

Occurrence of *Kellicottia bostoniensis* (Rousselet, 1908) and *Mesocyclops ogunnus* Onabamiro, 1957 in lakes of the Middle River Doce, MG, Brazil

Ocorrência de *Kellicottia bostoniensis* (Rousselet, 1908) e *Mesocyclops ogunnus* Onabamiro, 1957 em lagos do Médio Rio Doce, MG

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Abstract: The presence of the two exotic zooplankton species (*Kellicottia bostoniensis* and *Mesocyclops ogunnus*) in lakes of the Middle River Doce is discussed in the present work. *K. bostoniensis* was registered in Lakes Jacaré, Carioca and Águas Claras while *M. ogunnus* was restricted to the littoral zone of Lake Dom Helvécio. These zooplankton species may have been introduced in these environments by human action. Despite the low densities registered for both species, the monitoring of the invasion process is necessary to evaluate possible impacts on the zooplankton community structure in the lakes of Middle River Doce.

Keywords: exotic species, Copepoda, Rotifera, *Kellicottia bostoniensis*, *Mesocyclops ogunnus*.

Resumo: A presença de duas espécies zooplancônicas exóticas (*Kellicottia bostoniensis* e *Mesocyclops ogunnus*) em lagos do Médio Rio Doce é discutida no presente trabalho. *K. bostoniensis* foi registrada nas lagoas Jacaré, Carioca e Águas Claras, enquanto *M. ogunnus* esteve restrita a região litorânea do Lago Dom Helvécio. Estas espécies zooplancônicas podem ter sido introduzidas nestes ambientes pela ação antrópica. Apesar das baixas densidades observadas para as duas espécies, o monitoramento do processo de invasão é necessário para avaliar os possíveis impactos sobre a estruturação da comunidade zooplancônica nos lagos do Médio Rio Doce.

Palavras-chave: espécies exóticas, Copepoda, Rotifera, *Kellicottia bostoniensis*, *Mesocyclops ogunnus*.

The invasion of communities by exotic species is a concern not only to the academic and scientific communities, but has also alarmed different segments of society, since this phenomenon has dramatically increased worldwide (Mooney and Hobbs, 2000). The deployment of transport on a global scale over the past four centuries, together with the lack of control and the characteristic speed of these processes meant that species previously isolated by geographic barriers were able to overcome these obstacles and establish themselves in new regions (Ricciardi and MacIassac, 2000).

Once introduced, the species can successfully establish itself at the new environment and, eventually, become an invasive species, disrupting the composition of the local community (Williamson, 1996). Currently, the introduction of exotic species is considered the second major cause of loss of

biodiversity, second only to habitat destruction (Sala et al., 2000).

In aquatic environments, the introduction of exotic species is facilitated by the water flow, and has been responsible for changes in trophic relationships, density and species distribution. In the lake district of Middle Doce River, located at the Steel Valley in Minas Gerais, most lakes are inserted in a conservation unit (Rio Doce State Park- PERD), however the presence of exotic species was registered for fish (Godinho and Formagio, 1992; Latini and Petrere, 2004) and for the benthic macroinvertebrate community (De Marco Jr., 1999). The present paper registers the first record of exotic species for the zooplankton community.

Data for the zooplankton species were obtained from the Program for Long-Term Ecological Research (LTER / UFMG - site 4), which

monitored the plankton biodiversity in seven lakes (Carioca, Dom Helvécio, Gambazinho, Jacaré, Águas Claras, Palmeirinha, Amarela) during eight years (2000-2007) (Figure 1).

Two zooplankton species were considered exotic to the region of Middle River Doce: *Kellicottia bostoniensis* (Rotifera) and *Mesocyclops ogunnus* (Copepoda).

Kellicottia bostoniensis (Figure 2) is an indigenuous rotifer in North America (Edmondson, 1959). However, it has been widely sampled in aquatic environments of Europe (Arnemo et al., 1968;

Balvay, 1994 among others) and South America tolerating a wide variation in environmental conditions (Arnemo et al., 1968).

In Brazil, the first record of the species *K. bostoniensis* occurred at the Segredo Reservoir located at River Iguaçú, PR (Lopes et al., 1997). *Kellicottia bostoniensis* was identified in freshwater habitats in the Upper Tietê River hydrographic basin (São Paulo State) (Lucinda et al., 2004) and, in Minas Gerais State, this rotifer was recorded at Furnas (river Rio Grande) (Landa et al., 2002), Nova Ponte, Miranda (Souza, 2004) and Capim Branco I

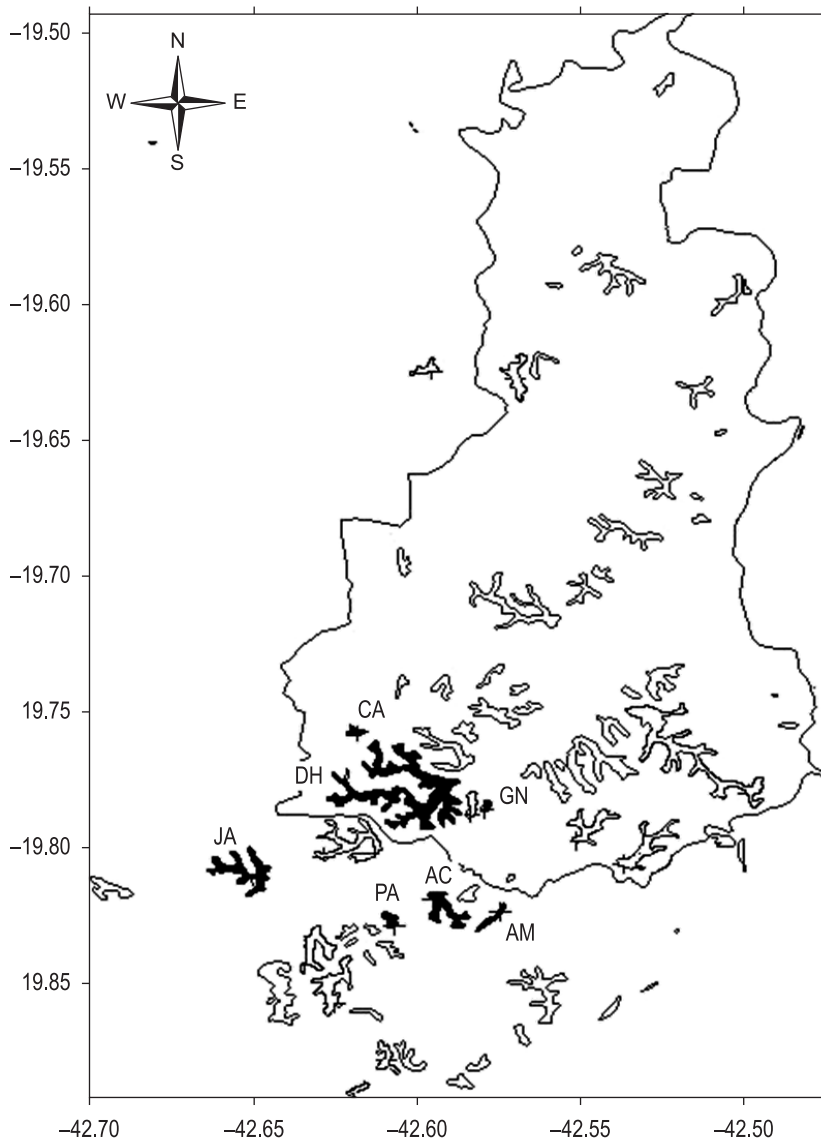


Figure 1. Map of the seven lakes studied in the Médio Rio Doce. The contour line delimits in the Parque Estadual do Rio Doce (Médio Rio Doce), containing in its interior Lakes Carioca (CA - 19° 45' 26,0" S and 042° 37' 06,2' W) Gambazinho (GN - 19° 47' 07,7" S and 042° 34' 45,5" W) and Dom Helvécio (DH - 19° 46' 55,7" S and 042° 35' 28,9" W), and in its surrounding Lakes Jacaré (JA - 19° 48' 37,8" S and 042° 38' 57,0" W), Palmeirinha (PA - 19° 49' 41,8" S and 042° 36' 25,4" W), Águas Claras (AC - 19° 49' 06,9" S and 042° 35' 42,5" W) and Amarela (AM - 19° 49' 23,1" S and 042° 34' 28,7" W).

(Valadares, 2007) (River Araguari) reservoirs and at Lagoa do Nado, BH (Bezerra-Neto et al., 2004). The high potential for colonization of this species is a reflection of good dispersibility and high ecological plasticity, being able to efficiently explore environments with different trophic states (Bezerra-Neto et al., 2004).

Kellicottia bostoniensis was found at low densities in the lakes Carioca, Águas Claras and Jacaré. In Lake Jacaré its highest density was 117 org.m⁻³ in March 2005. This species was sampled also in July and November of that year. This lake is located outside the boundaries of PERD, and is used as a fishing club. In Lake Águas Claras, also located outside the park boundaries, this species was sampled only in January 2005, with a total

of 56 org.m⁻³. In Lake Carioca *K. bostoniensis* was sampled in May (66 org.m⁻³), June (12 org.m⁻³), July (29 org.m⁻³), October (33 org.m⁻³), November (83 org.m⁻³) 2005 and January 2006 (8 org.m⁻³) (Figure 3). Lake Carioca is located within the park and is not open to the public.

Mesocyclops ogunnus (Figure 4) is a Copepoda Cyclopoida, with an African-Asian origin, first recorded in the Americas in 1993, at Furnas reservoir (Reid and Pinto-Coelho, 1994). Recently, the species was sampled in 15 reservoirs of São Paulo (Silva, 2003) and in the floodplain of the Upper Paraná (Lansac-Toha et al., 2002). According to Silva (2003) *M. ogunnus* is a typical species of limnetic region occurring in great abundance at the reservoirs of Tietê River Basin. Matsumura-Tundisi and Silva (2002) clarify the identification



Figure 2. *Kellicottia bostoniensis*.

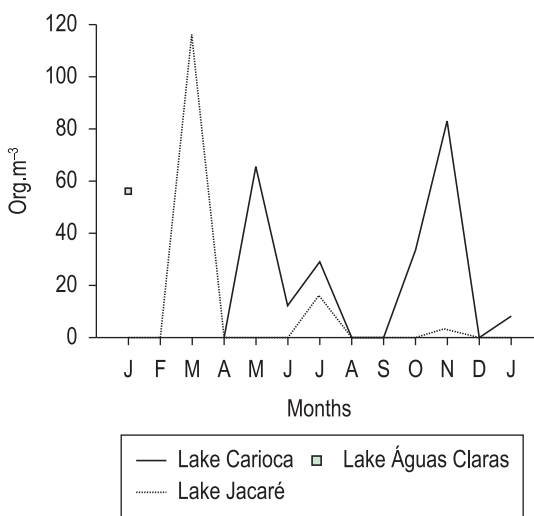


Figure 3. Population fluctuation of *Kellicottia bostoniensis* (org.m⁻³) in Lakes Carioca, Águas Claras and Jacaré from January 2005 to January 2006.

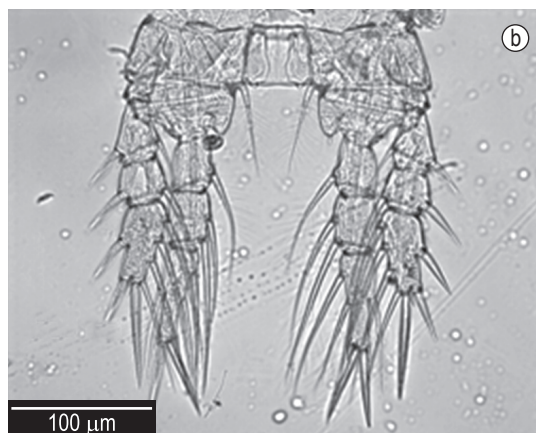


Figure 4. a) *Mesocyclops ogunnus* female; and b) the fourth paw detail.

of *M. ogunnus* that occurred in several reservoirs in the State of São Paulo and was previously identified as *M. kieferi*. These two species are closely related and have very similar characteristic.

In the lakes of Middle River Doce, this species was recorded with low densities (400 org.m⁻³, representing 0.34% of total microcrustaceans) in the littoral zone of Lake Dom Helvécio, considered an oligo-mesotrophic environment (Peixoto, 2007).

These zooplankton species may have been introduced in these environments by natural phenomena such as animal transport and wind action (Lopes et al., 1997, Jenkins and Underwood, 1998) or by human action (Reid and Pinto-Coelho, 1994). The production of dormant forms (resting eggs, for example) is a strategy widely documented for the zooplankton (Fryer 1996, Brendonck and De Meester, 2003, Gyllström and Lars-Anders, 2004) and ensures the persistence of the population in an environment that has become inhospitable to organisms. The eggs are extremely resistant to drought (Fryer, 1996), and may remain viable for long periods in fishing nets, survey equipment, boats, clothes and animals, increasing the chances of population recovery and dispersal / invasion of other aquatic environments.

It is likely that the introduction of these species is human related to the introduction of fish in lakes of the Middle River Doce, since the presence of *K. bostoniensis* and *M. ogunnus* was only observed in lakes where exotic fish species were recorded, including Lake Jacaré. In this lake there is a fishing club, a probable source of species dispersal to other lakes in the region.

Invertebrates invasions, particularly in the plankton realm, were, for a long time, rarely considered or reported, mainly due the difficulty of identifying the fact.

The monitoring of the invasion process is necessary to evaluate the possible impacts on the zooplankton community structure in lakes of the Middle River Doce.

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