $W$ ) of *Galeocharax knerii* from Veados, Paranapanema and Taquari rivers, Jurumirim Reservoir, State of Sao Paulo, Brazil.

Rivers	$L_s$ , cm	$W$ , g
Veados	13.5 (21.3-8.9)	44.3 (164.4-9.4)
Paranapanema	18.8 (25.6-8.2)	97.8 (254.6-8.47)
Taquari	19.4 (24.1-11.1)	156.9 (248.2-20.2)

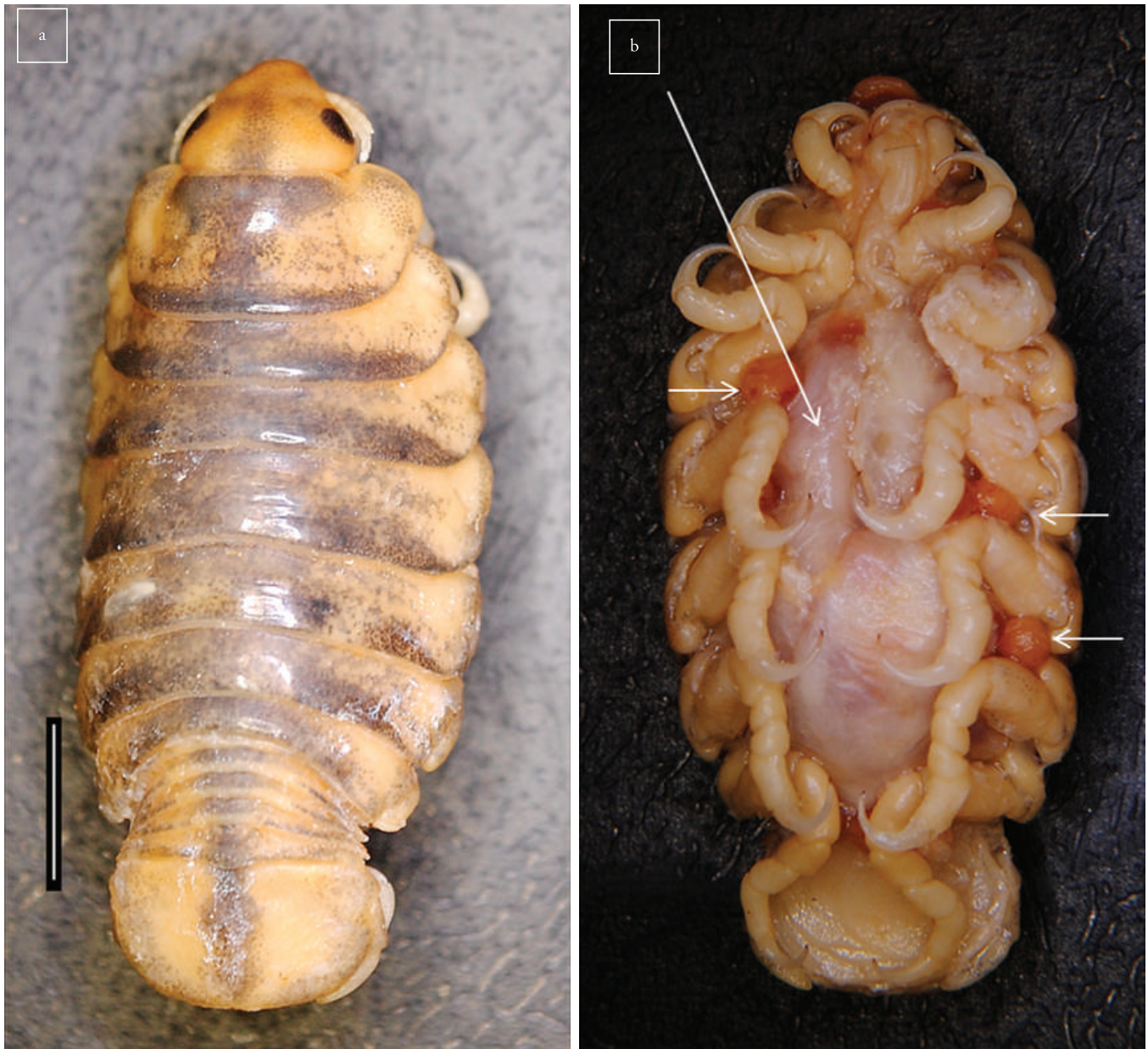


**Figure 1.** Location of affluent of the Jurumirim reservoir, State of Sao Paulo, Brazil; sampling rivers indicated by arrows (Source: modified from GoogleEarth – DigitalGlobe).

of the host caught from Veados River and three in each one from Paranapanema and Taquari rivers (Table 1). Only one species was found in the oral cavity of each host. The body length and width of each isopod were taken in dorsal view, using a caliper (Table 2).

There are few studies on the prevalence of isopod species in nature. Szidat and Schubart (1960) observed a prevalence of 90%

of *B. cigarra* (= *Philostomella cigarra*), in “peixe cadela” (*G. knerii*) from Mogi Guassu River in the region of Cachoeira de Emas in the State of Sao Paulo. In this study, it was possible to observe a higher prevalence in Paranapanema River (31.7%), compared to Veados (7.7%) and Taquari (5.7%) rivers. However, it may be difficult to estimate the real prevalence of parasitic crustaceans



**Figure 2.** *Braga cigarra* entire dorsal a) and entire ventral, at arrow, ventral marsupium with eggs attached b). Scale bar = 2 mm.

**Table 2.** Biometry of the body (in millimeters) of *Braga cigarra* found in the oral cavity of *Galeocharax knerii* from Veados, Paranapanema and Taquari rivers, Jurumirim Reservoir, State of Sao Paulo, Brazil. Values are presented as mean  $\pm$  standard deviation.

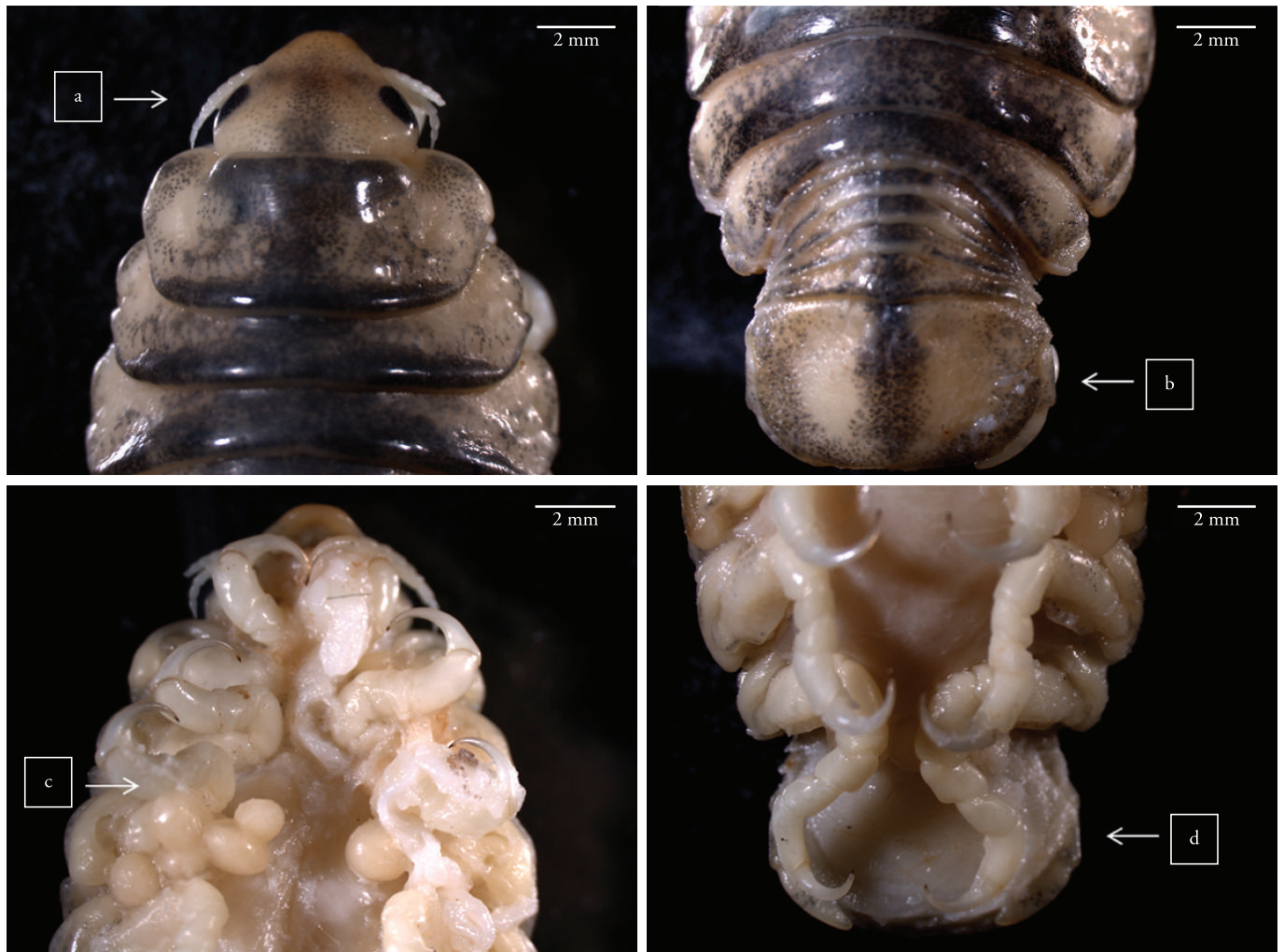
Rivers	Sex		Male measurements		Female measurements	
	Male	Female	Length	Width	Length	Width
Veados	-	6	-	-	20.9 $\pm$ 5.1	9.48 $\pm$ 2.3
Paranapanema	2	1	19.7 $\pm$ 2.3	9.5 $\pm$ 1.5	16.3	7.4
Taquari	-	3	-	-	22.3 $\pm$ 0.9	10.4 $\pm$ 0.1
Total	2	10	19.7 $\pm$ 2.3	9.5 $\pm$ 1.5	20.8 $\pm$ 4.2	9.5 $\pm$ 1.9

in the natural environment since after they were caught by fishing nets, they try to escape with strong movements and, in the course of time, stress increases and metabolism tends to decrease, which can lead the isopod to go out of the oral cavity of the host and explore a new habitat for survival (author's personal information).

The isopod *B. cigarra* is characterized by Cephalon with pointed snout; head with antennula shorter than the antenna; all pereopods with claws adapted for attachment to the host; wider rather than longer pleotelson and pleon slightly immersed in pereonite; long pereopod and multilaminar pleopods. All parasites found were identified as *B. cigarra* (Figures 2 and 3), as

re-described by Thatcher et al. (2009). Table 3 shows the records of occurrences of this species to date.

The present study reports the occurrence of *B. cigarra* parasitizing *G. knerii* from Veados, Paranapanema and Taquari rivers (upper Parana River basin), contributing to the knowledge of the distribution of this cymothoid in Brazil. These parasites are relatively easy to be visualized, because they are large in size and have legs equipped with strong jaws adapted to be fixed to the host. Usually, pathogenic phenomena are limited to the site of attachment, where compression of the tissue and massive infiltration of lymphocytes can be observed (PAVANELLI et al., 2008).



**Figure 3.** *Braga Cigarra*. External anatomical structure: a) head with pointed snout, antenna and antennule; b) pleotelson; c) pereopod and eggs adhered to the ventral; and d) multilaminar pleopods.

**Table 3.** Geographical distribution of *Braga cigarra* parasitizing the oral cavity of their hosts in South America, Brazil.

Host	Locality	References
<i>Galeocharax humeralis</i>	Mogi-Guassú River	Szidat and Schubart (1960)
<i>Galeocharax humeralis</i>	Mogi-Guassú River	Taberner (1986)
<i>Galeocharax knerii</i>	Grande River	Thatcher et al. (2009)
<i>Galeocharax knerii</i>	Veados River	This study
<i>Galeocharax knerii</i>	Paranapanema River	This study
<i>Galeocharax knerii</i>	Taquari River	This study

*B. cigarra* is differentiated from other genera by having narrow pleon and small pleotelson in females. This species was recorded and originally described by Szidat and Schubart (1960) in the Mogi-Guaçu River, State of Sao Paulo, Brazil, as *Philostomella cigarra* in the host *Galeocharax humeralis*. It was later redescribed by Thatcher et al. (2009) parasitizing the mouth of *G. knerii* in Rio Grande river, State of Minas Gerais, Brazil.

The possible losses associated with isopods living under the tongue of fish are difficult to assess; although the tongue of the host may be reduced in size, there is no direct evidence to indicate that the tissue was eaten (THATCHER, 2006). However, in the host studied herein, apparently, there was a compression of the tongue tissue where the parasite was attached.

The knowledge on the geographical distribution of cymothoids is also of considerable importance, since these organisms can be used as tools to aid in the understanding, conservation and preservation of aquatic ecosystems. Thus, this study contributes to the knowledge of the geographical distribution of *B. cigarra* in Veados, Paranapanema and Taquari rivers, affluent of Jurumirim reservoir, Brazil.

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