Check List 9(5): 1098–1100, 2013

ISSN 1809-127X (available at *www.checklist.org.br*)

Check List
Journal of species lists and distribution

NOTES ON GEOGRAPHIC DISTRIBUTION

Mesocyclops ogunnus Onabamiro 1957 (Crustacea: Copepoda: Cyclopoida): First report for northeastern Brazil

Helton Charllys Batista Cardôso [1*], Emmanoela Nascimento Ferreira [1], Bruna Queiroz da Silva [2] and Luiz Carlos Serramo Lopez [1]

1 Universidade Federal da Paraíba, Departamento de Sistemática e Ecologia, Programa de Pós-Graduação em Ciências Biológicas – Área de Concentração Zoologia. Campus I, Cidade Universitária, CEP 58059-900. João Pessoa, PB, Brazil.
2 Universidade Federal da Paraíba, Programa Regional de Pós–Graduação em Desenvolvimento e Meio Ambiente. Campus I, Cidade Universitária, CEP 58059-900. João Pessoa, PB, Brazil.
* Corresponding author. E-mail: *helcharllys@gmail.com*

ABSTRACT: *Mesocyclops ogunnus* is a copepod originally recorded in Africa and Asia, being considered an invader species in reservoirs in the Americas. The present work records its occurrence in northeastern Brazil for the first time. This species was collected in the Três Lagoas region in the city of João Pessoa, State of Paraíba, Brazil, which increases its geographical distribution beyond the central-western, southeastern and southern regions of the country.

The genus *Mesocyclops* Sars, 1914, is included in the family *Cyclopidae* and currently comprises 71 species (Holynska 2000), being one of the most diversified and successful genera of cyclopoid copepods found in continental waters (Silva 2008; Van de Velde 1984). Most species of this genus are found in subtropical (Holynska 2006; Holynska and Brown 2003) and inter-tropical zones, as for example of the African species (Mouelhi *et al.* 2000).

According to Gutierrez-Aguirre and Suáres-Morales (2001) 21 species and subspecies of the genus *Mesocyclops* have been described for the neotropical region; and of these, 15 have been reported to Brazil: *M. annulatus* Wierzejski, 1892; *M. annulatus diversus* Herbst, 1962; *M. aspericornis* Daday, 1906; *M. brasilianus* Kiefer, 1933; *M. ellipticus* Kiefer, 1936; *M. finitimus* Silva, 1989; *M. kieferi* Van de Velde, 1984; *M. leuckarti* Claus, 1857; *M. longisetus* Thiébaud, 1912; *M. longisetus curvatus* Dussart, 1987; *M. longisetus longisetus* Thiebaud, 1914; *M. meridianus* Kiefer, 1926; *M. meridionalis* Dussart and Frutos, 1985; *M. ogunnus* Onabamiro, 1957; and *M. paranaensis* Dussart and Frutos, 1985 (Lansac-tôha *et al.* 2002; Matsumura-Tundisi and Silva 2002; Rocha and Botelho 1998).

Mesocyclops ogunnus has been originally recorded in the African-Asian region (Holynska 2000; Van de Velde 1984) but has been subsequently observed on other continents, probably due to invasion events. In the African continent, this species has been reported in Nigeria (Onabamiro 1957; Oronsaye 2008), Tunisia (Mouelhi *et al.* 2000), Benin, Egypt, Ivory Coast, Senegal, Burkina Faso, Kenya, Mali, Mauritania, Mozambique, Chad, South Africa, and Ethiopia (Van de Velde 1984). Mouelhi *et al.* (2000) cited records of this species in Asia in: Israel, Bangladesh, Uzbekistan, Laos, Sri Lanka, Philippines, Vietnam and China. It also has been reported in the Americas in Florida (Hribar and Reid 2008), Central America (Suárez-Morales *et al.* 2004), and Brazil (Reid and Pinto-Coelho 1994).

In Brazil, this species has been found in the central-western, southeastern and southern regions of the country in the States of Mato Grosso do Sul, São Paulo, Minas Gerais, and Paraná (González *et al.* 2008; Lansac-tôha *et al.* 2002; Matsumura-Tundisi and Silva 2002; Peixoto *et al.* 2010; Santos-Wisniewski and Rocha 2007; Silva 2011) (Figure 1). The first report of this species to Brazil, as *M. ogunnus*, was in 1993 in the Furnas reservoir in the southern part of the State of Minas Gerais (Hribar and Reid 2008; Reid and Pinto-Coelho 1994). According to Matsumura-Tundisi and Silva (2002) this species was described erroneously in the São Paulo State as *M. kieferi* in some surveys (Nogueira 2001; Tundisi and Matsumura-Tundisi 1994). In a posterior work Matsumura-Tundisi and Silva (2002) corrected its identification to *M. ogunnus*.

Mesocyclops ogunnus has a history of relatively recent invasions in Brazil (Hribar and Reid 2008; Lansac-tôha *et al.* 2002) and, according to Matsumura-Tundisi and Silva (2002) and Reid and Pinto-Coelho (1994), this species may have been introduced into the Furnas reservoir with stocks of tilapias fish (*Oreochromis niloticus* Linnaeus, 1758) imported from Africa. The tilapias were first introduced in Brazil in the 70 and 80 decades, by Departamento Nacional de Obras Contra a Seca (DNOCS) in the State of Ceará (region northeast) and by hydroelectric companies in the

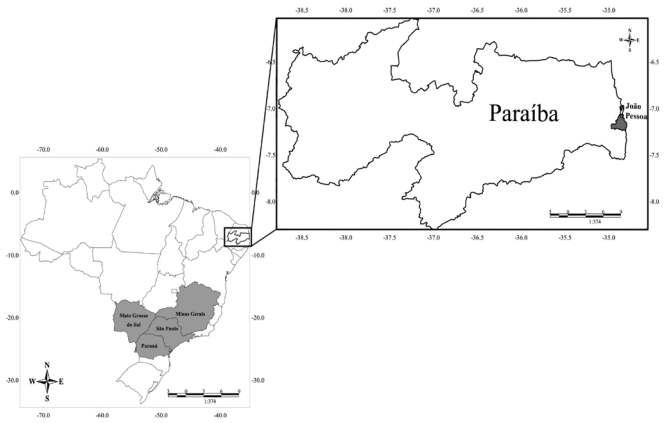

FIGURE 1. Geographical distribution of *M. ogunnus* in Brazil. The shaded areas represent previous reports of the species according to the literature. Expanded area represent the local of the new record of the specie for the northeastern region of the country (João Pessoa, State of Paraíba).

States of São Paulo and Minas Gerais (regions south and southeast) (Simões *et al.* 2007). However, Reid and Pinto Coelho (1994) pointed out that "the means of introduction of some copepod species, as in the case of *M. ogunnus* and *M. kieferi*, remain even more a matter for speculation."

This species has been found to be dominant in eutrophic reservoirs (Matsumura-Tundisi and Tundisi 2005; Peixoto *et al.* 2010) where it was generally associated with macrophytes (Lansac-tôha *et al.* 2002). Although *M. ogunnus* is commonly associated with fresh water, it can also be found in salt or brackish water environments; this characteristic appears to be one of the adaptative factors that has contributed to the dispersal of this organism to many different environments (Bonou *et al.* 1991; Guo 2000a; Guo 2000b; Van de Velde 1984).

The present records are the first occurrence of *M. ogunnus* in northeastern Brazil. Specimens were collected in May of 2009 in Três Lagoas (7°9"56.54" S and 34°53"44.51" W) in the western part of João Pessoa, State of Paraíba. The sampling were held performing horizontal hauls along the margins using a zooplankton net (100 µm mesh size). Immediately after collection, the samples were preserved in 3% formaldehyde. The specimens (Figure 2) were registered (UFPB.CRUST – 2397) and deposited in the Laboratório de Invertebrados Paulo Young (LIPY) at the Universidade Federal da Paraíba (UFPB).

Some of the main diagnostic characteristics of *M. ogunnus* are the presence of a row of spines on the maxillular palp, fifth pediger with many lateral spines and few dorsal spines, absence of internal spines in the caudal ramus (Figure 3 A-B). Other characteristics are basipodite of the antenna ornamented by a row of spines in the distal portion, leg 4 basipodite with 2 groups of long slender spines on its posteromedial surface, and leg 4 endopodite article with 3 terminal spines subequal in length and spinulate along most of their margins (Van de Velde 1984). and the seminal receptacle with broad horizontal lateral arms and long curve pore-canal (Figure 3 C-D) (Jeje 1988; Reid and Pinto-Coelho 1994). Therefore the characteristics of the specimens collected were compatible with the diagnosis of the species.

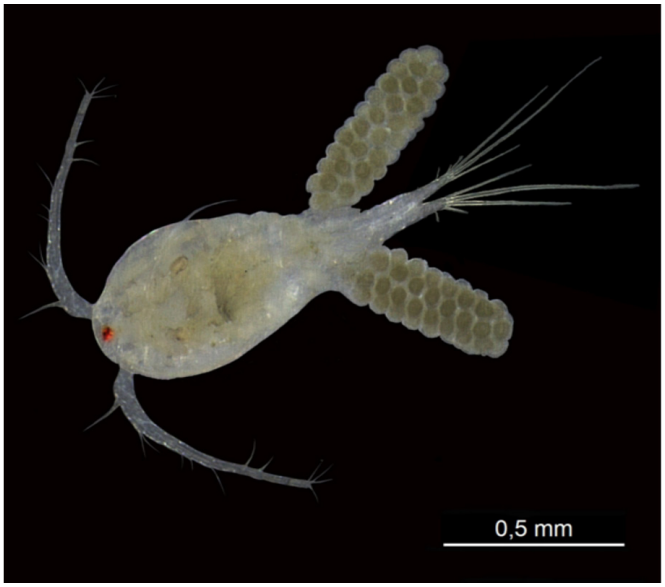

Figure 2. Female of *M. ogunnus* with two egg sacks. Photo: C. Liberal.

This report of *M. ogunnus* for the northeastern region of Brazil (State of Paraíba) represents an important increase in the distribution of this species and a strong indication of the capacity of this copepod species to invade Neotropical ecosystems. The relevance of this report is related to the importance of possible impacts of this copepod on local ecosystems.

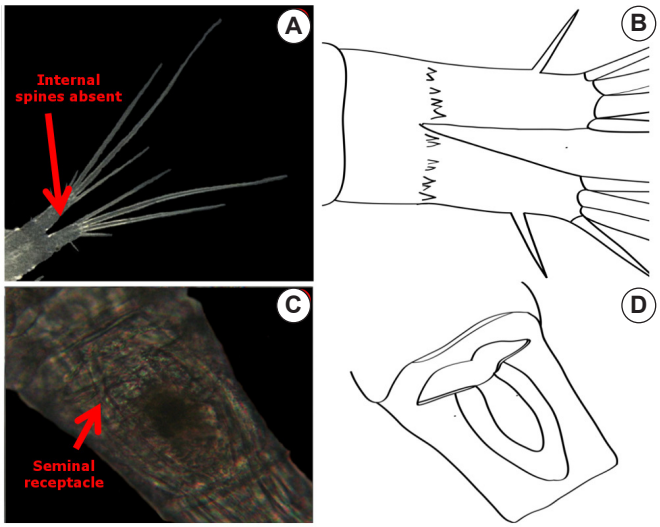

Figure 3. (A - B) Detail of the caudal ramus. (D - C) Detail of seminal receptacle.

Acknowledgments: The authors would like to thank the researcher Carlos Eduardo Falavigna da Rocha, professor at the Instituto de Biociências of the Universidade de São Paulo, for his help in identifying the specimens; Carolina N. Liberal for producing the photographic image; and the Laboratory of Entomology of the Universidade Federal da Paraíba for technical support.

Literature Cited

Bonou, C. A., M. Pagano and L. Saint-Jean. 1991. Développement et croissance en poids de Moina (cf) micrura et de *Mesocyclops ogunnus* dans un milieu saumâtre tropical : les étangs de pisciculture de Layo (Côte d"Ivoire). *Revue d"Hydrobiolgie Tropicale* 24: 287-303.

González, E. J., T. Matsumura-Tundisi and J. G. Tundisi. 2008. Size and dry weight of main zooplankton species in Bariri reservoir (SP, Brazil). *Brazilian Journal of Biology* 68: 69-75.

Guo, X.. 2000a. A redescription of *Mesocyclops pehpeiensis* Hu, 1943 and notes on *Mesocyclops ruttneri* Kiefer, 1981 (Copepoda, Cyclopidae). *Hydrobiologia* 418(1): 33-43.

Guo, X. 2000b. Two new species of *Mesocyclops* from southern China and notes on the genus *Mesocyclops* in China. *Hydrobiologia* 429(1): 115-131.

Gutiérrez-Aguirre, M. A. and E. Suárez-Morales. 2001. Distribution and taxonomy of the tropical American *Mesocyclops* G.O. Sars, 1914 (Copepoda, Cyclopoida). *Crustaceana* 74(5): 477-487.

Holynska, M. 2000. Revision of the Australasian species of the genus *Mesocyclops* Sars, 1914 (Copepoda: Cyclopidae). *Annales Zoologici* 50(3): 363-447.

Holynska, M. 2006. Phylogeny of *Mesocyclops* (Copepoda: Cyclopidae) inferred from morphological characters. *Zoological Journal of the Linnean Society* 147(1): 1-70.

Holynska, M. and M. Brown. 2003. Three new species of *Mesocyclops* G. O. Sars, 1914 (Copepoda, Cyclopoida) from Australia and Burma, with comments on the *Mesocyclops* fauna of Australia. *Crustaceana* 75: 1301-1334.

Hribar, L. J. and J. W. Reid. 2008. New records of copepods (Crustacea) from the Florida keys. *Southeastern Naturalist* 7(2): 219-228.

Jeje, C. Y. 1988. A revision of the Nigerian species of the genera *Mesocyclops* Sars, 1914 and *Thermocyclops* Kiefer, 1927 (Copepoda: Cyclopoida). *Hydrobiologia* 164(2): 171-184.

Lansac-tôha, F. A., l. F. M. Velho, J. Higuti and E. M. Takahashi. 2002. Cyclopidae (Crustacea, Copepoda) from the upper Paraná River floodplain, Brazil. *Brazilian Journal of Biology* 62: 125-133.

Matsumura-Tundisi, T. and W. M. Silva. 2002. Occurrence of *Mesocyclops ogunnus* Onabamiro, 1957 (Copepoda Cyclopoida) in water bodies of

São Paulo State, identified as *Mesocyclops kieferi* Van de Velde, 1984. *Brazilian Journal of Biology* 62: 615-620.

Matsumura-Tundisi, T. and J. Tundisi. 2005. Plankton richness in a eutrophic reservoir (Barra Bonita Reservoir, SP, Brazil); p. 367-378. *In* Segers, H. and K. Martens (ed). *Developments in Hydrobiology*, vol 180. Springer Netherlands.

Mouelhi, S., D. Defaye and G. Balvay. 2000. Présence de *Mesocyclops ogunnus* Onabamiro, 1957 (Crustacea : Copepoda) en Tunisie. *Annales de Limnologie* 36: 95-99.

Nogueira, M. G. 2001. Zooplankton composition, dominance and abundance as indicators of environmental compartmentalization in Jurumirim Reservoir (Paranapanema River), São Paulo, Brazil. *Hydrobiologia* 455(1):1-18.

Onabamiro, S. D. 1957. Some new species of Cyclops sensu lato (Crustacea: Copepoda) from Nigeria. *Journal of the Linnean Society of London, Zoology* 43(290): 123-133.

Oronsaye, C. 2008. Spatial distribution of planktonic copepods in Ikpoba River (Up-Stream) Benin City, Nigeria. *Bioscience Research Communications* 20: 299-303.

Peixoto, R. S., L. P. M. Brandão, C. d. F. Valadares and P. M. M. Barbosa. 2010. Occurrence of *Kellicottia bostoniensis* (Rousselet, 1908) and *Mesocyclops ogunnus* Onabamiro, 1957 in lakes of the Middle River Doce, MG, Brazil. *Acta Limnologica Brasiliensia* 22: 356-360.

Reid, J. and R. Pinto-Coelho. 1994. An Afro continental Copepod, *Mesocyclops ogunnus* found in Brazil; with a new key to the species of *Mesocyclops* in South America and a review of intercontinental introductions of copepods. *Limnologica* 24(4): 359-368.

Rocha, C. E. F. d. and M. J. C. Botelho. 1998. Maxillopoda – Copepoda, Cyclopoida; p. 129-166 *In* P. S. Young (ed.). *Catalogue of Crustacea of Brazil*. Rio de Janeiro, Museu Nacional.

Santos-Wisniewski, M. and O. Rocha. 2007. Spatial distribution and secondary production of copepoda in a tropical reservoir: Barra Bonita, SP, Brazil. *Brazilian Journal of Biology* 67: 223-233.

Silva, W. M. 2008. Diversity and distribution of the free-living freshwater Cyclopoida (Copepoda: Crustacea) in the Neotropics. *Brazilian Journal of Biology* 68: 1099-1106.

Silva, W. M. 2011. Potential use of Cyclopoida (Crustacea, Copepoda) as trophic state indicators in tropical reservoirs. *Oecologia Australis* 15(3): 511-521.

Simões, M. R., C. d. F. A. Ribeiro, S. d. C. A. Ribeiro, K. J. Park and F. E. X. Murr. 2007. Composição físico-química, microbiológica e rendimento do filé de tilápia tailandesa (*Oreochromis niloticus*). *Ciência e Tecnologia de Alimentos* 27: 608-613.

Suárez-Morales, E., J. W. Reid, F. Fiers and T. M. Iliffe. 2004. Historical biogeography and distribution of the freshwater cyclopine copepods (Copepoda, Cyclopoida, Cyclopinae) of the Yucatan Peninsula, Mexico. *Journal of Biogeography* 31(7): 1051-1063.

Tundisi, J. G. and T. Matsumura-Tundisi. 1994. Plankton diversity in a warm monomictic lake (Dom Helvécio, Minas Gerais) and a polymictic reservoir (Barra Bonita): a comparative analysis of the Intermediate disturbance hipothesis. *Anais da Academia Brasileira* 66(1): 15-28.

Van de Velde, I. 1984. Revision of the African species of the genus *Mesocyclops* Sars, 1914 (Copepoda: Cyclopidae). *Hydrobiologia* 109(1): 3-66.

Received: November 2011
Accepted: October 2012
Published online: October 2013
Editorial responsibility: Rodrigo Johnsson